

A review of completeness and appropriateness of radiology request and adequacy of clinical information on radiology request at BDF Hospital in Bahrain

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World Journal of Biology Pharmacy and Health Sciences, 2024, 19(02), 374–379

Publication history: Received on 10 June 2024; revised on 22 July 2024; accepted on 24 July 2024

Article DOI: <https://doi.org/10.30574/wjbphs.2024.19.2.0438>

Abstract

A retrospective cohort study of the completeness and appropriateness of the radiological have been performed at the Royal Medical Services - Bahrain Defence Force Hospital (RMS-BDF) between 12-March-2023 and 25-March-2023. In this framework, only two imaging modalities were selected: general X-rays and CT scan. Referrals from within RMS-BDF have been selected due to easy access and availability of all data needed for this audit. The electronic radiological request for these modalities were manually assessed for the following criteria: essential clinical information and other relevant clinical information. All evaluation criteria were listed in a data sheet and the assigned radiologists were asked to evaluate the radiological requests and tick correspondent notices in the data sheets. All data sheets were then sent to a statistician to analyze the data using Microsoft Office excel to generate graphs and figures. The data analysis showed that the accepted CT scan requests were 298 (69%) out of total 421 radiological requests. For the general X-rays, the accepted requests were 855 (40%) requests while the invalid requests were 1269 (60%) requests. According to Bahrain Defence Force Hospital standards, the referrer must provide enough medical information in order to justify the use of the radiation and to provide quality service to the patients. The outcome of this audit can be used to evaluate the compliance and completeness of the radiological request after intervention. Instructing the physicians and training them to fill all required and necessary clinical information.

Keywords: Radiology; Quality Improvement; Radiology Request; Computed Tomography; General X-ray

1. Introduction

Effective means of communication between the referring physicians and the radiologists is of a great importance in order to deliver accurate and efficient services to the patients^{6,13}. Radiology request is one of the essential communication tools used in referring patients for radiological investigations^{7,13}. In addition to radiological examination prescribed, proper clinical information about patients' condition could help the radiologists to suggest other or additional than prescribed if required^{7,12}. Even more, adequate clinical information is not only used to perform the radiological investigation, but also, to justify the use of medical radiation exposure^{1,3,10}. According to the radiation protection regulation of European Union Nations, "the referring doctor has the responsibility to collect all diagnostic information that justifies the requested radiological examination"^{1,3}. Time management is another consideration that is addressed if the radiological request is satisfactory⁸. For example, adequate clinical data and sufficient information like creatinine level before sending the patient for contrast-based studies in CT scans can save time for the patient and staff^{4,6}. The objectives of this audit were to assess the level of completion and legibility of information captured in electronic-

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based medical imaging requests and to determine whether the clinical history provided aided in the final impression/diagnosis. Furthermore, the objective of this audit is to appraise the justification of the radiological examinations.

2. Material and methods

2.1. Study sample

The radiology department at the Royal Medical Services - Bahrain Defence Force Hospital (RMS- BDF) consists of almost all the imaging modalities including Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Hybrid Nuclear Medicine (NM), Ultrasound (US), General Radiography, Interventional Radiography, Fluoroscopy, Dental Radiography, Bone Densitometry (BMD), Hybrid Theater, and Theater C-Arms. The radiology department receives various radiological requests from clinics inside the hospital and from many other hospitals and clinics to perform radiological examinations and procedures. In this audit, referrals from RMS-BDF have been selected due to accessibility and availability of all data needed for this audit. In addition, only two imaging modalities were selected for this audit: general X-rays and CT scan.

2.2. Study criteria

The electronic radiological request for these modalities were manually assessed for the following criteria:

- Essential clinical information: information that must be available in radiology request to validate the request, otherwise, the request should be rejected. This clinical information includes patient identification, gender, date of birth, correct examination required, pregnancy status, clinical problem, checking preliminary radiological examinations, avoidance use of abbreviation.
- Relevant clinical information: optional clinical information but it is important to be included as it improves the quality of services provided for the patient. This information includes referring ward/clinic, allergies, other relevant tests eg. CBC, Cr PTH, previous operations, current medication.

