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Original Article

A nationwide assessment of community pharmacists' attitudes towards dispensing errors: A cross-sectional study

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الملخص

أهداف البحث: الاستغناء عن الأخطاء في صرف الأدوية هي أسباب شائعة للضرر الذي يمكن الوقاية منه للمرضى. ومن المثير للاهتمام، أنه لا يعرف سوى القليل جدا عن انتشارها وأنواعها في بيئة الصيدلة المجتمعية في لبنان بسبب عدم وجود نظام إبلاغ فعال. لذلك، هدفت هذه الدراسة إلى استكشاف تصورات صيادلة المجتمع اللبناني عن أنواع هذه الأخطاء في لبنان، والعوامل الكامنة وراء حدوثها، وأسباب عدم الإبلاغ عنها، بالإضافة إلى الممارسات الحالية للحد منها.

طرق البحث: تم إجراء مسح مقطعي من خلال استبانة ذاتي ، باستخدام مقياس من 0-4، تم توزيعه على عينة من صيادلة المجتمع في لبنان.

النتائج: استجاب نحو 171 صيدلانيا للمسح، أفاد 68٪ منهم أن الأخطاء في صرف الأدوية شائع، ويعتقد 52٪ أنها تتزايد. كانت العوامل المساهمة الرئيسية المبلغ عنها في الأخطاء في صرف الأدوية أنها غير مقروءة والوصفات غير كاملة، وعبء العمل، وتعدد المهام، والانقطاعات، وتشابه أسماء الأدوية، والتعب. علاوة على ذلك، كانت الإستراتيجيات المتصورة للحد من أخطار التدمير الذاتي هي التعاون مع الأطباء، وتحسين الكتابة اليدوية، والفحص المزدوج، وتقديم المشورة المناسبة للمرضى، وتشجيع الإبلاغ، وإصدار المبادئ التوجيهية. أخيرا، كانت الأسباب الرئيسية لنقص الإبلاغ عن الفاعلين تتمثل في عدم وجود التزام بالإبلاغ (59٪) ونقص أنظمة الإبلاغ (56٪).

الاستنتاجات: قد تكون الأخطاء في صرف الأدوية سائدة جدا في لبنان لأنها تذهب دون رقابة من قبل السلطات. يوصى بشدة بأنظمة وصف الأدوية الإلكترونية والتقارير العادلة، جنبا إلى جنب مع دراسات المتابعة.

الكلمات المفتاحية: أخطاء الدواء؛ الأخطاء؛ في صرف الأدوية؛ صيدلية المجتمع؛ سلامة المريض؛ لبنان

Abstract

Objectives: Dispensing errors (DEs) are common causes of preventable harm to patients. Interestingly, very little is known about their prevalence and types in the community pharmacy setting in Lebanon due to the lack of an effective reporting system. Therefore, this study aims to explore the perceptions of community pharmacists about the types of these errors in Lebanon, the factors behind their occurrence, the reasons for underreporting, and the current practices for reducing them.

Methods: A cross-sectional survey was conducted through a self-administered questionnaire, using a scale of 0–4, distributed among a sample of community pharmacists in Lebanon.

Results: A total of 171 pharmacists responded to the survey, of whom 68% reported that DEs were common, and 52% believed that they were increasing. The main reported contributing factors to DEs were unreadable and incomplete prescriptions (≈3.0 ± 1.0 out of 5), workload, multitasking, interruptions, similarity in names of medications, and fatigue (≈2.5 ± 1.0). Moreover, the perceived strategies to limit the risks of DEs were collaboration with physicians, improving handwriting, double-checking, proper patient counselling,

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encouraging reporting, and issuance of guidelines (≈3.2 ± 1.0). Finally, the main reasons for under-reporting DEs were the lack of obligation to report and the lack of reporting systems (59% and 56%, respectively).

Conclusions: DEs may be very prevalent in Lebanon because they are unmonitored by the authorities. Electronic prescription and fair reporting systems are highly recommended, along with follow-up studies.

