Declarations

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Introduction

• A 2022 systematic review reported that diagnostic imaging was underused or overused a median of 13.8% of the time (interquartile range 4.5 to 29.0%) (in Canada from 2007 to 2021)\textsuperscript{1}.

• This over- and underuse of diagnostic imaging may result in:
  • iatrogenic harms to the patient
  • longer wait times
  • poorer health outcomes due to delays in diagnosis
  • inefficient use of scarce health care resources

• Both the number of CT and MRI examinations are expected to more than double in the period from 2017 to 2040.

• Trustworthy guidelines, and the recommendations within, should be evidence based and developed using rigorous methodology.

• Recommendations should also be contextualized (e.g., equity, accessibility, resources).
In 2020 the CAR, funded by the CMA, began working on Diagnostic Imaging Referral Guidelines.

Working in collaboration with national medical bodies/specialty societies:
- Canadian Medical Association
- Canadian Association of Emergency Physicians
- College of Family Physicians of Canada
- Choosing Wisely
- Nurse Practitioners Association of Canada
- Society of Rural Physicians of Canada
Mandate

Develop a comprehensive set of evidenced-based diagnostic imaging referral guidelines suited for integration into Clinical Decision Support (CDS) systems

a) Produce a comprehensive set of evidence-based diagnostic imaging referral guidelines

b) Follow the GRADE methodology, ensuring all guidelines are context-specific to the Canadian healthcare system

c) Produce guidelines as a public good that can be integrated into any referral CDS software system

d) Develop a ‘toolkit’ for the rollout of a CDS system

https://car.ca/news/enhanced-and-measured-patient-referrals/#more-13977
Why Clinical Decision Support (CDS)?

- Physicians across all disciplines are facing increased pressures due to factors such as volume of patients, ongoing systemic and practice changes.
- CDS has the potential to benefit all aspects of healthcare with patients being the primary benefactors (patients get the right test at the right time).
- CDS systems have imbedded guidelines to ensure that given any clinical scenario, the software guides the referring clinician to the best test or referral or recommends no test or referral.
- Provinces are beginning to demand CDS.
### 2012 CAR Guideline Sections

<table>
<thead>
<tr>
<th>CAR Section</th>
<th>Clinical/diagnostic scenarios in 2012</th>
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<tbody>
<tr>
<td>A. Central nervous system</td>
<td>15</td>
</tr>
<tr>
<td>B. Head and neck</td>
<td>15</td>
</tr>
<tr>
<td>C. Spine</td>
<td>6</td>
</tr>
<tr>
<td>D. Musculoskeletal systems</td>
<td>19</td>
</tr>
<tr>
<td>E. Cardiovascular</td>
<td>13</td>
</tr>
<tr>
<td>F. Thoracic</td>
<td>26</td>
</tr>
<tr>
<td>G. Gastrointestinal system</td>
<td>33</td>
</tr>
<tr>
<td>H. Urological, adrenal and genitourinary systems</td>
<td>12</td>
</tr>
<tr>
<td>I. Obstetrics and gynaecology</td>
<td>16</td>
</tr>
<tr>
<td>J. Trauma</td>
<td>29</td>
</tr>
<tr>
<td>K. Cancer</td>
<td>68</td>
</tr>
<tr>
<td>L. Pediatrics</td>
<td>78</td>
</tr>
<tr>
<td>M. Breast disease</td>
<td>8</td>
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<td><strong>TOTAL</strong></td>
<td><strong>338</strong></td>
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### Why revise/redo?

- Reflect current evidence
  - New studies
  - Technological advances
- Development of robust guideline methodology
- Involve referring clinicians in the guideline process, as they are primary users of the recommendations
Expert Panels

• Made up of 6 to 9 members
  • Radiologists
  • Referring clinicians (e.g., family physicians, specialty physicians)
  • Patient and family advisor
  • Guideline methodologist

• National representation including BC, Western Canada, Ontario, Quebec, and Atlantic Canada
Project process overview

Recruit Expert Panel
- Stagger 13 sections, for feasibility
- Complete and sign COIs and ToRs

Meeting #1
- Introduce EP members
- Discuss mandate
- Discuss process
- Discuss next steps

Revise scenarios
- Revise list of clinical and diagnostic scenarios
- Share with EP members for feedback

Meeting #2
- Discuss and finalize clinical/diagnostic scenarios
- Introduce GRADE

Rapid scoping review
- Conduct rapid scoping review of guidelines
- Map recommendations to each clinical/diagnostic scenario

EP independent review
- Review of recommendations mapping by EP members
- Formulate thoughts around recommendations considering GRADE framework

Develop Recommendations
- Discuss mapping results and formulate recommendations

Draft guideline
- Draft guideline written by the CAR
- Review and approval of draft guideline by EP members

Peer review
- Review guideline: Referral Guidelines Working Group
- Review guideline: External stakeholders

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
Systematic Rapid Scoping Review Methods

