

Original Research Article

Assessment of healthcare professionals' knowledge and practices regarding the appropriate use of medical devices in Morocco: a cross-sectional study

Mahila Lafhal^{1,2*}, Btissam Ait Hmad Oulahsen^{1,2}, Lhoussaine Zarayby^{1,3},
Amal Ait Haj Said^{1,4}, Soukaina Bennis^{1,3}

¹Department of Pharmacy, Faculty of Medicine and Pharmacy, Hassan II University, Casablanca, Morocco

²Department of Pharmacy, 20 August 1953 Hospital, Ibn Rochd University Hospital Center, Casablanca, Morocco

³Department of Pharmacy, Ibn Rochd Hospital, Ibn Rochd University Hospital Center, Casablanca, Morocco

⁴Department of Pharmacy, El Harouchi Hospital, Ibn Rochd University Hospital Center, Casablanca, Morocco

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*Correspondence:

Dr. Mahila Lafhal,

E-mail: mahilafhal@gmail.com

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ABSTRACT

Background: Appropriate use of medical devices (MDs) is essential to ensure quality of care and patient safety. This study aimed to assess healthcare professionals' knowledge and practices regarding the appropriate use of MDs in Morocco and to identify associated factors.

Methods: A descriptive and analytical cross-sectional study was conducted from June 2025 to February 2026 among 116 healthcare professionals in Morocco using an anonymous structured questionnaire. Data were analyzed using descriptive statistics and the chi-square or Fisher's exact test.

Results: Of 116 participants, 35 (30.2%) were pharmacists, 34 (29.3%) physicians, 29 (25.0%) nurses, and 18 (15.5%) other healthcare professionals. Only 26 (22.4%) had received specific training on MDs. Thirty-one (26.7%) could distinguish MD risk classes, 41 (35.3%) knew traceability procedures, and 27 (23.3%) knew incident reporting procedures, while 80 (69.0%) systematically verified MD functioning before use. Specific training was significantly associated with knowledge of risk classes ($p<0.001$), traceability ($p=0.001$), and incident reporting procedures ($p=0.009$). Professional experience was associated with verification of MD functioning ($p=0.006$). Overall, 63 (54.3%) considered MD use moderately appropriate. Lack of training (84.5%), workload (53.4%), and poor quality of some MDs (50.0%) were the main reported barriers. Regular training (86.2%), strengthened biomedical monitoring (69.8%), and standardized protocols (65.5%) were the main proposed improvements.

Conclusions: Gaps were identified in healthcare professionals' training and knowledge regarding MDs. Strengthening training, standardized procedures, and materiovigilance could promote safer MD use in Morocco.

Keywords: Medical devices, Materiovigilance, Healthcare professionals, Training, Traceability

INTRODUCTION

Medical devices (MDs) play an essential role in the preventive, diagnostic, and therapeutic management of patients. According to the World Health Organization (WHO), MDs encompass a wide range of products, from

simple dressings to advanced equipment such as medical imaging devices and implants.¹

Their appropriate and safe use is a major concern for the quality and safety of healthcare services, particularly in healthcare facilities where they are used daily by professionals from various categories and specialties.²

However, the diversity of MD classes and their increasing complexity may make their use more challenging and require appropriate knowledge of their operation, monitoring, and incident reporting. In this context, international regulatory frameworks, particularly those of the Food and Drug Administration (FDA) and the European Union through Regulation (EU) 2017/745 on MDs, place particular emphasis on the safety, risk management, and surveillance of MDs throughout their life cycle. Furthermore, while ISO 9001:2015 provides a general framework for quality management systems, ISO 13485:2016 specifies requirements for quality management systems of organizations involved in the life cycle of MDs, particularly for regulatory purposes.³⁻⁶

In Morocco, MDs are governed by a legislative and regulatory framework that notably establishes a national materiovigilance system and requires the reporting of incidents or risks of incidents associated with their use⁷. The Moroccan Agency for Medicines and Health Products (AMMPS) contributes to the regulation and surveillance of these products.⁸ However, the existence of a regulatory framework alone does not necessarily reflect healthcare professionals' level of knowledge or their implementation of these requirements. In this context, assessing healthcare professionals' knowledge and practices regarding the appropriate use of MDs is particularly relevant. This study aimed to assess healthcare professionals' knowledge and practices regarding the appropriate use of MDs in Morocco, identify associated factors, and determine potential areas for improving practice.

