MUSCULOSKELETAL SYSTEM GUIDELINE

MUSCULOSKELETAL SYSTEM EXPERT PANEL MEMBERS

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Canadian Association of Radiologists
L'Association canadienne des radiologistes

Contents

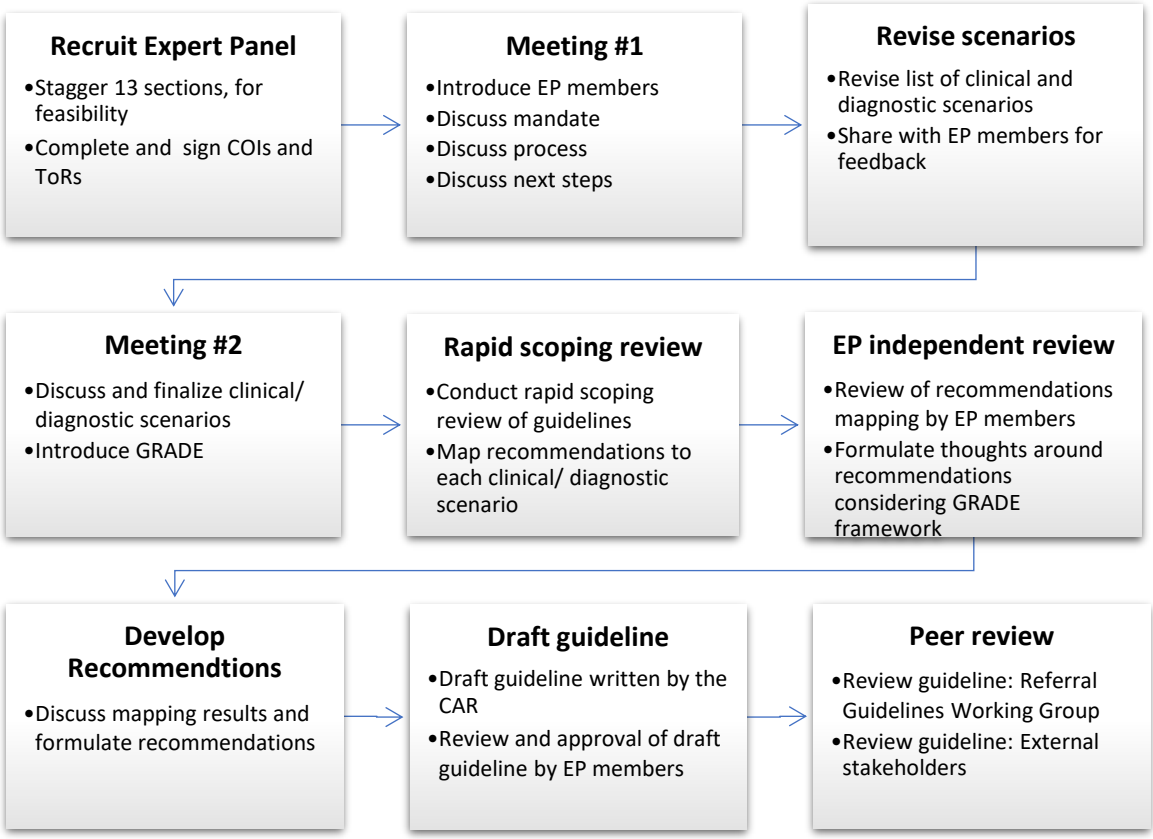
INTRODUCTION

The Canadian Association of Radiologists (CAR) last published their diagnostic imaging referral recommendations in 2012. These recommendations were made up of 13 sections, including the Musculoskeletal (MSK) system. In 2020, the CAR, funded by the Canadian Medical Association (CMA), developed a plan to create new CAR diagnostic imaging referral recommendation using a rapid guideline development approach. The general guideline development process is presented in **Figure 1**.

The project mandate is to develop a comprehensive set of evidence-based diagnostic imaging referral guidelines suited for integration into clinical decision support (CDS) systems.

An Expert Panel (EP) made up of musculoskeletal radiologists, referring clinicians, a patient representative, and an evidence review/ guideline methodologist from across Canada met over a series of 11 meetings from May 2021 to Feb 2022.

The 19 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 44 clinical/diagnostic scenarios was created, which informed the systematic search strategy and systematic rapid scoping review.



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); however, they may also be used by radiologists, patients, and/or patient representatives. These recommendations apply to the adult (≥18 years) population.

Scope

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.

DISCLAIMER

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.

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:

Study design: Guidelines providing diagnostic imaging recommendations for one or more of the clinical/diagnostic scenarios identified by the Musculoskeletal System EP. Guidelines also had to be produced using three criteria in the AGREE-II assessment tool [4,5]:

(1) Systematic methods were used to search for evidence: Searched and named at least one 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: We included any diagnostic imaging modality (e.g., radiograph [XR], magnetic resonance imaging [MRI], computed tomography [CT], ultrasound [US]).

Date of publication: We included guidelines that were published or updated in 2016 onward to identify the most recent guidelines, which would contain the most recently published primary studies, and for feasibility.

Language of publication: English, for feasibility

Search

An experienced information specialist, in consultation with the guideline methodologist, developed a systematic search strategy (**Appendix 1**) using the list of clinical/diagnostic scenarios identified by the Musculoskeletal System EP members. The search was run in Medline and Embase on July 22, 2021. The search was limited to publications from 2016 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 [6], one senior 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 [7,8]. 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. 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 senior reviewer evaluated the full texts of the guidelines against the eligibility criteria described above in the Inclusion Criteria.

Mapping

One senior reviewer extracted recommendations from all included guidelines and presented these in tabular form for each clinical/diagnostic scenario. The senior reviewer produced a synopsis (i.e., a condensed version of the evidence table) for each clinical/ diagnostic scenario based on the information in the evidence tables. These synopses highlighted the main recommendations across guidelines, with a focus on guidelines that used GRADE, and highlighted any discordant recommendations. EP members used these to help guide discussion when formulating the recommendations.

Critical appraisal

Each guideline was assessed for the level of quality using the AGREE-II instrument [4,5]. This was performed by one reviewer with a quality control check on a random sample of 10% of the guidelines.

FORMULATING RECOMMENDATIONS

Over a series of seven virtual meetings (September 2021 to February 2022), the Expert Panel members discussed each of the clinical scenarios using the information in the synopses as a guide. When required, the full evidence tables were consulted for additional information (**Appendix 2**).

NOTE: Details have been removed from Appendix 2 to comply with copyright protection. The clinical scenarios used in discussions and/or the imaging modalities discussed in the included guidelines are included, but recommendations have been removed. For additional information

on these recommendations, please access the full-text publications.

During these discussions, there were modifications to the list of clinical/diagnostic scenarios, either by merging one with another or by removing them completely. This resulted in a reduction of the initial 44 to the final list of 25 clinical/diagnostic scenarios, presented in this guideline.

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

Most 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 patient, and resource availability.

Grading of Recommendations Assessment, Development and Evaluation

The Grading of Recommendations Assessment, Development and Evaluation (GRADE) for Guidelines framework [9,10] 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 [11]. Therefore, this information was inferred by the level and strength of the evidence provided in the included guidelines.

(ii) We covered 25 clinical/diagnostic scenarios in the MSK section, which could have included several diagnostic imaging modality comparisons. This would have resulted in a minimum of 25 EtD frameworks, but realistically many more, as we would have had to create an EtD for each comparison (e.g., XR vs MRI, MRI vs CT, XR vs US) 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
- Resource use and costs

The strength and direction of the recommendations are represented by arrow directions and colours. Using GRADE as a guide [9], 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, but 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, but 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, but 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 5937 records were identified through the electronic database. After reviewing 2188 records, the AI reviewer excluded the remaining records (n=3592), as 95% of the predicted included records had been identified and the likelihood for inclusion of the remaining records was low (highest remaining prediction score of 3.8%). A second reviewer screened a set of randomly selected records (n=1129) for verification (10% of included and 20% of excluded records). Among these, there were seven conflicts, all between the two human screeners. These conflicts were resolved through discussion. An additional seven records were added from the supplemental searching. The full text for five records were not retrievable, and 12 records were non-English publications (**Appendix 4**). Among the remaining 172 full texts that were screened for eligibility, 31 were not guidelines providing recommendations for MSK imaging, 69 did not use systematic methods or sufficiently describe the methods used in the formulation of the guideline, and seven were excluded for 'other' reasons. A list of excluded records with reasons is available upon request. Recommendations from 41 guidelines (plus nine companion papers) were included (**Figure 2. PRISM flow diagram**).

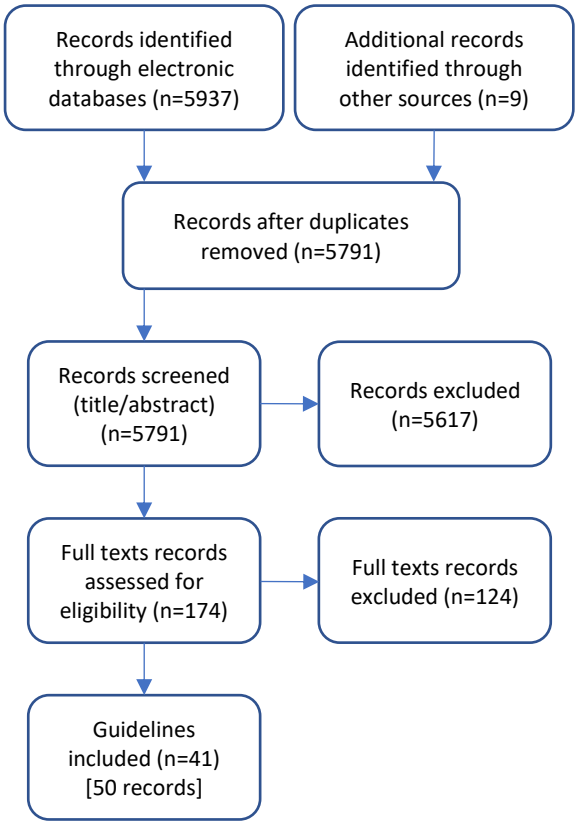


Figure 2 - PRISMA flow diagram

The number of guidelines included per clinical/diagnostic scenario ranged from 0 to 8. Where available, the certainty of the evidence in guidelines that used the GRADE framework are

highlighted to provide a sense of the certainty of the evidence of the included primary studies.

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 example GRADE [11], the Oxford Centre for Evidence-based Medicine 2009 and 2011 [12,13], Level of Appropriateness (American College of Radiologists), consensus, or an adaptation/ modification of one or more methods. 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 [14].

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 [15];
   - Effective doses are measured using reference phantoms with population, age and sex-averaged tissue weighting factors [15], 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 [16], 2007 [17]) 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 [18]; 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 the CAR Diagnostic Imaging Referral Guidelines Working Group (**Box**

1), Dr. George Grammatopoulos (Orthopedic Surgeon), Dr. Sibel Aydin (Rheumatologist), Dr. Bruce Foster (Radiologist).

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:
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Noel Corser, Hinton Medical Clinic, AB
Nicolas Dea, Vancouver Spine Surgery Institute, BC
Cathy MacLean, University of Saskatchewan, Department of Academic Family Medicine, SK
Erin Sarrazin, Nurse Practitioner Association of Canada, NS
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Charlotte Yong-Hing, BC Cancer, Vancouver, BC
Kaitlin Zaki-Metias, Trinity Health Oakland Hospital, USA

Italicized names are WG members who were also members of the Musculoskeletal Expert Panel.

MUSCULOSKELETAL SYSTEM CLINICAL/DIAGNOSTIC SCENARIOS

M1. Osteomyelitis, including diabetic foot

M2. Septic Arthritis

M3. Soft Tissue Infection, including necrotizing fasciitis

M4. Bone tumour – Primary

M5. Bone tumour – Metastases

M6. Bone tumour – Myeloma

M7. Soft tissue mass or tumour

M08. Soft tissue pain (non-periarticular)

M9. Osteoarthritis/Crystalline Arthropathy

M10. Inflammatory Arthropathy (Rheumatoid/Peripheral Spondyloarthropathy)

M11. Spondyloarthropathy (Axial)

M12. Bone pain (non-joint)

M13. Metabolic bone disease, including osteoporosis and osteomalacia

M14. Stress fracture (insufficiency and fatigue)

M15. Chest wall pain

M16. Shoulder pain or instability

M17. Elbow pain

M18. Hand and wrist pain

M19. MSK Pelvis or Hip pain

M20. Knee pain

M21. Ankle pain

M22. Foot pain

M23. Orthopedic hardware/arthroplasty pain/symptoms

M24. Avascular necrosis/bone infarction

M25. Complex regional pain syndrome

RECOMMENDATIONS

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.

M01. Osteomyelitis, including diabetic foot

Recommendations

1. In adults with suspected osteomyelitis, including the diabetic foot, we recommend **XR** as the initial imaging modality (↑↑).

↳ **1.1** If further investigation is required, we recommend **MRI** as the next imaging modality (↑↑).

↳ **1.2** If MRI is unavailable or contraindicated, we suggest **CT** (with contrast) or **NM** (bone scan) (↑).

> *For bone scan, the radioisotope and protocol employed may vary based on clinical presentation, regional practice preferences and resource availability.*

2. In adults with suspected osteomyelitis, we recommend **CT** for evaluation of sequestra or for guiding biopsy (↑↑).

3. In adults with suspected osteomyelitis, where MRI or CT were not performed, we suggest **US** to evaluate for superficial fluid collections (↑).

The 2021 CAR discussions to formulate these recommendations were informed by seven guidelines: the 2012 CAR recommendations [19], the ACR Appropriateness Criteria® Suspected Osteomyelitis, Septic Arthritis, or Soft-Tissue Infection (excluding spine and diabetic foot) recommendations [20], the consensus document from the European Association of Nuclear Medicine, the European Bone and Joint Infection Society, and the European Society of Radiology [21,22], the 2017 RCR iRefer recommendations [23], the ACR Appropriateness Criteria® Suspected Osteomyelitis of the Foot in Patients With Diabetes Mellitus [24], the NICE Diabetic foot problems guideline [25], and the clinical practice guideline by the Society for Vascular Surgery in collaboration with the American Podiatric Medical Association and the Society for Vascular Medicine [26] (**Appendix 2: Table M01**).

The NICE Diabetic foot problems guideline [25] used GRADE to evaluate the certainty of the evidence on imaging tests for osteomyelitis. Depending on the imaging modality evaluated (e.g., MRI, 99mTc-MDP scintigraphy), the certainty of the evidence ranged from VERY LOW to LOW (see Table 12 in the NICE Diabetic foot problems guideline in Appendix I-GRADE Profiles).

M02. Septic Arthritis

Recommendations

1. In adults with suspected septic arthritis, we recommend **XR** as the initial imaging modality (↑↑).
   - ↳ **1.1** If further investigation is required, we recommend **MRI** as the next imaging modality (↑↑).
     - ↳ **1.2** If MRI is unavailable or contraindicated, we suggest **CT** (with contrast) (↑).
2. In adults with suspected septic arthritis, where MRI or CT were not performed, we suggest **US** to evaluate for effusion or juxta-articular fluid collections (↑).
3. In adults with suspected septic arthritis, we suggest **US** or **Fluoroscopy** to facilitate arthrocentesis, immediately after XR, if bedside arthrocentesis is not feasible (EP consensus).

The 2021 CAR discussions to formulate these recommendations were informed by the ACR Appropriateness Criteria® Suspected Osteomyelitis, Septic Arthritis, or Soft-Tissue Infection (excluding spine and diabetic foot) recommendations [20], and the European Society of Musculoskeletal Radiology [27] (**Appendix 2: Table M02**).

M03. Soft Tissue Infection, including necrotizing fasciitis

Recommendations

1. In adults with suspected soft tissue infection, including necrotizing fasciitis, we recommend **XR** as the initial imaging modality (↑↑).

   If necrotizing fasciitis is suspected, surgical consultation should not be delayed by imaging. Imaging may be ordered concurrently with surgical consultation, or even bypassed at the discretion of the surgeon.

2. In adults with suspected deep or aggressive soft tissue infection, we recommend **MRI** as the next imaging modality (↑↑).
   - ↳ **2.1** If MRI is unavailable or contraindicated, we suggest **CT** (with contrast) (↑).
3. In adults with suspected soft tissue infection, we suggest **US** to evaluate for superficial fluid collections (↑).
   - ↳ **3.1** If further investigation is required, we recommend **MRI** as the next imaging modality (↑↑).
     - ↳ **3.2** If MRI is unavailable or contraindicated, we suggest **CT** (with contrast) (↑).

For imaging of foreign bodies, see Trauma clinical/diagnostic scenario T16. Superficial soft tissue injury foreign body.

The 2021 CAR discussions to formulate these recommendations were informed by the ACR Appropriateness Criteria® Suspected Osteomyelitis, Septic Arthritis, or Soft-Tissue Infection (excluding spine and diabetic foot) recommendations [20] (**Appendix 2: Table M03**).

M04. Bone tumour – Primary

Recommendations

1. In adults with suspected primary bone tumour, we recommend **XR** as the initial imaging modality (↑↑).
   - ↳ **1.1** If further investigation is required, we recommend **MRI** as the next imaging modality (↑↑).

↳ **1.2** If MRI is unavailable or contraindicated, we suggest **CT** (with contrast) (↑).

↳ **1.3** If XR, MRI or CT remain equivocal, we suggest **NM** (bone scan) (EP consensus).

The 2021 CAR discussions to formulate these recommendations were informed by four guidelines: the 2012 CAR recommendations [19], the American Academy of Orthopaedic Surgeons clinical practice guideline [28], the ACR Appropriateness Criteria® Primary Bone Tumors [29], and the 2017 RCR iRefer recommendations [23] (**Appendix 2: Table M04**).

M05. Bone tumour – Metastases

Recommendations

1. In adults with known primary cancer (non-myeloma), we recommend **NM** (bone scan) as the initial imaging modality to assess for skeletal metastases (↑↑).
2. In adults with suspected bone metastases, we recommend **XR** as the initial imaging modality for assessment of focal symptomatic sites, or for correlation with a NM, MRI or CT finding (↑↑).
3. In adults with metastases seen on XR requiring further local assessment or staging, we recommend **MRI** (↑↑).

   ↳ **3.1** If MRI is unavailable or contraindicated, we suggest **CT** (with contrast) (↑).
4. In adults with suspected metastases, we recommend against **skeletal survey XR** (↓↓).
5. In adults with suspected bone metastases, **whole-body CT**, **whole-body MRI**, and **positron emission tomography (PET)** are evolving techniques and may be used depending on regional practice preferences and resource availability (EP consensus).

The 2021 CAR discussions to formulate these recommendations were informed by the 2012 CAR recommendations [19] and the 2017 RCR iRefer recommendations [23] (**Appendix 2: Table M05**).

M06. Bone tumour – Myeloma

Recommendations

1. In adults with suspected myeloma, we recommend **whole-body CT** (low dose) or **PET/CT** as the initial imaging modality for staging (↑↑).

   ↳ **1.1** If whole-body CT or PET/CT is negative or unavailable, we recommend **whole-body MRI** as the next imaging modality (↑↑).

   ↳ **1.2** If whole-body CT, PET/CT, and MRI are unavailable or contraindicated, we suggest **XR** (skeletal survey) (↑).
2. In adults with known myeloma, we recommend **XR** for assessment of focal symptomatic sites, or for correlation with an MRI or CT finding (↑↑).
3. In adults with suspected myeloma, we recommend against **NM** (bone scan) (↓↓).

The 2021 CAR discussions to formulate these recommendations were informed by four guidelines: the 2012 CAR recommendations [19], the European Society for Medical Oncology [30], the NICE Myeloma guideline [31,32], and the 2017 RCR iRefer recommendations [23] (**Appendix 2: Table M06**).

M07. Soft tissue mass or tumour

Recommendations

1. In adults with superficial soft tissue mass, we recommend **US** as the initial imaging modality (↑↑).
   - ↳ **1.1** If further investigation is required, we recommend **MRI** as the next imaging modality (↑↑).
2. In adults with deep or large soft tissue mass (≥5 cm), we recommend **MRI** as the initial imaging modality (↑↑).
   - ↳ **2.1** If MRI is unavailable or contraindicated, we suggest **CT** (with contrast) (↑).
3. In adults with soft tissue masses, we recommend **XR** for evaluation of calcification, or if bone/ joint involvement is suspected, after US (↑↑).

The 2021 CAR discussions to formulate these recommendations were informed by four guidelines: the 2012 CAR recommendations [19], the American Academy of Orthopaedic Surgeons clinical practice guideline [28], the ACR Appropriateness Criteria® Soft Tissue Masses [33], and the 2017 RCR iRefer recommendations [23] (**Appendix 2: Table M07**).

M08. Soft tissue pain (non-periarticular)

Recommendations

1. In adults with non-joint soft tissue pain, we recommend **US** as the initial imaging modality (EP consensus).
   - ↳ **1.1** If further investigation is required, we recommend **MRI** as the next imaging modality (EP consensus).
     - ↳ **1.2** If MRI is unavailable or contraindicated, we suggest **CT** (with contrast) (EP consensus).
2. In adults with non-joint soft tissue pain, we suggest **XR** for evaluation of regional bone pathology (EP consensus).

As there were no guidelines identified that specifically addressed non-joint soft tissue pain (**Appendix 2: Table M08**), the Musculoskeletal Expert Panel members felt there was sufficient similarities with M7. Soft tissue tumour/mass and non-joint soft tissue pain to produce Expert Panel consensus recommendations for this clinical scenario.

M09. Osteoarthritis/Crystalline Arthropathy

Recommendations

1. In adults with suspected osteoarthritis or crystalline arthropathy, we recommend **XR** as the initial imaging modality (↑↑).
2. In adults with suspected gout, we suggest **US** as a complement to XR to identify tophi (↑).
3. In adults with suspected gout, **CT** (dual-energy) may be used depending on regional practice preferences and resource availability (EP consensus).

The 2021 CAR discussions to formulate these recommendations were informed by four guidelines: the American College of Physicians (ACP) Gout guideline [34], the ACR Appropriateness Criteria® Chronic Extremity Joint Pain – Suspected Inflammatory Arthritis guideline [35], the European Society of Musculoskeletal Radiology (ESSR) guideline [27], and the European League Against Rheumatism (EULAR) guideline [36] (**Appendix 2: Table M09**).

M10. Inflammatory Arthropathy (Rheumatoid/Peripheral Spondyloarthropathy)

Recommendations

1. In adults with suspected inflammatory arthropathy, we recommend **XR** as the initial imaging modality (↑↑).
   - ↳ **1.1** If further investigation is required for evaluation of findings such as effusion, synovitis, erosions and enthesitis, we suggest **US** as the next imaging modality (↑).
     - ↳ **1.2** In adults with multifocal joint pain, we suggest **NM** (bone scan) as an alternative to US to determine the distribution of synovitis (↑).
   - ↳ **1.3** If further investigation is required for evaluation of findings such as acute synovitis, cartilage damage, erosions, and bone marrow edema OR as an alternative to US, we suggest **MRI** as the next imaging modality (↑).

The 2021 CAR discussions to formulate these recommendations were informed by five guidelines: the 2012 CAR recommendations [19], the ACR Appropriateness Criteria® Chronic Extremity Joint Pain – Suspected Inflammatory Arthritis guideline [35], and the European League Against Rheumatism (EULAR) guideline [37], the NICE Rheumatoid Arthritis guideline [38,39], the 2017 RCR iRefer recommendations [23] (**Appendix 2: Table M10**).

M11. Spondyloarthropathy (Axial)

Recommendations

1. In adults with suspected axial spondyloarthropathy, we recommend **XR of the sacroiliac joints ± spine** as the initial imaging investigation (↑↑).
   - ↳ **1.1** If further investigation is required, we recommend **MRI of the sacroiliac joints ± spine** as the next imaging investigation (↑↑).
     - ↳ **1.2** If MRI is unavailable or contraindicated, we suggest **CT of the sacroiliac joints ± spine** (↑).
2. In adults with suspected axial spondyloarthropathy, we recommend against **NM** (bone scan) (↓↓).

The 2021 CAR discussions to formulate these recommendations were informed by six guidelines: the 2012 CAR recommendations [19], the ACR Appropriateness Criteria® Chronic Back Pain Suspected Sacroiliitis-Spondyloarthropathy [40], the Brazilian Society of Rheumatology guideline [41], the NICE Spondyloarthritis in over 16s guideline [42–44], the 2017 RCR iRefer recommendations [23], and the Working Group on ultrasound of the Spanish Society of Rheumatology guideline [45] (**Appendix 2: Table M11**).

The NICE Spondyloarthritis in over 16s guideline [42–44] used GRADE to evaluate the certainty of the evidence. Depending on the imaging modality evaluated (e.g., XR, MRI), the certainty of the evidence ranged from VERY LOW to HIGH (see Tables 33-42 in the NICE Spondyloarthritis guideline in Appendix G-GRADE tables).

M12. Bone pain (non-joint)

Recommendations

1. In adults with non-traumatic, non-joint bone pain, we recommend **XR** of the symptomatic area(s) as the initial imaging modality (↑↑).
   - ↳ **1.1** If further investigation is required, we recommend **MRI** as the next imaging modality (↑↑).
     - ↳ **1.2** If MRI is unavailable or contraindicated, we suggest **CT** (EP consensus).
       - ↳ **1.3** If CT is unavailable, we recommend **NM** (bone scan) (↑↑).

