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RESEARCH ARTICLE

Assessment of patients' knowledge and practices regarding their medication use and risks in Lebanon

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Abstract *Background* Patients' knowledge of their medications play a pivotal role in their disease management. *Objective* Assess the knowledge and practices of Lebanese outpatients regarding their own medication use and risks. *Setting* Four hundred and sixty community pharmacies across Lebanon. *Method* It was a cross-sectional study performed from March through May 2016 among Lebanese outpatients, using a self-administered questionnaire. Descriptive statistics were used to calculate all participants' responses. The association between categorical variables were evaluated using Pearson χ^2 test or Fisher's exact test. Binary logistic regressions were performed to identify factors associated with medication patients' knowledge and interest. *Main outcome measure* Ability of the patients to identify own medications' elements: name, strength, dosage regimen, indication, and adverse drug reactions. *Results* Our study comprised 921 patients, with around 16% taking ≥5 medications/day. Around 56% of our patients showed sub-optimal medication knowledge. Patients' higher educational level, number of chronic diseases, and patient physician interaction were associated with higher medication knowledge. Many patients admitted not discussing their medications each time they visit their physicians (38.7%); not reading the leaflet of each medication they take (61.2%); and not regularly asking their pharmacist about the potential interactions of OTC drugs with prescribed medications (53.9%). *Conclusion* This study showed suboptimal medication-related knowledge, and suboptimal patient's interactions with primary care givers. Our findings serve as a platform for healthcare providers to understand patients' needs and educate them about medication use and risks.

Keywords Adverse drug reactions · Community pharmacies · Knowledge · Lebanon · Medication · Outpatients

Impacts on practice

- Patients with higher level of education, and multiple chronic diseases were significantly associated with higher medication knowledge.
- Patients who actively seek physician's advice about their own medications and receive information related to potential ADRs of the medications show higher medication knowledge.

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- There are 40% more chances of reading the drug leaflet if a Lebanese patient is female.
- Patients, especially those with lower educational level, should be adequately educated and instructed to their medication main elements (name, strength, dosage, regimen, indication, and adverse drug reactions) to reduce potential adverse drug events.

Introduction

In recent years, outpatients are considered to be active receivers of drug therapy [1, 2]. And patients' medication knowledge plays a pivotal role in the disease management, as it was shown to be positively correlated with a higher quality of life, adherence to treatment, and attainment of favorable clinical outcomes [3–7]. Many outpatients take one or more prescription drugs, in combination with multiple self-prescribed OTC medications. Such regimens increase the chance of drug interactions and potential toxicity [8]. Accordingly, patients should be adequately instructed, and provided with the necessary information and skills of dosing, administration and monitoring to safeguard their health and improve their health status [9]. Patients' medication knowledge can also be enhanced via several practices such as reading the drug information leaflets and improving the interaction with the primary care givers [10–12]. Along the same lines, national and international regulatory bodies encourage patients to read the drug information leaflet for better use of their medications. The leaflet contains the essential information which patients need to enable them to use the medicine safely and effectively [13, 14]. Furthermore, patients should be encouraged to inquire about the potential interactions of their medications. The national patient safety foundation (NPSF) endorses educative initiatives encouraging patients to ask questions every time they talk with a health care provider or acquire their medicine [15].

Studies assessing patients' knowledge about prescribed drugs showed suboptimal medication knowledge among patients in community pharmacies and primary care facilities, when they were asked to recall different medication-related information such as drug names, dosage regimens, and potential adverse drug reactions (ADRs) [4–6, 16–18].

Similarly to most developing countries, several factors in Lebanon may increase the risk of polypharmacy, inappropriate medication use and potential adverse drug events. Those factors include: (a) fragmented care, (b) easy-accessibility to medications, and (c) financial constraints causing many patients to bypass physicians and obtain medications directly from pharmacies without adequate diagnosis and monitoring [19]. Studies assessing medication use in Lebanon addressed limited topics related to patient adherence to their prescribed regimen [20, 21], appropriateness of medication regimens [22–24], and some aspects of medication prescribing errors [25]. These studies showed suboptimal medication adherence and therapy monitoring, inappropriate medication use among Lebanese outpatients, and occurrence of prescribing medication errors in Lebanese hospitals [20–26]. However, no studies assessing outpatients' knowledge of their prescribed medications and related risks are available in Lebanon. Similarly, no known studies have assessed practices that can enhance medication knowledge such as reading the drug information leaflets and interacting with the primary care givers.