METHODS

A descriptive and analytical cross-sectional study was conducted from June 2025 to February 2026 among healthcare professionals working in different healthcare settings in Morocco. Participants from medical and paramedical professions were recruited using convenience sampling. Participation was voluntary, and responses were collected anonymously.

Data were collected using a structured 14-item questionnaire developed according to the objectives of the study. The questionnaire was distributed electronically, mainly via WhatsApp and email, and was also available in paper format.

The questionnaire collected participants' general and professional characteristics and assessed several aspects related to MDs, including specific training, knowledge of MD classification according to risk level, knowledge of traceability and incident reporting procedures, and the practice of checking the proper functioning of MDs before use. It also assessed participants' perceptions of the appropriate use of MDs in their professional setting, the main factors that could limit their appropriate use, and the measures proposed to improve practices. Multiple responses were allowed for some questions.

Data were analyzed using Jamovi software. Qualitative variables were presented as frequencies and percentages. Associations between qualitative variables were assessed using the chi-square (χ^2) test or Fisher's exact test when the assumptions of the chi-square test were not met. Statistical significance was set at $p < 0.05$.

RESULTS

Descriptive analysis

A total of 116 healthcare professionals working in different healthcare settings across Morocco participated in the study, including pharmacists, physicians, nurses, and other healthcare professionals. Participants had varying levels of professional experience, with those having more than 10 years of experience representing the largest group (Table 1). Most participants (77.6%) had not received specific training on MDs. Only 26.7% reported being able to distinguish between MD risk classes, and 35.3% were familiar with traceability procedures. Systematic verification of the proper functioning of MDs before use was reported by 69.0% of participants. In contrast, only 23.3% were familiar with procedures for reporting MD-related incidents (Table 1).

Regarding the overall use of MDs within their healthcare settings, 54.3% of participants considered their use moderately appropriate, while 36.2% considered it appropriate and 9.5% considered it inappropriate. The main factors reported as potentially limiting the appropriate use of MDs were lack of training (84.5%), workload (53.4%), and the poor quality of some MDs (50.0%). The main measures proposed to improve practices were regular training (86.2%), strengthened biomedical monitoring (69.8%), and the development of standardized protocols (65.5%).

Analysis of associated factors

A statistically significant association was observed between profession and having received specific training on MDs ($p = 0.013$). Pharmacists had the highest proportion of participants who had received specific training, whereas physicians had the lowest proportion (Table 2). Specific training on MDs was significantly associated with the ability to distinguish between MD risk classes ($p < 0.001$), knowledge of traceability procedures ($p = 0.001$), and knowledge of incident reporting procedures ($p = 0.009$). In contrast, no statistically significant association was observed between specific training and systematic verification of the proper functioning of MDs before use ($p = 0.140$) (Table 2).

Professional experience was significantly associated with systematic verification of the proper functioning of MDs before use ($p = 0.006$). However, no statistically significant association was observed between professional experience and knowledge of procedures for reporting MD-related incidents ($p = 0.314$) (Table 3).

Table 1: Descriptive analysis of the variables studied, (n=116).

Variables	N (%)
Profession	
Pharmacists	35 (30.2)
Physicians	34 (29.3)
Nurses	29 (25.0)
Other healthcare professionals	18 (15.5)
Years of professional experience	
<1	8 (6.9)
1-5	34 (29.3)
6-10	19 (16.4)
>10	55 (47.4)
Specific training on MDs	
Yes	26 (22.4)
No	90 (77.6)
Ability to distinguish between MD risk classes (Classes I, IIa, IIb, and III)	
Yes	31 (26.7)
No	59 (50.9)
Partially	26 (22.4)
Knowledge of MD traceability procedures	
Yes	41 (35.3)
No	75 (64.7)
Verification of proper MD functioning before each use:	
Yes	80 (69.0)
No	36 (31.0)
Availability of materiovigilance reporting forms in the department	
Yes	21 (18.1)
No	45 (38.8)
Do not know	50 (43.1)
Knowledge of MD incident reporting procedures	
Yes	27 (23.3)
No	89 (76.7)
Perception of appropriate MD use in the department	
Yes	42 (36.2)
No	11 (9.5)
Moderately	63 (54.3)

Table 2: Association between specific training on MDs and participants' characteristics, knowledge, and practices.

