A retrospective audit of General Practitioner (GP) referrals for musculoskeletal radiographs.

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Aims and objectives

There is an increasing trend in the reliance on radiological services in investigating and guiding management of patients. This is supported by a study demonstrating a 26.5% increase in radiology examinations in England from 30 million in 2004/5 to almost 39 million in 2010/11 [1].

With implementation of the Health and Social Care Act 2012, there is a drive to enhance primary care services to aid early diagnosis and reduce secondary care referrals [2]. To this end, evidence-based guidance has been developed to support primary care clinicians [3,4]. 'iRefer' developed by the Royal College of Radiologists (RCR) provides guidance for primary care clinicians in deciding the most appropriate imaging investigation for a given clinical problem based on best available evidence. In addition, advice is also given within the context of UK radiation legislation [5].

Even with availability of national guidelines, due to an increasing reliance on clinical imaging, there is potential for inappropriate imaging requests in the primary care setting. Therefore, audit of practice is required to assess adherence to guidelines [3].

The purpose of our audit was to assess compliance of musculoskeletal radiograph requests at a General Practitioner’s (GP) surgery in England with iRefer guidance.

Methods and materials

Musculoskeletal radiograph requests made between June and October 2013 were retrospectively reviewed by accessing electronic patient records at the GP’s surgery. All patients who had a musculoskeletal radiograph in this period were consecutively sampled.

Following data was obtained: radiological reports, indications and outcomes following radiographs. Patient notes were reviewed to assess if radiograph reports significantly altered the patient's management - in the form of referral to secondary care for further assessment or further investigations following radiographs.

The data was processed in Microsoft Excel and was analysed using RCR iRefer guidelines as the standard.
Results

62 musculoskeletal radiograph requests were identified in the five-month period for the purposes of this audit.

The results are considered in each anatomical region below.

**Knee Radiographs**

**Standard:**

When there is no trauma, locking or restriction of movements, knee radiograph requests are indicated when:

- there is sudden onset of pain or exacerbation of pain.
- planning surgery.
- pain persists >6 weeks in children and young adults [4].

In cases of knee pain with locking:

- radiographs are indicated if there is clinical suspicion of loose bodies [4].

Knee radiographs consisted of 25 (40%) of the requests. As knee radiographs represent majority of the requests, the results are presented in more detail.

Of the 25 requests, 13 (52%) were congruent with above standards. Figure 1 demonstrates further breakdown of this category of requests. 11 of the 13 radiographs in this category prompted further investigations or referral for further management (orthopaedics and paediatrics) (Fig 2).

Contrastingly, results of 12 requests that were not congruent with standards prompted a change in management (referral for orthopaedic assessment) in one patient, despite only having mild osteoarthritic changes (Fig 2). Majority of the patients were managed conservatively following radiographic reports. Four patients were referred for radiographs for locking symptoms or suspected meniscal pathology. All patients with meniscal symptoms were referred for orthopaedic review after radiographs.

Overall, osteoarthritic changes were common a finding - in 13 (52%) knee radiographs.
**Hip Radiographs**

Standard:

In non-traumatic hip pain, hip radiographs are indicated when:

- there is persistent pain
- suspicion of avascular necrosis [4].

There were a total of six (9.6%) hip radiograph requests. Two of these requests were following recent trauma. The remaining four requests were congruent with the standard (Table 1).

<table>
<thead>
<tr>
<th>Indication</th>
<th>Findings</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic right hip pain.</td>
<td>Normal appearances of joint.</td>
<td>Treated as trochanteric bursitis by GP.</td>
</tr>
<tr>
<td>Worsening left hip pain.</td>
<td>Normal appearances of joint, bones osteopaenic.</td>
<td>Treated as trochanteric bursitis by GP.</td>
</tr>
<tr>
<td>Chronic bilateral hip pain.</td>
<td>Early osteoarthritis of both hips.</td>
<td>Referred for physiotherapy.</td>
</tr>
<tr>
<td>Chronic bilateral hip pain.</td>
<td>Moderate osteoarthritis.</td>
<td>Conservative management.</td>
</tr>
</tbody>
</table>

**Table 1.** Hip radiograph requests.

**Shoulder Radiographs**

Standard:

Impingement should be clinically diagnosed. For a painful shoulder, radiographs are indicated:

- for preoperative assessment
- for persistent shoulder pain that is unresponsive to conservative treatment to exclude calcific tendinitis [4].

