Original article

Utilization of drug information resources among community pharmacists in Jordan: A cross-sectional study

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A R T I C L E   I N F O

A B S T R A C T

Background: Pharmacists are considered to be important sources of drug information (DI) for patients and other healthcare providers. This study aims to examine the characteristics of DI utilization for practicing pharmacists in Jordan and identify the main barriers that impede their ability to utilize them.
Method: A cross-sectional study using an online survey was conducted in Jordan between the 27th of November 2020 and 18th of January 2021. Our questionnaire was constructed to explore pharmacists' utilization patterns of DI resources, the types of DI resources they use and barriers impeding them.
Results: A total of 1875 pharmacists participated in this study. Only one-fifth of the participating pharmacists reported that they referred to DI databases. The most commonly reported databases/websites were Drugs.com, Jordan FDA, and Medscape. The most commonly reported paper-based resources were Drugs in Jordan, Step up pharmacy, and British Pharmacopeia. The most commonly used mobile applications were Drugs.com, Medscape and Lexicomp. 44% of the pharmacists reported that they use DI resources fewer than five times per week and more than half of them (60.7%, n = 1138) reported that the day-shift was the shift that allowed them more time to use DI resources. Lack of time was the most common barrier (53.2%) that restricted the ability of pharmacists to use DI resources.
Conclusion: Using electronic resources is still deficient and far from optimum and interventions to improve the pharmacists' utilization of electronic drug databases are required. Universities and various pharmaceutical bodies are advised to train pharmacists on using DI databases.

1. Introduction

Pharmacists are considered to be important sources of drug information for patients and other healthcare providers (Pedersen et al., 2008, Pedersen et al., 2014). Community pharmacists are in a unique position to provide drug-related information and counselling because they are regularly in direct contact with patients and easily build personal trusted relationships with them (Burkiewicz et al., 2005). As drug information providers and, ultimately, patient care providers, community pharmacists are expected to keep abreast of new modalities of therapy and with the emergence of new drug information (Fong 1985, Rae et al., 1992, Chan et al., 1996).

Appropriate drug information is essential for correct drug use and best patient outcome through reducing or eliminating symptoms and decreasing medication errors (Melnyk et al., 2000). The International Pharmaceutical Federation (FIP) states that it is the pharmacist's responsibility to ensure that patients receive the required medication information. Failure to provide valuable drug-related information can have several adverse outcomes (Asmelashe Gelayee et al., 2017). The best sources of information are considered those that provide highly relevant and valid information that can be applied with ease (Iwanowicz et al., 2006).

Pharmacists, therefore, need to access comprehensive, valid, reliable and up-to-date medicine information sources, balancing primary literature (e.g. biomedical journals), secondary literature (e.g. Medline), and tertiary literature (e.g. reference books). In addition to literature, web-based information can be useful if the provider commits to providing accurate information. In the absence of independent resources, pharmacists will have to depend on information from pharmaceutical companies (Iwanowicz et al., 2006).

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Given the importance and the availability of diverse drug information (DI) sources (Wong et al., 2009), several studies have been conducted in the United States (US) (Poirier and Ascione 1980, Rae et al., 1992, Gettig 2008, Moorman et al., 2017) and various other countries (Zehnder et al., 2004, Ball and Al-Othman 2007, Udezi et al., 2007, MbchB et al., 2008, Wong et al., 2009, Khan and Shafie 2010, Chitme et al., 2014, Borja-Hart and Leachman 2016, Asmelashe et al., 2017) to identify the DI sources that were most commonly used by pharmacists. However, little information is known about the types of drug information sources commonly used by pharmacists in Jordan (Wazaify et al., 2009). The objectives of this study were to examine the characteristics of drug information utilization for practicing pharmacists in Jordan and identify the main barriers that impede their ability to utilize them.

2. Methods

2.1. Study design and study population

A cross-sectional study using an online survey was conducted in Jordan between the 27th of November 2020 and 18th of January 2021 to explore the extent of using various drug information resources to counsel patients and respond to their queries during their visit to community pharmacies. Our questionnaire was constructed to explore pharmacists' utilization patterns of drug information resources, the types of drug information resources they use and barriers impeding them (Zehnder et al., 2004, Wong et al., 2009).

The questionnaire tool was reviewed to evaluate the suitability, relevance, simplicity, and adequacy of the questions. The questionnaire comprised twenty-two items, including demographic characteristics, questions about work settings, patients' inquiries about drug information, and the utilization patterns of drug information resources.

2.2. Sampling strategy

A convenience sampling technique was employed where eligible participants were invited to participate in the study through social media platforms. All the participants were invited to participate in the study voluntarily and were, thus, considered exempt from written informed consent. The study aims and objectives were explained in the cover letter which accompanied the questionnaire. The inclusion criteria for the study were: a) registered pharmacists (having a minimum qualification of bachelor degree in pharmacy), and b) currently working in Jordan. The inclusion criteria were highlighted in the cover letter.

2.3. Sample size

The total number of registered pharmacists in Jordan until December 2020 is around 26,000 pharmacists, based on this number of population and using a confidence interval of 95%, a standard deviation of 0.5, and a margin of error of 5%, the minimum required sample size was 379 participants.

