



## Original Scientific Paper

# EXPLORING NURSES' KNOWLEDGE, ATTITUDES, AND PERCEPTIONS OF MEDICATION ERRORS IN A GENERAL HOSPITAL IN MALTA – A CROSS-SECTIONAL SURVEY

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## ABSTRACT

**Background:** Medication errors (MEs) continue to pose a significant risk to patient safety despite established safety measures. Nurses are central to administering medications, and their knowledge, experience, and work environment influence both the likelihood of errors and whether they are reported. This study explored nurses' perspectives on MEs, reporting practices, and barriers to reporting in a general hospital in Malta.

**Methods:** A quantitative cross-sectional study was conducted using an anonymous online questionnaire informed by the Theory of Planned Behaviour. Of the 429 nurses invited, 301 completed the survey (response rate 70.2%). The questionnaire addressed the prevalence of MEs, reporting behaviours, knowledge of medications, perceived contributing factors, and attitudes towards reporting. Descriptive and inferential statistics were used to analyse the data.

**Results:** Most nurses (88%,  $n = 265/301$ ) reported having made at least one medication error. Reporting was inconsistent: 54% ( $n = 163/301$ ) had never reported an error, 35% ( $n = 105/301$ ) reported some, and only 11.6% ( $n = 35/301$ ) reported all incidents. The area of work was significantly linked to perceived barriers and reporting behaviour. Nurses in reliever pools (92.6%), medical wards (89.9%), and surgical wards (79.7%) were more likely to feel concerns or barriers about reporting. Reporting practices also varied by area, with lower reporting in paediatric (36.8%) and orthopaedic wards (44.0%) and higher reporting in reliever pools (67.9%). While most nurses valued reporting (89%,  $n = 268/301$ ), only 34% ( $n = 102/301$ ) would

report errors causing no harm, and 78% ( $n = 235/301$ ) were reluctant to report colleagues.

**Conclusions:** The findings reveal that MEs are common and underreported. Knowledge gaps, communication challenges, and systemic issues such as staffing shortages create barriers to safe medication management. Fear of repercussions further discourages reporting, highlighting the need for supportive, transparent practices. Hospitals should foster a non-punitive reporting culture, strengthen training, and improve interprofessional communication. Addressing these challenges can reduce medication errors and enhance patient safety and care quality.

**Keywords:** Medication errors, Error reporting, Reporting barriers, Nurses' knowledge, Attitudes and perceptions, Patient safety.

## INTRODUCTION

Globally, medication-related harm constitutes more than 50% of all preventable harm in medical care, resulting in an estimated yearly expense of €4.5–21.8 billion in Europe (1). Additionally, the World Health Organization (WHO) estimates that medication errors (MEs) are responsible for 1 death per 1 million population; with a population of approximately 447 million in the EU, this equates to around 163,000 deaths per year (2). Drug administration errors are commonly understood as failures in one of the five “rights” of medication administration: the right patient, medication, time, dose, and route (Mula, 2019). However, further literature emphasizes that medication

administration forms part of a broader, multidisciplinary care process; therefore, to ensure safe administration, additional “rights” have been proposed, including right documentation, action/reason, form, and response (3).

Despite ongoing efforts to improve safety through technological and organizational strategies, medication errors continue to occur frequently. The knowledge of nurses, their attitude, and perceptions are significant factors in the occurrence of errors as well as the probability of reporting (4,5).

Local studies in Malta have explored nurses’ perceptions of factors contributing to MEs and barriers to error reporting. A study involving nurses working in medical wards identified illegible medical prescriptions, nurse fatigue, and frequent interruptions as key contributors to medication errors (6). Fear of blame and limitations within the reporting system were reported as major barriers to error reporting. However, this study was limited by a small sample size and the inclusion of nurses from only one specialty. Another local study focused on intravenous medication administration among paediatric nurses (7). The main challenges reported included difficulties with drug reconstitution and dilution, limited access to pharmacists, lack of standardized guidelines, and insufficient training in intravenous medication management.

