ORIGINAL RESEARCH

Adequacy of completion of radiology request forms at St. Francis' Hospital of Katete District: A clinical audit in Zambia

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Abstract

Background

Most imaging examinations use ionising radiation which causes biological effects on the body. For this reason, only justified examinations should be requested by adequately completing the radiology request form (RRF) by clinicians. The RRF allows radiographers and radiologists to assess if the benefit outweighs the risk associated with medical radiation exposure. Inadequately or incorrectly filled RRFs leads to unnecessary radiation exposures, imaging errors, and delays in performing the examination. Therefore, this study aimed at auditing the adequacy of completion of general RRFs at St. Francis' Hospital of Katete District in Zambia.

Methods

This was a quantitative study in which RRFs for general radiography from January to December 2020 were audited. Data were collected retrospectively using a checklist from a total of 974 RRFs. The filled-in forms were assessed for completeness of information related to the patient, examination, and referring clinician. Data were analysed using descriptive statistics. The standard of completeness was based on the Royal College of Radiologists (RCR) guidelines requiring all the designated variables completed on the RRF.

Results

Most N=881(90.5%), RRFs were incompletely filled. With regards to patient's identification, the findings revealed N=4(0.5%), N=597(61.3%), N=3(0.4%), and N=2(0.3%) RRFs devoid of patient's name, hospital number, age, and gender, respectively. Regarding the examination, the findings revealed N=3(0.4%), N=68(7%), N=449(46.2%), and N=336 (37%) RRFs devoid of requested examination, clinical history, and level of urgency, respectively. Regarding the referrer, the findings revealed N=135(13.9%), N=173(17.8%), N=472(48.5%), and N=31(3.2%) RRFs were devoid of information relating to the ward, clinicians' name, referring department, and signature, respectively.

Conclusion

This audit reports that most of the RRFs were incompletely filled-in at St. Francis' Hospital. Furthermore, the hospital number, clinical history and level of urgency were the frequently unfilled variables. Overall, there were gaps in completion of RRFs requiring remedying.

Key words: Clinical audit, medical imaging, radiographer, radiology request form, Zambia

Introduction

Medical imaging is essential in the preliminary diagnosis of diseases and injuries, and monitoring of patient treatment¹. Radiographers and radiologists are the main imaging professionals responsible for carrying our various imaging examinations which clinicians request; such as general radiography (plain film), contrast aided studies, diagnostic (US), Ultrasonography Mammography, Computed Tomography (CT), magnetic resonance imaging (MRI) and Radionuclide imaging (RNI), to aid in the diagnosis of diseases and injuries. The referring clinicians request an imaging examination by completing a radiology request form (RRF) and in return, the radiologist or reporting radiographer replies through a written diagnostic report based on imaging output. Akintomide and colleagues², define a radiology request form as a written communication tool used by clinicians to refer patients for medical imaging investigations. In other words, RRF is a legal medical-imaging communication tool.

The provision of all information on the RRF is a radiation protection measure used to protect patients from unnecessary irradiation^{3,4}. In Zambia, the requesting and undertaking of radiological examinations are governed by the Ionising Radiation Protection Act of 2011 of Zambia⁵. Therefore, to monitor the compliance of referring clinicians to the Ionising Radiation Protection Act of 2011 of Zambia, periodical clinical audits must be conducted in radiology departments⁶. The European Society of Radiology (ESR)⁷, defines clinical audit as a tool used to improve the quality of patient care, experience, and outcome through formal review of systems, pathways, and outcome of care against defined standards, and the implementation of change based

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on the results. The cited benefits of clinical auditing include improving the quality of care, promoting the effective use of imaging resources, enhancing the provision and organisation of clinical services, and further professional education and training ⁶⁻¹⁰. Therefore, all healthcare professionals involved in medical imaging, such as radiologists, radiographers, clinicians, nurses, and assistants should participate in clinical auditing to improve the quality of healthcare services. It is a multidisciplinary clinical activity.

