Imaging of the Spine for Physical Therapists: An Update on Current Literature and State Trends

Matt Schumacher, PT, DPT, DSc
Manual Therapy Certification
Board-Certified Orthopedic Clinical Specialist
Fellow, American Academy of Orthopedic Manual Physical Therapists

Instructional Objectives

- Analyze the current scope of practice for imaging referrals by physical therapists in the United States
- Review current literature on evidence support physical therapists in performing diagnostic imaging
- Discern when and why ordering imaging is appropriate within a physical therapist's scope of practice.
- Synthesize evidence-based guidelines and clinical reasoning to integrate imaging decisions into patient management strategies.

HISTORY

50 year history of imaging privileges for physical therapists within the military

PRACTICE

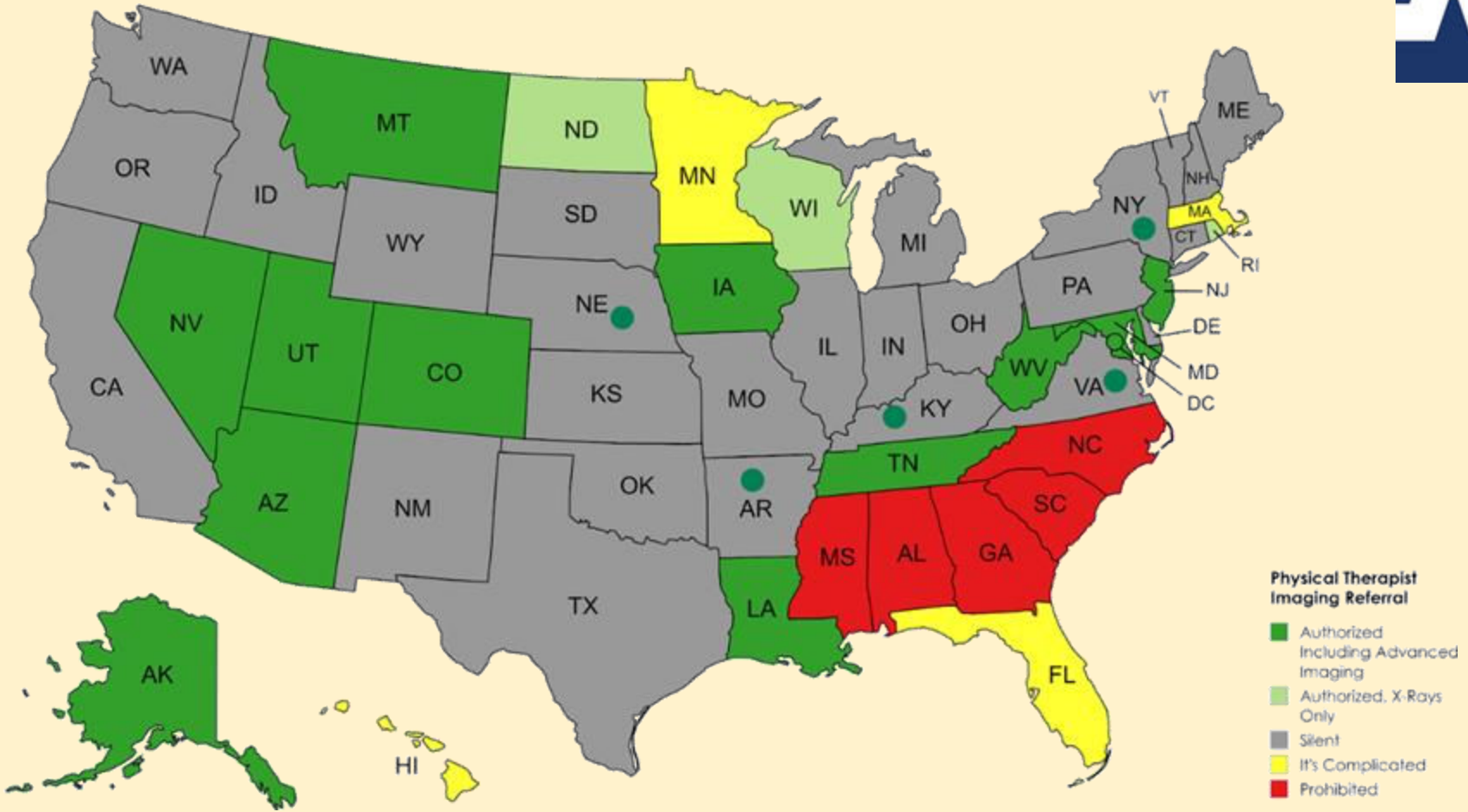
Imaging referral is part of PT practice in a growing number of US states & in Federal health care systems, including Veteran's Affairs