The increasing recruitment of foreign nurses in Maltese hospitals has introduced greater cultural and educational diversity within the workforce. While this has been associated with positive outcomes, including knowledge sharing and workforce sustainability (8), differences in training backgrounds may influence perceptions and practices related to medication safety. A cross-sectional study conducted in Italy and Malta found that organisational factors, rather than individual nurse characteristics, influenced nursing practices related to medication errors (9).

Recent evidence also suggests persistent underreporting of medication errors due to fear of consequences, lack of feedback, and unclear reporting procedures (10). Despite existing research, there is limited recent evidence exploring nurses’ knowledge, attitudes, and reporting behaviours across multiple clinical areas in Malta. Moreover, the alterations in healthcare systems and workforce dynamics after the COVID-19 pandemic could have impacted medication safety practices. Therefore, updated evidence is needed to comprehend the new issues and reporting habits of nurses in a better way.

This study aimed to explore nurses’ knowledge, attitudes, and perceptions of medication errors in a general hospital in Malta. The objectives were:

- To identify factors that nurses believed contributed to medication errors.
- To explore nurses’ perceptions of barriers to reporting medication errors.
- To identify potential strategies for preventing medication errors.

By examining these aspects, the research aimed to contribute to the existing body of knowledge on patient safety, healthcare quality improvement, and nursing practice.

## METHODS

### STUDY DESIGN

A quantitative cross-sectional study design was employed to explore nurses’ perspectives on medication errors, reporting practices, and perceived barriers to reporting. This study was underpinned by a post-positivist approach, which assumes that reality can be measured objectively, while acknowledging that findings may be influenced by context and participant perspectives (52). The study was also informed by the Theory of Planned Behaviour, which guided the development of the questionnaire and interpretation of nurses’ attitudes, perceived norms, and behavioural intentions related to medication error reporting.

### STUDY SETTING

The study was conducted at a general hospital in Malta and involved nurses working across a range of clinical areas. The online questionnaires were distributed in January and allowed one month (30 days) of data collection (5th January 2024 to the 4th of February 2024).

### STUDY POPULATION AND SAMPLING

The target population included all registered nurses working within the hospital across different clinical areas. A total of 429 nurses were invited to participate in the study. Participation was voluntary, and data were collected anonymously. Of these, 301 nurses completed the questionnaire, yielding a response rate of 70.2%.

A convenience sampling technique was used to recruit participants.

### DATA COLLECTION PROCEDURE

The questionnaire was distributed electronically to eligible participants. Participation was voluntary, and responses were collected anonymously to encourage honest reporting, reduce response bias, and create a supportive environment for nurses to provide accurate information about their experiences with medication errors and reporting practices.

### DATA COLLECTION INSTRUMENT

The study employed a two-part questionnaire adapted from previously validated instruments (11,12). The questionnaire

included three main sections: The first section collected data on (1) nurses' demographic information, (2) nurses' knowledge, attitudes, and perceptions of medication errors, and (3) perceived barriers to reporting medication administration errors. Section two comprised statements about factors contributing to errors, which nurses rated using a six-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). Participants were also asked to estimate the proportion of medication errors in their unit, including both intravenous and non-intravenous medications, using percentage ranges from 0% to 100%. Section three focused on reporting barriers and included mainly closed-ended questions, with one open-ended item allowing nurses to share additional comments or suggestions. These qualitative responses were used to provide context and enrich the quantitative findings.

Permission to adapt and use both questionnaires was obtained from the original authors.

## DATA ANALYSIS

Data were analysed using IBM SPSS Statistics Version 28. Descriptive statistics summarized nurses' demographic characteristics, knowledge, attitudes, perceptions, and reporting practices.

Inferential statistics were used to examine associations between variables, with a significance level set at 0.05. The Chi-square test was applied to assess associations between categorical variables, and Fisher's Exact test was used when variables were binary. Effect sizes were measured using Cramer's V for Chi-square and Phi for Fisher's Exact, with values ranging from 0 (no association) to 1 (complete association). Effect sizes were interpreted as small (<0.3), medium (0.3–0.5), or large (>0.5).

