Referral Guidelines in the UK:
Making the best use of clinical radiology services

Denis Remedios
Northwick Park Hospital, Harrow UK
Chair RCR Guidelines Working Party
Making the best use of clinical radiology services: Referral Guidelines

The Royal College of Radiologists has published guidelines since 1989. 7th edition due in 2011.

• Development
• Users
• Implementation
• Effectiveness
• Audit
• Challenges
Web-base guidelines
The need for guidelines

Introduction

Why are guidelines needed?

A useful investigation is one in which the result—positive or negative—will alter clinical management and/or add confidence to the clinician’s diagnosis. A significant number of radiological investigations do not fulfil these aims and may add unnecessarily to patient irradiation.[5] The chief causes of the wasteful use of radiology are as follows.

1. **Repeating investigations which have already been done:** such as at another hospital, in an outpatient department, or in an accident and emergency department. Every attempt should be made to get previous images and reports. Transfer of digital data through electronic links will assist in this respect. **HAS IT BEEN DONE ALREADY?**

2. **Undertaking investigations when results are unlikely to affect patient management:** because the anticipated positive finding is usually irrelevant—eg, degenerative spinal disease—or because a positive finding is unlikely. **DO I NEED IT?**

3. **Investigating too early:** for example, before the disease could have progressed or resolved, or before the results could influence treatment. **DO I NEED IT NOW?**

4. **Doing the wrong investigation:** imaging techniques undergo rapid change. It is often helpful to discuss an investigation with a specialist in clinical radiology or nuclear medicine before it is requested. **IS THIS THE BEST INVESTIGATION?**

5. **Failing to provide appropriate clinical information and questions that the imaging investigation should answer:** deficiencies here may lead to use of the wrong technique, or the report being poorly focused on the clinical problem. **HAVE I EXPLAINED THE PROBLEM?**

6. **Over-investigating:** some clinicians tend to rely on investigations more than others. Some patients take comfort in being investigated. **ARE THEY ALL NEEDED?**
Guideline methodology:

- User survey
- Centralisation of literature searches (Medline, Embase, Cochrane, ACR-AC, NICE/SIGN, Google scholar) with inclusion / exclusion filters and electronic hand search of 7 high impact journals
- 16 Expert Panels drawn from the RCR Special Interest Groups:
  - main system based specialties,
  - oncology and paediatrics
  - modality based groups
- Review 4 yearly
Delphi process

- Evidence sent in first iteration with further supporting evidence in subsequent rounds
- E-mail based questionnaires: max 3 rounds
- Delphi iterative process to agree recommendations and their grades
- Groups of c. 10 experts from UK & Europe
- 75% participation; 75% agreement

Consultation and editing

• Draft guidelines sent for consultation to >100 organisations in UK & Europe.
• The editorial process strengthened draft guidelines with further evidence gleaned through consultation.
• The web editorial group included members with web design skills.
RCR Recommendations

- **Indicated** - likely to contribute
- **Specialised investigation** - often complex, time consuming or costly
- **Indicated only in specific circumstances** - only done if appropriate for the individual
- **Not indicated**
- **Grading A-C based on evidence level**
  - In 6e: 67 grade A, 409 B, 171 C.

Guideline: Chronic back pain

**Lumbar spine - Chronic back pain with no clinical or serological indicators of infection or neoplasia (ie, no red flags)**

<table>
<thead>
<tr>
<th>INVESTIGATION</th>
<th>DOSE</th>
<th>RECOMMENDATION [GRADE]</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRI</td>
<td></td>
<td>Indicated [C]</td>
</tr>
<tr>
<td>XR</td>
<td>![Radiation]</td>
<td>Indicated only in specific circumstances [C]</td>
</tr>
<tr>
<td>CT</td>
<td>![Radiation]</td>
<td>Specialised investigation [C]</td>
</tr>
<tr>
<td>NM</td>
<td>![Radiation]</td>
<td>Specialised investigation [C]</td>
</tr>
</tbody>
</table>