Physiotherapists in multiple countries have imaging referral privileges

CRITERIA

Physical therapists utilize consensus derived imaging guidelines effectively

PTs able to Request Imaging per State




STATE OF NORTH DAKOTA
ND passed in August 1, 2021
GREAT SEAL OF NORTH DAKOTA

25.1302.01000

Sixty-ninth
Legislative Assembly
of North Dakota

SENATE BILL NO. 2273

Introduced by

Senators Bekkedahl, Boschee, Lee

Representatives Koppelman, Satrom

A BILL for an Act to amend and reenact subsection 14 of section 43-26.1-01 and section 43-26.1-11.1 of the North Dakota Century Code, relating to diagnostic imaging by physical therapists.

Physical Therapists and Diagnostic Imaging

[RESEARCH REPORT]

WILLIAM G. BOISSONNAULT, PT, DHSc[1] • DOUGLAS M. WHITE, DPT, OCS, RMSK[2] • SARA CARNEY, DPT, ATC[3,4]
BRITTANY MALIN, DPT[4] • WAYNE SMITH, DPT, MEd, SCS, ATC, RMSK[5]

Diagnostic and Procedural Imaging Curricula in Physical Therapist Professional Degree Prog

JOSPT OPEN | RESEARCH REPORT

Charles R. Hazle Jr., PT, PhD[1] ■ William G. Boissonnault, PT, DPT, DHS
Rebecca L. Watts, BS[1] ■ Bryson A. McKee, BS[1]

Diagnostic and Procedu
Imaging Curricula in Ph
Therapi t Professional
Degree date

Recipient of the 2002 Sports Physical Therapy Section Excellence in Research Award

Clinical Diagnostic Accuracy and Magnetic Resonance Imaging of Patients Referred by Physical Therapists, Orthopaedic Surgeons, and Nonorthopaedic Providers

Ordering of Diagnostic Imaging by Physical Therapists: A 5-Year Retrospective Practice Analysis

Aaron P. Keil, Brian Baranyi, Sa

IJSPT INTERNATIONAL JOURNAL OF SPORTS PHYSICAL THERAPY

Int J Sports Phys Ther. 2016 Oct; 11(5): 708–717.

DIAGNOSTIC IM
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PMCID: PMC5046964
PMID: 27757283

PORTS PHYSICAL
RACTICE

Scott C. Dembowski, PT,

Observational Study > J Man Manip Ther. 2022 Oct;30(5):261-272.

doi: 10.1080/10669817.2022.2106729. Epub 2022 Aug 13.

[CLINICAL

ROBERT E. BOYLES, PT, DSc, O
DANIEL PINTO, PT, OCS, FAAO

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Physical Therapists Are Routinely Performing the Requisite Skills to Directly Refer for Musculoskeletal Imaging: An Observational Study

Lance M Mabry [1], Richard Severin [2,3], Angela S Gisselman [4], Michael D Ross [5], Todd E Davenport [6], Brian A Young [3], Aaron P Keil [2], Don L Goss [1]

Affiliations + expand

PMID: 35968741 PMCID: PMC9487956 (available on 2023-08-13)

DOI: 10.1080/10669817.2022.2106729 Paperpile

l Therapist Practice:
ssful

urer, MD,
g, PT, DSc, Scott Rezac, DPT,
Brian Baranyi, DPT

PTJ: Physical Therapy & Rehabilitation Journal | *Physical Therapy*, 2021;101:1–11
https://doi.org/10.1093/ptj/pzaa187
Advance access publication date October 17, 2020
Original Research

Survey of Physical Therapists' Attitudes, Knowledge, and Behaviors Regarding Diagnostic Imaging

Sean D. Rundell, PT, DPT, PhD[1,*], Murray E. Maitland, PT, PhD[2], Robert C. Manske, PT, DPT, MEd[3], George J. Beneck, PT, PhD[4]

[1]Department of Rehabilitation Medicine, University of Washington, Box 356490, 1959 NE Pacific St, Seattle, WA 98194-6490, USA; and Department of Health Services, University of Washington, Seattle, Washington, USA
[2]Department of Rehabilitation Medicine, University of Washington, Seattle, Washington, USA
[3]Department of Physical Therapy, Wichita State University, Wichita, Kansas, USA
[4]Department of Physical Therapy, California State University, Long Beach, Long Beach, California, USA

