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A Cross-Sectional Survey among Pharmacy Students, Pharmacists, and Physicians in Jordan on Pharmaceutical Care and Telehealth Practices during the COVID-19 Pandemic

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ABSTRACT

The primary obstacle to implementing pharmaceutical care was identified as limited access to patient medical records (90.6%). Most participants (93.0%) supported the development of a website offering pharmaceutical care services, and 45.1% indicated they would be willing to pay for such a service if available. Additionally, a large majority (89.8%) agreed that establishing a comprehensive patient data database could reduce medical errors. Evaluation of the four domains of pharmaceutical care—technical, psychosocial, communication, and administrative—among students and pharmacists revealed weaknesses across all areas. The findings underscore that inadequate documentation of patient medical information significantly increases the risk of medical complications and represents the most commonly cited barrier to integrating pharmaceutical care. This highlights the potential of telemedicine and the creation of specialized websites and database repositories to maintain continuity of care, even during pandemics.

Keywords: Pharmaceutical care, Pandemic, Electronic medical files, COVID-19

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Introduction

Enhancing healthcare systems' responsiveness to patient needs remains a central challenge worldwide [1, 2]. Consequently, research increasingly focuses on improving healthcare experiences to align with patient expectations [3-5]. Since patients play a pivotal role in setting priorities within healthcare, their involvement in the pharmaceutical care (PC) process is essential [4]. Given that patients, healthcare professionals, and policymakers often have differing perspectives on what constitutes high-quality care [6], assessing patient acceptability has become a key component of evaluating healthcare quality [7].

Over the past decades, pharmacists in Jordan have expanded their role beyond traditional dispensing, with PC services steadily increasing. Clinical pharmacists now collaborate more closely with healthcare teams in hospitals and other clinical settings to optimize therapy outcomes [8-14]. However, these services are generally offered free of charge in Jordan and most other Arabic countries, highlighting the need for evaluation by patients, direct care providers, and policymakers.

Patient satisfaction is influenced by factors such as pharmacist professionalism, communication skills, counseling quality, service efficiency, and pharmacy accessibility. In Jordan, pharmacy convenience and free advice were primary motivators for visiting pharmacies [15, 16], while in Saudi Arabia, proximity and competent pharmacists were decisive factors [15, 17]. Globally, studies indicate that patients generally perceive PC positively, yet barriers remain, particularly in community pharmacy settings [17-21]. Research also shows that patients are satisfied with various PC services [17, 22, 23]. In developing countries like Jordan, understanding patient attitudes and

willingness to pay for PC can help pharmacists better meet patient needs, with many patients supporting the expansion of PC services [12, 21].

Telemedicine—defined as the use of electronic communications to exchange medical information and provide remote clinical care (telehealth)—offers convenience, cost savings, and reduced travel time [24-26]. During the COVID-19 pandemic, telemedicine has proven especially valuable for ensuring continuity of care for chronic disease patients, supporting social distancing, and minimizing infection risk [27-31].

This study aimed to explore the perceptions of pharmacy students, pharmacists, and physicians in Jordan regarding PC services and telemedicine during the COVID-19 pandemic. Additionally, it sought to identify perceived barriers to patients seeking pharmacist consultations and evaluate the preparedness of pharmacy students and pharmacists to provide PC.

Materials and Methods

Study design and participants

A descriptive cross-sectional design was employed targeting healthcare providers (physicians and pharmacists) and fourth- and fifth-year pharmacy students at the Faculty of Pharmacy, Applied Science Private University (ASU), Jordan. Students in years one through three and non-healthcare providers were excluded. Data collection occurred over four months, from November 2020 to February 2021, with ethical approval obtained from the ASU Institutional Review Board (2021-PHA-3).

Survey development and administration

Data were collected using an online questionnaire via Google Forms, a method offering efficiency, cost savings, rapid response collection, and participant anonymity [32]. Convenience sampling was employed, with pharmacy students recruited through online lectures on Microsoft Teams during COVID-19 restrictions, while physicians and pharmacists were approached via social media platforms (Facebook and WhatsApp).

The self-administered survey included an overview of the study, inclusion criteria, and informed consent. Responses were collected anonymously to minimize bias and protect confidentiality throughout the study.

Data collection tool

To create the questionnaire, an extensive review of relevant literature was conducted [32-39]. An initial version in English was drafted based on insights from previous studies. This draft underwent expert review, and feedback from subject-matter specialists was incorporated to finalize the content.

The survey is organized into multiple sections. The first section collects participants' demographic and professional information. To evaluate attitudes toward different pharmaceutical care (PC) services provided by pharmacists or pharmacy students, a five-point Likert scale was employed, ranging from 1 (strongly disagree) to 5 (strongly agree). A separate four-point scale, from 1 (unimportant) to 4 (very important), measured participants' views on the importance of pharmacists' ability to deliver various PC services.

