JPHSR Journal of Pharmaceutical Health Services Research

ROYAL PHARMACEUTICAL SOCIETY

Research Paper

JPHS 2020, 11; 275–285

Received March 31, 2020
Accepted May 13, 2020
DOI 10.1111/jphs.12364
ISSN 1759-8885

Risk management in community pharmacy practice in Abu Dhabi Region: a cross-sectional study

Reham Abu Hagar[a], Faris El-Dahiyat[a] and Ghaleb El Refae[b,c]

[a]Clinical Pharmacy program, College of Pharmacy, Al Ain University, Al Ain, UAE, [b]College of Pharmacy, Al Ain University, Al Ain, UAE and [c]College of Business, Al Ain University, Al Ain, UAE

Abstract

Objectives Pharmacy risk factors impose a major threat to general healthcare outcomes. Risks that can directly affect patients are known as clinical risk factors, and other, non-clinical risk factors may also affect a pharmacist's performance and pharmaceutical profession. This study aims to evaluate the risks, which occur in community pharmacies in Abu Dhabi, and to investigate the protective plans followed in such incidence.

Methods A self-administrated online questionnaire was distributed to community pharmacists in Abu Dhabi. The questionnaire items were tested by content and face validity in a panel of experts and pilot study. The Statistical Package for the Social Sciences (SPSS) program was used for the data analysis.

Key findings Medication errors and computer system malfunction occur monthly, as reported by 40% of the participants (n = 131). Theft cases were reported by 37.6% (n = 121) of the pharmacists. Violence was categorized as verbal, psychological and physical abuse, and the frequency was 56.8% (n = 183), 30.4% (n = 98) and 14.3% (n = 46) respectively. Almost all the participants belief that communication skills, alertness and experience are the most important internal factors affecting performance. Environmental factors such as the availability of restrooms were cited as important external factors enhancing performance. Chain pharmacies were found to address electrical failure and dealing with look-alike sound-alike/high-alert medication efficiently.

Conclusions Different types of clinical and non-clinical risk in pharmacy practice were identified, and risk mitigation techniques were proposed. A positive attitude of community pharmacists was observed towards identifies risks and on the suggested mitigation techniques. It is necessary to publish a universally referenced validated risk factor list for evaluating current risk management plans to maintain safe pharmacy practices and include management courses within pharmacy curriculum.

Keywords Clinical risk; Community Pharmacy; non clinical risk; risk management

Background

A risk can best be described as some degree of probability that exposure to a hazard will lead to a negative outcome or consequence, such as loss, damage, injury or death.[1] Risk in pharmacy may go beyond medication error to cover all quality-related events in professional practice, including risk in the workplace, environmental risks and financial[2] risks.

The management processes used in pharmacies should include risk analysis, risk identification, risk threat measurement and a plan to resolve such common or unexpected risks in community pharmacy settings. Medication management is a sophisticated process that is fraught with potential errors.[3]

Establishing values regarding safety practices and a professional, safe employee attitude, operational rules, and a preventative protocol of risk identification and evaluation associated with incident analysis will aid in maintaining a good safety system in community pharmacies.[4-7]

In Abu Dhabi, the Department of Health (DOH) requires that all facilities should implement a comprehensive risk assessment plan identifying the risks and hazards and analysing their impact and also establishing strategies, policies and a preparedness plan to deal with these hazards.[8]

There are various risks in community pharmacy settings, but they all fall into one of two categories. Clinical risk factors, such as medication errors, adverse drug reactions

Correspondence
Faris El-Dahiyat, Director of Clinical Pharmacy Program, College of Pharmacy, Al Ain University, P.O.Box: 64141 Al Ain, UAE.
E-mail: faris.dahiyat@aau.ac.ae

and drug–drug interactions, mainly concern patient safety. Non-clinical risk factors include computer system malfunction, electricity failure, robbery and theft cases, and external and internal factors affecting the pharmacist's performance.[9]

Clinical risk factors have a massive impact if left undetected: according to the United States' Institute of Medicine (IOM), around 7000 Americans die yearly because of medication errors.[10]

Medication errors are likely to harm at least 1.5 million patients per year in the United States. Around 400 000 adverse events are prevented every year.[11]

The current study evaluated the present status of risk occurrence in community pharmacies in Abu Dhabi and investigated the protective plans that are followed in risky cases to generate an overall view of risk management plans in concurrent pharmacy practice.

Methods

Study design

A cross-sectional study was conducted in the period 1 May 2019 to 29 May 2019. The survey was targeting licensed community pharmacists working in chain and independent community pharmacies located in the Abu Dhabi region.

