

Adherence of Radiological Investigation Requests from Medical Wards, to Royal College of Radiologists' Guidelines

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ABSTRACT

Background: Radiological investigation requests get rejected by vetting radiologists, if they do not adhere to Royal College of Radiologists (RCR) guidelines and Ionizing Radiation (Medical Exposure) Regulations - IR(ME)R 2017 guidelines. This leads to significant delays for all three parties involved: the requesting clinician, the radiologist who vets the investigation, and the patient whose management is affected. Hence radiological investigation requests, which are the main means of communication between the referring clinician and the radiologist, should be appropriately filled in to facilitate the justification process and to optimize patient management.

Aims/purpose: To evaluate the adherence of radiological investigation requests of inpatients from medical wards at University Hospitals of Leicester, to RCR guidelines and identify improvement areas, thereby reducing preventable patient delays.

Methods: Data from 500 investigation requests of adult inpatients for common modalities of imaging (CT, X-Ray, and MRI) from medical wards at University Hospitals of Leicester were collected across two audit cycles, omitting any patient-identifiable information, and were analyzed for their completeness and adherence to RCR protocols.

Results: Based on the analysis, inadequacies of imaging requests were identified, both in completion and adherence to RCR guidelines. In the initial audit cycle, even though more than 90% of the 250 investigation requests analysed contained clinical history, the name of requesting clinician and the question to be

answered, only 64% of the investigation requests contained clinical examination or relevant investigation findings. In comparison to more than 94% of MRI and X-Ray requests, only 68.6% of CT requests adhered to RCR and IR(ME)R 2017 guidelines. In order to raise awareness and educate, the audit findings and recommendations were presented in a local medical teaching session within the hospital, and the same was propagated among medical doctors, through an online flyer. During the re-audit, another 250 radiological investigation requests were evaluated, where 73.3% of the requests included relevant clinical examination and/or investigation results and 76% of the CT requests adhered to iRefer guidelines for indication.

Conclusion: Radiological investigation requests get rejected if it does not adhere to RCR guidelines for completeness (1) or indication (in compliance with IR(ME)R 2017) (3). This in turn results in delays in patient management. This could be minimized by increasing awareness about the above guidelines and the need for adhering to the same, thereby making sure all the necessary details are filled in and the investigation being requested is appropriate for the clinical indication.

Keywords: Radiology, Audit, Medicine

INTRODUCTION

Radiological investigations, particularly those involving ionizing radiation, are performed only after they are vetted by the responsible radiologist. The vetting process mainly involves ensuring that the test is justified as per laid out protocols, such as

the IR(MER) 2017 and RCR guidelines. [1-3]

The main reason for this is studies linking the increased risk of cancers to even low doses of ionizing radiation. [4]

With growing advances in technology, radiological imaging has become an inevitable part of medical management. According to RCR, radiology investigation requests must be legibly and completely filled so that the radiologist is provided with adequate information to justify the investigation – failing to do so results in the rejection of imaging requests. [1] Therefore, delays due to the rejection of imaging requests lead to an increased duration of inpatient stay and injudicious use of requesting clinicians' and radiologists' time amidst limited hospital resources.

According to the British Institute of Radiology, clinical audits on compliance with guidelines aid the justification process and improve the quality of referrals. [5]

Therefore, this study conducted two audit cycles to identify the pitfalls in radiological imaging requests – both in completion and appropriateness of the requests. Different hospitals have their own customized format for investigation requests – be it manually written or electronic requests. Even if electronic means of requesting are in practice, the information fields that are set as mandatory will also differ among hospitals. Therefore, the information collected by investigation requests varies between hospitals and trusts. Hence, an internal audit was conducted within the University Hospitals of Leicester medical wards, analyzing the quality of their imaging requests against RCR and IR(MER)2017 guidelines, to identify areas that needed improvement.

Actions are to be taken to educate clinicians not only regarding the RCR guidelines for the completion of radiological request forms but also regarding appropriate referral guidelines laid down in iRefer. [2]. This facilitates maintaining the expected quality of imaging requests, thereby minimizing rejected requests and optimizing patient care from an imaging point of view.

MATERIALS & METHODS

This retrospective case-record-based study was performed in two audit cycles. An audit was registered with the Clinical Audit Department at the University Hospitals of Leicester NHS Trust.

Our target population included adult patients admitted to general medical wards within the trust hospitals who had radiological investigations requested for them during their inpatient stay. Requests from other specialties and outpatient imaging requests were excluded.

