

ORIGINAL ARTICLE

## Knowledge, Attitude and Perception of Community Pharmacists in Kulim towards Preventing Medication Errors.

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### Abstract

Medication error falls under one of the five research priority domains identified by the Ministry of Health Malaysia in the Pharmacy Research Priorities. In Malaysia, there are some studies on medication errors, but most were done in hospitals. There is still no study on medication errors in community settings particularly in Kulim, Kedah. This study aimed to assess the knowledge, attitude and perception of community pharmacists in Kulim, Kedah regarding their role in preventing medication errors. This study is a cross-sectional survey, utilising an online questionnaire administered to community pharmacists in Kulim. Google Forms was used to generate and distribute survey questions. The sample size was estimated at 49 community pharmacists. , a Non-probability sampling was employed to gather data for this study. The self-administered questionnaire consists of four sections: 1) Section A: sociodemographic characteristics questions; 2) Section B: evaluation of respondents' basic knowledge of medication errors; 3) Section C: evaluation of respondents' attitude in preventing medication errors; and 4) Section D: evaluation of respondents' perception towards roles in preventing medication errors. Among the 49 respondents, 48 (98%) demonstrated a good knowledge in preventing medication errors, with only 1 (2%) respondent showing fair knowledge. All respondents (100%) exhibited a positive attitude towards preventing medication errors. Forty-eight (98%) respondents have a good perception, with only 1 (2%) respondent had a fair perception. From the demographic data, only the highest education level has a significant association with the perception of respondents in preventing medication errors ( $p = 0.001$ ). Community pharmacists in Kulim, Kedah exhibit good knowledge, positive attitude, and good perception toward preventing medication errors.

**Keywords:** *Attitude; community pharmacist; knowledge; medication error; perception.*

## Introduction

In the past, a pharmacist's primary responsibility was to dispense prescriptions as ordered by a doctor and ensure that the prescribed medications complied with the legal requirements [1]. Nevertheless, pharmacists' current role now involves more than just dispensing medication at the counter; they now provide other services related to pharmaceutical care [2]. Pharmacists could undertake detailed medication reviews for patients, and recognise problems related to pharmaceutical care. They also offer suggestions as well as remedies for the administration or reliability of medications. Furthermore, patients might seek counselling on healthcare issues from pharmacists as well as instruction on prescription adherence and device management skills. In short, pharmacists play an essential role in practically all aspects of the pharmaceutical process and significantly influence patient care and safety [3]. Medication error (ME) is “a failure in the treatment process that leads to, or has the potential to lead to, harm to the patient” [4]. According to the National Coordinating Council for Medication Error Reporting and Prevention, a medication error is “any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient, or consumer”. Medication errors can occur at any stage from prescription to administration, across various care settings, and due to various causes.

The yearly cost of treating patients with medication-related errors surpasses USD40 billion [5]. Medication errors impose a significant economic burden on patients and the healthcare system due to the escalating treatment costs [6]. The economic effect of medication errors in the U.S. has dropped from USD 177.4 billion in 2001 to USD 21 billion in 2014 due to the implementation of effective medication error control measures [7]. In addition to the monetary cost, medication errors can also cause patients to suffer psychologically and physically. They result

in unintended patient harm, including increased readmission rates, additional medical interventions, and fatalities worldwide [8].

The prevalence of medication errors per 100,000 U.S. citizens grew dramatically from 1.09% in 2000 to 2.28% in 2012 [9]. A study found that 67.97% of hospitalised paediatric patients in an Ethiopian hospital experienced medication prescribing errors, with dosing errors being the most common type, accounting for 48.6%, followed by inappropriate drug selection (19%) [10]. In 2020, a study observed that 41.8% of hospitalised patients experienced at least one medication error throughout their hospital admission [11]. The incidence of medication errors was reported to be 30.5% in an emergency department of a teaching hospital in Malaysia [12]. The findings from previous studies show that the trend of medication errors is increasing globally. These errors can be the fault of the healthcare providers, patients or caregivers [13]. Understanding why errors occur is crucial for identifying possibilities for error prevention and creating long-term improvements in patient safety.