**Related Guidelines**

For children see P11 Back pain

Guideline Publication Date: September 2007

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## Dose information

### Making the best use of clinical radiology services

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Typical effective dose (mSv)*</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="symbol" /></td>
<td>0</td>
<td>US, MRI</td>
</tr>
<tr>
<td><img src="image" alt="symbol" /></td>
<td>&lt;1</td>
<td>CXR, XR limb, XR pelvis, mammography</td>
</tr>
<tr>
<td><img src="image" alt="symbol" /></td>
<td>1–5</td>
<td>IVU, XR lumbar spine, NM (eg, bone), CT head and neck</td>
</tr>
<tr>
<td><img src="image" alt="symbol" /></td>
<td>5–10</td>
<td>CT chest or abdomen, NM (eg, cardiac)</td>
</tr>
<tr>
<td><img src="image" alt="symbol" /></td>
<td>&gt;10</td>
<td>Extensive CT studies, some NM studies (eg, some PET-CT)</td>
</tr>
</tbody>
</table>

*The average annual background dose in most parts of Europe falls within the 1–5 mSv range.*

US=ultrasound; MRI=magnetic resonance imaging; CXR=chest X-ray; XR=X-ray; IVU=intravenous urography; NM=nuclear medicine; CT=computed tomography; PET-CT=positron emission tomography co-registered with CT.
Criteria for choice of investigations

For a given clinical problem, imaging modalities are listed in the following order:

1. Evidence-based diagnostic impact
2. Effective dose
3. Cost effectiveness
<table>
<thead>
<tr>
<th>Level</th>
<th>Type of study</th>
<th>Prognostic studies—investigating the effect of a patient characteristic on the outcome of disease</th>
<th>Diagnostic studies—investigating a diagnostic test</th>
<th>Economic and decision analyses—developing an economic or decision model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I</td>
<td>High-quality randomised controlled trial with statistically significant difference or no statistically significant difference but narrow confidence intervals</td>
<td>High-quality prospective study (all patients were enrolled at the same point in their disease with ≥80% follow-up of enrolled patients)</td>
<td>Testing of previously developed diagnostic criteria in series of consecutive patients (with universally applied reference &quot;gold&quot; standard)</td>
<td>Sensible costs and alternatives; values obtained from many studies; multiway sensitivity analyses</td>
</tr>
<tr>
<td></td>
<td>Systematic review of level-I randomised controlled trials (and study results were homogeneous)</td>
<td>Systematic review of level-I studies</td>
<td>Systematic review of level-I studies</td>
<td>Systematic review of level-I studies</td>
</tr>
<tr>
<td>Level II</td>
<td>Lesser-quality randomised controlled trial (eg, &lt;80% follow-up, no blinding, or imperfect randomisation)</td>
<td>Retrospective study</td>
<td>Development of diagnostic criteria on basis of consecutive patients (with universally applied reference &quot;gold&quot; standard)</td>
<td>Sensible costs and alternatives; values obtained from limited studies; multiway sensitivity analyses</td>
</tr>
<tr>
<td></td>
<td>Prospective comparative study</td>
<td>Untreated controls from a randomised controlled trial</td>
<td>Systematic review of level-II studies</td>
<td>Systematic review of level-II studies</td>
</tr>
<tr>
<td></td>
<td>Systematic review of level-II studies or level-I studies with inconsistent results</td>
<td>Lesser-quality prospective study (e.g., patients enrolled at different points in their disease or &lt;80% follow-up)</td>
<td>Systematic review of level-II studies</td>
<td>Systematic review of level-II studies</td>
</tr>
<tr>
<td>Level III</td>
<td>Case-control study</td>
<td>Case-control study</td>
<td>Study of non-consecutive patients (without consistently applied reference &quot;gold&quot; standard)</td>
<td>Analyses based on limited alternatives and costs; imperfect estimates</td>
</tr>
<tr>
<td></td>
<td>Retrospective comparative study</td>
<td>Systematic review of level-III studies</td>
<td>Systematic review of level-III studies</td>
<td>Systematic review of level-III studies</td>
</tr>
<tr>
<td>Level IV</td>
<td>Case series</td>
<td>Case series</td>
<td>Case-control study</td>
<td>No sensitivity analyses</td>
</tr>
<tr>
<td>Level V</td>
<td>Expert opinion</td>
<td>Expert opinion</td>
<td>Expert opinion</td>
<td>Expert opinion</td>
</tr>
</tbody>
</table>
### Radiation doses

