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Knowledge, attitude, and perceived barriers towards pharmaceutical care among graduating pharmacy students in North West, Ethiopia. -a multicenter cross-sectional study

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Abstract

Introduction Pharmaceutical care (PC) is a pharmacist's responsibility, and its provision of medication-related care is meant to improve patients' quality of life. The future of PC is in the hands of graduating pharmacy students (GPS). Good knowledge and a positive attitude toward providing PC is essential among pharmacy students. In addition, identifying and resolving perceived barriers is crucial for PC.

Method A Cross-sectional study was conducted among GPS using a single-stage cluster sampling technique in North West, Ethiopia. A self-administered questionnaire was used to measure knowledge, attitude, and perceived barriers of GPS toward PC provision. The data that passed the quality check were entered and analyzed using Statically Package for Social Science version 27.0. Kruskal-Wallis H test and Mann-Whitney U test were performed to assess the difference in PC knowledge and attitude, and P-value < 0.05 was used to declare statistically significant difference.

Result Overall, 140 GPS participated, giving a response rate of 90.3%, and the mean (± SD) age was 23.72 ± 2.87 years. Overall, 122 (87.1%) and 54 (38.6%) GPS have good PC knowledge and positive attitudes toward provision of PC, respectively. Half of the GPS perceived that lack of therapeutics knowledge prevents them from providing PC. Statistically significant differences were observed in PC knowledge and attitude based on institution, education level before joining the program, source of motivation, previous incomplete grades, and participation in extracurricular activities.

Conclusion Graduating pharmacy students' knowledge on PC is adequate. But only less than half of the GPS have a positive attitude toward the provision of PC. Identifying barriers and tackling them is crucial to improve practitioners' attitude and the PC provision service. Promoting inclusive health policies on PC can improve the PC provision.

Keywords Pharmaceutical care, Graduating pharmacy students, Pharmaceutical care knowledge and pharmaceutical care attitude, Ethiopia

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Background

From the beginning of the 21st century, by incorporating pharmaceutical care (PC), the role of the pharmacist is shifting to patient-centered care [1]. PC is a "provision of medication-related care to achieving definite outcomes that improve a patient's quality of life" [1, 2]. Pharmacists are a relatively underutilized resource and almost "invisible" in recent health care policies [3, 4, 5]. Patient-oriented pharmacy services were developed to promote the rational use of medicines [6]. PC services provided by pharmacists are an integral component of the health care delivery system. In addition, PC serves as a regime to work in collaboration with the patient and healthcare providers to achieve better clinical outcomes and predefined goals of therapy [7, 8, 9] through prevention, identification, and resolution of drug therapy problems [1].

Pharmaceutical care promotes rational medicine use and improves patient health-related outcomes [10, 11, 12, 13]. In addition, PC improves patients' medication adherence [14, 15], decreases hospital stay, hospital readmission, and optimizes patients' health-related quality of life, while reducing the cost of illness [16, 17, 18]. In resource-limited settings, including Ethiopia, implementing PC services is relevant and well-accepted to optimize medicine use [19].

In Ethiopia, a clinical pharmacy program was established in 2009 in collaboration with the Ethiopian Pharmaceutical Association, the Strengthening Pharmaceutical Systems program of Management Sciences for Health, and the University of Washington [20]. The first patient-oriented pharmacy program was established at Jimma University in 2009 [19, 21]. Despite measures taken to improve the PC, the service, and attitude of the pharmacist is increasingly at risk due to exclusive health policies in Ethiopia [22].

Studies were conducted on pharmacy students' attitudes toward the provision of PC in Jourdan [23], Ethiopia [24], the United Arab Emirates (UAE) [25], Nepal [26], and Cuba [27]. Graduating pharmacy students (GPS) are trained in therapeutics to provide comprehensive drug management and PC during their final year clerkship attachment [24, 28, 29].

The future of PC is in the hands of pharmacy students. To improve PC provision, developing good PC knowledge and a positive attitude toward the provision of PC is essential among pharmacy students. In addition, identifying and resolving perceived barriers on PC provision is crucial [27, 30]. Previously conducted study in Ethiopia in 2015 [24] did not assess the knowledge of GPS on PC, and many guidelines were updated including the Ethiopian standard treatment guideline, after the study was conducted. In addition, provision of PC has been facing many challenges and the development is not as expected in Ethiopia. For this reason, it's important to assess knowledge, attitude, and perceived barriers toward PC provision among GPS in this era in Ethiopia.