2.4. Statistical analysis

Data were analysed using SPSS software, version 25 (IBM Corp, Armonk, NY, the United States of America (USA)). Continuous variables were reported as mean (±standard deviation [SD]). Categorical variables were reported as frequencies and percentages.

2.5. Ethical considerations

This study was approved by the Research Ethics Committee at the Faculty of Pharmacy at Isra University, Amman, Jordan (PH – 2021 – 10). As participation in the study was voluntary, the research ethics committee approved the consent waiver.

3. Results

3.1. Demographic and practices characteristics

A total of 1,875 pharmacists participated in this study. More than half of them (68.5%, n = 1,285) were females. Concerning age, 67% (n = 1,285) of them were aged 23 – 30 years old. The vast majority (80.1%, n = 1,502) were bachelor degree holders. Half of them (50%, n = 938) graduated from local private universities. More than half of them (64.3%, n = 1,205) were working at independent community pharmacies during the day-shift (66.8%, n = 1,252). Around 40% (n = 781) of them had 1 – 5 years of experience and 28.9% (n = 542) had been working in their current pharmacy setting for less than one year. Up to 42% (n = 795) of the pharmacists reported that there was one registered pharmacist to serve patients in any single shift at their workplace. Around half (51%, n = 956) of the pharmacists were working in Amman, the capital of Jordan. Up to 48% (n = 907) of the pharmacists reported that their pharmacies dispensed less than 20 prescriptions for medication (Rx) per day and 35% (n = 647) reported that their pharmacies dispensed 21–40 over the counter (OTC) medications per day. For further details on the demographic and practices characteristics of the study participants, refer to Table 1.

3.2. Patients inquiry about drugs information

One-third of the participating pharmacists (30.7%, n = 575) reported that around 10 – 25% of the patients inquired about OTC medications and a similar percentage (34.5%, n = 647) inquired about prescription medications (Rx) See Table 2.

3.3. Utilization pattern of drug information resources

When the participants were asked about which resources they used for patient counselling and answering queries, memory, drug leaflets, and Google websites were the most commonly reported resources with 73%, 53.9% and 37.9%, respectively. One-fifth of the participating pharmacists reported that they referred to drug information databases. The most commonly reported databases/websites were Drugs.com, Jordan FDA, and Medscape with 30%, 26% and 23.5%, respectively.

When the pharmacists were asked about what paper-based drug information resources were available at their pharmacy, the most commonly reported resources were Drugs in Jordan, Step up pharmacy, and British Pharmacopeia with 52.6%, 21.3% and 20.6%, respectively. In cases where pharmacists were using a mobile phone to obtain drug information, the most commonly used mobile applications were Drugs.com, Medscape and Lexicomp with 56.5%, 33.1% and 24.3%, respectively. Drug leaflets and websites were the most commonly used drug information sources to obtain information about new drugs becoming available in pharmacies with 78.8% and 56.2%, respectively.

As many as 44% of the pharmacists reported that they use drug information resources fewer than five times per week and more than half of them (60.7%, n = 1,138) reported that the day-shift was the shift that allowed them more time to use drug information resources. Lack of time was the most common barrier (53.2%) that

Table 1
Demographic and practices characteristics.

Demographic variable	Frequency (%)
Age categories	
23–30 years	1255 (66.9)
31–35 years	267 (14.2)
36–40 years	130 (6.9)
41–45 years	109 (5.8)
46 years and above	114 (6.1)
Gender	
Females	1285 (68.5)
Pharmacy degree	
Bachelor	1502 (80.1)
Pharmacy Doctor	241 (12.9)
Higher degree	132 (7.0)
Place of graduation	
Local private university	938 (50.0)
Local governmental university	864 (46.1)
Foreign university (outside Jordan)	73 (3.9)
Work setting	
Independent community pharmacy	1205 (64.3)
Governmental hospital (outpatient pharmacy)	220 (11.7)
Private hospital (outpatient pharmacy)	134 (7.1)
Chain pharmacy	316 (16.9)
Main working shift (more than one answer can be selected)	
Day	1252 (66.8)
Evening	727 (38.8)
Night	257 (13.7)
Experience in practicing pharmacy	
Less than one year	542 (28.9)
1–5 years	781 (41.7)
6–10 years	251 (13.4)
More than 10 years	301 (16.1)
Duration of work in current pharmacy setting	
Less than one year	531 (28.3)
1–2 years	454 (24.2)
3–5 years	451 (24.1)
5–10 years	227 (12.1)
More than 10 years	212 (11.3)
How many registered pharmacists are available to serve patients in a single shift?	
One pharmacist	795 (42.4)
1 – 2 pharmacists	657 (35.0)
2 – 3 pharmacists	263 (14.0)
3 – 4 pharmacists	78 (4.2)
4 – 5 pharmacists	38 (2.0)
More than 5 pharmacists	44 (2.3)
Location of pharmacy	
Amman	956 (51.0)
Alzarqa	160 (8.5)
Irbid	237 (12.6)
Albalqa	57 (3.0)
Jarash	62 (3.3)
Altafelah	33 (1.8)
Ajloun	25 (1.3)
Alaqaba	32 (1.7)
Alkarak	98 (5.2)
Madaba	127 (6.8)
M'aan	9 (0.5)
Almafraq	79 (4.2)
On average, how many prescription medications (Rx) does your pharmacy dispense per day?	
Fewer than 20 prescriptions	907 (48.4)
21–40 prescriptions	457 (24.4)
41–60 prescriptions	191 (10.2)
61–80 prescriptions	93 (5.0)
81–100 prescriptions	79 (4.2)
More than 100 prescriptions	148 (7.9)
On average, how many OTC medications does your pharmacy dispense per day?	
Fewer than 20 prescriptions	570 (30.4)
21–40 prescriptions	647 (34.5)
41–60 prescriptions	304 (16.2)
61–80 prescriptions	188 (10.0)
81–100 prescriptions	86 (4.6)
More than 100 prescriptions	80 (4.3)

