

Participation of pharmacists and patients in web-based pharmaceutical care consultation based on MEDICODE

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ABSTRACT

Background: The participation of providers and patients in medical communication is the core element of shared decision making. Furthermore, web-based pharmaceutical care consultation is increasingly necessary, welcomed and popular.

Objective: This study aimed to analyze the participation of pharmacists and patients in web-based pharmaceutical care consultation, so as to form the promotion strategy for both parties' participation.

Methods: Data of pharmacist-patient encounters was obtained from the online platform 'Good Doctor Website' from March 31, 2012 to June 22, 2019. MEDICODE was employed to analyze the participation of pharmacists and patients in web-based pharmaceutical care consultation using dialogue ratio, the preponderance of initiative, and dialogical roles (information provider, listener, instigator and participant).

Results: This study included 121 pharmacist-patient encounters which discussed 382 specifically named medications. On average, 3.75 specific themes were discussed per medication. Among the 29 specific themes observed, 16 were initiated primarily by patients and 13 by pharmacists, 22 were primarily monologue, 6 were primarily dialogue, and 1 was a combination of the two. Pharmacists and patients were information providers or listeners in most content theme categories, such as possible main effect, possible adverse effect, instructions, warnings, adherence, designation, and observed adverse effect.

Conclusions: Pharmacists and patients exchanged less drug-related information in web-based pharmaceutical care consultation. The exchange had more patient-dominated behaviors and more of a monologue. Furthermore, pharmacists and patients were mainly information providers or listeners in communication. The participation of both parties was insufficient.

1. Introduction

Pharmaceutical care is the professional practice for patient-centered medication management services, and effective communication between pharmacists and patients is an essential tool for pharmaceutical care practice [1,2]. Pharmaceutical care consultation is a pharmacist-patient interview, which can improve medication effectiveness, adherence and safety, enhance pharmacists' feelings of value, establish pharmacists' image, and improve the relationship between pharmacists

and patients [3,4].

The participation of healthcare providers and patients in medical communication (such as the exchange of relevant clinical information and treatment opinions) is the core element of shared decision making (SDM) which is hailed as the future of medical consultations [5,6]. However, there was insufficient participation of pharmacists and patients in pharmaceutical care consultation [7,8]. For example, van Dijk et al. found that pharmacy staff members provided little medication-related information at the counter [7]. In addition, Kayyali et al.

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found that many patients did not participate in the discussion about their medication treatment changes [8].

With the advancement of Internet technology, Internet now plays a vital role in healthcare provision [9]. Many policies, such as 'Opinions of the general office of the state council on promoting the development of internet + healthcare' and 'Opinions on accelerating high-quality development of pharmaceutical care' [10,11], were introduced in China to promote web-based pharmaceutical care. These policies suggested supporting medical and health institutions and qualified third-party institutions to build online platforms and promote effective communication between healthcare providers and patients. There are many online platforms for medical communication between healthcare providers and patients in China, among which 'Good Doctor Website' has attracted a growing number of pharmacists to join in and provide web-based pharmaceutical care consultation [12]. Due to the COVID-19 pandemic, this service has received unprecedented promotion and application, making it more necessary, welcomed, and popular [9].

The studies on web-based pharmaceutical care consultation were mainly conducted from the users' perspectives [13] or to introduce the application of this service [14,15]. Few studies focused on the construction of instruments or the use of the instruments to measure the participation of pharmacists and patients in web-based pharmaceutical care consultation. MEDICODE is a validated instrument developed to assess medication discussions during medical consultations [16,17]. The participation of healthcare providers and patients in exchanges of medication information is measured by dialogue ratio, the preponderance of initiative, and dialogical roles [18]. This instrument was mainly used for face-to-face communication between healthcare providers and patients [7,19]. Web-based pharmaceutical care consultation has some characteristics; for example, critical patients are not applicable and the form of medication plan is mainly suggestions [12]. However, the information exchange (such as medication information required by the pharmacist for decision-making and medication treatment suggestions required by the patient) is similar online and offline. MDICODE, an instrument measuring information exchanges on medications, is also suitable for online environments. Therefore, we aimed to analyze the participation of pharmacists and patients in web-based pharmaceutical care consultation based on MEDICODE, so as to form the promotion strategy for both parties' participation.