*If concern for **osteomyelitis**, see M01. Osteomyelitis, including diabetic foot.*
*If concern for **primary bone tumour**, see M04. Bone tumour – Primary.*
*If concern for **osseous metastasis**, see M05. Bone tumour – Metastases.*
*If concern for **myeloma**, see M06. Bone tumour – Myeloma.*
*If concern for **metabolic bone disease**, see M13. Metabolic bone disease, including osteoporosis and osteomalacia.*
*If concern for **stress fracture**, see M14. Stress fracture (insufficiency and fatigue).*
*If concern for **avascular necrosis/bone infarction**, see M24. Avascular necrosis/bone infarction.*

The 2021 CAR discussions to formulate these recommendations were informed by the 2012 CAR recommendations [19] and the 2017 RCR iRefer recommendations [23] (**Appendix 2: Table M12**).

M13. Metabolic bone disease, including osteoporosis and osteomalacia

Recommendations

1. In adults with suspected osteoporosis, we recommend **Dual-energy X-ray absorptiometry (DEXA)** for the measurement of bone mineral density (↑↑).
2. In adults with suspected metabolic bone disease with pain or focal area of concern, we recommend **XR** as the initial imaging modality (↑↑).
   - ↳ **2.1** If further investigation is required, we recommend **MRI** as the next imaging modality (↑↑).
     - ↳ **2.2** If MRI is not available or is contraindicated, we suggest **CT** to evaluate focal pain (↑).
3. In adults with suspected metabolic bone disease with multi-focal areas of pain or concern, we suggest **NM** (bone scan) as the initial imaging modality (↑).

*If concern for **stress fracture**, see M14. Stress fracture.*

The 2021 CAR discussions to formulate these recommendations were informed by five guidelines: the 2012 CAR recommendations [19], the ACR Appropriateness Criteria® Osteoporosis and Bone Mineral Density guideline [46], the Paget's Association guideline [47], the 2017 RCR iRefer recommendations [23], and the United States Preventive Services Task Force (USPSTF) guideline [48,49] (**Appendix 2: Table M13**).

M14. Stress fracture (insufficiency and fatigue)

Recommendations

1. In adults with suspected stress (fatigue or insufficiency) fracture, we recommend **XR** of the area of interest as the initial imaging modality (↑↑).

↳ **1.1** If further investigation is required for evaluation of suspected stress fracture, we recommend **MRI** for the pelvis and hip (↑↑) and suggest **MRI** for any other sites (EP consensus) as the next imaging modality.

↳ **1.2** If MRI is unavailable or is contraindicated or would result in a clinically significant delay in diagnosis, we suggest **CT** (↑).

↳ **1.3** If CT is unavailable, we suggest **NM** (bone scan) (↑).

The 2021 CAR discussions to formulate these recommendations were informed by the ACR Appropriateness Criteria® Stress (fatigue/insufficiency) fracture, including sacrum, excluding other vertebrae [50] (**Appendix 2: Table M14**).

M15. Chest wall pain

Recommendations

1. In adults with non-traumatic chest wall pain, we recommend **XR of the chest ± ribs** as the initial imaging investigation (↑↑).

↳ **1.1** If further investigation is required for evaluation of <u>focal</u> chest wall or joint area of concern, we suggest **US** as the next imaging modality (↑).

↳ **1.2** If further investigation is required, we recommend **MRI** (↑↑).

↳ **1.3** If further investigation is required for evaluation of <u>diffuse</u> chest wall or intra-thoracic pathology, we recommend **CT** as the next imaging modality (↑↑).

The 2021 CAR discussions to formulate these recommendations were informed by the ACR Appropriateness Criteria® Nontraumatic Chest Wall Pain guideline [51] (**Appendix 2: Table M15**).

M16. Shoulder pain or instability

Recommendations

1. In adults with shoulder pain or instability, we recommend **XR** as the initial imaging modality (↑↑).

For evaluation of instability, routine XR series may need to be supplemented with specialized radiographic projections, based on regional practice preferences.

↳ **1.1** If further investigation is required for evaluation of soft tissue pathology, such as rotator cuff tear, tendinopathy, effusion, bursitis, soft tissue calcification, or extra-articular impingement, we recommend **US** as the next imaging modality (↑↑).

↳ **1.2** If further investigation is required OR as an alternative to US, we recommend **MRI** (↑↑).

For assessment of degenerative joint pathology, if XR demonstrates greater than mild osteoarthritis, MRI may not be indicated as it often will not advance diagnosis or management. Specialist consultation should be considered, to determine if MRI is required.

↳ **1.3** In adults with suspected labral tear, ligamentous and cartilage injuries, or instability, we recommend **MR arthrography** (↑↑) or **high-field MRI** (i.e., 3T) (EP consensus), with selected MRI technique based on regional preference/ availability/ expertise.

↳ **1.4** If MRI is unavailable or contraindicated, we suggest **CT arthrography** to evaluate for findings such as rotator cuff and/or labral tear (↑).

2. In adults with shoulder pain or instability, after XR, we suggest **CT** for evaluation of clinically relevant bone anatomy, in the context of pre-operative planning (↑).

The 2021 CAR discussions to formulate these recommendations were informed by five guidelines: the 2012 CAR recommendations [19], the American Academy of Orthopedic Surgeons recommendations [52], the ACR Appropriateness Criteria® Shoulder Pain-Atraumatic recommendations [53], the European Society of Musculoskeletal Radiology (ESSR) guideline [27], and the 2017 RCR iRefer recommendations [23] (**Appendix 2: Table M16**).

M17. Elbow pain

Recommendations

1. In adults with elbow joint pain of suspected articular origin, we recommend **XR** as the initial imaging modality (↑↑).

↳ **1.1** If further investigation is required, we recommend **MRI** as the next imaging modality (↑↑).

For assessment of degenerative joint pathology, if XR demonstrates greater than mild osteoarthritis, MRI may not be indicated as it often will not advance diagnosis or management. Specialist consultation should be considered, to determine if MRI is required.

2. In adults with elbow pain with suspected tendon pathology, nerve compression, effusion, synovitis, or bursitis, we recommend **XR** or **US** as the initial imaging modality (↑↑).

↳ **2.1** If further investigation is required, we recommend **MRI** as the next imaging modality (↑↑).

3. In adults with elbow pain, after XR, we suggest **CT** for evaluation of clinically relevant bone anatomy, in the context of pre-operative planning (↑).

The 2021 CAR discussions to formulate these recommendations were informed by the European Society of Musculoskeletal Radiology (ESSR) guideline [27]. Although the ACR Appropriateness Criteria® Chronic Elbow Pain [54] did not meet the inclusion criteria for this guideline, as it was published in 2015, due to the lack of recommendations around other imaging modalities it was referenced to provide additional support to the CAR discussions and recommendations (**Appendix 2: Table M17**).

M18. Hand and wrist pain

Recommendations

1. In adults with hand and/or wrist joint pain, we suggest **XR** as the initial imaging modality (↑).

Routine XR series may need to be supplemented with specialized radiographic projections, based on clinical presentation and regional practice preferences.

↳ **1.1** If further investigation is required, we suggest **MRI** (↑).

For assessment of degenerative joint pathology, if XR demonstrates greater than mild osteoarthritis, MRI may not be indicated as it often will not advance diagnosis or management. Specialist consultation should be considered, to determine if MRI is required.

↳ **1.2** If MRI is unavailable or contraindicated, we suggest **CT arthrography** for the evaluation of the triangulofibrocartilaginous complex (TFCC), intrinsic ligaments of the wrist or capsule (↑).

2. In adults with hand and/or wrist pain suspected to be soft tissue related, such as ganglion cyst, synovitis, tenosynovitis, we suggest **US** as the initial imaging modality (↑).

   ↳ **2.1** As an alternative to US, we suggest **MRI** (↑).

3. In adults with hand and/or wrist pain, after XR, we suggest **CT** for evaluation of bone anatomy, chronic scaphoid fracture OR in the context of pre-operative planning (↑).

*For suspected **inflammatory arthritis of the wrist**, see M9. Inflammatory Arthropathy (Rheumatoid/ Peripheral Spondyloarthropathy).*

The 2021 CAR discussions to formulate these recommendations were informed by two guidelines: the ACR Appropriateness Criteria® Chronic Wrist Pain [55], and by the European Society of Musculoskeletal Radiology (ESSR) guideline [27] (**Appendix 2: Table M18**).

M19. MSK Pelvis or Hip pain

Recommendations

Hip pain

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

   Routine XR series may need to be supplemented with specialized radiographic projections, for conditions such as femoroacetabular impingement (FAI), hip dysplasia, or post-traumatic deformity, based on clinical concern and regional practice preferences.

2. For evaluation of internal derangement of the hip such as labral tear, osteochondral injury, or intraarticular body and if further investigation is required, we recommend **MR arthrography** (↑↑) or **high-field MRI** (i.e., 3T) (EP consensus).

   For assessment of degenerative joint pathology, if XR demonstrates greater than mild osteoarthritis, MRI may not be indicated as it often will not advance diagnosis or management. Specialist consultation should be considered, to determine if MRI is required.

   If XR demonstrates features associated with femoroacetabular impingement (FAI) or hip dysplasia, then consultation to orthopaedic surgery or sports medicine specialist is suggested as MRI may not be the most appropriate, next investigative modality.

   ↳ **2.1** If MRI is unavailable or is contraindicated, we suggest **CT arthrography** for evaluation for internal derangement of the hip (↑).

3. For evaluation of deep soft tissue pathology, after XR, we recommend **MRI** as the next imaging modality (↑↑).

4. For evaluation of superficial soft tissue pathology, after XR, we recommend **US** or **MRI** as the next imaging modality (↑↑).

5. In adults with hip pain, we suggest **CT** for evaluation of clinically relevant bone anatomy, typically in the context of pre-operative planning (EP consensus).

Musculoskeletal Pelvic Pain (including osteitis pubis or athletic pubalgia)

6. In adults with musculoskeletal pelvic pain, we suggest **XR** as the initial imaging modality (EP consensus).

- ↳ **6.1** If further investigation is required, we suggest **MRI** as the next imaging modality (EP consensus).
  - ↳ **6.2** If MRI is unavailable or contraindicated, we suggest **US** if pathology is favoured to be soft tissue related (EP consensus).
  - ↳ **6.3** If MRI is unavailable or contraindicated, we suggest **CT** or **NM (bone scan)** if pathology is favoured to be osseus (EP consensus).

*For **sacroiliac joint pathology**, see M10. Inflammatory Arthropathy.*
*For suspected **fracture**, see M14. Stress fracture.*
*For **avascular necrosis** of the hip, see M24. Avascular necrosis.*

The 2021 CAR discussions to formulate these recommendations were informed by six guidelines: the 2012 CAR recommendations [19], the ACR Appropriateness Criteria® Chronic Hip Pain recommendations [56], the European Society of Musculoskeletal Radiology (ESSR) guideline [27], the International Hip-related Pain Research Network recommendations [57], and the Lisbon Agreement recommendations [58–60], and the 2017 RCR iRefer recommendations [23] (**Appendix 2: Table M19**).

M20. Knee pain

Recommendations

1. In adults with knee joint pain, we recommend **XR** as the initial imaging modality (↑↑).
   - ↳ **1.1** If further investigation is required, we recommend **MRI** as the next imaging modality (↑↑).

     For assessment of degenerative joint pathology, if XR demonstrates greater than mild osteoarthritis, MRI may not be indicated as it often will not advance diagnosis or management. Specialist consultation should be considered, to determine if MRI is required.
   - ↳ **1.2** If MRI is unavailable or contraindicated, we suggest **CT arthrography** to evaluate for findings such as meniscal tear or chondral defects (↑).
2. In adults with knee pain suspected to be soft tissue related, such as extensor mechanism pathology, bursitis, joint effusion, and popliteal cyst/mass, we recommend **US** as the initial imaging modality (↑↑).
   - ↳ **2.1** As an alternative to US, we recommend **MRI** (↑↑).
3. In adults with chronic knee joint pain, after XR, we suggest **CT** for evaluation of clinically relevant bone anatomy in scenarios such as patellofemoral maltracking, osteochondral defect, or intraarticular bodies (↑) OR in the context of pre-operative planning (EP consensus).

The 2021 CAR discussions to formulate these recommendations were informed by four guidelines: the 2012 CAR recommendations [19], the ACR Appropriateness Criteria® Chronic Knee Pain recommendations [61], the European Society of Musculoskeletal Radiology (ESSR) guideline [27], and the 2017 RCR iRefer recommendations [23] (**Appendix 2: Table M20**).

M21. Ankle pain

Recommendations

1. In adults with ankle pain, we recommend **XR** as the initial imaging modality (↑↑).
   - ↳ **1.1** If further investigation is required for evaluation of effusion or tendon abnormality, we recommend **US** as the next imaging modality (↑↑).

↳ **1.2** If further investigation is required to evaluate for findings such as osteochondral lesion or unstable ligament tears, or as an alternative to US for tendon pathology, we recommend **MRI** as the next imaging modality (↑↑).

> *For assessment of degenerative joint pathology, if XR demonstrates greater than mild osteoarthritis, MRI may not be indicated as it often will not advance diagnosis or management. Specialist consultation should be considered, to determine if MRI is required.*

2. In adults with ankle pain, after XR, we suggest **CT** for evaluation of clinically significant bone anatomy in scenarios such as osteochondral defect, intraarticular bodies, tarsal coalition (↑) OR in the context of pre-operative planning (EP consensus).

The 2021 CAR discussions to formulate these recommendations were informed by two guidelines: the ACR Appropriateness Criteria® Chronic Ankle Pain recommendations [62], and the European Society of Musculoskeletal Radiology (ESSR) guideline [27] (**Appendix 2: Table M21**).

M22. Foot pain

Recommendations

1. In adults with foot pain, we suggest **XR** as the initial imaging modality (↑).

2. In adults with foot pain suspected to be soft tissue related, such as plantar fasciitis, tendon pathology, bursitis, Morton's neuroma, we suggest **US** as the next imaging modality (↑).

↳ **2.1** If further investigation is required for evaluation for findings such as stress fracture, tarsal coalition, plantar fasciitis, tarsal tunnel syndrome, tendon pathology, or Morton's neuroma, we suggest **MRI** (↑).

> *For assessment of degenerative joint pathology, if XR demonstrates greater than mild osteoarthritis, MRI may not be indicated as it often will not advance diagnosis or management. Specialist consultation should be considered, to determine if MRI is required.*

3. In adults with foot pain, after XR, we suggest **CT** for evaluation of pathologies such as stress fracture, osteochondral defect (↑↑) or for evaluation of clinically relevant bone anatomy, typically in the context of pre-operative planning (EP consensus).

4. In adults with foot pain suspected to be a stress fracture, if MRI and CT are unavailable or contraindicated, we suggest **NM** (bone scan) (↑).

The 2021 CAR discussions to formulate these recommendations were informed by four guidelines: the 2012 CAR recommendations [19], the ACR Appropriateness Criteria® Chronic Foot Pain recommendations [63], and the European Society of Musculoskeletal Radiology (ESSR) guideline [27], and the 2017 RCR iRefer recommendations[23] (**Appendix 2: Table M22**).

M23. Orthopedic hardware/arthroplasty pain/symptoms

Recommendations

1. In adults with orthopedic hardware/arthroplasty pain or symptoms, we recommend **XR** as the initial imaging modality, to evaluate for findings such as fracture, dislocation, periprosthetic osteolysis, or hardware fracture/ loosening (↑↑).

↳ **1.1** If further investigation is required for evaluation of periprosthetic osteolysis or fracture, we recommend **CT** as the next imaging modality (↑↑). Metal artifact reduction parameters should be implemented.

↳ **1.2** In adults with orthopedic hardware/arthroplasty pain or symptoms suspicious for infection, loosening, or fracture, we recommend **NM** (bone scan) when CT is negative, indeterminate, or unavailable (↑↑).

For bone scan, the radioisotope and protocol employed may vary based on clinical presentation, regional practice preferences and resource availability.

2. In adults with orthopedic hardware/arthroplasty pain or symptoms suspected to be related to soft tissue pathology, after XR, we recommend **MRI** as the next imaging modality (↑↑). Metal artifact reduction sequences should be implemented.

↳ **2.1** If MRI is not available or contraindicated, we suggest **CT** (with contrast) (↑).

3. In adults with orthopedic hardware/arthroplasty pain or symptoms, we recommend **US** to evaluate for superficial fluid collections (↑↑).

4. In adults with orthopedic hardware/arthroplasty pain or symptoms concerning for septic arthritis, after XR, we suggest **US** or **Fluoroscopy** to facilitate arthrocentesis (EP consensus).

The 2021 CAR discussions to formulate these recommendations were informed by seven guidelines: the 2012 CAR recommendations [19], the ACR Appropriateness Criteria® Suspected Osteomyelitis, Septic Arthritis, or Soft Tissue Infection recommendations [20], the ACR Appropriateness Criteria® Imaging after Total Knee Arthroplasty [64], the ACR Appropriateness Criteria® Imaging after Shoulder Arthroplasty [65], the European Association of Nuclear Medicine (EAMN), European Bone and Joint Infection Society (EBJIS) and the European Society of Radiology (ESR) recommendations [22,66], the International Consensus on Orthopedic Infections [67], and the 2017 RCR iRefer recommendations [23] (**Appendix 2: Table M23**).

M24. Avascular necrosis/bone infarction

Recommendations

1. In adults with suspected avascular necrosis/bone infarction, we recommend **XR** as the initial imaging (↑↑).

↳ **1.1** If further investigation is required for evaluation of avascular necrosis, we recommend **MRI** as the next imaging modality (↑↑).

↳ **1.2** If MRI is unavailable or is contraindicated, we suggest **NM** (bone scan) (↑).

↳ **1.3** If MRI and NM (bone scan) are unavailable or contraindicated, we suggest **CT** (↑).

The 2021 CAR discussions to formulate these recommendations were informed by four guidelines: the 2012 CAR recommendations [19], the ACR Appropriateness Criteria® Osteonecrosis of the Hip [68], the German S-3 guideline on femoral head necrosis [69], and the 2017 RCR iRefer recommendations [23] (**Appendix 2: Table M24**).

M25. Complex regional pain syndrome

Recommendations

1. In adults with suspected complex regional pain syndrome, we suggest **XR** as the initial imaging modality (↑↑).

↳ **1.1** If further investigation is required, we suggest **NM** (bone scan) as the next imaging modality (EP consensus).

↳ **1.2** If NM is unavailable or is contraindicated, we suggest **MRI** (EP consensus).

The 2021 CAR discussions to formulate these recommendations were informed by two guidelines: the ACR Appropriateness Criteria® Chronic Foot Pain recommendations [63], and the ACR Appropriateness Criteria® Shoulder Pain-Atraumatic recommendations [53] (**Appendix 2: Table M25**).

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APPENDIX 1. SEARCH STRATEGIES

2021 Jul 22
Database: Ovid MEDLINE(R) ALL <1946 to July 21, 2021>
Search Strategy:
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1 exp Musculoskeletal Diseases/ (1125792)
2 ((arthro* or musculoskeletal* or musculo-skeletal* or muscle? or muscular* or MSK or osteo* or skelet* or bone?) adj5 (disease? or disorder? or instabil* or necros#s or necrotic* or pain* or unstab*)).tw,kf. (171055)
3 exp Osteomyelitis/ (23415)
4 (osteomyelit* or osteo-myelit* or (inflam* adj2 bone?)).tw,kf. (27553)
5 Soft Tissue Infections/ (3815)
6 ((connective tissue or soft tissue?) adj5 infecti*).tw,kf. (10403)
7 exp Bone Neoplasms/ (129604)
8 ((arthro* or musculoskeletal* or musculo-skeletal* or muscle? or muscular* or MSK or osteo* or skelet* or bone?) adj5 (adenocarcinoma* or adeno-carcinoma* or cancer* or carcinoma* or malignan* or mass or masses or metasta* or neoplasm* or sarcoma* or tumour* or tumor*)).tw,kf. (160843)
9 Multiple Myeloma/ (42524)
10 (osteosarcoma* or osteo-sarcoma* or chondrosarcoma* or chondro-sarcoma* or Ewing* sarcoma* or adamantinoma* or myeloma* or plasmacytoma* or plasma-cytoma*).tw,kf. (102275)
11 ((ankle? or arm or arms or back or bone? or cartilage or clavicle? or coccyx? or elbow? or femur? or femoral or fibula? or foot or feet or finger? or forearm? or hand? or hip or hips or humerus or humeral or iliac or ilium or knee? or kneecap? or leg or legs or limb or limbs or lower extremit* or metatarsal? or neck? or patella? or pelvic or pelvis or radius or radial or rib or ribs or sacra or sacral or sacrum or scapula* or shoulder? or skull? or spine? or spinal or tailbone? or tibia? or toe or toes or ulna? or upper extremit* or vertebra* or wrist?) adj5 (disease? or disorder? or instabilit* or necros#s or necrotic* or pain* or unstab*)).tw,kf. (330879)
12 ((avascular* or connective tissue? or joint? or sacroiliac or sacro-iliac or soft tissue*) adj5 (disease? or disorder? or instabil* or necros#s or necrotic* or pain* or unstab*)).tw,kf. (76514)
13 Osteomalacia/ (4712)
14 (osteomalacia* or osteo-malacia*).tw,kf. (5472)
15 (bone adj3 (decay* or soften*)).tw,kf. (114)
16 ricket?.tw,kf. (8068)
17 exp Osteoporosis/ and Musculoskeletal Pain/ (26)
18 (osteoporo* adj5 pain*).tw,kf. (1328)
19 ((chest wall? or thoracic wall? or thorax wall?) adj5 pain*).tw,kf. (703)
20 ((sternoclavicular* or sterno-clavicular* or claviculosternal* or claviculo-sternal*) adj5 pain*).tw,kf. (84)
21 Fractures, Stress/ (3525)
22 ((fatigue or stress or march* or insufficienc*) adj3 fractur*).tw,kf. (7868)
23 (microfractur* or micro-fractur*).tw,kf. (2165)
24 ((connective tissue* or soft tissue*) adj5 inflam*).tw,kf. (3351)
25 exp Soft Tissue Neoplasms/ (25510)
26 ((connective tissue? or soft tissue?) adj5 (adenocarcinoma* or adeno-carcinoma* or cancer* or carcinoma* or malignan* or mass or masses or metasta* or neoplasm* or sarcoma* or tumour* or tumor*)).tw,kf. (34608)
27 exp Arthritis/ (271026)
28 exp Crystal Arthropathies/ (14550)
29 (arthropath* or arthro-path* or arthralgi* or arthrit* or osteoarthrit* or osteo-arthrit*).tw,kf. (270550)
30 (gout or chondrocalcinos#s or chondro-calcinos#s).tw,kf. (14838)
31 (spondylarthrit* or spondyl-arthrit*).tw,kf. (1062)
32 (osteonecro* or osteo-necro* or kienbo?ck* disease).tw,kf. (12417)
33 (sacroiliit#s or sacro-iliit#s).tw,kf. (2277)
34 ((prosthes#s or prosthetic*) adj5 pain*).tw,kf. (834)
35 Peripheral Nervous System Diseases/ (23526)
36 ((PNS or peripheral nervous system* or peripheral nerve?) adj5 (disease? or disorder? or instabil* or necros#s or necrotic* or pain* or unstab*)).tw,kf. (6062)
37 peripheral neuropath*.tw,kf. (22919)
38 exp Fracture Fixation/ae [adverse effects] (7426)
39 exp Fractures, Bone/ and exp Postoperative Complications/ (19429)
40 exp Fractures, Bone/co [complications] (27884)
41 ((fractur* or postfractur* or post-fractur*) adj3 (complicat* or followup? or follow-up?)).tw,kf. (8428)
42 exp Complex Regional Pain Syndromes/ (5689)
43 (complex regional pain adj3 (pain* or syndrome*)).tw,kf. (3308)
44 CRPS$2.tw,kf. (2645)
45 deafferenta* pain*.tw,kf. (290)
46 causalgia*.tw,kf. (593)
47 exp Orthopedic Equipment/ and exp Pain/ (4239)
48 exp Orthopedic Equipment/ae [adverse effects] (7000)
49 (((orthop?ed* or ortho-p?ed* or fracture fixat*) adj5 (device? or equipment or hardware)) and (pain* or symptom* or syndrome*)).tw,kf. (189)
50 (bone adj2 (nail* or plate* or screw* or wire*) adj5 (pain? or symptom* or syndrome*)).tw,kf. (16)
51 (sutur* adj2 anchor* adj5 (pain? or symptom* or syndrome*)).tw,kf. (20)
52 ((artificial limb? or artificial extremit* or prosthe*) adj5 (pain? or symptom* or syndrome*)).tw,kf. (1144)
53 (artificial adj (ankle? or arm or arms or clavicle? or coccyx? or elbow? or femur? or femoral or fibula? or foot or feet or finger? or forearm? or hand? or hip or hips or humerus or humeral or iliac or ilium or knee? or kneecap? or leg or legs or metatarsal? or neck? or patella? or pelvic

