

The importance of accurate clinical information in requests for radiological examinations: a comprehensive analysis

Msc. Fluturim NELA

RADIOLOGY TECHNICIAN AT HYGEIA INTERNATIONAL HOSPITAL.
ASSISTANT LECTURER AT EUROPEAN UNIVERSITY OF TIRANA
CORRESPONDING AUTHOR: FLUTURIM NELA
E-mail: fluturimnela@uet.edu.al

Msc. Sulejman HAXHI

RADIOLOGY TECHNICIAN AT AMERICAN HOSPITAL.
ASSISTANT LECTURER AT EUROPEAN UNIVERSITY OF TIRANA

Abstract

Introduction: Requests for radiological examinations are the first step in selecting patients to undergo radiological examinations. The range of radiological equipment, protocols and examinations is very wide. Also, technological developments at very fast rates, as well as improvements in study protocols lead to innovations and updates in medical radiology. The starting point of this literature review study is our personal clinical experience, where we have often encountered requests for radiological examinations formulated without minimal clinical information. **Purpose:** This paper highlights the multifaceted benefits of having ample clinical information in order to select an optimal, widely accepted, and most importantly effective protocol to achieve the required imaging diagnosis. It is also of great importance for clinicians of various fields that their recommendations for radiological examinations can give the expected

answers so that imaging diagnosis together with clinical and laboratory data reach an accurate diagnosis and optimal treatment for the patient. **Methods:** The selected sources were critically evaluated for their relevance and reliability in order to provide a complete perspective on the subject. The literature was selected on PUBMED and Medline. **Results:** From the several study groups that were engaged in finding data we found out that clinical information improved the accuracy of interpretation, clinical relevance, and confidence of reporting; however, reporting time was not substantially affected by the addition of clinical information. **Conclusions:** The findings of this literature review suggest that clinical information has a very positive impact on the correct selection of the examining protocol, on patient management, and most importantly on radiological reporting. It is in the best interest of radiologists and technicians to communicate the importance of clinical information as a very efficient tool for reporting examinations and to respond to radiological examination requests of referring clinicians as rigorously as possible. Further work is recommended to establish standards so that the requirements criteria for radiological examinations are specific, clear, and well-orientated across the wide range of examination techniques found in the diagnostic field.

Keywords: Imaging; medical requirement; clinical information; communication; protocol; radiologic report.

Introduction

It is usually routine for radiologists to interpret imaging examinations and formulate an imaging report using clinical information provided by the referring physicians of the examinations. Clinical information refers to all information that summarizes the medical requirements detailing the patient's clinical situation and should include the current presenting problem, current and past medical history, medications currently taken, possible allergies if any, clinical suspect, and clinical question to answer. The medical request can take one of two routes from the referrer to the radiologist: via the radiology technician, who completes the imaging examination before sending it along with the medical request to the radiologist; or the request is transmitted directly to the radiologist who then reviews the clinical information and selects the imaging protocol to be performed, before transferring the patient and request to the radiologic technician. The radiologist is also able to review clinical information on demand during image interpretation and radiological report formulation.¹

Clinical information is used to give the radiologist a greater understanding of the clinical context of the patient under radiological examination. For all medical



imaging examinations, a referral or request compiled by a specialist physician is required. The request should list the patient's identifying details and indicate the type of examination required.^{2,3} The request should be signed and dated by the referrer.² This allows compliance with radiation safety regulations or aspects of MRI safety and maximum workflow efficiency. When the patient presents to the referrer (clinician), they are evaluated by the specialist and a request for imaging studies is compiled, using information about the patient's health. This information is very useful in radiology, both for technicians and radiologists.

Criteria for the selected literature

During this literature review study, we have included only those studies that clearly emphasized and had to do with clinical information and its impact on radiological examinations, either in terms of reporting accuracy, protocol selection, and examination planning, as well as the importance of this information in the accuracy of imaging diagnosis.

Studies and literature reviewed

In a study undertaken by a group of British researchers, the aim of the study was to determine whether clinical information changes the radiological report of CT. 50 cases were studied and each study was interpreted by two or three consultant radiologists, before and after clinical information was obtained. 19 reports were changed after clinical information was known.⁴

Meanwhile, another study was undertaken to evaluate the impact of questionnaires completed by patients at the time of CT examination for the identification of possible causes of abdominal pain, compared only to the requests of clinicians. Added information from patients was found to have a positive impact and pain was associated with new CT findings other causes of pain were identified and included diverticulitis, cystitis, peritoneal implants, epiploic appendicitis, metastatic bone disease, umbilical hernia, gastritis, and SMA syndrome. In conclusion, this study group concluded that patient questionnaires provide additional clinical history, increase diagnostic yield, and improve radiologists' confidence in CT reporting.⁵