Most medical imaging examinations such as general X-rays, Mammography, and CT use ionising radiation. It is known that ionising radiation causes biological effects on the body, such as radiation-induced cancer, skin erythema, hair loss, cataracts, and infertility^{3,11,12}. For this reason, only justified radiological examinations should be requested and performed. The justification principle state that no person shall carry out a medical radiation exposure unless it has been justified by a licensed clinician as showing a sufficient net benefit to the patient³.

The referring clinician has a responsibility to complete all the information on the RRF to allow the radiographer or radiologist to undertake a risk-benefit analysis before exposing the patient to radiation^{4,19}. The Royal College of Radiologists (RCR)13 argues that the importance of adequately completing the RRF is underestimated by referring clinicians. The supply of inadequate information on the RRF can lead to exposure of patients to unnecessary ionising radiation, mistakes in patient identification, delay in returning reports, and reduction in the value of the diagnostic report⁴. The components of the RRF vary depending on the medical facility, but they all have similar basic requirements. According to the Royal College of Radiologist (RCR)⁴ all referrals should include the clinical background, question to be answered (indication), patient demographic data (name, age, address, and phone number), ward or location of the patient, and identity of the requesting clinician where the name and signature are included.

There are three (3) stages to undertaking a medical imaging examination: preparation for the examination, undertaking the examination, and post-examination³. In the context of this audit, the first stage involves the radiographer checking the RRF to ascertain that the examination is justified and adequately completed. In the second stage, the radiographer undertakes the imaging projections required based on the information about the patient supplied on the RRF. The last stage involves the assessment of the quality of images to ensure that all the interest areas, patient identification orientation, information, and anatomical including side markers where applicable, are present for effective radiographic and radiological interpretation. All such audit processes, which sometimes incorporate real time imaging in the second stage, is undertaken to ensure unnecessary irradiation of patients to ionising radiation and improve the quality of imaging services.

General radiography (plain film) is the oldest and most requested and performed medical imaging examination. The inadequacies in the filling of RRF received in the department of imaging at St. Francis' Hospital of Katete, Zambia portrayed a problem that prompted the need to study the extent of the problem. To improve the delivery of imaging services, a clinical audit was deemed necessary on general radiography being the only medical imaging service offered using ionising radiation at St. Francis' Hospital. This study aimed at appraising the adequacy of completion of general RRFs that the Department of Medical Imaging at St Francis Hospital in Katete district, Zambia, received.

Methodology

This clinical audit was conducted quantitatively at St Francis Hospital. St. Francis' Hospital is a third level hospital with a bed capacity of 450 located in the Katete district, Eastern province of Zambia. The services offered at the medical facility include, medical imaging, general surgery, obstetrics and gynaecology, paediatrics, internal medicine, and physiotherapy. The department of Medical Imaging offers general radiography (using both screen-film and digital radiography), and US. Only RRF on general radiography was included in this audit because it was the leading mode of medical imaging at this medical facility. This imaging method uses ionising radiation which causes biological effects on the human body^{3,11,12} unlike US which uses non-ionising radiation. The audit only focused on the completion of information on the RRFs.

Permission to conduct this audit was obtained from St. Francis' Hospital Management through the Medical Superintendent. The study did not involve patients or interfere with the patient's examinations. Personal details of the patients or clinicians on the RRFs were not used. An ethical waiver was also obtained from the National Health Research Authority of Zambia (NHRAZ) to publish the results of the audit.

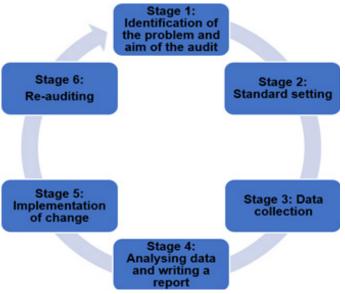


Figure 1: Stages in conducting an audit on completion of Radiology Request Forms

This study was conducted using six main stages of conducting a successful clinical audit: identification of the problem and aim of the audit, standard-setting, data collection, data analysis and writing a report, implementation of change, and re-auditing. Figure 1, below, shows the steps involved in conducting the Completion of RRF Audit.