Questionnaire development

With the aid of a brain-storming meeting with the quality department manager and the governmental affairs officer, the questionnaire items were adapted from a risk management model (SHELLO Model) and from previous literature.[9,12–14]

A questionnaire comprising three sections was developed in English. The first section of the questionnaire collected the participants' demographics (gender, age, country of graduation, years of experience, level of education, position and type of pharmacy).

The second section discussed the non-clinical risk factors affecting pharmacy practice in community pharmacy and suggested some steps to mitigate these risks. The third section \ evaluated the clinical risks and showed the impact of these risks on pharmacy practice in community pharmacy and risks reduction techniques.

Validity and reliability testing

Content validity was ensured by asking two experts (a quality assurance manager and pharmacy manager) and two academics to evaluate the final version the questionnaire. A list of risk factors occurring in community settings was compiled and reviewed according to the applicability of the factors in UAE community pharmacies.

A further pilot study of 10 pharmacists was conducted, and the phrasing of the survey was reviewed for any necessary clarification or rephrasing.

Cronbach's alpha value was 0.826, which represents good internal consistency. The content validity index value of 0.935 indicated that the survey had excellent validity.

Sampling and sample size

In this study, the population was identified as licensed community pharmacists in Abu Dhabi. The population size was identified using the healthcare provider list from the DOH website. Filters were applied manually to ensure that the results were limited to licensed community pharmacists in Abu Dhabi region which yielded 1976 candidates. A representative sample of 322 was calculated from the population (N 1976) with 5% margin of error and 95% confidence level using Raosoft.[15] In order to reach the representative sample size of 322, 450 pharmacies were randomly selected to participate in this survey by using Microsoft Excel randomization software. Invitation letters along with the questionnaire were sent via email. When the representative sample size (322 completed questionnaires) was reached after almost one months of starting data collection in May 20019, data collection stopped (response rate was 71.6%).

Statistical analysis

All data were entered and analysed using SPSS (version 18; IBM Corp., Armonk, NY, USA). Both descriptive statistics techniques such as frequency and cross-tabulation and inferential statistics using chi-square tests were used, and a P value < 0.05 was considered statistically significant.

Ethical consideration

Al Ain University Research Committee approved this project. The participation of pharmacists approached was strictly voluntary, and their informed consent was obtained. Anonymity of respondents was preserved in the study, as names of participants were not included.

Results

More than half of the participants were female (62.4% (n = 201)), and more than half of the participants were aged between 24 and 34 years old (50.6% (n = 163)). Almost the entire sample graduated from Arab county (78.3% (n = 252)), and 36.6% (n = 118) of the sample had 5–10 years of experience. More than half of the participants were from chain pharmacies (62.1% (n = 200)), and more than three-quarters of the participants were licensed pharmacists (76.1 (n = 245); Table 1).

Non-clinical risk factors

Risk of breaching patients' confidentiality

Patients at community pharmacies are always concerned about their privacy at the pharmacy, as keeping their privacy intact is essential. Thus, the respondents were asked to assess the importance of the following factors, in their opinion, to maintaining patients' confidentiality.

Almost the entire sample (98.1% (n = 316)) reported that providing private counselling areas is important, almost the entire sample (96.9% (n = 312)) rated keeping patients' documents in files with limited access as important, almost the entire sample (95% (n = 306)) rated avoiding sharing patients' information with co-workers as important, and

Table 1 Demographic data

Demographic data.	Per cent	(*N*)
Gender		
Male	37.6%	(121)
Female	62.4%	(201)
Age		
24–34	50.6%	(163)
35–44	35.7%	(115)
45–54	11.8%	(38)
Above 55	1.9%	(6)
Country of graduation		
Arab Country	78.3%	(252)
Western Country	0.9%	(3)
Asian Country	11.2%	(36)
African Country	9.6%	(31)
Years of experience		
Less than 1 year	5.9%	(19)
1–5 years	32.0%	(103)
5–10 years	36.6%	(118)
More than 10 years	25.5%	(82)
Current position		
Licensed pharmacist	82.3%	(265)
Licensed pharmacist with managerial position	17.7%	(57)
Type of pharmacy		
Single	37.9%	(122)
Chain/Group	62.1%	(200)

almost the entire sample (94.4% (n = 304)) reported that discarding documents containing patients' data in the appropriate way are also important (Table 2).

Factors affecting pharmacists' performance

Internal pharmacist characteristics

The entire sample rated communication skills as an important factor (100% (n = 322)). Factors, namely, alertness and focusing, and knowledge were both rated as important by 99.7% (n = 321) of the sample, while experience and physical health were reported as important by 98.4 % (n = 317) of the sample (Table 2).