In Malaysia, there are some studies on medication errors but most of them were conducted in hospital settings, and there is still no study on medication errors in community settings in Kulim, Kedah. The knowledge and competency of community pharmacists in identifying and preventing medication errors need to be assessed to improve the quality of healthcare and reduce the economic burden. This study aims to assess the knowledge, attitude and perception of community pharmacists in Kulim, Kedah regarding their role in preventing medication errors. Moreover, we study the association between sociodemographic characteristics and the level of knowledge, attitude and perception of community pharmacists.

## Methods

### *Study sample*

According to the official portal of the Pharmaceutical Services Programme of the Ministry of Health Malaysia, there are a total of 63 Type A Licence holders (comprising wholesale and retail, wholesale only, or retail only) in Kulim, Kedah. The sample size for community pharmacists is estimated to be 49. The determination was made using the Raosoft sample size calculator, with a 95% confidence interval, a 5% margin of error, and assuming a 50% response distribution, along with a 10% dropout consideration. This study was conducted among a convenient sample of community pharmacists in Kulim, Kedah.

### *Data collection*

Responses from participants were collected via an online questionnaire. Additionally, data were gathered in person by engaging community pharmacists in their workplaces, where they had the opportunity to fill in the online form using the researcher's tablet.

### *Study instrument*

The self-administered questionnaire consists of four sections: 1) Section A: sociodemographic characteristics questions; 2) Section B: evaluation of respondents' basic knowledge on medication errors; 3) Section C: evaluation of respondents' attitude in preventing medication errors; and 4) Section D: evaluation of respondents' perception towards roles in preventing medication errors. The questionnaire was created in a closed-ended format, and exclusively in English and was validated. The knowledge, attitude and perception (KAP) levels of the respondents were determined using Bloom's cut-off point. A content validation questionnaire was administered to qualified pharmacist academicians within the faculty for validation purposes.

Table 1. Bloom's cut-off point.

Category	Score
Low level	80% - 100%
Moderate level	60% - 79%
High level	< 60%

A pilot study involving 10 community pharmacists was conducted, during which the internal consistency reliability of the survey was analysed using Cronbach's alpha statistics, resulting in a value of 0.807.

### *Scoring method of Section B: Knowledge in identifying and preventing medication errors*

There are five statements related to medication errors in this section, which assess respondents' knowledge of basic information regarding medication errors. Each question presents a choice of "True" or "False". Every "True" response is given a score of one (1) and every "False" response is scored as zero (0). A cumulative score is calculated for the whole section. They were categorized into three (3) levels:

Table 2. Level of knowledge scores.

Knowledge level	Score
Poor knowledge	< 3
Fair knowledge	3
Good knowledge	4 – 5

### *Scoring method of Section C: Attitude in identifying and preventing medication errors*

Section (C) comprises eight statements aimed at assessing the attitudes of community pharmacists toward medication errors. The questions utilise a 5-point Likert scale format, with answer options, "Never", "Rarely", "Sometimes", "Often" or "Always". The scores were calculated by assigning one (1) point for a "Never" response, two (2) points for a "Rarely" response, three (3) points for a "Sometimes" response, four (4) points for an "Often" response and five (5) points

for an “Always” response. This section has a maximum total score of 40 points. The attitude of respondents were classified as below:

Table 3. Level of attitude scores.

Attitude level	Score
Poor attitude	< 24
Moderate attitude	24 – 31
Good attitude	32 – 40

*Scoring method for Section D: Perception in identifying and preventing medication errors*

This section comprises eight statements that assess the perception of community pharmacists regarding medication errors. The questions are in a 5-point Likert scale format, with answer options, “Strongly disagree”, “Disagree”, “Neutral”, “Agree” or “Strongly agree”. The scores were calculated by assigning one (1) point for a “Strongly disagree” response, two (2) points for a “Disagree” response, three (3) points for a “Neutral” response, four (4) points for a “Agree” response and five (5) points for a “Strongly agree” response. The total score may range from 8 to 40 points. The perception of respondents is categorised as follows:

Table 4. Level of perception scores.