*Address all correspondence to Dr Rundell at: srundell@uw.edu

- Survey of 739 respondents
- Results[18]→
  - 11.6% of PT respondents are referring for diagnostic imaging
  - Attitudes differed by professional development level, years from graduation, FAAOMPT status, or board certified specialty status

JOURNAL OF MANUAL & MANIPULATIVE THERAPY
2022, VOL. 30, NO. 5, 261–272
https://doi.org/10.1080/10669817.2022.2106729

Physical Therapists Are Routinely Performing the Requisite Skills to Directly Refer for Musculoskeletal Imaging: An Observational Study

Lance M. Mabry[a], Richard Severin[b,c], Angela S. Gisselman[d], Michael D. Ross[e], Todd E. Davenport[f], Brian A. Young[c], Aaron P. Keil[b] and Don L. Goss[a]

- Having diagnostic imaging training in DPT school, post-professional training (e.g., board-certification, fellowship training), and being an APTA member routinely performed greater imaging skills *(p<.001)*

How about us in North Dakota?

JOURNAL OF MANUAL & MANIPULATIVE THERAPY
https://doi.org/10.1080/10669817.2024.2346957

Identifying physical therapists' attitudes, beliefs, and barriers toward diagnostic imaging referral: a mixed-methods study

Matthew R. Schumacher, Kendra A. Karl, Mattias A. Stich, Christopher R. Dean, Sara R. Lawson and Jason L. Hogan

Doctor of Physical Therapy Program, University of Mary, Bismarck, USA

Clinical Rules to Diagnostic Imaging for the Physical Therapist

Imaging Rules

- Purpose of Rules
  - Increase overall efficiency in ordering
  - Assists in the PT's clinical reasoning
  - Reduce costs
  - Need for widely accepted guidelines for referral for imaging

- *"Clinical Imaging Rules not only help in decision making but **prevent** needless imaging, **reduce or eliminate** radiation exposure, and keep healthcare costs down."*[16]

Use of Imaging

- *“Additionally, PTs must understand that the ability to request imaging **does not transfer to the ability to interpret imaging**.”*[16]
- *“Referring for imaging requires interpretation by the appropriate professional (ie, radiologist) consistent with other medical providers.”*[16]

American College of Radiology (ACR) Appropriateness Criteria

- The ACR Appropriateness Criteria ® are **evidence-based guidelines** designed to assist referring physicians and other healthcare providers in selecting the most appropriate imaging or treatment options for specific clinical conditions
- Using these guidelines **supports providers in improving the quality of care** and promoting the **efficient use** of radiology resources

Canadian C-Spine Rules[1]

- Prospective cohort study performed in 10 large Canadian hospitals
  - Patients included with a specific MOI or had some visible injury / dangerous mechanism
- 8,924 patients were enrolled and assessed
  - 151 patients (1.7%) had a clinically important C-Spine injury
  - Sensitivity of 100%; Specificity of 42.5%

The Canadian C-Spine Rule for Radiography in Alert and Stable Trauma Patients

Ian G. Stiell, MD, MSc, FRCPC
George A. Wells, PhD
Katherine L. Vandemheen, BScN
Catherine M. Clement, RN
Howard Lesiuk, MD
Valerie J. De Maio, MD, MSc
Andreas Laupacis, MD, MSc
Michael Schull, MD, MSc
R. Douglas McKnight, MD
Richard Verbeek, MD
Robert Brison, MD, MPH
Daniel Cass, MD
Jonathan Dreyer, MD
Mary A. Eisenhauer, MD
Gary H. Greenberg, MD
Iain MacPhail, MD, MHSc
Laurie Morrison, MD, MSc
Mark Reardon, MD
James Worthington, MBBS

Context High levels of variation and inefficiency exist in current clinical practice regarding use of cervical spine (C-spine) radiography in alert and stable trauma patients.

Objective To derive a clinical decision rule that is highly sensitive for detecting acute C-spine injury and will allow emergency department (ED) physicians to be more selective in use of radiography in alert and stable trauma patients.

Design Prospective cohort study conducted from October 1996 to April 1999, in which physicians evaluated patients for 20 standardized clinical findings prior to radiography. In some cases, a second physician performed independent interobserver assessments.

Setting Ten EDs in large Canadian community and university hospitals.