The Friedman test, a nonparametric method for related groups, was used to compare responses to Likert-scale items across multiple statements completed by the same participants. This test determined whether the distribution of responses differed significantly across the statements. For all tests, p-values below 0.05 were considered statistically significant.

Responses to the open-ended question at the end of the survey were analysed using descriptive thematic analysis. This approach enabled the researcher to identify and discuss key themes emerging from participants' comments, providing a rich and detailed understanding of nurses' perspectives while complementing the quantitative findings (13).

## ETHICAL CONSIDERATIONS

The study was approved by the Faculty Research Ethics Committee, FHS-2023-00491, and permission to conduct the research in the hospital was granted by the CEO, nursing director, medical director, and data protection officer. Participation was voluntary, and completion of the online questionnaire indicated informed consent. Participants were provided with

clear information about the study's purpose and objectives and were assured that their responses would remain anonymous and confidential. No identifying information, including email addresses, was collected.

Data were stored securely on password-protected devices accessible only to the primary researcher. Access was restricted to authorized personnel involved in data analysis, and all data will be archived in accordance with institutional retention policies before being securely disposed of. The survey link was distributed via intermediaries to minimize direct contact between the researcher and participants. This approach was recommended to minimise potential power imbalances and promote honest responses (14). This approach ensured compliance with ethical principles of confidentiality, anonymity, and fairness.

## RESULTS

### DESCRIPTIVE ANALYSIS AND NURSES' DEMOGRAPHIC PROFILE

A total of 429 nurses were invited to participate; 301 responded, yielding a response rate of 70%. The majority of respondents were aged 25–40 years (66%) and female (57%). Most had 5–10 years of nursing experience (40%) and held a bachelor's degree (60%). Maltese nurses constituted 79% of the sample. English was the most commonly spoken language (94%), followed by Maltese (80%), and 30% reported fluency in other languages, including Italian, Urdu, Hindi, Tagalog, Malayalam, Bengali, Romanian, Yoruba, Filipino, and Punjabi.

Respondents worked predominantly in medical wards (30%), reliever pools (27%), and surgical wards (23%). The most common roster was Day, Day, Night, Rest, Off (DDNRO) (64%), and 58% worked more than 46.6 hours per week. Demographic details are summarized in Table 1.

Table1: Demographic Characteristics.

Variables	Frequency (n)	Percentage (%)
<b>Age</b>		
<25 years	63	21
25-40 years	198	66
>40 years	40	13
<b>Gender</b>		
Male	130	43
Female	171	57
Other/Prefer not to say	0	0

Variables	Frequency (n)	Percentage (%)
<b>Years of post-graduate nursing experience</b>		
<1 year	13	4
1-5 years	115	38
5.1-10 years	119	40
>10 years	54	18
<b>Highest level of nursing education</b>		
Diploma	31	10
Bachelor's Degree	181	60
Post-Graduate (Master, PhD etc)	74	25
Other*	15	5
<b>Nationality</b>		
Maltese	239	79
Other**	62	21
<b>Languages spoken fluently</b>		
Maltese	241	80
English	283	94
Other***	90	30
<b>Ward/Specialisation</b>		
Medical	89	30
Surgical	69	23
Paediatric	19	6
Orthopaedic	25	8
Reliever pool	81	27
Urology	7	2
Cardiac	6	2
Infectious Diseases Unit	3	1
Gynae	1	<1
ENT	1	<1
<b>Roster</b>		
DDNRO	192	64
DNRO	0	0
Days only	68	22
Nights only	41	14
<b>Hours worked per week</b>		
46.6 hours	98	33
46.6 hours + overtime	175	58
40 hours	25	8
Reduced hours	3	<1

