Canadian Association of Radiologists Journal
2025, Vol. 76(1) 25–32

DOI: 10.1177/08465371241261317
journals.sagepub.com/home/caj

Canadian Association of Radiologists Genitourinary Imaging Referral Guideline

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Abstract

The Canadian Association of Radiologists (CAR) Genitourinary Expert Panel is made up of physicians from the disciplines of radiology, emergency medicine, family medicine, nephrology, and urology, a patient advisor, and an epidemiologist/guideline methodologist. After developing a list of 22 clinical/diagnostic scenarios, a rapid scoping review was undertaken to identify systematically produced referral guidelines that provide recommendations for one or more of these clinical/diagnostic scenarios. Recommendations from 30 guidelines and contextualization criteria in the Grading of Recommendations, Assessment, Development, and Evaluations (GRADE) for guidelines framework were used to develop 65 recommendation statements across the 22 scenarios (2 scenarios point to the CAR Obstetrics and Gynecology Diagnostic Imaging Referral Guideline). This guideline presents the methods of development and the referral recommendations for haematuria, hypertension, renal disease (or failure), renal colic, renal calculi in the absence of acute colic, renal lesion, urinary tract obstruction, urinary tract infection, scrotal mass, or pain, including testicular torsion, adrenal mass, incontinence, urgency, and frequency, chronic pelvic pain, elevated PSA, infertility, and pelvic floor.

Résumé

Le groupe d'experts en radiologie de l'appareil génito-urinaire de l'Association canadienne des radiologistes (CAR) regroupe des radiologistes, des urgentologues, des médecins généralistes, des néphrologues, des urologues, une représentanet des patients et une épidémiologiste spécialisée en méthodologie de l'élaboration de lignes directrices. Après avoir élaboré une liste de 22 scénarios cliniques/diagnostiques, le groupe d'experts a entrepris une revue rapide de délimitation du problème en vue de repérer les lignes directrices relatives aux demandes d'examen produites de façon systématique qui fournissent des recommandations pour un ou plusieurs de ces scénarios. Des recommandations provenant de 30 lignes directrices et des critères de contextualisation dans le cadre GRADE (notation des recommandations, analyses, développements et évaluations) ont été utilisés pour élaborer 65 énoncés de recommandations couvrant les 22 scénarios (2 scénarios renvoient aux lignes directrices de la CAR relatives aux demandes d'examen d'imagerie diagnostique en obstétrique et gynécologie). Ces lignes directrices présentent les étapes à suivre et les recommandations d'orientation dans les cas d'hématurie, d'hypertension, de néphropathie (ou d'insuffisance rénale), de colique néphrétique, de calculs rénaux non accompagnés de colique aiguë,

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de lésions rénales, d'obstruction des voies urinaires, d'infection des voies urinaires, de masse ou de douleur scrotale (y compris de torsion testiculaire), de masse surrénalienne, d'incontinence urinaire, d'urgence urinaire, de fréquence urinaire, de douleur pelvienne chronique, de taux sanguin d'APS élevé, d'infertilité et de troubles liés au plancher pelvien.

Keywords
genitourinary, diagnostic imaging, referrals, guideline, recommendations

Introduction

Beginning in March 2023, an Expert Panel (EP) made up of physicians from the disciplines of radiology, emergency medicine, family medicine, nephrology, and urology, a patient advisor, and an epidemiologist/guideline methodologist met to develop a new set of recommendations specific to referral pathways for genitourinary conditions. Through discussion (via a virtual meeting) followed by offline communication, the EP developed a list of 22 clinical/diagnostic scenarios to be covered by this guideline. These recommendations are intended primarily for referring clinicians (eg, family physicians, specialty physicians, nurse practitioners); however, they may also be used by radiologists, individuals/patients, and patient representatives.

Our methods describing the guideline development process, including the rapid scoping review to identify the evidence base, has been published in *CMAJ Open*[1] and an editorial to this series of guideline publications is available in *CARJ*.[2] The application of well-established scoping review and rapid review guidance (JBI,[3] Cochrane Handbook,[4] Cochrane Rapid Review Methods Group[5]) and guideline methodology (ie, Grading of Recommendations Assessment, Development, and Evaluation or GRADE[6,7]) were used to identify the evidence-base and to guide the Expert Panel in determining the strength and direction of the recommendations for each clinical scenario (Table 1). The quality of conduct and reporting of the included guidelines identified in the scoping review were evaluated with the AGREE-II checklist,[8] using a modified scoring system. In instances where guidelines were lacking, expert consensus was used to develop the recommendation. Contextualization to the Canadian health care system was considered for each recommendation, with discussion around the factors found in the Evidence to Decision framework in GRADE for guidelines (eg, balance of desirable and undesirable outcomes, values and preferences, resources implications).[7]