2.3. Tools

- A check mark data sheets containing all essential and relevant clinical information were created. The collected data were then sent to the statistician for analysis using SPSS and Microsoft Office Excel.

2.4. Methodology

A retrospective cohort study of the radiological requests was conducted at the Royal Medical Services- Bahrain Defence Force Hospital (RMS-BDF) between 12-March-2023 and 25-March-2023. The essential radiological information and the relevant clinical information were all listed in a data sheet. The assigned radiologists were asked to evaluate the radiological requests and tick correspondent notices in the data sheets. All data sheets were then sent to a statistician to analyze the data using Microsoft Office excel to generate graphs and figures.

3. Results

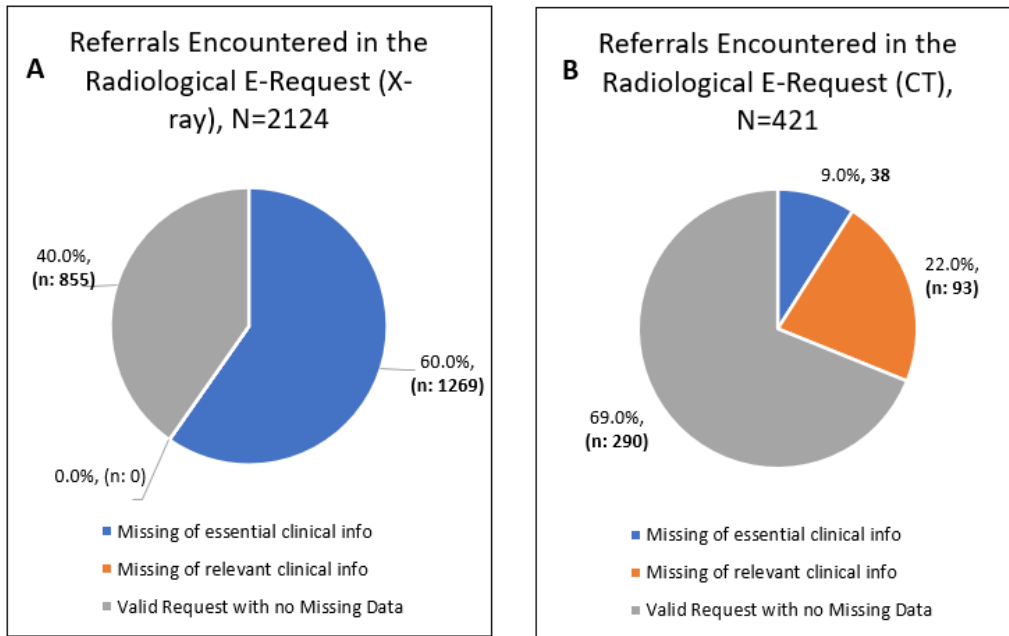


Figure 1 Referrals encountered in the radiological E-request, A: general X-rays N= 2124 and B: CT scan N= 421

A total of two thousand five hundred and forty-five (2545) electronic requests were referred to the radiology department between the period of 12-March-2023 to 25-March-2023, of which 421 were CT requests and 2124 were X-ray requests. From the figure (1, A), it can be seen that the number of valid requests with no missing information from the general X-rays were 855 (40%) requests while the invalid requests were 1269 (60%) requests. From the figure, (1, B), it can be seen that the number of valid radiological requests with no missing data from the CT scan were 298 (69%) out of total 421 radiological requests while requests with missing essential clinical data were 38 (9%) requests and missing relevant clinical information were 93 (22%) requests.