Aim of the study

The primary objective of this study was to evaluate medication-related knowledge and practices of Lebanese outpatients. Secondary objectives were to assess potential determinants of patients' knowledge and interest in their medication use and risks.

Ethics approval

The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments. The Lebanese American University' Review Board has approved the study (IRB approval #00006954). All participants provided oral informed consent to participate in the study.

Methods

Study design and setting

This was a cross-sectional observational study performed from March through May 2016, among Lebanese outpatients visiting a sample of 460 community pharmacies across Lebanon. The pharmacies were selected by convenience sampling, from the list of active community pharmacies obtained from the Order of Pharmacists of Lebanon. The first two patients visiting the pharmacy during the investigator's presence and agreeing to participate were randomly selected.

Study participants

Patients were eligible for the study if they were Lebanese, aged 18 years or older, visiting a community pharmacy,

receiving at least one medication, and willing to participate in the study.

Data collection tool

A questionnaire was designed to elicit patients' relevant information. The questionnaire was originally derived from the World Health Organization "Patient Questionnaire about Medication Safety" [27]. It was then adapted to the Lebanese context. Additional questions were also adapted from a study by Okuyan et al. that assessed medication knowledge and adherence among patients at 60 community pharmacies in Istanbul [6]. Those questions were added to align with the study objectives. The final questionnaire addressed the following areas: (1) patients' sociodemographic characteristics and medical condition; (2) elements of medication knowledge; and (3) medication-related practices and experience, directed to depict risk-prone behaviors and interest in medication use and risks. Throughout the questionnaire, frequency was measured using a five-point Likert scale with answer categories ranging from always (5) to never (0).

Assessing medication-related knowledge

Patients were asked to cite the name, strength and dosage regimen of each medication they were taking at the time of the interview, along with the indication, and any potential ADR they know may be caused by these medications. The answers, provided by each patient, were analyzed according to each of the following 5 elements: name (brand or generic), strength, dosage regimen, indication, and potential ADRs (at least one ADR per drug). For each element, patients' answers were analyzed as follows: (1) Patients who knew the answer for <50% of their medications –score of 0–; 2) Patients who knew the answer for ≥50% of their medications, but not 100% –score of 1–; and 3) Patients who knew the answer for all of their medications –score of 2–. An index for total medication knowledge (additive score) was then created, with a minimum score of zero and a maximum score of 10 (patients who knew all the answers for all the 5 elements of their medications). Accordingly, the patient's "total medication knowledge" was classified as follows: sub-optimal medication knowledge (Index score of 0–7); and optimal medication knowledge (Index score of 8–10).

Data collection process

Properly trained investigators approached patients for consent on voluntary participation, and assurance of personal data confidentiality. After obtaining consent, the self-administered questionnaire was filled by the patients. The questionnaire was pilot-tested before administration, to ensure validity and clarity of included questions.

Sample size calculation

Sampling statistics were based on the aforementioned study by Okuyan et al. [7] where prevalence of adequate medication knowledge among outpatients was reported to be around 64.5%. Estimating the Lebanese population size to be around 5,000,000 [28], the following formula allowed to calculate the minimal sample size $= 1.96^2 * 0.645(1 - 0.645)/0.05^2 = 352$, with a power to provide 95% confidence interval with 5% confidence limit [29]. Given that we would take 2 patients from every pharmacy to improve the representability of the sample, the design effect would be 2, and the minimal sample size to take would be 704 patients. Additional 30% of patients were recruited to take into account the possibility of missing values on some questions. The total sample size was thus defined to be 920 patients to be interviewed from 460 community pharmacies.

Data management and statistical analysis

Once the data was collected, the information was coded, entered into SPSS software (version 23), verified for data entry errors, and analyzed. Descriptive statistics were used to report all participants' responses. Continuous variables were described using means and standard deviations. Categorical variables were described using frequencies. For the bivariate and the multivariable analysis, the five-point Likert scale was dichotomized into Yes (always/very often) and No (sometimes/rarely/never). The association between categorical variables was evaluated using Pearson χ^2 test or Fisher's exact test where the expected cell count <5. Binary logistic regressions were performed to identify factors that affect dichotomous dependent variables, using backward LR method. Results are assumed to be significant when $p < 0.05$ for all statistical analysis.

