

# Radiological Error – An Early Assessment of Departmental Radiology Discrepancy Meetings

## Abstract:

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## Abstract

This study reviews cases discussed at radiology departmental discrepancy meetings and retrospectively determines patterns of radiological error. All cases discussed since the inception of our departmental discrepancy meetings (20-month period) were reviewed. Discrepancies were classified according to the RADPEER score. The imaging method from which the discrepancy arose was recorded. An attendance log at all meetings was kept. 111 discrepancies were identified in 104 patients. 52 (46.85%) of the 111 discrepancies arose in relation to plain film radiography, 46 (41.44%) to CT, 11 (9.9%) to magnetic resonance imaging, and 2 (1.8%) to nuclear medicine examinations. Several repeating discrepancies were identified. Discrepancy Meetings facilitate collective learning from radiology discrepancies and thereby improve patient safety. They provide radiologists with the invaluable opportunity to reconsider current practice and when indicated to change and improve practice. The majority of discrepancies are due to false negative interpretation and occur primarily in plain film and CT reporting.

## Introduction

Discrepancy in radiology is defined as a difference in opinion between the original interpretation of a study and the interpretation at review representing a significant difference in diagnosis, which may affect patient care. Potential causes of a reporting discrepancy include: inadequate, misleading or incorrect clinical information, poor imaging technique, excessive workload or poor working conditions, observation / interpretation errors and ambiguity of wording or summary of report. Radiological interpretation is not an exact science. It involves decision making under conditions of uncertainty and a certain degree of error is inevitable and is well-recognised

A National Quality Assurance Program in Radiology has been set up by the Faculty of Radiologists, Royal College of Surgeons Ireland in collaboration with the National Cancer Control Program (NCCP) and the HSE's Directorate of Quality and Clinical Care to provide guidelines for practical and implementable quality assurance measures. In conjunction with existing local quality systems, this will enable each hospital to monitor and evaluate their own performance in an effort to improve patient safety. The Quality Assurance program includes guidelines on discrepancy meetings, which serve as a non-judgmental way for groups to collectively learn from discrepancies made in the past so that they do not occur again. Radiologists are currently being encouraged to hold meetings where cases involving radiological discrepancy are discussed. There is evidence that discrepancy rates can be reduced following establishment of a departmental discrepancy meeting. In spite of this, many radiologists and institutions do not engage in such practice. Mankad et al. showed that out of 301 radiologists surveyed at the Radiological Society of North America annual meeting 2009 only 178 (59%) stated that their department held regular discrepancies meetings suspect this percentage to be lower in Ireland.

Despite the undeniable importance of learning from discrepancies, there is a paucity of literature available dedicated to the review of radiological discrepancy. Brady et al. recently published a paper concluding that errors are inevitable, in medicine as in life, and the concept of necessary fallibility must be accepted. Their paper explores the concepts of error and discrepancy in radiology and outlines a graduated approach to the management of perceived or identified errors or discrepancies in radiological practice. Quantification of the absolute number of discrepancies is practically impossible. Nevertheless we describe our local experience in the process of radiological discrepancy reporting as a tool for overall national quality improvement.

## Methods

All discrepancies presented arose during work performed at a busy academic training institution with all advanced diagnostic radiological imaging modalities, including a Positron Emission Tomography/Computed Tomography (PET/CT) scanner, two 64-slice CT scanners, two 1.5T Magnetic Resonance (MR) scanners, 2 Single-Photon Emission Computed Tomography (SPECT/CT) scanners, Ultrasound (US) and a (research) 3T MR scanner. Consultants or Specialist registrars reported all of the imaging studies. A small proportion of plain film and ultrasound imaging were reported independently by Specialist registrars but all CT, MRI and intervention were directly reported by a consultant or checked by a consultant prior to issuing a formal report.