Keywords: Community pharmacy; Dispensing errors; Lebanon; Medication errors; Patient safety

Introduction

Medication errors are the main cause of patient injury and preventable harm in the healthcare system.[1] The World Health Organization (WHO) has estimated that medication errors cause at least one death per day and injure 1.3 million people annually in the United States of America.[2] These errors cost the American economy around $40 billion annually and may result in the loss of patients' trust in the healthcare system.[3] Medication errors can occur at any point from the time the medicine is ordered to the time it is administered by the patient.[3]

In developing countries, the problem of irrational drug use is more common due to frail healthcare systems and poor patient education, which leads to non-adherence.[4] In addition, this malpractice can lead to wastage of resources and reduction in the quality of drug therapy. This is supported by a recent report from the WHO that has shown that more than half of all medications are not appropriately prescribed and dispensed, and more than half of the patients take their medications incorrectly.[5]

One of the most common types of medication errors is related to pharmacy practice. A recent systematic review has shown that the rate of dispensing errors (DEs) in the USA ranges from 0% to 55%.[6] Such errors are considered the main cause of avoidable adverse events that may compromise patient safety.[7] A systematic review of literature that evaluated studies related to medication errors in Middle Eastern countries found that DEs were inadequately evaluated in these countries.[8] However, a recent meta-analysis reported that the incidence of DEs in KSA was 28.2%.[9]

A dispensing error is defined as a "discrepancy between a prescription and the medicine that the pharmacists provide to the patient or distribute to the hospital floors on the basis of these prescriptions".[10] Therefore, an optimal dispensing practice involves more than grabbing a medicine from a pharmacy shelf and handing it over to the patient. Rather, it must ensure that the correct medicine is delivered to the right patient, with an appropriate dosage regimen, clear directions for use, and optimal packaging. Such a practice is the core to achieving a rational drug therapy.[11,12] However, several barriers may obstruct appropriate and safe dispensing practices, such as workload, time pressure, and poor prescription handwriting.[13–15]

Community pharmacists are primary health care providers who are always available to provide on-demand counselling because they are more easily accessible and affordable by consumers than other healthcare providers.[16–20] Their role became more prominent with the expansion of pharmaceutical care services, especially in reviewing and ensuring the rational use of medicines.[20–22] They actively participate in optimising public health, improving patient safety, decreasing the incidence of medication errors, and reducing healthcare costs.[23] However, the lack of a culture of patient safety, and work overload during peak hours may weaken the quality of patient counselling offered by community pharmacists, thereby increasing the incidence of DEs.[24]

Community pharmacists should be encouraged to report medication errors because this is crucial for identifying mistakes, learning from current incidents, and preventing future incidents. However, several obstacles to reporting DEs have been described. These include, a lack of time, blame culture, inappropriate protocols and methods for reporting, lack of protection for reporters, lack of accountability, and fear of punishment.[13] Therefore, understanding the reasons behind the underreporting of medication errors is an essential step in improving patient safety in the community pharmacy setting.

In Lebanon, there is a dearth of evidence and statistics regarding medication DEs at community pharmacies. This is perhaps due to the lack of a validated and well-recognised reporting system, in addition to the obstacles mentioned earlier. Moreover, there is no explicit national policy that encourages pharmacists to report medication error incidents. Consequently, the objectives of the study were to describe the types of DEs perceived by Lebanese community pharmacists, their current practices to reduce such errors, the perceived factors associated with DEs, and the reasons behind the underreporting of medication errors. Understanding these issues may contribute to the development of national policies and procedures for reporting and managing medication errors, which will hopefully be instrumental in improving pharmacy practice and patient safety.

Materials and Methods

Study population, sampling, and time frame

This observational cross-sectional study was conducted during January 2021. Our target sample size was 10% of the registered community pharmacies in Lebanon, which was approximately 2,800 at the time of this survey.[25] Therefore, 280 accessible community pharmacies from all governorates in Lebanon were conveniently approached by two research assistants. If a pharmacy was found closed or

refused to participate, it was substituted by the nearest pharmacy.