Variables	No specific MD training	Specific MD training	P value
Profession			
Other healthcare professionals	14 (77.8)	4 (22.2)	0.013
Nurses	22 (75.9)	7 (24.1)	
Physicians	32 (94.1)	2 (5.9)	
Pharmacists	22 (62.9)	13 (37.1)	
Ability to distinguish between MD risk classes			
No	54 (91.5)	5 (8.5)	<0.001
Yes	15 (48.4)	16 (51.6)	
Partially	21 (80.8)	5 (19.2)	
Knowledge of MD traceability procedures			
No	66 (88.0)	9 (12.0)	0.001
Yes	24 (58.5)	17 (41.5)	
Verification of proper MD functioning before use			
No	31 (86.1)	5 (13.9)	0.140
Yes	59 (73.8)	21 (26.3)	
Knowledge of MD incident reporting procedures			
No	74 (83.1)	15 (16.9)	0.009
Yes	16 (59.3)	11 (40.7)	

Statistical significance was set at $p < 0.05$.

Table 3: Association between professional experience and selected medical device-related knowledge and practices.

Variables	<1 year	1-5 years	6-10 years	>10 years	P value
Verification of proper MD functioning before use					
No	5 (13.9)	16 (44.4)	5 (13.9)	10 (27.8)	0.006
Yes	3 (3.8)	18 (22.5)	14 (17.5)	45 (56.3)	
Knowledge of MD incident reporting procedures					
No	5 (5.6)	24 (27.0)	17 (19.1)	43 (48.3)	0.314
Yes	3 (11.1)	10 (37.0)	2 (7.4)	12 (44.4)	

*Statistical significance was set at $p < 0.05$.

DISCUSSION

This study highlights gaps in the training and knowledge of Moroccan healthcare professionals regarding MDs, particularly in relation to risk classification, traceability, materiovigilance, and incident reporting. These findings are consistent with several international studies and literature reviews reporting gaps in healthcare professionals' knowledge and practices regarding MDs and materiovigilance.⁹⁻¹² A recent meta-analysis further supports this trend, showing that knowledge of materiovigilance remains limited despite generally favorable attitudes toward incident reporting, and emphasizing the importance of training in improving knowledge and practices.¹³

Analysis by profession showed a statistically significant association between professional category and having received specific training on MDs ($p=0.013$). The differences observed across professional categories may reflect variations in responsibilities and the level of involvement of each profession in MD management. However, the low proportion of trained professionals across all categories highlights the need to strengthen both initial and continuing training programs, in line with recommendations from the literature.¹⁴⁻¹⁶

Healthcare professionals who had received specific training showed better knowledge of MD classification ($p<0.001$), traceability procedures ($p=0.001$), and incident reporting procedures ($p=0.009$). These findings suggest that training may represent an important means of strengthening the knowledge required for the safe use of MDs. This observation is supported by studies showing that educational interventions can significantly improve healthcare professionals' knowledge, attitudes, and practices regarding materiovigilance.¹⁷

In contrast, no statistically significant association was observed between specific training and systematic verification of the proper functioning of MDs before use ($p=0.140$), whereas professional experience was significantly associated with this practice ($p=0.006$). This finding may suggest that experience gained through professional practice contributes to the integration of certain verification practices into routine care. However, professional experience was not significantly associated with knowledge of incident reporting procedures ($p=0.314$), indicating that years of professional

experience alone may not be sufficient to ensure adequate knowledge of materiovigilance reporting procedures.