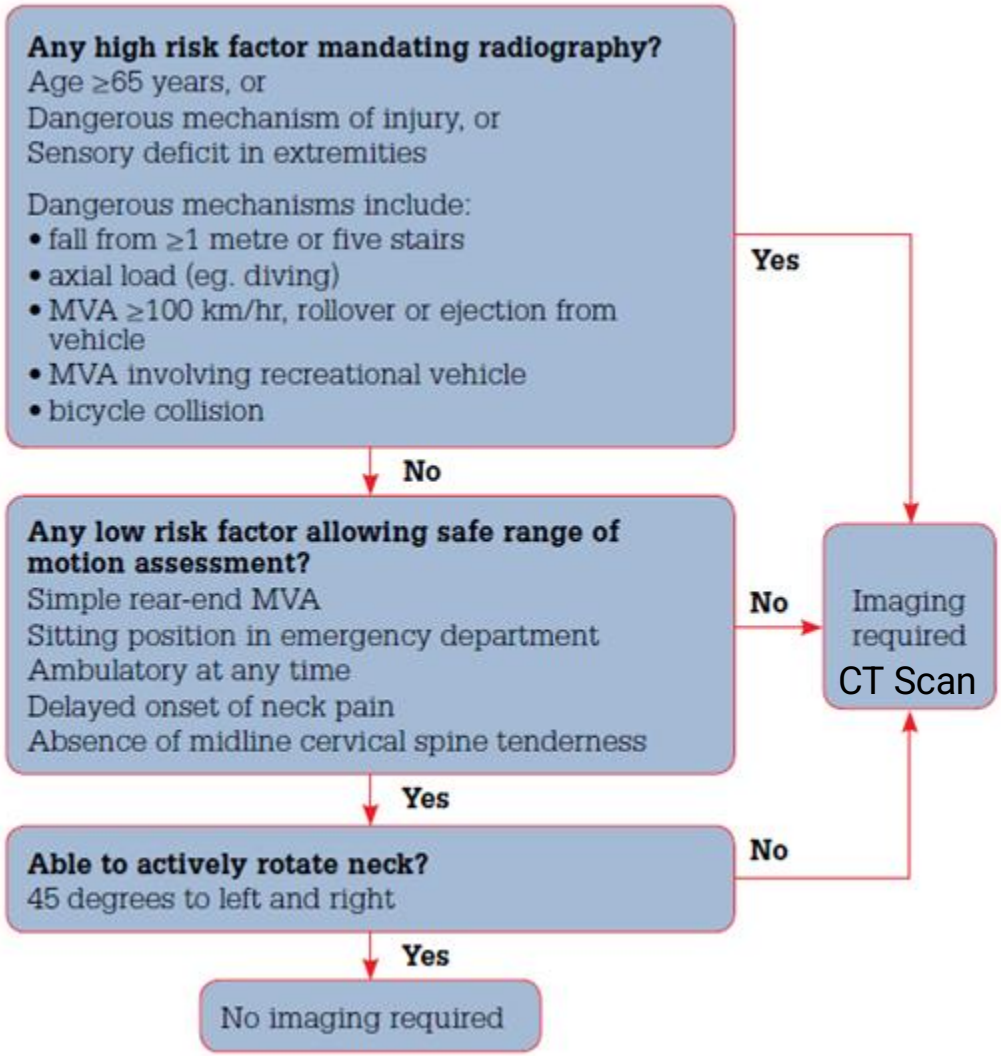
Patients Convenience sample of 8924 adults (mean age, 37 years) who presented to the ED with blunt trauma to the head/neck, stable vital signs, and a Glasgow Coma Scale score of 15.

Main Outcome Measure Clinically important C-spine injury, evaluated by plain radiography, computed tomography, and a structured follow-up telephone interview. The clinical decision rule was derived using the κ coefficient, logistic regression analysis, and χ^2 recursive partitioning techniques.

Results Among the study sample, 151 (1.7%) had important C-spine injury. The resultant model and final Canadian C-Spine Rule comprises 3 main questions: (1) is there any high-risk factor present that mandates radiography (ie, age ≥65 years, dangerous mechanism, or paresthesias in extremities)? (2) is there any low-risk factor present that allows safe assessment of range of motion (ie, simple rear-end motor vehicle collision, sitting position in ED, ambulatory at any time since injury, delayed onset of neck pain, or absence of midline C-spine tenderness)? and (3) is the patient able to actively rotate neck 45° to the left and right? By cross-validation, this rule had 100% sensitivity (95% confidence interval [CI], 98%-100%) and 42.5% specificity (95% CI, 40%-44%) for identifying 151 clinically important C-spine injuries. The potential radiography ordering rate would be 58.2%.