or pelvis or radius or radial or rib or ribs or sacra or sacral or sacrum or scapula* or shoulder? or skull? or tailbone? or tibia? or toe or toes or ulna? or vertebra* or wrist?) adj5 (pain? or symptom* or syndrome*)).tw,kf. (4)
54 or/1-53 [MSK] (1762672)
55 Diagnostic Imaging/ (42492)
56 dg.fs. [diagnostic imaging] (1277858)
57 (diagnos* adj3 (image? or imaging)).tw,kf. (48407)
58 (x-ray* or xray*).tw,kf. (385602)
59 Image Interpretation, Computer-Assisted/ (46797)
60 exp Imaging, Three-Dimensional/ (85251)
61 ((3D or 3-D or 3-dimension* or three dimension*) adj (image? or imaging)).tw,kf. (18522)
62 exp Ultrasonography/ (456225)
63 (ultrasound* or ultrasonograph* or ultra-sonograph* or ultrasonic* or ultra-sonic*).tw,kf. (404555)
64 (echograph* or echo-graph* or echotomograph* or echo-tomograph* or echosonograph* or echo sonograph*).tw,kf. (10810)
65 exp Radiography/ (1145139)
66 (radiograph* or radiographic imag* or roentgenograph* or roentgeno-graph*).tw,kf. (259850)
67 (fluoroscop* or fluoro-scop*).tw,kf. (30263)
68 exp Radionuclide Imaging/ (221328)
69 ((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 scintigraph* or scinti-graph* or scintiphotograph* or scinti-photograph*).tw,kf. (55233)
70 exp Tomography/ (977106)
71 (tomograph* or tomo-graph*).tw,kf. (457183)
72 (CAT scan* or CT scan* or PET scan* or PET imag* or PT scan* or PT imag*).tw,kf. (128765)
73 (SPECTCT or SPECT CT or "SPECT/CT").tw,kf. (4644)
74 (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,kf. (442315)
75 (cineradiograph* or cine-radiograph* or cinefluorograph* or cine-fluorograph* or radiocinematograph* or radio-cinematograph*).tw,kf. (1815)
76 Nuclear Medicine/ (6185)
77 ((nuclear or atomic) adj1 medicine?).tw,kf. (14355)
78 (nuclear adj1 radiolog*).tw,kf. (427)
79 or/55-78 [DIAGNOSTIC IMAGING] (3023981)
80 54 and 79 [MSK - DI] (429060)
81 exp Animals/ not Humans/ (4863701)
82 80 not 81 [ANIMAL-ONLY REMOVED] (410303)
83 (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. (4574906)
84 82 not 83 [OPINION PIECES REMOVED] (265167)
85 exp Guidelines as Topic/ (168919)
86 exp Clinical Protocols/ (176821)
87 Guideline.pt. (16420)
88 Practice Guideline.pt. (28829)
89 standards.fs. (751948)
90 Consensus Development Conference.pt. (12070)
91 Consensus Development Conference, NIH.pt. (794)
92 (consensus or guideline* or guidance? or standards or recommendation*).ti,kf. (205759)
93 (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,kf. (111094)
94 or/85-93 [CPG FILTER] (1219513)
95 84 and 94 [MSK - DI - CPGs] (8128)
96 limit 95 to yr="2016-current" (2427)
97 exp Musculoskeletal Diseases/ (1125792)
98 ((arthro* or musculoskeletal* or musculo-skeletal* or muscle? or muscular* or MSK or osteo* or skelet* or bone?) adj5 (disease? or disorder? or instabil* or necros#s or necrotic* or pain* or unstab*)).tw,kf. (171055)
99 exp Osteomyelitis/ (23415)
100 (osteomyelit* or osteo-myelit* or (inflam* adj2 bone?)).tw,kf. (27553)
101 exp Bone Neoplasms/ (129604)
102 ((arthro* or musculoskeletal* or musculo-skeletal* or muscle? or muscular* or MSK or osteo* or skelet* or bone?) adj5 (adenocarcinoma* or adeno-carcinoma* or cancer* or carcinoma* or malignan* or mass or masses or metasta* or neoplasm* or sarcoma* or tumour* or tumor*)).tw,kf. (160843)
103 Multiple Myeloma/ (42524)
104 (osteosarcoma* or osteo-sarcoma* or chondrosarcoma* or chondro-sarcoma* or Ewing* sarcoma* or adamantinoma* or myeloma* or plasmacytoma* or plasma-cytoma*).tw,kf. (102275)
105 ((ankle? or arm or arms or back or bone? or cartilage or clavicle? or coccyx? or elbow? or femur? or femoral or fibula? or foot or feet or finger? or forearm? or hand? or hip or hips or humerus or humeral or iliac or ilium or knee? or kneecap? or leg or legs or limb or limbs or lower extremit* or metatarsal? or neck? or patella? or pelvic or pelvis or radius or radial or rib or ribs or sacra or sacral or sacrum or scapula* or shoulder? or skull? or spine? or spinal or tailbone? or tibia? or toe or toes or ulna? or upper extremit* or vertebra* or wrist?) adj5 (disease? or disorder? or instabilit* or necros#s or necrotic* or pain* or unstab*)).tw,kf. (330879)
106 ((avascular* or joint? or sacroiliac or sacro-iliac or connective tissue? or soft tissue*) adj5 (disease? or disorder? or instabil* or necros#s or necrotic* or pain* or unstab*)).tw,kf. (76514)
107 exp Soft Tissue Neoplasms/ (25510)

108 ((connective tissue? or soft tissue?) adj5 (adenocarcinoma* or adeno-carcinoma* or cancer* or carcinoma* or malignan* or mass or masses or metasta* or neoplasm* or sarcoma* or tumour* or tumor*)).tw,kf. (34608)
109 (arthropath* or arthro-path* or arthralgi* or arthrit*).tw,kf. (210355)
110 (osteonecro* or osteo-necro* or kienbo?ck* disease).tw,kf. (12417)
111 (sacroiliit#s or sacro-iliit#s).tw,kf. (2277)
112 ((prosthes#s or prosthetic*) adj5 pain*).tw,kf. (834)
113 or/97-112 [MSK] (1653855)
114 Diagnostic Imaging/ (42492)
115 dg.fs. [diagnostic imaging] (1277858)
116 (diagnos* adj3 (image? or imaging)).tw,kf. (48407)
117 (x-ray* or xray*).tw,kf. (385602)
118 Image Interpretation, Computer-Assisted/ (46797)
119 exp Imaging, Three-Dimensional/ (85251)
120 ((3D or 3-D or 3-dimension* or three dimension*) adj (image? or imaging)).tw,kf. (18522)
121 exp Ultrasonography/ (456225)
122 (ultrasound* or ultrasonograph* or ultra-sonograph* or ultrasonic* or ultra-sonic*).tw,kf. (404555)
123 (echograph* or echo-graph* or echotomograph* or echo-tomograph* or echosonograph* or echo sonograph*).tw,kf. (10810)
124 exp Radiography/ (1145139)
125 (radiograph* or radiographic imag* or roentgenograph* or roentgeno-graph*).tw,kf. (259850)
126 (fluoroscop* or fluoro-scop*).tw,kf. (30263)
127 exp Radionuclide Imaging/ (221328)
128 ((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 scintigraph* or scinti-graph* or scintiphotograph* or scinti-photograph*).tw,kf. (55233)
129 exp Tomography/ (977106)
130 (tomograph* or tomo-graph*).tw,kf. (457183)
131 (CAT scan* or CT scan* or PET scan* or PET imag* or PT scan* or PT imag*).tw,kf. (128765)
132 (SPECTCT or SPECT CT or "SPECT/CT").tw,kf. (4644)
133 (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,kf. (442315)
134 (cineradiograph* or cine-radiograph* or cinefluorograph* or cine-fluorograph* or radiocinematograph* or radio-cinematograph*).tw,kf. (1815)
135 Nuclear Medicine/ (6185)
136 ((nuclear or atomic) adj1 medicine?).tw,kf. (14355)
137 (nuclear adj1 radiolog*).tw,kf. (427)
138 or/114-137 [DIAGNOSTIC IMAGING] (3023981)
139 113 and 138 [MSK - DI] (406167)
140 exp Animals/ not Humans/ (4863701)
141 139 not 140 [ANIMAL-ONLY REMOVED] (388298)
142 (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. (4574906)
143 141 not 142 [OPINION PIECES REMOVED] (250199)
144 exp Guidelines as Topic/ (168919)
145 exp Clinical Protocols/ (176821)
146 Guideline.pt. (16420)
147 Practice Guideline.pt. (28829)
148 standards.fs. (751948)
149 Consensus Development Conference.pt. (12070)
150 Consensus Development Conference, NIH.pt. (794)
151 (consensus or guideline* or guidance? or standards or recommendation*).ti,kf. (205759)
152 (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,kf. (111094)
153 or/144-152 [CPG FILTER] (1219513)
154 143 and 153 [MSK - DI - CPGs] (7644)
155 limit 154 to yr="2016-current" (2247)
156 96 not 155 [EXPANDED VERSUS ORIGINAL RESULTS] (180)

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Embase

Database: Embase Classic+Embase <1947 to 2021 July 21>
Search Strategy:
---
1 exp musculoskeletal disease/ (2636609)
2 ((arthro* or musculoskeletal* or musculo-skeletal* or muscle? or muscular* or MSK or osteo* or skelet* or bone?) adj5 (disease? or disorder? or instabil* or necros#s or necrotic* or pain* or unstab*)).tw,kw. (254425)
3 exp osteomyelitis/ (49905)
4 (osteomyelit* or osteo-myelit* or (inflam* adj2 bone?)).tw,kw. (37741)
5 soft tissue infection/ (12927)
6 ((connective tissue or soft tissue?) adj5 infecti*).tw,kw. (14678)
7 exp bone tumor/ (169882)
8 ((arthro* or musculoskeletal* or musculo-skeletal* or muscle? or muscular* or MSK or osteo* or skelet* or bone?) adj5 (adenocarcinoma* or adeno-carcinoma* or cancer* or carcinoma* or malignan* or mass or masses or metasta* or neoplasm* or sarcoma* or tumour* or tumor*)).tw,kw. (239980)
9 multiple myeloma/ (89957)
10 (osteosarcoma* or osteo-sarcoma* or chondrosarcoma* or chondro-sarcoma* or Ewing*

sarcoma* or adamantinoma* or myeloma* or plasmacytoma* or plasma-cytoma*).tw,kw. (154747)
11 ((ankle? or arm or arms or back or bone? or cartilage or clavicle? or coccyx? or elbow? or femur? or femoral or fibula? or foot or feet or finger? or forearm? or hand? or hip or hips or humerus or humeral or iliac or ilium or knee? or kneecap? or leg or legs or limb or limbs or lower extremit* or metatarsal? or neck? or patella? or pelvic or pelvis or radius or radial or rib or ribs or sacra or sacral or sacrum or scapula* or shoulder? or skull? or spine? or spinal or tailbone? or tibia? or toe or toes or ulna? or upper extremit* or vertebra* or wrist?) adj5 (disease? or disorder? or instabilit* or necros#s or necrotic* or pain* or unstab*)).tw,kw. (484524)
12 ((avascular* or joint? or sacroiliac or sacro-iliac or connective tissue? or soft tissue*) adj5 (disease? or disorder? or instabil* or necros#s or necrotic* or pain* or unstab*)).tw,kw. (117522)
13 osteomalacia/ (9121)
14 (osteomalacia* or osteo-malacia*).tw,kw. (8028)
15 (bone adj3 (decay* or soften*)).tw,kw. (210)
16 ricket?.tw,kw. (10937)
17 exp osteoporosis/ and exp musculoskeletal pain/ (4475)
18 (osteoporo* adj5 pain*).tw,kw. (2327)
19 ((chest wall? or thoracic wall? or thorax wall?) adj5 pain*).tw,kw. (1379)
20 ((sternoclavicular* or sterno-clavicular* or claviculosternal* or claviculo-sternal*) adj5 pain*).tw,kw. (125)
21 stress fracture/ (7158)
22 ((fatigue or stress or march* or insufficienc*) adj3 fractur*).tw,kw. (9952)
23 microfracture/ (1592)
24 (microfractur* or micro-fractur*).tw,kw. (2901)
25 soft tissue inflammation/ (885)
26 ((connective tissue* or soft tissue*) adj5 inflam*).tw,kw. (4971)
27 exp soft tissue injury/ (9823)
28 exp soft tissue tumor/ (62129)
29 ((connective tissue? or soft tissue?) adj5 (adenocarcinoma* or adeno-carcinoma* or cancer* or carcinoma* or malignan* or mass or masses or metasta* or neoplasm* or sarcoma* or tumour* or tumor*)).tw,kw. (49398)
30 exp arthritis/ (547412)
31 exp crystal arthropathy/ (27227)
32 (arthropath* or arthro-path* or arthralgi* or arthrit* or osteoarthrit* or osteo-arthrit*).tw,kw. (416447)
33 (gout or chondrocalcinos#s or chondro-calcinos#s).tw,kw. (22457)
34 spondylarthritis/ (9501)
35 (spondylarthrit* or spondyl-arthrit*).tw,kw. (1967)
36 (osteonecro* or osteo-necro* or kienbo?ck* disease).tw,kw. (16377)
37 (sacroiliit#s or sacro-iliit#s).tw,kw. (4188)
38 ((prosthes#s or prosthetic*) adj5 pain*).tw,kw. (1200)
39 exp peripheral neuropathy/ (79546)
40 ((PNS or peripheral nervous system* or peripheral nerve?) adj5 (disease? or disorder? or instabil* or necros#s or necrotic* or pain* or unstab*)).tw,kw. (8857)
41 peripheral neuropath*.tw,kw. (37539)
42 exp fracture fixation/ae [Adverse Drug Reaction] (1504)
43 exp fracture/ and exp postoperative complication/ (33591)
44 exp fracture/co [Complication] (31699)
45 ((fractur* or postfractur* or post-fractur*) adj3 (complicat* or followup? or follow-up?)).tw,kw. (11156)
46 exp complex regional pain syndrome/ (10601)
47 (complex regional pain adj3 syndrome*).tw,kw. (4915)
48 CRPS$2.tw,kw. (4279)
49 deafferenta* pain*.tw,kw. (372)
50 causalgia*.tw,kw. (1103)
51 exp orthopedic equipment/ and exp pain/ (32235)
52 exp orthopedic equipment/am, ae [Adverse Device Effect, Adverse Drug Reaction] (11343)
53 (((orthop?ed* or ortho-p?ed* or fracture fixat*) adj5 (device? or equipment or hardware)) and (pain* or symptom* or syndrome*)).tw,kw. (289)
54 (bone adj2 (nail* or plate* or screw* or wire*) adj5 (pain? or symptom* or syndrome*)).tw,kw. (26)
55 (sutur* adj2 anchor* adj5 (pain? or symptom* or syndrome*)).tw,kw. (22)
56 ((artificial limb? or artificial extremit* or prosthe*) adj5 (pain? or symptom* or syndrome*)).tw,kw. (1626)
57 (artificial adj (ankle? or arm or arms or clavicle? or coccyx? or elbow? or femur? or femoral or fibula? or foot or feet or finger? or forearm? or hand? or hip or hips or humerus or humeral or iliac or ilium or knee? or kneecap? or leg or legs or metatarsal? or neck? or patella? or pelvic or pelvis or radius or radial or rib or ribs or sacra or sacral or sacrum or scapula* or shoulder? or skull? or tailbone? or tibia? or toe or toes or ulna? or vertebra* or wrist?) adj5 (pain? or symptom* or syndrome*)).tw,kw. (9)
58 or/1-57 [MSK] (3255228)
59 diagnostic imaging/ (205975)
60 (diagnos* adj3 (image? or imaging)).tw,kw. (69830)
61 (x-ray* or xray*).tw,kw. (496629)
62 computer assisted tomography/ (778958)
63 computer assisted diagnosis/ (41938)
64 exp three-dimensional imaging/ (109280)
65 ((3D or 3-D or 3-dimension* or three dimension*) adj (image? or imaging)).tw,kw. (24310)
66 exp echography/ (858022)
67 (ultrasound* or ultrasonograph* or ultra-sonograph* or ultrasonic* or ultra-sonic*).tw,kw. (605518)
68 (echograph* or echo-graph* or echotomograph* or echo-tomograph* or echosonograph* or echo sonograph*).tw,kw. (14605)
69 exp radiography/ (1338146)
70 (radiograph* or radiographic imag* or roentgenograph* or roentgeno-graph*).tw,kw. (326320)
71 (fluoroscop* or fluoro-scop*).tw,kw. (51681)

Appendix 1. Search Strategies

72 exp scintiscanning/ (202764)
73 ((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 scintigraph* or scinti-graph* or scintiphotograph* or scinti-photograph*).tw,kw. (79879)
74 exp tomography/ (2016192)
75 (tomograph* or tomo-graph*).tw,kw. (595891)
76 (CAT scan* or CT scan* or PET scan* or PET imag* or PT scan* or PT imag*).tw,kw. (231038)
77 (SPECTCT or SPECT CT or "SPECT/CT").tw,kw. (10783)
78 (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. (690882)
79 (cineradiograph* or cine-radiograph* or cinefluorograph* or cine-fluorograph* or radiocinematograph* or radio-cinematograph*).tw,kw. (2421)
80 nuclear medicine/ (36550)
81 ((nuclear or atomic) adj1 medicine?).tw,kw. (29316)
82 (nuclear adj1 radiolog*).tw,kw. (645)
83 or/59-82 [DIAGNOSTIC IMAGING] (4486749)
84 58 and 83 [MSK - DI] (826742)
85 exp animal/ or exp animal experimentation/ or exp animal model/ or exp animal experiment/ or nonhuman/ or exp vertebrate/ (31383313)
86 exp human/ or exp human experimentation/ or exp human experiment/ (23870299)
87 85 not 86 (7514265)
88 84 not 87 [ANIMAL-ONLY REMOVED] (787603)
89 (conference abstract or editorial or letter).pt. (6014710)
90 case report/ or exp case study/ or directory/ (2818722)
91 88 not (89 or 90) [OPINION PIECES REMOVED] (388560)
92 exp practice guideline/ (604283)
93 (consensus or guideline* or guidance? or standards or recommendation*).ti,kw. (277970)
94 (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. (158913)
95 or/92-94 [CPG FILTER] (848283)
96 91 and 95 [MSK - DI - CPGs] (11842)
97 limit 96 to yr="2016-current" (4375)
98 exp musculoskeletal disease/ (2636609)
99 ((arthro* or musculoskeletal* or musculo-skeletal* or muscle? or muscular* or MSK or osteo* or skelet* or bone?) adj5 (disease? or disorder? or instabil* or necros#s or necrotic* or pain* or unstab*)).tw,kw. (254425)
100 exp osteomyelitis/ (49905)
101 (osteomyelit* or osteo-myelit* or (inflam* adj2 bone?)).tw,kw. (37741)
102 exp bone tumor/ (169882)
103 ((arthro* or musculoskeletal* or musculo-skeletal* or muscle? or muscular* or MSK or osteo* or skelet* or bone?) adj5 (adenocarcinoma* or adeno-carcinoma* or cancer* or carcinoma* or malignan* or mass or masses or metasta* or neoplasm* or sarcoma* or tumour* or tumor*)).tw,kw. (239980)
104 multiple myeloma/ (89957)
105 (osteosarcoma* or osteo-sarcoma* or chondrosarcoma* or chondro-sarcoma* or Ewing* sarcoma* or adamantinoma* or myeloma* or plasmacytoma* or plasma-cytoma*).tw,kw. (154747)
106 ((ankle? or arm or arms or back or bone? or cartilage or clavicle? or coccyx? or elbow? or femur? or femoral or fibula? or foot or feet or finger? or forearm? or hand? or hip or hips or humerus or humeral or iliac or ilium or knee? or kneecap? or leg or legs or limb or limbs or lower extremit* or metatarsal? or neck? or patella? or pelvic or pelvis or radius or radial or rib or ribs or sacra or sacral or sacrum or scapula* or shoulder? or skull? or spine? or spinal or tailbone? or tibia? or toe or toes or ulna? or upper extremit* or vertebra* or wrist?) adj5 (disease? or disorder? or instabilit* or necros#s or necrotic* or pain* or unstab*)).tw,kw. (484524)
107 ((avascular* or joint? or sacroiliac or sacro-iliac or connective tissue? or soft tissue*) adj5 (disease? or disorder? or instabil* or necros#s or necrotic* or pain* or unstab*)).tw,kw. (117522)
108 exp soft tissue injury/ (9823)
109 exp soft tissue tumor/ (62129)
110 ((connective tissue? or soft tissue?) adj5 (adenocarcinoma* or adeno-carcinoma* or cancer* or carcinoma* or malignan* or mass or masses or metasta* or neoplasm* or sarcoma* or tumour* or tumor*)).tw,kw. (49398)
111 (arthropath* or arthro-path* or arthralgi* or arthrit*).tw,kw. (328863)
112 (osteonecro* or osteo-necro* or kienbo?ck* disease).tw,kw. (16377)
113 (sacroiliit#s or sacro-iliit#s).tw,kw. (4188)
114 ((prosthes#s or prosthetic*) adj5 pain*).tw,kw. (1200)
115 or/98-114 [MSK] (3157111)
116 diagnostic imaging/ (205975)
117 (diagnos* adj3 (image? or imaging)).tw,kw. (69830)
118 (x-ray* or xray*).tw,kw. (496629)
119 computer assisted tomography/ (778958)
120 computer assisted diagnosis/ (41938)
121 exp three-dimensional imaging/ (109280)
122 ((3D or 3-D or 3-dimension* or three dimension*) adj (image? or imaging)).tw,kw. (24310)
123 exp echography/ (858022)
124 (ultrasound* or ultrasonograph* or ultra-sonograph* or ultrasonic* or ultra-sonic*).tw,kw. (605518)
125 (echograph* or echo-graph* or echotomograph* or echo-tomograph* or echosonograph* or echo sonograph*).tw,kw. (14605)
126 exp radiography/ (1338146)

127 (radiograph* or radiographic imag* or roentgenograph* or roentgeno-graph*).tw,kw. (326320)
128 (fluoroscop* or fluoro-scop*).tw,kw. (51681)
129 exp scintiscanning/ (202764)
130 ((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 scintigraph* or scinti-graph* or scintiphotograph* or scinti-photograph*).tw,kw. (79879)
131 exp tomography/ (2016192)
132 (tomograph* or tomo-graph*).tw,kw. (595891)
133 (CAT scan* or CT scan* or PET scan* or PET imag* or PT scan* or PT imag*).tw,kw. (231038)
134 (SPECTCT or SPECT CT or "SPECT/CT").tw,kw. (10783)
135 (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. (690882)
136 (cineradiograph* or cine-radiograph* or cinefluorograph* or cine-fluorograph* or radiocinematograph* or radio-cinematograph*).tw,kw. (2421)
137 nuclear medicine/ (36550)
138 ((nuclear or atomic) adj1 medicine?).tw,kw. (29316)
139 (nuclear adj1 radiolog*).tw,kw. (645)
140 or/116-139 [DIAGNOSTIC IMAGING] (4486749)
141 115 and 140 [MSK - DI] (814527)
142 exp animal/ or exp animal experimentation/ or exp animal model/ or exp animal experiment/ or nonhuman/ or exp vertebrate/ (31383313)
143 exp human/ or exp human experimentation/ or exp human experiment/ (23870299)
144 142 not 143 (7514265)
145 141 not 144 [ANIMAL-ONLY REMOVED] (775997)
146 (conference abstract or editorial or letter).pt. (6014710)
147 case report/ or exp case study/ or directory/ (2818722)
148 145 not (146 or 147) [OPINION PIECES REMOVED] (382447)
149 exp practice guideline/ (604283)
150 (consensus or guideline* or guidance? or standards or recommendation*).ti,kw. (277970)
151 (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. (158913)
152 or/149-151 [CPG FILTER] (848283)
153 148 and 152 [MSK - DI - CPGs] (11623)
154 limit 153 to yr="2016-current" (4299)
155 97 not 154 [EXPANDED VERSUS ORIGINAL RESULTS] (76)

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APPENDIX 2. EVIDENCE TABLES

Levels and Grades of evidence

2012 CAR and 2017 RCR Grades

[A] Any of the following:

(1) High-quality diagnostic studies in which a new test is independently and blindly compared with a reference standard in an appropriate spectrum of patients;

(2) Systematic review and meta-analyses of such high-quality studies.

[B] Any of the following:

(1) Studies with a blind and independent comparison of the new test with the reference standard in a set of non-consecutive patients or confined to a narrow spectrum of patients;

(2) Studies in which the reference standard was not applied to all patients;

(3) Systematic reviews of such studies.

[C] Any of the following:

(1) Studies in which the reference standard was not objective;

(2) Studies in which the comparison of the new test with the reference standard was not blind or independent;

(3) Studies in which positive and negative test results were verified using different reference standards;

(4) Expert opinion.

