Requesting radiological investigations – do junior doctors know their patients? A cross-sectional survey

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Summary

**Objectives** To ascertain clinicians’ knowledge of their patients when requesting radiological investigations, as required legally by UK government legislation ‘Ionising Radiation (Medical Exposure) Regulations 2000’ (IRMER 2000), following the implementation of European Working Time Directive.

**Design** Cross-sectional survey.

**Participants** All doctors requesting radiological requests every Monday, following the weekend on-call, over an 8-week period. There were no exclusion criteria.

**Main outcome measures** Baseline data analysis, including grade and specialty of requesting doctor, types of modality requested, knowledge of their patient, addressograph signature confirming identity and appropriateness of investigation.

**Results** 164 requests were received, the majority (61%) were made by Foundation Programme 1 (FP1) doctors and general medical specialties accounted for the highest proportion of requests (45%). Ultrasound scanning was the most frequently requested investigation (47%), closely followed by computed tomography (CT) scans (42%). Almost a third (30%) of requests were made by doctors who had not seen the patient to be investigated, predominantly by FP1 doctors (\(p=0.003\)) and more frequently by general medical specialties (\(p=0.001\)). Signatures were absent on 20% of the addressographs and overall, 10% of requests were deemed inappropriate.

**Conclusions** In almost a third of radiological requests, doctors have not seen patients to be investigated, most likely as a result of shift-working patterns. This does not fulfil the IRMER 2000 criteria and potentially exposes patients to unnecessary and inappropriate radiation.

Introduction

The UK government legislation, ‘Ionizing Radiation (Medical Exposure) Regulations (IRMER) 2000’,\(^1\) states that when requesting a radiological investigation, the referrer (clinician) is required to provide sufficient and accurate clinical information for the IRMER practitioner (radiologist/radiographer).
to be best able to determine whether the examination is appropriate and justified. With the recent implementation of European Working Time Directives (EWTD) and varying shift work patterns, anecdotal evidence suggests that there are increasing number of junior doctors requesting radiological investigations without great insight into the patient’s history or examination, and occasionally having not even seen the patient. While consultants are increasingly being relied upon for continuity of patient care, requests for radiological investigations by juniors with no knowledge of their patients is not only a wasted learning opportunity, but more importantly leaves significant room for error, and consequently patients may be exposed to unnecessary radiation by having needless and inappropriate investigations. This prospective study was designed to ascertain the referrer’s knowledge of their patient to be investigated.

Methods

In our hospital it is our policy that a consultant radiologist is on duty at all times to maintain protocol and advise on requests for all inpatient, non-plain film, investigations. The requesting doctor brings the radiological request forms (RRF) to the radiologist (KGT) who either agrees to the imaging or advises on a more appropriate alternative investigation which is then arranged, performed and reported the same day. When the information on the RRF is inadequate, confusing or illegible, the requesting doctor is questioned and the appropriateness of the request ascertained.

We prospectively collected all data for inpatient radiological requests (excluding plain films) received on a Monday, over an eight-week period in 2010. All requests were reviewed by a single duty consultant radiologist (KGT) who routinely covers this time period. Many of the requests are those related to inpatient admissions from the proceeding weekend emergency take, as well as the routine Monday radiological requests. There were no exclusion criteria.

Throughout the investigation a specifically designed proforma was completed for every request. Data collected included grade and specialty of the requesting doctor, type of investigation requested and knowledge of their patients to be investigated.

In our hospital, trust policy requires the requesting doctor to countersign the identifying addressograph on each request to verify that the patient details are correct and also to avoid inappropriate imaging of the wrong patient. The presence of this signature was noted for each request form.

In patients with renal impairment or renal failure, radiological investigations involving the use of nephrotoxic agents may be contraindicated. In order to identify such at-risk patients, our RRF provides space to record the patient’s recent creatinine and the presence or absence of these data was also noted where appropriate.

Occasionally, additional imaging would be warranted following an investigation and this was organized by the radiologist, although it was not requested by a clinician (most commonly a carotid duplex scan following a computed tomography [CT] head scan in the context of a cerebrovascular attack). All such requests were noted.

Finally, using all the above information provided by the requesting doctor, the investigation was deemed either appropriate or inappropriate by the consultant radiologist (KGT).