- Using best practice guidance:
  - **Protocol**: Protocol reported using items in PRISMA-P (Moher 2015)
  - **Scoping Review**: Joanna Briggs Institute
    “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
    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.”
  - **Guideline**: GIN-McMaster Guideline Development Checklist and GRADE for Guidelines (adapted where necessary)

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**Canadian Association of Radiologists**
L’Association canadienne des radiologues
Systematic Rapid Scoping Review Methods

• Inclusion Criteria
  • Systematically produced guidelines, meeting the following criteria (adapted from AGREE-II checklist)\(^8,9\):
    • **AGREE-II Question 7.** Systematic methods were used to search for evidence: Searched and named at least 1 electronic database using an electronic search strategy (e.g., Medline, Embase, PubMed, CENTRAL).
    • **AGREE-II Question 8.** 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 but does not provide explicit methods.
    • **AGREE-II Question 9.** 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.
  • Published in last 5 years (to capture recent studies and for feasibility)
  • Published in English (for feasibility)
Artificial Intelligence

- Active Machine Learning
  - Ongoing learning throughout screening (i.e., iterations)
  - Prioritizes records to be screened next based on likelihood of inclusion
  - Allows for modifications of traditional screening methods (e.g., dual-independent review)

Extracted from Reference 10.
Artificial Intelligence

• Reduction in screening burden:
  • Stop screening once 95% of the predicted relevant references are identified
  • 95% of the relevant records are found within screening ~40% of the total records\textsuperscript{10,11}

• Additional checks:
  • AI Audit: Identifies excluded records with ≥0.85 inclusion score
  • 2\textsuperscript{nd} human screener verifying 30% of total records (10% included; 20% excluded)
Systematic Rapid Scoping Review Methods

• **Supplemental searching**: American College of Radiology (Appropriateness Criteria ®), Royal College of Radiologists (UK iRefer), speciality specific guideline groups (e.g., SOGC for OBGYN), EP member suggestions

• **Full-text screening**: Pilot exercise by two reviewers (e.g., 25-30 records), with conflicts resolved through discussion; Single reviewer screening for the remainder

• **Data mapping**: Single reviewer extraction, with verifications of extracted information

• **Critical appraisal of included guidelines**: AGREE-II checklist, single reviewer, with verification
Developing Recommendations

- Grading of Recommendations Assessment, Development and Evaluation,\(^6,7\) adapted as required
- Contextualized to the Canadian Healthcare systems
  - Benefits and harms
  - Values and preferences
  - Equity, accessibility, acceptability
  - Resources, Costs

### 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, 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.
Recommendation Caveats

• 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.

• 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.

• Not all imaging modalities are available in all treating locations, particularly in rural or remote areas of Canada. Decisions about whether to transport a patient for recommended imaging or perform alternate imaging locally or serial clinical examination/observation, etc. can be difficult, and should consider the expected benefits of recommended imaging, risks of transport, patient preference, and other factors.
Guidelines progress

• Approved guidelines:
  • Trauma (21 scenarios)
  • OBGYN (12 scenarios)
  • Breast Disease (20 scenarios)

• Under review:
  • Musculoskeletal System (25 scenarios)
  • Gastrointestinal System (20 scenarios)
  • Head & Neck (11 scenarios)

• Underway:
  • Thoracic
  • Cardiovascular
  • Urology, adrenal, and genitourinary systems

• Not yet started:
  • Spine
  • Central Nervous System
  • Pediatrics
  • Cancer
Next Steps

• Translate recommendations into French
• Post completed guidelines on the CAR website
• Integrate into CDS and work with Health Authorities/Stakeholders across Canada
  • Government of Quebec, eHealth Centre of Excellence, Alberta Health Authority
• Publish each guideline (open-access) in the CARJ so they will be indexed in electronic databases (e.g., PubMed, Medline)
• Patient-friendly summaries
CDS flow diagrams

• For each clinical scenario we are creating a flow diagram to help with integration into CDS
  • Eliminate interpretation of recommendations
  • Reviewed by EP members once designed
• Software agnostic
1. In patients with risk-reduction mastectomy and reconstruction (bilateral or unilateral), we suggest **no imaging for breast cancer screening** on the reconstructed side(s) (↓).

2. In patients with risk-reduction mastectomy and reconstruction presenting with a palpable area of concern, we recommend **mammography/digital breast tomosynthesis** as well as **targeted US** as the initial imaging techniques (↑↑). *Imaging with mammography and US may differ based on facility practice when evaluating patients with autologous tissue versus implant-based reconstruction. For example, patients with implant-based reconstruction may initially undergo US, with mammography being performed only if feasible.*

3. In patients with risk-reduction mastectomy without reconstruction, we suggest **no imaging for breast cancer screening** (↓).

4. In patients with risk-reduction mastectomy without reconstruction presenting with a palpable area of concern, we recommend **targeted US** as the initial imaging technique (↑↑).
Questions?

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Website: https://car.ca/patient-care/referral-guidelines/
References