Identification of the problem and aim of the audit Prior to conducting the audit, the Department of Medical Imaging had observed that most RRFs received were either incomplete or incorrectly filled in. Furthermore, the Quality Improvement Committee (QIC) of St. Francis' hospital had tasked the department of imaging with the responsibility of formulating a QI project. This led to conducting the clinical audit. On account of observed incomplete and incorrectly filled-in RRFs, the department decided to audit the adequacy of completion of general RRFs. In addition, the audit was supported by available literature that confirms that incomplete and incorrect filled-in RRFs negatively impacted the quality of medical imaging services^{2, 4, 19,24}.

Standard-setting

The set standard of achieving all (100%) the RRF information completed or filled-in was based on the Roya College of Radiologists⁴ guidelines and literature^{2,14,15,19,24}. **Data collection**

Data were collected retrospectively in March 2021 using a checklist developed based on the RRF of St. Francis' Hospital (Appendix 1). The checklist contained the following variables: ward, date, patient name, hospital number, age, gender, X-ray examination, indication/diagnosis, clinical history, urgency, referring physician and department, and signature. Collecting data retrospectively was quicker, cheaper, and easier because the old RRFs were already available in the records room within the department of imaging⁶. In addition, this method of data collection by the medical imaging manager (MIM) did not interfere with the workflow and imaging of the patients. The MIM retrieved all available RRFs from the archives for the year 2020, and collected data with the assistance of two members of the QIC using a checklist. A total of nine hundred and seventy-four (974) general RRFs were collected and included in the audit process. The filled- in forms were assessed for completeness of all the variables on the RRF (Appendix 1).

Data analysis and writing a report

Data were analysed on completion of the data collection process using a Statistical Package for Social Sciences (SPSS), version 23. One (1) was assigned if the variable was filled in, and two (2) if the variable was not filled in. Specific information from the SPSS: percentage of incomplete and complete RRFs, and distribution of incomplete RRFs showing the percentage per variable seldom filled in, was generated and displayed in a graph, and tables for better appreciation. The audit report was written and presented to both the QIC and Hospital Management for improvement action.

Implementation of change

The QIC presented the findings to clinicians and other healthcare professionals who refer patients for medical imaging examinations. In addition, the Head Clinical Care (HCC) issued a memo to all referring clinicians emphasising the significance of completing and correctly filling in RRFs. The completion and correct filling in of RRFs was included in the induction programmes for new referring clinicians⁶. The radiographers were also returning incomplete and incorrectly filled RRFs for non-emergency cases via the porters and back to: clinicians, wards and departments, as a strategy to encourage them to do the right thing. RRFs for emergency cases were returned to clinicians after patient had been examined, provided the examination, details of patient, and referrer were provided.

Re-auditing

Re-auditing is planned for the year ending 2022 to assess any improvement following interventional strategies stated above.

Results

A total of 974 of the RRFs met the inclusion criteria of being from the period under review (January to December 2020).

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Distribution (in %) of complete and incomplete forms

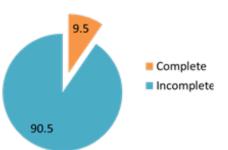


Figure 2: Distribution of incomplete and complete radiology request forms

Table	1:	Distribution	of	RRFs	without	complete	patient
identif	icati	ion information	n			-	-

Category	Number of RRFs (%)
Name of patient	N= 4 (0.5%)
Hospital number	N=597(61.3%)
Patient's age	N=2(0.3%)
Patient's gender	N=3(0.4%)

The findings revealed that a total of N=93(9.5%), out of the 974 RRFs were completely filled, while N=881(90.5%) RRFs were inadequately filled. Figure 1 below illustrates the aforementioned results.

The findings of the study revealed that some RRFs were missing information relating to patient identification. The name of the patient was missing in N=4(0.5%) of the RRFs, while the hospital number was missing in N=597(61.3%) of the RRFs analysed. Also, the slot for the patients' age was left unfilled in N=2(0.3%) of the RRFs, while the gender for the patient was not provided in N=3(0.4%) of the RRFs. Table 1 illustrates the aforementioned results.