The second section investigates the main challenges that hinder the delivery of PC in practice. The third section focuses on economic aspects, including willingness to pay for PC and telemedicine services, support for an online PC platform, and opinions on whether these services should incur a fee.

Questions regarding medical errors were also included, assessing whether participants believed that a comprehensive patient database containing medical records could help reduce such errors. Responses were captured on a five-point agreement scale, from 1 (strongly disagree) to 5 (strongly agree).

Some questions were specifically directed at pharmacy students, asking about the PC services they performed during training and their confidence in providing these services. Preparedness was rated using a five-level scale from 1 (poor) to 5 (excellent), with scores assigned accordingly: 1 for poor, 2 for average, 3 for good, 4 for very good, and 5 for excellent. This approach was adapted from Ried *et al.* (2002) [40] and modified by Scott *et al*. (2010) [41].

Pharmacists were asked about the average time spent with patients, the use of electronic patient records, actions taken when identifying prescription errors, and physician receptiveness to their recommendations. Their ability to perform PC tasks was also rated on the same five-point scale used for students.

Lastly, physicians were asked to indicate their acceptance of pharmacists' recommendations concerning prescribing errors.

Data analysis

Responses from the online survey were first exported to Microsoft Excel (Microsoft Corporation, Redmond, WA, USA) and subsequently imported into IBM SPSS Statistics for Windows, version 25.0 (IBM Corporation, Armonk, NY, USA) for both descriptive and inferential analyses. The Shapiro-Wilk test was applied to assess the normality of continuous variables. Descriptive statistics were reported as means with standard deviations (SD) or as medians with interquartile ranges (IQR) for Likert-scale items, depending on the data distribution. Categorical variables were summarized as frequencies and percentages.

Abbreviations

PC: Pharmaceutical Care

Results and Discussion

A total of 541 individuals completed the survey, with the majority being female (67.3%) and free of chronic medical conditions (90.4%), and an average age of 24.7 ± 7.20 years. Most participants were students (70.2%), 301 (55.6%) reported having no personal income, and a large proportion were not employed (76.2%) **(Table 1).** All respondents had a healthcare-related background: 380 (70.2%) were pharmacy students, 62 (11.5%) were community pharmacists, 49 (9.1%) were pharmacists not practicing in a community setting, and 50 (9.2%) were physicians. Nearly half of the participants reported having experienced at least one medical error during their lifetime **(Table 1).**

Table 1. Basic characteristics of study participants (N = 541)

Characteristic	Frequency (Percentage) or Mean ± SD
Role	
Pharmacy student	380 (70.2%)
Community pharmacist	62 (11.5%)
Non-community pharmacist	49 (9.1%)
Physician	50 (9.2%)
Gender	
Male	177 (32.7%)
Female	364 (67.3%)
Age (years)	24.7 ± 7.20
Employment status	
Not employed	412 (76.2%)
Employed	129 (23.8%)
Type of health insurance	
Ministry of Health	60 (11.1%)
Government	38 (7.0%)
Private sector	135 (25.0%)
University coverage	308 (56.9%)
Monthly income	
No income	301 (55.6%)
Less than $500	78 (14.4%)
$500–$1000	100 (18.5%)
More than $1000	62 (11.5%)
Presence of chronic disease	52 (9.6%)
Experience of medical errors in lifetime	
None	292 (54.0%)
1–2 times	205 (37.9%)
3–4 times	32 (5.9%)
More than 4 times	12 (2.2%)

Assessment of participants' attitudes toward pharmaceutical care (PC) revealed that a large majority (89.1%) agreed or strongly agreed that all pharmacists should be involved in providing PC, and 81.1% considered it a primary responsibility of the pharmacist. Most respondents also felt that PC contributes to better patient health

(91.3%) and offers professional satisfaction (77.2%). However, 372 participants (68.8%) perceived that delivering PC requires substantial time and effort, and 63.6% believed it adds an excessive workload for pharmacists **(Table 2)**.