Perception level	Score
Poor perception	< 24
Moderate perception	24 – 31
Good perception	32 – 40

*Data Analysis*

The data obtained from this study were analysed using the IBM Statistical Package for Social Sciences version 21 (SPSS v.21). Descriptive frequency analysis was employed to examine the outcome of the data. The chi-square test was utilised to determine the association between independent and dependent variables. A *p*-value < 0.05 was considered statistically significant.

**Results**

***Sociodemographic characteristics of the study population***

Table 5 presents the sociodemographic characteristics of the respondents. As shown in the table, there were more female participants than male participants. Out of 49 respondents, 27 (55.1%) were female while 22 (44.9%) were male. There were 37 (75.5%) respondents aged between 26 to 35, followed by 11 (22.4%) respondents aged between 36 to 45 and 1 (2%) respondents aged between 46 to 55. In terms of educational background, 45 (91.8%) respondents held a Bachelor of Pharmacy degree, while 4 (8.2%) had completed their Master's degree. Regarding professional roles, the majority of respondents (73.5%) were full-time pharmacists, followed by 6 (12.2%) respondents serving as outlet managers. Owners of pharmacies and locum pharmacists comprised 14.3% of the respondents. Among the respondents, 33 (67.3%) were working in independent pharmacies, while 16 (32.7%) respondents worked in chain pharmacies. Data on work experience revealed that 39 (79.6%) respondents had 1 to 5 years of experience, 7 (14.3%) had 6 to 10 years and a minority (6.1%) possessed more than 10 years of experience.

***Respondent’s knowledge in preventing medication errors.***

Table 6 shows the respondents’ knowledge in prevention of medication errors. All respondents concurred that a medication error constitutes any preventable event involving inappropriate medication use or patient harm. Twenty-three (46.9%) of respondents, believed that medication errors involve only errors in prescribing and dispensing process. In addition, 48 (98%) respondents acknowledged that errors could occur at any stage, from prescribing to the ultimate provision of the drug to the patient. Additionally, it was recognized by 48 (98%) respondents that the omission of medication from

a prescription constitutes a prescribing error. Moreover, all respondents (100%) agreed that pharmacists may report near misses and actual medication errors in Medication Error Reporting System (MERS).

As shown in Table 7 most respondents answered all five knowledge items correctly. Out of 49 respondents, 48 (98%) have good knowledge of preventing medication errors while only 1 (2%) respondent appeared to have moderate knowledge of preventing medication errors.

### ***Respondent's attitude in preventing medication errors***

In terms of attitude towards preventing medication errors, 39 (79.6%) of respondents always verify with a doctor the prescription that was illegible, vague, incomplete or that seemed inappropriate and irrational for the patient, while 10 (20.4%) of them have done so often. Majority of the respondents (69.4%) always ensure not to dispense expired medications to patients. On using reference material (e.g., MIMS) when uncertain or unfamiliar with medication, 32 (65.3%) answered always, followed by 15 (30.6%) of respondents who answered often and only one (2%) answered sometimes. Out of 49 respondents, 30 (61.2%) of them always checked for allergies or a history of adverse reactions before dispensing medication while 19 (38.8%) checked it often.

The total score was analysed and the respondents' level of attitude in preventing medication errors was evaluated. The results are depicted in Table 9, where it shows that all respondents (100%) have good attitude towards preventing medication errors.

### ***Respondent's perception in preventing medication errors***

On perception towards preventing medication errors, 40 (81.6%) of respondents strongly agree that medication errors occur when a pharmacist

fails to ensure the right patient receives the right drugs with the right dose and quantity while 9 (18.4%) of respondents agree with the statement. Most of the respondents (79.6%) strongly agree that medication errors occur when the physician's writing on the prescription is difficult to read or illegible. Concerning the statement that patient counselling by pharmacists helps to decrease the number of medication errors, 34 (69.4%) answered strongly agree, followed by 15 (30.6%) respondents who agree. Out of 49 respondents, 42 (85.7%) strongly agree that collaboration between different healthcare providers and settings helps decrease medication errors, while 7 (14.3%) agreed.

