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“It's all in the history”: A service evaluation of the quality of radiological requests in acute imaging

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ABSTRACT

Introduction: The aim of this service evaluation project was to assess the quality of clinical details provided in radiological requests.

Methods: A retrospective review of adult inpatient and emergency department radiological requests over a seven-day period was performed, using the local Clinical Radiological Information System (CRIS). Requests for plain film, CT, MRI and Ultrasound were assessed for the inclusion of a clinical question, lateralisation/localisation of signs or symptoms if required, and relevant past medical/surgical history if available.

Results: 1548 imaging requests were analysed. 76% asked a specific clinical question. 74% of requests requiring localisation provided this. Of those cases with relevant past medical or surgical history available, 49% mentioned this. Emergency department (ED) requests provided localisation when required in 81% of cases compared to 62% of in-patients ($p < 0.05$). However, in-patient requests contained relevant past history in 53% of cases compared to 40% for ED requests ($p = 0.00096$). Compared to plain film requests, those for CT, MRI and Ultrasound studies were more complete in respect to inclusion of a clinical question (88% versus 72%, $p < 0.05$), localisation if required (83% versus 71%, $p = 0.0007$) and pertinent clinical history (67% versus 42%, $p < 0.05$). Requests from the weekend more often included a clinical question (83% vs 75%, $p = 0.00054$) and localisation if needed (84% vs 71%, $p = 0.00188$) compared with weekday requests.

Conclusion: This large-scale service evaluation project shows that the quality of clinical details in requests for radiological investigations requires improvement, particularly in regard to inclusion of relevant past medical and surgical history.

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Introduction

The clinical details provided for radiology requests are often crucial to the interpretation of a radiological investigation, however at times this information is insufficient or missing important clinical history.

It is well recognised that the omission of important clinical details can have a detrimental effect on the radiology report generated. A number of specific cases have been described in the Royal College of Radiologists publication READ: Radiology Events and Discrepancies.^{1–3} These include implanted surgical haemostatic agents being mistaken for collections on CT,¹ interpreting a

thrombus as a retained cannula on ultrasound of the dorsum of the hand² and post-surgical changes in the breast being mistaken for malignancy on CT.³ Brady et al. suggested inadequacy of clinical information was one of the key system issues contributing to errors in radiology.⁴

There is also considerable evidence to show that when adequate clinical details are provided, this enables the reporting practitioner to formulate a useful report.^{5–7} Despite this, there are no established standards available to enable clinical audit of radiology request quality. In the literature, certain aspects of the clinical information provided have been highlighted to be of particular value. The importance of the communication of a specific clinical question has been emphasized by Fischer⁸ and Mervyn et al.⁵ The value of localisation was illustrated by Berbaum et al., showing that information regarding the site of trauma increased fracture detection.⁶ More recently, Leslie et al. purported that correct past medical

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history had a beneficial effect on CT reports (improving their accuracy) and that the more complex the investigation, the more important the clinical information.⁷ Therefore the authors identified the presence of a clinical question, localisation of signs and provision of an adequate past medical history as important aspects to be included in the radiological request.

Previous service evaluation projects have identified deficiencies in these particular aspects of the clinical information. Oswal et al. demonstrated omission of a clinical question to be answered in 17% of the 400 forms assessed in their study⁹ and Depasquale et al.'s analysis of 200 request forms suggested that the past medical history section was completely missing in 7%, and that where it was present, was frequently incomplete.¹⁰ Akinola's study of 145 cross-sectional imaging requests showed only 18% of clinical histories given were detailed.¹¹

In view of this, the authors sought to address three separate points in this service evaluation project: 1) Does the request pose a clinical question?, 2) If lateralisation or localisation of clinical signs/symptoms is needed, is it provided? and 3) If there is important and relevant past medical or surgical history available, is this provided?. With 1548 request forms assessed, this service evaluation project aims to provide the largest single-centre analysis to date on the topic of the quality of clinical details included in radiology requests for acute imaging.

Methods

This was a review of emergency department and in-patient radiological investigations at a tertiary centre. Data were collected retrospectively and recorded anonymously. The project was deemed to be a service evaluation project (the category assigned at our institution to projects not meeting the criteria for research or audit) and as such no formal application, ethical approval or local permissions were required.