The questionnaire

A well-structured and validated self-administered questionnaire was adopted from Peterson et al.,[26] where most questions were close-ended with pre-defined answers using a Likert-type scale (i.e. no effect = 0, little effect = 1, moderate effect = 2, strong effect = 3, and very strong effect = 4). The questionnaire was divided into five main sections: (a) demographic characteristics of the respondents such as age, educational level, and geographical location and other relevant information of the pharmacy; (b) perceived contributing factors to DEs; (c) perceived strategies that might decrease the risk of DEs; (d) perceived types of DEs; and (e) reasons for the underreporting of DEs. The questionnaire forms were distributed to all selected pharmacies to be completed and emailed to the research team.

The pilot test

A pilot test was conducted on a convenience sample of 11 community pharmacists, other than the study sample. These community pharmacists were informed about the study purpose and were asked to complete a self-administered questionnaire. Afterwards, their feedback in relation to the clarity and understandability of the questionnaire was obtained. Some participants recommended adding additional factors that might contribute to DEs, such as lack of technical resources (e.g. Internet access), and the involvement of pharmacy technicians in drug dispensing. Minor amendments were made by the research team accordingly. Data obtained from the pilot tests were not included in the study results.

Statistical analysis

Data were analysed using the 24th version of the Statistical Package for the Social Sciences (SPSS, International Business Machines Corp., Armonk, New York, USA). Descriptive data were presented as frequencies and percentages for categorical variables, while continuous variables were represented by mean and standard deviation (SD). The associations between variables were analysed using Pearson's Chi-square and Mann–Whitney U tests. Differences were considered significant at $p < 0.05$.

Results

Only 171 community pharmacists (61%), out of our sample (n = 280), completed and returned the survey (Figure 1). The remaining pharmacies were recontacted by phone, but they did not respond. Tables 1 and 2 summarise relevant pharmacy and pharmacist information, respectively. Approximately 68% of the pharmacists believed that DEs were common, and 52% believed that the incidents of these errors were increasing.

Several factors were found to contribute to the occurrence of DEs by pharmacists. The scores of the impact of each factor on a scale of 0–4 are presented in Table 3 by the mean ± SD. The factors with the strongest impact included unreadable prescriptions, incomplete prescriptions, workload, multitasking, similarity in names of medications, interruption, and fatigue. In addition, Table 4 reveals the views and perceptions of pharmacists about the strategies that could be implemented in community pharmacies to decrease the risk of DEs. The same previous scale was used to record pharmacists' perceptions, where the most favoured strategies included collaboration with physicians, improving prescription handwriting, improving patient counselling, issuing national error-reporting guidelines, and introducing electronic prescriptions. The pharmacists' perceptions about the most common types of DEs are illustrated in Table 5, which shows giving incomplete instructions to patients was the most common. When pharmacists were asked about the reasons behind the underreporting of DEs, their answers revealed that the most common reasons were the absence of an obligation to report and the lack of a reporting system in the country, as shown in Table 6.

Pearson's Chi-square test and Mann–Whitney U test were used to assess the association between various variables

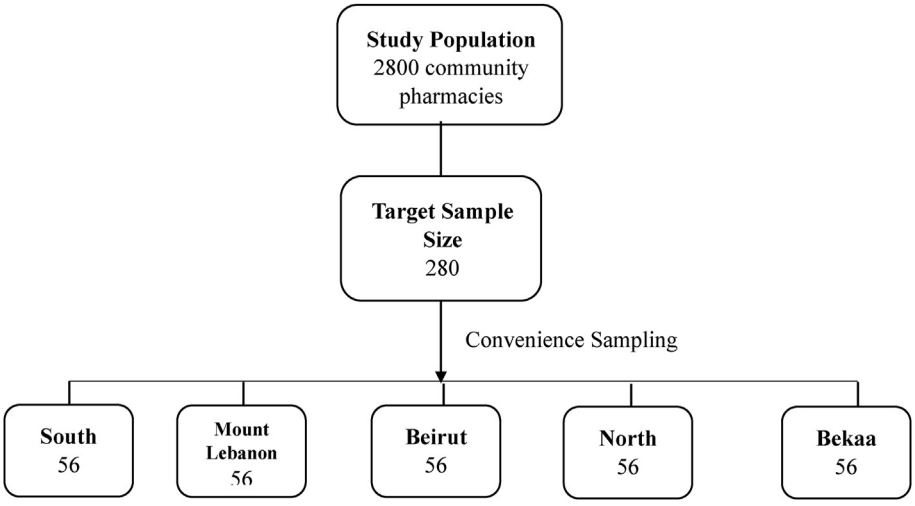

Figure 1: Study Design Flowchart.