External factors

Appropriate temperatures were reported as an important factor by 100% (n = 322) of the sample, sufficient and well-distributed lights across the pharmacy were reported as an important factor by 98.8% (n = 318) of the sample, and availability of a restroom at the pharmacy was considered important by 96.9% (n = 312) of the sample. Only 95% (n = 306) of the sample reported noise from customers, colleagues and electronic devices as important factors that may affect a pharmacist's performance (Table 2).

Factors related to prescribing errors can result in mortality and morbidity. In the pharmacists' opinion, all the factors are important, with the following percentages: 99.7% (n = 321) considered prescribing the wrong doses important, 99.1% (n = 321) stated that mistakes related to indications are important, 99.1% (n = 319) reported that unclear hand writing is important, 98.8% (n = 318) rated prescribing the wrong medication class as important, 94.4% (n = 304) reported inaccessibility of patients' history as

Table 2 Non-clinical risk factors

Type of risks	Important (*N*)		Not important (*N*)	
Risk of patient's confidentiality				
Provide a private counselling area	98.10%	(316)	1.90%	(6)
Keep patient data in separate filing	96.90%	(312)	3.10%	(10)
Do not share patient information	95.00%	(306)	5%	(16)
Discard documents containing patient's data in a proper way	94.40%	(304)	5.60%	(18)
Risk of performance (internal factors)				
Communication skills	100%	(322)	0%	(0)
Knowledge	99.70%	(321)	0.30%	(1)
Alertness and focusing	99.70%	(321)	0.30%	(1)
Physical health	98.40%	(317)	1.60%	(5)
Experience	98.40%	(317)	1.60%	(5)
Risk of performance (external factors)				
Temperature should be maintained to avoid discomfort	100%	(322)	0%	(0)
Sufficient and well-distributed lights across	98.80%	(318)	1.20%	(4)
Availability of rest room for breaks during duties	96.90%	(312)	3.10%	(10)
Noise from customers, colleagues	95%	(306)	5%	(16)

	Per cent	(*N*)
How frequently do you encounter computer system malfunction?		
Other	7.1%	(23)
One time per month	41.0%	(132)
Two times per month	32.3%	(104)
3–4 times per month	19.6%	(63)
Computer malfunction consequences		
Work overload	76.7%	(247)
Customer dissatisfaction	48.8%	(157)
Wrong dispense	33.9%	(109)
Delay dispense	57.1%	(184)
Improper counselling	13.0%	(42)
Security measure theft attempt		
Security camera	92.5%	(298)
Security tags	9.9%	(32)
Inventory and sales record	54.0%	(174)
Security alarm	11.8%	(38)
Type of violation		
Verbal violation	56.8%	(183)
Physical violation	14.3%	(46)
Psychological violation	30.4%	(98)
Haven't faced any violation	36.0%	(116)
Protective measure against violation		
Called police	9.6%	(31)
Reported to the management	38.8%	(125)
Asked for help from other pharmacist	26.7%	(86)
Nothing was done	13.7%	(44)
Plan in electricity failure cases		
Self-response	29.5%	(95)
Informed responsible team	52.2%	(168)
Used emergency backup generator	11.5%	(37)
No action	0.9%	(3)

Table 2 (Continued).

Risks incidences	Yes		No	
Have you faced any case of customer/employee theft in your pharmacy?	37.6%	(121)	62.4%	(201)
Have you ever faced any violent customers at your pharmacy?	64.0%	(206)	36.0%	(116)
Have you ever faced a case of electricity failure at the pharmacy?	59.6%	(192)	40.4%	(130)

important, and finally, only 89.8% (n = 289) considered prescribed doses in kg/dose important (Table 3).

The frequency of computer system malfunctions was reported as 'one time per month' by 41.0% (n = 132), 'two times per month' by 32.3% (n = 104) and 'three to four times per month' by 19.6% (n = 63).

The participants' responses regarding system malfunction consequences were as follows: Work overload (76.7% (n = 247)) was the most reported consequence, and improper counselling (13% (n = 42)) was the least reported consequence (Table 2).

Over one-third of the participants reported having encountered cases of theft in Abu Dhabi pharmacies (37.6% (n = 121)), but almost two-thirds of the respondents had never encountered a case of theft (62.4% (n = 201)). Common ways to detect such cases in Abu Dhabi community pharmacies were categorized from the most commonly used to less commonly used protective measures. Security cameras are the most commonly used protective measure (92.5% (n = 298)), followed by inventory and sales records (54.0% (n = 174)), security alarms (11.8% (n = 38)) and security tags (9.9% (n = 32)), as shown in Table 2.

More than half of the sample (64% (n = 206)) reported having been abused by a violent customer once, while 36% (n = 116) denied having faced any such cases (Table 2).

In terms of the nature of the reported violence, 56.8% (n = 183), 30.4% (n = 98) and 14.3% (n = 46) of the sample reported having experienced verbal abuse, psychological abuse and physical abuse respectively.