2. Methods

2.1. Design and data sources

Data was collected from a retrospective review of the online platform 'Good Doctor Website (<https://www.haodf.com/>)' for provider-patient communication. 'Good Doctor Website', founded in 2006, is one of the largest Chinese websites for health consultations [20]. The data in this study is publicly reported on the website, while the content is anonymous for health information sharing.

Pharmacist-patient consultations were reviewed for analysis. The inclusion criteria of the consultations were: (1) patients with hypertension or high blood pressure (web-based pharmaceutical care consultation is mainly asynchronous, unsuitable in urgent situations for the existing time gap in communication. In addition, chronic diseases are more suitable for web-based pharmaceutical care consultation than acute diseases, and hypertension is one of the common chronic diseases [12]); and (2) patients who are neither pregnant nor breastfeeding. Consultations with privacy setting, telephone consultations, or consultations without pharmacists' responses were not included. From March 31, 2012 to June 22, 2019, we included all the pharmacist-patient consultations according to the inclusion criteria at the classification of the pharmacy department.

2.2. Measurement

Participation of pharmacists and patients in web-based pharmaceutical care consultation was evaluated based on MEDICODE. MEDICODE is a validated instrument developed to analyze exchanges of medications, and the unit of analysis is individual medication [17]. Medication class and status, frequency of medication themes, the preponderance of initiative, dialogue ratio, and dialogical roles could be analyzed by this measurement.

2.2.1. Medication class and status

Medications were grouped into Western medicine and traditional Chinese medicines according to Chinese national condition. The World Health Organization (WHO) Anatomical Therapeutic Chemical (ATC) classification system [21] was used for further classification of Western medicine. Medication status was defined in terms of its history of use (old, new or active) and the way it was discussed (simply discussed, prescribed, renewed, or advised against) [16]. Old, new or active means a drug the patient has taken in the past but no longer takes, a drug the patient has never taken, or a drug the patient is currently taking, respectively [16]. Due to the lack of prescribing authority for pharmacists in China, our study presented four medication status (old discussed, new discussed, active discussed, medication advised against).

2.2.2. Frequency of medication themes

According to the previous study, 10 medication content themes and 33 specific themes has been reported [18]. The 10 medication content themes included designation, possible main effect, observed main effect, possible adverse effect, observed adverse effect, warnings, instructions, indication to re-consult, adherence, and attitudes/emotions [18]. In this study, the frequency of 10 medication content themes and 33 specific themes were calculated.

2.2.3. Preponderance of initiative, dialogue ratio, and dialogical roles

The coding and meanings of the preponderance of initiative, dialogue ratio, and dialogical roles has been presented in previous studies [18,22]. The preponderance of initiative of themes was related to each medication discussed, with a value of (−1) if the theme discussion was initiated by the patient and (+1) if it was initiated by the pharmacist. The average value varied from −1 to 1. The pharmacist preponderance of initiative was arbitrarily indicated by a plus sign (+), and the patient preponderance of initiative by a minus sign (−). The dialogue ratio of themes was related to each medication discussed, with a value of (0) if monologue and (1) if dialogue. The average value was then transposed onto a 0–1 scale, and the dialogue ratio indicated whether the exchange was more of a monologue (value from 0 to 0.5) or a dialogue (value from 0.5 to 1). Based on initiation and participation, dialogical roles were divided into information provider, listener, instigator and participant (Table 1).

To achieve SDM in pharmacist-patient communication and form high-quality pharmaceutical care, pharmacists and patients need fully exchange clinical information, treatment opinions, and so on. Thus, we expected the exchange to be more of a dialogue, and pharmacists or patients would play roles as motivators and participants.

