Canadian Association of Radiologists
L'Association canadienne des radiologistes

Decoding Diagnostics

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FMF
Family Medicine Forum
Forum en médecine familiale

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Declarations/Conflict of Interest Disclosures

Marc Venturi - No relevant disclosures

- Employee of the Canadian Association of Radiologists
- Referral Guideline project funded by the **Canadian Medical Association**

Cathy MacLean - No relevant disclosures

- Served as a Working Group member for the oversight of the Referral Guidelines Project

Martin Heroux - No relevant disclosures

- MSK Expert Panel Member

Canadian Association of Radiologists

The national voice for radiologists in Canada, dedicated to imaging excellence and advocating for the highest standard of patient care across the country

A recognized leader in education, research and innovation in radiology

Focused on providing world-class resources that empower our members to be more successful in their profession

Objectives

- Describe these guidelines as a resource for DI referrals
- Utilize effective strategies to create easy access to CAR guidelines
- List the benefits of referral guidelines tailored to your practice.

Project mandate

- Develop a comprehensive set of evidenced-based diagnostic imaging referral guidelines suited for integration into Clinical Decision Support (CDS) systems
  1. Follow the GRADE methodology, ensuring all guidelines are context-specific to the Canadian healthcare system
  2. Produce guidelines as a public good that can be integrated into any referral CDS software system

Methodology

Protocol: Protocol reported using items in PRISMA-P (Moher 2015)

Scoping Review: JBI

"A scoping review allows for mapping of the body of literature and can be conducted to summarize and disseminate research findings."

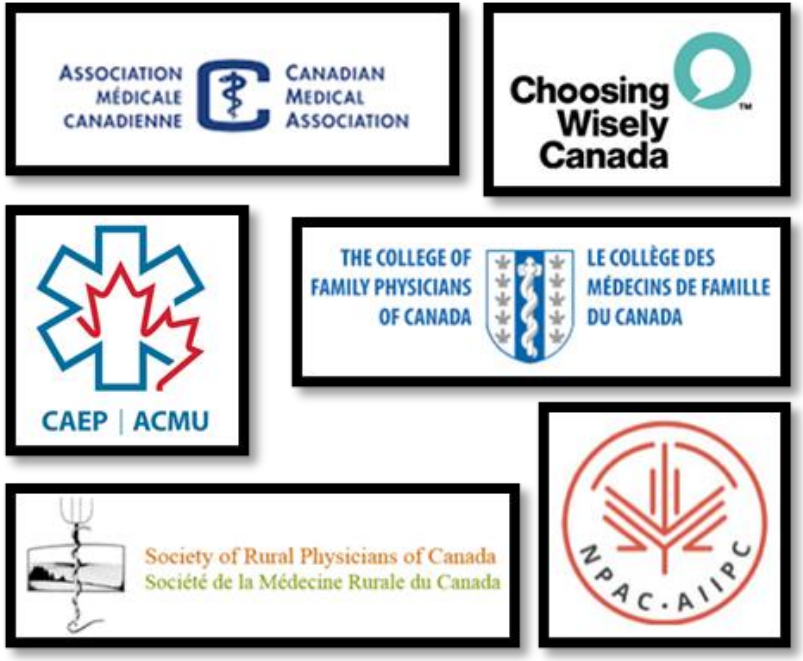
Rapid Review: Cochrane Rapid Review methods guidance[3]

A rapid review is a "form of knowledge synthesis that accelerates the process of conducting a traditional systematic review through streamlining or omitting a variety of methods to produce evidence for stakeholders in a resource-efficient manner.'' [4]

Guideline: GIN-McMaster Guideline Development Checklist[5] and GRADE for Guidelines (adapted where necessary) [6,7]

Partnerships

- National medical bodies/specialty societies
  - Canadian Medical Association (CMA)
  - Canadian Association of Emergency Physicians (CAEP)
  - College of Family Physicians of Canada (CFPC)
  - Choosing Wisely Canada
  - Nurse Practitioners Association of Canada (NPAC)
  - Society of Rural Physicians of Canada (SRPC)