Table 2. Participants' attitudes toward pharmaceutical care (PC) (N = 541)

Statement	5 *	4 *	3 *	2 *	1 *	Mean ± SD	Median (IQR)
Pharmacists should provide PC	285 (52.7%)	197 (36.4%)	54 (10.0%)	5 (0.9%)	0 (0.0%)	4.41 ± 0.71	5 (1)
PC should be a pharmacist's primary responsibility	228 (42.1%)	211 (39.0%)	91 (16.8%)	10 (1.8%)	1 (0.2%)	4.21 ± 0.80	4 (1)
Pharmacy students can provide PC during experiential training	192 (35.5%)	186 (34.4%)	136 (25.1%)	27 (5.0%)	0 (0.0%)	4.00 ± 0.90	4 (2)
Providing PC requires significant time and effort	148 (27.4%)	224 (41.4%)	123 (22.7%)	45 (8.3%)	1 (0.2%)	3.87 ± 0.91	4 (2)
PC enhances patient health	276 (51.0%)	218 (40.3%)	44 (8.1%)	1 (0.2%)	2 (0.4%)	4.41 ± 0.68	5 (1)
PC is professionally satisfying	202 (37.3%)	216 (39.9%)	103 (19.0%)	19 (3.5%)	1 (0.2%)	4.11 ± 0.84	4 (1)
Providing PC is the appropriate approach for pharmacy practice	238 (44.0%)	224 (41.4%)	75 (13.9%)	4 (0.7%)	0 (0.0%)	4.29 ± 0.73	4 (1)
The extra workload from delivering PC is not justified	159 (29.4%)	185 (34.2%)	148 (27.4%)	44 (8.1%)	8 (0.9%)	3.83 ± 0.97	4 (2)

*5 Strongly agree; 4 = Agree; 3 = Neutral; 2 = Disagree; 1 = Strongly disagree.

Figure 1 illustrates the main obstacles to implementing pharmaceutical care (PC) in practice. The most frequently reported barrier was limited access to patient medical records in pharmacies (90.6%), followed by the absence of private counseling spaces (86.9%), insufficient communication and coordination with physicians (85.2%), and the physical separation of pharmacists from patient care areas (80.0%), which were all identified as significant challenges to integrating PC.

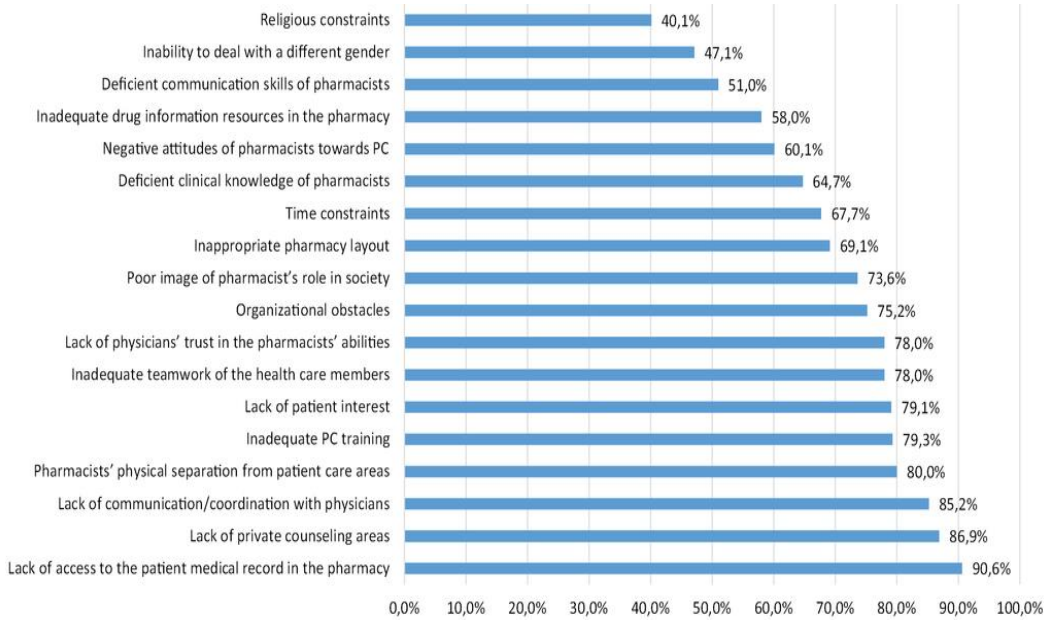

Figure 1. Key obstacles to implementing pharmaceutical care (PC) according to study participants (N = 541).

Only a small proportion of respondents (15.3%, n = 83) reported having electronic patient records available in the pharmacy. Nevertheless, the overwhelming majority (93.0%) expressed support for developing an online platform to deliver PC services, and 244 participants (45.1%) indicated they would be willing to pay for access to such a service. Of those willing to pay, around one-third (33.3%) were ready to spend $20 or less annually for these services **(Table 3).**

Table 3. Participants' willingness to pay for pharmaceutical care (PC) services and telemedicine (N = 541)