Results

Patients' socio-demographics characteristics and medical condition

The study comprised 921 patients from different geographical areas around Lebanon.

Study participants had almost equal gender distribution; had a mean age of 53.3 years old (SD 16.5); and were mostly married (72.7%). Patients had different educational levels ranging from illiterate (4.5%) to doctoral degrees (2.2%), and had different employment statuses (27%

employed, 22.4% self-employed, 29% unemployed, and 14.3% retired). Most of the study participants (39.7%) were medically covered by the national social security fund. When examining patients' health condition, 47.6% of the study participants reported having ≥3 concomitant chronic diseases, and around 16% taking ≥5 medications/day (Table 1).

Medication-related knowledge

Analysis of the patients' answers per element showed the following: around 82% of the patients knew the names of all the medications they were taking, 54.2% knew all the strengths, 74.4% knew all the dosage regimens, 54.8% knew all the indications, and only 2.1% knew potential ADRs of all of their medications (Fig. 1).

Following the classification previously detailed in the methodology, 55.7% of the participants were considered to have sub-optimal medication knowledge, while 38.8% demonstrated optimal medication knowledge.

Outpatients' medication-related practices

Several findings that might compromise medication safety at the level of medication acquisition and intake were identified in this study. The findings include: (a) Acquiring their medications from different pharmacies (10.5%); (b) Not taking into account counseling when selecting the pharmacy (77.5%); (c) Using non-calibrated measures for intake of liquid medications (76.6% for teaspoon and tablespoon); and (d) Having a neighbor/relative administer injectable medications (14.1%). Furthermore, many patients reported the followings: (a) Not discussing the medications that they take each time they visit the physicians (38.7%); (b) Not reading the leaflet of each medication they take (61.2%); and (c) Not asking about the possible interactions between the over-the-counter drugs that they are buying and the medications they already take (53.9% for sometimes, rarely, and never) (Table 2).

Outpatient experience with the primary care givers

The findings revealed that physicians did not regularly assess medication history (25.4%); and inquire about previous ADRs (46.1% for sometimes, rarely, and never) before prescribing the new drug(s). Moreover, the results have consistently shown lower rates (always/very often) of patient counseling by physicians compared to pharmacists regarding drug interactions (35.4 and 81.9% respectively), potential ADRs (38.1 and 69.7% respectively), missed doses (32.9 and 59.4% respectively), and accidental overdose (31.1 and 52.4% respectively) (Table 3).

Table 1 Sociodemographic characteristics and medical condition

Characteristic	Frequency (%)[a]
Gender	
Male	444 (48.2)
Female	461 (50.1)
Age (years)	
Mean age	53.3
Minimum	19
Maximum	95
Standard deviation	16.5
Marital status	
Single	139 (15.1)
Married	670 (72.7)
Widowed	89 (9.7)
Divorced	17 (1.8)
Level of education	
Illiterate	41 (4.5)
Elementary school	138 (15)
Complementary school	141 (15.3)
High school	208 (22.6)
Some university/college courses	130 (14.1)
Bachelor degree	146 (15.9)
Master's degree	82 (8.9)
Doctoral degree	20 (2.2)
Employment status	
Student	22 (2.4)
Self-employed	206 (22.4)
Employed	249 (27)
Unemployed	267 (29)
Retired	132 (14.3)
Healthcare coverage	
NSSF	366 (39.7)
MOH	46 (5)
Private insurance	157 (17)
Self-payer	170 (18.5)
Other (Army, COOP)	160 (17.4)
Geographic area of residence	
Beirut	135 (14.7)
Mount Lebanon	461 (50.1)
North	6 (0.7)
Bekaa	149 (16.2)
South/Nabatiyye	164 (17.8)
Number of chronic diseases per patient	
1	183 (19.9)
2	299 (32.5)
3	199 (21.6)
4	148 (16.1)
5	68 (7.4)
6	15 (1.6)
7	8 (0.9)

Table 1 continued

Characteristic	Frequency (%)[a]
Number of medications taken at home every day	
1	68 (7.4)
2	181 (19.7)
3	260 (28.2)
4	178 (19.3)
5	84 (9.1)
≥6	63 (6.8)
Missing	87 (9.4%)
Intake of any oral liquid medication	
Yes	57 (6.2)
No	859 (93.3)
Intake of any inhaled medication	
Yes	60 (6.5)
No	858 (93.2)
Intake of any patch medication	
Yes	12 (1.3)
No	907 (98.5)
Intake of any injectable medication	
Yes	88 (9.6)
No	832 (90.3)