Some RRFs were missing information relating to the medical imaging examination. The findings of the study revealed that in N=3(0.4%) of the RRFs, the referring clinicians left the slot for examination requested unfilled. Furthermore, the study findings revealed that N=68(7%) of the RRFs had the slot for the indication left unfilled, while the clinical history was not provided on N=449(46.2%) of the forms. Also, N=336 (37%) of the RRFs revealed that the slot for urgency was left unfilled. Table 2 shows the distribution of RRFs without complete information relating to the imaging examination.

The study also revealed that some RRFs were missing information relating to the referring clinician. In N=135(13.9%) of the RRFs, the hospital ward or location relating to where the patients came from was unfilled.

Furthermore, N=173(17.8 %) of the forms were devoid of the name of the referring clinician. Also, the slot for requesting department was left unfilled in N=472(48.5%) of the forms, while the signature of the referring clinician was not appended on N=31(3.2%) of the RRFs. Table 3 shows the distribution of incomplete RRFs devoid of information relating to the referrer and location of the patient.

 Table 2: Distribution of RRFs without complete information relating to the examination

Category	Number of RRFs (%)
Requested examination	N=3(0.4%)
Indication/diagnosis	N=68(7%)
Clinical history	N=449(46.2 %)
Urgency	N=336(37%)

Table 3: Distribution of RRFs devoid of complete information relating to referrer

Category	Number of RRFs (%)
Ward	N=135(13.9%)
Referring clinician	N=173(17.8%)
Department	N=472(48.5%)
Signature	N=31(3.2%)

Discussion

This study was aimed at auditing the adequacy of completion of RRF related to general radiography (plain film) for 12 months. Akintomide et al.² state that an RRF should meet a certain standard for it to effectively communicate what the clinician requires of the radiology or Medical Imaging department. The findings in this study show that only 9.5% of the RRFs were completely filled, while Rawoo²² discovered that 73% of the RRFs analysed in his study were completely filled. Contrary to these findings, Yousef et al.20 and Abubakar et al.23 discovered that none of the RRFs analysed in their studies were completely filled-in. Incomplete RRF can result in delayed imaging, increased workload to radiographers and radiologists, wrong imaging, wrong diagnostic reports, associated wrong treatment, increased radiation dose to patients and service providers as this context adds to repeated examinations. Repetition of examinations also bring about unwarranted increased service costs and patients time in the healthcare facility^{1,11,19}, thereby rendering low-quality imaging services. Therefore, the need to adequately complete RRFs remain vitally important.

The current study also found that 90.5% of the RRFs were incomplete. Some RRFs were devoid of information regarding patient identification: name, gender, and age. According to Zafar et al.²¹, referring clinicians must provide adequate information to ensure the right radiological procedure is done for the right patient. A study by Zafar et al.²¹ though with a focus on RRFs for CT, found comparable results, where 72.34 % of RRFs in their study were also devoid of complete information relating to the patient identification. Robinson et al.24 and Whitley et al.3 emphasise the need for clinicians to provide adequate information, such as the patient's name. Besides, details such as gender and age are essential to the strengthening of the patient's identity²⁴. This demographic information also helps the radiologist or reporting radiographer in image interpretation and reporting because some diseases are aligned to gender and age group. The findings of this study also revealed inadequately filled RRFs devoid of information relating to the examination.

The study revealed that 46% of the RRFs were devoid of the clinical history. Findings in other two studies^{20,21} showed that the clinical history was devoid in 20% and 99% of the RRFs analysed respectively. The current study revealed the indication or provisional diagnosis missing on 7% of the RRFs, while Zafar et al. (2018) reported 1.33% in this parameter. The RRF should provide information such as clinical history, presenting complaint, and indication or provisional diagnosis to enable the radiographer or radiologist to appreciate the health status of the patient, arrive at decision on examination to be done^{3,23}. This information is used to justify the exposure of the patient to ionising radiation. The specific examination requested should be inscribed on the RRF³. The current study shows that the slot for the level of urgency was left blank in 37% of the RRFs audited. However, the urgency of the medical examination is significant to determine if the patient must be attended to in the shortest possible time compared to other patients in the same queue. It should be mentioned that some medical imaging examinations are performed on a booking basis. Thus, examinations are booked according to the urgency of the case.