Question	Response	Frequency (%)
Availability of an electronic patient file at the pharmacy	Yes	83 (15.3%)
Support for establishing a website providing PC services	Yes	503 (93.0%)
Willingness to pay for a paid PC website	Yes	244 (45.1%)
	No, not interested	95 (17.6%)
	Unsure, want more information about website benefits	77 (14.2%)
	No, would consult GP instead	41 (7.6%)
	No, other reasons	84 (15.5%)
Maximum annual amount willing to pay for the website	$0	103 (19.0%)
	$20	180 (33.3%)
	$40	60 (11.1%)
	$60	33 (6.1%)
	$80	16 (3.0%)
	$100	14 (2.6%)
	$150	11 (2.0%)
	Unsure	124 (22.9%)

The lack of adequate documentation of patients' medical information (89.3%) and patients' challenges in recalling their medical history (84.7%) were identified as key contributors to the risk of medical errors. In addition, most participants (89.8%) believed that establishing a comprehensive patient database could help reduce such errors **(Table 4).**

Table 4. Factors associated with increasing or reducing medical errors (N = 541)

Statement	5 *	4 *	3 *	2 *	1 *	Mean ± SD	Median (IQR)
Inadequate documentation of patient medical information is a major contributor to the high occurrence of medical errors	251 (46.4%)	232 (42.9%)	53 (9.8%)	4 (0.7%)	1 (0.2%)	4.35 ± 0.70	4 (1)
Patients often struggle to recall their medical history and medication details	177 (32.7%)	221 (32.7%)	103 (19.0%)	32 (5.9%)	8 (1.5%)	3.97 ± 0.94	4 (2)
Failing to record patients' medical histories increases the chances of healthcare providers committing medical errors	244 (45.1%)	214 (39.6%)	75 (13.9%)	8 (1.5%)	0 (0.0%)	4.28 ± 0.76	4 (1)
Creating a comprehensive database containing patient information, medical conditions, medications, lab results, imaging, and other records is essential for preventing medical errors	344 (63.6%)	142 (26.2%)	48 (8.9%)	7 (1.3%)	0 (0.0%)	4.52 ± 0.71	5 (1)

*5 = Strongly agree; 4 = Agree; 3 = Neutral; 2 = Disagree; 1 = Strongly disagree.

Among the students, the majority were in their final year of study (63.9%), while only 47 individuals (12.4%) had not yet begun their practical training. Over half of the students (55.2%) had completed at least 720 hours of training out of the total 1,440 required credit hours. Community pharmacies served as the primary training sites for most students (78.2%). Regarding their experiences at these locations, more than three-quarters of community pharmacies (76.6%) offered some form of patient counseling, yet only 116 pharmacies (30.5%) maintained electronic medical records for patients **(Table 5)**. Students' involvement in pharmaceutical care primarily included

verifying drug indications (89.5%), educating patients about correct usage and dosage (88.4%), and informing patients of potential side effects (82.1%). When asked about their preparedness to provide PC after completing their studies, nearly half of the students (47.6%) expressed uncertainty about their readiness **(Table 5).**

Table 5. Pharmacy students' perspectives on pharmaceutical care (PC) (N = 380)

Statement	Response	Frequency (%)
Source of motivation for pursuing pharmacy education	Self-motivated	228 (60.0%)
	Family preference	63 (16.8%)
	Influenced by friends or seniors	18 (4.7%)
	Other reasons	68 (17.9%)
Have you started your final year of study?	Yes	243 (63.9%)
Training location	Not yet started	47 (12.4%)
	Community pharmacy	297 (78.2%)
	Hospital	14 (3.7%)
	Pharmaceutical company	19 (5.0%)
	Industry	3 (0.8%)
Training hours completed	0 hours	42 (11.1%)
	1–359 hours	42 (11.1%)
	360–719 hours	86 (22.6%)
	720–999 hours	82 (21.8%)
	1000–1440 hours	127 (33.4%)
Is patient counseling available at your training site?	Yes	291 (76.6%)
Is there an electronic patient file at your training site?	Yes	116 (30.5%)
Key components of patient counseling performed during training	Explain drug indication	340 (89.5%)
	Provide dose and usage instructions	336 (88.4%)
	Inform about side effects	312 (82.1%)
	Discuss drug–drug interactions	286 (75.3%)
	Monitor treatment outcomes	276 (72.6%)
Do you feel ready to provide the different aspects of PC?	Yes	167 (43.9%)
	No	32 (8.4%)
	Unsure	181 (47.6%)

Among the 62 pharmacists employed in community pharmacies, all reported providing counseling to patients when dispensing medications (100%). Regarding the duration of counseling, 24 pharmacists (38.7%) spent less than five minutes per patient, another 24 (38.7%) spent between five and nine minutes, and none reported exceeding fifteen minutes. When asked about the availability of electronic patient records, only 26 pharmacists (41.9%) confirmed having them. Despite this, the majority (38 pharmacists, 61.3%) felt confident in delivering various aspects of pharmaceutical care **(Table 6)**. Additionally, about 71% of respondents believed that PC services should involve payment, with preferred methods including per patient (45.5%), per minute of consultation (22.7%), per prescription (22.7%), or other approaches (9.1%).