[a] Sometimes the cumulative percentages may not reach 100% due to missing values. When missing values are less than 10%, they were not reported explicitly

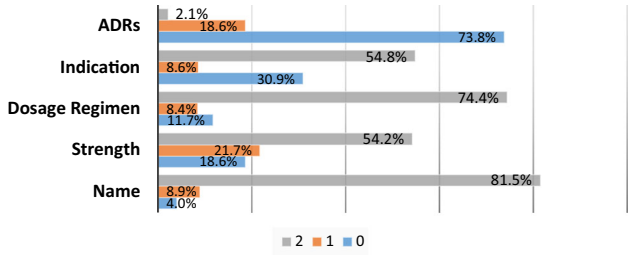

Fig. 1 Medication-related knowledge per element. *ADRs* adverse drug reactions; *0* patients who knew the answer for <50% of their medications; *1* patients who knew the answer for ≥50% of their medications; *2* patients who knew the answer for all of their medications

Determinants of patients' medication knowledge

In the multivariable analysis, several variables were positively associated with higher total medication knowledge. A higher level of education ($p = 0.035$) and a higher number of chronic disease ($p = 0.026$) were significantly associated with higher medication knowledge. Furthermore, patients who initiated the discussion about the medications with the physicians ($p = 0.02$), and who were counseled by the physicians about potential ADRs of the medications showed higher medication knowledge ($p = 0.012$) (Table 4).

Determinants of medication-related practices

Reading the leaflet

The multivariable analysis showed that being a female (ORa 1.429; 95% CI 0.972–0.995; $p = 0.041$), having a higher educational level ($p < 0.001$), and physicians counseling patients about the potential ADRs of prescribed medications (ORa 1.804; 95% CI 1.248–2.609; $p = 0.002$) were all positively associated with reading the leaflet, while increased age was inversely associated with reading the leaflet (ORa 0.983; 95% CI 0.972–0.995; $p = 0.005$) (Table 5).

Asking the pharmacist about potential interactions of OTC drugs with their medications

In the multivariable analysis, several variables remained positively associated with patients asking the pharmacists about potential interactions of OTC drugs with their medications. Those variables are: (a) level of education ($p = 0.001$), (b) geographic area of residence ($p < 0.001$), (c) physicians inquiring about previous ADRs before prescribing a new drug (ORa 1.540; 95% CI 1.064–2.229; $p = 0.022$), and (d) physicians providing counseling about the potential ADRs of the prescribed medications (ORa 2.385; 95% CI 1.628–3.495; $p < 0.001$) (Table 5).

Discussion

The results of this study showed suboptimal total medication knowledge in 55.7% of the sample population, and highlighted a set of risk-prone practices performed by the study group.

Medication-related knowledge

The study sheds lights on various elements of medication-related information retained by the patients. In terms of knowledge, "medication name" captured the highest recall among patients with 82%, followed by "dosage regimen" (74.4%), "indication" (54.8%), "strength" (54.2%), and "ADRs" (2.1%). In a study assessing patient medication knowledge in Turkey, only 10.9% of patients could recall their drugs' names correctly as soon as they leave the physician's office [18]. The higher knowledge percentage for medication name obtained in our study could be partially attributed to the difference in the study setting, i.e. in the community pharmacy, the medication name is explicitly mentioned by the patient compared to physician's office.