The total score was summed up and the levels of respondents' perception in preventing medication errors were summarized. 48 (98%) respondents have a good perception and only 1 (2%) respondent has a moderate perception.

### ***Association between sociodemographic characteristics with knowledge, attitude and perception of community pharmacists in preventing medication errors***

The Chi-square test was employed to examine the association between the independent variables and dependent variables. The existence of differences in relation to the perceived significance of causative factors was observed between the defined groups within sex (2 factors), age (4 factors), highest education level (3 factors), current employment status (4 factors), pharmacy setting (3 factors) and length of working experience as a community pharmacist (4 factors). No relationships were found in this study except for the relationship between the highest education level and the level of perception of respondents in preventing medication errors where the significance difference value is  $p = 0.001$ .

## Discussion

### *Level of knowledge of respondents*

This study found that almost all community pharmacists (98%) in the study had good knowledge of preventing medication errors while only 1 (2%) respondent appeared to have moderate knowledge. This finding indicates that community pharmacists are well exposed to and understand medication errors quite well. It is consistent with a few earlier studies conducted in Malaysia in which most community pharmacists had sufficient knowledge about medication errors and were skilled enough to identify them [14]. A pharmacist's top priority is to ensure the safe prescribing and dispensing of drugs to patients; hence, community pharmacists are supposed to have good knowledge to play their roles in preventing medication errors.

### *Level of attitude of respondents*

The community pharmacists in Kulim, Kedah displayed a good attitude towards preventing medication errors. Result from a previous study conducted in Selangor, Johor and Melaka also proved that community pharmacists have a positive attitude towards medication errors [15]. Of the respondents, 79.6% always verify with a doctor the prescription that was illegible, vague, incomplete or that seemed inappropriate and irrational for the patient. Addressing and resolving all concerns about the prescription with the prescriber before dispensing are crucial steps to prevent medication errors from reaching patients [16]. Verification entails confirming the medication name, potency, dosage form and other details to ensure the correct pharmaceutical supply.

Dispensing patient-specific doses of liquid or enteral medications in cups or specially designed syringes is well-practised among community pharmacists in Kulim, Kedah. The American Academy of Pediatrics (AAP) and the US Food and Drug Administration (FDA) encourage patients, especially parents to use dosing tools with standard marking scales such as oral

syringes and dosing cups rather than nonstandard kitchen spoons, which vary greatly in size and shape to promote dosing accuracy. When precision is required, oral syringes are the gold standard [17].

Of the respondents, 79.6% always provide relevant counselling and information to patients by using information sheets and other helping tools. Some patients may not be able to fully comprehend the information if it is only conveyed verbally. When there is a substantial amount of material to learn, breaking it down into small and digestible chunks might facilitate overcoming the limitations of working memory and lessen demand. The use of a pictographic dosing diagram visually showing the quantity to measure in a provided dosing tool, in conjunction with a demonstration during counselling was found to reduce liquid medication dosing error rates [16]. Most of the respondents (69.4%) always ensure not to dispense expired medications to patients. The issue that often arises regarding medication errors is expired medications being dispensed to patients. Near-expiry medicines are also dangerous, especially if they are intended for a long-term treatment course. If these issues are not detected during the dispensing process, medication error may reach patients. In a study among community pharmacists in UAE, most medication errors were caused by medicine being replaced with near-expiry ones [18].

Checking for allergies or a history of adverse reactions before dispensing medication is not strictly practiced among community pharmacists in Kulim, Kedah. In addition to known adverse effects, unanticipated negative effects may occur without intent to harm the patient. For example, when a pharmacist switches from one medication to another to boost revenues without realising that the switch may induce an allergic reaction in the patient. This falls under the category of "unintended errors" [18].