A systematic search for guidelines (with an a priori defined inclusion criteria) was run in Medline and Embase on May 29, 2023. The search was limited to publications from 2018 onward (Supplemental Appendix 1). Supplemental searching included the following national radiology and/or guideline groups: the American College of Radiology, the American Urological Association, the Canadian Urological Association, the National Institute for Health and Care Excellence, the Society of Obstetricians and Gynecologists, and the Royal College of Radiologists 8th Edition (2017). Recommendations for each clinical scenario were formulated over 2 virtual meetings on January 20 and February 12, 2024. External review and feedback were obtained from radiologists, a nuclear medicine radiologist, an emergency physician, a family physician, and nurse practitioners. The full guideline can be found on the CAR website (www.car.ca).

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]

Results

Systematic Scoping Review

A total of 4205 records were identified through the electronic database and 18 additional records were added from the supplemental search. Thirty guidelines, plus 2 companion papers, were included (Figure 1). All potentially relevant guidelines were published in English. A list of excluded records with justifications for exclusion is available upon request. Most guidelines were rated as moderate or high quality, using the modified AGREE-II checklist[8] (Supplemental Appendix 2). The number of guidelines included per clinical/diagnostic scenario ranged from 1 to 6, with a median of 3 guidelines per clinical scenario.

Recommendations

Additional details of the included guidelines, including which imaging modalities (eg, computed tomography [CT], magnetic resonance imaging [MRI], radiograph [XR], ultrasound [US]) that were discussed can be found in Supplemental Appendix 3.

A guideline is intended to guide and not be an absolute rule. Medical care is complex and should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, preferences, and resource availability. Not all imaging modalities are available in all clinical environments, particularly in rural or remote areas of Canada. Decisions about patient transfer, use of alternative imaging or serial clinical examination and observation can be complex and difficult. Therefore, the expected benefits of recommended imaging, risks of travel, patient preference, and other factors must be considered. The guideline recommendations are designed to assist the choice of imaging modality in situations where it is deemed clinically necessary to obtain imaging.

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

We reviewed relevant recommendations related to the 22 clinical/diagnostic scenarios previously published by radiology and specialty societies, including: the Canadian Association of Radiologists,[9] the American College of Emergency Physicians,[10] the American College of Radiology,[11-20] the American Urological Association/Society of Urodynamics, Female Pelvic Medicine & Urogenital Reconstruction,[21] the American Urological Association/Canadian Urological Society/Society of Urodynamics, Female Pelvic Medicine & Urogenital Reconstruction,[22] the Canadian Urological Association,[23-29] the European Association of Urology,[30-32] the German Association of Scientific Medical Societies in Germany,[33] Hypertension Canada,[34] National Comprehensive Cancer Network,[35] the National Institute for Health and Care Excellence,[36-38] the Royal College of Radiologists,[39] and the Urethral Structures Guideline Amendement.[40]

Recommendations are presented in Table 2.