Table 2 Outpatients' medication-related practices

Outcome	Frequency (%)[a]
Source of medication acquisition	
Same pharmacy	783 (85)
Different pharmacies	93 (10.5)
Other (Dispensaries, Lebanese Ministry of Public Health…)	21 (2.3)
Preference for pharmacy selection (check all that apply)	
You know/trust the Pharmacist	616 (66.9)
Insurance selection	24 (2.6)
Proximity to work	108 (11.7)
Proximity to house	337 (36.6)
Easy access and Parking	82 (8.9)
You get discount	28 (3)
You get counseling	207 (22.5)
Tools used to measure liquid dose of medication	
Teaspoon	5 (8.3)
Tablespoon	41 (68.3)
Calibrated cup	5 (8.3)
Calibrated syringe	2 (3.3)
Administration of injectable medication performed by	
Self	37 (43.5)
Neighbor/relative	12 (14.1)
Pharmacist, at home	6 (7.1)
Pharmacist, at the pharmacy	19 (22.4)
Doctor/nurse at home	6 (7.1)
Healthcare provider in outpatient clinics	3 (3.5)
Discussion of prescribed medications with physician during visit/consultation	
Always	289 (31.4)
Very Often	252 (27.4)
Sometimes	247 (26.8)
Rarely	79 (8.6)
Never	30 (3.3)
Initiation of medication-related discussion	
Physician	265 (28.8)
Patient	505 (54.8)
Accompanying person	72 (7.8)
Reading the leaflet of each medication	
Always	160 (17.4)
Very often	170 (18.5)
Sometimes	214 (23.2)
Rarely	157 (17)
Never	194 (21.1)
Asking about possible interactions with prescribed medications while getting the OTC's from the pharmacy	
Always	186 (20.2)
Very often	213 (23.1)
Sometimes	259 (28.1)
Rarely	125 (13.6)
Never	112 (12.2)

[a] Sometimes the cumulative percentages may not reach 100% due to missing values. When missing values are less than 10%, they were not reported explicitly

Table 3 Outpatient experience with the primary care givers

	Always	Very often	Sometimes	Rarely	Never
Outpatient experience with the treating physician[a]					
Physician assessing medication history before prescribing a new drug	394 (42.8)	276 (30)	154 (16.7)	56 (6.1)	24 (2.6)
Physician providing counseling about drug interactions	119 (12.9)	207 (22.5)	282 (30.6)	189 (20.5)	111 (12.1)
Physician providing counseling about missing doses	116 (12.6)	187 (20.3)	246 (26.7)	193 (21)	160 (17.4)
Physician providing counseling about accidental overdose	120 (13)	167 (18.1)	203 (22)	220 (24.3)	194 (21.1)
Physician inquiring about previous ADRs before prescribing a new drug	204 (22.1)	277 (30.1)	264 (28.7)	118 (12.8)	42 (4.6)
Physician providing counseling about potential ADRs	124 (13.5)	227 (24.6)	332 (36)	153 (16.6)	71 (7.7)
Outpatient experience with the pharmacist[a]					
Pharmacist providing counseling about drug interactions	356 (38.7)	398 (43.2)	107 (11.6)	32 (3.5)	11 (1.2)
Pharmacist providing counseling about missing doses	228 (24.8)	319 (34.6)	234 (35.4)	79 (8.6)	42 (4.6)
Pharmacist providing counseling about accidental overdose	223 (24.2)	263 (28.2)	231 (25.1)	117 (12.7)	63 (6.8)
Pharmacist providing counseling about potential ADRs	267 (29)	375 (40.7)	213 (23.1)	35 (3.8)	20 (2.2)

[a] Sometimes the cumulative percentages may not reach 100% due to missing values. When missing values are less than 10%, they were not reported explicitly

Table 4 Total medication knowledge—multivariable analysis

Variable	ORa	Confidence interval	*p* value
Educational level (Illiterate being the reference)			0.035
Elementary school	2.748	1.057–7.147	0.038
Complementary school	1.857	0.705–4.894	0.211
High school or equivalent	2.961	1.155–7.589	0.024
Some university/college courses	2.943	1.094–7.921	0.033
Bachelor degree	4.409	1.631–11.921	0.003
Master's degree	3.782	1.303–10.975	0.014
Doctoral degree	1.531	0.369–6.346	0.557
Marital status (single being the reference)			0.125
Married	1.065	0.606–1.872	0.826
Widowed	0.976	0.458–2.079	0.950
Divorced	7.354	1.353–39.955	0.021
Number of chronic disease	1.168	1.018–1.341	0.026
Source of medication acquisition (same pharmacy being the reference)			0.098
Different Pharmacies	1.751	1.036–2.960	0.036
Other	0.774	0.235–.551	0.674
Initiation of medication-related discussion (Physician being the reference)			0.020
Patient	1.717	1.212–2.379	0.009
Accompanying person	1.319	0.706–2.465	0.385
Physician providing counseling about potential ADRs ("No" being the reference)	1.530	1.097–2.136	0.012