Five frequently requested imaging modalities were selected, namely X-ray chest, X-ray abdomen, X-ray long bones, MRI head, and CT (head, thorax, abdomen, and pelvis).

The first audit cycle was conducted over 10 days, from 5th October 2022 to 10th October 2022. 50 consecutive requests, including rejected requests for each modality, were audited retrospectively to ensure completeness and adherence to the RCR and IR(ME)R 2017 guidelines. The total sample size was 250.

The requests were analyzed based on the indication for the request and inclusion of details, mainly the name and contact information of the requesting clinician, clinical history, clinical examination and/or relevant investigation findings, and the clinical question to be answered.

The aforementioned data were collected from the trust's investigation applications – ICE and Nervecentre, along with the trust's Radiology Information system, iCRIS. All patient-identifiable information was omitted. This was entered into a form that was specifically prepared using the RCR guidelines.

The data were analysed using Microsoft Excel sheet. After analyzing the results of the first audit cycle, inadequacies were identified in radiological imaging requests. These were presented at a local medical teaching session attended by requesting clinicians in the trust, along with recommendations for change. Online and physical flyers containing the same

information were distributed among referring clinicians.

A re-audit was performed after 6 months, from 20th May 2023 to 30th May 2023, following the same methodology and study population to evaluate quality improvement and changes in practice. The investigation requests which were requested after the dissemination of flyers were analyzed. Therefore, a total of 500 radiological investigation requests were analysed in this study – 250 in each cycle.

RESULT

The data was collected in two audit cycles. A total of 500 radiological investigation requests were assessed across both audit cycles; 250 requests were assessed in each audit cycle.

In the first audit cycle, even though 92% of the investigation requests contained information regarding the clinical history or background, only 64% of these requests contained any information on clinical examination or relevant investigation findings. Since the name of the requesting clinician is automatically filled in by the requesting platform of the trust, all the requests contained the information of the requesting clinician (100%); however, only 36% of the requests mentioned any contact information of the requesting clinician. It was reassuring to note that 90.4% of the investigation requests specified the question to be answered.

All the analyzed requests for X-ray Abdomen adhered to iRefer guidelines for indication during the first audit cycle. About 94% of the MRI requests, 90% of the Chest X-ray requests, and 97.4% of the long bone X-ray requests were also appropriate for the indication as per iRefer guidelines. However, only about 68% of the CT requests were appropriately referred.

The audit findings were presented in local teaching sessions within the trust in order to create awareness about the inadequacies in the radiological investigation requests and educate about how they should be appropriately filled to minimize rejections. Online and physical flyers containing the same information were propagated throughout the trust in order to educate the requesting clinicians. After these interventions, a re-audit was done to assess any changes in the above statistics.

In the second audit cycle, the clinical history and background information, along with the clinical examination and/or relevant investigation findings, were filled in in 94.7% and 73.3% of the investigation requests, respectively. A 3% improvement was noted in the question-to-be-answered section of the request in comparison to the first audit cycle. 47% of the requests contained the contact information of the requesting clinician. The above results have been summarized in Figure 1.

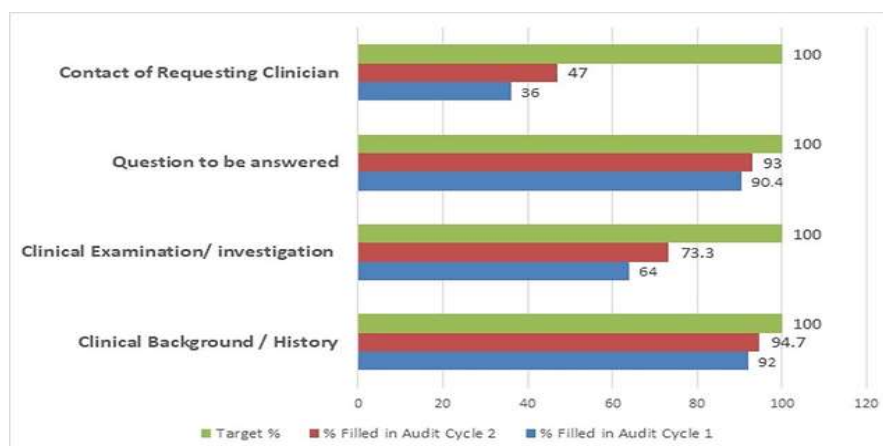


Figure 1: Completeness of information within radiological investigation requests across two audit cycles, in comparison to target RCR standards.