Table 2
Percentage of patients enquiring about drug information.

Variable	Frequency (%)
What is the estimated percentage of patients who ask for information about OTC medications?	
Fewer than 10% of patients	396 (21.1)
10 – 25% of patients	575 (30.7)
25 – 50% of patients	540 (28.8)
More than 50% of patients	364 (19.4)
What is the estimated percentage of patients who ask for information about prescription medications (Rx)?	
Fewer than 10% of patients	431 (23.0)
10 – 25% of patients	647 (34.5)
25 – 50% of patients	481 (25.7)
More than 50% of patients	305 (16.3)

restricted the ability of pharmacists to use drug information resources See Table 3.

4. Discussion

The current study aimed to examine the characteristics of drug information utilization for practicing pharmacists in Jordan and identify the main barriers that impede their ability to utilize them. Like other countries, community pharmacies in Jordan are the most accessible primary healthcare facilities, and most pharmacists work in the private sector, Amman, the capital of Jordan, contained over 63% of the community pharmacies (Al-Wazaify and Albsoul-Younes 2005, Elayeh et al., 2017).

Community pharmacy has significant amounts of data which if obtained, stored, and utilized correctly could assist in the provision of enhanced patient care (Wright and Twigg 2016). Besides, the move from hardcopies to electronic version of drug information resources highly influenced the ability of pharmacists in the community pharmacies to respond to various questions despite the fact that different electronic resources have differences among them in ease of use and speed of extracting questions for different medication related questions (Belgado et al., 1997).

The utilization of DI resources has been a matter of concern worldwide over the last three decades. Research has been conducted on DI resources available at the community pharmacies in different states of America (Poirier and Ascione 1980, Rae et al., 1992, Gettig 2008, Borja-Hart and Leachman 2016, Moorman et al., 2017), Switzerland (Zehnder et al., 2004), Hong Kong (MbchB et al., 2008), South-Eastern Asian countries (Wong et al., 2009, Khan and Shafie 2010), African countries (Udezi et al., 2007, Asmelashe et al., 2017), and certain Arab countries (Ball and Al-Othman 2007, Wazaify et al., 2009, Chitme et al., 2014). This type of study is important because pharmacists are the first line personnel who are approached by the community members and by other healthcare providers for drug-related information. In a previous study that was conducted in Illinois, the USA, pharmacists were shown to be more familiar with and have wider access to drug information resources than nurses and physicians (Gettig 2008).

Our study took into consideration the shifts that allow the pharmacist more time to use available DI resources. Up to 61% of the participants in our study mentioned that the day shift allowed them more time, versus 35% and 20% for the evening and the night shifts, respectively. This is reasonable since, in the daytime shift, more than one pharmacist may be working at the same time, and this is usually the case in hospital-based outpatient pharmacies and chain pharmacies, as well as some of the large independent outlets. This result is quite interesting since majority of the pharmacists who were surveyed rotate shifts and are, therefore, acquainted with the different workloads in different shifts.

Table 3
Characteristics of the utilization of drug information resources.