Occasionally, doctors would request advice from the radiologist as to the most appropriate type of imaging modality. This would typically arise in more complex clinical situations, where the referrer felt imaging was important, but unsure which imaging method to use. All such requests were also noted.

Data were collected in Excel® and statistical analysis was performed using Fischer’s exact test. \( P < 0.05 \) was considered statistically significant.

Results

Over the two-month time-period, 164 radiological requests were received, the majority of which were made by Foundation Year 1 doctors (FY1s, pre-registration house officers) (61%, see Figure 1a). The most commonly requested radiological investigation was an ultrasound scan (47%) closely followed by CT scans (42%, see Figure 1b).

General medical ‘doctors’ made the largest proportion of requests (44.5%), followed by
general surgeons (29.9%). Further detail on the sources of the requests are given in Figure 2.

In almost a third (30%) of the radiological requests made, the doctor had not seen the patient (group A) contrary to the IRMER criteria requirements. The remaining requests were made by a doctor who had seen the patient (group B). Doctors in group A were most likely to be from medical specialties (64%, \( P = 0.001 \)), whereas group B had a greater proportion of surgical specialties (see Figure 3). A significantly higher proportion of requests from group A came from FY1 doctors (\( P = 0.003 \)).

Of all the group A requests, 26 (52%) were for CT scans and 17 (34%) for ultrasound scans. The type of scan requested (as divided into CT, ultrasound scan [USS]/Duplex and other) were similar between the two groups (\( P = 0.08 \), see Table 1). A total of nine investigations were supplemented by further imaging as suggested by the consultant radiologist (group A = 4, group B = 5, \( P = 0.24 \)). Out of 164 requests, 11 (7%) asked for the radiologist’s advice regarding which investigation was most suitable to assist in making a diagnosis. None of these came from group A (\( P = 0.019 \), see Table 1).

Seventeen (10%) requests for various radiological investigations were rejected by the consultant radiologist (KGT) as they were deemed inappropriate. Reasons included a similar investigation within a week, no impact on the management of patient’s condition and lastly, the requested investigation would not clarify the diagnosis. In such cases, the investigation was changed to a more appropriate modality or the requesting doctor was asked to contact other specialties. The majority of the rejected requests were made by registrars (11/17). Of the rejected requests, there was no statistically significant difference between group A (n = 7) and B (n = 10, \( P = 0.4 \), see Table 1).

It is our trust policy that the requesting doctor countersigns the identifying addressograph on each request in order to verify that the request is for the correct patient. Of the 164, 134 (82%) were correctly signed. Significantly more forms were correctly signed in group B (86%) than group A (68%, \( P = 0.018 \), see Table 1). None of the doctors within group A were able to confirm the accuracy of the addressograph to the radiologist as they had not seen the patient, and patient details had to be verified with other ward staff prior to scanning.

Finally, creatinine levels are required for radiological investigations involving nephrotoxic agents. The majority of scans requested did not

**Figure 1**

Details of RRFs. (a) Pie chart of grades of doctors requesting radiological investigations. (Cons, consultant; Reg, registrar or equivalent; CT1/CT2, core trainee 1/2 or equivalent; F1/F2, Foundation Programme Doctor Year 1/2; NP, nurse practitioner). (b) Pie chart of types of investigation requested (CT, computed tomography; USS, ultrasound scan; MRI, magnetic resonance imaging)
Figure 2
Histogram of types of specialties requesting scans

(A+E, Accident and Emergency; ITU, intensive therapy unit; Med, general medicine; Micro, microbiology; O&G, obstetrics and gynaecology; Opth, ophthalmology; Paeds, paediatrics; Psych, psychiatry; Surg, general surgery; T&O, trauma and orthopaedics; Urol, urology)

Figure 3
Breakdown of requests arising from group A including grade (a) and speciality (b).

(Reg, registrar or equivalent; CT1/CT2, core trainee 1/2 or equivalent; F1/F2, Foundation Programme Doctor Year 1/2; A+E, Accident and Emergency; Med, general medicine; O&G, obstetrics and gynaecology; Surg, general surgery)
require this, but for those that did, a greater proportion came from group A (64%) compared with group B (31%, \( P = 0.024 \), see Table 1).

**Discussion**

It is our hospital’s policy to discuss all radiological requests (excluding plain films) on inpatients with a radiologist prior to it being undertaken. It is this mechanism which has brought to light the very limited knowledge that junior doctors have of their patients. Prior to the EWTD, it was usual that doctors working overnight and remained on duty the following day, and thus had first-hand knowledge of their patients including the patient’s clerking and examination.