Table 1: Pharmacy information (n = 171).

Information	n (%)
Geographic location	
Beirut	54 (31.6)
Mount Lebanon	38 (22.2)
South	58 (33.9)
Bekaa	15 (8.80)
North	6 (3.50)
Pharmacy design	
Traditional counter	157 (91.8)
Waiting and counselling area	14 (8.20)

Table 2: Pharmacist information (n = 171).

Information	n (%) or mean ± SD
Age group	
23–35	149 (87.1)
≥36	22 (12.9)
Education level	
Bachelor's degree	114 (66.7)
Postgraduate studies	57 (33.3)
Work experience in community pharmacy	
0–4 years	95 (55.6)
5–9 years	53 (31.0)
10–14 years	14 (8.2)
15–20 years	4 (2.3)
≥20 years	5 (2.9)
Position in the pharmacy	
Owner	63 (36.8)
Employee	108 (63.2)
Working hours per day	4.55 ± 1.84
<7 h	54 (31.6)
≥7 h	117 (68.4)
Average prescriptions per day	
<20	61 (35.7)
20–50	77 (45.0)
>50	33 (19.3)
Pharmacist's perception that DEs are common	
Yes	116 (67.8)
No	55 (32.2)
Pharmacist's perception that the rate of DEs is increasing	
Yes	88 (51.5)
No	83 (48.5)

DEs, dispensing errors; ***SD***, standard deviation.

(related to the pharmacy and pharmacists) and the pharmacists' perceptions. These perceptions included the factors thought to increase DEs, the strategies believed to minimise errors, and the most common types of DEs (demonstrated earlier in Tables 3–5). Workload ($p = 0.029$), multi-tasking ($p = 0.007$), and lack of time for patient counselling (P = 0.008) were significantly perceived as the main contributors to DEs among employees. Interruptions ($p = 0.015$) and pharmacy technicians involved in dispensing ($p = 0.012$) were the main factors contributing to DEs among pharmacists older than 36 years. Noise ($p = 0.010$), interruptions ($p = 0.010$), being the sole pharmacist ($p = 0.030$), and similar drug names ($p < 0.001$) were considered the main

Table 3: Factors believed to increase dispensing errors.

Factors	Mean ± SD[a]
Workload	2.67 ± 1.03
Multi-tasking of pharmacists	2.64 ± 1.14
Extended working hours (>8 h/day)	2.19 ± 1.19
Inadequate staff	2.35 ± 1.26
Being the sole pharmacist	2.39 ± 1.23
Low income	1.84 ± 1.36
Pharmacy technicians involved in dispensing	2.18 ± 1.32
Fatigue	2.50 ± 1.06
Lack of time for patient counselling	2.21 ± 1.19
Interruption by others	2.54 ± 1.18
Noise	1.63 ± 1.24
Inadequate pharmacy space	2.05 ± 1.21
Insufficient pharmacy lighting	1.17 ± 1.22
Disorganised medications on shelves	1.39 ± 1.26
Insufficient drug information resources	1.72 ± 1.37
Incomplete prescriptions	2.90 ± 1.07
Unreadable prescriptions	3.02 ± 1.09
Similarity of medication names	2.54 ± 1.10
Similar medication labels and packages	2.21 ± 1.22

[a] Mean ± standard deviation (SD) of the scores of the used scale, where 0 = no effect, 1 = little effect, 2 = moderate effect, 3 = strong effect, and 4 = very strong effect.

factors associated with DEs in the Beirut region in reference to Mount Lebanon, while pharmacy technicians involved in dispensing ($p = 0.010$) were the main reasons for DEs in the South region. Significant associations between pharmacists'

Table 4: Strategies perceived to reduce the risk of dispensing errors.