Oxford Centre for Evidence-based Medicine 2009 Levels of Evidence

https://www.cebm.ox.ac.uk/resources/levels-of-evidence/oxford-centre-for-evidence-based-medicine-levels-of-evidence-march-2009 [Accessed March 21, 2022]

Oxford Centre for Evidence-based Medicine 2011 Levels of Evidence

https://www.cebm.net/wp-content/uploads/2014/06/CEBM-Levels-of-Evidence-2.1.pdf [Accessed March 21, 2022]

Table M01. Osteomyelitis, including diabetic foot

Guideline group AGREE-II Assessment	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: positron emission tomography; US: ultrasound; XR: radiograph	
CAR 2012 [19]	**D01. OSTEOMYELITIS** - XR: Indicated [C]: XR is indicated for initial imaging. - MRI: Specialized investigation [C]: MRI is an excellent imaging modality to assess osteomyelitis and associated soft tissue abnormalities, especially in the spine. - NM: Indicated [C]: Bone scan (Two- or three-phase skeletal scintigraphy) is useful after a normal or equivocal x-ray if osteomyelitis is suspected as a normal bone scan makes osteomyelitis very unlikely. If osteomyelitis is suspected but there are no localizing signs or symptoms, skeletal scintigraphy is useful; however, findings are not specific. - NM: Specialized investigation [C]: Tc-99-HMPAO and In-111-labelled white cell scans are an alternative to MRI. Gallium-67 Citrate imaging is useful for vertebral osteomyelitis and chronic infections. In-111-labelled white cells are useful for infections in bones or joints. Combined leukocyte and marrow imaging is currently the technique of choice for peri-prosthetic infection (see also painful prosthesis D22). The use of those specialized techniques is usually reserved for cases with abnormal bone scans. - CT: Specialized investigation [C]: CT is useful to guide soft tissue and bone biopsy and is the best imaging modality to evaluate for sequestra in chronic osteomyelitis. - US: Specialized investigation [C]: US may be helpful to assess for a subperiosteal abscess in acute osteomyelitis.
ACR 2017 [20] Moderate quality	**SUSPECTED OSTEOMYELITIS, SEPTIC ARTHRITIS, OR SOFT-TISSUE INFECTION (EXCLUDING SPINE AND DIABETIC FOOT)** ▪ Variant 1. Suspected osteomyelitis, septic arthritis, or soft-tissue infection (excluding spine and diabetic foot). First study. ▪ Variant 4. Soft-tissue or juxta-articular swelling with cellulitis and a skin lesion, injury, wound, ulcer, or blister. Suspected osteomyelitis. Additional imaging following radiographs. ▪ Variant 5. Soft-tissue or juxta-articular swelling with a history of prior surgery. Suspected osteomyelitis or septic arthritis. Additional imaging following radiographs.
EANM/EBJIS/ESR 2019 [21,22] Moderate quality	**PERIPHERAL BONE INFECTION** - Conventional radiography (OCEBM 2011 level 3) - CT (OCEBM 2011 level 4) - White blood cell scintigraphy (OCEBM 2011 level 2) - Hybrid SPECT-CT white blood cell imaging (OCEBM 2011 level 2) - F-FDG-PET/CT (OCEBM 2011 level 5)
RCR 2017 [23] High quality	**M07. SUSPECTED OSTEOMYELITIS** - XR [C] - MRI [B] - US [C] - CT [C] - NM [C]

Appendix 2. Evidence Tables

Guideline group AGREE-II Assessment	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: positron emission tomography; US: ultrasound; XR: radiograph	
	- PET-CT [B]
DIABETIC FOOT	
ACR 2019 [24] Moderate quality	**SUSPECTED OSTEOMYELITIS OF THE FOOT IN PATIENTS WITH DIABETES MELLITUS** ▪ Variant 1. Suspected osteomyelitis of the foot in patients with diabetes mellitus. Initial imaging ▪ Variant 2. Soft-tissue swelling without ulcer. Suspected osteomyelitis or early neuropathic arthropathy changes of the foot in patients with diabetes mellitus. Additional imaging following radiographs. ▪ Variant 3. Soft-tissue swelling with ulcer. Suspected osteomyelitis of the foot in patients with diabetes mellitus with or without neuropathic arthropathy. Additional imaging following radiographs.
NICE 2016 [25] High quality	**DIABETIC FOOT PROBLEMS. PREVENTION AND MANAGEMENT** - XR: Recommendation 29 - MRI: Recommendation 32
SVS, APMA, SVM 2016 [26] Moderate quality	**MANAGEMENT OF DIABETIC FOOT** - Plain radiographs (GRADE: 2C [~conditional recommendation, low certainty]) - MRI (GRADE: 1B [~strong recommendation, moderate certainty]) - Leukocyte or antigranulocyte scan (GRADE: 2B [~conditional recommendation, moderate certainty])

Abbreviations: ACR: American College of Radiology; APMA: American Podiatric Medical Association; CAR: Canadian Association of Radiologists; EANM: European Association of Nuclear Medicine; EBJIS: European Bone and Joint Infection Society; ESR: European Society or Radiology; NICE: National Institute for Health and Care Excellence; OCEMB: Oxford Centre for Evidence-based Medicine; RCR: Royal College of Radiologists; SVM: Society for Vascular Medicine; SVS: Society for Vascular Surgery

Table M02. Septic arthritis

Guideline group AGREE-II Assessment	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 [19]	This scenario was not addressed in the 2012 CAR guidelines.
ACR 2017 [20] Moderate quality	**SUSPECTED OSTEOMYELITIS, SEPTIC ARTHRITIS, OR SOFT-TISSUE INFECTION (EXCLUDING SPINE AND DIABETIC FOOT)** ▪ Variant 1. Suspected osteomyelitis, septic arthritis, or soft-tissue infection (excluding spine and diabetic foot). First study. ▪ Variant 5. Soft-tissue or juxta-articular swelling with a history of prior surgery. Suspected osteomyelitis or septic arthritis. Additional imaging following radiographs. (See **Wrist pain. Variant 4**)
ESSR 2018 [27] Moderate quality	- Shoulder septic arthritis: US (OCEBM level C) - Elbow septic arthritis/effusion: US (OCEBM level B)

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; ESSR: European Society of Musculoskeletal Radiology; OCEBM: Oxford Centre for Evidence-based Medicine

Table M03. Soft tissue infection

Guideline group AGREE-II Assessment	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included)
CAR 2012 [19]	This scenario was not addressed in the 2012 CAR guidelines.
ACR 2017 [20] Moderate quality	**SUSPECTED OSTEOMYELITIS, SEPTIC ARTHRITIS, OR SOFT-TISSUE INFECTION (EXCLUDING SPINE AND DIABETIC FOOT)** ▪ Variant 1. Suspected osteomyelitis, septic arthritis, or soft-tissue infection (excluding spine and diabetic foot). First study. ▪ Variant 2. Soft-tissue or juxta-articular swelling. Suspected soft-tissue infection. Additional imaging following radiographs.

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

Table M04. Bone tumours - Primary

Guideline group AGREE-II Assessment	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: positron emission tomography; US: ultrasound; XR: radiograph	
CAR 2012 [19]	**D02. PRIMARY BONE TUMOUR (See also K44, K45)** - XR: Indicated [B]: XR should be performed when there is bone pain that is not resolving, and it may be the only imaging required for some benign bone lesions. - MRI: Specialized investigation [B]: If the XR appearances are suggestive of a malignant bone tumour, referral to a specialist centre should not be delayed. MRI is the best imaging modality for local staging. - NM: Indicated [B]: If the XR appearances are suggestive of a primary bone tumour, obtaining skeletal scintigraphy should not delay referral to a specialist centre. NM is primarily used for evaluating the skeleton for additional sites of involvement; the bone scan may overestimate the local tumour extent. In most circumstances, a normal bone scan excludes malignancy. The role of FDG-PET remains to be clarified and may have a role for identification of distant metastasis (bone and non-bone). PET/CT fusion images may be helpful for targeting areas with more cellular metabolic activity (although biopsy should be carried out in specialized bone tumour centres where histological expertise and knowledge of surgical approach is available). - CT: Specialized investigation [B]: CT may be useful in some tumours, such as osteoid osteoma, and can demonstrate intratumoral calcification and ossification better than MRI, but it should only be ordered by a specialist or after consultation with a radiologist.
AAOS 2019 [28] High quality	- Conventional radiographs (Strength of Recommendation: Moderate) - Radiographs and MRI (Strength of Recommendation: Moderate) - Tc99 bone scan (Strength of recommendation: Limited) - MRI (Strength of recommendation: Consensus) - Contrast-enhanced CT (Strength of recommendation: Consensus)
ACR 2020 [29] Moderate quality	**PRIMARY BONE TUMORS.** ▪ Variant 1. Suspect primary bone tumor. Initial imaging. ▪ Variant 2. Suspect primary bone tumor. Radiographs negative or do not explain symptoms. Next imaging study. ▪ Variant 3. Suspect primary bone tumor. Benign radiographic features. Not osteoid osteoma. Next imaging study. ▪ Variant 4. Suspect primary bone tumor. Radiographs or clinical presentation suggest osteoid osteoma. Next imaging study.
RCR 2017 [23] High quality	**M08. SUSPECTED PRIMARY BONE TUMOUR** - XR [B] - MRI [B] - CT [B] - US [B] - NM (bone scan) [B] - PET-CT [B]

Abbreviations: AAOS: American Academy of Orthopaedic Surgeons; ACR: American College of Radiology; CAR: Canadian Association of Radiologists; NICE: National Institute for Health and Care Excellence; RCR: Royal College of Radiologists

Appendix 2. Evidence Tables

Note: The NICE guideline on Suspected cancer (Section 17.1: Bone sarcoma) was published in 2015. Recommendations for XR, however this was based on clinical experience as there were no studies identified that evaluated XR. No summary of findings or levels of certainty.

Table M05. Bone tumour – Metastases

Guideline group AGREE-II Assessment	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: positron emission tomography; XR: radiograph	
CAR 2012 [19]	**D03. KNOWN PRIMARY TUMOUR, SKELETAL METASTASES** - NM: Indicated [B]: Bone scintigraphy is useful for assessing the presence and extent of skeletal metastases in patients with known primary cancers both at initial presentation and in follow-up. Its sensitivity and specificity is increased by using SPECT (and SPECT-CT whenever available). It is more sensitive for osteoblastic metastases and relatively insensitive in assessing the extent of multiple myeloma and purely osteolytic metastases. It is moderately specific and may require correlation with other imaging modalities. Bone scintigraphy may also be used to assess response to treatment, although the flare phenomena may suggest progression if bone scans are performed too soon after the initiation of systemic therapy (< 3 months). - MRI: Indicated [B]: MRI is useful to assess and characterize skeletal metastases, particularly in the axial skeleton. It may underestimate peripheral lesions that are not included in the field of view but whole-body examinations using diffusion-weighted sequences are becoming more widespread. Its sensitivity is lower for small osteoblastic metastases. - XR skeletal survey: Not indicated [B]: XRs are only useful for the assessment of focal symptomatic sites or for correlation with a NM examination.
RCR 2017 [23] High quality	**M09. SKELETAL METASTASES FROM KNOWN PRIMARY TUMOUR** - MRI [B] - NM (bone scan) [B] - XR skeletal survey [B] - CT [B] - PET-CT [B]

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

Table M06. Bone tumour – Myeloma

Guideline group AGREE-II Assessment	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: positron emission tomography; XR: radiograph	
CAR 2012 [19]	**D06. MYELOMA** - XR skeletal survey: Indicated [C]: XR indicated for initial staging and planning for possible radiation therapy. Follow up of abnormalities can be limited to specific sites. - MRI: Specialized investigation [B]: Screening examination of the of the axial skeleton (spine, pelvis, proximal femora) is very sensitive, and particularly useful in patients with diffuse osteopenia or known non-secretory myeloma. It may be used for evaluation of a focal mass or follow up of disease extent. - NM: Not indicated [B]: NM has a limited sensitivity and may not detect all sites of involvement.
ESMO 2021 [30] Moderate quality	- Whole-body low-dose CT - PET-CET - Whole-body MRI
NICE 2016 [31,32] High quality	- Whole-body MRI - Whole-body low-dose CT - Skeletal survey - Isotope bone scans
RCR 2017 [23] High quality	**M12. MYELOMA** - MRI [B] - CT [B] - XR skeletal survey [C] - PET-CT [B]

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; ESMO: European Society for Medical Oncology; NICE: National Institute for Health and Care Excellence; RCR: Royal College of Radiologists

Note: ACR guideline for this scenario is “Currently under consideration for future development”

Table M07. Soft tissue mass or tumour

Guideline group AGREE-II Assessment	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: positron emission tomography; XR: radiograph; US: ultrasound	
CAR 2012 [19]	**D04. SOFT TISSUE MASS OR TUMOUR** - MRI: Indicated [B]: MRI is the best imaging modality for evaluating soft tissue masses and in some cases may provide a specific diagnosis. - US: Indicated [C]: US is useful for distinguishing between solid and cystic masses. It can be used to determine appropriate evolution of a presumed hematomas or follow other probably benign lesions. Percutaneous biopsy under US guidance can be carried out in specialized bone tumour centres where histological expertise and knowledge of surgical approach is available - XR: Indicated in specific circumstances [B]: XR can identify calcified (and sometimes fatty) tumor matrix and underlying osseous abnormalities. CT may also be useful in this regard.
AAOS 2019 [28] High quality	- Radiographs (Strength of recommendation: Consensus) - MRI (Strength of recommendation: Consensus); IV contrast (Strength of recommendation: Consensus) - CT (Strength of recommendation: Consensus) - US for small (<5 cm), superficial soft-tissues tumors (Strength of recommendation: Consensus); Us for large (>5 cm), deep soft-tissue tumors (Strength of recommendation: Consensus)
ACR 2018 [33] Moderate quality	**SOFT-TISSUE MASSES.** ▪ Variant 1. Soft-tissue mass. Superficial or palpable. Initial imaging study. ▪ Variant 2. Soft-tissue mass. Nonsuperficial (deep) or nonspecific clinical assessment or located in an area difficult to adequately evaluate with radiographs (flank, paraspinal region, groin, or deep soft tissues of the hands and feet). Initial imaging study. ▪ Variant 3. Soft-tissue mass. Nondiagnostic initial evaluation (ultrasound and/or radiograph). Next imaging study. ▪ Variant 5. Soft-tissue mass. Nondiagnostic initial evaluation. Patient non–MRI compatible or with metal limiting MR evaluation. Next imaging study.
RCR 2017 [23] High quality	**M10. SOFT TISSUE MASS** - US [B] - MRI [B] - XR [B] - Image-guided biopsy [B] - PET-CT [B]

Abbreviations: AAOS: American Academy of Orthopaedic Surgeons; ACR: American College of Radiology; NICE: National Institute for Health and Care Excellence; RCR: Royal College of Radiologists

Note: NICE guideline on Suspected cancer (section 17.2: soft tissue sarcoma) was published in 2015. Recommendations for US, however this was based on clinical experience as there were no studies identified that evaluated US. No summary of findings or levels of certainty.

Table M08. Soft tissue pain (non-periarticular)

Guideline group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered
CAR 2012 [19]	This scenario was not addressed in the 2012 CAR guidelines.

Abbreviations: CAR: Canadian Association of Radiologists

Table M09. Osteoarthritis/Crystalline Arthropathy

Guideline group AGREE-II Assessment	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[19]	This scenario was not addressed in the 2012 CAR guidelines.
ACP 2017 [34] High quality	**GOUT** - Dual-energy computed tomography (DECT) or ultrasonography (ACP grading system: low quality evidence) - Serum urate alone, computed tomography, or plain radiography for diagnosing gout (ACP grading system: inconclusive evidence)
ACR 2017 [35] Moderate quality	**CHRONIC EXTREMITY JOINT PAIN—SUSPECTED INFLAMMATORY ARTHRITIS.** ▪ Variant 3. Chronic extremity joint pain. Suspect gout. (See **Knee Pain. Variant 1**, which provides additional information on osteoarthritis of the knee.)
ESSR 2018 [27] Moderate quality	**OSTEOARTHRITIS** - US for the following scenarios: Acromion-clavicular joint OA (OCEMB level: C), Wrist: Pisiform triquetral OA (OCEMB level: C), Wrist: Scapho-trapezio trapezoidal OA, (OCEMB level: C), Hip: Intra-articular pathology (OCEMB level: A), Knee OA
EULAR 2017 [36] Moderate quality	**OSTEOARTHRITIS** - Imaging to make the diagnosis in patients with typical presentation of OA (Levels of evidence: III-IV) - Conventional (plain) radiography - US or MRI and CT or MRI (Levels of evidence: III-IV) **Levels of Evidence**: Categories of evidence: Ia, evidence for meta-analysis of randomised controlled trials; Ib, evidence from at least one randomised controlled trial; IIa, evidence from at least one controlled study without randomisation; IIb, evidence from at least one other type of quasi-experimental study; III, evidence from non-experimental descriptive studies, such as comparative studies, correlation studies and case–control studies; IV, evidence from expert committee reports or opinions or clinical experience of respected authorities

Abbreviations: ACP: American College of Physicians; ACR: American College of Radiology; CAR: Canadian Association of Radiologists; ESSR: European Society of Musculoskeletal Radiology; EULAR: European League Against Rheumatism; NICE: National Institute for Health and Care Excellence; OA: Osteoarthritis; OCEBM: Oxford Centre for Evidence-based Medicine

Note: NICE Gout: In development (expected June 2022), NICE Osteoarthritis: Diagnostic imaging last updated in 2014.

Table M10. Inflammatory Arthropathy (Rheumatoid/Peripheral Spondyloarthropathy)

Guideline group AGREE-II Assessment	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; US: ultrasound	
CAR 2012 [19]	**D10. ARTHROPATHY: PRESENTATION** - XR affected joint: Indicated [C]: XR may be helpful to determine the type of arthritis, although visible bony changes are often a relatively late feature. - XR hands/feet: Indicated [C]: In patients with suspected rheumatoid arthritis, XR of the feet may show erosions in asymptomatic as well as symptomatic feet, even when symptomatic hands appear normal. - XR multiple joints: Indicated only in specific circumstances [C]: Only symptomatic joints should be x-rayed unless otherwise indicated by other clinical investigations. - MRI: Specialized investigation [C]: MRI can show acute synovitis, articular cartilage damage, early erosions and bone marrow edema better than XR. - US: Specialized investigation [C]: US can show acute synovitis and erosions in superficial joints. It requires a trained-operator. - NM: Specialized investigation [C]: NM can show acute synovitis and its distribution.
ACR 2017 [35] Moderate quality	**CHRONIC EXTREMITY JOINT PAIN—SUSPECTED INFLAMMATORY ARTHRITIS.** ▪ Variant 1. Chronic extremity joint pain. Suspect rheumatoid arthritis. ▪ Variant 2. Chronic extremity joint pain. Suspect seronegative spondyloarthropathy. (Includes psoriatic arthritis, reactive arthritis, ankylosing spondylitis, and arthritis associated with inflammatory bowel disease, includes the synovial spaces, entheses, and osseous surfaces of the extremities.) (See **Wrist pain. Variant 3.**)
EULAR 2016 [37] Moderate quality	- US (OCEMB level 2b)
NICE 2018 [38,39] High quality	**RHEUMATOID ARTHRITIS** - X-ray - US
RCR 2017 [23] High quality	**M16. ARTHROPATHY: PRESENTATION** - XR affected joint [B] - XR hands/feet [B] - US/MRI/NM (bone scan) [B] - XR multiple joints [B]

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; EULAR: European League Against Rheumatism; NICE: National Institute for Health and Care Excellence; OCEBM: Oxford Centre for Evidence-based Medicine; RCR: Royal College of Radiologists

Table M11. Spondyloarthropathy (Axial)

Guideline group AGREE-II Assessment	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; US: ultrasound	
CAR 2012 [19]	**D14. SACROILIAC PAIN** - XR: Indicated [B]: XR is usually the first initial imaging modality for the assessment of sacroiliitis in patients with seronegative arthropathy. - MRI: Specialized investigation [C]: MRI is the imaging modality of choice when strong suspicion of early sacroiliitis exists and the XR is normal. - CT: Specialized investigation [C]: MRI is more sensitive than CT for early sacroiliitis, but CT may suffice if MRI is not readily available. CT may demonstrate early erosions when XR is normal. - NM: Specialized investigation [C]: MRI is preferred over NM for early sacroiliitis, but NM may suffice if MRI is not readily available.
ACR 2017 [40] Moderate quality	**CHRONIC BACK PAIN SUSPECTED SACROILIITIS-SPONDYLOARTHROPATHY** ▪ Variant 1. Inflammatory sacroiliac or back symptoms. Suspected axial spondyloarthropathy. Initial evaluation. ▪ Variant 2. Inflammatory sacroiliac symptoms. Suspected axial spondyloarthropathy. Radiographs negative or equivocal. ▪ Variant 3. Inflammatory back pain symptoms. Suspected axial spondyloarthropathy. Radiographs negative or equivocal. ▪ Variant 4. Inflammatory sacroiliac symptoms. Suspected axial spondyloarthropathy. Negative radiographs and MRI of the sacroiliac joints.
Brazilian Society Rheum 2020 [41] Moderate quality	- Radiography, sacroiliac joints (SIJ) MRI (OCEMB 2009 level 1A; Strength of recommendation: strong) - Spine MRI scans (OCEBM 2009 level 1B; Strength of recommendation: strong)
NICE 2017 [42–44] High quality	**SPONDYLOARTHRITIS IN OVER 16S** - X-ray - Scintigraphy - MRI
RCR 2017 [23] High quality	**M20. SACROILIAC PAIN** - MRI [B] - XR [B] - CT/NM (bone scan) [B]
WG on US Spanish Society Rheum 2016 [45] Moderate quality	- US (OCEBM 2009 level 2b) - MRI of the sacroiliac joints (OCEBM 2009 level 5); MRI of the sacroiliac joints (OCEBM 2009 level 2a) - Spinal MRI (OCEBM 2009 level 3a)

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; NICE: National Institute for Health and Care Excellence; OCEBM: Oxford Centre for Evidence-based Medicine; RCR: Royal College of Radiologists; Rheum: Rheumatology; WG: Working Group

Table M12. Bone pain (non-joint)

Guideline group AGREE-II Assessment	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; US: ultrasound	
CAR 2012 [19]	**D05. BONE PAIN (for children see L28-L29)** - XR: Indicated [C]: XR is an important first step in evaluation of focal bone pain. - NM: Indicated [C]: Indicated if pain persists with normal XR or equivocal and abnormal XR. Bone scans are commonly positive in patients with persistent bone pain and may be helpful in directing more specific studies. - MRI: Specialized investigation [C]: MRI is an appropriate imaging modality if pain persists and XR and NM are normal. MRI may also provide further information when XR and/or NM findings are abnormal. - CT: Specialized investigation [C]: CT can assist in further characterization of bony abnormalities identified on XR, NM/MRI. It may be useful in planning bone biopsy.
RCR 2017 [23] High quality	**M11. BONE PAIN** - XR [C] - MRI [C] - CT [C] - NM (bone scan) [C] - US [C]

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

Table M13. Metabolic bone disease, including osteoporosis and osteomalacia

Guideline group AGREE-II Assessment	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; DEXA: dual-energy x-ray absorptiometry; MRI: magnetic resonance imaging; NM: nuclear medicine; XR: radiograph	
CAR 2012 [19]	**D07. METABOLIC BONE DISEASE** - XR: Indicated [C]: XR is the best imaging modality for identifying the characteristic features of some metabolic bone diseases such as hyperparathyroidism and osteomalacia. It may also identify new vertebral compression fractures in patients with osteoporosis. Correlation with NM may be required. - DEXA: Indicated [A]: DEXA is the standard technique to determine bone density. Quantitative CT can also accurately measure bone density. - NM: Indicated [C]: NM can help determine some causes of hypercalcemia (e.g. hyperparathyroidism, certain metastases), and of raised alkaline phosphatase (e.g. Paget's disease, some metastases). Bone scans can also differentiate new from old vertebral fractures. **D08. OSTEOMALACIA WITH PAIN (see also Metabolic Bone Disease)** - XR: Indicated [B]: XR is the best initial imaging modality to establish a cause of local pain or to assess an equivocal lesion identified on NM. - NM: Specialized investigation [C]: NM may demonstrate abnormal increased activity and associated complications (e.g. pseudo-fractures). - MRI: Specialized investigation [C]: MRI may be used to establish the cause of local bone pain not shown on XR or to assess equivocal XR findings. May also be used in evaluation of complications, dating of fractures and identification of occult fractures if X Rays negative
ACR 2017 [46] Moderate quality	**OSTEOPOROSIS AND BONE MINERAL DENSITY.** ▪ Variant 1. Asymptomatic BMD screening or individuals with established or clinically suspected low BMD.
Paget's Association 2019 [47] High quality	- Plain X-rays (GRADE: very low certainty) - MRI or CT imaging (GRADE: very low certainty)
RCR 2017 [23] High quality	**M13. METABOLIC BONE DISEASE** - XR [C] - DEXA [A] - NM (bone scan) [C] - MRI [B] - CT [C] **M14. SUSPECTED OSTEOMALACIA WITH PAIN** - XR [B] - MRI [C] - NM (bone scan) [C]
USPSTF 2018 [48,49]	- DEXA in women (B recommendation)

Guideline group AGREE-II Assessment	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; DEXA: dual-energy x-ray absorptiometry; MRI: magnetic resonance imaging; NM: nuclear medicine; XR: radiograph	
Moderate quality	- In men (I statement [insufficient evidence])

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; PDB: Paget's Disease of Bone; NICE: National Institute for Health and Care Excellence; RCR: Royal College of Radiologists; USPSTF: United States Preventive Services Task Force

Note: The NICE Osteoporosis: assessing the risk of fragility fracture guideline was published in 2012, with a surveillance report in 2019 determining the need for an update)

Table M14. Stress fracture (insufficiency, fatigue)

Guideline group AGREE-II Assessment	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included)
CAR 2012 [19]	This scenario was not addressed in the 2012 CAR guidelines.
ACR 2017 [50] Moderate quality	**STRESS (FATIGUE/INSUFFICIENCY) FRACTURE, INCLUDING SACRUM, EXCLUDING OTHER VERTEBRAE** ▪ Variant 1. Suspected stress (fatigue) fracture, excluding vertebrae. First imaging study. ▪ Variant 2. Suspected stress (fatigue) fracture, hip. Negative radiographs. Next imaging study. ▪ Variant 3. Suspected stress (fatigue) fracture, excluding hip and vertebrae. Negative radiographs. Next imaging study. ▪ Variant 6. Suspected stress (insufficiency) fracture, pelvis or hip. First imaging study. ▪ Variant 7. Suspected stress (insufficiency) fracture, pelvis or hip. Negative radiographs. Next imaging study. ▪ Variant 8. Suspected stress (insufficiency) fracture of lower extremity, excluding pelvis and hip. First imaging study. ▪ Variant 9. Suspected stress (insufficiency) fracture of lower extremity, excluding pelvis and hip. Negative radiographs. Next imaging study. ▪ Variant 11. Suspect stress (fatigue or insufficiency) fracture, pelvis or hip or sacrum. Pregnant patient. ▪ Variant 12. Suspect stress (fatigue or insufficiency) fracture of the long bones. Pregnant patient.