The most reported protective measure in such cases was reporting such cases to management (38.8% (n = 125)), and the least reported protective measure was calling the police (9.6 % (n = 31); Table 2).

Over half of the sample (59.6% (n = 192)) reported exposure to electricity failure at least once at the pharmacy, while 40.4% (n = 130) denied exposure to any such case. In such an incidence, 52.2% (n = 168) informed their responsible team, and 0.9% (n = 3) reported taking no action (Table 2).

Near-expired items and items that have slow movement in community pharmacies impose the risk of financial loss. There are recommendations that can be followed to minimize such incidences. In terms of following these recommendations, 84.2% (n = 271) try to sell near-expired items before their expiry dates, 56.5% (n = 182) return near-

Table 3 Clinical risk factors

Risk of prescribing medication error	Important (*N*)		Not important (*N*)	
Prescribing wrong dose of medication	99.70%	(321)	0.30%	(1)
Unclear hand writing	99.10%	(319)	0.90%	(3)
Mistakes related to indication	99.10%	(319)	0.90%	(3)
Prescribing wrong medication class	98.80%	(318)	1.20%	(4)
Failure to get accurate patient history	94.40%	(304)	5.60%	(18)
Prescribing dose in form of Kg/dose for child omitting final dose calculation	89.80%	(289)	10.20%	(33)

	Per cent	(*N*)
How frequently do you face medication error at your pharmacy?		
Other	7.5%	(24)
One time per month	40.4%	(130)
Two times per month	30.7%	(99)
3–4 times per month	21.4%	(69)
Actions taken on medication error		
Contact the physician	73.6%	(237)
Document and report to relevant authority	58.1%	(187)
Ask another pharmacist in the shift	54.7%	(176)
Dispense as received	6.2%	(20)
Explain the problem to the patient and advise to contact the physician	40.1%	(129)
Adverse drug reaction reporting barriers		
Reporting form is not available/accessible	17.1%	(55)
Lack of knowledge about side effects (can't recognize ADR cases to report it)	55.9%	(180)
Process of reporting is time-consuming	48.8%	(157)
I think reporting ADR is not important	21.4%	(69)
Fear of disciplinary actions	30.4%	(98)
Drug–drug interaction detection		
Computer alert system	19.6%	(63)
Pharmacist experience	55.6%	(179)
List of common interaction in pharmacy	43.5%	(140)
Pharmacist scientific knowledge	66.1%	(213)
Nothing is being used	9.6%	(31)
LASA preventative plan		
Medications are separated on the same shelf	78%	(251)
Special stickers are used to alert the pharmacist before picking the medicine	87.9%	(283)
No preventative action is made in my pharmacy	6.5%	(21)
High-alert preventative plan		
Improving access to information about updated high-alert lists	52.2%	(168)
Using auxiliary labels	84.5%	(272)
Restricting access to high-alert medications	30.4%	(98)
Periodic meetings with the pharmacists	19.9%	(64)
Automated system alert	9.3%	(30)
Action taken to prevent near expiry		
Return the items back to the supplier/store	56.5%	182
Push the items to be sold before the due date	84.2%	271
Request items with long expiry	39.8%	128
Redistribute items between chain pharmacies	42.9%	138

expired items to the supplier, 42.9% (n = 138) redistribute items between branches of the chain group, and 39.8% (n = 128) request items with long expiry dates to avoid the risk of expired item retention (Table 3).

Clinical risk factors

For all clinical risks in community pharmacy, please refer to the Table 3.

The frequency of occurrence of medication errors in community pharmacies is as follows: 40.4% (n = 130) reported encountering medication errors once per month, 30.7% (n = 99) answered twice per month, and the remaining 7.5% answered rarely, not that often, not too much, or once or twice a year.

The most reported protective measure to avoid medication errors was contacting the physician (73.6% (n = 237)), and the least reported measure was choosing to dispense the prescription as received from the physician (6.2% (n = 20); Table 3).

Targeting the reasons for under-reporting may increase cases of adverse drug reaction (ADR) and medication error to reduce the risk of their occurrence. The most reported reason was lack of knowledge about side effects (cannot recognize ADR cases to report them; 55.9% (n = 180)), and the least reported reason was that the reporting form is not available/accessible (17.1% (n = 55)).

More than half of the sample (66.1% (n = 213)) defer to the pharmacist's scientific knowledge, 55.6% (n = 179) defer to the pharmacist's experience, 43.5% (n = 140) keep a list of common interactions in the pharmacy as a reference, 19.6% (n = 63) use a computer alert system, and 9.6% (n = 31) use nothing for detecting drug interactions (Table 3). Look-alike and sound-alike (LASA) errors may impose risk, especially if there is no plan to minimize such incidences.[16] In terms of preventative measures, 87.9% (n = 283) of the sample reported that special stickers are used for LASA medication, 78% (n = 251) reported that LASA medications are separated on the same shelf in their pharmacies, and only 6.5% (n = 21) had no preventative measures (Table 3).

