
Volume 9 - Issue 5, 2009 - Cover Story: Patient Access to Medical Imaging

The Development and Impact of Referral Guidelines:

Current Status in the United Kingdom and North America

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Referral guidelines for diagnostic and interventional radiology have been in existence for 20 years and have been published in the United Kingdom (the Royal College of Radiologists' "Making the best use of clinical radiology services"), United States (American College of Radiology's "Appropriateness Criteria"), Europe, Australia and New Zealand, Hong Kong, Canada and other countries. The intention is to provide guidance towards the correct choice of investigation by clinician and radiologist for an individual patient rather than to be prescriptive.

Referral criteria have also been used to produce referral pathways and protocols with algorithms designed and agreed by relevant stakeholders (clinician, radiologist and health organisation) for use within a defined community or health organisation. The value of referral guidelines in justification is to avoid unnecessary ionising exposures when an investigation without ionising radiation is of greater or equal diagnostic efficacy.

Checklist for Ensuring Appropriate Referral

The strategy for ensuring investigations are helpful to management can be summarised from the RCR guidelines mentioned above:

- *Avoid repeat investigations.* This important cause of unhelpful and unjustifiable radiology is not directly addressed by referral criteria and requires an additional strategy.
- *Avoid investigations when results are unlikely to affect patient management.* This applies to investigations that cannot discriminate disease for the particular clinical problem. Diagnostic efficacy and impact are prerequisites for an appropriate test.
- *Avoid investigating too early.* Some chronic conditions such as headache or lower back pain not associated with sinister features can be managed without imaging as most will improve within weeks. Investigation would be appropriate should symptoms persist.
- *Avoid the wrong investigation.* Evidence-based guidance as to the most effective investigation should ensure an appropriate test but choice is influenced by local availability and expertise, particularly in less well-resourced regions.
- *Ensure adequate and appropriate clinical information is available with a defined question to be answered by the investigation.* The value of an imaging report is proportional to the clinical information provided.
- *Avoid over-investigation.* Although some patients and referring medical practitioners are reassured by multiple examinations of dubious cumulative value, this practice is not helpful and may carry an unjustifiable radiation burden.

How are Referral Guidelines Developed?

Guideline development has evolved to incorporate a more evidence-based approach. For the published 6th edition of referral guidelines and the 7th edition in preparation, the methodology used by the RCR includes:

1. Centralised literature searches with inclusion and exclusion filters including an electronic "hand search" of seven journals with high impact factors;
2. Expert panels from special interest groups that are system-based, age-based (paediatrics) or modality-based (especially for nuclear medicine);
3. Delphi consensus to agree recommendations, comments and grading of evidence. These Delphi groups comprise approximately 10 experts and may have a mix of specialty and modality base. Consensus is reached with 75% participation and 75% agreement at five, six or seven on a

seven-point Likert scale. Expert bias is avoided by anonymising data and geographical bias avoided by use of Delphi experts from different centres;

4. Wide consultation with colleges and organisations, and

5. Consideration of additional evidence through consultation.

Ordering of recommended investigations is based on:

- Evidence-based diagnostic impact. Selection of the best test is ensured for the clinical indication;
- Radiation effectiveness dose. Low or no dose investigations are promoted;
- Cost-effectiveness, and
- Particular consideration for guidance in the paediatric population.

The 6th edition of the RCR Referral Guidelines published in 2007 contains 315 guidelines, 43 of which are new. The evidence base has been strengthened with fewer than a quarter reliant on expert opinion alone.

Referral Guidelines in North America

The American College of Radiology's imaging referral criteria are intended to offer guidance for common clinical problems, to radiologists and referring physicians and also to hospitals and payers. Guideline development is based on attributes from the Agency for Healthcare Research and Quality, such as: validity; reliability/reproducibility; clinical applicability; clinical flexibility; clarity; multidisciplinary process; scheduled review, and documentation.

It is recognised that data from scientific studies is frequently insufficient. Consensus for the ACR Appropriateness Criteria was reached using a Delphi technique with a maximum of three rounds, scoring one to nine for appropriateness of an examination. Consensus is reached with 80% agreement. Guidance for initial imaging is offered with caveats that the availability of equipment and personnel will influence choice and that the final decision will be reached by referring physician and radiologist together. The aim is for quality and cost-effectiveness. Development of referral criteria on both sides of the Atlantic have converged on a reasonably similar methodology, summarised in the table above.

Do Referral Guidelines Work?

Evidence suggests that justification is lacking for many radiological procedures. After the publication of the first edition of the RCR referral guidelines in 1989, the RCR showed a reduction in referrals for plain radiographs by 13%. The following year a randomised controlled study by GPs in the UK showed significantly fewer referrals for lumbar spine radiography and a higher proportion of requests conforming to guidelines in the group of GPs to whom guidelines were distributed.

This early success by simple distribution of guidelines was unfortunately not sustained in a longer study over four years. Additional strategies were clearly required. Feedback of audit data regarding unjustified referrals for lumbar spine and knee radiographs was ineffective at reducing referral rates but an educational reminder in reports for such incompletely justified investigations was helpful in producing a 20% reduction. This effect was sustained.

In North America, the application of ACR guidelines has been shown to reduce the number of radiological examinations performed by non-radiologists. For example, a study of computed tomography (CT) for trauma showed that there was potential for a 44% reduction in number of these high dose investigations if ACR guidelines were used to guide justification.

Challenges for the Future

The challenge for the future is to present the right guideline(s) at the right time possibly as part of a clinical decision support system. Such systems are under development in North America and in the UK. The concept in the UK, that a referral for imaging is a request for a radiological opinion, concords with such guidance. The way forward for justification will involve:

- A joint approach between referring and radiological practitioner supported by the relevant healthcare organisation;
- Promotion of the principle that an imaging referral is a request for a radiological opinion both for the type of investigation and the findings therein, and
- Use of referral guidelines to inform the decision to image and which investigation to choose possibly through a clinical decision support system.

Published on : Sat, 5 Sep 2009