Methods

Study design, period and setting

A Multicenter cross-sectional study was conducted from November 15 to December 8, 2023 at University of Gondar (UOG) and Bahir Dar University (BDU) Northwest, Ethiopia. UOG resides in Gondar, a city, and Woreda in Amhara Region, Ethiopia, 738 km from Addis Ababa (the capital city of Ethiopia) and established as a Public Health College in 1954. Currently, its health college has more than 10 undergraduate degrees and 34 postgraduate programs. BDU resides in Bahir Dar city, the capital of Amhara Regional State of Ethiopia, and is 565 km from Addis Ababa (the capital city of Ethiopia). The health collage is among the available colleges and established in October 2007.

Population of the study

The source population was graduating pharmacy students who studied at the North West Ethiopia governmental universities. Students from UOG and BDU were considered as the study population.

Eligibility criteria

Graduating pharmacy students who were available during the data collection period and showed a willingness to participate by signing written informed consent were included in this study.

Sample size determination and sampling technique

Governmental universities available in the North West Ethiopia, that have a bachelor of pharmacy degree program were considered a cluster (Bahir Dar University, Debre Markos University, Debre Tabor University, and the University of Gondar). The study cluster was selected using a single-stage cluster sampling method from available clusters. University of Gondar and Bahir Dar University were selected using the lottery method from all available clusters. Since the study population was small and used a single stage cluster sampling method, all available GPS were included in this study.

Study variables

Pharmaceutical care knowledge, attitude, and perceived barrier toward provision of PC were dependent variables. Age, gender, marital status, educational level when joining the B. pharm program, institution, source of motivation for joining the B. pharm program, employment, previous incomplete grade, and participation in extracurricular activities were treated as independent variables.

Data collection instrument and procedure

A Self-administered questionnaire was used to assess knowledge, attitude, and perceived barriers of GPS toward PC provision. The data was collected after students were informed about the purpose, the content of the questionnaire, and written informed consent was obtained. The questionnaire had four major parts, focused on socio-demographic characteristics, knowledge, attitude, and perceived barriers. PC knowledge was assessed using a tool that was previously used in published literature [31]. This tool has 10 yes or no questions (yes = 1 point, no and I don't know = 0) and the final score ranges from 0 to 10. GPS who scored 50% and above were considered as they had good PC knowledge, and the rest were treated as they had poor PC knowledge [32, 33].

The attitude of GPS was measured using 13 items, the Pharmaceutical Care Attitudes Survey (PCAS), which was developed by Martin and Chisholm [30] and widely used in different literature [24, 25, 26, 27, 34, 35, 36, 37, 38]. The tool was scored on a 1–5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral,4 = agree and 5 = strongly agree). The PCAS has three domains, professional benefit (questions 4, 5, and 7–12), professional duty (questions 1–3), and return on effort (questions 6 and 13). Reverse scoring was used on the return on effort domain. The final score ranges from 13 to 65 and the highest score shows a positive attitude toward PC provision. Bloom's cut-off points were used to classify GPS attitude. GPS scored ≥ 80% (≥ 52 score) was considered as they had a positive attitude, a 60–79% (39–51 score) neutral attitude, and a negative attitude when GPS scored < 60% (< 39 score) of 100% (65 score) on PCSA [39].

A 20-item tool was prepared by reviewing different literature that asses the perceived barrier to ward PC [24, 25, 26, 36, 40, 41] and used in this study to assess perceived barriers toward the provision of PC. The perceived barrier was scored on a 3-point Likert scale (0 = not at all, 1 = low extent, 2 = moderate extent and 3 = high extent) and the score ranged from 0 to 60 (Supplementary file 1). The highest score shows a higher perceived barrier toward the provision of PC.

Table 1 Socio-demographic characteristics of graduating pharmacy students, North West, Ethiopia, 2023

Variables		Frequency	Percentage (%)
Age Mean (± SD) = 23.72 ± 2.87	Above mean	56	40
	Below mean	84	60
Institution	UOG	100	71.4
	BDU	40	28.6
Gender	Male	68	48.6
	Female	72	51.4
Marital status	Single	113	80.7
	Married	27	19.3
Educational level when joining B. Pharm program	Diploma in pharmacy	53	37.9
	Health assistance	30	21.4
	10 + 12	57	40.7
Source of motivation to join pharmacy	Self-motivated	67	47.9
	Forced by family	41	29.3
	Influenced by friends	13	9.3
	Other	19	13.6
Current employment	Yes	49	35
	No	91	65
Any previous incomplete grade	Yes	34	24.3
	No	106	75.7
Participation in extracurricular activities	Yes	68	48.6
	No	72	51.4