**Other\*** refers to: Nursing school (14), conversion course (1)

**Other\*\*** refers to: Indian (35), Filipino (10), Pakistani (9), Nigerian (4), Romanian (4)

**Other\*\*\*** refers to: Italian (30), Urdu (14), Hindi (9), Tagalog (9), Malayalam (9), Bengali (7), Romanian (4), Yoruba (4), Filipino (1), Punjabi (1), Arabic (1), Spanish (1)

## PREVALENCE OF MEDICATION ERRORS

A total of 88% of respondents reported having made a medication error (ME) at some point, yet underreporting was common. Specifically, 54% admitted to never reporting, 35% reported some incidents, and only 11.6% reported all occurrences. Both non-intravenous (non-IV) and intravenous (IV) errors were perceived as underreported.

For non-IV errors, 31.2% of nurses estimated that 21–30% of errors are reported, 27.6% estimated 31–40%, and 16.3% believed only 0–20% are reported. Wrong route and wrong time errors were least reported, with 70% and 68% estimating a 0–20% reporting rate. Reporting of 100% of non-IV errors occurred mainly for severe incidents: wrong patient (12%), drug given with known allergy (11%), wrong drug (8%), and wrong dose (7%).

For IV errors, underreporting persisted but was slightly lower. Wrong time and wrong method errors were reported at 65% and 48%, respectively. IV errors reported 100% of the time included the wrong patient (12%), the wrong drug (11%), a drug given with a known allergy (11%), the wrong dose (10%), and omission (2%). Figures 5 and 6 illustrate overall ME reporting patterns, highlighting a persistent culture of underreporting.

## NURSES' KNOWLEDGE OF MEDICATIONS

Most nurses reported good knowledge and access to medication information. The majority disagreed that they had limited knowledge (strongly disagree 33%, moderately disagree 31%) or lacked access (strongly disagree 43%, moderately disagree 43%). However, 54% (17% strongly, 37% moderately) reported insufficient training on new medications. Equipment issues (moderate 19%, slight 30%) and occasional non-adherence to procedures (slight 36%, moderate 20%) were acknowledged as contributors to errors, while awareness of patient allergies was high (strongly disagree 14%, moderately disagree 50%).

Table 2: Nurses' Knowledge on Medications.

Statement	Limited knowledge	Insufficient training	Equipment issues	Unaware of allergies
<b>Strongly Agree (%)</b>	5	17	10	5
<b>Moderately Agree (%)</b>	10	37	19	10
<b>Slightly Agree (%)</b>	15	20	30	21
<b>Slightly Disagree (%)</b>	20	10	15	15
<b>Moderately Disagree (%)</b>	31	10	15	50
<b>Strongly Disagree (%)</b>	33	6	11	14

## PERCEIVED CAUSES OF MEDICATION ERRORS

**Communication and workflow:** Illegible handwriting (55% strongly agree), unclear orders (35%), changing orders (35%), inconsistent documentation of verbal instructions (strong 55%, moderate 27%), frequent abbreviations (moderate 34%, slight 44%), and poor nurse–doctor communication (strong 27%, moderate 45%) were reported. Interruptions during administration (65%) and difficulty completing medication rounds on time (strong 44%, moderate 37%) were common.

**Medication properties and packaging:** Similar drug names (70%), appearance (71%), packaging (75%), and substitution with cheaper brands (77%) were identified as contributors. Multiple patients on similar medications were also noted (strong 26%, moderate 58%).

**Pharmacy services:** Nurses reported confidence in pharmacy practices: few perceived issues with incorrect dosage (86% strongly disagree), improper preparation (89%), labelling errors (86%), or pharmacist availability (72%).

**Systemic factors:** Staffing shortages (strong 60%, moderate 31%), redeployment (strong 29%, moderate 32%), and patient transfers (strong 51%, moderate 21%) were seen as stressors impacting safe medication administration.

Table 3: Perceived Causes of Medication Errors.

