

Data Quality of Request Forms for Lumbar Spine Radiography in a Tertiary Care Hospital in Sri Lanka

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Research note

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Abstract

Objective: To assess the data quality of request forms for lumbar spine X-ray received by a tertiary care hospital in the Central Province, Sri Lanka. **Results:** A total number of 185 lumbar spine X-ray request forms received by the Department of Radiology were analysed. Data quality was assessed on the aspects of completeness, accuracy and legibility. Completeness was assessed for different sections separately and altogether eight sections in the request forms were analyzed. Out of the 185 request forms, 138 (74.5%) had complete entries for all the eight sections. Thirteen (7.0%) requests failed to provide the clinical history. Five request forms (2.7%) failed to provide the sex and the age of the patient. Thirty two (17.3%) did not provide details on the region of examination. Accuracy was assessed in relation to the clinical history and region of examination. In the 172 requests, which gave a clinical history, 167 (97.1%) provided relevant clinical histories for requesting lumbar spine X-rays. Five requests (2.9%) provided irrelevant history and five (2.9%) requests contained non-standard abbreviations. Five (2.7%) referrals were not readable by the radiologists. Hence, the data quality of lumbar spine X-ray request forms received by the Department of Radiology needs further improvement.

Introduction

Lumbar spine X-ray requests contribute to a major proportion of X-ray requests received by a radiology department, given that lower back pain has become an important problem worldwide with ever increasing disease burden [1,2]. It is pertinent that the necessary details of the patient are written in the request form, which will enable to obtain the appropriate intended images and to facilitate reporting by the radiologist. It is important to appreciate the fact that, though being a simple investigation, which can be performed at any radiology department with a basic X-ray unit, the lumbar spine X-ray delivers a significant amount of radiation [3-5]. During an Anteroposterior (AP) and lateral lumbar spine X-ray, about 2.20 mSv and 1.50 mSv radiation doses are delivered respectively [3]. Global evidence suggests that in the clinical management of patients with lower back pain, requesting of lumbar spine X-rays occurs more often than recommended [1,6,7]. Thus, it is important to perform the investigation only when it contributes to any alteration in patient management. Furthermore, while requesting a lumbar spine X-ray all the necessary details should be written in the request form by the referring clinician. This will enable to prevent or minimize unnecessary radiological exposure to the patient and also prevents repetitive radiographical imaging. Although there is a rise in the number of radiological investigations performed, studies have shown that the majority does not provide results that alter the patient management [8].

Evidence from different clinical settings suggests that the data quality of X-ray request forms is suboptimal leading to reduced effectiveness of the provision of radiological evidence [8-11]. Thus, Royal College of Radiologists has stated that all the request forms should be adequately and legibly filled in order to avoid any form of misinterpretation of data [9]. Although, there is no universally accepted uniform referral form, all the forms used worldwide have generally accepted components in the referral form [8]. With this regard, apart from patients' clinical details, details pertaining to patients' identification, which includes patients' name, age, clinic number and the referring ward, should be included.

In relation to the clinical details of the referring patients for lumbar spine X-rays, it is important to indicate the duration of symptom/s, history of trauma and sinister symptoms known as red flag symptoms. These will enable the radiologist to guide patients to best imaging modality according to the clinical presentation.

According to the current practice in Sri Lankan context, the referral forms issued by the Ministry of Health, Nutrition and Indigenous Medicine are used for referring patients for lumbar spine X-rays. The information to be filled in this form, which is the 'Requisition for X-ray Diagnostic Examination' (Health: 318) are,

- Date
- Patient name and address
- Age of the patient
- Sex of the patient
- Ward number
- Bed Head Ticket (BHT) number
- Clinical history
- Region and nature of the examination

As highlighted above, all these information should be properly filled when a patient is being referred for an X-ray lumbar spine. In addition, the referring medical officer should endorse the referral form.

As the information provided in the referral forms are extremely useful for generating relevant radiological evidence, it is necessary to assess whether these referral forms are filled appropriately by the referring clinicians. However, thus far, there is no available literature pertaining to the data quality of request forms in the Sri Lankan context. A clinical audit performed in radiology units is a central quality management tool, which is considered as a multi-disciplinary, multi-professional activity integrated into the operational management of the healthcare environment with the purpose of reducing the radiation dose of patients and staff and to implement evidence-based best practices in radiology organizations [12,13]. Thus, the present audit was conducted with the aim of assessing the data quality of request forms for Lumbar Spine X-ray received by a tertiary care hospital in the Central Province, Sri Lanka.

Methods

This audit was conducted at the Department of Radiology in a tertiary care hospital in the Central Province, Sri Lanka. Prior to the commencement of the study, approval from the Institutional Ethical Review Committee and the permission from the Head of the Institution were obtained. The audit was conducted for a period of two months starting from February 2016. All the lumbar spine X-ray request forms received by the Department of Radiology during the stated period were considered for analysis.