Strategies	Mean ± SD[a]
Collaboration with physicians	3.35 ± 0.87
Enforcing prescription double-checking before dispensing	3.25 ± 0.88
Improving prescription handwriting	3.30 ± 0.95
Establishing non-punitive measures to encourage pharmacists to report errors	3.04 ± 0.90
Enforcing patient counselling at dispensing	3.09 ± 0.84
Assigning a private area for counselling	2.88 ± 0.92
Having more than one pharmacist per shift	2.91 ± 0.99
Issuance of national guidelines and strategies to limit dispensing errors	3.04 ± 1.05
Assigning specific tasks to each pharmacy staff	2.85 ± 1.10
Using electronic prescriptions	3.03 ± 1.15
Improving medication labelling and packaging	2.84 ± 1.13
Having regular resting and meal breaks	2.67 ± 1.10
Getting paid for clinical services	2.50 ± 1.24

[a] Mean ± standard deviation (SD) of the scores of the used scale, where 0 = no effect, 1 = little effect, 2 = moderate effect, 3 = strong effect, and 4 = very strong effect.

Table 5: Pharmacists' perceptions about the most common types of dispensing errors.

Dispensing errors	Mean ± SD[a]
Dispensing wrong medications	1.63 ± 1.27
Dispensing wrong doses	1.67 ± 1.15
Dispensing wrong dosage forms	1.51 ± 1.11
Giving incomplete instructions	1.93 ± 1.16
Dispensing medications that are known to have major drug–drug interactions	1.25 ± 1.02
Dispensing contraindicated medications	1.29 ± 1.07

[a] Mean ± standard deviation (SD) of the scores of the used scale, where 0 = no effect, 1 = little effect, 2 = moderate effect, 3 = strong effect, and 4 = very strong effect.

Table 6: Reasons for underreporting dispensing errors (n = 171).

Reasons	n (%)
No obligations to report	100 (58.5)
No system of reporting	95 (55.6)
Fear of blame by patients	72 (42.1)
No legal protection for pharmacists	69 (40.4)
Fear of punishment (e.g. being fired)	64 (37.4)
No time to report (heavy workload)	63 (38.8)
Fear of blame by colleagues/employers	62 (36.3)
Most current errors do not harm the patient	46 (26.9)
No preventive actions will be taken by authorities after reporting	41 (24.0)
No incentive to report	37 (21.6)
There is no need to report	34 (19.9)
Reporting procedures are expected to be complicated and lengthy	26 (15.2)

Table 8: Significant[a] association[b] between the pharmacists' perceived strategies to reduce the risk of dispensing errors, and variables related to pharmacy and pharmacist.

Strategies	Age between 23 and 35 years	Position in the pharmacy (employee)
Having more than one pharmacist per shift	–	0.001
Assigning specific tasks to each pharmacy staff	0.003	0.003
Having regular resting and meal breaks	0.007	0.036
Getting paid for clinical services	0.013	–

[a] Statistical significance at $p < 0.05$.
[b] Pearson's Chi-square test and Mann–Whitney U test were used to assess the association.

Table 9: Significant[a] association[b] between the pharmacists' perceptions about the most common types of dispensing errors, and variables related to pharmacy and pharmacists.

Dispensing errors	Age ≥36 years old	Education level (Bachelor's)	Average prescriptions per day >50
Dispensing wrong medications	–	–	0.010
Dispensing wrong doses	–	0.023	0.010
Dispensing wrong dosage forms	–	0.033	–
Giving incomplete instructions	–	0.018	–
Dispensing medications that are known to have major drug–drug interactions	–	–	0.030
Dispensing contraindicated medications	0.008	–	0.010

[a] Statistical significance at $p < 0.05$.
[b] Pearson's Chi-square test and Mann–Whitney U test were used to assess the association.

Table 7: Significant[a] association[b] between the pharmacists' perceived factors that contribute to increased dispensing errors, and variables related to pharmacy and pharmacists.

