

Evaluation of Medical Prescribers' Theoretical Knowledge on Medical Imaging in the Northern Region of Burkina Faso

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Abstract

Introduction: Medical imaging is a medical specialty that involves producing images of the human body and interpreting them for diagnostic, therapeutic purposes, and for monitoring the progress of pathologies. We aimed to assess the theoretical knowledge of doctors and interns in medical imaging in the northern region of Burkina Faso. **Methodology:** This was a descriptive cross-sectional survey based on a self-administered questionnaire. Prescribers' knowledge was estimated based on scores derived from questionnaire responses. **Results:** We collected 106 questionnaires out of 163, *i.e.* a participation rate of 65.03%. The average knowledge score was 81.71% for the contribution of medical imaging to patient management. It was 60.02% for the indications/counter-indications of radiological examinations and 72.56% for the risks associated with exposure to radiation during these examinations. The score was 59.83% for the methods used to select the appropriate radiological examination. As regards the completeness of the clinical and biological information on the forms requesting imaging examinations, the score was 96.65%. Specialist doctors had the highest overall level of knowledge (74.68%). **Conclusion:** Improved technical facilities, good initial and in-service training, and interdisciplinary collaboration will help to ensure that imaging tests are properly prescribed, leading to better patient care.

Keywords

Theoretical Knowledge, Medical Imaging, Northern Region, Burkina Faso

1. Introduction

Medical imaging is defined as: “a medical speciality consisting of producing images of the living human body and interpreting them for diagnostic or therapeutic purposes (interventional imaging) or for monitoring the progress of pathologies” [1]. It is used for diagnosis, in addition to a clinical examination and other investigations, such as biological examinations or neuropsychological tests [2]. Ouahigouya teaching hospital is almost the only public health centre in the northern region of Burkina Faso, with a functional medical imaging department. The number of radiologists is inadequate, as is the infrastructure and equipment. A major challenge therefore remains to be met in terms of the availability and accessibility of human and material resources in medical imaging in this region. Prescription of imaging examinations must comply with strict prescribing rules to enable radiologists to carry out and interpret the results in the best possible way [3]. In addition to cooperating openly with radiologists, prescribers must provide relevant information for the benefit of patients. In Belgium [4] it was noted that out of 150 requests analyzed at the CHU of Liège, relevant clinical information was present in most requests, *i.e.* 93%, whereas at the CHU of Liège, only 23% of the 150 requests for examinations contained these elements. In Burkina Faso, research showed that in 35% of cases, the prescription of medical imaging examinations was inadequate, with only 17% concordance between the clinical hypotheses put forward by clinicians and the results of the examinations. [5]. There was also a lack of awareness of the risks associated with medical imaging, resulting in over-prescribing of medical imaging examinations and radiation exposure to patients and healthcare staff [6]. This study aims to assess the theoretical knowledge of doctors and interns about medical imaging in the northern region of Burkina Faso.

2. Materials and Methods

The study was carried out in Burkina Faso’s northern region health facilities, including the Centre Hospitalier Universitaire Régional de Ouahigouya (CHUR-OHG) and health facilities in the region’s six districts: Ouahigouya, Titao, Seguenega, Gourcy, Yako and Thiou.

This was a descriptive, cross-sectional study conducted over three (03) months, from 1^{er} February to 31 March 2020.

We included in this study all interns from the CHUR-OHG as well as general practitioners and specialists from the northern region of Burkina Faso who were present during the study period and who agreed to complete our questionnaire. The study did not consider radiology specialists, specialists, and general practitioners as well as interns absent during the study period, those we were unable to contact for various reasons, and those who did not give their consent. We also did not include paramedical staff, as the request for an imaging examination is a medical act.

Data were collected using a written questionnaire. All the doctors and interns

included in the study were given the questionnaire, explanations of how to fill in the various questions, and an assurance of confidentiality. Interviews were conducted on an individual basis, and those concerned answered the various questions on the spot. The variables studied were:

- the contribution of medical imaging to patient care;
- medical imaging procedures;
- identification of specialist radiography examinations;
- the basic principles of imaging examinations;
- active or passive participation in radiological examinations;
- indications and contraindications for radiological examinations;
- the risks associated with exposure to radiation during imaging examinations;
- how to choose the appropriate radiological examination;
- the completeness of the clinical and biological information on the medical imaging examination request forms.

Statistical Analysis

The data were entered on a computer and analyzed using Epi info version 6.0 software, and the graphs were constructed using Excel software.

The survey was based on a self-administered and locally-tested questionnaire. Prescribers' knowledge was estimated based on scores derived from questionnaire responses and presented as averages.

Based on the qualitative nature of our variables, individual scores and then average percentage scores were established to facilitate the interpretation of the results. For example, with regard to theoretical knowledge of the contribution of medical imaging to patient management:

- ✓ The individual scores corresponded to:
 - 100% = 5 correct answers;
 - 80% = 4 correct answers;
 - 60% = 3 correct answers;
 - 40% = 2 correct answers;
 - 20% = 1 correct answer;
 - 0% = no correct answer.
- ✓ The average knowledge scores on the contribution of medical imaging corresponded to the average of the individual knowledge scores on this contribution.