There were a total of six (9.6%) shoulder radiograph requests. Three requests were congruent with the standard (Table 2).
Requests that fit with standard | Outcome | Requests that do not fit with standard | Outcome
--- | --- | --- | ---
Two month history of shoulder pain. Imaging to rule out calcific tendinitis | Medical Management | Frozen shoulder | Joint injection
Imaging to rule out calcific tendinitis | Referral for orthopaedic review. | Impingement Symptoms | Conservative management
Chronic shoulder pain not resolved with injection | Referral for orthopaedic review. | Imaging to exclude osteoarthritis of AC joint | Symptoms resolved without intervention.

Table 2. Shoulder radiograph requests.

Spinal Radiographs

Standard for lumbar radiographs:

- In chronic lumbar pain with red flag symptoms, radiographs are indicated when suspecting osteoporotic wedge fractures.
- In acute back pain with no red flag symptoms, radiographs not indicated. A normal radiograph may be falsely reassuring [4].

Standard for cervical radiographs:

- Plain radiographs are not indicated for brachialgia. To consider specialist referral or MRI when pain affecting lifestyle, vascular insufficiency or in the presence of red flag symptoms [4].

A total of seven requests (11.2%) were identified for spinal imaging. One patient had red flag neurological symptoms and was therefore excluded from results. Of the remaining six requests, one was congruent with above standards (Table 3).
fall and no red flag symptoms.

Bilateral shin pain  Physiotherapy referral.

Neurological symptoms related to neck pain  Medical management of osteoarthritis of C-spine

Whiplash injury  Physiotherapy referral.

Table 3. Spinal radiographs

Ankle, elbow and small joint radiographs

Standard:

Standards for the above joints are not specified in iRefer. Therefore, we are unable to comment on appropriateness of all requests pertaining to these joints. The frequency of requests for each joint is demonstrated in Figure 3.

18 radiographs (29%) covering a range of joints were identified.

There were four instances of trauma which required appropriate plain radiograph assessment. In keeping with iRefer guidance, two cases of suspected osteomyelitis of the foot were imaged [4]. There were two requests for radiographs for heel pain which revealed calcaneal spurs. As per iRefer, calcaneal spurs are common incidental findings and radiographs rarely helps in identifying cause of pain [4].

Images for this section:
Fig. 1: Breakdown of knee radiograph indications that fit with standards.

Fig. 2: Proportion of knee radiograph requests that altered management.
**Fig. 3:** Indications and frequency of radiograph requests in elbow, ankles and small joints of hand and feet.
Conclusion

The recommendations from this audit are:

• In patients with locking symptoms of the knee, evidence supports use of alternate imaging such as MRI or specialist assessment rather than radiographs.
• Soft tissue pathology of the shoulder such as impingement syndrome should be diagnosed clinically and ultrasound rather than radiographs has greater evidence for assessment.
• In cases of brachialgia, alternative investigations such as MRI or specialist input is indicated in the presence of neurological red flag symptoms.
• The cause of heel pain is rarely detectable on radiographs.

In order to achieve the standards recommended by iRefer, the findings of the audit was presented and discussed with the GP partners at a local audit meeting. In order to help decision making, access to iRefer was made available on all computers at the practice and instructions were given at the meeting on how to access iRefer. The second cycle of the audit was planned to be repeated in one year.

It is important to note some limitations of this audit: retrospective nature of the study, no statistical analysis and the lack of standards to assess appropriateness of small joints (of hand and feet) radiograph requests. However, this audit represents an opportunity to quickly study current practice, which, with the advent of electronic patient records is easily reproducible in other GP practices.

Personal information

Dr Jason Jacob, the first author, led and designed this audit whilst as a foundation trainee at Stockport NHS Foundation Trust and is currently a medical demonstrator at the University of St Andrews, Scotland.

Dr Harish Thampy is a clinical lecturer at the University of Manchester and supervised this audit.

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5 The Ionising Radiation (Medical Exposure) Regulations 2000.