Factors	Age ≥36 years	Education level (postgraduate)	Position in the pharmacy (employee)	Geographic location
Workload	–	–	0.029	–
Multi-tasking of pharmacists	–	0.014	0.007	–
Being the sole pharmacist	–	–	–	0.030[c]
Pharmacy technicians involved in dispensing	0.012	–	–	0.010[d]
Lack of time for patient counselling	–	–	0.008	–
Interruption by others	0.015	–	–	0.010[c]
Noise	–	–	–	0.010[c]
Similarity of medication names	–	–	–	<0.001[c]

[a] Statistical significance at $p < 0.05$.
[b] Pearson's Chi-square test and Mann–Whitney U test were used to assess the association.
[c] Beirut.
[d] South.

perceptions and the aforementioned variables are summarised in Tables 7–9.

Other statistical analyses revealed that the variables of age (23–35 years), employee position, and the average number of daily prescriptions of 20–50 were associated with pharmacists' perception that DEs are common ($p = 0.020$, < 0.001, and 0.010, respectively). Finally, community pharmacy work experience of < 9 years and the ages between 23 and 35 were found to be associated with the pharmacists' perception that the risk of DEs is increasing ($p = 0.010$, and 0.046, respectively).

Discussion

In Lebanon, there is a lack of knowledge about dispensing error rates in community pharmacies, as well as an absence of a validated and well-recognised reporting system that encourages pharmacy staff to report them. Therefore, this is perhaps the first study to address the perception of community pharmacists in Lebanon toward the nature and causes of DEs, as well as the current practice in reporting them. Thus, the study will help guide future interventions to improve community pharmacy practices in Lebanon, aiming to establish national policies in this regard.

The main contributing factors to DEs, recognised by the respondents, were incomplete or unreadable prescriptions, in addition to a high workload and similarity in drug names. These factors have also been identified in other studies as the major causes of DEs.[27–29] It was also reported that 25% of pharmacists had misread illegible handwritten prescriptions, which, in turn, may lead to serious and fatal errors in dispensing medicines.[29] In addition, pharmacists face daily challenges in reading and interpreting incomplete and illegible prescriptions. They may be reluctant to contact prescribers to find out about the prescribed medication, either because of the prescribers' unspecified contact numbers or fear of embarrassment or rejection.[30] In Lebanon, pharmacists commonly share confusing prescriptions with their colleagues on convenient platforms, soliciting help to read them. However, this may increase the chances of DEs when there are different interpretations of the prescriptions. Therefore, prescribers should meet the basic requirements of a medical prescription, which include the medication's name, dose, and dosage form with complete instructions of use, either legibly handwritten or electronically generated. The prescription must also be signed and stamped by the prescriber, whose contact number must also be indicated.

The current study has also revealed the need to enforce the use of electronic prescribing, which is applied on a very small scale in some hospitals in Lebanon. The impact of electronic prescriptions on reducing the incidence of medication errors by more than 50% has been well documented.[27] Furthermore, DEs may be reduced when pharmacists are granted access to patient information through electronic medical records. Otherwise, the indication for the medication should be mentioned on the regular prescription with proper patient counselling.[31]

Our results also indicated that frequent interruptions and the involvement of pharmacy technicians in the dispensing process were among the main factors contributing to DEs, as viewed by pharmacists older than 35 years of age. This may be due to the fact that senior pharmacists are always occupied with multiple tasks and a heavy workload and are frequently interrupted by others. This may distract them from focusing on decoding handwritten prescriptions, leading to DEs. This is supported by our findings, where high workloads and multi-tasking had also contributed significantly to DEs. Remarkably, pharmacists from the South region of Lebanon viewed the intrusion of pharmacy technicians as a significant contributing factor to DEs. This could be explained by the fact that southern community pharmacies are solely operated by technicians, who are less trained, less experienced, and require close supervision by pharmacists. This issue also raises important concerns about the lack of authoritarian inspection of community pharmacies in this region.