BDU: Bahir Dar University, UOG: University of Gondar, SD: Standard deviation

Data processing and analysis

The data that passed the quality check were entered and analyzed using the Statically Package for Social Science version 27.0. Descriptive statistics like frequency, proportion, and mean ± standard deviation (SD) were used. A Kolmogorov-Smirnova statistical test was used to test the normality of the data (normally distributed when the P-value > 0.05). Normally distributed and skewed continuous variables were expressed as the mean (± SD) and median (Interquartile range), respectively. Since the data was skewed, Kruskal-Wallis H test and Mann-Whitney U test were used to assess statistically significant differences in PC knowledge and attitude based on the study participants' socio-demographic characteristics. Mann-Whitney U test was performed to detect the difference in PC knowledge and attitude for independent variables with one degree of freedom. Kruskal-Wallis H test was used to detect the difference among independent variables with two or more degrees of freedom. P-value < 0.05 was used to declare a statistically significant difference.

Result

Graduating pharmacy students' socio-demographic characteristics

From 155 GPS, 140 participated in this study, giving a response rate of 90.3%. The mean (± SD) age of the GPS was 23.72 ± 2.87 years and the majority were from UOG (n = 100, 71.4%). Nearly half (n = 67, 47.9%) and above quarter (n = 41, 29.3%) of the students joined B. pharm program by preference and forced by family, respectively. Of all participants, around half of them participate in extracurricular activities (N = 72, 51.4%) (Table 1).

Table 2 Graduating pharmacy students' pharmaceutical care knowledge, North West, Ethiopia, 2023

No	PC Knowledge Assessment Question	Yes (%)	No (%)	I don't know (%)
1	PC is defined as a patient-centered way to deliver medication management services	131 (93.6)	4(2.9)	5(3.6)
2	PC is a philosophy of practice where pharmacists work with and for the patient to optimize medication therapy outcomes	117(83.6)	14(10)	9(6.4)
3	PC stresses a pharmacist's responsibility for a patient's drug-related needs and being held accountable for the commitment	96(68.6)	33(23.6)	11(7.9)
4	The purpose of PC is to achieve positive patient outcomes	103 (73.6)	10(7.1)	27(19.3)
5	Primary focus of PC in the health care system is identifying and meeting patient's drug-related needs	108(77.1)	16(11.4)	16(11.4)
6	Primary responsibility of PC in the drug use process is the identification, prevention, and resolution of drug therapy problems	108(77.1)	21(15)	11(7.9)
7	PC practitioner conducts an assessment of the patient, his/her medical problems, and drug therapies leading to drug therapy problem identification	102(72.9)	18(12.9)	20(14.3)
8	PC practitioner develops a plan that establishes the desired goals of therapy for each of the patient's medical conditions	114(81.4)	16(11.4)	10(7.1)
9	PC practitioner schedules for follow-ups with the patient to evaluate the results of pharmacotherapy, recommendations, and other interventions	119(85)	13(9.3)	8(5.7)
10	Documentation of the care provided is among the vital elements of the pharmaceutical practice process	104(74.3)	15(10.7)	21(15)