About 99% of the Abdominal X-ray requests, 98% of the Long bone X-ray requests, and 95% of the MRI requests adhered to iRefer guidelines for indication in the second audit cycle; However, only

87% of the chest X-ray requests and 76% of the CT requests adhered to the iRefer guidelines in this cycle. These results have been demonstrated in Figure 2.

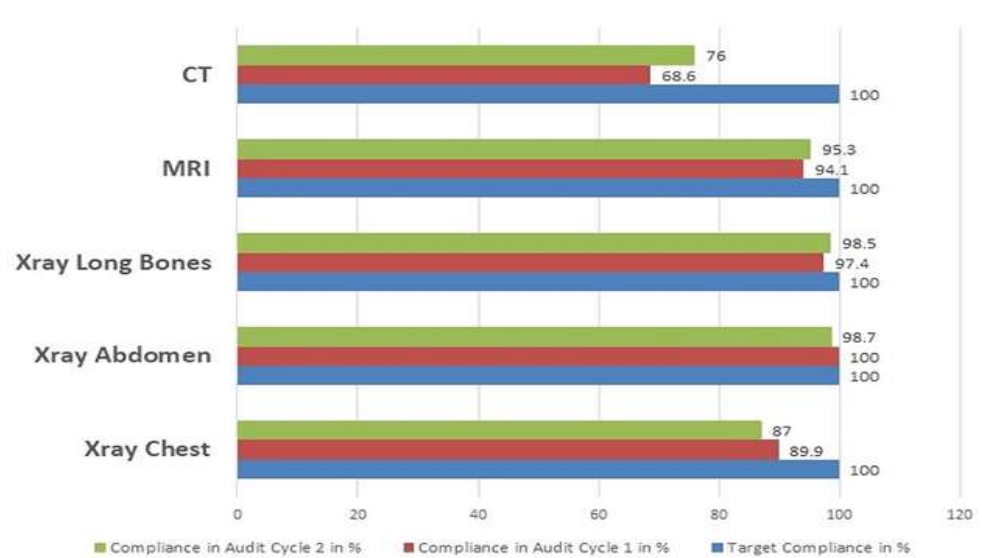


Figure 2: Compliance of the analyzed radiological investigation requests to iRefer guidelines for their indication.

DISCUSSION

Radiological investigations have become a cornerstone in diagnosis and management, not just in surgical specialties, but also in medical specialties. From diagnosis and initiation of management protocols for emergencies such as stroke, to being a part of various health screening programs, radiological investigations are now an inevitable part of medical management guidelines. With radiology being an entirely separate department from other specialties such as Internal Medicine and various Surgical specialties, radiological investigation requests act as the main source of communication between the radiologist and the referring clinician.

However, most of these investigations, mainly Computed Tomography (CT) and X-rays involve ionizing radiations. The radiation exposure to patients undergoing CT is in the range of 1–24 mSv per examination. [6] Even the lowest imaginable dose of radiation increases the probability of DNA breakage, which in turn increases the chance of mutation and carcinogenesis. Therefore, each medical radiation exposure

adds to the total accumulated dose of exposure, which is in turn directly proportional to the risk of radiation-induced cancer, owing to both their deterministic and stochastic effects. [4] These effects are further acknowledged by the American College of Radiology in their white paper view, which states “The rapid growth of CT and certain nuclear medicine studies may result in an increased incidence of radiation-related cancer in the not-too-distant future”. [7] Therefore, the benefits of employing these investigations should be weighed against the potential adverse effects of radiation exposure. Studies have shown that about 20 – 77% of radiological investigations undertaken were inappropriate and/ or unnecessary. [5]

The Royal College of Radiologists (RCR) has published iRefer guidelines, which are a set of evidence-based instructions that direct clinicians towards safe, appropriate, and judicious use of radiological investigations [2]. These guidelines also provide practical guidance for clinicians to follow the Ionising Radiation (Medical Exposure) Regulations (IRMER), which make

clinicians responsible for ensuring that "all exposures to ionising radiation are justified and that doses are optimised." [3]. As per ICRP recommendations, "justification, optimisation of protection, and application of dose limits" form the three principles of radiological protection [8]. When a radiological investigation is requested, it undergoes a justification process by the radiologist, in keeping with the IR (ME)R 2017 regulations [3], to justify that the medical implications of the radiological investigation report are far more significant than the risks involved with radiation exposure. Once that is ascertained, it must be ensured that the requested investigation is appropriate for that particular clinical scenario and that it improves patient diagnosis and/or management

[5]. Therefore, adequately and appropriately filled radiological investigation requests that describe the clinical history of the patient, the relevant examination and/or investigation findings, and the clinical question to be answered provide the radiologist with adequate information to justify the examination, which in turn results in fewer requests being rejected. Therefore, to appropriately justify a radiological investigation, the radiologist must be provided with all the clinical details that are necessary by the referring clinician, who acts as the intermediary between the patient and the radiologist. The information that must be provided includes reasons for the request and necessary clinical details, which may include clinical history, relevant investigation findings, clinical questions to be answered, and the referrer's details and contact information [2].