Table 6. Dispensing practices and pharmaceutical care in community pharmacies (N = 62)

Statement	Response	Frequency (%)
Number of prescriptions dispensed per day	Fewer than 5	14 (22.6%)
	5–10	24 (38.7%)
	More than 10	24 (38.7%)
Do you provide patient counseling when dispensing medications?	Yes	62 (100%)

Average time spent per patient	Less than 5 minutes	24 (38.7%)
	5–9 minutes	24 (38.7%)
	10–15 minutes	14 (22.6%)
	More than 15 minutes	0 (0.0%)
Should counseling services be compensated?	Yes	44 (71.0%)
Preferred method of payment	Per minute of consultation	10 (22.7%)
	Per patient	20 (45.5%)
	Per prescription	10 (22.7%)
	Other methods	4 (9.1%)
Availability of electronic patient files	Yes	26 (41.9%)
Action when detecting an error in a prescription	Contact the physician	44 (71.0%)
	Substitute the drug with an alternative	12 (19.4%)
	Dispense despite error	4 (6.5%)
	Refuse to dispense	2 (3.2%)
Physician acceptance of pharmacist recommendations	Always	8 (12.9%)
	Sometimes	54 (87.1%)
	Never	0 (0.0%)
Preparedness to implement various aspects of PC	Yes	38 (61.3%)
	No	6 (9.7%)
	Unsure	18 (29.0%)

When asked how they handle issues in prescriptions, respondents reported the following actions: contacting the physician (71.0%), substituting the prescribed drug with a better alternative (19.4%), dispensing the medication despite it being inappropriate (6.5%), or refusing to dispense it (3.2%). Regarding physicians' responses to pharmacists' recommendations, most participants indicated that physicians accepted the advice only occasionally (87.1%) **(Table 6).**

Assessment of students' and pharmacists' preparedness across the four domains of pharmaceutical care—technical, psychosocial, communication, and administrative—revealed overall deficiencies in all areas **(Table 7).** Within the technical domain, both groups demonstrated the weakest skills in monitoring pharmacokinetic parameters. For psychosocial competencies, the lowest proficiency was observed in the use of computers and data management in professional practice. In terms of communication, the most limited ability was noted in sharing patients' medical records with other healthcare professionals. Finally, within administrative and management aspects, participants generally showed weaknesses across all evaluated items **(Table 7).**

Table 7. Pharmacy students' and pharmacists' perceptions of their preparedness to provide PC.

	Pharmacists (n = 62)							**Pharmacy students (n = 380)**						
	1	**2**	**3**	**4**	**5**	**Mean ± SD**	**Median (IQR)**	**1**	**2**	**3**	**4**	**5**	**Mean ± SD**	**Median (IQR)**
Technical aspects														
Gather and analyze information to avoid or address issues in drug therapy.	18 (29.0)	16 (25.8)	14 (22.5)	4 (6.4)	10 (16.1)	2.810 ±1.140	3 (2)	59 (15.5)	85 (22.4)	139 (36.6)	67 (17.6)	30 (7.9)	2.548 ±1.399	2 (2)
Assess the laboratory test results for an individual patient.	22 (35.4)	16 (25.8)	8 (12.9)	2 (3.2)	14 (22.5)	2.737 ±1.130	3 (1)	53 (13.9)	115 (30.3)	122 (32.1)	59 (15.5)	31 (8.2)	2.516 ±1.555	2 (2)