In another case study of 250 clinical requests for examinations, it was seen that the addition of clinical information given to patients by imaging technicians had a positive effect on radiographic interpretation in 2/3 of these medical requests.⁶

In a retrospective study of 315 cases of CT and MRI examinations taken together, to look at the accuracy of the compilation of radiological requests it was found that

the indications of the requests were more likely to be incomplete (256/315, 81%) than discordant (133/315, 42%) compared with the clinician's notes ($p < 0.0001$). The potential impact of inconsistency between clinical information in clinician requests and notes was higher in effect on radiologist interpretation than on scan planning (135/315, 43%, vs. 25/315, 8%, $p < 0.0001$). Thus this study concluded that: Improving the availability of relevant clinical information documented within the imaging examination request is necessary both for the aspect of planning the scan and for an optimal interpretation of the examination.⁷

In a study of subtle fractures, a 10% increase in confidence and accuracy of interpretation was observed when clinical requests had complete written information and when the information was accompanied by a chart that accurately indicated the site of pain.⁸

In a study on "stroke" where the clinical records of 733 patients admitted to the hospital as suspected of "stroke" were reviewed, in the findings of the study it was seen that in the cases where the clear clinical indication for "early stroke" was emphasized, the sensitivity of CT without contrast increased with increasing information and clinical data on patients, and the study emphasized that whenever possible, relevant clinical history should be made available to physicians interpreting emergency head CT scans.⁹

In a prospective blinded study consisting of 50 consecutive patients who were examined in the radiology department for CT scanner. Each study was interpreted by two of three consultant radiologists, before and after familiarization with the clinical information. 19 radiology reports were changed after the clinical information became known to the radiologists. Clinical follow-up was available in 15 cases. In ten cases reports were more accurate after clinical information and in five cases reports were less accurate. In three of the five cases where accuracy was reduced, the clinical information provided by the referring clinicians was incorrect. It was concluded that clinical information influences CT imaging reports and diagnosis. If the information is correct, it has a beneficial effect; if it is incorrect it has a harmful effect. The more complex the investigation, the more important the clinical information. There was a correlation between the interpreting physicians regarding the influence of the patient's clinical information. Therefore, accurate clinical information improves the radiology report. It is the clinician's responsibility to provide this information in an accurate and understandable form.¹⁰

In another study, the effect of clinical information on the accuracy of reporting accident and emergency radiographs was evidenced. Two groups of radiologists were tasked with interpreting a total of 50 sets of radiographs, 30 subtle fractures, and 20 controls. In half of them, the clinical history and the exact location of the pain and problem were given, and in the other half, no such information was given. After an interval of 6 months, the radiographs were viewed again with the amount



of information reversed. Observers were asked to determine the presence of the injury, describe its location, and indicate how certain they were of their diagnosis. Correct diagnosis improved from 72.3 percent to 80.3 percent overall and from 68.1 percent to 81.4 percent in the fracture group. All observers improved their performance as clinical details became known. The results confirm that accurate clinical details improve injury localization and improve imaging diagnosis ratio.¹¹

Even in mammographic examinations, the impact of clinical information has an impact on the improvement and accuracy of radiological reports. Thus, in a study conducted on 240 mammograms with and without clinical information by two different radiologists, it was concluded that the addition and familiarity with clinical information increased specificity and sensitivity in radiological interpretation.¹²

A study that included detailed clinical information coupled with the help of a DWI sequence on MRI made it possible to more accurately identify stroke cases, and it was found that when combined with acute stroke-specific examination such as DWI, the clinical information it did not add much diagnostic accuracy, but on the other hand, the specificity of the two techniques together to investigate acute stroke is reinforced.¹³

Positive results for our thesis were also found in the study of neuropathy of the optic nerve by means of MRI, when the clinical information is detailed, the imaging protocol with FOV and dedicated sequences for optic neuritis such as STIR and contrast sequences made it possible to achieve a greater accuracy in the imaging diagnosis of optic neuritis by MRI with a dedicated protocol. A review of clinical information improved inter-reader agreement, particularly when assessed for contrast enhancement in the optic nerve.¹⁴

Idiopathic pulmonary fibrosis (IPF) is a progressive fibrotic interstitial lung disease (ILD). This study describes the central role of high-resolution computed tomography (HRCT) in the diagnosis of IPF and discusses how communication between pulmonologists and radiologists can be improved to make the interpretation of HRCT scans more effective. Clinical information is important in the interpretation of HRCT scans, as the likelihood that specific radiological features reflect IPF is not absolute but depends on the clinical context, this study highlights that the more clinical information specific to IPF the pulmonologist provides the more imaging diagnosis is closer to accuracy.¹⁵