A thoroughly filled radiological investigation request aids in a smooth justification process, which hastens patient management, whereas the rejection of said investigation due to an inadequately filled request adversely affects both patients and clinicians. In the case of admitted patients, it prolongs the inpatient stay. It also hampers effective patient management. Requests being rejected result in the unproductive use

of both the referring clinicians' and radiologists' time and efforts.

The percentage of the requests in this study contained the clinical background of the patient, which is higher than that found in studies conducted in hospitals in Pakistan that employed manually written requests, [9] but comparable to the studies from hospitals in Pakistan that utilized electronic means of requesting. [10]

Referrer details and a contactable means of communication must be included within the radiological investigation request. [2]. This aids in establishing better communication between the radiologist and the requesting clinician, which in turn has two important implications: this could provide an additional step that could help discuss a request during the justification process. This would potentially reduce the rejection rate of imaging requests. The second is that urgent and/or significant unexpected findings could be communicated to the clinician promptly, which would minimize the chance of them being overlooked, thereby improving patient safety. The data regarding the same that was obtained in this study (36% and 47% in the first and second cycles, respectively) did not meet the RCR standards; however, it was comparatively better than other studies, where only about 10% of the requests contained the signature and contact information of the referring clinician. [9]

After completing the first cycle of the audit, the results were presented in a local teaching session within the trust, which was attended by referring clinicians of all grades, from junior doctors to consultants. The RCR recommendations for an appropriate radiological request as well as the importance of adhering to them were also conveyed. The results and recommendations were also propagated as flyers- both physical and online- among referring clinicians. The improvement in the quality of investigation requests seen in the re-audit is attributed to the above measures taken to educate the requesting clinicians. Hence, increasing awareness about the RCR

recommendations and the implications they have on patient management is an important part of ensuring the quality of investigation requests. This information could be included in the induction sessions of newly recruited clinicians to ensure continuity of awareness. In those hospitals that have electronic means of requesting investigations, fields could be made mandatory to ensure adequately filled investigation requests in accordance with the RCR guidelines. [6] In addition, providing clinicians with access to guidelines regarding appropriate investigations as iRefer by RCR could result in the correct investigations being requested for the particular clinical scenario. According to the British Institute of Radiology, "the use of guidelines can achieve an immediate dose reduction of 20%, with a potential of 40% or even more. They can help eliminate categories of examination of little or no clinical value". [5] For clinicians to adhere to the recommended filling of request forms, they must first understand the importance of the justification process, for which it is necessary to be aware of the radiation risks these investigations involve. [5] Studies have shown that there is very little awareness among clinicians regarding the radiation dose-risk relationship. [11,12] Hence, improving awareness about the risks posed by medical radiation exposure also forms one of the foundation stones for empowering clinicians to make complete and appropriate radiological investigation requests.

This study, however, was conducted within a single trust, which uses an electronic means of requesting investigations, over a period of six months between the two phases. The rejection rates and quality of requests may vary between different trusts based on factors such as local training and inductions and the requesting interface (electronic or paper).

For example, in a similar study conducted in a local hospital in Karachi, Pakistan, where investigation requests were manually filled in, only about 44% of the requests contained

the name of the requesting physician, [9] compared to 100% of the requests in this study. This can be attributed to the use of an electronic system of requesting, which automatically fills in the name of the requesting clinician. This hence cannot be compared to medical institutions using paper requests, whose number of adequately completed requests may be even lower, not only because mandatory fields for input are not applicable in paper requests but also because other factors such as illegible handwriting may influence the quality of investigation requests.

CONCLUSION

Inadequacies were identified in terms of the completion of radiological investigation requests, as well as their compliance with RCR referral guidelines. This would hinder the justification process and may lead to the rejection of such requests, which in turn adversely affects patient management. Steps to educate regarding the importance of appropriately filling the radiological investigation requests, as well as creating awareness about tools such as iRefer to gain insight about various imaging referral guidelines help reduce the above inadequacies. Modifying electronic request forms to adhere to RCR guidelines would also help in the justification process.

Declaration by Authors

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