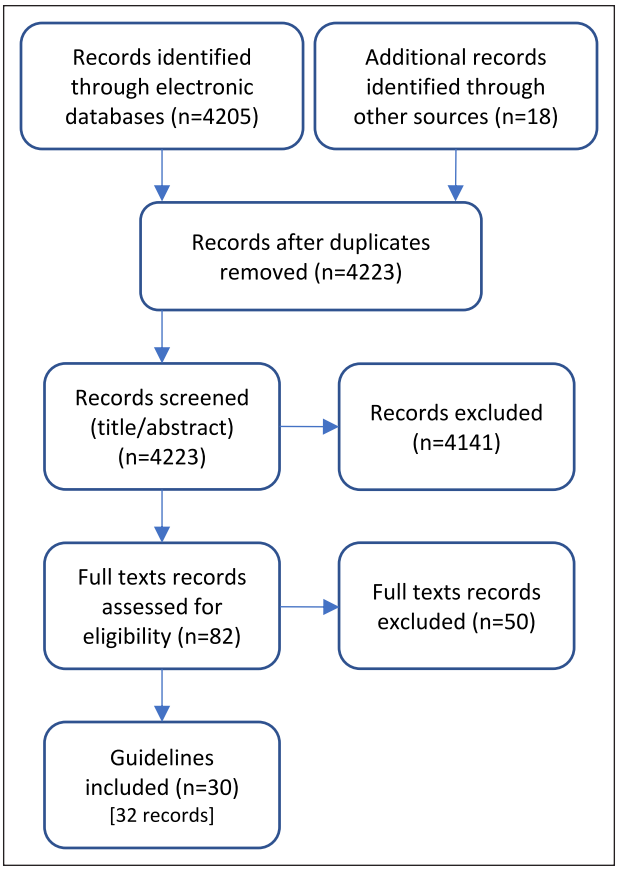

Figure 1. PRISMA flow diagram.

Table 2. Genitourinary Recommendations.

Clinical/diagnostic scenario and recommendations

GU01. HAEMATURIA

GU01A. Gross haematuria[9,11,39]

1. In younger adults with gross haematuria, we recommend **US** as the initial imaging modality, in conjunction with urology referral (↑↑).
- ↳ **1.1** If further imaging is required, we suggest **CT urography** as the next imaging modality (↑).
  - ↳ **1.2** If CT urography is contraindicated, we recommend **MR urography** as an alternative imaging modality (↑↑).

2. In older adults with gross haematuria, we recommend **CT urography** as the initial imaging modality in conjunction with urology referral (↑↑).
- ↳ **2.1** If CT urography is contraindicated, we recommend **MR urography** or **US** as an alternative imaging modality (↑↑).

Note. CT urography is equivalent to CT intravenous pyelography (CT IVP).

GU01B. Microhaematuria[9,11,21,39]

1. In low-risk patients✧ with microscopic haematuria, we recommend **US** as the initial imaging modality with consideration to urology referral (↑↑).

2. In high-risk adults (eg, older age, smoking history) with microhaematuria, we recommend **CT urography** as the initial imaging modality (↑↑).

3. In pregnant adults with microhaematuria, 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

GU02. HYPERTENSION, IN ABSENCE OF RENAL DISEASE (OR KIDNEY FAILURE)

GU02A. Responsive to medication[9,34]

1. In adults with hypertension who are responsive to medication, we recommend **no imaging** (↓↓).

GU02B. Unresponsive to medication[9,34,39]

1. In adults with hypertension who are unresponsive to medication,✧ we suggest **against US Doppler** as the initial imaging modality (↓).

2. In adults with hypertension who are unresponsive to medication,✧ we recommend **US** as the initial imaging modality to assess for renal size and/or size discrepancy (EPc).
- ↳ **2.1** If further imaging is indicated clinically, we recommend **CTA** as the initial imaging modality (↑↑).
  - ↳ **2.2** If CTA is contraindicated, we suggest **MRA or NM** as an alternative imaging modality (↑).

✧≥3 medications[34]

GU03. RENAL DISEASE (OR FAILURE)

GU03A. Acute kidney injury (or failure)[9,12,36,39]

Renal and pre-renal causes of acute renal failure are more common than post-renal etiologies (eg, stones) and should be excluded clinically and biochemically prior to consideration of any imaging.

1. In adults with acute kidney injury (or failure), we recommend **US** as the initial imaging modality (↑↑).
- ↳ **1.1** If US is unavailable, we suggest **CT** as an alternative imaging modality (↑).

GU03B. Chronic kidney disease[9,12,39]

1. In adults with suspected chronic kidney disease, we recommend **US** as the initial imaging modality (↑↑).
- ↳ **1.1** If characterization of US-detected hydronephrosis is needed, we suggest **CT abdomen and pelvis** as the next imaging modality (↑).
  - ↳ **1.2** If contrast-enhanced CT is contraindicated, we suggest **MRI** as an alternative imaging modality (↑).
    - ↳ **1.3** If MRI is unavailable, we suggest **non-contrast CT** as an alternative imaging modality (↑).

2. In adults with suspected renovascular cause of chronic kidney disease, see GU02. Hypertension, in absence of renal disease (or failure).

For information on the use of gadolinium-based contrast agents in kidney disease, see the 2019 CAR guideline.[41]

(continued)

Table 2. (continued)

GU04. RENAL COLIC[9,10,13,23,24,30,39]

1. In younger adults with suspected renal colic, we recommend **US** ± **abdominal XR** as the initial imaging modalities (↑↑).
   - ↳ **1.1** If further imaging is required, we recommend **CT** as the next imaging modality (↑↑).
2. In older adults with suspected renal colic, we recommend **CT** as the initial imaging modality (↑↑).
   - ↳ **2.1** If CT is unavailable, we recommend **US and/or abdominal XR** as an alternative imaging modality (↑↑).
3. In pregnant adults with suspected renal colic, we recommend **US** as the initial imaging modality (↑↑).