Table 1
Dialogical roles [18].

Coding		Dialogical roles	
Initiation	Participation	Pharmacist	Patient
Patient	Monologue	Listener	Information Provider
Patient	Dialogue	Participant	Instigator
Pharmacist	Monologue	Information Provider	Listener
Pharmacist	Dialogue	Instigator	Participant

3. Results

3.1. Characteristics of Pharmacist–patient encounters

This study included 135 effective pharmacist–patient consultations. There were 453 medications in 135 consultations, and 71 medications' specific names were not mentioned. These 71 medications were excluded because it was difficult to determine whether the discussion of a specific theme was targeted at the unidentified medication. Finally, 382 medications with specific names in 121 pharmacist–patient consultations were included for analysis. On average, 3.16 medications were discussed per encounter.

3.2. Medication class and status

The medication class was shown in Table 2. Of these 382 medications, 333 Western medicines and 49 traditional Chinese medicines were discussed. Medications for the 'cardiovascular system' and 'alimentary tract and metabolism' were discussed more in Western medicine (Table 2).

Medication status were shown in Table 3. The largest proportion (47.38%) of medication status was 'active discussed', followed by 'new discussed' (29.84%) and 'old discussed' (9.95%).

3.3. Frequency of medication themes

The frequency of content themes and specific themes was shown in Table 4. With respect to 10 content themes, the average frequency of 'designation' was the highest (198.33), followed by 'observed main effect' (94.50) and 'instructions' (36.33); The average frequency of 'indication to re-consult', 'adherence' and 'possible adverse effect' was less than 20, accounting for less than 5% of 382.

With respect to 33 specific themes, the frequency of 'medication named', 'form of medication', 'observed effects on symptoms', and 'dosage instructions' was more than 100, which were more discussed. On the other hand, the frequency of 'seriousness of observed adverse effects of medication', 'indication to re-consult', 'commitment to take medication', and 'solutions for non-adherence' was zero, which were not discussed. On average, 3.75 themes were discussed per medication.

The frequency of 'form of medication', 'expected effect on symptoms', 'observed effects on symptoms', 'control of problem', 'dosage instructions', 'duration of treatment', and 'adjustment of dosage' was

Table 2
Medication class.

Medication class			Frequency N (%)
Western medicine	Cardiovascular system	Agents acting on the renin-angiotensin system	92 (24.08)
		Calcium channel blockers	80 (20.94)
		Beta blocking agents	32 (8.38)
		Lipid modifying agents	19 (4.97)
		Diuretics	11 (2.88)
		Antihypertensives	6 (1.57)
		Cardiac therapy	5 (1.31)
		Vasoprotectives	2 (0.52)
		Alimentary tract and metabolism	33 (8.64)
		Blood and blood forming organs	27 (7.07)
	Alimentary tract and metabolism	Anti-infectives for systemic use	4 (1.05)
		Musculo-skeletal system	3 (0.79)
		Genito urinary system and sex hormones	3 (0.79)
		Nervous system	2 (0.52)
		System hormonal preparation, excl. sex hormones and insulins	1 (0.26)
		Sensory organs	1 (0.26)
		Respiratory system	1 (0.26)
		Other	11 (2.88)
	Traditional Chinese medicines		49 (12.83)
	Total		382 (100.00)

Table 3

Medication status.

Medication status	Frequency (%)
Active discussed	181 (47.38)
New discussed	114 (29.84)
Old discussed	38 (9.95)
Medication advised against	18 (4.71)
Other	
Two status involved ^a	5 (1.31)
Difficult to identify	26 (6.81)
All medications	382 (100.00)

Note: a. Because of the prolonged span of some Internet consultations, such as more than one day, some medications involved two status. There were mainly the following two situations: (1) At the beginning of the consultation, the pharmacist and patient discussed a medication that was 'new discussed'. The patient took this medication when consulting on the second day or a few days later, so the medication status transformed to 'active discussed'; (2) At the beginning of the consultation, the pharmacist and patient discussed a medication that was 'active discussed'. The patient did not take this medication when consulting on the second day or a few days later, so the medication status transformed to 'old discussed'.

significantly different across medication classes (P less than 0.05).