Variables with a *p* value of 0.2 or less in the bivariate analysis were included in the initial model. Those include: gender, marital status, educational level, healthcare coverage, geographical area of residence, number of chronic diseases, number of medications/day, taking liquid medications, taking patch medications, source of medication acquisition, discussing their medications each time they visit the physician, initiating the discussion about the medications with the physician, and physicians providing counseling about potential ADRs. Categorical variables identified: marital status, educational level, healthcare coverage, geographical area of residence, and source of medication acquisition, and initiating the medication discussion with the physician. Using a Backward LR method, the model finally retained the variables shown in this table. Hosmer and Lemshow test for sample adequacy *p* value: 0.383

Table 5 Medication-related practices—multivariable analysis

Variable	ORa	Confidence interval	*p* value
Reading the leaflet—multivariable analysis[a]			
Age	0.983	0.972–0.995	0.005
Gender (male being the reference)	1.429	1.015–2.010	0.041
Educational level (Illiterate being the reference)			.000
Elementary school	2.306	0.486–10.940	0.293
Complementary school	5.451	1.184–25.090	0.029
High school or equivalent	8.164	1.822–36.587	0.006
Some university/college courses	7.201	1.548–33.491	0.012
Bachelor degree	15.532	3.351–71.992	0.000
Master's degree	13.883	2.886–66.770	0.001
Doctoral degree	11.744	2.015–68.441	0.006
Physician providing counseling about potential ADRs ("No" being the reference)	1.804	1.248–2.609	0.002
Physician providing counseling about missing doses ("No" being the reference)	1.389	0.947–2.037	0.093
Asking about possible interactions with prescribed medications while getting the OTC's from the pharmacy[b]			
Educational Level (Illiterate being the reference)			.001
Elementary school	1.467	0.562–3.833	.434
Complementary school	1.782	0.683–4.648	.238
High school or equivalent	3.083	1.223–7.768	.017
Some university/college courses	4.289	1.630–11.281	.003
Bachelor degree	3.932	1.509–10.242	.005
Master's degree	3.355	1.213–9.284	.020
Doctoral degree	2.309	0.605–8.808	.221
Geographic Area of Residence (Beirut being the reference)			.000
Mount Lebanon	0.585	0.367–0.933	.024
North Lebanon	0.349	0.051–2.389	.283
Bekaa	0.257	0.142–0.466	.000
South	0.459	0.257–0.819	.008
Nabatiyye	2.714	0.679–10.856	.158
Physician inquiring about previous ADRs before prescribing a new drug ("No" being the reference)	1.540	1.064–2.229	.022
Physician providing counseling about potential ADRs ("No" being the reference)	2.385	1.628–3.495	.000

[a] Variables with a *p* value of 0.2 or less in the bivariate analysis were included in the initial model. Those include: gender; marital status; educational level; age; employment status; income category; healthcare coverage, number of chronic diseases; number of daily medications; the physician providing counseling about potential drug interactions and ADRs, missed doses, and accidental overdose; the physician inquiring about previous ADRs before prescribing a new medication; and the pharmacist providing counseling about potential ADRs and missed doses. Categorical variables identified: marital status, educational level, employment status, income category, and healthcare coverage. Using a Backward LR method, the model finally retained the variables shown in this table. Hosmer and Lemshow test for sample adequacy *p* value: 0.822

[b] Variables with a *p* value of 0.2 or less in the bivariate analysis were included in the initial model. Those include: age, educational level, healthcare coverage, geographical of residence, total medication knowledge; the physician providing counseling about ADRs, missed doses, and accidental overdose; and the physician inquiring about medication history and previous ADRs before prescribing a new medication. Categorical variables identified: educational level, healthcare coverage, and geographical area of residence. Using a Backward LR method, the model finally retained the variables shown in this table. Hosmer and Lemshow test for sample adequacy *p* value: 0.694

Other studies describing patients' medication knowledge in community pharmacies in Portugal and Spain listed "medication safety" as the dimension with the lowest scores, with ADRs knowledge ranging from 7.3 to 15.3% [16, 17]. The findings raise concerns regarding patients' awareness of their medications' uses and risks, and the potential ensuing ADRs. Patients must have at least a basic understanding of the benefits and risks of their prescribed drugs and how to administer them, in order to make informed decisions about their medication therapy, and take these medications appropriately and safely [30]. Moreover, patients' ability to interpret symptoms and attribute them to drugs may affect their willingness to recognize and tolerate expected ADRs when they arise [31].