Variable	Over all Frequency (%)	Age Frequency (%)					Gender Frequency (%)		Main working shift Frequency (%)				Location Frequency (%)	
		23–30 years	31–35 years	36–40 years	41–45 years	46 years and above	Males	Females	Independent community pharmacy	Governmental hospital	Private hospital	Chain pharmacy	Amman	Other cities
What resources do you use for counselling patients and answering their queries? (more than one answer can be selected)														
Memory	1,369 (73.0)	929 (67.9)	186 (13.6)	84 (6.1)	78 (5.7)	92 (6.7)	442 (32.3)	927 (67.7)	909 (66.4)	138 (10.1)	78 (5.7)	244 (17.8)	720 (52.6)	649 (47.4)
Drug leaflets	1,010 (53.9)	689 (68.2)	139 (13.8)	67 (6.6)	57 (5.6)	58 (5.7)	274 (27.1)	736 (72.9)	654 (64.8)	108 (10.7)	67 (6.6)	181 (17.9)	501 (49.6)	509 (50.4)
Google websites	710 (37.9)	474 (66.8)	100 (14.1)	47 (6.6)	43 (6.1)	46 (6.5)	208 (29.3)	502 (70.7)	435 (61.3)	89 (12.5)	46 (6.5)	140 (19.7)	366 (51.5)	344 (48.5)
Pharmacy reference book/handbooks	444 (23.7)	307 (69.1)	56 (12.6)	35 (7.9)	20 (4.5)	26 (5.9)	109 (24.5)	335 (75.5)	278 (62.6)	61 (13.7)	25 (5.6)	80 (18.0)	207 (46.6)	237 (53.4)
Most commonly used drug information databases														
Drug information databases	357 (19.0)	250 (70.0)	42 (11.8)	21 (5.9)	26 (7.3)	18 (5.0)	107 (30.0)	250 (70.0)	217 (60.8)	41 (11.5)	24 (6.7)	75 (21.0)	181 (50.7)	176 (49.3)
Peers or supervisor	332 (17.7)	262 (78.9)	42 (12.7)	13 (3.9)	7 (2.1)	8 (2.4)	93 (28.0)	239 (72.0)	215 (64.8)	33 (9.9)	28 (8.4)	56 (16.9)	190 (57.2)	142 (42.8)
Drugs.com	562 (30.0)	405 (72.1)	83 (14.8)	27 (4.8)	21 (3.7)	26 (4.6)	138 (24.6)	424 (75.4)	360 (64.1)	66 (11.7)	30 (5.3)	106 (18.9)	279 (49.6)	283 (50.4)
Jordan FDA	487 (26.0)	345 (70.8)	59 (12.1)	32 (6.6)	21 (4.3)	30 (6.2)	157 (32.2)	330 (67.8)	338 (69.4)	29 (6.0)	30 (6.2)	90 (18.5)	247 (50.7)	240 (49.3)
Medscape	441 (23.5)	326 (73.9)	50 (11.3)	29 (6.6)	16 (3.6)	20 (4.5)	150 (34.0)	291 (66.0)	267 (60.5)	58 (13.2)	29 (6.6)	87 (19.7)	225 (51.0)	216 (49.0)
Jodrugs.com	330 (17.6)	238 (72.1)	45 (13.6)	23 (7.0)	15 (4.5)	9 (2.7)	80 (24.2)	250 (75.8)	238 (72.1)	26 (7.9)	18 (5.5)	48 (14.5)	132 (40.0)	198 (60.0)
Lexicomp	257 (13.7)	184 (71.6)	34 (13.2)	15 (5.8)	12 (4.7)	12 (4.7)	75 (29.2)	182 (70.8)	132 (51.4)	36 (14.0)	21 (8.2)	68 (26.5)	113 (44.0)	144 (56.0)
PubMed	221 (11.8)	153 (69.2)	33 (14.9)	17 (7.7)	11 (5.0)	7 (3.2)	78 (35.3)	143 (64.7)	128 (57.9)	34 (15.4)	17 (7.7)	42 (19.0)	96 (43.4)	125 (56.6)
FDA	151 (8.1)	106 (70.2)	22 (14.6)	9 (6.0)	9 (6.0)	5 (3.3)	52 (34.4)	99 (65.6)	105 (69.5)	10 (6.6)	8 (5.3)	28 (18.5)	72 (47.7)	79 (52.3)
Altibbi.com	99 (5.3)	65 (65.7)	14 (14.1)	8 (8.1)	6 (6.1)	6 (6.1)	37 (37.4)	62 (62.6)	63 (63.6)	11 (11.1)	4 (4.0)	21 (21.2)	53 (53.5)	46 (46.5)
Rxlist.com	56 (3.0)	41 (73.2)	7 (12.5)	5 (8.9)	–	3 (5.4)	17 (30.4)	39 (69.6)	33 (58.9)	6 (10.7)	3 (5.4)	14 (25.0)	27 (48.2)	29 (51.8)
Access Pharmacy	53 (2.8)	30 (56.6)	8 (15.1)	7 (13.2)	4 (7.5)	4 (7.5)	22 (41.5)	31 (58.5)	29 (54.7)	9 (17.0)	2 (3.8)	13 (24.5)	22 (41.5)	31 (58.5)
Medline	51 (2.7)	31 (60.8)	10 (19.6)	8 (15.7)	2 (3.9)	–	19 (37.3)	32 (62.7)	22 (43.1)	10 (19.6)	9 (17.6)	10 (19.6)	23 (45.1)	28 (54.9)
Facts and Comparisons	44 (2.3)	22 (50.0)	12 (27.3)	5 (11.4)	2 (4.5)	3 (6.8)	13 (29.5)	31 (70.5)	20 (45.5)	7 (15.9)	6 (13.6)	11 (25.0)	19 (43.2)	25 (56.8)
Mims.com	32 (1.7)	13 (40.6)	12 (37.5)	2 (6.3)	2 (6.3)	3 (9.4)	16 (50.0)	16 (50.0)	17 (53.1)	7 (21.9)	3 (9.4)	5 (15.6)	19 (59.4)	13 (40.6)
Micromedex	26 (1.4)	12 (46.2)	7 (26.9)	4 (15.4)	2 (7.7)	1 (3.8)	12 (46.2)	14 (53.8)	9 (34.6)	6 (23.1)	5 (19.2)	6 (23.1)	9 (34.6)	17 (65.4)
Others	232 (12.4)	158 (68.1)	26 (11.2)	10 (4.3)	13 (5.6)	25 (10.8)	82 (35.3)	150 (64.7)	154 (66.4)	25 (10.8)	15 (6.5)	38 (16.4)	120 (51.7)	112 (48.3)
What paper-based drug information resources are available at your pharmacy? (more than one answer can be selected)														
Drugs in Jordan	986 (52.6)	644 (65.3)	152 (15.4)	60 (6.1)	67 (6.8)	63 (6.4)	288 (29.2)	698 (70.8)	662 (67.1)	103 (10.4)	60 (6.1)	161 (16.3)	444 (45.0)	542 (55.0)
Step up pharmacy	399 (21.3)	324 (81.2)	30 (7.5)	19 (4.8)	14 (3.5)	12 (3.0)	77 (19.3)	322 (80.7)	283 (70.9)	18 (4.5)	26 (6.5)	72 (18.0)	166 (41.6)	233 (58.4)
British Pharmacopeia	387 (20.6)	243 (62.8)	60 (15.5)	29 (7.5)	25 (6.5)	30 (7.8)	147 (38.0)	240 (62.0)	233 (60.2)	66 (17.1)	24 (6.2)	64 (16.5)	188 (48.6)	199 (51.4)
British National Formulary	252 (13.4)	145 (57.5)	34 (13.5)	23 (9.1)	23 (9.1)	27 (10.7)	84 (33.3)	168 (66.7)	134 (53.2)	64 (25.4)	17 (6.7)	37 (14.7)	143 (56.7)	109 (43.3)
United States Pharmacopeia	171 (9.1)	110 (64.3)	28 (16.4)	17 (9.9)	6 (3.5)	10 (5.8)	64 (37.4)	107 (62.6)	96 (56.1)	25 (14.6)	23 (13.5)	27 (15.8)	83 (48.5)	88 (51.5)