PC: pharmaceutical care

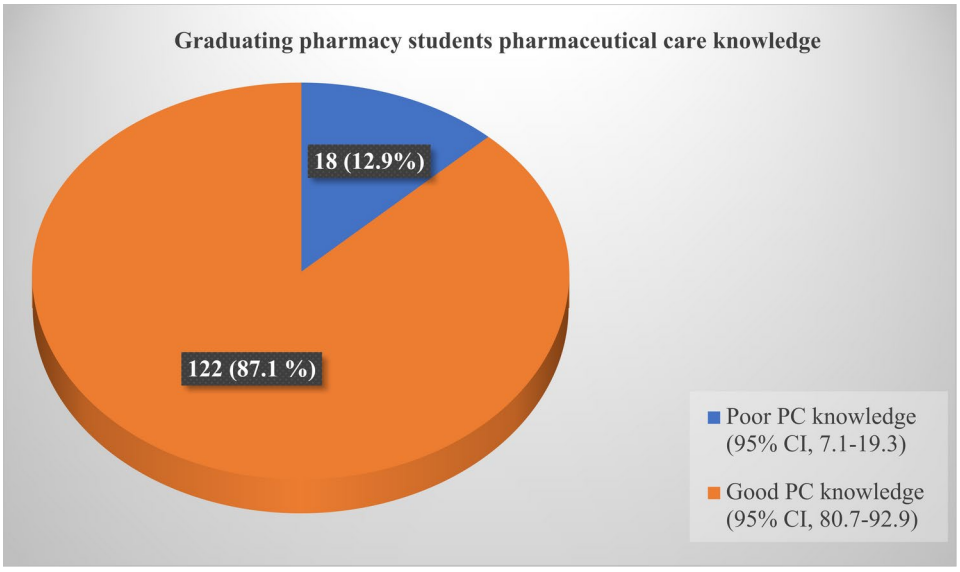

Fig. 1 Graduating pharmacy students' pharmaceutical care knowledge, North west, Ethiopia 2023
PC: pharmaceutical care, CI: confidence interval

Graduating pharmacy students' pharmaceutical care knowledge

Widely GPS know that PC is a patient-centered way to deliver medication management services ($n = 131$, 93.6%), and is a philosophy of practice where pharmacists work with and for the patient to optimize medication therapy outcomes ($N = 117$, 83.6%). In addition, above two-thirds ($n = 96$, 68.6%) of GPS know that PC stresses a pharmacist's responsibility for a patient's drug-related needs and being held accountable for the commitment. However, 21 (15%) didn't know documentation is vital or not (Table 2). Overall, 122 (87.1%, 95% CI, 80.7–92.9) GPS have good PC knowledge (>Fig. 1).

Graduating pharmacy students' attitudes toward provision of pharmaceutical care

More than three fourth of GPS agreed that all pharmacists have to provide PC ($n = 119$, 85%), pharmacists primary responsibility in the health-care setting should be to prevent and solve medication-related problems ($n = 128$, 91.4%), and like to perform PC as a pharmacist ($n = 118$, 82.1%). In addition, around three-fourths of GPS feel that the PC is the right direction to provide better care in the future ($n = 105$, 75%) and would benefit pharmacists ($n = 104$, 74.3%). Even though above half of the students feel that providing PC takes too much time and effort ($n = 91$, 65%) and is not worth the additional workload

Table 3 Graduating pharmacy students' attitudes toward provision of pharmaceutical care, North west, Ethiopia, 2023

Statement Students' attitudes towards pharmaceutical care in PCAS item	Response					
	SA	A	*N*	DA	SDA	Mean (SD)
All pharmacists should perform PC	87 (62.1)	32 (22.9)	14(10)	4(2.9)	3(2.1)	4.4 (0.94)
Primary responsibility of pharmacists in health-care setting should be to prevent and solve medication-related problems	71(50.7)	57(40.7)	5(3.6)	6(4.3)	1(0.7)	4.36(0.8)
Pharmacists' primary responsibility should be to practice PC	54(38.6)	44(31.4)	20(14.3)	20(14.3)	2(1.4)	3.9(1.11)
Pharmacy students can perform PC during their clerkship	45 (32.1)	49(35)	17(12.1)	28(20)	1(0.7)	3.78(1.13)
I think the practice of PC is valuable	72(51.4)	32(22.9)	12(8.6)	16(11.4)	8(5.7)	4.02(1.26)
Providing PC takes too much time and effort	46(32.9)	45(32.1)	28(20)	19(13.6)	2(1.4)	2.19 (1.1)
I would like to perform PC as a pharmacist	66(47.1)	49(35)	11(7.9)	4(2.9)	10(7.1)	4.12(1.14)
Providing PC is professionally rewarding	53(37.9)	52(37.1)	18(12.9)	5(3.6)	12(8.6)	3.9 (1.2)
I feel that the PC is the right direction for the provision to better care for future	34(24.3)	71(50.7)	19(13.6)	13(9.3)	3(2.1)	3.8 (0.96)
I feel that PC movement would benefit pharmacists	42 (30)	62(44.3)	22(15.7)	6(4.3)	8(5.7)	3.89(1.1)
I feel that PC movement will improve patient health	66(47.1)	52 (37.1)	14(10)	8(5.7)	0	4.23(0.86)
I feel that practicing PC will benefit my professional pharmacy career as a pharmacy practitioner	70(50)	46(32.9)	12 (8.6)	2(1.4)	10(7.1)	4.2(1.1)
Providing PC is not worth the additional workload that it places on the pharmacist	42(30)	31 (22.1)	32(22.9)	23(16.4)	12(8.6)	2.5 (1.3)