### *Level of perception of respondents*

In this study, it was determined that community pharmacists in Kulim, Kedah have a satisfactory

perception towards preventing medication errors, with 98% of them at good level and only 2% at moderate level. The outcome is consistent when compared with previous study carried out among Malaysian community pharmacists [15].

Most of the respondents (79.6%) strongly agree that medication errors occur when the physician's writing on the prescription is difficult to read or illegible. A prevalent cause of medication errors is distortions that may arise from poor handwriting, misinterpreted symbols, the use of abbreviations, and incorrect translation which can then lead to major errors [5]. It is proven that the incorporation of abbreviations in prescriptions and other forms of communication raises the possibility of a medication error [19]. According to a study, community pharmacists in Jordan also believe the most significant contributing factor to dispensing mistakes was a doctor's prescription that was poorly written and hence difficult to understand [20].

All respondents except for one agree there is a chance for medication errors to occur when pharmacists are distracted by other patients and co-workers. According to pharmacists, situations of delayed medication and approval of inappropriate doses by the pharmacy were attribute to the workload [21]. Heavy workloads, driven by the variety of tasks that pharmacists need to handle and the layout of pharmacies, are both significant contributors to the frequency of dispensing mistakes [20].

On the statement patient counselling by pharmacists helps to decrease the number of medication errors, 34 (69.4%) answered strongly agree, followed by 15 (30.6%) respondents who agree. Counselling patients and their caregivers using minimal scientific terminology is an essential role of the pharmacist [16]. Dosing accuracy can be improved by demonstrating how to dose liquid medications [16].

Most of the respondents believe that prescriptions with generic names of drugs help to reduce medication errors, corresponding to the outcome of one study which stated medicines with similar sounding names are widely known as a high-risk

category for medication error, which can have serious consequences for the patient's health [22]. Due to many marketed medications with similar trade names, confusion over medications was a contributing factor to medication errors. Thus, in accordance to the American Society of Health-System Pharmacists (ASHP) guidelines on preventing medication errors, prescribers ought to use generic names of medicines in prescriptions to avoid prescription misinterpretation.

Out of 49 respondents, 42 (85.7%) strongly agree that collaboration between different healthcare providers and settings helps decrease medication errors, while 7 (14.3%) agreed. This deduction matches the result of the existing study where collaboration between different healthcare providers and settings helps to decrease medication errors [5]. From the result of this study, community pharmacists acknowledge that they are not the only ones at fault when it comes to medication errors. Community pharmacies should encourage bi-directional interactions between pharmacists, physicians, patients and caregivers to improve patient safety and therapeutic outcomes [9].

#### ***Association between sociodemographic characteristics with knowledge, attitude and perception of community pharmacists in preventing medication errors***

The finding of this study shows that only the highest education level received from sociodemographic data has a significant association with the perception of respondents in preventing medication errors ( $p = 0.001$ ). No other relationships were found. This may be due to the small sample size where the association is not detectable.

According to the findings of this study, there is no significant difference concerning the relationship between the length of working as a community pharmacist and the KAP of community pharmacists in preventing medication errors. However, based on the results, it shows that those who have been in this line for more than 5 years have better knowledge and perception towards

preventing medication errors. This trend can also be seen in a study conducted in Pahang where pharmacists with more experience showed a significantly more favourable KAP in medication errors [14]. This result has suggested that individuals who are unfamiliar and inexperienced with medication errors should be provided with additional awareness training and mentoring from experienced pharmacists.

The employment status did have an influence on the KAPs of community pharmacists towards medication error despite not being statistically significant. Based on the responses of respondents, 83.3% of outlet managers have good perception of preventing medication errors, as all of them perceived good knowledge of medication errors. Managers of outlets have responsibilities beyond serving patients and customers. Community pharmacists claim that they do not have enough time to execute patient safety actions because they are too preoccupied with dispensing [23]. Their work efficiency is also frequently disrupted by new duties arising in the pharmacy. Heavy workloads and regular disruptions in their working environment cause burnout and are related with greater dispensing mistakes, putting patient safety at risk. This clearly shows that employment status does affect the KAPs in preventing medication errors.