GU05. RENAL CALCULI IN ABSENCE OF RENAL COLIC[9,37,39]

1. In patients with known renal calculi in the absence of acute colic, we recommend **US** (↑↑).
   - ↳ **1.1** If US is unavailable, we recommend **XR** (↑↑).

GU06. RENAL LESION[9,14,25-27,39]

1. In adults with suspected solid renal lesion(s) incidentally detected on US or CT requiring further characterization, we recommend a **multi-phase CT abdomen** as the initial imaging modality (↑↑).
   - ↳ **1.1** If further imaging is required, we suggest **MRI abdomen** as the next imaging modality (↑).
     - ↳ **1.2** If CT and MRI are contraindicated, we recommend **contrast-enhanced US** as an alternative (↑↑).
2. In adults with suspected cystic renal lesion(s) incidentally detected requiring further characterization, we recommend **US** as the initial imaging modality (↑↑).
   - ↳ **2.1** If further imaging is required, we recommend **multi-phase CT abdomen** (↑↑).
     - ↳ **2.2** If CT is contraindicated, we recommend **MRI abdomen** as an alternative (↑↑).
       - ↳ **2.3** If MRI is contraindicated, we recommend **contrast-enhanced US** as an alternative (↑↑).

GU07. URINARY TRACT OBSTRUCTION

GU07A. Upper (pelviectasis, hydronephrosis)[9,39]

1. In adults with suspected upper urinary tract obstruction, we recommend **US** as the initial imaging modality (↑↑).
   - ↳ **1.1** If further imaging is required, we recommend **CT abdomen** as the next imaging modality (↑↑).
2. In pregnant adults with suspected upper urinary tract obstruction, we recommend **US** as the initial imaging modality (↑↑).
   - ↳ **2.1** If further imaging is required, we recommend **MRI abdomen** as the next imaging modality (↑↑).

If clinical concern for renal colic, see GU04; *If clinical concern for infection, see* GU08.

GU07B. LOWER (LOWER URINARY TRACT SYNDROME)[9,28,31,39,40]

The guideline recommendations are to assist the choice of imaging modality in situations where it is felt clinically and/or biochemically necessary to obtain imaging. If imaging is required, then:

1. In adults with male anatomy and suspected lower urinary tract obstruction, we recommend **against imaging** in the absence of renal impairment (↓↓).
   - ↳ **1.1** In patients with renal impairment, we recommend **US** (↑↑).
2. In adults with male anatomy and treatment resistant lower urinary tract obstruction, we suggest **US** in conjunction with urology referral (↑).
3. In adults with female anatomy and suspected lower urinary tract obstruction, we recommend **US** in conjunction with specialist referral (↑↑).

If clinical concern for pelvic floor dysfunction, see GU15.

GU08. URINARY TRACT INFECTION (UTI)

GU08A. Acute[9,33,39]

1. In adults with acute urinary tract infection, we recommend **no imaging** (↓↓).

For acute urinary tract infection in the paediatric population, see CAR Pediatric Guideline.

GU08B. Post-treatment failure (pyelonephritis)[9,15]

1. In adults with suspected acute pyelonephritis, we recommend **against imaging** (↓↓).
2. In adults with suspected abscess or other complications of acute pyelonephritis, we recommend **US or CT abdomen and pelvis** as the initial imaging modality (↑↑).
3. In pregnant adults with suspected abscess or other complications of acute pyelonephritis, we suggest **US** as the initial imaging modality (↑).
   - ↳ **3.1** If US is indeterminate or clinical suspicion persists, we suggest **MRI** as the next imaging modality (↑).

(continued)

Table 2. (continued)

GU08C. Chronic and recurrent bladder infections[9,16,22]

1. In adults with female anatomy with uncomplicated recurrent lower urinary tract infections, we recommend **against imaging** (↓↓).
2. In patients with complicated urinary tract infections, we recommend urology referral (↑↑).

For recurrent urinary tract infection in the pediatric population, see CAR Pediatric Guideline.