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

Table M15. Chest wall pain

Guideline group AGREE-II Assessment	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [19]	This scenario was not addressed in the 2012 CAR guidelines.
ACR 2021 [51] Moderate quality	**NONTRAUMATIC CHEST WALL PAIN** ▪ Variant 1. Nontraumatic chest wall pain. No history of malignancy. Initial imaging ▪ Variant 2. Nontraumatic chest wall pain. Known or suspected malignancy. Secondary evaluation after normal chest radiograph. Next imaging study. ▪ Variant 3. Nontraumatic chest wall pain. Suspected infectious or inflammatory condition. Secondary evaluation after normal chest radiograph. Next imaging study.

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

Table M16. Shoulder pain or instability

Guideline group AGREE-II Assessment	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; US: ultrasound	
CAR 2012 [19]	**D12. PAINFUL SHOULDER, IMPINGEMENT SYNDROME AND ROTATOR CUFF TEAR** - XR: Indicated: XR may demonstrate acromioclavicular osteoarthrosis and acromial enthesophytes, subacromial space narrowing, tendon calcification, and glenohumeral osteoarthrosis. - US: Specialized investigation [C]: Provides dynamic assessment of shoulder impingement and demonstrates rotator cuff tears or tendinopathy. It requires a trained-operator. - MRI: Specialized investigation [C]: MRI allows precise assessment of the extent of rotator cuff tears, and it also shows bursal inflammatory changes and other associated abnormalities. **D13. SHOULDER INSTABILITY** - XR: Indicated: Assess glenohumeral congruence and demonstrates bony abnormalities (Bankart and Hill-Sachs fractures). - MR arthrography: Indicated only in specific circumstances [C]: Glenoid labrum, glenohumeral ligaments, cartilage and synovial cavity are well-delineated. - CT arthrography: Indicated only in specific circumstances [C]: Glenoid labrum, glenohumeral ligaments, cartilage and synovial cavity are well-delineated.
AAOS 2019 [52] High quality	- Strong evidence supports that magnetic resonance imaging, magnetic resonance angiography, and ultrasonography are useful adjuncts to a clinical examination for identifying rotator cuff tears (Strength of recommendation: Strong).
ACR 2018 [53] Moderate quality	**SHOULDER PAIN-ATRAUMATIC.** ▪ Variant 1. Atraumatic shoulder pain. Initial imaging. ▪ Variant 2. Atraumatic shoulder pain. Suspect rotator cuff disorders (tendinosis, tear, calcific tendinitis). Initial radiographs normal or inconclusive. Next imaging study. ▪ Variant 3. Atraumatic shoulder pain. Suspect labral tear and instability. Initial radiographs normal or inconclusive. Next imaging study. ▪ Variant 4. Atraumatic shoulder pain. Suspect bursitis. Initial radiographs normal or inconclusive. Next imaging study. ▪ Variant 5. Atraumatic shoulder pain. Suspect adhesive capsulitis. Initial radiographs normal or inconclusive. Next imaging study. ▪ Variant 6. Atraumatic shoulder pain. Suspect biceps tendinitis, bursitis, dislocation, or tear. Initial radiographs normal or inconclusive. Next imaging study. ▪ Variant 8. Atraumatic shoulder pain. Neurogenic pain (excluding plexopathy). Initial imaging.
ESSR 2018 [27] Moderate quality	US for the following scenarios: - Gleno-humeral joint: dynamic instability US (OCEMB level B) - Tendons and soft tissue: Bursitis (C); Calcific tendonitis (B); Full thickness cuff tear (A); Long head biceps tendon: rupture (B); Long head biceps tendon: dislocation (B); Septic Arthritis (C) - Bones: Acromion-clavicular joint trauma/instability (B); Acromion-clavicular joint osteoarthritis (C); Occult tuberosity fracture (C) - Tendons and soft tissue: Long head biceps tendon (B): tendinopathy; Partial thickness cuff tear (A); Pectoralis/deltoid tears (C)

Guideline group AGREE-II Assessment	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; US: ultrasound	
	- Nerves: Suprascapular nerve entrapment (C)
RCR 2017 [23] High quality	**M18. PAINFUL SHOULDER (INCLUDING IMPINGEMENT SYNDROME AND SUSPECTED ROTATOR CUFF TEAR)** - US [B] - MRI [B] - XR [C] - MR/CT arthrography [B] **M19. SHOULDER INSTABILITY** - XR [C] - MRI/MR arthrography [B] - CT/CT arthrography [B]

Abbreviations: AAOS: American Academy of Orthopaedic Surgeons; ACR: American College of Radiology; CAR: Canadian Association of Radiologists; ESSR: European Society of Musculoskeletal Radiology; OCEBM: Oxford Centre for Evidence-based Medicine; RCR: Royal College of Radiologists

Table M17. Elbow pain

Guideline group AGREE-II Assessment	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included)
US: ultrasound	
CAR 2012 [19]	This scenario was not addressed in the 2012 CAR guidelines.
ESSR 2018 [27] Moderate quality	US for the following scenarios: - Tendons and soft tissues: Lateral epicondylitis (A); Medial epicondylitis; Olecranon bursitis (D); Septic arthritis/effusion (B); Snapping triceps injury (C); Synovitis (B); Triceps tendon injury (C) - Nerves: Median nerve entrapment, pronator syndrome; Radial nerve compression; Ulnar nerve neuropathy (B); Ulnar nerve subluxation (D) - Loose bodies; Lateral condyle fracture in children/fractures; Radial head subluxation/fracture; Supracondylar elbow fracture, postoperative positioning; Osteochondral injury

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; ESSR: European Society of Musculoskeletal Radiology
Note: The ACR Elbow Pain guideline [54] was last performed in 2015.

Table M18. Hand and wrist pain

Guideline group AGREE-II Assessment	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included)
US: ultrasound	
CAR 2012 [19]	This scenario was not addressed in the 2012 CAR guidelines.
ACR 2018 [55] Moderate quality	**CHRONIC WRIST PAIN.** ▪ Variant 1. Chronic wrist pain. With or without prior injury. Best initial study. ▪ Variant 2. Chronic wrist pain. Routine radiographs normal or nonspecific. Persistent symptoms. Next study. ▪ Variant 3. Chronic wrist pain. Routine radiographs normal or nonspecific. Suspect inflammatory arthritis. Next study. ▪ Variant 4. Chronic wrist pain. Radiographs normal or show nonspecific arthritis. Exclude infection. Next study. ▪ Variant 5. Ulnar-sided chronic wrist pain. Radiographs normal or nonspecific. Next study. ▪ Variant 6. Radial-sided chronic wrist pain. Radiographs normal or nonspecific. Next study. ▪ Variant 12. Chronic wrist pain. Radiographs normal or nonspecific. Suspect carpal tunnel syndrome. Next study.
ESSR 2018 [27] Moderate quality	US for the following scenarios: - Tendons and soft tissues: Central clip injury (C); De Quervain disease (C); Extensor carpi ulnaris/estensor carpi radialis tendinopathy (C); Flexor carpi ulnaris/flexor carpi radialis tendinopathy (D); Foreign body (C); Gamekeeper's thumb and Stener lesion (C); Ganglion; (C) Joint synovitis (B); Mass (C); Pulley/sagittal band/central slip injury-ruptures (C); Rugby/jersey finger (C); Tenosynovitis/rupture (C); Trigger finger (C) - Nerves: Carpal tunnel syndrome (C); Guyons canal (C); Wartenberg syndrome (C) - Bones: Hammer hand (C); Volar plate avulsion (X-ray negative) (C); Pisiform triquetral osteoarthritis (C); Scapho-trapezio trapezoidal osteoarthritis (C); Finger fracture (B)
NICE	See Rheumatoid Arthritis.

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; ESSR: European Society of Musculoskeletal Radiology; NICE: National Institute for Health and Care Excellence

Table M19. MSK Pelvis and Hip pain

Guideline group AGREE-II Assessment	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; SPECT: single-photon emission computerized tomography; XR: radiograph; US: ultrasound	
CAR 2012 [19]	**D15. NON-TRAUMATIC HIP PAIN** - XR: Indicated [C]: XR is indicated as the initial imaging modality for persistent pain. - MRI: Specialized investigation [C]: MRI is the best modality for further evaluation of persistent hip pain if the XR is normal. MRI arthrography is indicated for suspected labral tears. - NM (Tc-99m MDP bone scintigraphy): Indicated only in specific circumstances [B]: MRI is preferred over NM since NM is less specific, but NM may suffice if MRI is not readily available. May be a screening tool before MRI., especially in older patients (osteoporotic fractures). It should be noted that SPECT (or SPECT-CT whenever available) should be used. Bone scans may show pathology that may cause referred pain.
ACR 2017 [56] Moderate quality	**CHRONIC HIP PAIN.** ▪ Variant 1. Chronic hip pain. First test. ▪ Variant 2. Chronic hip pain. Radiographs negative, equivocal, or nondiagnostic. Suspect extra-articular noninfectious soft tissue abnormality, such as tendonitis. ▪ Variant 3. Chronic hip pain. Radiographs negative, equivocal, or nondiagnostic. Suspect impingement. ▪ Variant 4. Chronic hip pain. Radiographs negative, equivocal, or nondiagnostic. Suspect labral tear with or without clinical findings consistent with or suggestive of impingement. ▪ Variant 5. Chronic hip pain. Evaluate articular cartilage. Next test after radiographs.
ESSR 2018 [27] Moderate quality	US for the following scenarios: - Tendons, soft tissue, and bones: Fluid detection (A), Snapping hip: Extra-articular (A) - Intra-articular pathology: Morel-Lavalee lesions (C); Muscle injuries high grade (B); Sciatic nerve – thigh (D); Synovitis/effusion/synovial or labral cysts (A) - Nerves: Femoral (D); Lateral femoral cutaneous (C)
IHPRN 2018 [57] Moderate quality	- AP pelvis and lateral femoral head–neck radiographs - MRI/MRA or CT scan
Lisbon Agreement 2020-2021 [58–60] Moderate quality	**FEMOROACETABULAR IMPINGEMENT (FAI)** - Anteroposterior (AP) pelvic radiograph and a lateral view of the hip for assessing patients for FAI (OCEBM level 4) - AP pelvis radiograph and a Dunn 45° view for clinically suspected FAI (OCEBM level 3) - Radial MRI and CT for assessing the femoral head-neck junction (OCEBM level 3) - AP pelvic radiograph for assessing acetabular coverage (OCEBM level 3) - CT or MRI for acetabular malversion (OCEBM level 4) - CT or MRI for measurement of femoral torsion (OCEBM level 2)
RCR 2017 [23] High quality	**M21. NON-TRAUMATIC HIP PAIN INCLUDING SUSPECTED AVASCULAR NECROSIS** - XR [B]

Appendix 2. Evidence Tables

Guideline group AGREE-II Assessment	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; SPECT: single-photon emission computerized tomography; XR: radiograph; US: ultrasound	
	- MRI [B] - US [B] - NM (bone scan) [B] - CT [B]

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; ESSR: European Society of Musculoskeletal Radiology; FAI: Femoroacetabular impingement; IHPRN: International hip-related Pain Research Network; OCEMB: Oxford Centre for Evidence-based Medicine; RCR: Royal College of Radiologists

Table M20. Knee pain

Guideline group AGREE-II Assessment	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; XR: radiograph; US: ultrasound	
CAR 2012 [19]	**D17. NON-TRAUMATIC KNEE PAIN** - XR: Indicated only in specific circumstances [C]: Symptoms frequently arise from soft tissues which will not show on XR, and osteoarthritic changes are common. XR is indicated in the following circumstances: sudden or onset or exacerbation of pain; pain persisting more than 6 weeks in children and young adults; suspected intra-articular bodies (XR will only identify radio-opaque intra-articular bodies); and for pre-operative evaluation for knee replacement surgery. - MRI: Indicated only in specific circumstances [B]: MRI is the best imaging modality for the assessment of internal knee derangement (eg. meniscal tears, intra-articular bodies). - US: Indicated only in specific circumstances [C]: MRI is generally preferred over US because it evaluates the entire knee and it is not operator-dependent; however US may suffice if MRI is not readily available. US is indicated if the patient has anterior knee pain with suspected tendon pathology and/or bursitis. - NM: Indicated only in specific circumstances [C]: NM can be useful in identifying referred pain, stress fractures and other bone lesions.
ACR 2018 [61] Moderate quality	**CHRONIC KNEE PAIN.** ▪ Variant 1. Adult or child greater than or equal to 5 years of age. Chronic knee pain. Initial imaging. ▪ Variant 2. Adult or child greater than or equal to 5 years of age. Chronic knee pain. Initial knee radiograph negative or ▪ demonstrates joint effusion. Next imaging procedure. ▪ Variant 3. Adult or child greater than or equal to 5 years of age. Chronic knee pain. Initial knee radiograph demonstrates osteochondritis dissecans (OCD), loose bodies, or history of cartilage or meniscal repair. Next imaging procedure. ▪ Variant 4. Adult or child greater than or equal to 5 years of age. Chronic knee pain. Initial knee radiograph demonstrates degenerative changes or chondrocalcinosis. Next imaging procedure. ▪ Variant 5. Adult or child greater than or equal to 5 years of age. Chronic knee pain. Initial knee radiograph demonstrates signs of prior osseous injury (ie, Segond fracture, tibial spine avulsion, etc). Next imaging procedure.
ESSR 2018 [27] Moderate quality	US for the following scenarios: - Bones: Septic arthritis (A-B) - Tendons and soft tissues: Baker's cyst (A); Extra-articular ganglion (A); Osgood-Schlatter, Sinding-Larsen (A); Patellar tendinopathy/tear (A); Periarticular bursitis (A); Pes anserinus tendinobursitis (C); Quadriceps tendinosis/tear (A); Semitendinosus tendon (C); Semimembranosus tendon (C); Synovitis, effusion (A) - Nerves (A)
RCR 2017 [23] High quality	**M22. KNEE PAIN WITHOUT TRAUMA, LOCKING OR RESTRICTION OF MOVEMENT** - XR [C] - MRI [B] - US [C] **M23. KNEE PAIN WITH LOCKING**

Appendix 2. Evidence Tables

Guideline group AGREE-II Assessment	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; XR: radiograph; US: ultrasound	
	- MRI [B] - XR [C]

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; ESSR: European Society of Musculoskeletal Radiology; OCEBM: Oxford Centre for Evidence-based Medicine; RCR: Royal College of Radiologists

Table M21. Ankle pain (non-traumatic)

Guideline group AGREE-II Assessment	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included)
US: ultrasound	
CAR 2012 [19]	This scenario was not addressed in the 2012 CAR guidelines.
ACR 2018 [62] Moderate quality	**CHRONIC ANKLE PAIN.** ▪ Variant 1. Chronic Ankle Pain. Initial Imaging. ▪ Variant 3. Chronic ankle pain. Ankle radiographs normal, suspected osteochondral lesion. Next study. ▪ Variant 4. Chronic ankle pain. Ankle radiographs normal or nonspecific, suspected tendon abnormality. Next study. ▪ Variant 5. Chronic ankle pain. Ankle radiographs normal or nonspecific, suspected ankle instability. Next study. ▪ Variant 6. Chronic ankle pain. Ankle radiographs normal or nonspecific, suspected ankle impingement syndrome. Next study. ▪ Variant 7. Chronic ankle pain. Ankle radiographs normal, pain of uncertain etiology. Next study.
ESSR 2018 [27] Moderate quality	US for the following scenarios: - Tendons and soft tissues: Anterior talo-fibular ligament (A); Calcaneo-fibular ligament (A); Calcific tendinitis (A); Ganglion cysts (A); Joint effusions (C-D); Peroneal dislocation (A); Plantar fasciitis (A); Postoperative tendon tear (B); Retinacula (D); Retrocalcaneal bursitis (A); Sheath effusions (A); Synovitis, Tears (A); Tendinopathy (C) - Nerves: Entrapment (A) - Ankle joint instability (A) - Bones: Loose bodies (D); Bony avulsions (B)

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; ESSR: European Society of Musculoskeletal Radiology

Table M22. Foot pain (non-traumatic)

Guideline group AGREE-II Assessment	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; US: ultrasound	
CAR 2012 [19]	**D18. CHRONIC FOOT PAIN** - XR: Indicated only in specific circumstances [C]: Most patients should be managed on the basis of clinical findings without need for imaging. The cause of pain is rarely detectable on XR however XR is the first-line investigation for the imaging work-up of chronic foot pain. Pre-operative and post-operative evaluation of hallux valgus is best performed with weight-bearing AP and lateral XR of the feet. - MRI: Specialized investigation [C]: If XR is unremarkable/equivocal and suspect tarsal coalition, plantar fasciitis, tarsal tunnel syndrome, painful accessory navicular, Morton's neuroma, or inflammatory arthropathy. - US: Specialized investigation [C]: If proper expertise is available, US can be used in place of MRI to investigate tendinopathy, plantar fasciitis, tarsal tunnel syndrome, suspected inflammatory arthropathy, or Morton's neuroma. - NM (Tc-99m bone scintigraphy): Specialized investigation [C]: If suspect reflex sympathetic dystrophy, synovitis, stress or insufficiency fractures, or enthesopathy, and XR is negative/equivocal. - CT: Specialized investigation [C]: If suspect tarsal coalition and XR is unremarkable/equivocal.
ACR 2020 [63] Moderate quality	**CHRONIC FOOT PAIN.** ▪ Variant 1. Chronic foot pain. Unknown etiology. Initial imaging. ▪ Variant 3. Chronic metatarsalgia including plantar great toe pain. Radiographs negative or equivocal. Clinical concern includes sesamoiditis, Morton's neuroma, intermetatarsal bursitis, chronic plantar plate injury, or Freiberg's infraction. Next imaging study. ▪ Variant 4. Chronic plantar heel pain. Radiographs negative or equivocal. Clinical concern includes plantar fasciitis or plantar fascia tear. Next imaging study. ▪ Variant 5. Non-radiating chronic midfoot pain of suspected osseous origin. Radiographs negative or equivocal. Clinical concern includes occult fracture, or painful accessory ossicles. Next imaging study.
ESSR 2018 [27] Moderate quality	US for the following scenarios: - Tendons and soft tissues: Anterior talo-fibular ligament (A); Calcaneo-fibular ligament (A); Calcific tendinitis (A); Ganglion cysts (A); Joint effusions (C-D); Peroneal dislocation (A); Plantar fasciitis (A); Plantar plate (A); Postoperative tendon tear (B); Retinacula (D); Retrocalcaneal bursitis (A); Sheath effusions (A); Synovitis, Tears (A); Tendinopathy (C) - Nerves: Entrapment (A) - Bones: Loose bodies (D); Bony avulsions (B)
NICE	See Rheumatoid Arthritis.
RCR 2017 [23] High quality	**M25. HALLUX VALGUS** - XR [C] **M26. HEEL PAIN, SUSPECTED PLANTAR FASCIITIS** - US/MRI [B] - XR [C]

Guideline group AGREE-II Assessment	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; US: ultrasound	
	M28. FOREFOOT PAIN, SUSPECTED MORTON'S NEUROMA - XR [C] - US [C] - MRI [C]

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; ESSR: European Society of Musculoskeletal Radiology; NICE: National Institute for Health and Care Excellence

Table M23. Orthopedic hardware/arthroplasty pain/symptoms

Guideline group AGREE-II Assessment	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; US: ultrasound	
CAR 2012 [19]	**D19. PAINFUL PROSTHESIS** - XR: Indicated [B]: XR is indicated as the initial imaging to detect established loosening. - NM: Indicated [B]: NM is valuable for the investigation of late complications. Imaging should be discussed with a NM specialist to determine the most appropriate procedure. - Image-guided aspiration: Specialized investigation [B]: Image guided aspiration is particularly helpful if there is concern about infection. - US: Specialized investigation [C]: US is indicated if a peri-prosthetic abscess or superficial infection is suspected. - MRI: Specialized investigation [C]: MRI is indicated if there is concern about peri-prosthetic soft tissue abnormalities.
ACR 2017 [20] Moderate quality	**SUSPECTED OSTEOMYELITIS, SEPTIC ARTHRITIS, OR SOFT TISSUE INFECTION (EXCLUDING SPINE AND DIABETIC FOOT)** ▪ Variant 6. Pain and swelling or cellulitis associated with site of previous non-arthroplasty hardware. Suspected osteomyelitis or septic arthritis. Additional imaging following radiographs.
ACR 2017 [64] **ACR 2017** [65] Moderate quality (both guidelines)	**IMAGING AFTER TOTAL KNEE ARTHROPLASTY** [64] ▪ Variant 3. Pain after total knee arthroplasty. Periprosthetic infection not excluded. Initial imaging evaluation, including image-guided intervention. ▪ Variant 8. Pain after total knee arthroplasty. Clinical concern for instability. ▪ Variant 9. Pain after total knee arthroplasty. Suspect periprosthetic fracture. ▪ Variant 10. Status post total knee arthroplasty. Suspect complications related to the patella or the patellar liner (subluxation, dislocation, fracture, component loosening or wear, impingement, and osteonecrosis). ▪ Variant 11. Pain after total knee arthroplasty. Measuring component rotation. ▪ Variant 12. Pain after total knee arthroplasty. Suspect periprosthetic soft-tissue abnormality unrelated to infection, including quadriceps or patellar tendinopathy (quadriceps or patellar tendon tears, postoperative arthrofibrosis, patellar clunk syndrome, or impingement of nerves or other soft tissues). **IMAGING AFTER SHOULDER ARTHROPLASTY** [65] ▪ Variant 2: Symptomatic Patient With a Primary Shoulder Arthroplasty; Unknown Diagnosis; Initial Study. ▪ Variant 3: Evaluating Patients With Painful Primary-Shoulder Arthroplasty: Suspect Aseptic Loosening. Additional Imaging After Radiography ▪ Variant 4: Evaluating Patients With Painful Primary Shoulder Arthroplasty: Suspect Infection; Additional Imaging After Radiography. ▪ Variant 5: Evaluating Patients With Painful Primary Total Shoulder Arthroplasty: Suspect Fracture; Additional Imaging After Radiography. ▪ Variant 6: Evaluating Primary Shoulder Arthroplasty Patients With Possible Rotator Cuff Tear; Additional Imaging After Radiography.

Appendix 2. Evidence Tables

Guideline group AGREE-II Assessment	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; US: ultrasound	
EANM/EBJIS/ESR 2019 [22,66] Moderate quality	- Conventional radiographies (OCEBM level 2) - US (OCEBM level 2) - CT (OCEBM level 2)
ICOI 2019 [67] Moderate quality	- Nuclear imaging (Level of evidence: moderate)
RCR 2017 [23] High quality	**M24. PAINFUL PROSTHESIS** - XR [B] - NM (bone scan, white-cell scan) [B] - US [C] - Arthrography (aspiration/biopsy) [B] - MRI [B] - CT [B] - PET-CT [B]

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; EANM: European Association of Nuclear Medicine; EBJIS: European Bone and Joint Infection Society; ESR: European Society of Radiology; ESSR: European Society of Musculoskeletal Radiology; ICOP: International Consensus on Orthopedic Infections; OCEBM: Oxford Centre for Evidence-based Medicine: RCR: Royal College of Radiologists

Table M24. Avascular necrosis/bone infarction

Guideline group AGREE-II Assessment	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; SPECT: single-photon emission computerized tomography; XR: radiograph	
CAR 2012 [19]	**D16. SUSPECTED AVASCULAR NECROSIS** - XR: Indicated [B]: XR is indicated as the initial imaging modality, but it only becomes abnormal in established disease and may be negative within the first 6-9 months. - MRI: Indicated [B]: MRI is the most sensitive imaging modality for the detection of early avascular necrosis and will show the extent of necrosis. MRI is useful to detect occult avascular necrosis in the contralateral hip. It may be required for surgical planning. - NM (Tc-99m bone scintigraphy with SPECT): Specialized investigation [B]: NM can be used if MRI is not readily available. - CT: Specialized investigation [B]: CT is not as sensitive but may be used if MRI is not readily available.
ACR 2016 [68] Moderate quality	**OSTEONECROSIS OF THE HIP.** ▪ Variant 1. Adult or child. Clinically suspected osteonecrosis. First study. ▪ Variant 2. Adult. Clinically suspected osteonecrosis. Normal radiographs or radiographs that show femoral head lucencies suspicious for osteonecrosis. ▪ Variant 6. Adult or child. Osteonecrosis clinically suspected. Radiographs normal or abnormal but MRI contraindicated. Further evaluation is needed.
German S3-guideline 2016 [69] Moderate quality	**Diagnosis of Non-traumatic avascular necrosis of the femoral head** - Radiographs (pelvis ap and lateral hip/Lauenstein view) (LoE not reported) - MRI scan of both hips (SIGN 2014 LoE 2++, AMFW recommendation "should") - MRI scans to determine area and extent of necrosis and to exclude/confirm subchondral fracture and collapse (SIGN 2014 LoE 2-3, AMFW recommendation "should") - CT scan (SIGN 2014 LoE 2++, AMFW recommendation "should") - Bone scanning (SIGN 2014 LoE 2++, AMFW recommendation "may")
RCR 2017 [23]	See Hip pain (non-traumatic) **M21. NON-TRAUMATIC HIP PAIN INCLUDING AVASCULAR NECROSIS**

Abbreviations: ACR: American College of Radiology; AMFW: Association of the Scientific Medical Societies in Germany; ARCO: Association Research Circulation Osseous; CAR: Canadian Association of Radiologists; LoE: level of evidence; RCR: Royal College of Radiologists

Table M25. Complex regional pain syndrome (CRPS)

Guideline group AGREE-II Assessment	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included)
CAR 2012 [19]	This scenario was not addressed in the 2012 CAR guidelines.
ACR 2020 [63] **ACR 2018** [53] Moderate quality (both guidelines)	**CHRONIC FOOT PAIN** [63] ▪ Variant 2. Persistent posttraumatic foot pain. Radiographs negative or equivocal. Clinical concern includes complex regional pain syndrome type I. Next imaging study. **SHOULDER PAIN-ATRAUMATIC** [53] ▪ Variant 8: Atraumatic Shoulder Pain. Neurogenic Pain (Excluding Plexopathy). Initial Imaging.