Others	481 (25.7)	322 (66.9)	67 (13.9)	38 (7.9)	27 (5.6)	27 (5.6)	167 (34.7)	314 (65.3)	298 (62.0)	50 (10.4)	38 (7.9)	95 (19.8)	280 (58.2)	201 (41.8)
If you use a mobile phone to obtain drug information, what application do you use? (more than one answer can be selected)														
Drugs.com	1,059 (56.5)	721 (68.1)	158 (14.9)	70 (6.6)	56 (5.3)	54 (5.1)	280 (26.4)	779 (73.6)	696 (65.7)	122 (11.5)	66 (6.2)	175 (16.5)	522 (49.3)	537 (50.7)
Medscape	621 (33.1)	424 (68.3)	91 (14.7)	47 (7.6)	33 (5.3)	26 (4.2)	207 (33.3)	414 (66.7)	379 (61.0)	87 (14.0)	44 (7.1)	111 (17.9)	311 (50.1)	310 (49.9)
Lexicomp	456 (24.3)	326 (71.5)	70 (15.4)	26 (5.7)	22 (4.8)	12 (2.6)	141 (30.9)	315 (69.1)	262 (57.5)	50 (11.0)	38 (8.3)	106 (23.2)	199 (43.6)	257 (56.4)
UpToDate	281 (15.0)	174 (61.9)	47 (16.7)	23 (8.2)	20 (7.1)	17 (6.0)	89 (31.7)	192 (68.3)	164 (58.4)	44 (15.7)	24 (8.5)	49 (17.4)	147 (52.3)	134 (47.7)
Epocrates Rx	72 (3.8)	51 (70.8)	13 (18.1)	5 (6.9)	–	3 (4.2)	30 (41.7)	42 (58.3)	35 (48.6)	13 (18.1)	12 (16.7)	12 (16.7)	39 (54.2)	33 (45.8)
Micromedex	72 (3.8)	35 (48.6)	14 (19.4)	12 (16.7)	7 (9.7)	4 (5.6)	33 (45.8)	39 (54.2)	35 (48.6)	16 (22.2)	11 (15.3)	10 (13.9)	30 (41.7)	42 (58.3)
Clinical Key's Drug Monographs	50 (2.7)	25 (50.0)	14 (28.0)	7 (14.0)	1 (2.0)	3 (6.0)	22 (44.0)	28 (56.0)	24 (48.0)	11 (22.0)	10 (20.0)	5 (10.0)	17 (34.0)	33 (66.0)
Others	550 (29.3)	362 (65.8)	58 (10.5)	34 (6.2)	40 (7.3)	56 (10.2)	190 (34.5)	360 (65.5)	403 (73.3)	49 (8.9)	30 (5.5)	68 (12.4)	276 (50.2)	274 (49.8)
If a new drug becomes available in your pharmacy, which drug information resources do you use to gain or increase knowledge about it? (more than one answer can be selected)														
Drug leaflet	1,477 (78.8)	996 (67.4)	199 (13.5)	98 (6.6)	85 (5.8)	99 (6.7)	455 (30.8)	1022 (69.2)	985 (66.7)	155 (10.5)	84 (5.7)	253 (17.1)	752 (50.9)	725 (49.1)
Websites	1,054 (56.2)	712 (67.6)	154 (14.6)	71 (6.7)	63 (6.0)	54 (5.1)	342 (32.4)	712 (67.6)	655 (62.1)	132 (12.5)	76 (7.2)	191 (18.1)	548 (52.0)	506 (48.0)
Applications and databases	446 (23.8)	324 (72.6)	45 (10.1)	28 (6.3)	19 (4.3)	30 (6.7)	104 (23.3)	342 (76.7)	273 (61.2)	54 (12.1)	31 (7.0)	88 (19.7)	209 (46.9)	237 (53.1)
Pharmacy reference books	363 (19.4)	244 (67.2)	51 (14.0)	29 (8.0)	16 (4.4)	23 (6.3)	91 (25.1)	272 (74.9)	214 (59.0)	54 (14.9)	34 (9.4)	61 (16.8)	175 (48.2)	188 (51.8)
How often do you use drug information resources?														
Fewer than 5 times per week	824 (43.9)	535 (64.9)	118 (14.3)	49 (5.9)	54 (6.6)	68 (8.3)	283 (34.3)	541 (65.7)	537 (65.2)	94 (11.4)	57 (6.9)	136 (16.5)	456 (55.3)	368 (44.7)
6 – 10 times per week	607 (32.4)	437 (72.0)	89 (14.7)	36 (5.9)	25 (4.1)	20 (3.3)	172 (28.3)	435 (71.7)	404 (66.6)	63 (10.4)	37 (6.1)	103 (17.0)	281 (46.3)	326 (53.7)
11 – 15 times per week	239 (12.7)	160 (66.9)	33 (13.8)	23 (9.6)	14 (5.9)	9 (3.8)	77 (32.2)	162 (67.8)	144 (60.3)	29 (12.1)	20 (8.4)	46 (19.2)	110 (46.0)	129 (54.0)
16 – 20 times per week	92 (4.9)	50 (54.3)	14 (15.2)	13 (14.1)	6 (6.5)	9 (9.8)	21 (22.8)	71 (77.2)	52 (56.5)	17 (18.5)	10 (10.9)	13 (14.1)	43 (46.7)	49 (53.3)
More than 20 times per week	113 (6.0)	73 (64.6)	13 (11.5)	9 (8.0)	10 (8.8)	8 (7.1)	37 (32.7)	76 (67.3)	68 (60.2)	17 (15.0)	10 (8.8)	18 (15.9)	66 (58.4)	47 (41.6)
Which shift gives you more time to use drug information resources? (more than one answer can be selected)														
Day	1,138 (60.7)	769 (67.6)	155 (13.6)	74 (6.5)	62 (5.4)	78 (6.9)	298 (26.2)	840 (73.8)	735 (64.6)	140 (12.3)	72 (6.3)	191 (16.8)	546 (48.0)	592 (52.0)
Evening	655 (34.9)	430 (65.6)	96 (14.7)	45 (6.9)	50 (7.6)	34 (5.2)	242 (36.9)	413 (63.1)	432 (66.0)	54 (8.2)	47 (7.2)	122 (18.6)	346 (52.8)	309 (47.2)
Night	368 (19.6)	248 (67.4)	47 (12.8)	23 (6.3)	22 (6.0)	28 (7.6)	162 (44.0)	206 (56.0)	216 (58.7)	55 (14.9)	37 (10.1)	60 (16.3)	196 (53.3)	172 (46.7)
What are the barriers to using drug information resources? (more than one answer can be selected)														
Lack of time	997 (53.2)	664 (66.6)	134 (13.4)	80 (8.0)	53 (5.3)	66 (6.6)	305 (30.6)	692 (69.4)	625 (62.7)	134 (13.4)	66 (6.6)	172 (17.3)	509 (51.1)	488 (48.9)
Lack of access	712 (38.0)	468 (65.7)	117 (16.4)	46 (6.5)	45 (6.3)	36 (5.1)	227 (31.9)	485 (68.1)	455 (63.9)	90 (12.6)	49 (6.9)	118 (16.6)	339 (47.6)	373 (52.4)
Lack of necessary skills	322 (17.2)	210 (65.2)	51 (15.8)	15 (4.7)	24 (7.5)	22 (6.8)	96 (29.8)	226 (70.2)	188 (58.4)	47 (14.6)	38 (11.8)	49 (15.2)	160 (49.7)	162 (50.3)
Others	390 (20.8)	248 (63.6)	59 (15.1)	25 (6.4)	29 (7.4)	29 (7.4)	136 (34.9)	254 (65.1)	260 (66.7)	36 (9.2)	33 (8.5)	61 (15.6)	233 (59.7)	157 (40.3)