Interprofessional collaboration

- Cardiology
- Emergency medicine
- Family medicine
- Gynecology
- General practitioner in oncology
- Gastroenterology
- General surgery
- Laryngology/Laryngeal surgery
- Maternal fetal medicine
- Medical oncology
- Nephrology
- Neurosurgery
- Neurology
- Patient and family advisor
- Pediatric:
  - Emergency medicine
  - Neurosurgery
  - Orthopedic surgery
  - Endocrinology
  - General surgery
  - Otolaryngology
  - Urology
  - Gastroenterology
- Physiatry
- Radiology
- Respirology
- Spine surgery
- Sports medicine
- Urology

Why is it important?

Table 5: Trends in amount of inappropriately used practices over time

Category of care	2009–2017 *n* = 92		2018–2020 *n* = 80	
	No. of studies (no. of findings)	Median (IQR), %	No. of studies (no. of findings)	Median (IQR), %
Diagnostics subtotal	52 (154)	28.5 (17.0–50.4)	35 (99)	26.7 (7.0–42.2)
Therapeutics subtotal	58 (128)	42.2 (18.9–67.3)	50 (120)	24.5 (3.9–55.0)
Total	92 (282)	32.6 (18.0–58.7)	80 (219)	25.9 (5.0–52.1)

Note: IQR = interquartile range. Multiple diagnostics subcategory removed: only 1 data point in 2018–2020; multiple therapeutics subcategory removed: only 1 data point in 2009–2017.

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Table 1. Recommendation Text, Symbol, and Interpretation.

Recommendation	AGAINST	FOR
STRONG	**Strong, against** "we recommend against" (↓↓) • All or almost all informed people would not recommend/choose the course of action and only a small proportion would.	**Strong, for** "we recommend" (↑↑) • All or almost all informed people would recommend/choose the course of action and only a small proportion would not. • Request discussion if the intervention is not offered.
CONDITIONAL	**Conditional, against** "we suggest against" (↓) • Most informed people would not recommend/choose the course of action, 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.	**Conditional, for** "we suggest" (↑) • Most informed people would recommend/choose the course of action, 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.

Note. Down arrows are red and Up arrows are green when available in colour.
Created using the guidance provided in Andrews et al.[6]

H04. Neck mass of unknown origin, including salivary gland mass

Recommendations

1. In adults with neck mass of unknown origin with clinical concern for malignancy, we recommend **CT** as the initial imaging modality (↑↑).

2. In adults with neck mass of unknown origin with low clinical concern for malignancy, we recommend **US** as the initial imaging modality (↑↑).

   ↳ **2.1** If further investigation is required to characterize the mass, we recommend **CT or MRI** as the next imaging modality based on US findings (↑↑).

   In characterizing salivary gland masses, MRI may provide additional diagnostic information over CT.

Summary Tables

GI04. CHRONIC ABDOMINAL PAIN		
	1. In patients who meet the diagnostic criteria for irritable bowel syndrome, we recommend **against imaging** in the absence of concerning clinical and/or biochemical findings.	↓↓
	2. In patients with chronic abdominal pain, we recommend **against MRI** as an imaging modality due to limited sensitivity and specificity.	EPc
	3. In patients with chronic abdominal pain, we recommend **CT abdomen and pelvis** as the initial imaging modality.	↑↑
	↳ **3.1** If CT is unavailable, we suggest **US abdomen** as an alternative imaging modality, accepting its limited scope of assessment compared to CT.	↑
	4. In patients with chronic abdominal pain (suspected chronic mesenteric ischemia), we recommend **CTA abdomen and pelvis** as the initial imaging modality.	↑↑

Canadian Association of Radiologists - Website

- Car.ca
- Patient Care
- Referral Guidelines

Case 1

- A 35-year-old man presents to your office with a 7 month history of right shoulder pain that started after falling on the ice during a rec hockey game. The pain is located over the anterior shoulder and he notices frequent clicking. He has tried physio with no improvement. His physio asked him to get imaging to rule out a labral injury.
- **What test(s) will you order?**

Imaging Options

- X-ray
- CT scan
- Ultrasound
- MRI

Decision

M16. SHOULDER PAIN OR INSTABILITY[9,11,22,37,54]

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

↳ **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** (↑↑).[b]

↳ **1.3** In adults with suspected labral tear, ligamentous and cartilage injuries, or instability, we recommend **MR arthrography** (↑↑) or **high-field MRI** (ie, 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 (↑).