Using the local Clinical Radiology Information System (CRIS), a pilot project was conducted during which requests for plain film, ultrasound, CT and MRI in adult patients over two days were assessed. While initial analysis was promising, it was felt further data was needed and so data collection was expanded to a full week (seven days) both to increase the dataset and also to compare requests on weekdays and weekends. This resulted in a total analysis of 1548 requests for the aforementioned four modalities.

Fluoroscopy and interventional procedures were excluded due to an insufficient number of these investigations being performed during this time period. The reports for echocardiography and vascular ultrasound studies were often filed in the patient's paper notes rather than on CRIS, so these too were excluded from review.

The clinical requests of eligible studies were evaluated for relevant localisation and whether there was a specific question to be answered. The availability of previous imaging on CRIS was recorded, and also if relevant medical or surgical history was evident from previous imaging, whether this had subsequently been mentioned in the latest request.

Aspects of medical or surgical history were deemed "relevant" if they might feasibly aid or alter the practitioner's report if included in the request. It was necessary to categorise these as follows: surgery in the region examined, medical condition in the region examined, medical condition out of region examined, cancer in region examined, and cancer out of region examined.

Subgroup analysis was undertaken comparing the quality of requests for different imaging modalities, as well as comparing performance in emergency and inpatient departments, and assessing for differences between weekend and weekday data collected.

The Z test was selected as the most appropriate statistical tool to analyse the dataset for significant differences between these subgroups. From the generated Z scores, p values were obtained with a significance level set at $p < 0.05$.

Results

In total, 1548 imaging requests were analysed. Fig. 1 summarises the evaluation of the total data in relation to the three main questions posed by this study. 1187 (76%) of requests asked a specific clinical question. 673 (43%) required localisation of signs/symptoms and of these, 499 (74%) included this localisation in the request (e.g. site of pain for peripheral plain films). For 1339 (86%) of requests, the patient had previous imaging. Of these, 751 (56%) had relevant previous history available on CRIS, which was then sub-categorised as detailed in the Methods section. 372 (49%) of these cases included this relevant history in the clinical details section of the request form. Fig. 2 illustrates the relative proportions of the various subtypes of past medical or surgical history that were present in the cases analysed. Examples of pertinent clinical history omitted from requests were: bowel resection for malignancy not mentioned on abdominal radiograph request and previous brain surgery not mentioned on CT head request.

Of the total number of requests in the study, 831 related to in-patients and 717 were from the emergency department (ED). There was no statistically significant difference between these two departments in regards to the inclusion of a clinical question in requests. However, ED requests were shown to contain localisation, if required, significantly more frequently, with a figure of 348 out of 429 (81%), compared to 151 out of 244 (62%) for in-patient requests ($p < 0.05$). Conversely, in-patient requests were found to more often include relevant clinical history if this was available on CRIS. This was the case for 285 out of 534 (53%) in-patient requests compared to 87 of 217 (40%) ED requests ($p = 0.00096$).

The modalities were split into two subgroups: plain film (1104 requests) and higher order imaging which combined ultrasound, CT and MRI (444 requests) to compare quality. Higher order imaging requests were significantly more complete in relation to each of the three evaluation points when contrasted with plain film requests. 389 (88%) higher order imaging requests included a clinical question, compared to 798 (72%) plain film requests ($p < 0.05$). 159 (83%) higher order imaging requests requiring localisation included this in the request, compared to 340 of 482 (71%) for plain film ($p = 0.0007$). 151 of 224 (67%) higher order imaging requests with relevant clinical history available on CRIS included this in the request, compared with 221 of 527 (42%) for plain film ($p < 0.05$).

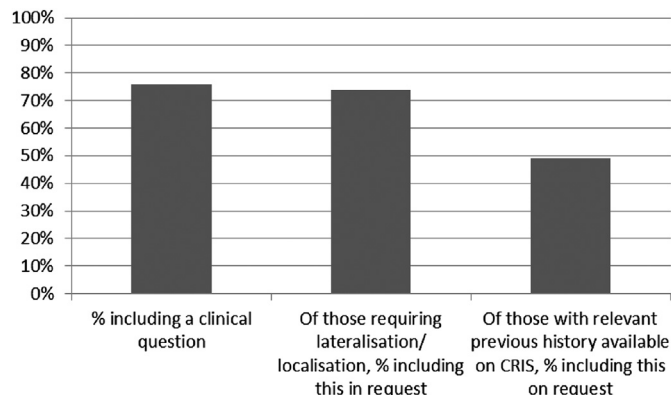


Figure 1. Summary of total data for all radiology requests analysed.

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