Gender and age-based differences can impact DI utilization pattern. Males and females may have different perspectives to similar issues, and their consideration/action may differ accordingly (Carvajal and Hardigan 2008, Carvajal et al., 2013). In a study conducted in 2019 by Carvajal, *et al.* investigated the effect of different variables including age and gender on the job satisfaction amongst pharmacists in the United States (Carvajal et al., 2019). The authors found that when age was controlled, female pharmacists were consistently more satisfied with most facets of their work than male pharmacists. However, with regards to the impact of these demographic characteristics on the utilization of DI, most of the previous studies did not explore the impact of gender or age on the use of DI resources (Ball and Al-Othman 2007, Chitme et al., 2014, Borja-Hart and Leachman 2016). On the other hand, in a study that was conducted in Northern Ethiopia (Asmelashe et al., 2017), the authors mentioned that females reported higher utilization pattern of textbook ($P = 0.009$), Internet ($P = 0.045$), databases ($P = 0.039$), and drug information center ($P = 0.026$) than males.

In an extensive exploration of knowledge and use of DI resources by American pharmacists Carvajal *et al.* identified different patterns influenced by gender and age-group classification (Carvajal et al., 2013). They reported that the preference of electronic resource use was significantly greater for females compared to males ($p < 0.01$) and for younger than older practitioners. On the other hand, males and older pharmacists seemed to possess more knowledge regarding which DI resources that must be maintained in compliance with state law. When choosing the preferred DI references, Micromedex was the source of choice for both genders and all age groups while Lexi-Comp Online was the second leading choice of younger and older females alike, while younger males pharmacists showed preference for Facts & Comparisons (Carvajal et al., 2013). However, personal preferences cannot be excluded and commonly seem to impact practitioners' choice of DI resources used (Belgado et al., 1997). The demographic characteristics of our study participants are comparable to other studies regarding age groups and gender.