Data collection and analysis

Data collection was carried out by the investigators by using a data extraction sheet. Data extraction sheet included gathering information related to all details in the request form as discussed above.

Data quality was assessed on the aspects of completeness, accuracy and legibility.

1. Completeness

All the components of the lumbar spine X-ray request form should be filled; hence, completeness of each component was assessed separately. When considering the region of examination, requesting the necessary X-ray views was taken into account.

2. Accuracy

The accuracy was evaluated with regard to mentioning the correct indication for the examination to be performed. Providing relevant clinical history along with the indication was evaluated. When considering a request for backache, providing the duration of symptoms and presence of red flag symptoms were considered. When multiple regions are given, for each region of interest providing relevant indication and history was considered. Usage of abbreviations was also noted.

3. Legibility

Overall legibility of the referral form was also considered.

The frequencies for each aspect of data quality were calculated with the percentages.

Results

A total number of 185 lumbar spine X-ray request forms were analysed.

1. Completeness

Completeness was assessed for different sections separately and the details of the analysis are summarized in Table 1. Altogether eight sections in the request forms were analysed. Out of the 185 request forms, 138 (74.5%) had complete entries for all the eight sections. It is important to note that 13 (7.0%) requests failed to provide the clinical history. Five request forms (2.7%) failed to provide the sex and the age of the patient. Thirty two (17.3%) did not provide details on the region of examination.

Table 1 Completeness of each section in lumbar spine X-ray request forms (n=185)

	Number of request forms	%
Date	185	100.0%
Patient name and address	185	100.0%
Age of the patient	180	97.3%
Sex of the patient	180	97.3%
Ward number	185	100.0%
Bed Head Ticket (BHT) number	185	100.0%
Clinical history	172	93.0%
Region and nature of examination	153	82.7%
Medical officers' signature	182	98.4%

2. Accuracy

Accuracy was assessed in relation to the clinical history and region of examination. In the 172 requests, which gave a clinical history, 167 (97.1%) provided relevant clinical histories for requesting lumbar spine X-rays. Five requests (2.9%) provided irrelevant history, which included cough (n=3) and hip joint pain (n=2). Five (2.9%) requests contained non-standard abbreviations. These were LBP, AS and OA. Table 2 provides the detailed analysis.

3. Legibility

Five (2.7%) referrals were not readable by the radiologists.

Table 2 Accuracy of details in sections "Clinical history and region of examination" (n=172)

	No. of referrals with accurate entries	%
Correct indication for lumbar spine X-rays	167	97.1%
Adequate Clinical details	64	37.2%
Inclusion of more than one region of examination in the same referral	34	19.8%
Providing the relevant clinical details for each examination (n=34)	13	38.2%
Use of non-standard abbreviations	5	2.9%

Discussion

Inadequately filled X-ray referral forms are still a major problem faced by radiology units in the world. Although there are no standard referral forms, each country has developed its own referral forms, including all the necessary details. The Ministry of Health, Nutrition and Indigenous Medicine in Sri Lanka has issued such forms to all the government hospitals in the country, where the referrals should be filled by the referring medical officer.

Usually, X-ray request form is the only means by which the radiologists gather clinical information about the patient when reporting an X-ray. Thus, properly filled request form with all the relevant clinical details is vital to provide a comprehensive report.

According to the audit findings, all the request forms contained the referral date, the name of the patient and the BHT number. Similar results were obtained for biodata information in an audit conducted in Nigeria [10]. In this study, only 97% provided the date in the request form. In our study, five request forms did not provide information regarding the age and the sex of the patient. Given the fact that certain disease conditions, such as osteoporosis, myeloma, are prevalent among different age groups and sex, it is important to state details with regard to age and sex of the patient.

The major deficiency in relation to the completeness was observed in providing clinical data. Only 64 (37.2%) request forms contained detailed clinical history including the duration of symptoms and presence of red flag symptoms. In a study conducted in Nigeria showed a similar trend with 34.4% providing adequate clinical history [10]. On the contrary, a study conducted in a separate state in Nigeria and Malta with regard to X-ray referrals, revealed 86.9% and 93.0% providing clinical details respectively [9,11].

Furthermore, there were indications that were not related to the lumbar spine and this is one of the serious defects, which should be addressed promptly. Being an investigation, which involves high radiation

exposure, there should always be justification for requesting the investigation.

Use of non-standard abbreviation as the clinical indication is another main defect identified. While using standard abbreviations are justifiable, as these can be read and understood by the medical professionals, the use of non-standard abbreviations always leaves the reporting radiologist in dilemma in understanding the clinical scenario.