The annual background radiation dose is 2.4mSv

<table>
<thead>
<tr>
<th>Typical effective dose (mSv)</th>
<th>Examples</th>
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<tbody>
<tr>
<td>0</td>
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<td>CT chest or abdomen, NM (e.g. cardiac)</td>
</tr>
<tr>
<td>more than 10</td>
<td>Extensive CT studies, some NM studies (e.g. some PET)</td>
</tr>
<tr>
<td>Procedure Description</td>
<td>Tariff (£)</td>
</tr>
<tr>
<td>-------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>MRI, one area, no contrast</td>
<td>154</td>
</tr>
<tr>
<td>MRI, one area, post contrast only</td>
<td>199</td>
</tr>
<tr>
<td>MRI, one area, pre and post contrast only</td>
<td>228</td>
</tr>
<tr>
<td>MRI, 2 or 3 areas, no contrast</td>
<td>171</td>
</tr>
<tr>
<td>MRI, 2 or 3 areas, with contrast</td>
<td>260</td>
</tr>
<tr>
<td>CT, one area, no contrast</td>
<td>105</td>
</tr>
<tr>
<td>CT, one area, post contrast only</td>
<td>131</td>
</tr>
<tr>
<td>CT, one area, pre and post contrast only</td>
<td>152</td>
</tr>
<tr>
<td>CT, 2 or 3 areas, no contrast</td>
<td>132</td>
</tr>
<tr>
<td>CT, 2 areas with contrast</td>
<td>164</td>
</tr>
<tr>
<td>CT, 3 areas with contrast</td>
<td>176</td>
</tr>
<tr>
<td>CT, More than 3 areas</td>
<td>223</td>
</tr>
<tr>
<td>Dexa Scans</td>
<td>49</td>
</tr>
<tr>
<td>Contrast fluoroscopy procedures &lt;20 mins room usage</td>
<td>147</td>
</tr>
<tr>
<td>Contrast fluoroscopy procedures &gt;20 mins and &lt;40 mins room usage</td>
<td>166</td>
</tr>
<tr>
<td>Ultrasound, scan 0-15 mins</td>
<td>63</td>
</tr>
<tr>
<td>Ultrasound, scan &gt; 15 mins</td>
<td>94</td>
</tr>
<tr>
<td>Nuclear Medicine Band 1</td>
<td>97</td>
</tr>
<tr>
<td>Nuclear Medicine Band 2</td>
<td>151</td>
</tr>
<tr>
<td>Nuclear Medicine Band 3</td>
<td>302</td>
</tr>
</tbody>
</table>
## Similarities between ACR and RCR referral criteria

<table>
<thead>
<tr>
<th>Features</th>
<th>ACR</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence-based</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Based on common clinical problems</td>
<td>159 (800 var.)</td>
<td>315</td>
</tr>
<tr>
<td>Cycle of review</td>
<td>1 yr selective</td>
<td>4 yrs</td>
</tr>
<tr>
<td>Expert Panels</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>Consensus Technique</td>
<td>Delphi</td>
<td>Delphi</td>
</tr>
<tr>
<td>Level of agreement for consensus</td>
<td>80%</td>
<td>75%</td>
</tr>
<tr>
<td>Involvement of other organisations</td>
<td>15 through consensus</td>
<td>100 through consultation</td>
</tr>
<tr>
<td>Dose information</td>
<td>Rel. radiation level (= ED)</td>
<td>Effective dose (ED)</td>
</tr>
<tr>
<td>Publication</td>
<td>web</td>
<td>Paper and restricted web</td>
</tr>
</tbody>
</table>
Guidelines: for whom?

- For referring practitioners: General Practitioners, doctors-in-training & non-medically qualified health professionals
- For radiology practitioners: ICRP level 2 justification
- For patients: reinforcement of advice
- For Healthcare organisations: decision support, planning and provision
Guideline implementation

- Concise and user-friendly guidelines designed for everyday use
- Web and pocket sized paper versions
- RCR guidelines adopted nationally in UK and available to NHS professionals through Department of Health
- Adopted by many private hospitals for good practice, not to limit referrers
- Translated, adapted & adopted abroad
Influence of RCR guidelines on referral from general practice

• Following guidelines, overall referrals fell 13% from 88.4 to 77.2/1000 patients

• referrals fell for:
  – chest (9.4%),
  – spine (17.5%),
  – skull (30%),
  – limbs /joints (13.5%)

• RCR Guidelines Working Party concluded guidelines reduced the rate of referral and thus patients' exposure to radiation

BMJ. 1993 Jan 9;306(6870):110-1
Randomized controlled trial of the effect of the RCR guidelines on GPs' referrals for radiographic examination

- 62 Practices randomised into 2 groups, one group receiving copies of guidelines
- Practices receiving guidelines requested fewer examinations of the spine, and made a higher proportion of requests which conformed to the guidelines
- Introduction of guidelines can influence general practitioners' radiological referrals in the short term

Use of RCR Guidelines to influence General Practice

• Dissemination of the RCR guidelines 3e booklet to GPs in Scotland
• Long study over 4 years
• Only a small effect on GPs' referrals
• No significant effects on the total number of requests, or on requests for individual examinations
• Concluded other strategies needed

Use of select Guidelines to influence General Practice

- Lumbar spine and knee x-rays
- 6-monthly feedback of audit data is ineffective
- Routine educational reminder messages to radiographs is effective in reduction by up to 20% and does not affect quality of referrals.