### **Limitation of study**

The limitations of a survey-based cross-sectional study are as akin to those of questionnaire-based studies. These limitations, including recall bias of participants, social desirability bias and communication barriers between researcher and participants, may have led to inaccuracies in the data. The study was conducted in Kulim, Kedah, and involved only 49 community pharmacists;

thus the findings cannot be generalized to the entire community pharmacist population. Given that the community pharmacists may be occupied with their responsibilities, they may have insufficient time and lack of focus in answering the questionnaire.

### **Conclusion**

Community pharmacists in Kulim, Kedah, demonstrated good knowledge, good attitude and good perception towards preventing medication errors. Community pharmacists with good knowledge, attitude and perception in safe medication use will reduce the number of medication errors. The outcome of this study shows that only the highest education level has a significant association with the perception of respondents in preventing medication errors ( $p = 0.001$ ). The small sample size is assumed to be the reason why no other association were identified. It is therefore suggested that future studies should explore differences and similarities using more participants to assess KAP towards medication errors across all states in Malaysia. The results obtained may be utilised to improve community pharmacy services and reduce the incidence of medication errors.



Table 5. Sociodemographic characteristics of respondents.

	<b>n</b>	<b>%</b>
<b>Gender</b>		
Male	22	44.9
Female	27	55.1
<b>Age</b>		
26 – 35	37	75.5
36 – 45	11	22.4
46 – 55	1	2.0
>55	0	0
<b>Highest education level</b>		
Bachelor	45	91.8
Master	4	8.2
PhD	0	0.0
<b>Current employment status</b>		
Pharmacist (owner of the pharmacy)	4	8.2
Pharmacist (manager of the outlet)	6	12.2
Full-time pharmacist	36	73.5
Locum pharmacist	3	6.1
<b>Pharmacy setting</b>		
Independent pharmacy	33	67.3
Chain pharmacy	16	32.7
Franchise pharmacy	0	0
<b>Length of working</b>		
1 – 5 years	39	79.6
6 – 10 years	7	14.3
11 – 15 years	2	4.1
>15 years	1	2.0

Table 6. Respondent’s knowledge in preventing medication errors.

<b>Statement</b>	<b>Responses, n (%)</b>	
	<b>True</b>	<b>False</b>
Medication error is any preventable drug event leading to inappropriate medication use or patient harm.	49 (100)	0 (0)
Medication errors involve only errors in prescribing and dispensing process.	23 (46.9)	26 (53.1)
Errors can occur at any step along the way, from prescribing to the ultimate provision of the drug to the patient.	48 (98)	1 (2)
The omission of medication from a prescription is considered a prescribing error.	48 (98)	1 (2)
Pharmacists may report near misses and actual medication errors in Medication Error Reporting System (MERS).	49 (100)	0 (0)

Table 7. Distribution of knowledge of community pharmacists in preventing medication errors.

Knowledge level	n (%)
Poor knowledge	0 (0)
Moderate knowledge	1 (2)
Good knowledge	48 (98)

Table 8. Respondent's attitude in preventing medication errors.

Statement	Responses, n (%)				
	1	2	3	4	5
Verify with a doctor the prescription that was illegible, vague, incomplete or that seemed inappropriate and irrational for the patient.	0 (0)	0 (0)	0 (0)	10 (20.4)	39 (79.6)
Ensure to not dispense expired medications to patients.	0 (0)	0 (0)	0 (0)	15 (30.6)	34 (69.4)
Use reference material (e.g., MIMS) when uncertain or unfamiliar with medication.	0 (0)	0 (0)	1 (2)	16 (32.7)	32 (65.3)
Check for allergies or a history of adverse reactions before dispensing medication.	0 (0)	0 (0)	0 (0)	19 (38.8)	30 (61.2)
Recalculate the dose before preparing/dispensing medications.	0 (0)	0 (0)	0 (0)	12 (24.5)	37 (75.5)
Provide relevant counselling and information to the patient (e.g., information sheet and side-effects, etc.)	0 (0)	0 (0)	0 (0)	10 (20.4)	39 (79.6)
Verify the mg/kg or mg/m <sup>2</sup> dose used (or another basis for the dose) to calculate the final dose of a drug before preparing/dispensing medications.	0 (0)	0 (0)	0 (0)	13 (36.5)	36 (73.5)
Dispense patient-specific doses of liquid oral/enteral medications in cups or specially designed oral/enteral syringes.	0 (0)	0 (0)	0 (0)	17 (34.7)	32 (65.3)