SA: Strongly Agree, A: Agree, N: Neutral D: Disagree, SD: Strongly disagree, PC: pharmaceutical care PCAS: Pharmaceutical Care Attitudes Survey

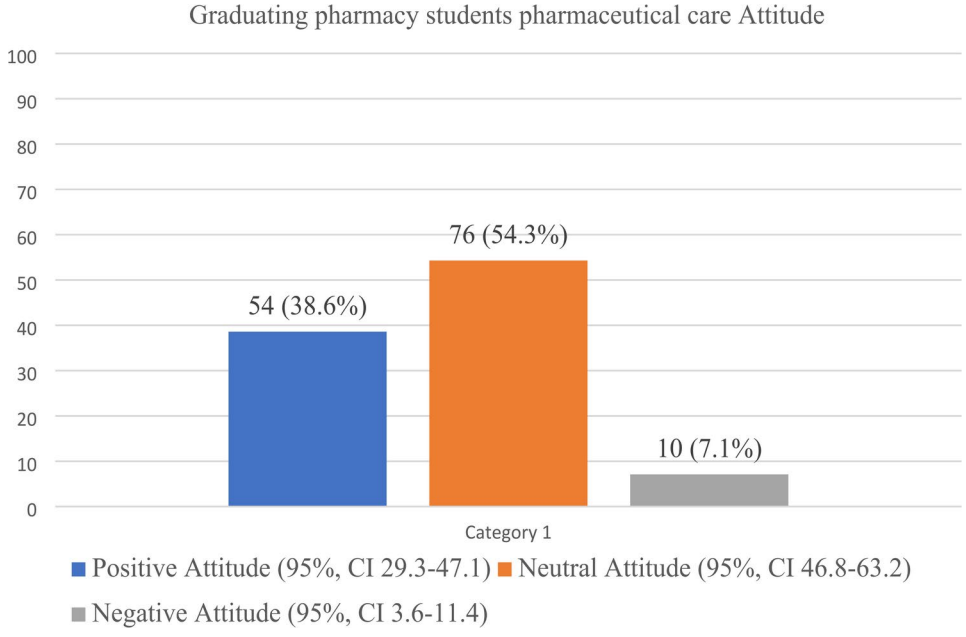

Fig. 2 Graduating pharmacy students' attitude toward provision of pharmaceutical care, North west, Ethiopia 2023
CI: Confidence interval

that it places on the pharmacist ($n=73$, 52.1%) (Table 3). Overall, 54 (38.6%, 95% CI, 29.3–47.1) GPS have a positive attitude on provision of PC (Fig. 2).

Perceived barrier to ward provision of pharmaceutical care

Graduating pharmacy students perceived that lack of therapeutic knowledge 71 (50.7%), workplace for counseling in the pharmacy 67 (47.9%), and inadequate training in PC 66 (47.1%) prevent them at a high extent from providing PC when they become a pharmacist. In addition, lack of access to patient medical records (2.29) and poor image of the pharmacist's role in the ward (2.24) are barriers with the highest mean score. However, 56 (40%) GPS do not perceive that religion can prevent them from providing PC (Table 4).

Table 4 Graduating pharmacy students perceived barrier to ward provision of pharmaceutical care North west, Ethiopia, 2023