Potential for reduction of CT

• CT for trauma
• Potential impact of the American College of Radiology Appropriateness Criteria
• 44% reduction may be possible

Hadley JL, Agola J, Wong P. AJR 2006; 186: 937-942
The long-term effect of educational reminder messages on primary care radiology referrals

- Educational reminder messages based on guidelines attached to x-ray reports reduces radiograph requests by GPs
- Referrals for knee and lumbar spine radiographs remained lower in the educational reminder messages group compared with the control group (relative risk=0.65 and 0.64)
- Over 12 consecutive months no evidence of the effect of the intervention wearing off

Reducing unnecessary skull radiographs in children

- Guidelines for skull radiographs following paediatric head trauma rewritten twice
- Number of skull radiographs performed fell from 146 in 1999 to 95 in 2001 and 50 in 2003
- Compliance with hospital guidelines increased from 85% in 1999 to 100% in 2003
- Guidelines that are acceptable to all specialties will improve compliance and reduce unnecessary radiographs

Changing clinical behaviour by making guidelines specific

• most promising approach was to use a variety of interventions including audit and feedback, reminders, and educational outreach

• Psychological research shows that the more precisely behaviours are specified, the more they are likely to be carried out

• Rewriting guidelines to increase behavioural specificity may be the simplest, most effective method of increasing implementation

• Specifying what, who, when, where, and how will assist implementation

Susan Michie, Marie Johnston. BMJ 2004;328:343-345
EITHER

This search function works only for the Audit Templates. You can search all the templates for words, parts of words or combinations of words using the search box below. You can use the % sign as a wildcard, before, after or in the middle of words, or parts of words. You can also use the % sign on its own to show a complete list of all the templates.

OR

Click on a keyword to open all related audit templates

- A&E
- Breast
- Chest
- Clinical_information
- Clinical_effectiveness
- Communication
- Consent
- Contrast
- CT
- ENT
- Equipment
- Errors
- Fluoroscopy
- Gastro-intestinal
- Guidelines
- Image_quality
- Intervention
- Investigative_protocols
- IRMER
- Lung
- Mammography
- MRI
- Musculoskeletal
- Neuro
- Nuclear_medicine
- Oncology
- Paediatric
- Patient_focus
- Plain_Film
- Radiation_protection
- Referral
- Reporting
- Resuscitation
- Revalidation
- Risk_management
- Role_extension
- Service_quality
- Training
- Ultrasound
- Urology
- Vascular
AuditLive: guidelines

1. **Pre-Op CXR for Elective Surgery**
   Pre-operative chest radiographs prior to elective surgery.

2. **GP Chest Radiography**
   Appropriateness of requests for chest radiography from GPs.

3. **Lumbar Spine Radiation Dose**
   Radiation dose received by a patient during a lumbar spine examination.

4. **Adequate Completion of Radiology Request Forms**
   Adequacy of completion of radiology request forms.

5. **Investigation of asymptomatic microscopic haematuria in adults**
   Assessment of compliance with agreed protocol for investigation of asymptomatic microscopic haematuria in adults.

6. **The vetting of requests for an imaging examination**
   A vetting process needs to be in place for the use of imaging services.

7. **Barium Enema Fluoroscopy Times and Doses**
   Fluoroscopy times and dose area products during barium enema examinations.

8. **Chest Radiographs: Skin Dose and Film Quality**
   Skin dose and film quality of chest radiographs.

9. **CT – Ward Staff Knowledge**
   Ward staff knowledge of the process of CT scanning.

10. **Imaging the Cervical Spine in Trauma**
    Adequacy of imaging the cervical spine in trauma referrals from the emergency department.

11. **Awareness of Radiation Doses Incurred in Diagnostic Investigations**
    Assessment of referrers’ knowledge of radiation doses for commonly requested examinations.