*1=Never, 2=Rarely, 3=Sometimes, 4=Often, 5=Always*

Table 9. Distribution of attitude of community pharmacists in preventing medication errors.

Attitude level	n (%)
Poor attitude	0 (0)
Moderate attitude	0 (0)
Good attitude	49 (100)

Table 10. Respondent's perception in preventing medication errors.

Statement	Responses, n (%)				
	1	2	3	4	5
Medication errors occur when a pharmacist fails to ensure the right patient receives the right drugs with the right dose and quantity.	0 (0)	0 (0)	0 (0)	9 (18.4)	40 (81.6)
Medication errors occur when the physician's writing on the prescription is difficult to read or illegible.	0 (0)	0 (0)	0 (0)	10 (20.4)	39 (79.6)
Medication errors occur when a pharmacist is distracted by other patients or co-workers.	0 (0)	0 (0)	1 (2)	13 (26.5)	35 (71.4)
Patient counselling by pharmacists helps to decrease the number of medication errors.	0 (0)	0 (0)	0 (0)	15 (30.6)	34 (69.4)
Prescriptions with generic names of drugs help to reduce medication errors.	0 (0)	0 (0)	1 (2)	12 (24.5)	36 (73.5)
Collaboration between different healthcare providers and settings helps to decrease medication errors.	0 (0)	0 (0)	0 (0)	7 (14.3)	42 (85.7)
Medication error is not a result of an error made by pharmacists only.	1 (2)	0 (0)	0 (0)	6 (12.2)	42 (85.7)
Generic substitution has an influence on medication errors.	0 (0)	0 (0)	0 (0)	7 (14.3)	42 (85.7)

1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree

Table 11. Distribution of perception of community pharmacists in preventing medication errors.

Perception level	n (%)
Poor perception	0 (0)
Moderate perception	1 (2)
Good perception	48 (98)

Table 12. Association between sociodemographic characteristics with knowledge of community pharmacists on medication errors.

	Knowledge level, n (%)			p-value
	Poor	Fair	Good	
<b>Gender</b>				
Male	0 (0)	0 (0)	22 (100)	0.362
Female	0 (0)	1 (3.7)	26 (96.3)	
<b>Age</b>				
26 – 35	0 (0)	0 (0)	37 (100)	0.171
36 – 45	0 (0)	1 (9.1)	10 (90.9)	
46 – 55	0 (0)	0 (0)	1 (100)	
>55	0 (0)	0 (0)	0 (0)	
<b>Highest education level</b>				
Bachelor	0 (0)	1 (2.2)	44 (97.8)	0.763
Master	0 (0)	0 (0)	4 (100)	
PhD	0 (0)	0 (0)	0 (0)	
<b>Current employment status</b>				
Pharmacist (owner of the pharmacy)	0 (0)	0 (0)	4 (100)	0.947
Pharmacist (manager of the outlet)	0 (0)	0 (0)	6 (100)	
Full-time pharmacist	0 (0)	1 (2.8)	35 (97.2)	
Locum pharmacist	0 (0)	0 (0)	3 (100)	
<b>Pharmacy setting</b>				
Independent pharmacy	0 (0)	0 (0)	33 (100)	0.147
Chain pharmacy	0 (0)	1 (6.3)	15 (93.8)	
Franchise pharmacy	0 (0)	0 (0)	0 (0)	
<b>Length of working experience as a community pharmacist</b>				
1 – 5 years	0 (0)	1 (2.6)	38 (97.4)	0.967
6 – 10 years	0 (0)	0 (0)	7 (100)	
11 – 15 years	0 (0)	0 (0)	2 (100)	
>15 years	0 (0)	0 (0)	1 (100)	

Table 13. Association between sociodemographic characteristics with the attitude of community pharmacists in preventing medication errors.