Location of work may influence the type of questions received by pharmacists. Rae, *et al.* observed no difference between the types of drug information questions received by independent pharmacists and pharmacists working in chain pharmacies (Rae et al., 1992). However, when comparing community and hospital pharmacists, pharmacists in the community frequently receive questions related to adverse drug reactions, drug interactions, and over-the-counter medications, while pharmacists in the hospital frequently receive questions relating to dosage and administration (Moorman et al., 2017). Wong, *et al.* mentioned that, in general, hospital pharmacists had access to a wider range of DI resources than did community pharmacists (Wong et al., 2009). This was supported by a study conducted in Saudi Arabia where DI resources were studied in ten public and three private hospitals (Alamri et al., 2017). In this study, the public hospitals have availability of Lexi-Comp's Drug Information Handbook (77%) and Micromedex (70%) compared to 23% and 30%, respectively in the private hospitals.

It was of interest to note that the percentage of patients who sought information on their medications was comparable for both OTC and prescription drugs and that more than 50% of the patients sought information on their medications once every five pharmacy visits, while less than 10% of the patients required information every four visits. The remaining 40% (10–50% of patients) sought information every three visits. This can be interpreted that those patients on chronic medications are knowledgeable about their medications, which are dispensed to them monthly. It is also the case that there is a reasonable level of education in Jordan and many people tend to get information on their own from the insert leaflets whenever required.

Compared to the study that was done in Jordan in 2009 (Wazaify et al., 2009), the DI resources available to the pharmacists in our study were by far superior to what was available 12 years ago. Nowadays, internet access is available and within reach of most pharmacists, either through pharmacy computers or through the pharmacists' mobile phones. Despite this availability, only 20% of the participating pharmacists reported that they referred to DI databases. When pharmacists were asked about the barriers to using DI resources, 70% of the answers were related to the lack of time or lack of necessary skills to extract drug-related information from available resources rather than lack of access to the resources themselves.

The most commonly reported databases/websites were Drugs.com, Jordan FDA and Medscape with 30%, 26%, and 23.5%, respectively. In a previous study conducted in 2014 in Oman (Chitme et al., 2014), using the internet was considered of secondary importance, and pharmacists rarely referred to databases due to the non-availability of an internet connection at their pharmacies. However, even when 88% of the pharmacies reported having internet access, as was the case in the study conducted in 2004 in Switzerland, Zehnder, *et al.* reported that the internet as a source of DI was of minor importance, and the official Swiss drug reference book was still the most popular source of DI, used to solve all kinds of drug-related problems (Zehnder et al., 2004). This, however, was not the case in Utah, the USA, where the pharmacists generally used electronic databases to answer DI questions and the majority of pharmacists considered the references available to them adequate to answer the questions they received (Moorman et al., 2017).

In our study, the main paper-based references available were comparable to those of Wazaify, *et al.*, (Wazaify et al., 2009) with Drugs in Jordan (52.6%), Step-up pharmacy (21.3%), British pharmacopeia (BP) (20.6%), British national formulary (BNF) (13.4%) and the United States Pharmacopeia (USP), (9.1%) being the most widely available resources. It is a limitation of the current study that we did not question the edition of the textbooks available, as was done in the previous Jordanian study (Wazaify et al., 2009) and the Kuwaiti study (Ball and Al-Othman 2007), where most of the references were found to be old or outdated. The same findings were reported with some references in the Omani study (Chitme et al., 2014). The reference Drugs in Jordan found in our study is published by the Jordanian Pharmaceutical Association and freely distributed to pharmacies, while Step-Up Pharmacy is a training book that was published recently.

The books at the disposal of the pharmacists seem to be adequate for the type of questions asked by patients and, therefore, pharmacists seem to be happy with them. This was also reported in the Omani study, where most of the pharmacists rely on the British national formulary (BNF), the Omani national formulary (ONF), the Martindale extra pharmacopoeia and MIMS (Chitme et al., 2014).