Furthermore, the following factors were linked to higher total medication knowledge: patients' higher level of education, multiple chronic diseases, intake of liquid medications, acquisition of medications from a different pharmacy each time, initiation of medication discussion with the physicians, and being counseled by the physicians about potential ADRs of medications.

Based on our study results, physicians should be encouraged to actively involve patients—especially those with lower educational levels—in the safety of their own medications. Such measures can be achieved via enhancing interaction with the patient to communicate major medication use and safety measures, and presenting the patient with written or illustrated medication-related information as appropriate.

Reading the drug information leaflet

In this information-rich society, the drug information leaflet is trustful and highly regulated compared to other sources of drug information that could be unreliable [14]. In our study, around 36% of the study participants reported reading the drug information leaflet always and very often, and around 17 and 21% reported reading the leaflet rarely and never respectively. Variable rates of patients reading the drug information leaflet were reported in the literature, depending on the scale used; the medication being new or refilled, or the patient having read part of the leaflet or all of it [10, 32–34]. In addition, it is reported that some patients find the information difficult to understand [34], and that reading potential risk information may trigger feelings of anxiety and reduce adherence [33, 35]. Our study however assessed only whether patients read the leaflet. It did not assess patients' understanding, the usefulness of the information they read in the leaflet, and its effect on patients' behavior.

The findings of this study also showed that female gender, higher educational level, and younger age were significantly positively associated with reading the leaflet. The variable "physicians providing counseling about missing doses" remained in the final model with a non-significant p value of 0.093, probably due to the relatively lower sample size. Further studies may be necessary to further investigate such finding. The literature reports variable findings as well [10, 33].

Asking the pharmacist about potential interactions of OTC drugs with their medications

In an American study assessing patient perspective of medication information desired from pharmacists in 6 states, drug interactions information was desired by 31% of the participant [36]. Our study documented a higher interest with 43% of patients regularly asking about the possible interactions with prescribed medications while getting OTCs from the pharmacy (43.3% for very often and always). This could be partially explained by the high density of pharmacies in Lebanon (66.06 pharmacies/100,000 inhabitants) compared to 10 and 31 pharmacies/100,000 inhabitants in US and EU respectively [37]. The latter study also showed that more educated patients were more likely to indicate a desire for information [36]. This is consistent with our study findings, where patients with a higher educational level were more likely than illiterate patients to ask the pharmacist about potential interactions of OTC drugs with their medications. The lack of statistical significance between patients with a doctoral degree and illiterate patients could be partially explained by the small number of patients in this category.

Moreover, patients who were asked by the physicians about previous ADRs or counseled about the potential ADRs of prescribed medications were more likely to ask the pharmacist about the potential drug interactions. This could be partially attributed to the fact that counseled patients may become more involved and concerned about medication safety.

To our knowledge, this is the first study addressing outpatients' own medication-related knowledge and practices in the Lebanese population. Our sample was taken from 460 pharmacies around Lebanon which improves the generalizability of the results to the Lebanese population.

Our study was aimed to assess the outpatients' knowledge about their own medications use and risks. However validated questionnaires reported in the literature assess patients' knowledge about a specific class of medications such as anticoagulants [38–40]; furthermore, the World Health Organization "Patient Questionnaire about Medication Safety" [27] is a brief questionnaire of twelve questions that does not allow a detailed assessment of the patients' knowledge. In the absence of a published validated tool, we used a specific and comprehensive method. Whenever patients were taking more than one medication, we asked patients about their knowledge of every single medication they are currently taking. We believe that this method would provide a clear and complete assessment, awaiting better tools to be validated in the Lebanese population.

All outcomes were based on the patients' reports and perspectives, leading to a potential recall bias. This may induce a non-differential information bias, directing the results towards the null. Patients' health literacy and healthcare access were not assessed in this study, and hence their potential association and influence on patients' medication knowledge were not evaluated. It is important to note that this study did not aim to assess all aspects of medication risks as perceived by the patients such as

knowledge and practices related to allergies, monitoring, medication storage, and expiring medications. This may lead to a residual confounding. We suggest future studies that take into account all these aspects to further improve the validity of the results.

Conclusion

This study showed patients' suboptimal medication-related knowledge, with particular deficiency in ADRs knowledge. The study also highlighted some error-prone medication-related practices mainly the "suboptimal" patients' interaction with the primary care givers. Our findings should serve as a platform for primary healthcare providers to better understand their patients' needs, and assume their essential role in improving patients' knowledge on all aspects of medications use.

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