All consultants in our institution contribute to the general radiology workload whilst maintaining complimentary specialist interests, and all radiologists are encouraged to contribute cases to the discrepancies meeting. Suspected discrepancies are chosen for discussion at the meeting at the discretion of the contributing radiologist, usually on the basis of perceived clinical importance and / or educational value. Cases are submitted to a convener, who presents all of the cases submitted anonymously and following open discussion, provides feedback to the reporting radiologist, with a summary of the discussion at the meeting. Cases were originally submitted in paper format into a discrepancy box but are currently submitted digitally. Mammograms are reported by a small number of individuals in our institution who operate a dedicated quality assurance program. Discrepancies from this source are, therefore, not discussed. The Royal College of Radiologists Standards for Radiology Discrepancy Meetings recommend that minimal individual attendance should be at least 50% at all meetings held and that the minimum frequency of meetings should be at least every 2 months. Figure 1 shows the attendance at and dates on which our discrepancy meetings were held.

We categorized our discrepancies into false-positive discrepancies, false-negative discrepancies, and misclassifications. A misclassification occurred when an abnormality was appreciated but ascribed to the wrong diagnosis, for example, a femoral hernia was called an inguinal hernia. Discrepancies were divided into the following subgroups; primary neoplasms, metastatic disease, fractures, mal-positioned hardware, vascular lesions, solid non-neoplastic lesions and miscellaneous. Discrepancies were also classified by the examination method from which they arose and each specific discrepancy was analyzed so that specific recurring discrepancies could be identified and collated. From the discrepancy meeting dated April 2011 onwards, the new proposed RADPEER scoring system was introduced. RADPEER is defined as a radiology peer-review process developed by the American College of Radiology. The accuracy of prior reports is scored by the current interpreter(s) of the study using a standardized, 4-point rating scale. Table 1 illustrates the scoring system we used. We chose the proposed new RADPEER scoring system because we feel it is an improvement on the original system, as it maintains the same system of numbers for scoring but makes the categories clearer. In addition, it gives radiologists the option to give opinions concerning the clinical significance of discrepancies.

Figure 1

## Results

111 discrepancies (109 (98.2%) false negative, 2 (1.8%) misclassifications) were identified in 104 patients. When classified according to mode of imaging, 52 (46.85%) of 111 discrepancies arose in relation to radiography, 46 (41.44%) to CT, 11 (9.9%) to MRI, and 2 (1.8%) to nuclear medicine (PET/CT and Isotope bone scan) examinations. 168,881 radiological examinations were performed in our institution in 2011. Table 2 illustrates the relative number of discrepancies presented relative to the total number of scans performed in each imaging modality.

Analysis of the false negative discrepancies identified that 4 patterns arose repeatedly during CT reporting. These involved 4 cases of gastrointestinal tract tumour, 2 vascular lesions, 5 significant bone lesions and 4 omental metastatic deposits that were missed. When categorized into subgroups, there were 21 (18.9%) missed primary neoplasms, 25 (22.5%) missed cases of metastatic disease, 32 (28.8%) missed fractures, 4 (3.6%) cases involving mal-positioned surgical hardware, 6 (5.4%) vascular lesions, 9 (8.1%) solid non-neoplastic lesions and 14 (12.6%) miscellaneous discrepancies. Analysis of the RADPEER scores assigned to discrepancies presented at meetings from April 2011 is shown in Figure 2. Overall we had 8 (14.28%) 4b discrepancies, 1 (1.78%) 4a discrepancy, 16 (28.57%) 3b discrepancies, 8 (14.28%) 3a discrepancies, 14 (25%) 2b discrepancies and 9 (16%) 2a discrepancies. This translates to 38 clinically significant discrepancies and 18 discrepancies deemed to be not clinically significant.