Based on these different scores, we have established the following nominal levels of knowledge:

- Good: overall score > 30 (50%);
- Moderate: overall score = 30;
- Poor: overall score < 30.

The data was collected without any obligation, respecting the confidentiality and anonymity of the respondents. We performed a descriptive analysis of the variables collected in the form of proportions. No statistical test was used.

3. Results

3.1. Profile of Respondents

The participation rate in the study was 65.03% (106 questionnaires collected from a total of 163 practitioners). Trainee interns, general practitioners, and specialists accounted for 46.23%, 31.13%, and 22.64% of participants respectively.

3.2. Practitioners' Theoretical Knowledge of the Contribution of Medical Imaging to Patient Care

Most practitioners (56.6%) had an individual score of 80%. **Table 1** shows the distribution of practitioners' individual theoretical knowledge scores on the contribution of medical imaging, according to qualification.

The average score for knowledge of the contribution of medical imaging was 81.71%. Specialist doctors had the highest average score (82.5%).

3.3. Theoretical Knowledge of Medical Imaging Examination Methods According to Qualification

According to qualification, 20.83% of specialist doctors had an individual score of 100%. **Table 2** shows the distribution of practitioners' individual scores for theoretical knowledge of medical imaging examination modalities according to qualification.

The average score for practitioners' theoretical knowledge of medical imaging examination procedures was 80.66%. Specialist doctors had an average score of 82.5%.

3.4. Theoretical Knowledge of the Basic Principles of Imaging Examinations According to Qualification

According to qualification, 51.51% of GPs had an individual score of 100%. The distribution of individual scores for practitioners' theoretical knowledge of the basic principles of medical imaging examinations according to qualification is shown in **Table 3**.

The average score for knowledge of the basic principles of medical imaging modalities was 83.52%. It was 87.27% for general practitioners.

Table 1. Distribution of individual scores for practitioners' theoretical knowledge of the contribution of imaging by qualification.

Practitioner qualifications	Score (%)				Total
	40%	60%	80%	100%	
General practitioner	1	5	19	8	33
Specialist	0	1	19	4	24
Internal trainee	1	10	22	16	49
Total	2	16	60	28	106

Table 2. Distribution of individual scores for practitioners' theoretical knowledge of the contribution of imaging by qualification.

Qualification	Score (%)										Total
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
General practitioner	0	0	1	0	0	1	5	9	17	0	33
Specialist	0	0	0	1	0	2	3	6	7	5	24
Internal trainee	1	1	0	0	2	4	8	12	17	4	49
Total	1	1	1	1	2	7	16	27	41	9	106

Table 3. Distribution of individual scores for practitioners' theoretical knowledge of the basic principles of medical imaging examinations, by qualification.

Qualification	Score (%)				Total
	40%	60%	80%	100%	
General practitioner	0	5	11	17	33
Specialist	2	4	8	10	24
Internal trainee	1	11	20	17	49
Total	3	20	39	44	106

3.5. Knowledge of How to Identify Specialist Radiography Examinations

According to qualification, 54.54% of GPs had an individual score of 100%. **Table 4** shows the distribution of individual knowledge scores on the identification of specialized examinations.

The average score for theoretical knowledge of the identification of specialized radiography examinations was 85.77%. General practitioners had an average score of 87.88%.

3.6. Knowledge of the Indications and Contraindications of Radiological Examinations

According to the qualification, 4.16% of specialist doctors had an individual score of 100%.

The average score for knowledge of indications and contraindications for radiological examinations was 60.02%. Specialist doctors had an average score of 64.17%.

3.7. Knowledge of the Risks Associated with Exposure to Radiation during Medical Imaging Examinations

By qualification, 18.36% of interns had an individual score of 100%. The average score for practitioners' theoretical knowledge of the risks associated with exposure to radiation during medical imaging examinations was 72.52%. Specialist doctors had an average score of 73.33%.

3.8. Knowledge of Participating in Radiological Examinations

According to qualification, 4.16% of specialist doctors had an individual score of

Table 4. Distribution of individual scores for practitioners' theoretical knowledge of the contribution of imaging by qualification.

Qualification	Score (%)								TOTAL
	0%	10%	50%	60%	70%	80%	90%	100%	
General practitioner	1	0	0	2	4	2	6	18	33
Specialist	0	1	1	2	4	3	1	12	24
Internal trainee	0	0	2	3	5	10	9	20	49
TOTAL	1	1	3	7	13	15	16	50	106

100%. The average score for theoretical knowledge in relation to the participation of practitioners in the performance of radiological examinations was 37.97%. Specialist doctors had an average score of 46.25%.

3.9. Knowledge of How to Choose the Right Radiological Examination

According to qualification, 12.5% of specialist doctors had an individual score of 100%. They also had an average score of 65%.

3.10. Knowledge of the Completeness of Clinical and Biological Information on Medical Imaging Request Forms

According to qualification, 91.66% of specialist doctors had an individual score of 100%. The average score for knowledge of the completeness of the biological and clinical information on the medical imaging examination request forms was 96.65%. General practitioners had an average score of 98.18%.