Determine and assess the pharmacokinetic characteristics.	24 (38.7)	16 (25.8)	14 (22.5)	2 (3.2)	6 (9.6)	2.579 ±1.174	3 (1)	83 (21.8)	95 (25.0)	132 (34.7)	39 (10.3)	31 (8.2)	2.194 ±1.265	2 (2)
Analyze data obtained from the patient's medical history and clinical evaluation	22 (35.4)	10 (16.1)	18 (29)	6 (9.6)	6 (9.6)	2.976 ±1.149	3 (2)	38 (10.0)	96 (25.3)	128 (33.7)	73 (19.2)	45 (11.8)	2.419 ±1.325	2 (2)
Draw logical conclusions even when the available data is partial or incomplete	18 (29.0)	14 (22.5)	20 (32.2)	6 (9.6)	4 (6.4)	2.713 ±1.185	3 (1)	66 (17.4)	105 (27.6)	114 (30.0)	62 (16.3)	33 (8.7)	2.419 ±1.195	2 (2)
Suggest suitable drug therapy options.	20 (32.2)	12 (19.3)	14 (22.5)	10 (16.1)	6 (9.6)	2.932 ±1.172	3 (2)	48 (12.6)	91 (23.9)	119 (31.3)	83 (21.8)	39 (10.3)	2.516 ±1.352	2 (2)
Assess a patient's pharmacotherapeutic regimen to identify, prevent, or address treatment-related issues.	20 (32.2)	12 (19.3)	14 (22.5)	10 (16.1)	6 (9.6)	2.9 ±1.181	3 (2)	52 (13.7)	88 (23.2)	127 (33.4)	72 (18.9)	41 (10.8)	2.516 ±1.352	2 (2)
Identify the most suitable drug delivery method.	22 (35.5)	10 (16.1)	12 (19.3)	12 (19.3)	6 (9.6)	2.958 ±1.215	3 (2)	51 (13.4)	90 (23.7)	108 (28.4)	86 (22.6)	45 (11.8)	2.516 ±1.400	2 (3)
Suggest appropriate medication dosages and dosing schedules.	26 (41.9)	6 (9.6)	10 (16.1)	14 (22.5)	6 (9.6)	2.939 ±1.202	3 (2)	51 (13.4)	91 (23.9)	109 (28.7)	84 (22.1)	45 (11.8)	2.484 ±1.468	2 (3)
Offer guidance and education to patients regarding their treatment.	22 (35.5)	10 (16.1)	14 (22.5)	10 (16.1)	6 (9.6)	2.879 ±1.209	3 (2)	59 (15.5)	88 (23.2)	111 (29.2)	84 (22.1)	38 (10.0)	2.484 ±1.376	2 (2)
Suggest strategies to improve patient adherence to therapy.	18 (29.0)	16 (25.8)	14 (22.5)	10 (16.1)	4 (6.4)	2.716 ±1.202	3 (2)	72 (18.9)	95 (25.0)	114 (30.0)	67 (17.6)	32 (8.4)	2.452 ±1.250	2 (2)
Oversee and track a patient's therapeutic plan.	24 (38.7)	14 (22.5)	16 (25.8)	4 (6.4)	4 (6.4)	2.452 ±1.302	3 (1)	68 (17.9)	96 (25.3)	114 (30.0)	67 (17.6)	35 (9.2)	2.452 ±1.302	3 (2)
Record details of the patient's information, assessment, care plan, and educational guidance.	24 (38.7)	2 (3.2)	24 (38.7)	8 (12.9)	4 (6.4)	2.355 ±1.294	3 (2)	49 (12.9)	99 (26.1)	142 (37.4)	52 (13.7)	38 (10.0)	2.355 ±1.294	2 (2)

Overall						2.765 ±0.199	3 (0)						2.451 ±0.093	2 (0)
Psychosocial aspects														
Determine the relevant information needed to guide decision-making for a specific problem.	24 (38.7)	8 (12.9)	18 (29)	8 (12.9)	4 (6.4)	2.452 ±1.276	3 (2)	39 (10.3)	103 (27.1)	139 (36.6)	65 (17.1)	34 (8.9)	2.452 ±1.276	3 (2)
Provide input and professional insights to the healthcare team.	22 (35.5)	6 (6.4)	22 (35.5)	8 (12.9)	4 (6.4)	2.323 ±1.265	3 (2)	41 (10.8)	85 (22.4)	137 (36.1)	68 (17.9)	49 (12.9)	2.194 ±1.099	2 (2)
Raise awareness and educate the public about health issues.	22 (35.5)	14 (22.5)	14 (22.5)	8 (12.9)	4 (6.4)	2.194 ±1.099	3 (1)	47 (12.4)	98 (25.8)	123 (32.4)	65 (17.1)	47 (12.4)	2.323 ±1.156	2 (2)
Utilize data and computer technology in professional practice.	22 (35.5)	16 (25.8)	14 (22.5)	10 (16.1)	0 (0.0)	2.323 ±1.156	3 (1)	46 (12.1)	98 (25.8)	152 (40.0)	41 (10.8)	43 (11.3)	2.387 ±1.246	2 (2)
Overall						2.323 ±0.105	3 (1)						2.339 ±0.110	2 (0)
Communication aspects														
Share medical record information with healthcare professionals.	22 (35.5)	10 (16.1)	18 (29.0)	12 (19.3)	0 (0.0)	2.387 ±1.246	3 (1)	47 (12.4)	94 (24.7)	147 (38.7)	55 (14.5)	37 (9.7)	2.387 ±1.246	2 (2)
Convey medical record information to the patient.	22 (35.5)	10 (16.1)	16 (25.8)	12 (19.3)	2 (3.2)	2.548 ±1.250	3 (2)	34 (8.9)	91 (23.9)	166 (43.7)	48 (12.6)	41 (10.8)	2.548 ±1.250	3 (2)
Gather and compile information to address drug-related inquiries from healthcare professionals.	22 (35.5)	6 (9.6)	22 (35.5)	8 (12.9)	4 (6.4)	2.323 ±1.265	3 (2)	41 (10.8)	85 (22.4)	137 (36.1)	68 (17.9)	49 (12.9)	2.194 ±1.099	2 (2)
Provide answers to a patient's request for information.	20 (32.3)	6 (9.6)	20 (32.3)	14 (22.5)	2 (3.2)	2.355 ±1.103	3 (1)	40 (10.5)	85 (22.4)	156 (41.1)	58 (15.3)	41 (10.8)	2.355 ±1.103	2 (2)
Overall						2.403 ±0.099	3 (1)						2.371 ±0.145	2 (0)
Administrative/Management aspects														