3.4. Preponderance of initiative, dialogue ratio, and dialogical roles

The preponderance of initiative, dialogue ratio, and dialogical roles were shown in Table 5. Among 29 specific themes observed, the preponderance of initiative in 16 themes was negative, indicating patients took more initiative, and the preponderance of initiative in 13 themes was positive, indicating pharmacists took more initiative. The dialogue ratio of 'control of problem', 'seriousness of possible adverse effects of medication', 'precautions against observed adverse effects of medication', 'drug interactions', 'expression of objections regarding medication' and 'expression of concern regarding medication' were between 0.5 and 1, indicating the exchange of these themes were more of dialogue.

Pharmacists' dialogical roles in content themes were shown in Fig. 1. Pharmacists mainly played the role of information providers and listeners in web-based pharmaceutical care consultation. Correspondingly, patients mainly played the role of listeners and information providers. In terms of 'attitudes/emotions', pharmacists' dialogical roles were between listener and participant, and patients' dialogical roles were between information providers and instigators.

4. Discussion

4.1. Principal findings

The study discovered the following findings in web-based pharmaceutical care consultation: (1) Pharmacists and patients exchanged less drug-related information; (2) There were more patient-dominated behaviors; (3) The dialogue ratio was low; (4) Pharmacists and patients were information providers or listeners in most content theme categories, such as possible main effect, possible adverse effect, instructions, warnings, adherence, designation, and observed adverse effect.

Pharmacists and patients exchanged less drug-related information in web-based pharmaceutical care consultation. Moreover, only 3.75 specific themes were discussed per medication. The study by Richard et al. [17] produced similar findings. They found that general 4.2 themes were broached per medication. A 'mere mention' was sufficient for a theme to be coded, so discussions of these themes were not extensive [17]. Considering the medications which were not mentioned specific names were excluded in our study, and it may be difficult to discuss the specific themes for these medications. Therefore, the actual specific themes discussed per medication may be even lower. The drug-related information provision was insufficient in various situations in China

Table 4

Frequency of content themes and specific themes (N = 382).

Content themes	Frequency N (%) ^a	Specific themes	Frequency N (%) ^b
Designation	198.33 (51.92)	Medication named	382 (100.00)
		Form of medication	117 (30.63)*
Possible main effect	33.50 (8.77)	Class named	96 (25.13)
		Expected effect on symptoms	44 (11.52) *
Observed main Effect	94.50 (24.74)	Action of medication	23 (6.02)
		Observed effects on symptoms	128 (33.51)*
Possible adverse effect	17.00 (4.45)	Control of problem	61 (15.97) *
		Possible adverse effects of medication	41 (10.73)
		Seriousness of possible adverse effects of medication	16 (4.19)
		Probability of possible adverse effects of medication	2 (0.52)
		Precautions against possible adverse effects of medication	9 (2.36)
Observed adverse effect	29.50 (7.72)	Observed adverse effects of medication	76 (19.90)
		Seriousness of observed adverse effects of medication	0 (0.00)
		Probability of observed adverse effects of medication	1 (0.26)
		Precautions against observed adverse effects of medication	41 (10.73)
Warnings	20.67 (5.41)	Drug interactions	54 (14.14)
		Contraindications of medication	3 (0.79)
		Allergies/intolerance to medications	5 (1.31)
Instructions	36.33(9.51)	Dosage instructions	125 (32.72)*
		Pharmacist recommends medication only as needed	6 (1.57)
		Timeframe for expected effect	10 (2.62)
		Duration of treatment	35 (9.16)*
		Adjustment of dosage	34 (8.90)*
		Opinion on strength of medication	8 (2.09)
Indication to re- consult	0.00 (0.00)	Indication to re-consult	0 (0.00)
Adherence	5.00 (1.31)	Adherence with medication	17 (4.45)
		Commitment to take medication	0 (0.00)
		Consequences of non-adherence	3 (0.79)
		Solutions for non-adherence	0 (0.00)
Attitudes/ Emotions	24.25(6.35)	Expression of attitude towards medication	77 (20.16)
		Expression of objections regarding medication	5 (1.31)
		Expression of doubt about effect of medication	2 (0.52)
		Expression of concern regarding medication	13 (3.40)