No	To what extent would each of the following barriers prevent you from providing PC when you become a pharmacist in the future?	High extent	Moderate extent	Low extent	Not at all	Mean score
1	Inadequate drug information resources in the pharmacy	62(44.3)	43(30.7)	22(15.7)	13(9.3)	2.1 (0.98)
2	Lack of access to patient medical records in the pharmacy	57(40.7)	70(50)	10(7.1)	3(2.1)	2.29(0.69)
3	Lack of therapeutics knowledge	71(50.7)	33(23.6)	25(17.9)	11(7.9)	2.17(0.98)
4	Lack of understanding of PC	33(23.6)	57(40.7)	28(20)	22(15.7)	1.72(0.99)
5	Lack of workforce for counseling in the pharmacy	54(38.6)	58(41.4)	21(15)	7(5)	2.14(0.85)
6	Inadequate training in PC	66(47.1)	45(32.1)	21(15)	8(5.7)	2.21(0.9)
7	Lack of workplace for counseling in the pharmacy	67(47.9)	37(26.4)	30(21.4)	6(4.3)	2.18(0.92)
8	Inadequate technology in the pharmacy	36(25.7)	56(40)	37(26.4)	11(7.9)	1.84(0.9)
9	Lack of self confidence	38(27.1)	44(31.4)	35(25)	23(16.4)	1.69(1.05)
10	Time constraints (lack of time)	37(26.4)	44(31.4)	39(27.9)	20(14.3)	1.7(1.02)
11	Poor image of pharmacist's role in wards	61(43.6)	59(42.1)	12(8.6)	8(5.7)	2.24(0.84)
12	Inability to deal with a different sex	25(17.9)	41(29.3)	41(29.3)	33(23.6)	1.41(1.04)
13	Religious constraint	14(10)	42(30)	28(20)	56(40)	1.1(1.05)
14	Inability to deal with different physicians	23(16.4)	50(35.7)	38(27.1)	29(20.7)	1.48(0.99)
15	Lack of well-established integrated system with other healthcare team	56(40)	44(31.4)	31(22.1)	9(6.4)	2.05(0.94)
16	Clinical pharmacists are perceived as fault founder by other healthcare team	49(35)	41(29.3)	28(20)	22(15.7)	1.84(1.08)
17	Lack of well-established documentation system	54(38.6)	61(43.6)	21(15)	4(2.9)	2.18(0.79)
18	Lack of a legally binding formal communication channel between pharmacists and physicians	50(35.7)	59(42.1)	21(15)	10(7.1)	2.06(0.89)
19	Lack of a legally binding condition to include a clinical pharmacist's recommendation in a patients care decision making	50(35.7)	68(48.6)	12(8.6)	10(7.1)	2.12(0.85)
20	In adequacy of financial incentive to practice a proper pharmaceutical care	41(29.3)	59(42.1)	20(14.3)	20(14.3)	1.86(0.99)

PC: pharmaceutical care

Factors affecting graduating pharmacy students' pharmaceutical care knowledge

A Mann-Whitney U test / Kruskal-Wallis H test showed that there was a statistically significant difference on PC knowledge based on, age (U = 1737.5, Z = 2.717, $P = 0.007$), institution (U = 348, Z = 7.92, $P < 0.001$), education level before joining B. pharm program (X^2 [2] = 43543, $P < 0.001$), source of motivation (X^2 [3] = 57.329, $P < 0.001$), having incomplete previous grade (U = 673.5, Z = 5.699, $P < 0.001$), and participation in extracurricular activities (U = 1966, Z = 2.089, $P = 0.037$) (Table 5).

To assess significant differences among GPS attitudes toward the provision of PC, a Mann-Whitney U test / Kruskal-Wallis H test was performed. This tests showed that there was a statistically significant difference among GPS based on institution (U = 532, Z = 6.805, $P < 0.001$), education level before joining B. pharm program (X^2 [2] = 26.884, $P < 0.001$), source of motivation (X^2 [3] = 45.731, $P < 0.001$), having previous incomplete grade (U = 759, Z = 5.093, $P < 0.001$), and participation in extracurricular activities (U = 1835, Z = 2.568, $P = 0.01$) (Table 6).

Discussion

This study aimed to assess knowledge, attitude, and perceived barriers toward provision of PC among GPS. This study reveals that the majority of GPS have good PC knowledge (87.1%) and only around one third of GPS have positive attitudes toward PC provision (38.6%). Lack of therapeutic knowledge was the most commonly perceived barrier at a higher extent among students.

From all GPS, 93.6% correctly define PC and 85% of them know PC needs follow-ups with the patient to evaluate the results of pharmacotherapy, recommendations, and other interventions. These results were in line with the study conducted in eastern Ethiopia, which revealed 94.9% and 82.1% of pharmacists correctly defined PC and PC needs follow-up to evaluate interventions, respectively [31]. In addition, 77.1% of participants stated that the primary focus of PC in the health care system is identifying and meeting patients' drug-related needs, which is less than the study conducted in Eastern Ethiopia (87.2%) [31]. This difference might arise from the difference in the study population's educational status. The overall PC knowledge is similar to the studies conducted in eastern Ethiopia [31], and Jamaica [33]. However, the result was higher than the study conducted in Jourdan [42]. This difference might be observed due to methodological differences between these studies. Even though more than two-thirds of the students have adequate PC knowledge, the school of pharmacy should give attention to increasing PC knowledge, since it's the basic, and lack of PC knowledge can affect the provision of PC.