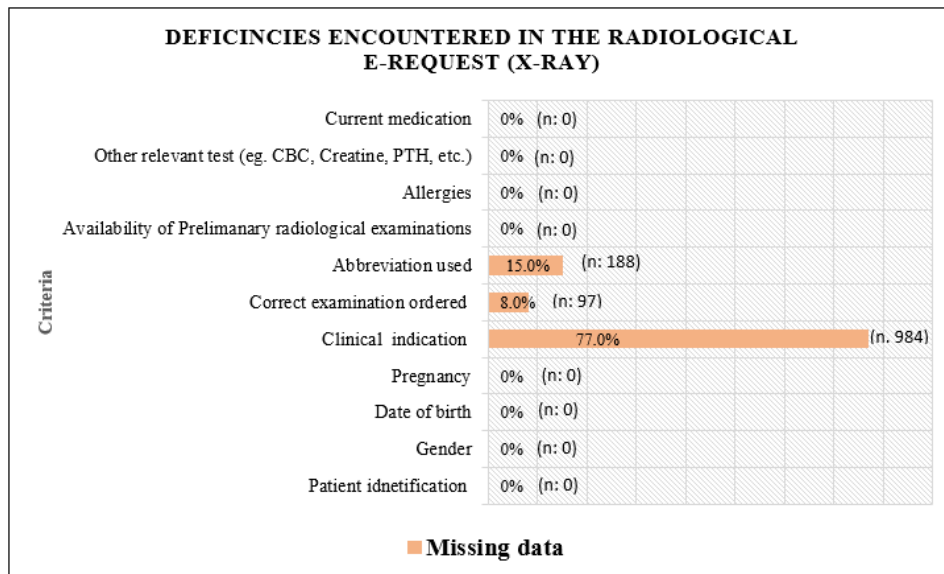


Figure 2 The total number of missing data in each criterion (Total referrals for X-ray = 2124)

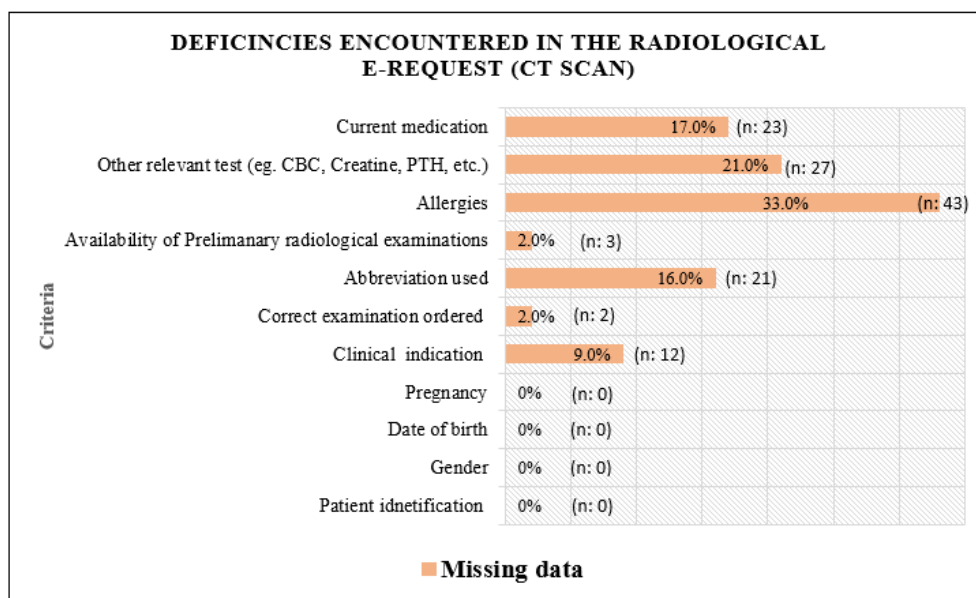


Figure 3 The total number of missing data in each criterion (Total referrals for CT = 421)

The breakdown of the figure (1, A) has been illustrated in figure (2). Figure 2, demonstrates that the highest missing data was found in 984 (77%) requests representing missing clinical indication. However, wrong requests and use of abbreviations were found in 97 (8%) and 188 (15%) requests respectively. On the other hand, other criteria. Similarly, the breakdown of figure 1, B, has been illustrated in figure 3. It can be seen that the major deficiency encountered in the CT request forms was attributed to missing data for the history of allergies 43 (33%) requests. Missing relevant tests performed for the patient but considered important to perform the CT scan were counted in 27 (21%) requests. Use of abbreviation and missing data for current medication were found comparable, 21 (16%) and 23 (17%) requests respectively. Likewise, the wrong requests and not using preliminary radiological examination have been noticed in 2 (2%) and 3 (2%) requests respectively. Other criteria, for example, pregnancy status, gender, date of birth and patient identification were found adequate.