Figure 2: RADPEER Score

### Discussion

In 2000, an organization with a memory<sup>10</sup> by the Department of Health, NHS described how increasing patient safety by reducing error is a key priority of major health services. The Royal College of Radiologists responded to this with the publication of 'To Err is Human: the Case for Review of Reporting Discrepancies' in 2001, recommending that discrepancy meetings form part of the process of audit within a department of clinical radiology. Case collection for discrepancy meetings will always be prone to error. It is not possible to collect absolutely every discrepancy, minor difference of opinion or unexpected outcome that occurs. Threshold for case submission varies from person to person. On this basis, we encourage all radiologists working in our department to submit all discrepancies. Our experience has shown that cases are more likely to be nominated for discussion if they are perceived to have clinical importance or educational value. This introduces sampling bias. False-positive discrepancies for example tend to be under-reported because they are often perceived to be less important than abnormalities that are missed. This inevitably skews the proportion of discrepancies attributed to more serious pathology and higher RADPEER scores. Another cause of sampling bias is the variable chance that an examination will be reviewed. CT and MRI studies are often reviewed for presentation at multidisciplinary meetings, so these discrepancies may be more likely to be noticed and presented in discrepancy meetings. Repeat radiographs for persisting pain may also explain why missed fractures are a common source of recognised discrepancy. Selection bias is also inherent to all discrepancy meetings. If only one radiologist interprets a particular type of examination then there is potential for their discrepancies to remain undiscovered. Ultrasound discrepancies also tend to be under-represented in discrepancy meetings compared with more easily demonstrated plain film, CT and MR images.

Our institution uses the proposed new RADPEER scoring language to formally grade our discrepancies as to their clinical importance. Judging the clinical significance for the patient can be problematic. Potential impact and actual impact on patient management are different. The situation where clinical impact is solely determined by the imaging report is very different from the setting where many different clinical factors (including other forms of imaging) feed into the clinical decision-making process. Therefore our RADPEER score is generated after a discussion about the perceived severity of the discrepancy in combination with the likelihood of the discrepancy having a clinical impact. Consensus can be difficult to achieve. Several factors are responsible for this: the clinical context of the case, the clinical information provided on the radiology request form and the clinical weighting imparted by an individual radiologist on a specific finding.

This is one of very few studies in the literature of radiological discrepancies, in which the new proposed RADPEER scoring language which grades discrepancies according to clinical importance is used<sup>9</sup>. McCreadie et al. believed that errors could not be formally graded as to their clinical importance because the ultimate impact of a discrepancy is often unclear at the time it is discovered. We believe that the determination of clinical significance does not have to be a difficult process based on absolute outcome measures. Instead, a general assessment of the likelihood of impact of the discrepancy on patient care is adequate. We think that assessing the clinical significance is beneficial because it converts the original RADPEER scoring system from a scoring system based on standards of care to an outcomes-based system, more in line with other peer-reviewed systems described in the literature<sup>13-15</sup>. In the current climate of emphasis on patient safety, this could perhaps become a more durable product<sup>16</sup>. Double-reading of radiological examinations in an attempt to reduce discrepancy rates is standard practice in mammography screening and the literature contains several small studies suggesting that similar benefit may be gained from the double-reading of other types of examination<sup>17,18</sup>. This is not a realistic solution however. The workload issues faced by most radiology departments make it impossible to resource significant double-reporting activity.

The general perception in our department is that the introduction of regular discrepancy meetings has been a positive development. Our meetings are performed in a serious yet non-confrontational manner. Open discussion is promoted. Anonymity of all cases and involved radiologists is maintained to prevent 'naming, shaming and blaming'. Our meetings are intended to be educational exercises thereby promoting open submission and discussion of cases. In conclusion, Fitzgerald stated that 'errors fall into recurrent patterns' and that 'there needs to be greater emphasis on error traps in radiological teaching, research and publication'. We agree and believe that it is essential to regard discrepancies as a motivation to learn. Learning from experience to prevent future recurrences is one of the cornerstones on which clinical governance is built. Regular discrepancy meetings facilitate collective learning and thereby improve patient safety.

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