High-alert medication errors impose a major risk that may affect overall health status, and a preventative plan must be followed to avoid such incidences. In terms of preventative measures, 84.5% (n = 272) of the sample reported using auxiliary labels, 52.2% (n = 168) reported keeping high-alert medication lists updated, 30.4% (n = 98) reported restricting access to high-alert medications, 19.9% (n = 64) reported meeting with the pharmacists periodically, and 9.3% (n = 30) reported an automated alert system (Table 3).

An association between demographics and the responses was found with respect to age group: According to their responses regarding whether they had faced a computer malfunction, the younger participants were found to be more committed to seeking professionalism; however, the older participants were significantly more likely to report psychological abuse.

Chain pharmacies were found to address electrical failure by establishing unified circulated policies to deal with such cases, as they were found to be more responsible in applying LASA/high-alert policies due to sudden random inspections performed by the management in addition to regular DOH audits (Table 4).

Discussion

The current study demonstrated that there was a significant association between demographics and other variables, namely, age. Participants aged between 24 and 34 were significantly more likely to have encountered a computer malfunction, and there was an association between younger age and dispensing the wrong medications and customer dissatisfaction. This might be attributable to the loyalty that is necessary to achieve customer satisfaction and follow the proper dispensing protocol. The younger participants might be more exposed to these consequences due to their reduced age and experience. Meanwhile, participants aged between 45 and 54 were more likely than others to report a psychological violation, as in advanced age groups, the internal psychological factors are affected.

A systematic review in 2017 revealed that the overall prevalence of elder abuse was 15.7% and that the prevalence of psychological elder abuse was 11.6%.[17] In addition, the older participants were more likely to report receiving help from other pharmacists in a shift in cases where they faced a medication error case, which may be caused by the pharmacist's failure to confirm with the physician or the physician's attitude and refusal to resolve the issue. A cross-sectional study in Switzerland indicated that 83% of pharmacists reported problems collaborating with physicians as a barrier to medication.[17]

Participants aged between 45 and 54 were more likely to report that the reporting form is not available than other options; this suggests that they might not know that the form is published online on the DOH website. They were also more likely to state that the lack of knowledge is a reason for under-reporting; this may be due to their advanced age, as a result of which they may have lost some pharmacological information. In a cross-sectional study in Pakistan to illustrate ADR reporting barriers, the results revealed that 74.2% stated that they did not report ADRs due to the unavailability of the reporting form, while 52.2% did not report due to their insufficient knowledge.[18]

Participants aged over 55 were more likely to report that ADRs are not important; this might be caused by a loss of intention and awareness due to their advanced age. All these findings were compared to a statistically significant P value < 0.05.

The type of pharmacy also had a significant correlation, as chain pharmacies reported customer dissatisfaction more than independent pharmacies, while independent pharmacies were more likely than chain pharmacies to dispense the wrong medications as a consequence of computer malfunctions.

Chain pharmacies were more likely than independent pharmacies to have been exposed to verbal violations. This could be caused by the higher number of customers served by chain pharmacies. In a cross-sectional study conducted to detect the frequency and consequences of violations in Ireland, highly statistically significant correlations were found between the reported degree of worry regarding workplace

Table 4 Significant association between Demographic and Responses

Computer malfunction consequence

	Age group		Graduation country		Position		Pharmacy type	
	χ2	**Sig. *P* value**	**χ2**	**Sig. *P* value**	**χ2**	**Sig. *P* value**	**χ2**	**Sig. *P* value**
Work overload			χ2 (3) = 9.727	*P* 0.016 ≤ 0.05*	χ2 (2) = 10.18	*P* 0.006 ≤ 0.01**		
Customer dissatisfaction	χ2 (3) = 8.676	*P* 0.030 ≤ 0.05*					χ2 (1) = 3.83	*P* 0.050 ≤ 0.05*
Wrong dispensing	χ2 (3) = 9.625	*P* 0.018 ≤ 0.05*					χ2 (1) = 8.07	*P* 0.005 ≤ 0.01**

Types of violation

	Age group		Pharmacy type	
	χ2	**Sig. *P* value**	**χ2**	**Sig. *P* value**
Verbal			χ2 (1) = 5.746	*P* 0.017 ≤ 0.05*
Psychological	χ2 (3) = 9.632	*P* 0.018 ≤ 0.05*		