Factor	Strongly Agree (%)	Moderately Agree (%)	Slightly Agree (%)
Illegible doctor handwriting	55	35	10
Interruptions during administration	65	20	15
Similar drug names/ packaging	70–75	20–25	5–10
Staffing shortages	60	31	9

## ATTITUDES AND PERCEPTIONS ON REPORTING MEDICATION ERRORS

Most nurses supported error reporting (80%) and valued it (89%). Reporting willingness varied: only 34% would report errors causing no harm, and 78% refrained from reporting colleagues' errors.

Concerns included perceived incompetence (70%), salary/contract repercussions (63%), and legal or patient trust issues (87%). Administrative responses were viewed critically: 80–84% perceived focus on individuals rather than systemic causes, and 83% doubted the effectiveness of corrective actions.

Table 4: Attitudes Toward Reporting Errors

Statement	Agree (%)	Disagree (%)
Errors should be reported	80	20
Reporting is valuable	89	11
Fear of repercussions	63–87	13–37
Reluctance to report colleagues	78	22

Overall, nurses identified a combination of individual knowledge, communication challenges, medication-related factors, and systemic issues as contributors to medication errors. Barriers to reporting, including fear of consequences and perceived shortcomings in the reporting system, were prevalent, emphasizing areas for improvement in promoting a culture of safety and transparency. In addition, the findings of this study shed light on the significant underreporting of MEs and the need for improved reporting mechanisms and a culture of transparency to enhance patient safety. Nurses' knowledge gaps, communication challenges with doctors, and systemic issues such as staffing levels pose substantial barriers to effective medication management and warrant targeted interventions. Additionally, the reluctance to report errors due to fears of repercussions highlights the importance of fostering a supportive environment that encourages open dialogue and learning from mistakes. By addressing these challenges and implementing targeted strategies to enhance medication safety practices, healthcare institutions can work towards minimizing ME occurrence and improving overall patient care outcomes.

## DISCUSSION

This study highlights persistent gaps in nurses' training on medication administration, particularly regarding new medications. Over half of respondents reported not receiving formal training; however, most indicated that medication-related information was readily accessible and that consultation with pharmacists posed no difficulty. These findings are consistent with local and international studies identifying insufficient training as a major contributor to medication errors (7,15). Despite this, most nurses expressed confidence in their pharmacological knowledge, contrasting with earlier studies reporting lower perceived competence (16,17). Nearly half of the participants admitted non-adherence to approved medication administration procedures, suggesting unsafe practices despite awareness of protocols. This indicates that improving knowledge alone may be insufficient without addressing behavioural and system-level factors.

Barriers in communication between physicians and nurses, such as illegible handwriting, ambiguous orders, and

missing documentation, were identified to be among the major contributors to medication errors. There was a strong correlation between poor communication and ME occurrence. These results align with the existing studies that have noted communication failures to be one of the most critical patient safety concerns (6,18). In contrast to previous research that examined primarily prescribing errors, the current study emphasizes the fact that communication problems occur throughout the various steps of the medication process and, therefore, it is a system-wide problem and is not limited to isolated cases.

The workload-related factors, such as interruptions and time pressure, were reported to be the main causes of medication mistakes. These results are consistent with the existing research, which demonstrated that workload and lack of continuity are associated with the higher risk of committing errors (6,19). There were also medication packaging problems, such as look-alike drugs, which confirms that resembling packaging is a risk factor that may cause mistakes (20,21). Other causes of MEs reported by nurses included faulty or improperly set equipment (22). These findings suggest that the environment and system design are key factors in medication errors, and not individual performance alone.

Most nurses acknowledged the importance of reporting medication errors; however, their willingness decreased when errors did not result in patient harm. The fear of blame, legal repercussions and absence of feedback were cited as significant disincentives to reporting. The results are also in line with the research that mentions the culture of blame and ineffective feedback mechanisms as the causes of underreporting (10,12,56,63).