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; CRPS: Complex regional pain syndrome; NICE: National Institute for Health and Care Excellence

Note: A 2021 NICE guideline covers treatment for CRPS, but diagnostic imaging was not covered by this guideline.

APPENDIX 3A. MUSCULOSKELETAL SYSTEM SUMMARY OF RECOMMENDATIONS (ENGLISH)

Clinical/ Diagnostic Scenario	Recommendations	Strength of Rec.
CT: computed tomography; **MRI**: magnetic resonance imaging; **NM**: nuclear medicine; **PET**: positron emission tomography; **US**: ultrasound; **XR**: radiograph **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
M1. Osteomyelitis, including diabetic foot	**1.** In adults with suspected osteomyelitis, including the diabetic foot, we recommend **XR** as the initial imaging modality.	↑↑
	↳ **1.1** If further investigation is required, we recommend **MRI** as the next imaging modality.	↑↑
	↳ **1.2** If MRI is unavailable or contraindicated, we suggest **CT** (with contrast) or **NM** (bone scan). *For bone scan, the radioisotope and protocol employed may vary based on clinical presentation, regional practice preferences and resource availability.*	↑
	2. In adults with suspected osteomyelitis, we recommend **CT** for evaluation of sequestra or for guiding biopsy.	↑↑
	3. In adults with suspected osteomyelitis, where MRI or CT were not performed, we suggest **US** to evaluate for superficial fluid collections.	↑
M2. Septic arthritis	**1.** In adults with suspected septic arthritis, we recommend **XR** as the initial imaging modality.	↑↑
	↳ **1.1** If further investigation is required, we recommend **MRI** as the next imaging modality.	↑↑
	↳ **1.2** If MRI is unavailable or contraindicated, we suggest **CT** (with contrast).	↑
	2. In adults with suspected septic arthritis, where MRI or CT were not performed, we suggest **US** to evaluate for effusion or juxta-articular fluid collections.	↑
	3. In adults with suspected septic arthritis, we suggest **US** or **Fluoroscopy** to facilitate arthrocentesis, immediately after XR, if bedside arthrocentesis is not feasible.	EPc
M3. Soft tissue infection *For imaging of foreign bodies, see Trauma*	**1.** In adults with suspected soft tissue infection, including necrotizing fasciitis, we recommend **XR** as the initial imaging modality. *If necrotizing fasciitis is suspected, surgical consultation should not be delayed by imaging. Imaging may be ordered concurrently with surgical consultation, or even bypassed at the discretion of the surgeon.*	↑↑

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	Recommendations	Strength of Rec.
CT: computed tomography; **MRI**: magnetic resonance imaging; **NM**: nuclear medicine; **PET**: positron emission tomography; **US**: ultrasound; **XR**: radiograph **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
clinical/diagnostic scenario T16. Superficial soft tissue injury foreign body.	**2.** In adults with suspected deep or aggressive soft tissue infection, we recommend **MRI** as the next imaging modality.	↑↑
	↳ **2.1** If MRI is unavailable or contraindicated, we suggest **CT** (with contrast).	↑
	3. In adults with suspected soft tissue infection, we suggest **US** to evaluate for superficial fluid collections.	↑
	↳ **3.1** If further investigation is required, we recommend **MRI** as the next imaging modality.	↑↑
	↳ ↳ **3.2** If MRI is unavailable or contraindicated, we suggest **CT** (with contrast).	↑
M4. Bone tumour – Primary	**1.** In adults with suspected primary bone tumour, we recommend **XR** as the initial imaging modality.	↑↑
	↳ **1.1** If further investigation is required, we recommend **MRI** as the next imaging modality.	↑↑
	↳ ↳ **1.2** If MRI is unavailable or contraindicated, we suggest **CT** (with contrast).	↑
	↳ ↳ ↳ **1.3** If XR, MRI or CT remain equivocal, we suggest **NM** (bone scan).	EPc
M5. Bone tumour – Metastases	**1.** In adults with known primary cancer (non-myeloma), we recommend **NM** (bone scan) as the initial imaging modality to assess for skeletal metastases.	↑↑
	2. In adults with suspected bone metastases, we recommend **XR** as the initial imaging modality for assessment of focal symptomatic sites, or for correlation with a NM, MRI or CT finding.	↑↑
	3. In adults with metastases seen on XR requiring further local assessment or staging, we recommend **MRI**.	↑↑
	↳ **3.1** If MRI is unavailable or contraindicated, we suggest **CT** (with contrast).	↑
	4. In adults with suspected metastases, we recommend against **skeletal survey XR**.	↓↓
	5. In adults with suspected bone metastases, **whole-body CT**, **whole-body MRI**, and **PET** are evolving techniques and may be used depending on regional practice preferences and resource availability.	EPc
M6. Bone tumour – Myeloma	**1.** In adults with suspected myeloma, we recommend **whole-body CT** (low dose) or **PET/CT** as the initial imaging modality for staging.	↑↑

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	Recommendations	Strength of Rec.
CT: computed tomography; **MRI**: magnetic resonance imaging; **NM**: nuclear medicine; **PET**: positron emission tomography; **US**: ultrasound; **XR**: radiograph **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
	↳ **1.1** If whole-body CT or PET/CT is negative or unavailable, we recommend **whole-body MRI** as the next imaging modality.	↑↑
	↳ ↳ **1.2** If whole-body CT, PET/CT, and MRI are unavailable or contraindicated, we suggest **XR** (skeletal survey).	↑
	2. In adults with known myeloma, we recommend **XR** for assessment of focal symptomatic sites, or for correlation with an MRI or CT finding.	↑↑
	3. In adults with suspected myeloma, we recommend against **NM** (bone scan).	↓↓
M7. Soft tissue mass or tumour	**1.** In adults with superficial soft tissue mass, we recommend **US** as the initial imaging modality.	↑↑
	↳ **1.1** If further investigation is required, we recommend **MRI** as the next imaging modality.	↑↑
	2. In adults with deep or large soft tissue mass (≥5 cm), we recommend **MRI** as the initial imaging modality.	↑↑
	↳ **2.1** If MRI is unavailable or contraindicated, we suggest **CT** (with contrast).	↑
	3. In adults with soft tissue masses, we recommend **XR** for evaluation of calcification, or if bone/ joint involvement is suspected, after US.	↑↑
M8. Soft tissue pain (non-periarticular)	**1.** In adults with non-joint soft tissue pain, we recommend **US** as the initial imaging modality.	EPc
	↳ **1.1** If further investigation is required, we recommend **MRI** as the next imaging modality.	EPc
	↳ ↳ **1.2** If MRI is unavailable or contraindicated, we suggest **CT** (with contrast).	EPc
	2. In adults with non-joint soft tissue pain, we suggest **XR** for evaluation of regional bone pathology.	EPc
M9. Osteoarthritis/ Crystalline Arthropathy	**1.** In adults with suspected osteoarthritis or crystalline arthropathy, we recommend **XR** as the initial imaging modality.	↑↑
	2. In adults with suspected gout, we suggest **US** as a complement to XR to identify tophi.	↑
	3. In adults with suspected gout, **CT** (dual-energy) may be used depending on regional practice preferences and resource availability.	EPc

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	Recommendations	Strength of Rec.
CT: computed tomography; **MRI**: magnetic resonance imaging; **NM**: nuclear medicine; **PET**: positron emission tomography; **US**: ultrasound; **XR**: radiograph **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
M10. Inflammatory Arthropathy (Rheumatoid/ Peripheral Spondyloarthropathy)	**1.** In adults with suspected inflammatory arthropathy, we recommend **XR** as the initial imaging modality.	↑↑
	↳ **1.1** If further investigation is required for evaluation of findings such as effusion, synovitis, erosions and enthesitis, we suggest **US** as the next imaging modality.	↑
	↳ **1.2** In adults with multifocal joint pain, we suggest **NM** (bone scan) as an alternative to US to determine the distribution of synovitis.	↑
	↳ **1.3** If further investigation is required for evaluation of findings such as acute synovitis, cartilage damage, erosions, and bone marrow edema OR as an alternative to US, we suggest **MRI** as the next imaging modality.	↑
M11. Spondyloarthropathy (Axial)	**1.** In adults with suspected axial spondyloarthropathy, we recommend **XR of the sacroiliac joints ± spine** as the initial imaging investigation.	↑↑
	↳ **1.1** If further investigation is required, we recommend **MRI of the sacroiliac joints ± spine** as the next imaging investigation.	↑↑
	↳ **1.2** If MRI is unavailable or contraindicated, we suggest **CT of the sacroiliac joints ± spine**.	↑
	2. In adults with suspected axial spondyloarthropathy, we recommend against **NM** (bone scan).	↓↓
M12. Bone pain (non-joint) *If concern for: **osteomyelitis**, see M01; **primary bone tumour**, see M04; **osseous metastasis**, see M5; **myeloma**, see M6; **metabolic bone disease**, see M13; **stress fracture**, see M14; **avascular necrosis/bone infarction**, see M24.*	**1.** In adults with non-traumatic, non-joint bone pain, we recommend **XR** of the symptomatic area(s) as the initial imaging modality.	↑↑
	↳ **1.1** If further investigation is required, we recommend **MRI** as the next imaging modality.	↑↑
	↳ **1.2** If MRI is unavailable or contraindicated, we suggest **CT**.	EPc
	↳ **1.3** If **CT** is unavailable, we recommend **NM** (bone scan).	↑↑
M13. Metabolic bone disease, including	**1.** In adults with suspected osteoporosis, we recommend **Dual-energy X-ray absorptiometry (DEXA)** for the measurement of bone mineral density (↑↑).	↑↑

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	Recommendations	Strength of Rec.
CT: computed tomography; **MRI**: magnetic resonance imaging; **NM**: nuclear medicine; **PET**: positron emission tomography; **US**: ultrasound; **XR**: radiograph **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
osteoporosis and osteomalacia *If concern for **stress fracture**, see M14. Stress fracture.*	**2.** In adults with suspected metabolic bone disease with pain or focal area of concern, we recommend **XR** as the initial imaging modality (↑↑).	↑↑
	↳ **2.1** If further investigation is required, we recommend **MRI** as the next imaging modality (↑↑).	↑↑
	↳ **2.2 If** MRI is not available or is contraindicated, we suggest **CT** to evaluate focal pain (↑).	↑
	3. In adults with suspected metabolic bone disease with multi-focal areas of pain or concern, we suggest **NM** (bone scan) as the initial imaging modality (↑).	↑
M14. Stress fracture (insufficiency, fatigue)	**1.** In adults with suspected stress (fatigue or insufficiency) fracture, we recommend **XR** of the area of interest as the initial imaging modality.	↑↑
	↳ **1.1** If **further** investigation is required for evaluation of suspected stress fracture, we recommend **MRI** for the pelvis and hip and suggest **MRI** for any other sites as the next imaging modality.	↑↑/EPc
	↳ **1.2** If MRI is unavailable or is contraindicated or would result in a clinically significant delay in diagnosis, we suggest **CT**.	↑
	↳ **1.3** If CT is unavailable, we suggest **NM** (bone scan).	↑
M15. Chest wall pain	**1.** In adults with non-traumatic chest wall pain, we recommend **XR of the chest ± ribs** as the initial imaging investigation (↑↑).	↑↑
	↳ **1.1** If further investigation is required for evaluation of <u>focal</u> chest wall or joint area of concern, we suggest **US** as the next imaging modality (↑).	↑
	↳ **1.2** If **further** investigation is required, we recommend **MRI** (↑↑).	↑↑
	↳ **1.3** If **further** investigation is required for evaluation of <u>diffuse</u> chest wall or intra-thoracic pathology, we recommend **CT** as the next imaging modality (↑↑).	↑↑
M16. Shoulder pain or instability	**1.** In adults with shoulder pain or instability, we recommend **XR** as the initial imaging modality. *For evaluation of instability, routine XR series may need to be supplemented with specialized radiographic projections, based on regional practice preferences.*	↑↑

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	Recommendations	Strength of Rec.
CT: computed tomography; **MRI**: magnetic resonance imaging; **NM**: nuclear medicine; **PET**: positron emission tomography; **US**: ultrasound; **XR**: radiograph **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
	↳ **1.1** If further investigation is required for evaluation of soft tissue pathology, such as rotator cuff tear, tendinopathy, effusion, bursitis, soft tissue calcification, or extra-articular impingement, we recommend **US** as the next imaging modality.	↑↑
	↳ **1.2** If further investigation is required OR as an alternative to US, we recommend **MRI**. *For assessment of degenerative joint pathology, if XR demonstrates greater than mild osteoarthritis, MRI may not be indicated as it often will not advance diagnosis or management. Specialist consultation should be considered, to determine if MRI is required.*	↑↑
	↳ **1.3** In adults with suspected labral tear, ligamentous and cartilage injuries, or instability, we recommend **MR arthrography** or **high-field MRI** (i.e., 3T), with selected MRI technique based on regional preference/ availability/ expertise.	↑↑/EPc
	↳ **1.4** If MRI is unavailable or contraindicated, we suggest **CT arthrography** to evaluate for findings such as rotator cuff and/or labral tear.	↑
	2. In adults with shoulder pain or instability, after XR, we suggest **CT** for evaluation of clinically relevant bone anatomy, in the context of pre-operative planning.	↑
M17. Elbow pain	**1.** In adults with <u>elbow joint pain of suspected articular origin</u>, we recommend **XR** as the initial imaging modality.	↑↑
	↳ **1.1** If further investigation is required, we recommend **MRI** as the next imaging modality. *For assessment of degenerative joint pathology, if XR demonstrates greater than mild osteoarthritis, MRI may not be indicated as it often will not advance diagnosis or management. Specialist consultation should be considered, to determine if MRI is required.*	↑↑
	2. In adults with <u>elbow pain with suspected</u> tendon pathology, nerve compression, effusion, synovitis, or bursitis, we recommend **XR** or **US** as the initial imaging modality.	↑↑
	↳ **2.1** If further investigation is required, we recommend **MRI** as the next imaging modality.	↑↑
	3. In adults with elbow pain, after XR, we suggest **CT** for evaluation of clinically relevant bone anatomy, in the context of pre-operative planning.	↑

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	Recommendations	Strength of Rec.
CT: computed tomography; **MRI**: magnetic resonance imaging; **NM**: nuclear medicine; **PET**: positron emission tomography; **US**: ultrasound; **XR**: radiograph **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
M18. Hand and wrist pain *For suspected **inflammatory arthritis of the wrist**, see M9. Inflammatory Arthropathy (Rheumatoid/ Peripheral Spondyloarthropathy).*	**1.** In adults with hand and/or wrist joint pain, we suggest **XR** as the initial imaging modality. *Routine XR series may need to be supplemented with specialized radiographic projections, based on clinical presentation and regional practice preferences.*	↑
	↳ **1.1** If further investigation is required, we suggest **MRI**. *For assessment of degenerative joint pathology, if XR demonstrates greater than mild osteoarthritis, MRI may not be indicated as it often will not advance diagnosis or management. Specialist consultation should be considered, to determine if MRI is required.*	↑
	↳ **1.2** If **MRI** is unavailable or contraindicated, we suggest **CT arthrography** for the evaluation of the triangulofibrocartilaginous complex (TFCC), intrinsic ligaments of the wrist or capsule.	↑
	2. In adults with hand and/or wrist pain suspected to be soft tissue related, such as ganglion cyst, synovitis, tenosynovitis, we suggest **US** as the initial imaging modality.	↑
	↳ **2.1** As an alternative to US, we suggest **MRI**.	↑
	3. In adults with hand and/or wrist pain, after XR, we suggest **CT** for evaluation of bone anatomy, chronic scaphoid fracture OR in the context of pre-operative planning.	↑
M19. MSK pelvis and hip pain *For: **sacroiliac joint pathology**, see M10; suspected **fracture**, see M14; **avascular necrosis** of the hip, see M24.*	**Hip pain** **1.** In adults with hip pain, we recommend **XR** as the initial imaging modality. *Routine XR series may need to be supplemented with specialized radiographic projections, for conditions such as femoroacetabular impingement (FAI), hip dysplasia, or post-traumatic deformity, based on clinical concern and regional practice preferences.*	↑↑
	2. For evaluation of internal derangement of the hip such as labral tear, osteochondral injury, or intraarticular body and if further investigation is required, we recommend **MR arthrography** or **high-field MRI** (i.e., 3T). *For assessment of degenerative joint pathology, if XR demonstrates greater than mild osteoarthritis, MRI may not be indicated as it often will not advance diagnosis or management. Specialist consultation should be considered, to determine if MRI is required.*	↑↑/EPc

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	Recommendations	Strength of Rec.
CT: computed tomography; **MRI**: magnetic resonance imaging; **NM**: nuclear medicine; **PET**: positron emission tomography; **US**: ultrasound; **XR**: radiograph **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
	If XR demonstrates features associated with femoroacetabular impingement (FAI) or hip dysplasia, then consultation to orthopaedic surgery or sports medicine specialist is suggested as MRI may not be the most appropriate, next investigative modality.	
	↳ **2.1** If MRI is unavailable or is contraindicated, we suggest **CT arthrography** for evaluation for internal derangement of the hip.	↑
	3. For evaluation of deep soft tissue pathology, after XR, we recommend **MRI** as the next imaging modality.	↑↑
	4. For evaluation of superficial soft tissue pathology, after XR, we recommend **US** or **MRI** as the next imaging modality.	↑↑
	5. In adults with hip pain, we suggest **CT** for evaluation of clinically relevant bone anatomy, typically in the context of pre-operative planning.	EPc
	Musculoskeletal Pelvic Pain (including osteitis pubis or athletic pubalgia)	
	6. In adults with musculoskeletal pelvic pain, we suggest **XR** as the initial imaging modality.	EPc
	↳ **6.1** If further investigation is required, we suggest **MRI** as the next imaging modality.	EPc
	↳ **6.2** If **MRI** is unavailable or contraindicated, we suggest **US** if pathology is favoured to be soft tissue related.	EPc
	↳ **6.3** If MRI is unavailable or contraindicated, we suggest **CT** or **NM** (bone scan) if pathology is favoured to be osseus.	EPc
M20. Knee pain	**1.** In adults with knee joint pain, we recommend **XR** as the initial imaging modality.	↑↑
	↳ **1.1** If further investigation is required, we recommend **MRI** as the next imaging modality. *For assessment of degenerative joint pathology, if XR demonstrates greater than mild osteoarthritis, MRI may not be indicated as it often will not advance diagnosis or management. Specialist consultation should be considered, to determine if MRI is required.*	↑↑
	↳ **1.2** If MRI is unavailable or contraindicated, we suggest **CT arthrography** to evaluate for findings such as meniscal tear or chondral defects.	↑

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Clinical/ Diagnostic Scenario	Recommendations	Strength of Rec.
CT: computed tomography; **MRI**: magnetic resonance imaging; **NM**: nuclear medicine; **PET**: positron emission tomography; **US**: ultrasound; **XR**: radiograph **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
	2. In adults with knee pain suspected to be soft tissue related, such as extensor mechanism pathology, bursitis, joint effusion, and popliteal cyst/mass, we recommend **US** as the initial imaging modality.	↑↑
	↳ **2.1** As an alternative to US, we recommend **MRI**.	↑↑
	3. In adults with chronic knee joint pain, after XR, we suggest **CT** for evaluation of clinically relevant bone anatomy in scenarios such as patellofemoral maltracking, osteochondral defect, or intraarticular bodies OR in the context of pre-operative planning.	↑ OR EPc
M21. Ankle pain	**1.** In adults with ankle pain, we recommend **XR** as the initial imaging modality (↑↑).	↑↑
	↳ **1.1** If further investigation is required for evaluation of effusion or tendon abnormality, we recommend **US** as the next imaging modality.	↑↑
	↳ **1.2** If further investigation is required to evaluate for findings such as osteochondral lesion or unstable ligament tears, or as an alternative to US for tendon pathology, we recommend **MRI** as the next imaging modality. *For assessment of degenerative joint pathology, if XR demonstrates greater than mild osteoarthritis, MRI may not be indicated as it often will not advance diagnosis or management. Specialist consultation should be considered, to determine if MRI is required.*	↑↑
	2. In adults with ankle pain, after XR, we suggest **CT** for evaluation of clinically significant bone anatomy in scenarios such as osteochondral defect, intraarticular bodies, tarsal coalition OR in the context of pre-operative planning.	↑ OR EPc
M22. Foot pain	**1.** In adults with foot pain, we suggest **XR** as the initial imaging modality.	↑
	2. In adults with foot pain suspected to be soft tissue related, such as plantar fasciitis, tendon pathology, bursitis, Morton's neuroma, we suggest **US** as the next imaging modality.	↑
	↳ **2.1** If further investigation is required for evaluation for findings such as stress fracture, tarsal coalition, plantar fasciitis, tarsal tunnel syndrome, tendon pathology, or Morton's neuroma, we suggest **MRI**.	↑

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Clinical/ Diagnostic Scenario	Recommendations	Strength of Rec.
CT: computed tomography; **MRI**: magnetic resonance imaging; **NM**: nuclear medicine; **PET**: positron emission tomography; **US**: ultrasound; **XR**: radiograph **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
	For assessment of degenerative joint pathology, if XR demonstrates greater than mild osteoarthritis, MRI may not be indicated as it often will not advance diagnosis or management. Specialist consultation should be considered, to determine if MRI is required.	
	3. In adults with foot pain, after XR, we suggest **CT** for evaluation of pathologies such as stress fracture, osteochondral defect OR for evaluation of clinically relevant bone anatomy, typically in the context of pre-operative planning.	↑↑ OR EPc
	4. In adults with foot pain suspected to be a stress fracture, if MRI and CT are unavailable or contraindicated, we suggest **NM** (bone scan).	↑
M23. Orthopedic hardware/ arthroplasty pain/ symptoms	**1.** In adults with orthopedic hardware/arthroplasty pain or symptoms, we recommend **XR** as the initial imaging modality, to evaluate for findings such as fracture, dislocation, periprosthetic osteolysis, or hardware fracture/ loosening.	↑↑
	↳ **1.1** If further investigation is required for evaluation of periprosthetic osteolysis or fracture, we recommend **CT** as the next imaging modality. Metal artifact reduction parameters should be implemented.	↑↑
	↳ **1.2** In adults with orthopedic hardware/arthroplasty pain or symptoms suspicious for infection, loosening, or fracture, we recommend **NM** (bone scan) when CT is negative, indeterminant, or unavailable.	↑↑
	2. In adults with orthopedic hardware/arthroplasty pain or symptoms suspected to be related to soft tissue pathology, after XR, we recommend **MRI** as the next imaging modality. Metal artifact reduction sequences should be implemented.	↑↑
	↳ **2.1** If MRI is not available or contraindicated, we suggest **CT** (with contrast).	↑
	3. In adults with orthopedic hardware/arthroplasty pain or symptoms, we recommend **US** to evaluate for superficial fluid collections.	↑↑
	4. In adults with orthopedic hardware/arthroplasty pain or symptoms concerning for septic arthritis, after XR, we suggest **US** or **Fluoroscopy** to facilitate arthrocentesis.	EPc

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	Recommendations	Strength of Rec.
CT: computed tomography; **MRI**: magnetic resonance imaging; **NM**: nuclear medicine; **PET**: positron emission tomography; **US**: ultrasound; **XR**: radiograph **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus		
M24. Avascular necrosis/ bone infarction	**1.** In adults with suspected avascular necrosis/bone infarction, we recommend **XR** as the initial imaging.	↑↑
	↳ **1.1** If further investigation is required for evaluation of avascular necrosis, we recommend **MRI** as the next imaging modality.	↑↑
	↳ **1.2** If MRI is unavailable or is contraindicated, we suggest **NM** (bone scan).	↑
	↳ **1.3** If MRI and NM (bone scan) are unavailable or contraindicated, we suggest **CT**.	↑
M25. Complex regional pain syndrome	**1.** In adults with suspected complex regional pain syndrome, we suggest **XR** as the initial imaging modality.	↑↑
	↳ **1.1** If further investigation is required, we suggest **NM** (bone scan) as the next imaging modality.	EPc
	↳ **1.2** If NM is unavailable or is contraindicated, we suggest **MRI**.	EPc

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APPENDIX 3B. MUSCULOSKELETAL SYSTEM SUMMARY OF RECOMMENDATIONS (FRENCH)