Actions taken if violated

	Experience	
	χ2	**Sig. *P* value**
Called police	χ2 (3) = 9.517	*P* 0.018 ≤ 0.05 *F*
Reported to management	χ2 (3) = 8.398	*P* 0.038 ≤ 0.05*

Occurrence of facing electricity failure cases

	Pharmacy type	
	χ2	**Sig. *P* value**
Occurrence of electricity failure	χ2 (1) = 13.591	*P* 0.000 ≤ 0.01**

Actions taken in case of electricity failure

	Position		Pharmacy type	
	χ2	**Sig. *P* value**	**χ2**	**Sig. *P* value**
Self-response	χ2 (2) = 11.319	*P* 0.003 ≤ 0.01**	χ2 (1) = 12.425	*P* 0.000 ≤ 0.01**
Informed responsible team			χ2 (1) = 18.4	*P* 0.000 ≤ 0.01**

Table 4 (Continued).

Plans to deal with near-expiry and non-moving items		
	Pharmacy type	
	$\chi 2$	**Sig. *P* value**
Return to supplier/store	$\chi 2$ (1) = 5.323	*P* 0.021 ≤ 0.05*
Sell item before due date	$\chi 2$ (1) = 11.286	*P* 0.001 ≤ 0.01**
Redistribute between chain pharmacies	$\chi 2$ (1) = 91.85	*P* 0.000 ≤ 0.01**
Occurrence of facing medication error cases		
	Graduation country	
	$\chi 2$	**Sig. *P* value**
Occurrence of medication error cases	$\chi 2$ (9) = 19.957	*P* 0.007 ≤ 0.05*
Responsibility of medication error		
	Experience	
	$\chi 2$	**Sig. *P* value**
Responsibility of medication error	$\chi 2$ (6) = 12.443	*P* 0.037 ≤ 0.05*
Action taken in case of medication error		
	Age group	
	$\chi 2$	**Sig. *P* value**
Ask another pharmacist in shift	$\chi 2$ (3) = 8.179	*P* 0.038 ≤ 0.05*
Action taken to reduce high-alert error		
	Pharmacy type	
	$\chi 2$	**Sig. *P* value**
Improving access to updated high-alert list	$\chi 2$ (1) = 7.181	*P* 0.007 ≤ 0.01**
Restriction access to high-alert medicine	$\chi 2$ (1) = 7.722	*P* 0.005 ≤ 0.01**

Table 4 (Continued).

Barriers to adverse drug reaction reporting

	Age group		Graduation country		Education level		Position		Pharmacy type	
	χ2	**Sig. *P* value**	**χ2**	**Sig. *P* value**	**χ2**	**Sig. *P* value**	**χ2**	**Sig. *P* value**	**χ2**	**Sig. *P* value**
Reporting form is not availability	χ2 (3) = 12.503	*P* 0.005 ≤ 0.05*	χ2 (3) = 10.56	*P* 0.012 ≤ 0.05*						
Lack of knowledge about ADR	χ2 (3) = 8.759	*P* 0.029 ≤ 0.05*								
Reporting is time-consuming							χ2 (2) = 9.116	*P* 0.010 ≤ 0.01**		
ADR is not important	χ2 (3) = 9.804	*P* 0.016 ≤ 0.05*							χ2 (1) = 12.957	*P* 0.000 ≤ 0.01**
Fear of disciplinary actions					χ2 (3) = 11.258	*P* 0.009 ≤ 0.05 *F*				

Drug–drug interaction detection

	Pharmacy type	
	χ2	**Sig. *P* value**
Computer alert system	χ2 (1) = 3.957	*P* 0.047 ≤ 0.05*
Pharmacist's experience	χ2 (1) = 25.45	*P* 0.000 ≤ 0.01**
Nothing is used	χ2(1) = 7.983	*P* 0.005 ≤ 0.01**