GU09. SCROTAL MASS OR PAIN, INCLUDING TESTICULAR TORSION AND EPIDIDYMITIS[9,17,18,39]

1. In adults with scrotal pathology, we recommend **US** (↑↑).
2. In adults with scrotal pain (without trauma) and clinical concern for Fournier's gangrene, we recommend **CT and surgical referral** (EPc).

GU10. ADRENAL MASS[19,29,35,39]

1. In adults with incidentally discovered indeterminate adrenal masses, we recommend **MRI or non-contrast CT** as the initial imaging modality (↑↑).
   - ↳ **1.1** If further imaging is required, we suggest adrenal washout **CT** as the next imaging modality (↑).
   - ↳ **1.2** If concern for adrenal metastasis, we suggest **NM (PET-CT)** (↑).
2. In adults with undiagnosed suspected biochemically active tumours, we suggest MRI or CT as the initial imaging modalities (↑↑).
   - ↳ **2.1** If further imaging is required, we suggest **NM consultation** (↑).

GU11. INCONTINENCE, URGENCY, AND FREQUENCY[32,38]

1. In adults with urinary incontinence, urgency, and/or frequency, we suggest **US** to assess for post-void residual urine, if clinically indicated (↑).
   - ↳ **1.1** Where post-void residual assessment is not clinically indicated, we recommend **against imaging** (↓↓).
2. In patients with female anatomy, to evaluate for specific causes of lower urinary tract symptoms (eg, urethral diverticulum, etc.), we suggest **MRI** (↑).

If clinical concern for lower urinary tract obstruction, see GU07B; *If clinical concern for urinary tract infection, see* GU08.

For urinary incontinence (Enuresis and Continual incontinence) in the paediatric population, see CAR Pediatric Guideline.

GU12. CHRONIC PELVIC PAIN

GU12A. Chronic pelvic pain in females

Recommendations for this clinical scenario were covered by the Obstetrics and Gynecology Expert Panel. See CAR Obstetric and Gynecology Diagnostic Imaging Referral Guideline[42] for more information.

GU12B. Chronic pelvic pain in males[9]

1. In adults with male anatomy with non-specific chronic pelvic pain, we suggest **CT** as the initial imaging modality (EPc).
2. In adults with suspected chronic prostatitis, we recommend **against routine imaging** (EPc).

In patients with elevated PSA, see GU13.

GU13. ELEVATED PSA[39]

1. In adults with persistently or markedly elevated PSA*, we recommend **urology referral** ± **MRI** (↑↑).

   Referral for MRI may differ based on regional/local practice preference.

**Refer to Canadian Urology Association Prostate screening guideline*[43]

GU14. INFERTILITY

Recommendations for this clinical scenario were covered by the Obstetrics and Gynecology Expert Panel. See CAR Obstetric and Gynecology Diagnostic Imaging Referral Guideline[42] for more information.

GU15. PELVIC FLOOR[20]

1. In adults with vaginal protrusion or bulge, or suspected pelvic organ prolapse, or defecatory dysfunction, we recommend **MR defecography** as the initial imaging modality (↑↑).
   - ↳ **1.1** If MR defecography is unavailable, we suggest **fluoroscopic defecography** as an alternative imaging modality (↑).

     Availability and use of MR defecography and fluoroscopic defecography may vary between provinces and between regions within a province.

If clinical concern for urinary dysfunction, see GU11.

Note. Strength of recommendation: ↑↑ = strong for; ↑ = conditional for; ↓ = conditional against; ↓↓ = strong against; EP = Expert Panel.
CT = computed tomography; MR/MRI = magnetic resonance/imaging; NM = nuclear medicine; PET = positron emission tomography; US = ultrasound; XR = radiograph.

Acknowledgments

We would like to thank: Becky Skidmore for creating the search strategies for the systematic scoping review, and the following individuals on the Diagnostic Imaging Referral Guidelines Working Group and external stakeholders for providing feedback on the guideline (listed alphabetically): Alanna Coleman (Nurse Practitioners Association of Canada), Noel Corser (Family physician), Sangeet Ghai (Radiologist), Stephanie Henry (Nurse Practitioners Association of Canada), Ryan Margau (WG co-chair, Radiologist), Paul Pageau (WG co-chair, Emergency medicine physician), Shirin Vellani (Nurse Practitioners Association of Canada), Jeffrey Wagner (Nuclear medicine radiologist), and Kaitlin Zaki-Metias (Radiologist).

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the Canadian Medical Association.

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Supplemental Material

Supplemental material for this article is available online.

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