3.11. The Overall Score for Questions

Table 5 shows the distribution of the average overall scores.

4. Discussion

4.1. Knowledge of the Contribution of Medical Imaging to Patient Care

Specialist doctors had the highest mean score for knowledge of the contribution of medical imaging (82.5%). Our results are similar to those of Somé MJM *et al.* [6] who found an average knowledge score on the contribution of medical imaging of 76.19%. The frequent use by specialists of medical imaging examinations in the diagnosis of pathologies and the number of years of practice would explain this. Practitioners' level of theoretical knowledge about the contribution of medical imaging was therefore good, with an average score of 81.71%, higher than 50%.

4.2. Knowledge of Medical Imaging Examination Methods

Specialist doctors have the highest average score for theoretical knowledge of

Table 5. Breakdown of average overall scores.

Qualification	Average (N = 60)
Specialist	44.91
General practitioner	43.54
Internal trainee	41.449
Average score	43.29

medical imaging examination methods (82.5%). Few practitioners (3.76%) had an individual knowledge score for medical imaging modalities of less than 50%. This rate was 9.64% in the study by Somé MJM *et al.* [6].

4.3. Knowledge of the Basic Principles of Imaging Examinations

General practitioners had the highest average score for theoretical knowledge of the basic principles of imaging examinations (87.27%). Very few practitioners (2.83%) had an individual score for theoretical knowledge of the basic principles of imaging examinations of less than 50%. This would be justified by the fact that they received good theoretical training on these principles during their medical training.

4.4. Knowledge of How to Identify Specialist Radiography Examinations

The average score for theoretical knowledge of the identification of specialized radiography examinations among GPs was the highest (87.88%), followed by that of interns (86.53%). This may be explained by the fact that GPs and interns are the first point of contact for patients.

4.5. Knowledge of the Indications and Contraindications of Radiological Examinations

Specialist doctors have the highest average score (64.17%) for knowledge of these indications and contraindications, followed by general practitioners (61.21%). This could be justified by their greater experience in prescribing and could be reflected in the fact that they take these indications into account when prescribing medical imaging examinations.

4.6. Knowledge of the Risks Associated with Exposure to Radiation during Imaging Examinations

Specialist doctors had the highest average knowledge score (73.33%) on this variable. Practitioners' theoretical knowledge of the risks associated with exposure to radiation during medical imaging examinations was good, with an average score of 72.56%, well above 50%. Our result is close to that of Gervaise A *et al.* [7] in France, who found that 70% of practitioners stated that they took account of the risks associated with X-rays when prescribing a scan, and 25% informed the patient. Nikiema Z *et al.* [8] in Burkina Faso showed that 82.9% of their res-

pondents stated that they took the benefit/risk ratio into account when prescribing medical imaging examinations and 9% stated that they had received specific training in radiation protection. Zoungrana B [9] found that 82.92% of respondents took the benefit-risk ratio into account and 60% informed the patient of the risks.

4.7. Knowledge of Prescribers' Involvement in Radiological Examinations

The average knowledge score for participation in radiological examinations was 37.97%, below 50%. The level of participation in radiological examinations was poor, with an average score (37.97%) of less than 50%. Our results corroborate those of Rathan *et al.* [10] who found an average score of 50% of new medical graduates in New Zealand who had never undergone imaging examinations.

4.8. Knowledge of How to Choose the Right Radiological Examination

Practitioners' knowledge of how to choose the appropriate radiological examination was good, with an average score (59.83%) of over 50%. This is confirmed by Somé MJM *et al.* [6].

4.9. Knowledge of the Completeness of Clinical and Biological Information on Imaging Test Request Forms

For this variable, general practitioners had the highest average score of 98.18%, followed by specialists with 97.5%. Our result is supported by Lougué LC *et al.* [11] who found that the clinical conformity criteria were met in 90.6% of cases, with the anatomical region predominating (98.8%). In contrast, Napon M *et al.* [12] showed that the most compliant requests were drawn up by specialists, doctors with a specialist diploma, and general practitioners in 29.47%, 28%, and 22.73% of cases respectively, and concluded that the overall compliance rate was low.

4.10. Breakdown of Average Overall Scores

The overall mean score for practitioners' theoretical knowledge of medical imaging was good at 43.29/60 (above 30).

5. Conclusion

The northern region of Burkina has many practitioners (specialists, general practitioners, and interns), the majority of whom took part in our survey. At the end of the study, it emerged that practitioners' overall theoretical knowledge of medical imaging in the northern region is good. Specialist doctors have the highest average knowledge scores, ahead of general practitioners. The best level of theoretical knowledge is that of the completeness of the clinical and biological information on the forms requesting medical imaging examinations. On the other hand, the score for participation in the active or passive performance of a

radiological examination remains deficient and needs to be improved with a view to better prescriptions in the future. Better communication and continuous training of prescribers on medical imaging are needed to improve their knowledge of this medical specialty.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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