Scénario clinique/diagnostique	Recommandations	Force
TDM : tomodensitométrie; **IRM** : imagerie par résonance magnétique; **MN** : médecine nucléaire; **TEP** : tomographie par émission de positons; **ÉCHO** : échographie; **RX** : radiographie **Force de la recommandation :** ↑↑: élevée pour; ↑ : incertaine pour; ↓↓: élevée contre; ↓: incertaine contre; **EPc** : consensus d'un panel d'experts		
M1. Ostéomyélite (y compris le pied diabétique)	**1.** Chez les adultes chez qui l'on soupçonne une ostéomyélite, y compris un pied diabétique, nous recommandons la **RX** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires, nous recommandons l'**IRM** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.2** Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons une **TDM** (avec produit de contraste) ou la **MN** (scintigraphie osseuse). *Pour la scintigraphie osseuse, le radioisotope et le protocole utilisés peuvent varier en fonction de la présentation clinique, des préférences régionales de pratique et de la disponibilité des ressources.*	↑
	2. Chez les adultes chez qui l'on soupçonne une ostéomyélite, nous recommandons la **TDM** pour l'évaluation d'un séquestre ou pour guider une biopsie.	↑↑
	3. Si une IRM ou une TDM n'a pas été réalisée chez des adultes chez qui l'on soupçonne une ostéomyélite, nous suggérons une **ÉCHO** pour évaluer les collections de liquide superficielles.	↑
M2. Arthrite septique	**1.** Chez des adultes chez qui l'on soupçonne une arthrite septique, nous recommandons la **RX** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires, nous recommandons l'**IRM** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.2** Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons une **TDM** (avec produit de contraste).	↑

Les recommandations des lignes directrices ont pour but d'aider les médecins à choisir la modalité d'imagerie adaptée dans les cas où ils jugent nécessaire, du point de vue clinique, d'obtenir une imagerie. À noter cependant que l'imagerie ne doit pas retarder une prise de décision reliée à la prise en charge du patient. La question de savoir si une imagerie est indiquée n'entre pas dans le cadre de ces lignes directrices. De plus, nous n'avons pas abordé la question de la répétition de l'imagerie et des intervalles de temps pour le suivi d'une maladie connue ou la surveillance d'un traitement. Par ailleurs, 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 du 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. Les présentes lignes directrices reposent sur des données probantes liées uniquement aux examens d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandations	Force
TDM : tomodensitométrie; **IRM** : imagerie par résonance magnétique; **MN** : médecine nucléaire; **TEP** : tomographie par émission de positons; **ÉCHO** : échographie; **RX** : radiographie **Force de la recommandation :** ↑↑: élevée pour; ↑ : incertaine pour; ↓↓: élevée contre; ↓: incertaine contre; **EPc** : consensus d'un panel d'experts		
	2. Si une IRM ou une TDM n'a pas été réalisée chez des adultes chez qui l'on soupçonne une arthrite septique, nous suggérons l'**ÉCHO** pour évaluer un épanchement ou les collections de liquide juxta-articulaires.	↑
	3. Chez des adultes chez qui l'on soupçonne une arthrite septique, nous suggérons l'**ÉCHO** ou la **fluoroscopie** pour faciliter l'arthrocentèse, immédiatement après la radiographie, s'il n'est pas possible de faire l'arthrocentèse au chevet du patient.	EPc
M3. Infection des tissus mous (y compris une fasciite nécrosante) *Pour l'imagerie de corps étrangers, voir Traumatisme - scénario clinique/ diagnostique T16. Lésion superficielle des tissus mous avec corps étranger.*	**1.** Chez des adultes chez qui l'on soupçonne une infection des tissus mous, y compris une fasciite nécrosante, nous recommandons la **RX** comme modalité d'imagerie initiale. *Lorsqu'on soupçonne une fasciite nécrosante, l'imagerie ne doit pas retarder une consultation chirurgicale. L'examen d'imagerie peut être demandé en même temps que la consultation de chirurgie, ou même être omis à la discrétion du chirurgien.*	↑↑
	2. Chez des adultes chez qui l'on soupçonne une infection profonde ou sévère des tissus mous, nous recommandons l'**IRM** comme modalité d'imagerie subséquente.	↑↑
	↳ **2.1** Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons une **TDM** (avec produit de contraste).	↑
	3. Chez des adultes chez qui l'on soupçonne une infection des tissus mous, nous suggérons une **ÉCHO** pour l'évaluation des collections superficielles de liquide.	↑
	↳ **3.1** Si des examens supplémentaires sont nécessaires, nous recommandons l'**IRM** comme modalité d'imagerie subséquente.	↑↑
	↳ **3.2** Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons une **TDM** (avec produit de contraste).	↑
M4. Tumeur osseuse – Primaire	**1.** Chez des adultes chez qui l'on soupçonne une tumeur osseuse primaire, nous recommandons la **RX** comme modalité d'imagerie initiale.	↑↑

Les recommandations des lignes directrices ont pour but d'aider les médecins à choisir la modalité d'imagerie adaptée dans les cas où ils jugent nécessaire, du point de vue clinique, d'obtenir une imagerie. À noter cependant que l'imagerie ne doit pas retarder une prise de décision reliée à la prise en charge du patient. La question de savoir si une imagerie est indiquée n'entre pas dans le cadre de ces lignes directrices. De plus, nous n'avons pas abordé la question de la répétition de l'imagerie et des intervalles de temps pour le suivi d'une maladie connue ou la surveillance d'un traitement. Par ailleurs, 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 du 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. Les présentes lignes directrices reposent sur des données probantes liées uniquement aux examens d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandations	Force
TDM : tomodensitométrie; **IRM** : imagerie par résonance magnétique; **MN** : médecine nucléaire; **TEP** : tomographie par émission de positons; **ÉCHO** : échographie; **RX** : radiographie **Force de la recommandation :** ↑↑: élevée pour; ↑ : incertaine pour; ↓↓: élevée contre; ↓: incertaine contre; **EPc** : consensus d'un panel d'experts		
	↳ **1.1** Si des examens supplémentaires sont nécessaires, nous recommandons l'**IRM** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.2** Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons une **TDM** (avec produit de contraste).	↑
	↳ **1.3** Si les résultats de la RX, de l'IRM ou de la TDM demeurent équivoques, nous suggérons d'effectuer une **MN** (scintigraphie osseuse).	EPc
M5. Tumeur osseuse – Métastases	**1.** Chez des adultes atteints d'un cancer primaire connu (myélome excepté), nous recommandons la **MN** (scintigraphie osseuse) comme modalité d'imagerie initiale pour détecter les métastases osseuses.	↑↑
	2. Chez des adultes chez qui l'on soupçonne des métastases osseuses, nous recommandons la **RX** comme modalité d'imagerie initiale pour l'évaluation des sites symptomatiques locaux ou pour une corrélation avec les constatations de la MN, d'une IRM ou d'une TDM.	↑↑
	3. Chez des adultes chez qui des métastases sont visibles à la radiographie et nécessitent une évaluation locale complémentaire ou une stadification, nous recommandons l'**IRM**.	↑↑
	↳ **3.1** Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons une **TDM** (avec produit de contraste).	↑
	4. Chez des adultes chez qui l'on soupçonne la présence de métastases, nous déconseillons une **étude du squelette par RX** (série osseuse).	↓↓
	5. Chez des adultes chez qui l'on soupçonne la présence de métastases osseuses, la **TDM du corps entier**, l'**IRM du corps entier et la TEP** sont des techniques en évolution qui peuvent être utilisées en fonction des préférences régionales de pratique et de la disponibilité des ressources.	EPc

Les recommandations des lignes directrices ont pour but d'aider les médecins à choisir la modalité d'imagerie adaptée dans les cas où ils jugent nécessaire, du point de vue clinique, d'obtenir une imagerie. À noter cependant que l'imagerie ne doit pas retarder une prise de décision reliée à la prise en charge du patient. La question de savoir si une imagerie est indiquée n'entre pas dans le cadre de ces lignes directrices. De plus, nous n'avons pas abordé la question de la répétition de l'imagerie et des intervalles de temps pour le suivi d'une maladie connue ou la surveillance d'un traitement. Par ailleurs, 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 du 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. Les présentes lignes directrices reposent sur des données probantes liées uniquement aux examens d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandations	Force
TDM : tomodensitométrie; **IRM** : imagerie par résonance magnétique; **MN** : médecine nucléaire; **TEP** : tomographie par émission de positons; **ÉCHO** : échographie; **RX** : radiographie **Force de la recommandation :** ↑↑: élevée pour; ↑ : incertaine pour; ↓↓: élevée contre; ↓: incertaine contre; **EPc** : consensus d'un panel d'experts		
M6. Tumeur osseuse – Myélome	**1.** Chez des adultes chez qui l'on soupçonne l'existence d'un myélome, nous recommandons une **TDM du corps entier** (à faible dose) ou une **TEP-TDM** comme modalité d'imagerie initiale pour la stadification.	↑↑
	↳ **1.1** Si la TDM du corps entier ou la TEP-TDM est négative ou non disponible, nous recommandons une **IRM du corps entier** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.2** Si la TDM du corps entier, la TEP-TDM et l'IRM ne sont pas disponibles ou sont contre-indiquées, nous suggérons la **RX** (série osseuse).	↑
	2. Chez des adultes atteints d'un myélome connu, nous recommandons la **RX** pour l'évaluation des sites symptomatiques locaux ou pour la corrélation avec les constatations de l'IRM ou de la TDM.	↑↑
	3. Chez des adultes chez qui l'on suspecte un myélome, nous déconseillons la **MN** (scintigraphie osseuse).	↓↓
M7. Masse ou tumeur des tissus mous	**1.** Chez des adultes présentant une masse superficielle des tissus mous, 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.	↑↑
	2. Chez des adultes ayant une masse profonde ou de grande taille des tissus mous (≥ 5 cm), nous recommandons l'**IRM** comme modalité d'imagerie initiale.	↑↑
	↳ **2.1** Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons une **TDM** (avec produit de contraste).	↑
	3. Chez des adultes ayant des masses de tissus mous, nous recommandons la **RX** pour l'évaluation des calcifications ou lorsqu'on soupçonne l'implication d'un os ou d'une articulation, après une échographie.	↑↑

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Scénario clinique/diagnostique	Recommandations	Force
TDM : tomodensitométrie; **IRM** : imagerie par résonance magnétique; **MN** : médecine nucléaire; **TEP** : tomographie par émission de positons; **ÉCHO** : échographie; **RX** : radiographie **Force de la recommandation :** ↑↑: élevée pour; ↑ : incertaine pour; ↓↓: élevée contre; ↓: incertaine contre; **EPc** : consensus d'un panel d'experts		
M8. Douleur des tissus mous (non péri-articulaire)	**1.** Chez des adultes présentant une douleur des tissus mous non articulaires, nous recommandons une **ÉCHO** comme modalité d'imagerie initiale.	EPc
	↳ **1.1** Si des examens supplémentaires sont nécessaires, nous recommandons l'**IRM** comme modalité d'imagerie subséquente.	EPc
	↳ **1.2** Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons une **TDM** (avec produit de contraste).	EPc
	2. Chez des adultes présentant une douleur des tissus mous non articulaires, nous suggérons la **RX** pour l'évaluation d'une pathologie osseuse localisée.	EPc
M9. Ostéoarthrite et arthropathie cristalline	**1.** Chez des adultes chez qui l'on soupçonne une ostéoarthrite ou une arthropathie cristalline, nous recommandons la **RX** comme modalité d'imagerie initiale.	↑↑
	2. Chez des adultes chez qui l'on soupçonne une goutte, nous suggérons l'**ÉCHO** comme complément à la RX pour repérer des tophus.	↑
	3. Chez des adultes chez qui l'on soupçonne une goutte, une **TDM** (double énergie) peut être utilisée en fonction des préférences régionales de pratique et de la disponibilité des ressources.	EPc
M10. Arthropathie inflammatoire (arthropathie rhumatoïde et spondylarthropathie périphérique)	**1.** Chez des adultes chez qui l'on soupçonne une arthropathie inflammatoire, nous recommandons la **RX** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires pour l'évaluation de constatations telles qu'un épanchement, une synovite, des érosions et une enthésite, nous suggérons l'**ÉCHO** comme modalité d'imagerie subséquente.	↑
	↳ **1.2** Chez des adultes présentant des douleurs articulaires multifocales, nous suggérons la **MN** (scintigraphie osseuse) comme substitut à l'**ÉCHO** pour déterminer la distribution de la synovite.	↑

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TDM : tomodensitométrie; **IRM** : imagerie par résonance magnétique; **MN** : médecine nucléaire; **TEP** : tomographie par émission de positons; **ÉCHO** : échographie; **RX** : radiographie **Force de la recommandation :** ↑↑: élevée pour; ↑ : incertaine pour; ↓↓: élevée contre; ↓: incertaine contre; **EPc** : consensus d'un panel d'experts		
	↳ **1.3** Si des examens supplémentaires sont nécessaires pour l'évaluation de constatations telles qu'une synovite aiguë, une atteinte cartilagineuse, des érosions et un œdème de la moelle osseuse OU comme substitut à l'échographie, nous suggérons une **IRM** comme modalité d'imagerie subséquente.	↑
M11. Spondylarthropathie (axiale)	**1.** Chez des adultes chez qui l'on soupçonne l'existence d'une spondylarthropathie axiale, nous recommandons la **RX des articulations sacro-iliaques ± de la colonne vertébrale** comme examen d'imagerie initiale.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires, nous recommandons une **IRM des articulations sacro-iliaques ± de la colonne vertébrale.**	↑↑
	↳ **1.2** Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons une **TDM des articulations sacro-iliaques ± de la colonne vertébrale**.	↑
	2. Chez des adultes chez qui l'on soupçonne une spondylarthropathie axiale, nous déconseillons la **MN** (scintigraphie osseuse).	↓↓
M12. Douleurs osseuses (non articulaires) *Si l'un des diagnostics suivants est envisagé :* ***ostéomyélite****, voir M01;* ***tumeur osseuse primaire****, voir M04;* ***métastase osseuse****, voir M5;* ***myélome****, voir M6;* ***maladie métabolique de l'os****, voir M13,* ***fracture de stress****, voir M14;* ***nécrose avasculaire ou infarctus osseux****, voir M24.*	**1.** Chez des adultes présentant des douleurs osseuses non traumatiques, non articulaires, nous recommandons la **RX** d'une ou plusieurs zones symptomatiques comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires, nous recommandons l'**IRM** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.2** Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons une **TDM**.	EPc
	↳ **1.3** Si une TDM n'est pas disponible, nous recommandons la **MN** (scintigraphie osseuse).	↑↑

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M13. Maladie métabolique des os, y compris l'ostéoporose et l'ostéomalacie *Si un diagnostic de **fracture de stress** est envisagé, voir M14. Fracture de fatigue.*	**1.** Chez des adultes chez qui l'on soupçonne une ostéoporose, nous recommandons l'**absorptiométrie biphotonique à rayons X (DXA)** pour la mesure de la densité minérale osseuse (↑↑).	↑↑
	2. Chez des adultes chez qui l'on soupçonne une maladie métabolique de l'os qui présentent de la douleur ou chez lesquels il y a une zone localisée de préoccupation, nous recommandons la **RX** comme modalité d'imagerie initiale (↑↑).	↑↑
	↳ **2.1** Si des examens supplémentaires sont nécessaires, nous recommandons l'**IRM** comme modalité d'imagerie subséquente (↑↑).	↑↑
	↳ 2.2 Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons une **TDM** pour l'évaluation de la douleur locale (↑).	↑
	3. Chez des adultes chez qui l'on soupçonne une maladie métabolique de l'os avec de multiples zones douloureuses ou préoccupantes, nous suggérons la **MN** (scintigraphie osseuse) comme modalité d'imagerie initiale (↑).	↑
M14. Fracture de stress (insuffisance, fatigue)	**1.** Chez des adultes chez qui l'on soupçonne une fracture de stress (fatigue ou insuffisance), nous recommandons la **RX** de la zone d'intérêt comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si des examens **supplémentaires** sont nécessaires pour l'évaluation d'une potentielle fracture de stress, nous recommandons une **IRM** du pelvis et de la hanche et nous suggérons une **IRM** pour tout autre site comme modalité d'imagerie subséquente.	↑↑/EPc
	↳ **1.2** Si une IRM n'est pas disponible ou est contre-indiquée ou risque d'entraîner un important retard pour le diagnostic, nous suggérons une **TDM**.	↑
	↳ **1.3** Si une TDM n'est pas disponible, nous suggérons une **MN** (scintigraphie osseuse).	↑
M15. Douleurs de la paroi thoracique	**1.** Chez des adultes présentant des douleurs non traumatiques de la paroi thoracique, nous recommandons la **RX du thorax ± des côtes** comme modalité d'imagerie initiale (↑↑).	↑↑

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	↳ **1.1** Si des examens supplémentaires sont nécessaires pour l'évaluation d'une zone localisée de la paroi thoracique ou d'une zone articulaire d'intérêt, nous suggérons l'**ÉCHO** comme modalité d'imagerie subséquente (↑).	↑
	↳ **1.2** Si des examens **supplémentaires** sont nécessaires, nous recommandons une **IRM** (↑↑).	↑↑
	↳ **1.3** Si des examens **supplémentaires** sont nécessaires pour l'évaluation d'une pathologie diffuse de la paroi thoracique ou intrathoracique, nous recommandons une **TDM** comme modalité d'imagerie subséquente (↑↑).	↑↑
M16. Douleur ou instabilité de l'épaule	**1.** Chez des adultes ayant une douleur ou une instabilité de l'épaule, nous recommandons la **RX** comme modalité d'imagerie initiale. *Dans le cadre de l'évaluation de l'instabilité de l'épaule, il peut être nécessaire de compléter des séries usuelles de radiographies avec des projections radiographiques spécialisées, en fonction des préférences régionales de pratique.*	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires pour l'évaluation d'une pathologie des tissus mous, comme une déchirure de la coiffe des rotateurs, une tendinopathie, un épanchement, une bursite, une calcification des tissus mous ou un conflit extra-articulaire, nous recommandons une **ÉCHO** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.2** Si des examens supplémentaires sont nécessaires OU comme alternative à l'échographie, nous recommandons une **IRM**. *Dans le cadre de l'évaluation d'une pathologie articulaire dégénérative, quand les radiographies montrent une ostéoarthrite de sévérité plus que légère, une IRM peut ne pas être indiquée, car elle ne fera souvent pas progresser le diagnostic ou la prise en charge. L'avis d'un spécialiste devrait être sollicité afin de déterminer si une IRM est nécessaire.*	↑↑

Les recommandations des lignes directrices ont pour but d'aider les médecins à choisir la modalité d'imagerie adaptée dans les cas où ils jugent nécessaire, du point de vue clinique, d'obtenir une imagerie. À noter cependant que l'imagerie ne doit pas retarder une prise de décision reliée à la prise en charge du patient. La question de savoir si une imagerie est indiquée n'entre pas dans le cadre de ces lignes directrices. De plus, nous n'avons pas abordé la question de la répétition de l'imagerie et des intervalles de temps pour le suivi d'une maladie connue ou la surveillance d'un traitement. Par ailleurs, 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 du 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. Les présentes lignes directrices reposent sur des données probantes liées uniquement aux examens d'imagerie diagnostique et non à la gestion clinique du patient.

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	↳ **1.3** Chez des adultes chez qui l'on soupçonne une déchirure du labrum, des lésions ligamentaires et cartilagineuses ou une instabilité de l'épaule, nous recommandons une **arthro-IRM** ou une **IRM à haut champ** (c.-à-d., 3T) avec une technique d'IRM sélectionnée en fonction des préférences régionales, de la disponibilité et de l'expertise.	↑↑/EPc
	↳ **1.4** Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons une **arthrographie avec TDM** pour évaluer des constatations telles qu'une déchirure de la coiffe des rotateurs, une déchirure du labrum, ou les deux.	↑
	2. Chez des adultes atteints de douleurs ou d'une instabilité de l'épaule, après la RX, nous suggérons une **TDM** pour l'évaluation de l'anatomie osseuse pertinente du point de vue clinique dans le contexte d'une planification préopératoire.	↑
M17. Douleur du coude	**1.** Chez des adultes ayant des douleurs du coude soupçonnées d'être d'origine articulaire, nous recommandons la **RX** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires, nous recommandons l'**IRM** comme modalité d'imagerie subséquente. *Dans le cadre de l'évaluation d'une pathologie articulaire dégénérative, quand les radiographies montrent une ostéoarthrite de sévérité plus que légère, une IRM peut ne pas être indiquée, car elle ne fera souvent pas progresser le diagnostic ou la prise en charge. L'avis d'un spécialiste devrait être sollicité afin de déterminer si une IRM est nécessaire.*	↑↑
	2. Chez des adultes ayant des douleurs du coude soupçonnées d'être associées à une pathologie tendineuse, une compression nerveuse, un épanchement, une synovite ou une bursite, nous recommandons la **RX** ou l'**ÉCHO** comme modalité d'imagerie initiale.	↑↑
	↳ **2.1** Si des examens supplémentaires sont nécessaires, nous recommandons l'**IRM** comme modalité d'imagerie subséquente.	↑↑

Les recommandations des lignes directrices ont pour but d'aider les médecins à choisir la modalité d'imagerie adaptée dans les cas où ils jugent nécessaire, du point de vue clinique, d'obtenir une imagerie. À noter cependant que l'imagerie ne doit pas retarder une prise de décision reliée à la prise en charge du patient. La question de savoir si une imagerie est indiquée n'entre pas dans le cadre de ces lignes directrices. De plus, nous n'avons pas abordé la question de la répétition de l'imagerie et des intervalles de temps pour le suivi d'une maladie connue ou la surveillance d'un traitement. Par ailleurs, 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 du 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. Les présentes lignes directrices reposent sur des données probantes liées uniquement aux examens d'imagerie diagnostique et non à la gestion clinique du patient.

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	3. Chez des adultes présentant des douleurs du coude, après la RX, nous suggérons une **TDM** pour l'évaluation de l'anatomie osseuse pertinente du point de vue clinique dans le contexte d'une planification préopératoire.	↑
M18. Douleur de la main et du poignet *En cas de suspicion d'arthrite inflammatoire du poignet, voir M9. Arthropathie inflammatoire (arthropathie rhumatoïde/spondylarthropathie périphérique)*	**1.** Chez des adultes présentant des douleurs articulaires de la main, du poignet, ou des deux, nous suggérons la **RX** comme modalité d'imagerie initiale. *Il peut être nécessaire de compléter les séries de radiographies de routine avec des projections radiographiques spécialisées en fonction de la présentation clinique et des préférences régionales de pratique.*	↑
	↳ **1.1** Si un examen complémentaire est nécessaire, nous suggérons une **IRM**. *Dans le cadre de l'évaluation d'une pathologie articulaire dégénérative, quand les radiographies montrent une ostéoarthrite de sévérité plus que légère, une IRM peut ne pas être indiquée, car elle ne fera souvent pas progresser le diagnostic ou la prise en charge. L'avis d'un spécialiste devrait être sollicité afin de déterminer si une IRM est nécessaire.*	↑
	↳ **1.2** Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons une **arthrographie avec TDM** pour l'évaluation du complexe fibrocartilagineux triangulaire (TFCC), des ligaments intrinsèques du poignet ou de la capsule articulaire.	↑
	2. Chez des adultes présentant des douleurs de la main ou du poignet soupçonnées d'être liées aux tissus mous, par exemple un kyste ganglionnaire, une synovite ou une ténosynovite, nous suggérons l'**ÉCHO** comme modalité d'imagerie initiale.	↑
	↳ **2.1** Comme alternative à l'échographie, nous suggérons une **IRM**.	↑
	3. Chez des adultes présentant des douleurs à la main ou au poignet, après une RX, nous suggérons une **TDM** pour l'évaluation de l'anatomie osseuse ou d'une facture chronique du scaphoïde OU dans le contexte d'une planification préopératoire.	↑

Les recommandations des lignes directrices ont pour but d'aider les médecins à choisir la modalité d'imagerie adaptée dans les cas où ils jugent nécessaire, du point de vue clinique, d'obtenir une imagerie. À noter cependant que l'imagerie ne doit pas retarder une prise de décision reliée à la prise en charge du patient. La question de savoir si une imagerie est indiquée n'entre pas dans le cadre de ces lignes directrices. De plus, nous n'avons pas abordé la question de la répétition de l'imagerie et des intervalles de temps pour le suivi d'une maladie connue ou la surveillance d'un traitement. Par ailleurs, 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 du 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. Les présentes lignes directrices reposent sur des données probantes liées uniquement aux examens d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandations	Force
TDM : tomodensitométrie; **IRM** : imagerie par résonance magnétique; **MN** : médecine nucléaire; **TEP** : tomographie par émission de positons; **ÉCHO** : échographie; **RX** : radiographie **Force de la recommandation :** ↑↑: élevée pour; ↑ : incertaine pour; ↓↓: élevée contre; ↓: incertaine contre; **EPc** : consensus d'un panel d'experts		
M19. Douleurs osseuses du pelvis et de la hanche *Pour : la **pathologie de l'articulation sacro-iliaque**, voir M10; une suspicion de **fracture**, voir M14; la **nécrose avasculaire** de la hanche, voir M24.*	**Douleur de la hanche** **1.** Chez des adultes présentant une douleur de la hanche, nous recommandons la **RX** comme modalité d'imagerie initiale. *Les séries de radiographies de routine peuvent devoir être complétées par des projections radiographiques particulières à des affections telles que le conflit fémoro-acétabulaire, la dysplasie de hanche ou une déformation post-traumatique, en fonction de la préoccupation clinique et des préférences régionales de pratique.*	↑↑
	2. Dans le cadre de l'évaluation d'un trouble interne de la hanche, comme une déchirure du labrum, un lésion ostéochondrale ou un corps intra-articulaire et si des examens supplémentaires sont nécessaires, nous recommandons une **arthro-IRM** ou une **IRM haute résolution** (c.-à-d., 3T). *Dans le cadre de l'évaluation d'une pathologie articulaire dégénérative, quand les radiographies montrent une ostéoarthrite de sévérité plus que légère, une IRM peut ne pas être indiquée, car elle ne fera souvent pas progresser le diagnostic ou la prise en charge. L'avis d'un spécialiste devrait être sollicité afin de déterminer si une IRM est nécessaire.* *Si la radiographie met en évidence des caractéristiques associées à un conflit fémoro-acétabulaire ou à une dysplasie de hanche, une consultation en chirurgie orthopédique ou avec un spécialiste de médecine du sport est suggérée, car l'IRM pourrait ne pas être la modalité d'examen suivante la plus adaptée.*	↑↑/EPc
	↳ **2.1** Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons une **arthrographie avec TDM** pour l'évaluation du trouble interne de la hanche.	↑
	3. En vue de l'évaluation d'une pathologie des tissus mous profonds, après la radiographie, nous recommandons l'**IRM** comme modalité d'imagerie subséquente.	↑↑
	4. En vue de l'évaluation d'une pathologie des tissus mous superficiels, après la radiographie, nous recommandons l'**ÉCHO** ou l'**IRM** comme modalités d'imagerie subséquentes.	↑↑