12. **An audit of open access referral for musculoskeletal ultrasound from General Practitioners**
    US is a useful imaging technique for evaluating soft tissue and joint abnormalities. Primary care physicians have open access to musculoskeletal ultrasound in many centres.

13. **An audit to assess compliance with the NICE head injury guidelines**
    This audit evaluates compliance with new NICE guidelines for the management of head injuries.

14. **The Image Quality of Plain Abdominal Radiography**
    Assessment of the Diagnostic Image Quality of Plain Abdominal Radiographs in Adult Patients.
Audit posters : Guidelines

1. Reducing the demand for lumbar spine radiography from General Practice –
2. An audit of unenhanced multislice CT (CT KUB) for investigation of acute renal colic in Leeds
3. Awareness of Radiation Doses Incurred in Diagnostic Investigations
5. Are abdominal radiographs being overused in the assessment of acute abdominal pain?
6. Making the best use of Imaging in Stroke patients
7. An Audit of Water Soluble Contrast Enema Referrals
8. An audit of body CT for investigation of occult malignancy
10. Mento-Occipital Facial Radiographs: A Waste Of Time?
11. An Audit of adherence to IRMER regulations in requesting and assessing chest radiographs performed on acute medical admissions.
12. Current day utilization of abdominal radiographs
13. An Audit Of Carotid Artery Doppler Ultrasound Requests
14. Lumbar spine xray audit
15. An Audit of a Scaphoid Fracture Protocol
16. Audit of Skull Radiography in Paediatric Head Injury at Blackpool Victoria Hospital
17. Audit of Doctors' Knowledge of Radiation Exposure
18. In suspected subarachnoid haemorrhage (SAH) how many patients have a lumbar puncture (LP) after a negative CT?
19. Justification in out of hours radiology
20. Acute Abdomen Imaging - An Audit
Audit: lumbar x-ray reduced 70%

GP Lumbar Spine Radiography referrals: an audit of current practice

Dr Kyriacos Patatas
Radiology Department, York Hospitals NHS Trust

OBJECTIVE:

To assess whether (1) GP lumbar spine radiography (LSR) referrals comply with RCR guidelines, and (2) to evaluate diagnostic yield of GP-referred LSRs

Background

LOW BACK PAIN IS VERY COMMON!
On any single day, 15% to 19% of UK adults report experiencing symptoms of low back pain (1).
Lumbar spine radiographs are commonly used to aid the diagnostic process.
There are 3 main concerns regarding the use of lumbar spine radiography:
1. Effectiveness (LSR is neither sensitive nor specific enough in the detection of many serious conditions, and may be falsely reassuring)
2. Cost (LSR is only likely to be defined as cost-effective when satisfaction is valued relatively high) (2)
3. Radiation risk (radiation dose 65 times that of a chest x-ray)

The recommendation from the Royal College of Radiologists (RCR) is that

Results

There was significant reduction in the GP-requests for LSR (average 23 per month compared to 80 in 2006, when methods were introduced to reduce demand and first audit was conducted).

92% of referrals conformed to the RCR guidelines and were therefore performed. In 8% of the referrals there was no clear indication and were returned to the GP, but 6% of those were subsequently done after discussion with a radiologist.
Guidelines appraisal

- Appraisal of Guidelines Research & Evaluation (AGREE)- instrument
  http://www.agreetrust.org/

- Guidelines International Network (GIN)- promotes systematic approach
  http://www.g-i-n.net/

- NHS Evidence Accreditation Scheme- quality mark (approval for MBUR7 pending)
  http://www.evidence.nhs.uk/Accreditation/Pages/Accreditation.aspx
Guideline use: challenges

• Distribution- widely and freely available to end-users
  “If they haven’t heard it you haven’t said it” McLuhan

• Implementation- decision support tools?
  “We shape our tools and thereafter our tools shape us” McLuhan

• Uptake- need buy-in by users and preferably ownership
  “Computers can do better than ever what needn’t be done at all. Making sense is still a human monopoly” McLuhan

• Monitoring- clinical audit, feedback and education
  “We drive into the future using only our rearview mirror ” McLuhan
Take home points

• Guidelines can reduce exams by 20% with potential for 40% reduction

• Clinical audit can improve compliance by 70%

• Scope for:
  – Increasing uptake
  – Clinical decision support
  – Adopting and adapting

“I may be wrong, but I’m never in doubt” Marshall McLuhan (Edmonton 1911-80)