	Attitude level, n (%)			p-value
	Negative	Neutral	Positive	
<b>Gender</b>				
Male	0 (0)	0 (0)	22 (100)	. a
Female	0 (0)	0 (0)	27 (100)	
<b>Age</b>				
26 – 35	0 (0)	0 (0)	37 (100)	. a
36 – 45	0 (0)	0 (0)	11 (100)	
46 – 55	0 (0)	0 (0)	1 (100)	
>55	0 (0)	0 (0)	0 (0)	
<b>Highest education level</b>				
Bachelor	0 (0)	0 (0)	45 (100)	. a
Master	0 (0)	0 (0)	4 (100)	
PhD	0 (0)	0 (0)	0 (0)	
<b>Current employment status</b>				
Pharmacist (owner of the pharmacy)	0 (0)	0 (0)	4 (100)	. a
Pharmacist (manager of the outlet)	0 (0)	0 (0)	6 (100)	
Full-time pharmacist	0 (0)	0 (0)	36 (100)	
Locum pharmacist	0 (0)	0 (0)	3 (100)	
<b>Pharmacy setting</b>				
Independent pharmacy	0 (0)	0 (0)	33 (100)	. a
Chain pharmacy	0 (0)	0 (0)	16 (100)	
Franchise pharmacy	0 (0)	0 (0)	0 (0)	
<b>Length of working experience as a community pharmacist</b>				
1 – 5 years	0 (0)	0 (0)	39 (100)	. a
6 – 10 years	0 (0)	0 (0)	7 (100)	
11 – 15 years	0 (0)	0 (0)	2 (100)	
>15 years	0 (0)	0 (0)	1 (100)	

. a No statistics are computed because attitude score is a constant.

Table 14. Association between sociodemographic characteristics with the perception of community pharmacists in preventing medication errors.

	Perception level, n (%)			p-value
	Poor	Fair	Good	
<b>Gender</b>				
Male	0 (0)	1 (4.5)	21 (95.5)	0.263
Female	0 (0)	0 (0)	27 (100)	
<b>Age</b>				
26 – 35	0 (0)	0 (0)	37 (100)	0.171
36 – 45	0 (0)	1 (9.1)	10 (90.9)	
46 – 55	0 (0)	0 (0)	1 (100)	
>55	0 (0)	0 (0)	0 (0)	
<b>Highest education level</b>				
Bachelor	0 (0)	0 (0)	45 (100)	0.001*
Master	0 (0)	1 (25)	3 (75)	
PhD	0 (0)	0 (0)	0 (0)	
<b>Current employment status</b>				
Pharmacist (owner of the pharmacy)	0 (0)	0 (0)	4 (100)	0.062
Pharmacist (manager of the outlet)	0 (0)	1 (16.7)	5 (83.3)	
Full-time pharmacist	0 (0)	0 (0)	36 (100)	
Locum pharmacist	0 (0)	0 (0)	3 (100)	
<b>Pharmacy setting</b>				
Independent pharmacy	0 (0)	0 (0)	33 (100)	0.147
Chain pharmacy	0 (0)	1 (6.3)	15 (93.8)	
Franchise pharmacy	0 (0)	0 (0)	0 (0)	
<b>Length of working experience as a community pharmacist</b>				
1 – 5 years	0 (0)	1 (2.6)	38 (97.4)	0.967
6 – 10 years	0 (0)	0 (0)	7 (100)	
11 – 15 years	0 (0)	0 (0)	2 (100)	
>15 years	0 (0)	0 (0)	1 (100)	

\*Statistical significance difference.

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