Case 2 -

- **Mr. J. D.** is a 32-year-old active male who recently escalated his marathon training intensity. He presents to your office with a chief complaint of **progressive right groin pain** that began approximately three weeks ago and is significantly aggravated by running. He denies any single traumatic event. The physical exam shows pain upon internal rotation of the hip and tenderness in the right groin area.
- You are concerned he could have a stress fracture of his hip.

Imaging Options

- X-ray
- CT scan
- Ultrasound
- MRI

Decision

M14. STRESS FRACTURE (INSUFFICIENCY AND FATIGUE)[20]

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) (↑).

Case 3

- A 67-year-old woman with a history of diabetic neuropathy presents with worsening left foot pain. She has a 2 cm, Grade 2 ulcer on the plantar aspect of her foot with exposed tendons. You are concerned about the possibility of osteomyelitis.
- In addition to labwork, what imaging would you order?

Imaging Options

- X-ray
- CT scan
- Ultrasound
- MRI

Decision

M01. OSTEOMYELITIS, INCLUDING DIABETIC FOOT[9,13,14,32,33,45,54,55]

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) (↑).[a]

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 (↑).

Case 4

- A 35-year-old woman presents with a four month history of tinnitus. She has been seeing a naturopath who has tried various treatments that have not helped at all.
- Her naturopath told the patient to book an appointment with you so that you can order an MRI of her head.
- Neurological exam in the office does not reveal any abnormalities.

- What test(s), *if any*, will you order?

Imaging Options

- **NOTHING**
- **MRI**
- **SOMETHING ELSE**

Decision – It's a trick question!

1. In adults with pulsatile tinnitus, we suggest **CT/CTA or MRI/MRA** as the initial imaging modality (↑).

> *The imaging modality selected may be based on regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.*

Decision – It's a trick question!

1. In adults with symmetrical atraumatic non-pulsatile tinnitus with no associated neurological signs and symptoms✧, we recommend **against imaging** (↓↓).

2. In adults with associated neurological signs and symptoms✧ OR with asymmetric atraumatic non-pulsatile tinnitus, we recommend **MRI of internal auditory canals** as the initial imaging modality (↑↑).

   ↳ **2.1** If MRI internal auditory canals is unavailable or contraindicated, we recommend **CT** (↑↑).

✧*For example, focal neurological abnormalities, otological (e.g., asymmetrical hearing loss), head and neck signs and symptoms*

For hearing loss, see CNS guideline

Case 5

- Lawrence is a 55-year-old man who you presents to your office for follow up. On routine testing, he was found to have microscopic hematuria. You have repeated the urinalysis twice and the microscopic hematuria has persisted.
- **What imaging would you order?**

Imaging Options

- **Ultrasound**
- **CT scan**
- **Referral to Urology**

Decision

1. In low-risk patients✧ with microscopic hematuria, we recommend **US** as the initial imaging modality with consideration to urology referral (↑↑).
2. In high-risk adults (e.g., older age, smoking history) with microhematuria, we recommend **CT urography** as the initial imaging modality (↑↑).
3. In pregnant adults with microhematuria, we recommend **US** as the initial imaging modality (↑↑).
   - ↳ **3.1** If US is inconclusive, we suggest **MR urography** as an alternative imaging modality (↑).