Although there are reporting systems, the fact that they are not used widely indicates that there are still structural and cultural obstacles in place. Interventions should prioritize the development of a non-punitive reporting culture focused on system learning rather than individual blame. No significant association was found between medication errors and work hours or roster type. This is in opposition to the research that found a correlation between shift length and fatigue and the risk of errors (23,24,33). Medication error occurrence or reporting was not significantly related to education level. However, experience revealed that there was a strong association was found between poor communication and medication error occurrence. This implies that experience, and not formal education, could be even more significant in medication safety in this context. There was also a correlation between experience and a higher probability of reporting errors.

In this research, there was no significant difference between Maltese and non-Maltese nurses with regard to medication errors (MEs) committed or reported. This is consistent with the findings of a previous study that did not identify any relationship between nationality and medication errors

(25,32). Nevertheless, the sample of Maltese participants might have dominated, which can affect the outcomes. Although the nationality was not significant, the issues concerning communication and language might also have an indirect impact on the clinical practice and cannot be ignored.

A significant association was found between the clinical area and medication error occurrence and reporting. Paediatric nurses reported fewer errors and greater willingness to report them (26,54). Medical wards reported higher error rates, likely due to workload and patient volume (6,39). Reliever nurses demonstrated lower reporting willingness, reflecting instability in staffing roles. These findings suggest that workplace context and staffing structure play a critical role in medication safety behaviours.

Nurses highlighted key factors influencing medication safety, including communication barriers, workload pressures, and system-related issues such as medication labelling and packaging. There was strong support for interventions such as improved communication practices, clearer documentation, and implementation of electronic systems, including barcode technology. Additionally, nurses emphasized the importance of a non-punitive, learning-oriented culture to improve error reporting.

## STRENGTHS AND LIMITATIONS OF THE STUDY

This cross-sectional study demonstrates several strengths. The use of a structured questionnaire ensured standardized data collection, while clear inclusion criteria focusing on experienced registered nurses enhanced the relevance of the findings. Exclusion of emergency, intensive care, and theatre nurses contributed to sample homogeneity and reduced potential confounding. Additionally, the use of an online survey facilitated efficient distribution and improved accessibility.

This study has several limitations. The use of a convenience sampling strategy and voluntary participation may have introduced selection bias and limited generalizability (27). The questionnaire was author-designed, and even though it was based on the existing literature, it was not fully validated, which can compromise reliability and comparability with other studies. Social desirability bias is also a possibility, especially since the survey was sent to colleagues, who might have been influenced by it. Workload could have influenced the rate of participation in the study, and the fact that some of the specialties were not included could have lowered the diversity of the views. The period of data collection was not very long, and this could have decreased the diversity of participation and responses. Moreover, the gender unequal distribution could have influenced the subgroup analysis. Lastly, the cross-sectional nature and lack of a multi-center study design restrict causal inference and external validity of results (53).

## CONCLUSIONS

This study identified persistent gaps in medication administration training among nurses, with more than half reporting no formal training. Nevertheless, nurses were primarily confident about their pharmacological knowledge, but non-compliance with the process of medication administration was widespread. Medication errors were frequently reported with communication failures, workload pressures, interruptions, and system-related issues, such as medication packaging and equipment limitations, which were key contributors to medication errors. Moreover, more than half of nurses reported not reporting medication errors due to the fear of blame, the absence of feedback, and legal issues were significant obstacles to reporting medication errors. There was a significant correlation between clinical area and error occurrence, whereas years of experience, but not the education level or work hours, were correlated with medication error reporting and occurrence.

In general, the results indicate that the system level and the organizational factors have a greater impact on medication errors in this setting than knowledge alone. Specifically, workplace culture and fear of blame seem to dominate reporting behaviour, whereas clinical experience seems to matter more than formal education as a determinant of safety practices.

According to these findings, medication safety improvement should focus on the structured and available training of nurses, enhancement of communication systems, and the creation of a non-punitive reporting culture that promotes learning through errors. Workload management and environmental factors leading to medication administration risks should also be taken into consideration in the interventions.

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