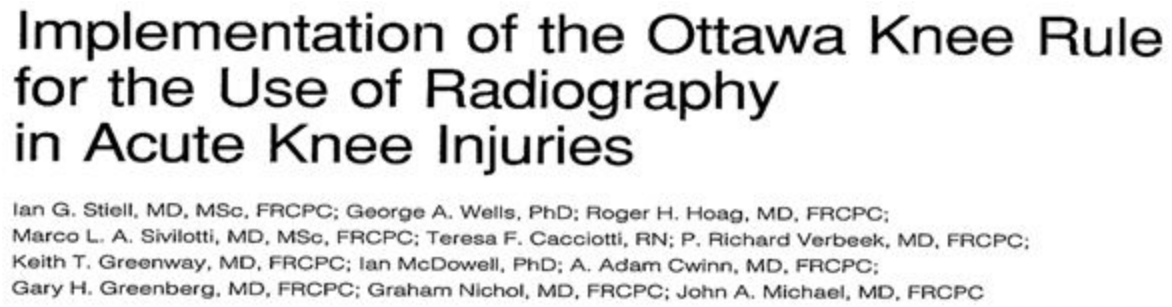
Conclusion We have derived the Canadian C-Spine Rule, a highly sensitive decision rule for use of C-spine radiography in alert and stable trauma patients. If prospectively validated in other cohorts, this rule has the potential to significantly reduce practice variation and inefficiency in ED use of C-spine radiography.

JAMA. 2001;286:1841-1848 www.jama.com



- CCR is Indicated for alert, stable patients, ≥ 14 years old, not pregnant[25]
  - 100 km/hr=62 mph
  - In 2012, plain film imaging switched to CT scan

Ottawa Knee Rules[5]



Implementation of the Ottawa Knee Rule for the Use of Radiography in Acute Knee Injuries

Ian G. Stiell, MD, MSc, FRCPC; George A. Wells, PhD; Roger H. Hoag, MD, FRCPC; Marco L. A. Sivilotti, MD, MSc, FRCPC; Teresa F. Cacciotti, RN; P. Richard Verbeek, MD, FRCPC; Keith T. Greenway, MD, FRCPC; Ian McDowell, PhD; A. Adam Cwinn, MD, FRCPC; Gary H. Greenberg, MD, FRCPC; Graham Nichol, MD, FRCPC; John A. Michael, MD, FRCPC

- 3907 patients in this controlled clinical trial
- Sensitivity at **100%** in detecting 58 knee fractures
- Patients where Ottawa Knee Rules were used spent less time with the practitioner (85 minutes versus 118 minutes) and incurred less total cost ($80 versus $183)

Ottawa Knee Rules[5]

A knee x-ray series is only required for knee injury patients with any of these findings:

1) age 55 years or older

or

2) isolated tenderness of patella*

or

3) tenderness at head of fibula

or

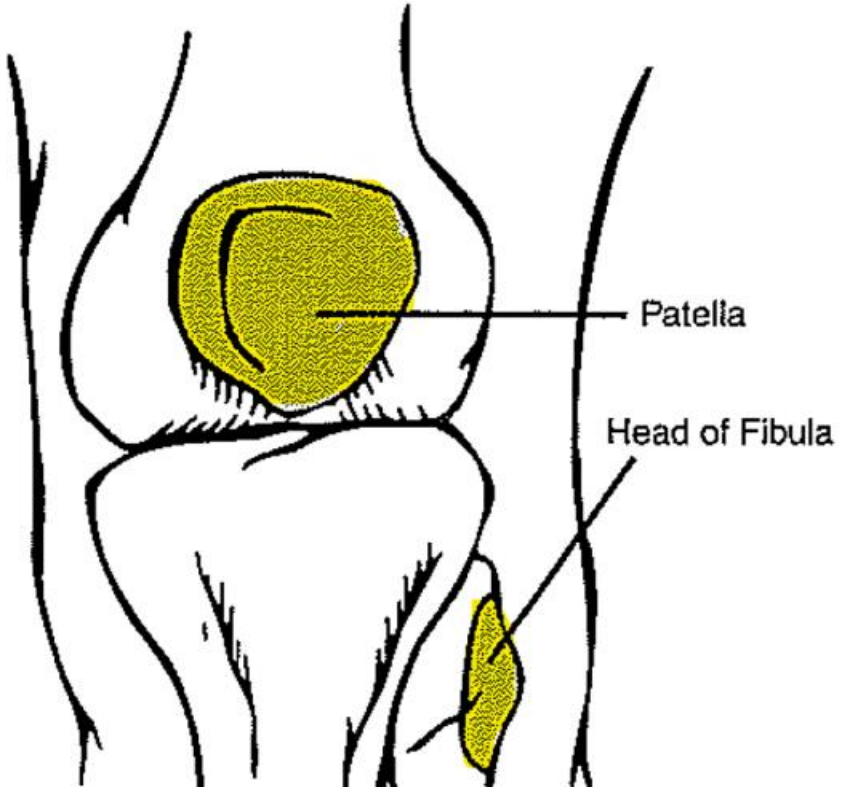
4) inability to flex to 90°

or

5) inability to bear weight both immediately and in the emergency department (4 steps)**

*No bone tenderness of knee other than patella.