Regarding perceptions of the appropriate use of MDs, more than half of the participants (54.3%) considered their use within healthcare settings to be moderately appropriate. Lack of training was the most frequently reported factor potentially limiting the appropriate use of MDs (84.5%), followed by workload (53.4%) and the poor quality of some MDs (50.0%). These findings suggest that challenges related to the appropriate use of MDs may not be attributable solely to individual knowledge but may also arise from organizational and resource-related factors. This observation is consistent with the literature, which identifies lack of knowledge and training, time constraints, and organizational difficulties among the barriers to the surveillance and reporting of MD-related incidents.^{18,19}

The main measures proposed by participants to improve the appropriate use of MDs were regular training (86.2%), strengthened biomedical monitoring (69.8%), and the development of standardized protocols (65.5%). These proposals are consistent with the gaps identified in our study and highlight the value of an approach combining the strengthening of healthcare professionals' competencies with improvements in the organization of MD-related practices. The emphasis placed on training is consistent with the literature highlighting the role of continuing training and educational interventions in improving knowledge and practices related to materiovigilance.^{13,19} Strengthening biomedical monitoring and standardizing procedures could also contribute to better management of MD use and surveillance within healthcare facilities.

The gaps identified in this study should also be considered in light of international requirements for MD safety. Major international standards and regulatory frameworks, including those of WHO, Regulation (EU) 2017/745 on MDs, and FDA, place considerable emphasis on safety, traceability, surveillance, and the definition of responsibilities throughout MD life cycle.^{3,4,20} Furthermore, ISO 13485:2016 specifies the requirements for quality management systems of organizations involved in the life cycle of MDs.⁶ Our findings therefore highlight the importance of strengthening healthcare professionals' training, knowledge of traceability procedures, and awareness of materiovigilance within healthcare facilities.

In Morocco, the existence of a regulatory framework for MDs and a national materiovigilance system, together with the regulatory activities carried out by the Ministry of Health and Social Protection and the Moroccan Agency for Medicines and Health Products (AMMPS), reflects the importance given to MD safety and surveillance.^{7,21} However, the gaps observed in our study regarding training, traceability, and knowledge of incident reporting procedures indicate that further efforts are needed to improve information and awareness among healthcare professionals.⁸ These gaps could hinder the optimal functioning of the materiovigilance system, whose effectiveness depends, among other factors, on users reporting incidents and risks of incidents.^{18,21}

From this perspective, coordinated involvement of quality managers, hospital pharmacists, and biomedical teams could help strengthen the implementation of procedures and improve the safe use of MDs. Such an approach appears particularly relevant because lack of knowledge of reporting procedures, uncertainty regarding which incidents should be reported, and organizational constraints have been identified as barriers to reporting MD-related incidents.¹⁹ Furthermore, incident analysis and feedback from previous events are important approaches for identifying the causes of adverse events and preventing their recurrence.²²

Nevertheless, this study has some limitations. The relatively modest sample size and the use of convenience sampling may limit the representativeness of the sample and the generalizability of the findings. In addition, the data were based on self-reported responses and may therefore have been influenced by recall or social desirability bias. Despite these limitations, this study provides data on Moroccan healthcare professionals' knowledge and practices regarding MDs. To our knowledge, published Moroccan data specifically assessing healthcare professionals' knowledge and practices regarding the appropriate use of MDs and their association with specific training remain limited. Available Moroccan studies have mainly addressed the regulatory framework, organization of the sector, traceability, and materiovigilance.²³ Our study therefore contributes to addressing this gap and provides data that may help guide future training programs and initiatives aimed at strengthening materiovigilance in Morocco. Multicenter studies with larger sample sizes and assessments of practices in real-world settings are needed to confirm these findings and evaluate the impact of training programs on the quality of MD management.

CONCLUSION

This study highlights gaps in the training and knowledge of Moroccan healthcare professionals regarding MDs, particularly in relation to risk classification, traceability, and materiovigilance. Specific training was significantly associated with better knowledge of MD classification, traceability procedures, and incident reporting

procedures, whereas professional experience was not significantly associated with knowledge of incident reporting procedures. These findings highlight the need to strengthen initial and continuing training programs on MDs to improve healthcare professionals' competencies, promote a culture of materiovigilance, and enhance the safe use of MDs. A coordinated strategy involving the relevant authorities, healthcare facilities, hospital pharmacists, quality managers, and biomedical teams could contribute to strengthening the appropriate use of MDs, traceability, and materiovigilance in Morocco.

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