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SHORT COMMUNICATION

Clinical audit of the completion of CT scan request forms

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Objective: To pilot study an audit looking at whether CT scan request forms are completed to an appropriate level. This was based on the adequacy of the detail provided and the use of abbreviations based on local trust guidance.

Methods: 60 CT scan requests were retrospectively analysed at University Hospital South Manchester. The following factors were considered: clinical information provided, the offering of a differential diagnosis and use of abbreviations in requests.

Results: Of the scan requests analysed, 44 (73%) were adequately completed according to the criteria set. The adequacy of requests and use of appropriate abbreviations varied between the types of scan being requested.

There were 59 different abbreviations used in 34 of the requests (57%). Of these, only two (3%) were considered inappropriate.

Conclusion: There is still room for improvement in the completion of CT scan requests at University Hospital South Manchester. The poor completion of the forms and use of poor abbreviations can have a detrimental effect on the reporting and therefore, care of the patient. It is important that this problem is tackled appropriately.

Advances in Knowledge: There is scope for improvement in the completion of CT request forms. This audit highlights this issue and provides the basis for implementing larger studies looking at completion of radiological request forms.

INTRODUCTION

CT request forms are a key method of communication between physicians and radiologists. They are used to request a CT scan with a subsequent report from a specialist in radiology, often to aid in making a diagnosis.¹ With medical imaging becoming ever more frequent and readily available, from both a medical and legal view, it is of paramount importance that request forms are appropriately filled-in. Medically, it has been shown that the clinical information can be influential in the radiologist's final report, and good clinical information has shown to be beneficial in leading to more accurate reporting and therefore in making the correct diagnosis.^{2,3} Legally, the Ionising Radiation (Medical Exposure) Regulations 2000 states that all exposures to radiation must be justified and optimised.⁴ With adequate clinical information for the request, the radiologist is then able to confirm this.

Whilst there are no formal NICE guidelines, guidance from The Royal College of Radiologists suggest that "Reasons for the request should be clearly stated and sufficient clinical details supplied to enable the imaging specialist to understand the particular diagnostic or clinical problems to be resolved by the radiological

investigation". Further guidance from the College states that the reporter should have knowledge of commonly used medical abbreviations.⁵

METHODS AND MATERIALS

This audit was performed retrospectively and assessed the first 15 CT head requests, first 15 CT chest requests, first 15 CT abdomen requests and the first 15 miscellaneous requests not falling into one of these categories (CT other) from the start date of the audit.

Once the request forms that were going to be evaluated have been identified, they were graded according to the request form criteria taken from information given at the Foundation Doctor induction. Each form was analysed according to three criteria on a yes or no basis of whether the information was present. The selected criteria being:

- (1) The presence of background clinical information.
- (2) The provision of a question to be answered or differential diagnosis.
- (3) The use of appropriate abbreviations (if included).

The presence of background clinical information and the offering of a differential diagnosis were relatively simple to categorically classify yes or no dependent on whether

it was present or not. Appropriate abbreviations were harder to grade due to subjectivity, and often dependent on experience. It was decided if the abbreviation was beyond the knowledge of a medical student in the clinical years of training, two radiologists of registrar level and above would be consulted. If they unanimously, and independently, knew what was meant by the abbreviation it would be classified as appropriate.

RESULTS

The results consisted of 60 data sets which were then analysed. These requests came from 19 different departments, which are linked to the requesting physician on the electronic request form.

Of the requests; 44 (73%) were considered adequate, 13 (22%) insufficient in one criterion and 3 (5%) insufficient in two criteria.

Of the 60 data sets, a differential diagnosis or question to be answered was posed in 55 requests (92%).

A differential or question to be answered was offered in 100% of requests for CT other scans and CT abdomens. Requests for CT chest scans had a differential in 93% of requests, this compares to CT head requests where only 73% of requests had a question to be answered or differential.

There were 59 abbreviations over 34 requests. The most common abbreviation seen was "SOB" for shortness of breath, which was used six times. Other common abbreviations included LOC, loss of consciousness, and PE for pulmonary embolism, being used four and times respectively. Of the 59 abbreviations, 2 (3%) were considered inappropriate for not conveying clearly what was meant, which lead to a detrimental effect in interpreting the request.

The requests for CT abdomen scans had the highest rate for being adequately filled (87%). Requests for CT other scans had the lowest rate for being adequately filled (67%).

Each of CT head, CT chest and CT abdomen requests had one request form which had been insufficiently completed in two criteria compared to CT other requests, which had no requests that were insufficient in two of the criteria.

Out of all the requests, only eight forms contained references to pathology tests. Of these requests, only two provided values, the others just stated the results were outside normal limits.

DISCUSSION

This audit, looking at whether CT request forms at University Hospital South Manchester have been adequately completed, showed that the majority of requests for CT scans did contain adequate information.

Limitations

As a pilot audit, the main limitation with this audit was both the size and the spread of the sample. With only 60 samples taken across a variety of CT scan requests, it was difficult to build up a clear picture of patterns within requests and be confident of the accuracy of those starting to form.