✧ no history of recent vigorous exercise, infection or viral illness, present or recent menstruation, renal parenchymal disease

Recommendations from four guidelines were used during the discussion and formulation of these recommendations: the 2012 CAR guideline Urology, Adrenal, and Genitourinary systems section [18], the 2020 ACR guideline on Hematuria [19], the 2020

How to integrate into practice

- Clinical Decision Support (CDS) systems
  - MedCurrent, X-Wave, “Ocean”
- NotebookLM
- Website PDFs
  - car.ca/patient-care/referral-guidelines/
- UpToDate?
- OpenEvidence?
- Perplexity – Give Context
- DIY → https://carrefassist-jeccvsb5.manus.space

Marc’s U-Built CAR Medical Imaging Referral Guidelines AI

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Microhematuria -> CAR

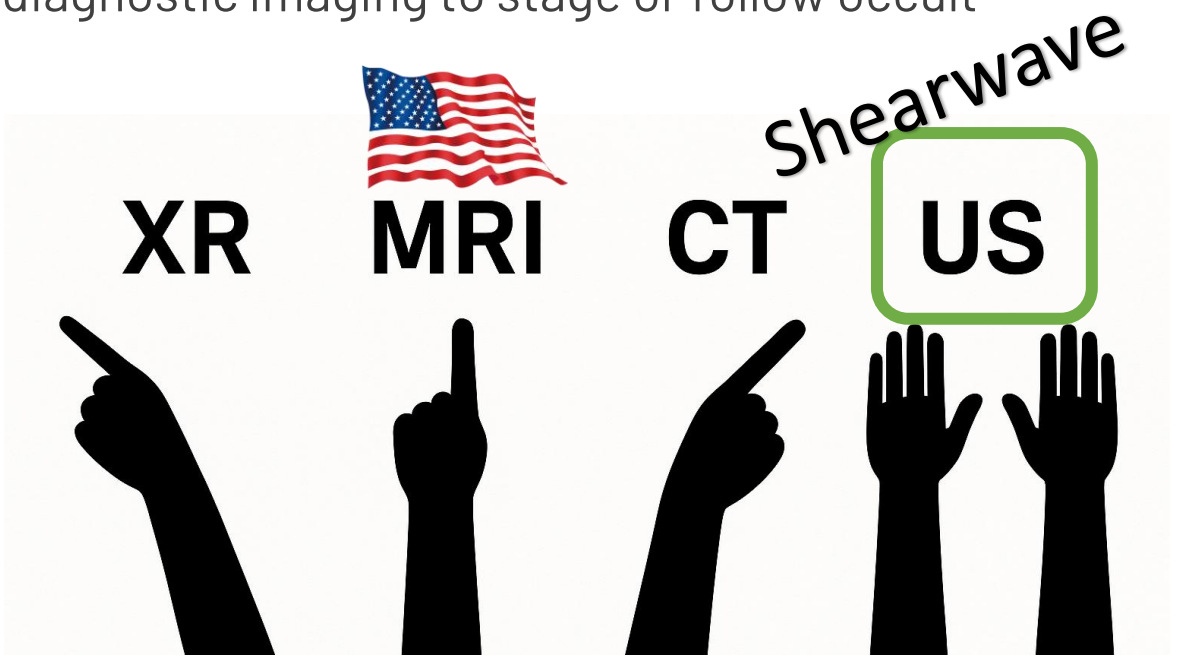
- In low-risk patients◊ with microscopic hematuria, we recommend **US** as the initial imaging modality with consideration to urology referral (↑↑).
- In high-risk adults (e.g., older age, smoking history) with microhematuria, we recommend **CT urography** as the initial imaging modality (↑↑).
- In pregnant adults with microhematuria, we recommend **US** as the initial imaging modality (↑↑).
- 3.1 If US is inconclusive, we suggest **MR urography** as an alternative imaging modality (↑).
- ◊ no history of recent vigorous exercise, infection or viral illness, present or recent menstruation, renal parenchymal disease