Assess, choose, and procure pharmaceutical products.	18 (29.0)	14 (22.5)	22 (35.5)	6 (9.6)	2 (3.2)	2.484 ±1.198	3 (1)	51 (13.4)	109 (28.7)	141 (37.1)	52 (13.7)	27 (7.1)	2.484 ±1.198	3 (2)
Design and carry out a pharmacy inventory management system.	18 (29.0)	10 (16.1)	24 (38.7)	6 (9.6)	4 (6.4)	2.323 ±1.098	3 (1)	40 (10.5)	121 (31.8)	140 (36.8)	50 (13.2)	29 (7.6)	2.323 ±1.098	2 (2)
Oversee financial and personnel resources.	18 (29.0)	16 (25.8)	20 (32.3)	6 (9.6)	2 (3.2)	2.355 ±1.216	3 (1)	45 (11.8)	111 (29.2)	141 (37.1)	56 (14.7)	27 (7.1)	2.355 ±1.216	2 (2)
Create and execute a drug formulary service.	20 (32.2)	14 (22.5)	18 (29)	6 (9.6)	4 (6.4)	2.355 ±1.216	3 (1)	54 (14.2)	107 (28.2)	135 (35.5)	54 (14.2)	30 (7.9)	2.355 ±1.216	2 (2)
Overall						2.379 ±0.071	3 (1)						2.379 ±0.071	2 (0)

1 = Poor; 2 = average; 3 = good; 4 = very good; 5 = excellent.

The survey posed a question to physicians regarding their reactions when a pharmacist identifies an incorrect or inappropriate prescription. Half of the respondents (50%) reported occasionally accepting the pharmacist's recommendation, 19 physicians (38%) stated they always accept it, and 6 physicians (12%) indicated that they do not accept such advice.

This is the first study in Jordan to examine the viewpoints of healthcare providers and pharmacy students regarding pharmaceutical care (PC) and telemedicine during the COVID-19 pandemic, along with the obstacles to incorporating PC into routine practice. The results emphasize the importance of having accessible electronic medical records for healthcare professionals. A large majority of participants (93.0%) supported creating an online platform containing patients' medical information to facilitate PC, and nearly half (45.1%) expressed willingness to pay for such a service. Participants also recognized that inadequate documentation of patient medical history and patients' difficulty remembering their health information elevate the risk of medical errors, and that a centralized database encompassing all relevant patient information could reduce this risk.

Overall, participants demonstrated a positive attitude toward PC, with most considering it a central responsibility of pharmacists that contributes to improved patient outcomes. These findings are consistent with previous studies conducted in Saudi Arabia [42], Qatar [43], Iraq [2], Malaysia [44], the United Arab Emirates [45], France [34], and Jordan [21]. The primary barriers to PC implementation identified in this study included limited access to patient medical records in pharmacies (90.6%), absence of private counseling spaces (86.9%), and insufficient communication or collaboration with physicians (85.2%). Notably, the first two barriers were also reported by patients in a recent Jordanian study (submitted paper). Similar challenges have been documented internationally, including restricted access to patient data, staffing shortages, time constraints, inadequate PC training, lack of established PC models, minimal interaction with patients or other healthcare professionals, insufficient counseling areas, underappreciation of the pharmacist's role, organizational hurdles, absence of remuneration, and separation from patient care areas [34, 43-46].

Limited access to patient records emerged as the most frequently reported barrier and is likely to contribute to higher rates of medication-related problems, echoing findings from prior studies in Jordan and other countries [21, 43-45]. While large pharmacy chains in Jordan maintain electronic patient records [47], the prevalence of electronic records in community pharmacies is unclear. Although the Jordanian government implemented the HAKEEM e-health system in 2009 to link public hospitals and clinics nationwide [47], no equivalent official system exists for community pharmacies or patients without government insurance. Creating a shared database connecting community pharmacies could enhance PC services and reduce medication errors. Beyond clinical advantages, the economic benefits of PC are well documented [48, 49], and increasing awareness among

healthcare providers and the public may encourage the adoption and financial support of services that facilitate PC.