Table 5 Factors affecting graduating pharmacy students' pharmaceutical care knowledge, North West, Ethiopia, 2023

Variables		Mean rank score	Mann-Whitney U test / Kruskal-Wallis H	*P*-value	Z score /df
Age	Above mean	81.4	1737.5	0.007	-2.717
	Below mean	63.18			
Institution	UOG	87.02	348	< 0.001	-7.92
	BDU	29.2			
Gender	Male	75.60	2101.5	0.133	-1.501
	Female	65.69			
Marital status	Single	72.12	1343	0.316	-1.002
	Married	63.74			
Educational level	Diploma in pharmacy	88.93	43.543	< 0.001	2
	Health assistance	30.72			
	10 + 12	74.30			
Source of motivation to join pharmacy	Self-motivated	89.66	57.329	< 0.001	3
	Forced by family	32.22			
	Influenced by friends	81.38			
	Other	78.11			
Current employment	Yes	70.46	2227.5	0.993	-0.009
	No	70.52			
Any previous incomplete grade	Yes	37.31	673.5	< 0.001	-5.699
	No	81.15			
Participation in extra calicular activities	Yes	77.59	1966	0.037	-2.089
	No	63.81			

BDU: Bahir Dar University, d/f: degree of freedom, UOG: university of Gondar

Table 6 Factors affecting graduating pharmacy students' attitude toward provision of pharmaceutical care, North west, Ethiopia, 2023

Variables		Mean rank score	Mann-Whitney U test / Kruskal	*P*-value	Z score /df
Age	Above mean	64.53	2017.5	0.153	-1.430
	Below mean	74.48			
Institution	UOG	55.82	532	< 0.001	-6.805
	BDU	107.2			
Gender	Male	68.38	2303.5	0.545	-0.605
	Female	72.51			
Marital status	Single	68.7	1322	0.28	-1.080
	Married	78.04			
Educational level	Diploma in pharmacy	58.46	26.884	< 0.001	2
	Health assistance	104.03			
	10 + 12	64.04			
Source of motivation to join pharmacy	Self-motivated	54.25	45.731	< 0.001	3
	Forced by family	106.21			
	Influenced by friends	56.38			
	Other	60.39			
Current employment	Yes	71.92	2160	0.76	-0.305
	No	69.74			
Any previous incomplete grade	Yes	101.18			
	No	60.66	759	< 0.001	-5.093
Participation in extra calicular activities	Yes	61.49			
	No	79.01	1835	0.010	-2.568

BDU: Bahir Dar University, d/f: degree of freedom, UOG: university of Gondar

More than half of GPS strongly agreed that all pharmacists should perform PC, and this result was in line with studies conducted in Ethiopia [24, 31], Jourdan [23, 42], and UAE [25, 43]. In addition, the majority of GPS agreed that preventing and solving medication-related problems should be primary responsibilities in a health care setting, this result was in line with a study conducted in Jourdan [23], Nepal [26], Qatar [36], UAE [25] and Ethiopia [24]. However, the result is higher than the study conducted in Poland [40], UAE [43] and Jourdan

[42]. Regarding professional benefits, 74.3% of GPS feel that PC movement would benefit pharmacists, this result was in line with a study conducted in Ethiopia [24]. However, it was lower than the study conducted in Jourdan (92%) [23, 42], UAE (92.6%) [25], and Nepal (92.6) [26]. This difference might be observed due to poor attitude of other healthcare professionals, their unwillingness to cooperate in the ward regarding PC, and clinical pharmacists are perceived as fault finders by other healthcare teams in this study. In addition, Ethiopia has weak health policies on the implementation of PC and PC established recently. Moreover, the challenges PC practitioners face from the system while practicing, make them perceive it as a burden rather than a benefit for pharmacists.