Discussions

Most of the included studies support the thesis that clinical information has a positive effect on the reporting of radiological reports. Studies have shown

that imaging interpretations improve accuracy, increase the confidence of the radiologist, and provide clearer information to the clinician. The study did not focus much on the effect of reporting time although some studies showed that clinical information had no significant effect on reporting time. Of course, the addition of clinical information and in some cases, laboratory information or assistance with some additional imaging examinations significantly strengthened the confidence of the radiologist in giving the imaging diagnosis. Clinical information also helps radiology technicians in standardizing scanning protocols whether in MRI, CT, or radiographic projections. Patients who were well-informed about their problem or who had with them previous examinations which were added as clinical information, served to increase the confidence of radiological reporting as a result of adding information about morbidity. Clinicians played an essential role in providing clinical information and often in specifying the pathology in chronically ill cases that underwent scanning examinations for further diagnostic or follow-up.

Conclusions

The findings of this literature review indicate that clinical information communicated to the radiologist has a positive impact on the radiology report. These results are relevant for the main consumers of medical imaging, that is, clinicians and not only those who benefit from more accurate imaging information for their doubts and achieve a better diagnostic effect for their patients. These results are also important for radiologists, as they demonstrate the potential improvement that the communication of clinical information can have on the quality of reporting. It is in the best interest of radiologists to communicate the importance of clinical information for radiologic reporting through the establishment of standard criteria to guide clinical practices and requirements from clinicians to the imaging department. They are also important for radiology technicians to establish standard and sometimes specific protocols for certain pathologies or problems in the range of imaging protocols in the menus of advanced imaging devices such as MRI and CT.

References

1. Journal of Medical Radiation Sciences. The effect of clinical information on radiology reporting: A systematic review doi: 10.1002/jmrs.424
2. ARPANSA. Radiation Protection Series No. 14. Commonwealth of Australia, Victoria, 2008.



3. The Royal Australian and New Zealand College of Radiologists. Radiation Safety in Medical Imaging, Version 1.0. Radiation Safety in Medical Imaging [Internet]. 2015. 05 August 2017 [cited 2017 24 September]; 1.0. Available from: <https://www.ranzcr.com/fellows/clinical-radiology/professional-documents/position-statement-on-radiationsafety-in-medical-imaging>.
4. British Institute of Radiology. The influence of clinical information on the reporting of CT by radiologists. Doi:<https://doi.org/10.1259/bjr.73.874.11271897>
5. Doshi, A.M., Huang, C., Ginocchio, L. *et al.* Impact of patient questionnaires on completeness of clinical information and identification of causes of pain during outpatient abdominopelvic CT interpretation. *Abdom Radiol* **42**, 2946–2950 (2017). <https://doi.org/10.1007/s00261-017-1202-8>
6. The Role of Clinical History Collected by Diagnostic Imaging Staff in Interpreting of Imaging Examinations. DOI: 10.1016/j.jmir.2018.07.009.
7. Lacson R, Laroya R, Wang A, et al. Integrity of clinical information in computerized order requisitions for diagnostic imaging. *J Am Med Inform Assoc* 2018; 25(12): 1651–6
8. Sarwar A, Wu JS, Kung J, et al. Graphic representation of clinical symptoms: a tool for improving detection of subtle fractures on foot radiographs. *AJR Am J Roentgenol* 2014;203(4): W429–33.
9. Mullins ME, Lev MH, Schellingerhout D, Koroshetz WJ, Gonzalez RG. Influence of availability of clinical history on detection of early stroke using unenhanced CT and diffusion-weighted MR imaging. *AJR Am J Roentgenol* 2002; 179(1): 223–8
10. Leslie A, Jones AJ, Goddard PR. The influence of clinical information on the reporting of CT by radiologists. *Br J Radiol* 2000; 73(874): 1052–5
11. Rickett AB, Finlay DB, Jagger C. The importance of clinical details when reporting accident and emergency radiographs. *Injury* 1992; 23(7): 458–60
12. The influence of clinical information on the accuracy of diagnostic mammography. DOI: 10.1023/B:BREA.0000025416.66632.84
13. Effect of Clinical History on Interpretation of Computed Tomography for Acute Stroke. doi: 10.1177/1941874418825179
14. Influence of clinical history on MRI interpretation of optic neuropathy. DOI: 10.1016/j.heliyon.2016.e00162.
15. Interpretation of HRCT Scans in the Diagnosis of IPF: Improving Communication Between Pulmonologists and Radiologists. DOI: 10.1007/s00408-018-0143-5.