The current study questioned not only the available resources but also their use by the staff. This was reported as another limitation of the previous Jordanian study (Wazaify et al., 2009). Using textbooks as a source of information is still popular and pharmacists still feel they are convenient and trustworthy. This is in agreement with the studies done in Switzerland (Zehnder et al., 2004), Malaysia (Khan and Shafie 2010) and Singapore (Wong et al., 2009), where pharmacists rely on tertiary resources such as textbooks as the primary source of drug information.

It was reported that 13% of the surveyed sample retrieved drug-related information from the primary drug information resources in the Omani study (Chitme et al., 2014). This is in concordance with the previous study done in 2009 in Malaysia (Khan and Shafie 2010), where 18% of the sample surveyed used primary resources as means of answering drug-related questions. In general, it is unu-

sual for community pharmacists to rely extensively on primary resources to answer drug-related questions because of their busy schedules, the lack of time to go through research articles or the lack of proper training on evaluating research articles, as reported by Chitme, *et al.* (Chitme et al., 2014).

When new drugs became available in pharmacies, the DI resources used to answer drug-related questions were the accompanying drug leaflets (78.8%) and websites (56.2%), respectively. These figures were higher than those found in the previous study conducted in Jordan, where 19.2% of the surveyed pharmacists relied on pharmaceutical companies for drug information. The high figure reported here can be attributed to the large scale of this study, where the population was almost 10 times that of the previous study, and that it involved all of the districts of Jordan in addition to Amman, which was the sole focus in the previous study. It is established from our study findings that resources available in the capital may differ from those in outlying pharmacies.

Our study included surveying community pharmacies, chain pharmacies and hospital-based outpatient pharmacies using the same questionnaire tool and same questions. Unlike the study conducted on Utah pharmacies (Moorman et al., 2017), we did not separate the type of questions that were asked by customers in each segment of the market. However, in the study conducted in Louisiana (Rae et al., 1992), the independent and chain pharmacists received the same types of DI questions and they relied on the same references to answer these questions. The study conducted in Singapore (Wong et al., 2009) showed that pharmacists in different settings receive different types of DI questions and have adequate resources to answer the general ones. These contradictory results can be explained by the fact that the first study conducted in Louisiana covered independent and chain pharmacists, both of which are considered community-based institutions, while in the latter study conducted in Singapore, there was a comparison between the community-based and the hospital-based pharmacists. Although it is a limitation of our study that we did not look into this issue in detail, we believe that the same principle applies to different Jordanian pharmacy formats as well.

To the best of our knowledge, only one study, that in Jordan in 2009 by Wazaify, *et al*, has been conducted in this field of research (Wazaify et al., 2009). However, their study was conducted in Amman only and their sample size was small (156 pharmacists). Despite the fact that Amman, the capital of Jordan, contained over 63% of the community pharmacies (Elayeh et al., 2017), and to be more comprehensive we recruited 1875 pharmacists, drawn from all the Jordanian provinces. Despite this wide trawl, 51% of the participants were based in Amman. This is logical taking into consideration that Amman is the capital of Jordan and the business centre of the country. However, it should be noted that, even within Amman itself, there were more pharmacies and they had wider internet access in the western part of the city than the eastern and central parts (Wazaify et al., 2009). This study has limitations. The study design, a cross-sectional survey, limited the ability to determine causality between survey variables. The use of online survey for data collection might have missed some of the targeted population and restrict the generalisability of our findings. Finally, we were not able to estimate the response rate for our study, which might have led to nonresponse bias, as we could not demonstrate how well the sample drawn from the population of interest. Therefore, the findings should be interpreted carefully.

In this study, the availability of paper-based drug resources is similar to the previous study conducted in Amman (Wazaify et al., 2009). We also agree with Ball and Al-Othman (Ball and Al-Othman 2007), that the availability of old or outdated DI resources have negative impact on the role of pharmacists and we support their call for national legislation to ensure the latest edition of at least one comprehensive drug information text or

computer database is present in all pharmacies. Such legislation has already been implemented by the Ministry of Health in Oman. Therefore, the Omani authority recommended that each pharmacy must have an updated copy of either the British or the Oman National Formulary (Chitme et al., 2014).

In our study, it was clear that more electronic resources are currently at the disposal of the pharmacists. This availability of electronic resources is a worldwide phenomenon, but it does not mean that using electronic drug information databases has improved. Most pharmacists still report using leaflets, textbooks, handbooks, peers' information, or their memory for answering drug-related questions.

5. Conclusion

Using electronic resources is still deficient and far from optimum and interventions to improve the pharmacists' utilization of electronic drug databases are required. Pharmaceutical bodies and decision makers are requested to recommend that each pharmacy whether within hospital-based and the community settings should provide DI resources which are up to date. Drug information center specialists and educational institution are encouraged to train pharmacists on the optimal utilization of DI databases/resources and extracting information from primary DI resources. Additionally, more time should be given to practicing pharmacists to enhance their ability to utilize DI resources. This can be achieved through increasing the number of pharmacists working in the same setting/shift.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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