Microhematuria -> USA

CT abdomen and pelvis without IV contrast	1-10 mSv ☢☢☢	3-10 mSv [ped] ☢☢☢☢	May be appropriate
US kidneys and bladder retroperitoneal	0 mSv O	0 mSv [ped] O	Usually not appropriate
Arteriography kidney	1-10 mSv ☢☢☢		Usually not appropriate
Radiography abdomen and pelvis	1-10 mSv ☢☢☢	0.3-3 mSv [ped] ☢☢☢	Usually not appropriate
Radiography intravenous urography	1-10 mSv ☢☢☢	0.3-3 mSv [ped] ☢☢☢	Usually not appropriate
MRI abdomen and pelvis without and with IV contrast	0 mSv O	0 mSv [ped] O	Usually not appropriate
MRI abdomen and pelvis without IV contrast	0 mSv O	0 mSv [ped] O	Usually not appropriate
MRU without and with IV contrast	0 mSv O	0 mSv [ped] O	Usually not appropriate
CT abdomen and pelvis with IV contrast	1-10 mSv ☢☢☢	3-10 mSv [ped] ☢☢☢☢	Usually not appropriate
CT abdomen and pelvis without and with IV contrast	10-30 mSv ☢☢☢☢	10-30 mSv [ped] ☢☢☢☢☢	Usually not appropriate
CTU without and with IV contrast	10-30 mSv ☢☢☢☢	10-30 mSv [ped] ☢☢☢☢☢	Usually not appropriate

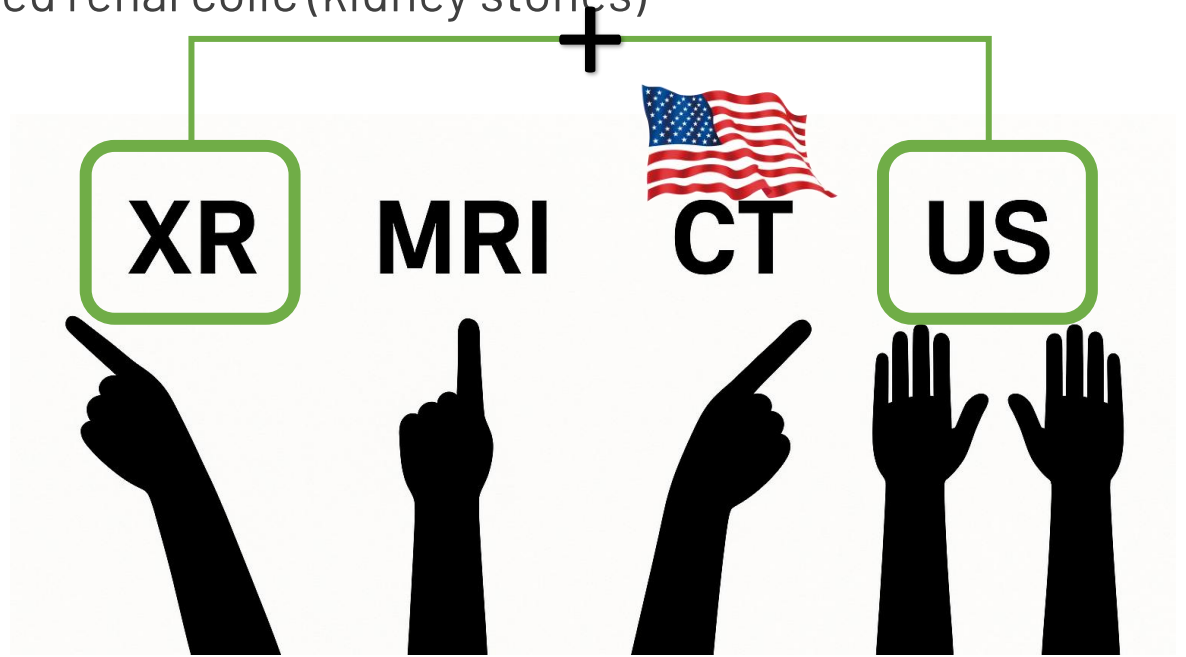
Case 6 -

- A noncirrhotic adult patient presents with chronic abnormal liver biochemistry, requiring diagnostic imaging to stage or follow occult hepatic fibrosis



Case 7

- A younger adult patient presents to the emergency department with suspected uncomplicated renal colic (kidney stones)



Summary

- Guidelines available online
- Use readily available tools to query the guidelines or access directly.
- Expedite patient journey
- Justify specific choices
- TEACHING!

PLEASE FILL OUT YOUR SESSION EVALUATION NOW!

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Thank you! Questions?