**Significant at $P \leq 0.01$
*Significant at $P \leq 0.05$

Table 5 Community pharmacy risk mitigation and reduction strategies

No.	Risk	Level	Technique	Impact	Strategy	Responsibility
1	Computer system malfunction	Low	Reduction	Work overload. Delay dispensing. Customer dissatisfaction. Wrong dispensing. Improper counselling.	Inform responsible team. Provide back up plans and policies to unify actions taken.	IT department, maintenance department, pharmacy manager.
2	Theft incidences	Low	Reduction	Financial loss. Physical attack. Customer drop. Insecurity.	Develop security plan. Multiple camera access for monitoring. Request theft alarm button.	Pharmacy manager, quality department, security department officer.
3	Violence	High	Reduction	Psychological attack Physical attack	Encourage reporting to management. Assign guards.	Pharmacy manager. Management.
4	Electricity failure	High	Avoiding	Medication damage Delay work	Use automated activated alarm. Establish temperature excursion policy. Use back up generator.	Maintenance department, pharmacy manager, quality department
5	Near-expiry items	Moderate	Reduction/ transferring	Financial loss Stock accumulation Reduced purchase desire	Develop internal policies. Establish deals with pharmaceutical companies. Develop skills to liquidate these items.	Pharmacy manager, pharmacist, pharmaceutical companies.
6	LASA error	Moderate	Elimination	Medication error	Circulate DOH policies. Keep medication list up to date. Regular inspections.	Jawda officer, pharmacists, quality department
7	High-alert medication error		Elimination	Medication error		Jawda officer, pharmacists, quality department
8	Medication error	Low	Reduction	Patient harm	Encourage contacting physician. Request to report the case to DOH using medication error reporting form.	Pharmacists, physicians.
9	Drug–drug interaction	Low	Reduction	Medication error Patient harm	Update pharmacists with common interactions. Periodic pharmacological meeting. Establish automated alert system.	Computer system failure Dispensing Pharmacist
10	Patient's confidentiality	Moderate	Elimination	Breach of patient privacy. Loss of reputation.	Specify a private counselling area. Notify all pharmacist to keep patient's data protected.	Pharmacist team
11	Pharmacist's performance	High	Avoiding	Affect work flow. Loss of professionalism. Medication error.	Keep positive work environment. Listen to staff and their needs. Reduce any obstacles. Periodic evaluation of pharmacist's performance. External mystery shopper deals.	Management Pharmacy manager

violence and the frequency of verbal abuse, as 77% of the participants had been exposed to verbal abuse.[19]

The reason why the chain pharmacies reported more cases of electricity failure than independent pharmacies might be because most chain pharmacies are located next to malls and electricity might be connected to the same generator. The chain pharmacies also reported self-response (segregating fridge items on ice boxes) and informing the responsible team more than independent pharmacies. This might be attributable to unified internal policies or circulars in the case of electricity failure. The chain pharmacies were also more likely than the independent pharmacies to report returning near-expiry items to the supplier, trying to sell near-expiry items before their expiry date and redistributing near-expiry items between branches. This may be due to the near-expiry policy that is circulated in chain pharmacies, as the literature states with respect to pharmacy management that developing policies will keep personnel consistently focused on the goal.[20]

The chain pharmacies reported improving access to updated lists of high-alert medication errors due to continuous updates and follow-ups conducted by their management

and restriction of access to high-alert medicine as measures to avoid high-alert medication errors, which may be because chain pharmacies are more likely than independent pharmacies to have multiple employees. Independent pharmacies were more likely than chain pharmacies to think that reporting is not important as a reason for ADR under-reporting, which might be as a result of less concern and evaluation of ADRs' importance from the direct manger in the drug–drug interaction detection plan. Chain pharmacies were more likely to rely on the pharmacist's experience for drug–drug interactions; this may be because more knowledgeable pharmacists are employed in group pharmacies.

Meanwhile, independent pharmacies are more likely than chain pharmacies to report taking no action as a way to detect drug–drug interactions in the pharmacy; this might be due to a lack of proper planning.

Position also had a correlation with dispensing the wrong medications as a consequence of computer malfunctions. The licensed pharmacist position was more likely to be concerned about dispensing the wrong medications. Self-response as a protective measure against electricity failure was more likely to be reported by pharmacy managers because they have the managerial skills to deal with the situation. In addition, considering that ADR reporting is time-consuming, one of the ADR reporting barriers might be due to the manager's workload, increased responsibility and shortage of time.

Community pharmacy risk mitigation and reduction strategies

A summary of detectable risk factors encountered in community pharmacy settings based on this study's findings and risk mitigation strategies is listed in Table 5 below.

Limitations of the study

These research findings cannot be generalized to the whole UAE, as the current study focused exclusively on Abu Dhabi city.

Conclusions

A positive attitude of community pharmacists was observed towards identifies risks and on the suggested mitigation techniques. Most of the participants reported exposure to a considerable amount of clinical and non-clinical risk factors. According to the frequency and severity of risk, these factors have been classified as low, moderate or high risk according to the reporting frequencies and occurrence. Computer system malfunction, theft and medication errors were classified as low-risk factors, whereas violence and electricity failure were classified as high-risk factors.

Multiple protective measures have been established to mitigate expected risks in community pharmacies. A considerable percentage of the participants reported that plans were used to handle the risks. Significant correlations were identified between different demographic factors and responses received from pharmacists.

There is a need to establish a standard protocol and updated pharmaceutical policies to maintain a healthy, safe pharmaceutical environment.