4. Discussion

There is inadequacy seen throughout the world pertaining to the completion of radiology request forms which has been demonstrated in various audits conducted on similar subjects^{1,6,13,14}. These audits reported various themes conforming to the most critical problems in different clinical settings. A medically significant document with legal standing is the radiology request form^{1,12}. It guarantees that the appropriate procedure is carried out on the right patient⁷. Figure 1, demonstrated that more than half of the general X-ray requests referred to the radiology department lack one of the important clinical information which is the clinical indication¹³. These results are much higher compared to a study done in Nigeria which had 30-49% of missing data in their radiology request forms.¹³ Another study by Afolabi et al. in Nigeria had even lower missing clinical information of only 10.4%.¹⁴

According to Bahrain Defence Force Hospital standards, the referrer must provide enough medical information justifying the desired medical exposure. Hence, the radiation practitioner can determine appropriate exposure is being used for the examination. This information is very crucial, to justify the use of ionizing radiation. According to the radiation protection principles, radiation protection consists of two major elements; firstly, is the justification for the use of the ionizing radiation and secondly, the optimization of the exposures. The aim of the radiation protection principle is to avoid the deterministic effects and reduce the stochastic effects^{1,2,3,10}.

For the first element, the justification, these questions must be answered to justify the use of the radiation: is the use of the ionizing radiation going to answer the clinical question? are the benefits for using the radiation outweigh the risks? and lastly are there any other imaging modalities like ultrasound and MRI, could be used to answer the clinical question? There is only one way for the radiologist and the radiographers to answer these questions and that is through clinical indication². It has also been noticed that the use of certain abbreviations is very common. Some abbreviations were very awkward and difficult to find in their full term. Abbreviations could mislead the radiologists and radiographers and consequently they might end up performing wrong or incomplete radiological examinations and procedures⁸.

Performing a wrong or incomplete examination may result in repetition of the radiological examination which is time consuming for the staff and patients⁸. In addition, repeating radiological procedures increases radiation burden, reducing the life expectancy of the x-ray tube and disturb the time management^{1,3,10}. Similarly, the lack of relevant clinical information will result in delaying the radiological services until all complementary clinical information are available⁸. Consequently, compromising the overall quality of service provided for the patients⁸.

5. Conclusion and recommendations

Radiological imaging represents a significant and growing portion of worldwide health care⁶. Medical imaging done right and for the right reasons enables quality medical care that adds value to patients. Insufficient essential clinical information in the radiological requests is considered malpractice and would affect the patient's outcome negatively^{7,8}. Inappropriate or missing clinical information may result in performing wrong procedure, delay in performing the examination and procedures, increase the radiation burden on the patient, reduce the life expectancy of the X-ray tubes and finally would increase the financial cost on the health institutions^{7,8,11}. Several methods have been tried to control the use of radiological imaging and achieve the best medical results for patients without unnecessary costs⁹. The best approach should combine a proactive approach; to be transparent, evidence-based and impartial in the doctor-patient relationship and to provide education and continuous quality improvement. By combining the appropriate use of imaging with associated cost reductions and improved quality through accreditation and accreditation, the highest value is achieved while delivering the best outcomes for patients⁷. One of the major limitations of this audit is that not all medical imaging modalities were included in this audit.

Ordering a radiological image without need is frequently excused as part of due diligence in medical practice. It's important to comprehend the reasons behind doctors' noncompliance with radiological practices by integrating decision assistance into clinical workflow⁷. The outcome of this audit can be used to evaluate the compliance and completeness of the radiological request after intervention. Instructing the physicians and training them to fill all required and necessary clinical information. Furthermore, it is recommended to audit other imaging modalities such as MRI, US, Mammography, Nuclear Medicine etc.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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