A key point to consider in forming a follow-up audit is the criterion of "containing background clinical information". In this study, any background information was considered adequate despite the amount detail provided. Across various types of scan, it is difficult to standardise what constitutes as adequate clinical information. Many CT chest scans contained information relating to smoking history, but not all, and a number of CT head requests stated whether consciousness was lost or not in the lead up to the scan being requested. These two pieces of information are good examples that appropriate clinical information is very much dependent on the type scan. This highlights how in future audits, a stringent criteria can highlight particular inadequacies in the request. This will help in making it easier to implement recommendations and strategies to try and resolve any identified problems.

Interpreting the results

Within this sample, the requests for CT head scans had the most inadequate request forms. This was mainly due to the lack of differential diagnosis or question to be answered. Whilst no explicit question was asked in these requests, it could be argued that in a number of the requests for a CT head scan, the question is implied, with the NICE guidelines stating that a CT head scan should be performed for anyone who has sustained head injuries and have developed risk factors.⁶

Abbreviations featured in just over half of requests (57%), with 59 abbreviations in total. The most abbreviations were used in the request for CT Chest scans, 21 abbreviations in 10 requests. Seven of these related to shortness of breath. The rest of the abbreviations were all respiratory related. Request for CT head scans contained the least abbreviations; only six forms (40%)

Table 1. Completion of CT request forms by type

Scan	Adequate	Insufficient 1	Insufficient 2	Differential offered	Requests using at least one abbreviation	Total abbreviations
CT head	10 (67%)	4 (27%)	1 (6%)	11 (73%)	6 (40%)	9
CT chest	11 (73%)	3 (20%)	1 (6%)	14 (93%)	10 (67%)	21
CT abdomen	13 (87%)	1 (6%)	1 (6%)	15 (100%)	9 (60%)	15
CT other	10 (67%)	5 (33%)	0 (0%)	15 (100%)	9 (60%)	14
Total	44 (73%)	13 (22%)	3 (5%)	55 (92%)	34 (57%)	59 (2 inappropriate)

contained a total of nine abbreviations, four of them being in the same request. The main three abbreviations used were ICH (intracranial haemorrhage), SAH (subarachnoid haemorrhage) and LOC (loss of consciousness).

Interestingly out of 60 request forms, only 8 included any reference to pathology tests and of these, only 2 included values when referencing the tests. Whilst not a factor in the grading of adequacy in this audit, it is an interesting point to consider. Radiologists are trained doctors and including test results can aid them in their forming of a diagnosis alongside the imaging. Reasons why requesting doctors do not routinely include test results could be indicative of attitudes towards the requests and doctors views that radiologist merely report what they can see on the scan.

CONCLUSION

To conclude, at University Hospital South Manchester a large proportion of CT request forms are filled in adequately. However, there is room for improvement in the completion of such requests. Before deciding on how to appropriately ensure this, further inspection of deficiencies need to be examined.

This would be best done by reaudit. By taking the discussed limitations into consideration, standards could be improved. The recommendation would be to focus on one type of scan. This would allow for a specific set of criteria could be applied. As

talked about previously, criteria relevant to that particular scan would allow for a more in-depth analysis of the clinical information present. If the analysis of appropriate abbreviations is also included, the system of a trainee's knowledge worked sufficiently.

For improving the compliance of the appropriate filling in of request forms, tackling the root of the problem is important. Through mandatory induction and training, a doctors' knowledge of what is needed on radiological request forms and an understanding of why it is important for aiding a radiologist could lead to a greater understanding and therefore an increase in standard.

The same strategy could also lead to a reduction of inappropriate abbreviations. Another way of addressing the problem is to make use of the electronic request system. By implementing a spelling and grammar checker on the electronic request form which would mean requests could not be sent off until they fulfilled these checks. Approved common or standard medical abbreviations could then be added to the spell checker dictionary by an approved administrator, forcing all requesting physicians to take the time to ensure their requests were appropriate.

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REFERENCES

1. Royal College of Radiologists. iRefer: making the best use of clinical radiology. *iRefer*. 2015. Available from: <https://www.rcr.ac.uk/publication/irefer-making-best-use-clinical-radiology-eighth-edition> [accessed 14 March 2018].
2. Leslie A, Jones AJ, Goddard PR. The influence of clinical information on the reporting of CT by radiologists. *Br J Radiol* 2000; **73**: 1052–5. doi: <https://doi.org/10.1259/bjr.73.874.11271897>
3. Dalla Palma L, Stacul F, Meduri S, Geitung JT. Relationships between radiologists and clinicians: results from three surveys. *Clin Radiol* 2000; **55**: 602–5. doi: <https://doi.org/10.1053/crad.2000.0495>
4. Department of Health. The Ionising Radiation (Medical Exposure) regulations (IRME) 2000–radiological considerations. *J Bone Joint Surg Am* 2000; **84**: 781–2.
5. Royal College of Radiologists (Great Britain). *Faculty of Clinical Radiology. Board. Standards for the reporting and interpretation of imaging investigations*. 2006. Available from: <http://www.rcr.ac.uk> [accessed 14 March 2018].
6. National Institute of Health and Care Excellence. *Head injury: assessment and early management | Guidance and guidelines | NICE*. 2018. Available from: <https://www.nice.org.uk/guidance/cg176> [accessed 14 March 2018].