**Unable to transfer weight twice onto each lower limb regardless of limping.



Pittsburgh Knee Rules[6, 7]

Multicenter comparison of two clinical decision rules for the use of radiography in acute, high-risk knee injuries

D C Seaberg [1], D M Yealy, T Lukens, T Auble, S Mathias

Affiliations + expand

PMID: 9656942 DOI: 10.1016/s0196-0644(98)70092-7

Abstract

Study objective: Two separate clinical decision rules, one developed in Ottawa and the other in Pittsburgh, for the use of radiography in acute knee injuries have been previously validated and published. In this study, the rules were prospectively validated and compared in a new set of patients.

Methods: A prospective, blinded, multicenter trial was conducted in the emergency departments of three urban teaching hospitals. A convenience sample of 934 patients with knee pain requiring radiographs was enrolled. A standardized data form was completed for each patient, comprising the 10 clinical variables included in the two rules. Standard knee radiographs were then taken in each patient. The rules were interpreted by the primary investigator on the basis of the data sheet and the final radiologist radiograph reading.

Results: In the 745 patients in whom the Pittsburgh rules could be applied there were 91 fractures (12.2%). The use of the Pittsburgh rule missed one fracture, yielding a sensitivity of 99% (95% confidence interval [CI], 94% to 100%); the specificity was 60% (95% CI, 56% to 64%). The Ottawa inclusion criteria were met by 750 patients, with 87 fractures (11.6%). The Ottawa rule missed three fractures, for a sensitivity of 97% (95% CI, 90% to 99%); specificity was 27% (95% CI, 23% to 30%).

Conclusion: Prospective validation and comparison found the Pittsburgh rule for knee radiographs to be more specific without loss of sensitivity compared with the Ottawa rule.

Can the Ottawa and Pittsburgh rules reduce requests for radiography in patients referred to acute knee clinics?