This study also showed devoid of information relating to the referrer such as the name and signature of the referring clinician and the patient's location on some RRFs. The signatures of the clinicians were missing on 3.2% of the RRFs. Findings of the previous two studies elsewhere^{15,23}, reported a 9.0% and 40.7% for RRFS devoid of the clinician's signature, respectively. The referrer is required to append signature on the RRF to validate the request^{3,18}. The RRF is a legal document that must be signed to be valid or accepted in a court of law, as lawsuits can arise. Our study found 0.5% of the RRFs devoid of the name of the referrer, while previous three studies elsewhere^{15,19,23}, reported 9.0%, 18%, and 28.7%, respectively. The name of the referrer and the referring department are important in case of a need for further information regarding the patient or follow-up^{18, 21}.

International Atomic Energy Agency (IAEA)9 recommends that all Medical Imaging departments should have protocols in place to determine the pregnancy status of patients of child-bearing age (12-55 years) before any radiological examination that could result in a significant dose to the foetus. This measure goes against exposing the foetus to ionising radiation as the foetus be highly sensitive to ionising radiation and amenable to radiation- induced biological effects^{11,12}. One approach commonly used is the "28-day rule", which states that whenever possible, one should perform the radiological examinations of the lower abdomen and pelvis within the 28-day interval following the onset of menstruation¹⁷. To operationalise this rule, referring medical practitioners should ask the patient and indicate on the RRF the Last Menstrual Period (LMP) to help the radiographer or radiologist to determine the possibility of pregnancy before proceeding with the examination. However, the findings of the current study revealed that the RRF used at St. Francis' hospital (See appendix 1) is devoid of the provision for indicating LMP. Chanda et al.¹⁹ observed this gap as the LMP component was missing in the RRF used for CT examinations at a Cancer Diseases Hospital of Zambia. Additionally, Abubakar et al.²³ discovered that 87% of the RRFs, in their study, were devoid of the mobility status of the patient. Besides the generic standard, the RRFs may, therefore, have additional requirements. Radiology or Medical Imaging Managements, such as pertaining to St. https://dx.doi.org/10.4314/mmj.v35i2.7

Francis' Hospital, should periodically review the RRFs for improvement.

Conclusion

This clinical audit has revealed a remarkable gap in the completion and adequate filling of RRFs at St. Francis' hospital. This picture is not unique as other studies have reported similar findings. There is need to bring awareness on this subject to all healthcare professionals who refer patients for medical imaging examinations, including trainee clinicians to improve the quality of medical imaging services. The RRF clinical audits involving other areas of imaging such as, US, mammography, CT, MRI, and RNI are encouraged. In addition, a national audit can be conducted in Zambia with the aim of standardisation of the RRF and inclusion of all pertinent missing requirements, including date of LMP.

Recommendations

It is hereby recommended that:

1. The St. Francis' Hospital Medical Imaging department holds meetings with referring clinicians to explain the importance of fully completing the RRFs.

2. Filling in of RRFs be included in the induction programme for all new clinicians of trainee clinicians on practical training attachments.

3. The St. Francis' hospital management issues an official communique to all referring clinicians emphasising the significance of fully completing the RRFs.

4. St. Francis' Hospital Management establishes an efficient and amicable mode of addressing inadequately or inappropriately completed RRFs without inconveniencing the clients.

5. RRF to be periodically reviewed to promote inclusion of all the data vital to the intended medical imaging examinations.

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Appendix 1: St Francis Hospital's radiology request form

ST. FRANCIS' MISSION HOSPITAL						
X- RAY REQUEST FORM						
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WAR	D:					
1.						
1.	Patient' Name:					
2.	Hospital Number					
3.	Age/Sex					
4.	X- Ray Examination					
5.	Indication / Diagnosis:					
6.	Clinical History:					
7.	Urgency:					
8.	Requesting Physician /Department:					
9.	Signature:					