In the interest of patient safety, the department of health has issued clear guidance regarding the requesting of radiological investigations. This clearly states that the referrer (clinician) has a responsibility to provide accurate and necessary information to the radiological practitioner, who is then responsible for determining if the request is appropriate. It is therefore clear that the referrer must have sufficient data regarding the patient to ensure that any exposure of patients to radiation is justified and the investigation appropriate. Non-ionizing radiological investigations (i.e. USS) may, by extension, be viewed in a similar fashion.

With the introduction of the EWTD, juniors are working fewer hours, often as part of a shift system. In our hospital, patients are often admitted and subsequently cared for by a number of different junior doctors. Our study demonstrates that 30% of doctors have not even seen or examined the patient prior to requesting imaging, and furthermore these FY1 doctors are usually those who request imaging by taking the forms to radiology department. In most cases, request forms are filled in by doctors who then ‘hand over’ the request forms, or leave them on the ward to be collected and taken to the radiology department by other juniors. This most commonly occurs when a doctor who is on-call over a weekend hands over the RRF to a junior to request investigations on a Monday morning.

To the best of our knowledge, no other study has investigated this issue. Other publications have shown substandard completion of RRFs. For example, Oswal et al. looked at 400 RRFs, and assigned a score out of 10 to each depending on how well 10 aspects of the form were completed. The average score was 8.7. In another study, Depasquale et al. examined 200 RRFs against nine parameters, and found only 4% fully completed.

In our institution addressographs containing patient demographics, including name, address, date of birth and unique hospital identifier are usually used for RRFs. These need to be counter signed when applied to the RRF to ensure the referrer has confirmed clinical details and that the correct patient will be sent for. Our results demonstrate that this was not done in 18% of the cases. Even when the signature was present,
some errors did occur, such as the use of an old addressograph with an incorrect address. Our RRFs also ask for recent creatinine level prior to contrast studies and less than a half (45%) of the RRFs provided this data.

Around 10% of requests were deemed inappropriate by the consultant radiologist (KGT) as they would not change management or, alternatively, the investigation had already been performed. Furthermore, a smaller number of the RRFs were felt to be inappropriate to investigate the clinical working diagnosis. Similar findings have been documented by Triantopoulou et al., who found almost 10% of 463 CT request forms were inappropriate, as deemed by three consultant radiologists. Martin et al. examined RRFs appropriateness using ‘The American College of Radiology (ACR) Appropriateness Criteria for Imaging and Treatment Decisions’, and they documented 24% of requests were inappropriate. Perhaps surprisingly, in our study we found no difference between doctors having ‘seen’ the patient and the incidence of the appropriateness of investigations. This may be due to the fact that more junior doctors of the team request less complex investigations, which are hence less likely to be deemed inappropriate by the consultant radiologist.

One of the serious implications of this study is that the juniors miss out on potential teaching opportunities when requesting radiology for patients they have no knowledge of. Understanding why a radiological investigation was requested and performed, changed to an alternative investigation, or rejected is an important part of postgraduate teaching.

Lastly, the limited knowledge of the patient by the junior doctor with the RRF can be so inadequate as to make it impossible for the radiologists to act as a radiological ‘gate keeper’, particularly when the written information is so sparse as to decide on the appropriateness of the requested investigation. Occasionally in this study, requests were received for patients who had already been discharged from the hospital, emphasizing the lack of personal information the requesting doctor has for the patient to be investigated.

There are a number of ways of improving such a system of working, to improve safety and reduce clinical errors. Education of juniors is important, especially during induction, so they understand the importance of accurate patient knowledge and the adverse affects of unnecessary radiation exposure. Electronic request forms, which make inclusion of certain information mandatory (e.g. creatinine, referring doctor, etc.), may also improve the situation and may promote accountability to the ordering doctor.

With the EWTD, more juniors are working shift hours and sadly do not have a chance to see complete patient episodes. Managing patient care effectively in such an environment relies heavily on accurate handover. Shortcomings in documentation, teamwork and communication have been shown to result in poorer outcomes. Our study clearly demonstrates that almost a third (30%) of all radiological requests are being made by doctors who have had no clinical contact with the patient and as such, there is a real risk that standards of patient care and safety have fallen.

References
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