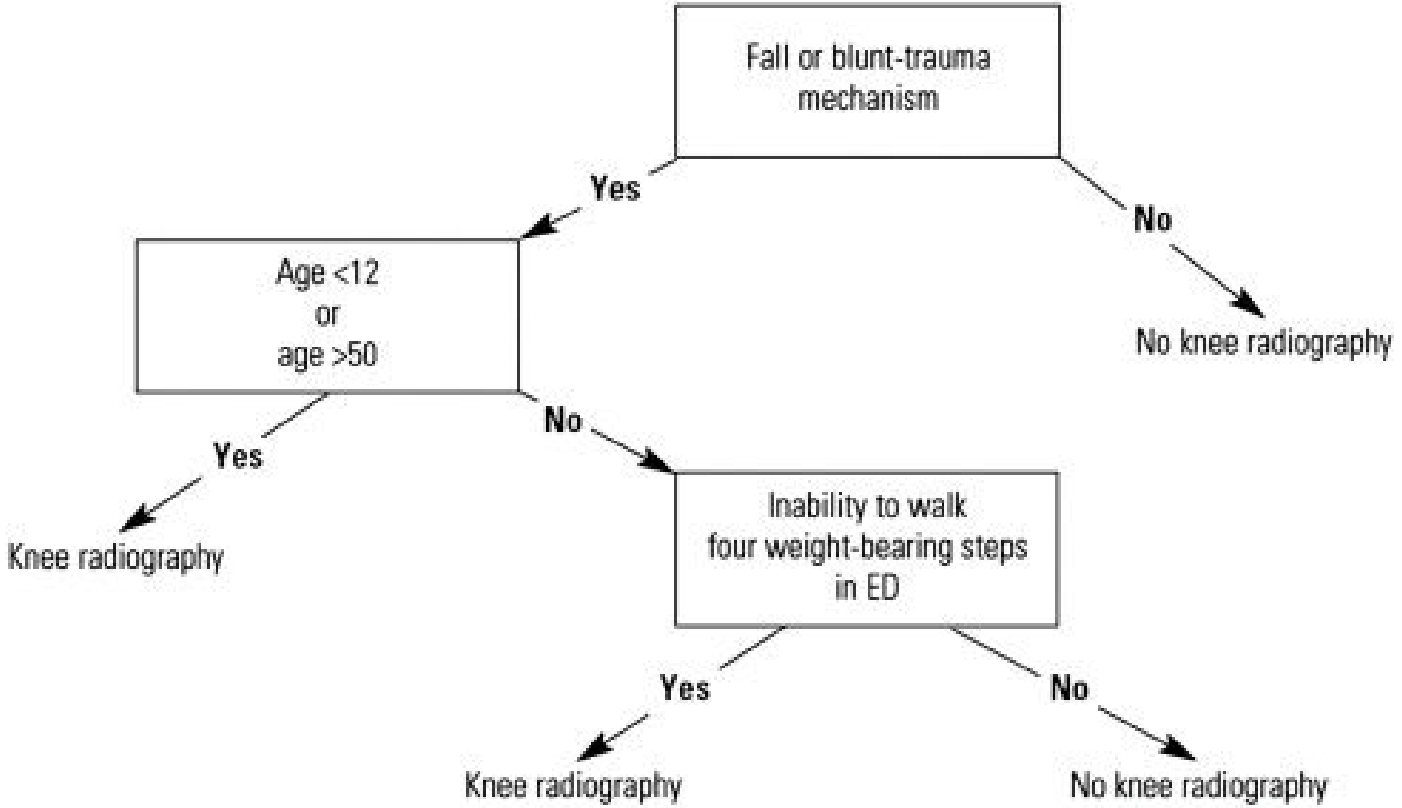
S Konan, TT Zang, N Tamimi, FS Haddad

University College London Hospitals NHS Foundation Trust, UK

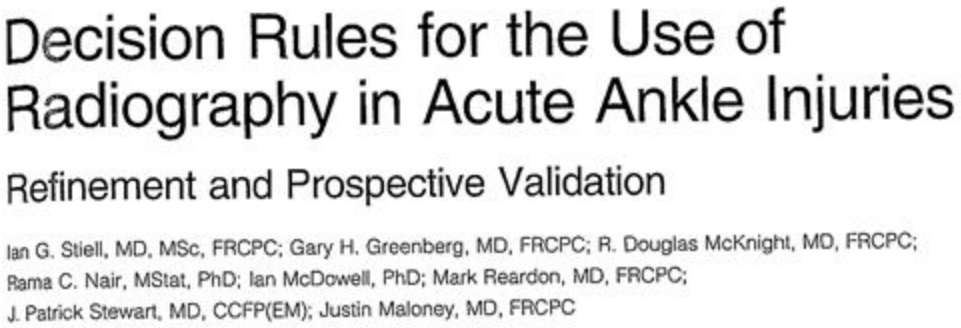
ABSTRACT

Our aim was to study the role of the Ottawa and Pittsburgh rules to reduce the unnecessary use of radiographs following knee injury. We prospectively reviewed 106 patients who were referred to our clinic over a 3-month period. The Ottawa and Pittsburgh rules were applied to individual patients to evaluate the need for radiography. One hundred and one patients (95%) had radiography of their knee. Five patients (5%) had a fracture of their knee and in all cases, the Ottawa and Pittsburgh knee rules were fulfilled. Using the Ottawa rules, 27 radiographs (25%) could have been avoided without missing a fracture. Using the Pittsburgh rules, 32 radiographs (30%) could have been avoided. The Ottawa and Pittsburgh rules have a high sensitivity for the detection of knee fractures. Their use can aid efficient clinical evaluation without adverse clinical outcome and may reduce healthcare costs.

Pittsburgh Knee Rules[6]



Ottawa Foot and Ankle Rules[18]



Decision Rules for the Use of Radiography in Acute Ankle Injuries

Refinement and Prospective Validation

Ian G. Stiell, MD, MSc, FRCPC; Gary H. Greenberg, MD, FRCPC; R. Douglas McKnight, MD, FRCPC; Rama C. Nair, MStat, PhD; Ian McDowell, PhD; Mark Reardon, MD, FRCPC; J. Patrick Stewart, MD, CCFP(EM); Justin Maloney, MD, FRCPC

- Studied 1032 patients in the first stage & 453 patients in the second stage
- Sensitivity→ 100% in detecting fractures
    - Ultimately reducing the number of physician radiographs ordered by a 33%

Ottawa Foot and Ankle Rules[18]