The absence of private counseling areas was the second most reported barrier, in line with studies from Qatar [46], Kuwait [35, 46], and the UAE [45]. Regulations in Jordan do not require dedicated counseling spaces in community pharmacies, and most pharmacy layouts do not allow for private consultation areas. However, the Jordan Pharmaceutical Association (JPA) has introduced the Good Pharmacy Practice (GPP) program, which encourages providing private counseling spaces, and several major pharmacy chains are beginning to implement this feature [47]. Offering a confidential environment for counseling improves the quality of patient consultations and encourages patients—who are essential participants in the PC process—to openly discuss their health concerns [50].

Communication and coordination gaps emerged as the third major barrier to effective pharmaceutical care (PC), consistent with prior studies [43, 44]. Strong interprofessional collaboration is essential for successful PC implementation [51, 52], yet multiple factors can hinder it in Arab healthcare settings. These include patients' and physicians' willingness to cooperate, logistical and financial constraints, perceived pharmacist competency [53], overlapping professional roles, and hierarchical differences among healthcare team members [54]. Other challenges involve limited time and financial incentives, lack of direct interaction, and potential fragmentation of patient care when multiple professionals are involved [54]. Establishing formalized communication channels, such as telemedicine platforms, could strengthen collaboration, improve PC delivery, and reduce medication errors.

Although 61.3% of pharmacists and 43.9% of pharmacy students reported feeling ready to carry out different PC responsibilities, self-assessment indicated general weaknesses across all dimensions—technical, psychosocial, communication, and administrative. Administrative skills were particularly limited, echoing findings from the U.S. [41], Kuwait [55], and Turkey [56], which may reflect the minimal emphasis on administrative training in pharmacy curricula. With the Jordan Pharmaceutical Association's Good Pharmacy Practice (GPP) initiative promoting ongoing professional development [47], these findings highlight the importance of enhancing both undergraduate and continuing education programs to better equip pharmacists and students to deliver all aspects of PC, particularly administrative functions [57].

Telemedicine represents another promising approach to overcoming these barriers. By providing centralized access to patient information, telemedicine supports continuity of care during transitions between care settings, especially where specialized services are unavailable [58]. Its utility was especially evident during the COVID-19 pandemic, when lockdowns and movement restrictions limited access to medical care globally [59, 60]. Despite pharmacists reporting that they routinely counsel patients, most spend under ten minutes per patient, with none exceeding fifteen minutes, primarily due to heavy workloads, time constraints, and lack of financial reimbursement. Notably, around 71% felt that compensation should be provided for such services. Telemedicine platforms and online PC systems could help alleviate these challenges. In this study, 93% of respondents supported the concept of telemedicine websites, and 60% expressed willingness, to some extent, to pay for the service.

Healthcare in Jordan is provided through public and private sectors. Government services are cheaper, so financial limitations often drive patients to seek care in public facilities, which increases demand and places pressure on healthcare workers. This environment reduces consultation time, heightens the risk of medication errors, and reinforces the need for web-based PC and telemedicine solutions. Similar benefits of telemedicine have been observed in Iraq [36] and Canada [61], benefiting patients, healthcare providers, and overall healthcare systems.

Telemedicine has also been shown to improve chronic disease management, medication adherence, and patient self-management [62, 63]. Although participants indicated willingness to pay for these services, broader education about telemedicine and PC is needed to increase acceptance among both healthcare professionals and the public. Conducting cost-benefit analyses, clarifying payment methods, and addressing insurance coverage could further enhance adoption and support policymakers in integrating telemedicine into the national healthcare system [33].

Several limitations should be noted for this study. First, the number of participating pharmacists was relatively low compared to pharmacy students, which may have skewed the results toward perceived opinions rather than actual practices observed in real-world settings. Second, self-reported assessments of preparedness to deliver pharmaceutical care (PC) could overstate true competencies, as participants tend to overestimate their abilities. Finally, when participants were asked to indicate how much they might pay for a web-based PC and telemedicine service, they were provided with minimal information regarding the platform's features or the potential economic benefits of the PC, which may have resulted in an underestimation of their willingness to pay.

Conclusion

This study represents the first effort in Jordan to examine the views of healthcare providers and pharmacy students on PC and telemedicine during the COVID-19 pandemic. Findings suggest that incomplete or inaccessible patient medical information, along with patients' difficulty recalling their medical history, is a key barrier that increases the likelihood of medication-related problems. The results highlight the importance of telemedicine and the development of specialized digital platforms to store patient information, which can support continuity of care even during crises such as pandemics. Implementing an electronic, easily accessible database containing comprehensive patient information could help healthcare providers reduce errors and enhance the effectiveness of PC services.

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