Although there are no standard guidelines recommending not to request for more than one region of examination in one request form, when requesting multiple regions of examination, it is important to provide necessary details for each region separately. In this audit, 34 request forms had more than one region of examination to be imaged. However, only 13 gave the relevant clinical details to each region.

In addition, it is important to note that illegible request forms lead to unnecessary time wastage and misleading information, both of which will negatively affect the quality of radiological reporting. Furthermore, illegible request forms may lead to obtaining inappropriate radiographs exposing the patients to unnecessary radiation.

Conclusions And Recommendations

The data quality of lumbar spine X-ray request forms received by the Department of Radiology needs further improvement. The major deficiencies noted were, failing to provide adequate details on clinical presentation and provision of inappropriate indications for the study.

Considering the results obtained in this audit we recommend that,

- Lumbar spine X-ray should be ordered only if there is a clear indication and all the clinical details should be included in the request form.
- Indication and brief clinical history should be written on the request form
- There should not be any irrelevant indications when requesting lumbar spine X-rays.
- Medical officers should state their name and the designation in the request form.
- Usage of non-standard abbreviations should be avoided.
- When multiple regions of examination are requested, the indication for each region should be separately stated in the request form.

Limitations

Given that the audit was conducted over limited time period, the number of request forms analysed are relatively small. However, further observational studies with larger sample sizes and qualitative studies to explore the reasons leading to poor data quality need to be carried out.

Abbreviations

AP: Anteroposterior; BHT: Bed Head Ticket

Declarations

Ethics approval and consent to participate

The study was carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki). Ethical clearance to conduct the study was obtained from the Institutional ethics review committee of the Faculty of Medicine, University of Peradeniya, Sri Lanka.

Consent for publication

Not applicable.

Availability of data and material

The datasets used and analysed during the present study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

MCW, SR and NDW were involved in the conception and design of the study. MCW and SR collected data. NDW and MCW analysed and interpreted data. MCW and NDW prepared the manuscript. SR made substantial contribution to revise the manuscript. All authors read and approved the final manuscript.

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References

1. Somerville S, Hay E, Lewis M, Barber J, van der Windt D, Hill J, Sowden G. Content and outcome of usual primary care for back pain: a systematic review. *Br J Gen Pract* 2008;58:790-7.
2. Ehrlich GE. Low back pain. *Bull World Health Organ* 2003;81:671-6.
3. Simpson AK, Whang PG, Jonisch A, Haims A, Grauer JN. The radiation exposure associated with cervical and lumbar spine radiographs. *J Spinal Disord Tech* 2008;21:409-12.
4. Jarvik JG, Deyo RA. Diagnostic evaluation of low back pain with emphasis on imaging. *Ann Intern Med* 2002;137:586-97.
5. Baker R, Lecouturier J, Bond S. Explaining variation in GP referral rates for x-rays for back pain. *Implement Sci* 2006;1:15.
6. Espeland A, Baerheim A. Factors affecting general practitioners' decisions about plain radiography for back pain: implications for classification of guideline barriers-a qualitative study. *BMC Health Serv Res* 2003;3:1.
7. Tannor AY. Lumbar Spine X-Ray as a Standard Investigation for all Low back Pain in Ghana: Is It Evidence Based?. *Ghana Med J* 2017;51:24-9.
8. Abubakar MG, Ivor CN, Waziri A, Joseph DZ, Luntsi G, Obotiba A, Mathew E. Evaluation of the Adequacy of Completion of Radiology Request Forms in a Tertiary Hospital, Northeast, Nigeria. *Pac j sci technol* 2015;16:219-24.
9. Depasquale R, Crockford MP. Are radiology request forms adequately filled in. *Malta Med J* 2005;17:37.
10. Afolabi OA, Fadare JO, Essien EM. Audit of completion of radiology request form in a Nigerian specialist hospital. *Ann Ib Postgrad Med* 2012;10:48-52.
11. Akintomide AO, Ikpeme AA, Ngaji AI, Ani NE, Udofia AT. An audit of the completion of radiology request forms and the request practice. *J Family Med Prim Care* 2015;4:328-30
12. European Commission. European Commission guidelines on clinical audit for medical radiological practices (diagnostic radiology, nuclear medicine and radiotherapy). Luxembourg: Publications Office of the European Union, 2009. <http://www.efrs.eu/uploads/files/54eb49f5-5608-4f82-b211-7ec250ace4bd.no%20159%20%E2%80%94%20european%20commission%20guide%20lines.pdf>. Accessed 17 Jun 2019.
13. Miettunen K, Metsälä E. Auditor recommendations resulting from three clinical audit rounds in Finnish radiology units. *Acta Radiol* 2017;58:692-7.