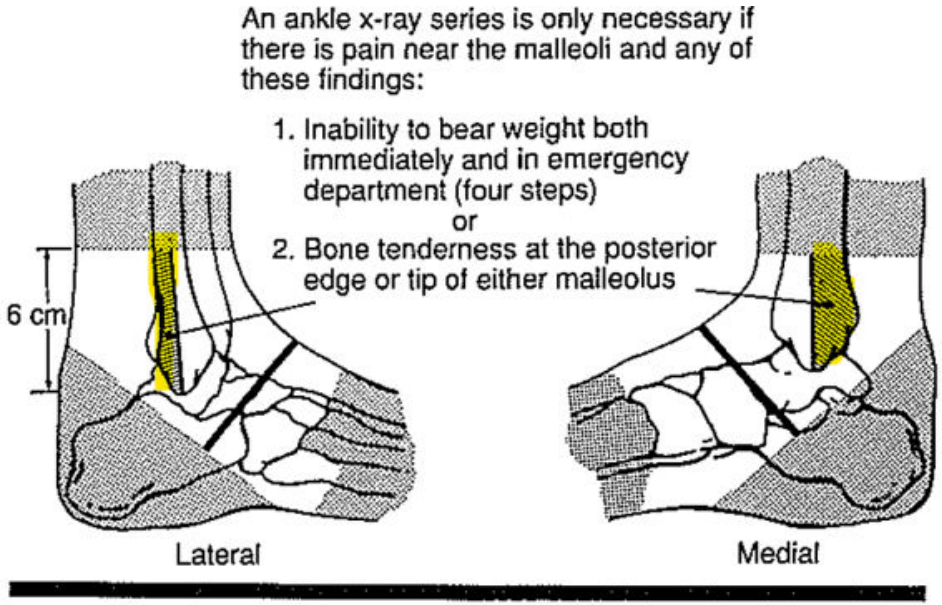


Fig 1.—Refined clinical decision rule for ankle radiographic series in ankle injury patients (adapted from Stiell et al[16]).

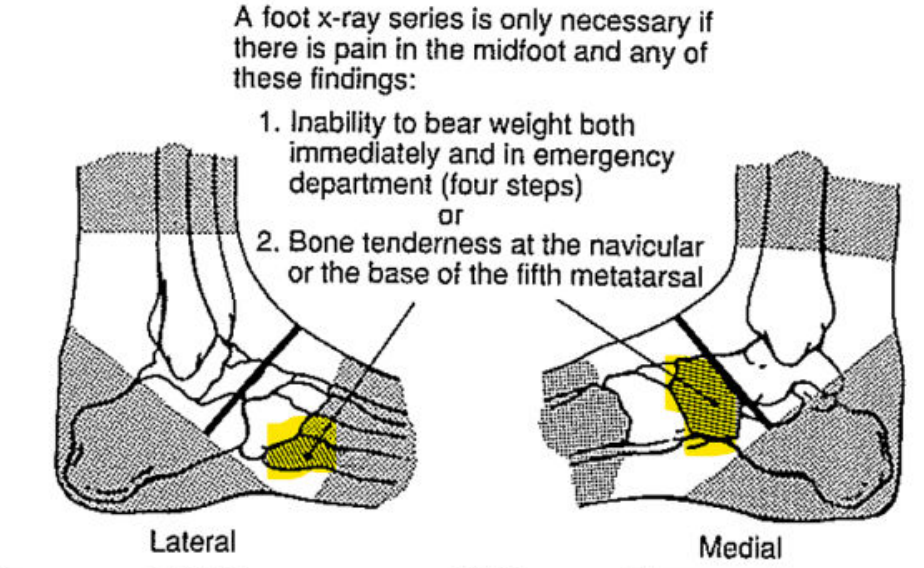


Fig 2.—Refined clinical decision rule for foot radiographic series in ankle injury patients (adapted from Stiell et al[16]).

Communicating Imaging Needs[22]

- You are the only one clinically evaluating your patient
  - Different than referring to MD for imaging
- Communication is key!
  - Communicate with radiologist→ EMR, writing a script, etc.
- How to order imaging→ **AGOLDMED**

Age	A 25-year-old
Gender	Male
Onset	with a sudden onset
Location	of deep medial right knee pain
Duration of symptoms	over the past 2 days
Mechanism of injury	following a testing injury playing pick-up basketball
Examination findings	He has a (+) Lachman's
Diagnosis (suspected)	Suspect ACL tear.
Orders	Please perform A/P, Lateral, and tunnel notch view.

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