The following recommendations might create risk free pharmacy practice environment: focus on pharmacy management courses in pharmacy curriculum to establish a fundamental pharmaceutical managerial skill, develop a more detailed updated risk mitigation policies and protocols by regulatory authorities. In addition to periodic inspection and audits to ensure that all community pharmacies are up to date regarding good pharmacy practice protocol, a unified policy should be implemented among all community pharmacies to enhance the processes of risk management and assessment and to implement an appropriate corrective action plan.

Future visions

It is recommended to conduct future studies on a wider extent including other cities and regions to enhance the generalizability among UAE community pharmacies setting.

Declarations

Conflict of interest

The Author(s) declare(s) that they have no conflicts of interest to disclose.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Authors' contributions

GR conceptualized the project with FD and RA. RA performed data collection, entry and analysis and manuscript development. FD contributed to data analysis, interpretation and manuscript development. All authors approved the final version. All Authors state that they had complete access to the study data that support the publication.

Ethics approval and consent to participate

This study was approved by Research Committee of Al Ain university.

Data availability statement

The data sets used and/or analysed during the current study are available from the corresponding author on reasonable request.

References

1. RopeikD, Risk Gray GM. *A Practical Guide for Deciding What's Really Safe and What's Dangerous in the World Around You*. Boston, MA: Houghton Mifflin Harcourt, 2002.
2. KennethB. Chapter 11. Risk management. In: Warholak TL, Nau DP, eds. *Quality and Safety in Pharmacy Practice*. New York, NY: McGraw-Hill, 2010: 273.

3. DillesT *et al*. Barriers for nurses to safe medication management in nursing homes. *J Nurs Scholarsh* 2011; 43: 171–180.
4. PhippsDL, Ashcroft DM. Psychosocial influences on safety climate: evidence from community pharmacies. *BMJ Qual Saf* 2011; 20: 1062–1068.
5. WaterfieldJ. *Community Pharmacy Handbook*. London, U.K.: Pharmaceutical Press, 2008.
6. HarveyJ *et al*. Exploring safety systems for dispensing in community pharmacies: focusing on how staff relate to organizational components. *Res Soc Admin Pharm* 2015; 11: 216–227.
7. RooneyJJ, Heuvel LN. Root cause analysis for beginners. *Qual Progress* 2004; 37: 45–56.
8. DOH*2017 DOH Policy on Healthcar eEmergency & Disaster Management for the Emirate of Abu Dhabi*. https://www.haad.ae/HAAD/LinkClick.aspx?fileticket=WLy1Cm9zXvI%3D&tabid=1485 (accessed 10 August 2019).
9. NesbittK *et al*. Safe dispensing in community pharmacies: applying the software, hardware, environment and liveware (SHELL) model. *Clin. Pharm* 2019; 27: 9.
10. KohnLT *et al*. *Errors in Health Care: A Leading Cause of Death and Injury. InTo Err is Human: Building a Safer Health System*. Washington, DC: National Academies Press (US), 2000.
11. AspdenP *et al*. *Committee on Identifying and Preventing Medication Errors. Preventing Medication Errors: Quality Chasm Series*. Washington, DC: National Academies Press, 2007: 1269–1272.
12. HattinghHL. *Investigation of Community Pharmacy Risk Management Regulation and Practices in the Context of an Expanding Role*. PhD [dissertation]. Gold Coast: Griffith University, 2008. Available from: https://pdfs.semanticscholar.org/f8eb/531efcf79e887e99f77f7e0cda6ed7069e28.pdf. (accessed 12 August 2019)
13. OlteanAM, Crişan O. Risk management in preventing medication errors in a community pharmacy. *FARMACIA* 2018; 66: 725–732.
14. AlslubiH, El-Dahiyat F. Patient safety practices among community pharmacists in Abu Dhabi, United Arab Emirates. *J Pharm Health Serv Res* 2019; 10: 203–221.
15. Raosoft I. *Sample size calculator*. Seattle, WA: Raosoft, Inc.; 2004. www.raosoft.com/samplesize. (accessed 14 April 2019)
16. EmmertonLM, Rizk MF. Look-alike and sound-alike medicines: risks and 'solutions'. *Int J Clin Pharm* 2012; 34: 4–8.
17. YonY *et al*. Elder abuse prevalence in community settings: a systematic review and meta-analysis. *Lancet Glob Health.* 2017; 5: e147–e156.
18. NiquilleA *et al*. Medication reviews led by community pharmacists in Switzerland: a qualitative survey to evaluate barriers and facilitators. *Pharm Pract* 2010; 8: 35.
19. SyedA *et al*. Assessment of knowledge, attitude and barriers towards pharmacovigilance among physicians and pharmacists of Abbottabad, Pakistan. *Pharmacy* 2018; 6: 29.
20. FitzGeraldD, Reid A. Frequency and consequences of violence in community pharmacies in land. *Occup Med* 2012; 62: 632–637.