Around half (52.1%) of GPS feel that providing a PC is not worth the additional workload that it places on the pharmacist. Similar findings were also reported in Nepal (51.7) [26]. However, this study result is higher than the studies conducted in Qatar 9% [36], and Jourdan (27%) [42], and UAE (44.6) [25]. This might be, currently PC provision is facing economic challenges and a lack of acceptance in the actual system in recent Ethiopia. More than two-thirds of GPS feel that they can perform PC during their clerkship, this result was in line with a studies conducted in Jourdan (75.8) [23], Nepal (72) [26], Ethiopia (79%) [24], Qatar (82%) [36], and UAE (79.8%) [25, 43]. However, one out of six students thinks that providing PC takes too much time and effort and the result is higher than the studies conducted in Jourdan [23, 42]. This difference might be observed due to the PC practice is just in the evolving era in our health care setups. In addition, technological and human power limitations in the study setting make it a time-consuming duty. Only around one third (38.6%) of GPS have a positive attitude toward PC provision. This result was less than studies conducted in Yemen [44], Jamaica (81%) [33], Jourdan [23], eastern Ethiopia (52.6%) [31], and Ethiopia (74.5%) [24]. This difference might be observed due to methodological differences, the challenges the students faced during clerkship attachment from other healthcare professionals, their instructors, and lack of a well-established integrated system with the other healthcare team in this study setting. In addition, this difference might be observed with studies conducted in Jamaica and eastern Ethiopia due to the difference in education level of the study population. Overall, Lack of a binding system to include a clinical pharmacist's recommendation in a patient's care decision making, high barriers and lower acceptance of PC provision in the study setting affects students' attitude and the practice. Improving the system and reducing the barriers that prevent practitioner from practicing PC is crucial to improve GPS attitude and PC provision through their professional journey.

Even though there are common perceived barriers by PC practitioners. They might differ by local health belief and the country. The perceived barriers in this study are similar to the studies conducted in Motta town, Ethiopia [45], and the UAE [43], however, the perception magnitude is higher in our study than the UAE study. 80%, 58.8% and 65.7% of GPS perceived that a lack of workforce for counseling, time constraints, and inadequate technology in the pharmacy as a barrier in providing PC, respectively. Studies conducted in Chania [46] and the UAE [43] also reveals that these factors are a barrier, however, the perception is lower than that of a study conducted in our setup. This difference might be observed due to a difference in study population and setting. The lack of therapeutic knowledge was the most commonly perceived barrier in this study, and this result was in line with the study conducted in the UAE [25]. Similar to a previously conducted study in Ethiopia [24], Religious constraints are the least perceived barrier in this study. Most barriers perceived in this study setting are related to the lack of implementation of policies related to PC provision in the Ethiopia health settings, limited resources, and misbelief of health care professionals, and lack of comprehension of PC philosophy by pharmacy professional.

Study limitation

This multicenter study used a standardized attitude and knowledge assessment tool to evaluate GPS knowledge and attitude. In addition, reverse scoring was used to detect response consistency. However, this study was not conducted without limitation, since it is cross-sectional, it cannot determine causality, the data collection is self-reported, students might respond only with positive answers and underreport the negative ones, and recall bias might occur on the PC knowledge. The limitations aforementioned limit the generalizability of the study. In addition, since cluster sampling used some information, and variability within the population might be missed. The statistical analysis used to observe the difference did not estimate the effect size.

Conclusion

Graduating pharmacy students' knowledge on PC is adequate. But only less than half of the GPS have a positive attitude toward the provision of PC. Identifying barriers and tackling them is crucial to improve practitioners' attitude and the PC provision service. Promoting inclusive health policies on PC, by incorporating PC in the healthcare services, can improve the PC provision. Pharmaceutical care knowledge and attitude are predictors of PC provision.

Abbreviations

BDU	Bahir Dar university
GPS	Graduating pharmacy student
PC	Pharmaceutical care
PCAS	Pharmaceutical Care Attitudes Survey
SD	Standard deviation
UAE	United Arab Emirates
UOG	University of Gondar

Supplementary Information

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Supplementary Material 1

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Author contributions
Abdisa Gemedi Jara, Faisel Dula Sema, Masho Tigabe Tekele and Mikias Mered Tilahun participated in the conceptualization and design of the study. Abdisa Gemedi Jara, Wagaye Atalay Taye, and Endalamaw Aschale Mihrete, supervised the data collection. All authors participated in data analysis and interpretation. Abdisa Gemedi Jara drafted the initial manuscript. All authors took part in revising, or critically reviewing the article, read and approved the final manuscript. Abdisa Gemedi Jara is the guarantor accepts full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish.

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Data availability
The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate
Ethical clearance was obtained from Research and Ethical Review Committee of University of Gondar, School of Pharmacy, Department of Clinical Pharmacy. This study was conducted by the Helsinki Declaration. The purpose of the study was explained to the study participants and we assured them the data would only be used for research purposes, not academic evaluation. Written informed consent was obtained from participants, who showed their agreement by signing the consent form before the data collection began. To comfort students, one selected study participant was asked to collect the questionnaire they filled and by excluding study participants' names and other identifiers, confidentiality was maintained at all levels of the study.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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