Les recommandations des lignes directrices ont pour but d'aider les médecins à choisir la modalité d'imagerie adaptée dans les cas où ils jugent nécessaire, du point de vue clinique, d'obtenir une imagerie. À noter cependant que l'imagerie ne doit pas retarder une prise de décision reliée à la prise en charge du patient. La question de savoir si une imagerie est indiquée n'entre pas dans le cadre de ces lignes directrices. De plus, nous n'avons pas abordé la question de la répétition de l'imagerie et des intervalles de temps pour le suivi d'une maladie connue ou la surveillance d'un traitement. Par ailleurs, 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 du 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. Les présentes lignes directrices reposent sur des données probantes liées uniquement aux examens d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandations	Force
TDM : tomodensitométrie; **IRM** : imagerie par résonance magnétique; **MN** : médecine nucléaire; **TEP** : tomographie par émission de positons; **ÉCHO** : échographie; **RX** : radiographie **Force de la recommandation :** ↑↑: élevée pour; ↑ : incertaine pour; ↓↓: élevée contre; ↓: incertaine contre; **EPc** : consensus d'un panel d'experts		
	5. Chez des adultes présentant une douleur de la hanche, nous suggérons une **TDM** pour l'évaluation de l'anatomie osseuse pertinente du point de vue clinique dans le contexte d'une planification préopératoire.	EPc
	Douleur pelvienne musculo-squelettique (y compris ostéite pubienne ou pubalgie de l'athlète)	
	6. Chez des adultes présentant une douleur osseuse du pelvis, nous suggérons la **RX** comme modalité d'imagerie initiale.	EPc
	↳ **6.1** Si des examens supplémentaires sont nécessaires, nous suggérons l'**IRM** comme modalité d'imagerie subséquente.	EPc
	↳ **6.2** Si une **IRM** n'est pas disponible ou est contre-indiquée, nous suggérons une **ÉCHO** si le clinicien pense que la pathologie est liée aux tissus mous.	EPc
	↳ **6.3** Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons une **TDM** ou la **MN** (scintigraphie osseuse) si le clinicien pense que la pathologie est d'origine osseuse.	EPc
M20. Douleur du genou	**1.** Chez des adultes présentant des douleurs de l'articulation du genou, nous recommandons la **RX** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires, nous recommandons l'**IRM** comme modalité d'imagerie subséquente. *Dans le cadre de l'évaluation d'une pathologie articulaire dégénérative, quand les radiographies montrent une ostéoarthrite de sévérité plus que légère, une IRM peut ne pas être indiquée, car elle ne fera souvent pas progresser le diagnostic ou la prise en charge. L'avis d'un spécialiste devrait être sollicité afin de déterminer si une IRM est nécessaire.*	↑↑
	↳ **1.2** Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons une **arthrographie avec TDM** pour évaluer des constatations telles qu'une déchirure d'un ménisque ou des lésions cartilagineuses.	↑

Les recommandations des lignes directrices ont pour but d'aider les médecins à choisir la modalité d'imagerie adaptée dans les cas où ils jugent nécessaire, du point de vue clinique, d'obtenir une imagerie. À noter cependant que l'imagerie ne doit pas retarder une prise de décision reliée à la prise en charge du patient. La question de savoir si une imagerie est indiquée n'entre pas dans le cadre de ces lignes directrices. De plus, nous n'avons pas abordé la question de la répétition de l'imagerie et des intervalles de temps pour le suivi d'une maladie connue ou la surveillance d'un traitement. Par ailleurs, 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 du 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. Les présentes lignes directrices reposent sur des données probantes liées uniquement aux examens d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandations	Force
TDM : tomodensitométrie; **IRM** : imagerie par résonance magnétique; **MN** : médecine nucléaire; **TEP** : tomographie par émission de positons; **ÉCHO** : échographie; **RX** : radiographie **Force de la recommandation :** ↑↑: élevée pour; ↑ : incertaine pour; ↓↓: élevée contre; ↓: incertaine contre; **EPc** : consensus d'un panel d'experts		
	2. Chez des adultes présentant une douleur du genou soupçonnée d'être liée aux tissus mous, comme une pathologie du mécanisme extenseur, une bursite, un épanchement articulaire et un kyste ou une masse poplités, nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale.	↑↑
	↳ **2.1** En remplacement de l'échographie, nous recommandons l'**IRM**.	↑↑
	3. Chez des adultes ayant une douleur chronique de l'articulation du genou, après la radiographie, nous suggérons une **TDM** pour l'évaluation de l'anatomie osseuse pertinente du point de vue clinique dans des scénarios tels qu'une anomalie de la course rotulienne, un manque ostéocartilagineux ou des corps étrangers intra-articulaires OU dans le contexte d'une planification préopératoire.	↑ OU EPc
M21. Douleur de la cheville	**1.** Chez des adultes présentant une douleur de la cheville, nous recommandons la **RX** comme modalité d'imagerie initiale (↑↑).	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires pour l'évaluation d'un épanchement ou d'une anomalie tendineuse, nous recommandons l'**ÉCHO** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.2** Si des examens supplémentaires sont nécessaires pour l'évaluation de constatations comme une lésion ostéocartilagineuse ou des déchirures ligamentaires instables, ou comme alternative à une échographie pour une pathologie tendineuse, nous recommandons une **IRM** comme modalité d'imagerie subséquente. *Dans le cadre de l'évaluation d'une pathologie articulaire dégénérative, quand les radiographies montrent une ostéoarthrite de sévérité plus que légère, une IRM peut ne pas être indiquée, car elle ne fera souvent pas progresser le diagnostic ou la prise en charge. L'avis d'un spécialiste devrait être sollicité afin de déterminer si une IRM est nécessaire.*	↑↑

Les recommandations des lignes directrices ont pour but d'aider les médecins à choisir la modalité d'imagerie adaptée dans les cas où ils jugent nécessaire, du point de vue clinique, d'obtenir une imagerie. À noter cependant que l'imagerie ne doit pas retarder une prise de décision reliée à la prise en charge du patient. La question de savoir si une imagerie est indiquée n'entre pas dans le cadre de ces lignes directrices. De plus, nous n'avons pas abordé la question de la répétition de l'imagerie et des intervalles de temps pour le suivi d'une maladie connue ou la surveillance d'un traitement. Par ailleurs, 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 du 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. Les présentes lignes directrices reposent sur des données probantes liées uniquement aux examens d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandations	Force
TDM : tomodensitométrie; **IRM** : imagerie par résonance magnétique; **MN** : médecine nucléaire; **TEP** : tomographie par émission de positons; **ÉCHO** : échographie; **RX** : radiographie **Force de la recommandation :** ↑↑: élevée pour; ↑ : incertaine pour; ↓↓: élevée contre; ↓: incertaine contre; **EPc** : consensus d'un panel d'experts		
	2. Chez des adultes présentant une douleur de la cheville, après la radiographie, nous suggérons une **TDM** pour l'évaluation de l'anatomie osseuse significative du point de vue clinique dans des scénarios tels qu'une lésion ostéocartilagineux, des corps étrangers intra-articulaires, une synostose du tarse OU dans le contexte d'une planification préopératoire.	↑ OU EPc
M22. Douleur du pied	**1.** Chez des adultes présentant une douleur du pied, nous suggérons la **RX** comme modalité d'imagerie initiale.	↑
	2. Chez des adultes présentant des douleurs au pied soupçonnées d'être liées aux tissus mous, comme une fasciite plantaire, une tendinopathie, une bursite, ou un névrome de Morton, nous suggérons l'**ÉCHO** comme modalité d'imagerie subséquente.	↑
	↳ **2.1** Si des examens supplémentaires sont nécessaires pour l'évaluation de constatations comme une fracture de fatigue, une synostose du tarse, une fasciite plantaire, un syndrome du canal tarsien, une tendinopathie ou un névrome de Morton, nous suggérons une **IRM**. *Dans le cadre de l'évaluation d'une pathologie articulaire dégénérative, quand les radiographies montrent une ostéoarthrite de sévérité plus que légère, une IRM peut ne pas être indiquée, car elle ne fera souvent pas progresser le diagnostic ou la prise en charge. L'avis d'un spécialiste devrait être sollicité afin de déterminer si une IRM est nécessaire.*	↑
	3. Chez des adultes présentant des douleurs au pied, après la radiographie, nous suggérons une **TDM** pour l'évaluation de pathologies comme une fracture de stress, une lésion ostéocartilagineuse OU pour l'évaluation de l'anatomie osseuse pertinente du point de vue clinique dans le contexte d'une planification préopératoire.	↑↑ OU EPc
	4. Chez des adultes présentant une douleur du pied soupçonnée d'être une fracture de stress, quand l'IRM et la TDM ne sont pas disponibles ou sont contre-indiquées, nous suggérons la **MN** (scintigraphie osseuse).	↑

Les recommandations des lignes directrices ont pour but d'aider les médecins à choisir la modalité d'imagerie adaptée dans les cas où ils jugent nécessaire, du point de vue clinique, d'obtenir une imagerie. À noter cependant que l'imagerie ne doit pas retarder une prise de décision reliée à la prise en charge du patient. La question de savoir si une imagerie est indiquée n'entre pas dans le cadre de ces lignes directrices. De plus, nous n'avons pas abordé la question de la répétition de l'imagerie et des intervalles de temps pour le suivi d'une maladie connue ou la surveillance d'un traitement. Par ailleurs, 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 du 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. Les présentes lignes directrices reposent sur des données probantes liées uniquement aux examens d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandations	Force
TDM : tomodensitométrie; **IRM** : imagerie par résonance magnétique; **MN** : médecine nucléaire; **TEP** : tomographie par émission de positons; **ÉCHO** : échographie; **RX** : radiographie **Force de la recommandation :** ↑↑: élevée pour; ↑ : incertaine pour; ↓↓: élevée contre; ↓: incertaine contre; **EPc** : consensus d'un panel d'experts		
M23. Douleur/symptômes liés au matériel orthopédique/arthroplastie	**1.** Chez des adultes présentant des douleurs ou des symptômes liés à une arthroplastie ou à du matériel orthopédique, nous recommandons la **RX** comme modalité d'imagerie initiale afin d'évaluer des constatations comme une fracture, une luxation, une ostéolyse périprothétique, ou une fracture ou un desserrement du matériel orthopédique.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires pour l'évaluation d'une ostéolyse ou d'une fracture périprothétique, nous recommandons une **TDM** comme modalité d'imagerie subséquente. Des paramètres de réduction des artéfacts métalliques devraient être utilisés.	↑↑
	↳ **1.2** Chez des adultes présentant une douleur ou des symptômes liés à une arthroplastie ou à du matériel orthopédique, et chez qui on soupçonne une infection, un desserrage ou une fracture, nous recommandons la **MN** (scintigraphie osseuse) quand les résultats de la TDM sont négatifs ou indéterminés, ou qu'une TDM n'est pas disponible. *Pour la scintigraphie osseuse, le radioisotope et le protocole utilisés peuvent varier en fonction de la présentation clinique, des préférences régionales de pratique et de la disponibilité des ressources.*	↑↑
	2. Chez des adultes présentant des douleurs ou des symptômes liés à une arthroplastie ou à du matériel orthopédique, et chez qui on soupçonne une pathologie des tissus mous, après la radiographie, nous recommandons l'**IRM** comme modalités d'imagerie subséquente. Des séquences de réduction des artéfacts métalliques devraient être utilisées.	↑↑
	↳ **2.1** Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons une **TDM** (avec contraste).	↑
	3. Chez des adultes présentant des douleurs ou des symptômes liés à une arthroplastie ou à du matériel orthopédique, nous recommandons une **ÉCHO** pour évaluer les collections de liquide superficielles.	↑↑

Les recommandations des lignes directrices ont pour but d'aider les médecins à choisir la modalité d'imagerie adaptée dans les cas où ils jugent nécessaire, du point de vue clinique, d'obtenir une imagerie. À noter cependant que l'imagerie ne doit pas retarder une prise de décision reliée à la prise en charge du patient. La question de savoir si une imagerie est indiquée n'entre pas dans le cadre de ces lignes directrices. De plus, nous n'avons pas abordé la question de la répétition de l'imagerie et des intervalles de temps pour le suivi d'une maladie connue ou la surveillance d'un traitement. Par ailleurs, 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 du 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. Les présentes lignes directrices reposent sur des données probantes liées uniquement aux examens d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandations	Force
TDM : tomodensitométrie; **IRM** : imagerie par résonance magnétique; **MN** : médecine nucléaire; **TEP** : tomographie par émission de positons; **ÉCHO** : échographie; **RX** : radiographie **Force de la recommandation :** ↑↑: élevée pour; ↑ : incertaine pour; ↓↓: élevée contre; ↓: incertaine contre; **EPc** : consensus d'un panel d'experts		
	4. Chez des adultes présentant des douleurs ou des symptômes liés à une arthroplastie ou à du matériel orthopédique, évoquant une arthrite septique, après la radiographie, nous suggérons une **ÉCHO** ou une **fluoroscopie** pour faciliter une arthrocentèse.	EPc
M24. Nécrose avasculaire et infarctus osseux	**1.** Chez des adultes chez qui l'on soupçonne une nécrose avasculaire ou un infarctus osseux, nous recommandons la **RX** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires pour l'évaluation d'une nécrose avasculaire, nous recommandons une **IRM** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.2** Si une IRM n'est pas disponible ou est contre-indiquée, nous suggérons la **MN** (scintigraphie osseuse).	↑
	↳ **1.3** Si l'IRM et la MN (scintigraphie osseuse) ne sont pas disponibles ou sont contre-indiquées, nous suggérons une **TDM**.	↑
M25. Syndrome douloureux régional complexe	**1.** Chez des adultes chez qui l'on soupçonne un syndrome douloureux régional complexe, nous suggérons la **RX** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires, nous suggérons la **MN** (scintigraphie osseuse) comme modalité d'imagerie subséquente.	EP
	↳ **1.2** Si la MN n'est pas disponible ou est contre-indiquée, nous suggérons l'**IRM**.	EPc

Les recommandations des lignes directrices ont pour but d'aider les médecins à choisir la modalité d'imagerie adaptée dans les cas où ils jugent nécessaire, du point de vue clinique, d'obtenir une imagerie. À noter cependant que l'imagerie ne doit pas retarder une prise de décision reliée à la prise en charge du patient. La question de savoir si une imagerie est indiquée n'entre pas dans le cadre de ces lignes directrices. De plus, nous n'avons pas abordé la question de la répétition de l'imagerie et des intervalles de temps pour le suivi d'une maladie connue ou la surveillance d'un traitement. Par ailleurs, 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 du 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. Les présentes lignes directrices reposent sur des données probantes liées uniquement aux examens d'imagerie diagnostique et non à la gestion clinique du patient.

APPENDIX 4. POTENTIALLY RELEVANT NON-ENGLISH GUIDELINES

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APPENDIX 5. AGREE-II ASSESSMENTS

Guideline Group	Domain 1				Domain 2				Domain 3									Domain 4				Domain 5					Domain 6			Overall quality rating
	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 (%)	
ACR 2017 [20]	2	2	2	6 (67)	3	2	3	8 (89)	3	2	2	3	3	3	1	3	20 (83)	3	3	3	9 (100)	2	2	1	1	6 (50)	2	2	4 (67)	Moderate
EANM/EBJIS/ESR 2019 [21,22]	3	2	3	8 (89)	3	1	3	7 (78)	3	3	3	2	3	3	3	3	23 (96)	3	3	3	9 (100)	3	3	1	1	8 (67)	1	3	4 (67)	Moderate
RCR 2017 [23]	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 [24]	2	2	3	7 (78)	3	2	3	8 (89)	3	2	3	3	3	3	1	3	21 (88)	3	3	3	9 (100)	2	2	1	1	6 (50)	2	3	5 (83)	Moderate
NICE (CG19) 2016 [25]	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	2	3	3	3	3	23 (96)	3	3	3	9 (100)	3	3	3	1	10 (83)	3	3	6 (100)	High
SVS, APMA, SVM 2016 [26]	3	2	3	8 (89)	3	2	3	8 (89)	2	2	3	3	3	3	3	3	22 (92)	3	3	3	9 (100)	1	3	1	1	6 (50)	3	3	6 (100)	Moderate
ESSR 2018 [27]	3	2	2	7 (78)	3	1	2	6 (67)	3	3	3	3	2	2	1	1	18 (75)	3	2	3	8 (89)	1	2	1	1	5 (42)	3	3	6 (100)	Moderate
AAOS 2019 [28]	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	3	3	3	3	24 (100)	3	3	3	9 (100)	3	3	1	1	8 (67)	3	3	6 (100)	High
ACR 2020 [29]	2	2	3	7 (78)	3	2	3	8 (89)	3	2	2	3	3	3	1	3	20 (83)	3	3	3	9 (100)	3	2	1	1	7 (58)	2	3	5 (83)	Moderate
ESMO 2021 [30]	3	2	2	7 (78)	3	1	2	6 (67)	2	1	3	3	3	3	3	3	21 (88)	3	3	3	9 (100)	1	3	1	1	6 (50)	3	2	5 (83)	Moderate
NICE (NG 35) 2016 [31,32]	3	3	3	9 (100)	3	3	3	9 (100)	3	2	3	3	3	3	3	3	23 (96)	3	3	3	9 (100)	2	3	3	2	10 (83)	3	3	6 (100)	High
ACR 2018 [33]	2	2	2	6 (67)	3	2	3	8 (89)	3	2	2	3	3	3	1	3	20 (83)	3	3	3	9 (100)	2	2	1	1	6 (50)	2	2	4 (67)	Moderate
ACP 2017 [34]	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	3	3	3	2	23 (96)	3	3	3	9 (100)	2	3	2	1	8 (67)	3	3	6 (100)	High
ACR 2017 [35]	3	2	2	7 (78)	3	2	3	8 (89)	3	2	2	3	3	3	1	3	20 (83)	3	3	3	9 (100)	2	2	1	1	6 (50)	2	2	4 (67)	Moderate
EULAR 2017 [36]	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	2	3	3	1	21 (88)	3	3	3	9 (100)	2	3	1	1	7 (58)	3	3	6 (100)	Moderate

Appendix 5. AGREE-II assessments

Guideline Group	Domain 1				Domain 2				Domain 3									Domain 4				Domain 5					Domain 6			Overall quality rating
	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 (%)	
EULAR 2017 [37]	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	2	3	3	3	23 (96)	3	3	3	9 (100)	2	3	1	1	7 (58)	3	2	5 (83)	Moderate
NICE (NG100) 2018 [38,39]	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	2	3	3	3	3	23 (96)	3	3	3	9 (100)	3	3	3	1	10 (83)	3	3	6 (100)	High
ACR 2017 [40]	3	2	3	8 (89)	3	2	3	8 (89)	3	2	2	3	3	3	1	3	20 (83)	3	3	3	9 (100)	2	2	1	1	6 (50)	2	2	4 (67)	Moderate
Brazilian Gdln 2020 [41]	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	3	3	3	3	24 (100)	3	3	3	9 (100)	1	2	2	1	6 (50)	3	2	5 (83)	Moderate
NICE (NG65) 2017 [42–44]	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	2	3	3	3	11 (92)	3	3	6 (100)	High
Spanish Gdln. 2018 [45]	3	2	3	8 (89)	3	1	2	6 (67)	3	3	3	3	2	3	3	1	21 (88)	3	3	3	9 (100)	1	2	1	1	5 (42)	3	2	5 (83)	Moderate
ACR 2017 [46]	2	2	3	7 (78)	3	2	3	8 (89)	3	2	2	3	3	3	1	3	20 (83)	3	3	3	9 (100)	2	2	1	3	8 (67)	2	2	4 (67)	Moderate
Paget's Assoc. 2019 [47]	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	2	3	3	3	3	23 (96)	3	3	3	9 (100)	3	3	1	1	8 (67)	3	2	5 (83)	High
USPSTF 2018 [48,49]	3	2	3	8 (89)	2	3	3	8 (89)	3	3	1	2	3	3	1	1	17 (71)	3	3	3	9 (100)	3	3	3	1	10 (83)	3	3	6 (100)	Moderate
ACR 2017 [50]	2	2	1	5 (56)	3	2	3	8 (89)	3	2	2	3	3	3	1	3	20 (83)	3	3	3	9 (100)	2	2	1	1	6 (50)	2	2	4 (67)	Moderate
ACR 2021 [51]	2	2	2	6 (67)	3	2	3	8 (89)	3	2	2	3	3	3	1	3	20 (83)	3	3	3	9 (100)	2	2	1	1	6 (50)	2	2	4 (67)	Moderate
AAOS 2020 [52]	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	3	3	3	3	24 (100)	3	3	3	9 (100)	2	3	3	1	9 (75)	3	3	6 (100)	High
ACR 2018 [53]	3	2	2	7 (78)	3	2	3	8 (89)	3	2	2	3	3	3	1	3	20 (83)	3	3	3	9 (100)	2	2	1	1	6 (50)	3	2	5 (83)	Moderate
ACR 2018 [55]	2	2	2	6 (67)	3	3	3	9 (100)	3	2	2	3	3	3	1	3	20 (83)	3	3	3	9 (100)	2	3	1	1	7 (58)	2	2	4 (67)	Moderate
ACR 2017 [56]	3	2	3	8 (89)	3	2	3	8 (89)	3	2	2	3	3	3	1	3	20 (83)	3	3	3	9 (100)	2	2	1	1	6 (50)	2	2	4 (67)	Moderate
Intl HRPRN [57]	3	2	3	8 (89)	3	1	3	7 (78)	2	3	1	3	2	2	3	1	17 (71)	3	3	3	9 (100)	1	2	2	1	6 (50)	3	3	6 (100)	Moderate

Appendix 5. AGREE-II assessments

Guideline Group	Domain 1				Domain 2				Domain 3									Domain 4				Domain 5					Domain 6			Overall quality rating
	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 (%)	
Lisbon Agree. 2020 [58–60]	3	3	2	8 (89)	3	1	3	7 (78)	3	2	3	3	2	3	3	3	22 (92)	3	3	3	9 (100)	1	3	1	1	6 (50)	3	3	6 (100)	Moderate
ACR 2018 [61]	3	2	3	8 (89)	3	3	3	9 (100)	3	2	2	3	3	3	1	3	20 (83)	3	3	3	9 (100)	2	2	1	1	6 (50)	2	2	4 (67)	Moderate
ACR 2018 [62]	2	2	2	6 (67)	3	3	3	9 (100)	3	2	2	3	3	3	1	3	20 (83)	3	3	3	9 (100)	2	3	1	1	7 (58)	2	2	4 (67)	Moderate
ACR 2020 [63]	3	2	2	7 (78)	3	2	3	8 (89)	3	2	2	3	3	3	1	3	20 (83)	3	3	3	9 (100)	2	2	1	1	6 (50)	2	3	5 (83)	Moderate
ACR 2017 [64]	3	2	3	8 (89)	3	3	3	9 (100)	3	2	2	3	3	3	1	3	20 (83)	3	3	3	9 (100)	2	2	1	1	6 (50)	2	3	5 (83)	Moderate
ACR 2016 [65]	3	2	2	7 (78)	3	2	3	8 (89)	3	2	2	3	3	3	1	3	20 (83)	3	3	3	9 (100)	2	2	1	1	6 (50)	2	3	5 (83)	Moderate
EANM, EBJIS, ESR 2019 [66]	3	3	2	8 (89)	2	1	2	5 (56)	3	3	3	3	2	3	3	3	23 (96)	3	3	3	9 (100)	3	3	3	1	10 (83)	2	3	5 (83)	Moderate
ICOI 2019 [67]	2	3	2	7 (78)	2	1	1	4 (44)	3	3	3	2	3	3	1	1	19 (79)	3	3	3	9 (100)	2	1	3	3	9 (75)	1	2	3 (50)	Moderate
ACR 2016 [68]	2	2	3	7 (78)	3	2	3	8 (89)	3	2	2	3	3	3	1	3	20 (83)	3	3	3	9 (100)	2	2	1	1	6 (50)	2	2	4 (67)	Moderate
German S3 Gdln. 2016 [69]	3	2	3	8 (89)	1	1	1	3 (33)	3	3	3	3	2	3	1	1	19 (79)	3	3	3	9 (100)	2	1	1	1	5 (42)	1	2	3 (50)	Moderate