Interestingly, we found a gap between pharmacists' perceptions of factors associated with DEs and their selected strategies to prevent them. All the proposed strategies were chosen by the pharmacists in close proportions, which is consistent with the results of several other studies.[32–34] These results provide evidence that pharmacy staff could not distinguish between the perceived factors associated with DEs and the appropriate strategies to prevent them. This indicates that Lebanese community pharmacists have insufficient knowledge of the concept and application of medication safety practices. Therefore, the roles and responsibilities of pharmacists in preventing and reporting DEs must be emphasised in the undergraduate curriculum and during their training period, and reinforced during real practice.[35]

The most commonly reported type of DEs in this study was the delivery of incomplete instructions about the use of the medicine, which was also supported by previous studies.[15,36] This result could be interpreted by the fact that community pharmacists are commonly multitaskers with excessive workload and time pressure, which leads to a lack of time for perfect patient counselling. Regardless of the circumstances, patients must be offered enough time to learn about the benefits and risks of the treatment for their safety. It should also be noted that almost all pharmacies in the current study sample were designed using traditional dispensing and cashier counters, which is the common model in all of Lebanon's community pharmacies. This design does not offer privacy or facilitate optimal delivery of patient care services.[37] This is because patients usually tend not to disclose their medical information unless their privacy is maintained. Therefore, it is essential to add private counselling areas in community pharmacies.

The main reasons for underreporting DEs in this study included the lack of an effective system of reporting, which is unfortunately true. Moreover, around one-third of the pharmacists reported the fear of being blamed by patients, colleagues, and/or employers, in addition to the fear of punishment, which reflects the effect of the culture of blame on the reporting practice. Therefore, the Ministry of Public Health and the Lebanese Pharmacovigilance National Center should establish a progressive, and initially at least, non-punitive reporting system to encourage pharmacists to practice reporting under the umbrella of patient safety.

It was thought that more experienced pharmacists would report that DEs are common and increasing. However, this

study revealed that younger pharmacists and those with less than nine years of professional experience were more aware of this issue. This can be justified by the fact that the subject of medication safety has been newly embedded in the pharmacy curriculum in Lebanon, which may have resulted in better recognition and identification of errors among new graduates.

Finally, it is highly recommended to increase the number of pharmacists who work on the same shift in every pharmacy, especially in southern Lebanon. Studies that estimate the risk of DEs by community pharmacists in Lebanon are recommended to follow the current one.

We were not able to increase the sample size of the community pharmacies to more than 10% or to use random sampling because we had only two research assistants available to travel across the country. In addition, moving across the country was difficult because of the lockdown due to the COVID-19 outbreak. Moreover, the distribution of the questionnaire online or through the telephone was not expected to yield a high response rate. This is supported by the fact that only 61% of the visited pharmacies returned the answered forms despite our best efforts to communicate with non-responders. They were expected to be overloaded with multiple tasks, as per our findings.

Conclusions

Dispensing errors by community pharmacies in Lebanon were found to be highly associated with the quality of the prescription, a high workload, and the involvement of pharmacy technicians in dispensing. Moreover, the absence of an obligation to report and the absence of a valid, well-recognised system of reporting DEs were the main factors contributing to the underreporting behaviour of pharmacists.

Electronic prescribing, easy access to electronic medical records by pharmacists, and the establishment of a fair reporting system by the health authorities in Lebanon are expected to reduce the error rates and encourage the reporting behaviour of pharmacists. It is highly recommended to emphasise patient safety in the pharmacy curriculum in Lebanon and to spread this culture among pharmacists through continuing education. Further studies on the actual prevalence and types of DEs committed by Lebanese community pharmacists are also recommended.

Source of funding

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Conflict of interest

The authors have no conflict of interest to declare.

Ethical approval

The World Medical Association Declaration of Helsinki guidelines was followed to design and conduct this study.[38] The study protocol was approved by the Institutional Review Board of Beirut Arab University (No. 2021-H-0073-P-R-0446). Written informed consent was obtained from all respondents after the nature and purpose of the study were explained to them, and after assuring them that the collected data would be kept confidential and anonymous.

Authors contributions

Study conception and design: SK and HMJK; analysis and interpretation of results: RI and LK; manuscript draft: SK and RI; and manuscript revision: HMJK. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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