Note: a. The frequency of content themes was the average frequency of all the specific themes of this content. b. Subgroup analyses were performed by medication class using chi-square test or Fishers exact chi-square test. 'Medication named', 'seriousness of observed adverse effects of medication', 'indication to re-consult', 'commitment to take medication' and 'solutions for non-adherence' cannot be calculated statistics. * represented $P < 0.05$.

and abroad. Enough information sharing is also a prerequisite to SDM [17]. In order to form high-quality web-based pharmaceutical care consultation, sufficient drug-related information sharing is needed. Due to asynchronous communication online [23], it provided conditions for exchange of more drug-related information to some extent. Pharmacists had more time to seek relevant information and allowed patients to read these materials [12]. Patients also had more time to understand the information. Therefore, improving pharmacists' communication skills and guiding patients to exchange sufficient drug-related information

through medical institution training, continuing education, and curriculum system reform are essential.

The frequency of some specific themes was significantly different across medication classes, possibly be due to the purpose of drug use. For example, the purpose of using most traditional Chinese medicines was physical conditioning in our study. Therefore, the specific themes of these medications, such as 'observed effects on symptoms', 'control of problem', 'dosage instructions', 'duration of treatment', and 'adjustment of dosage' were discussed less.

We found that there were more patient-dominated behaviors. Among the 29 specific themes observed, 16 were mainly initiated by patients and 13 by pharmacists. This outcome accords with previous findings that online provider-patient communication increases patient initiative and reduces provider authority [24]. The patient's activeness positively affects a provider's informational and emotional support, resulting in higher patient satisfaction [25]. However, van Dijk et al. found that pharmacy staff members initiated a discussion much more often than patients at the pharmacy counter [7]. This may be an important difference between online and offline communication.

The medication themes in our study were important for patients' health outcomes. However, the exchange of most themes was more of a monologue, and some, such as adherence issue, were even not discussed. The dialogue ratio of 'adherence with medication' and 'consequences of non-adherence' was low. The themes of 'commitment to take medication' and 'solutions for non-adherence' were not discussed. Furthermore, pharmacists did not act as instigators to make patients provide adherence information. Low adherence to medicines for chronic disease patients is a significant health problem, and non-adherence is linked to increased hospitalization, higher all-cause mortality, and higher healthcare cost [26,27]. Therefore, healthcare providers should identify non-adherence, and take appropriate measures to improve medication adherence for patients with chronic diseases.

We found that pharmacists and patients were mainly information providers or listeners in web-based pharmaceutical care, and the participation of both parties was insufficient. Why is there a lack of in-depth online pharmacist-patient communication on medication? On the one hand, there was an overall low coverage of pharmaceutical care [28]. On the other hand, some existing problems, such as the unclear definition of pharmacists' rights and responsibilities, insufficient online communication time, and limited access to patient signs and other information, may hinder in-depth communication between pharmacists and patients. Furthermore, in China, the clinicians' online prescription rights have been restricted, with only prescriptions for certain common diseases and chronic diseases permitted [10]. The exploration of pharmacists' prescription rights is still in infancy [29], particularly on the Internet. The separation of web-based pharmaceutical care consultation and prescription may also hinder the in-depth communication between the two sides. Therefore, measures should be taken to provide institutional guarantee and legal support for high-quality web-based pharmaceutical care, such as accelerating the legislation of pharmacist law, improving policies and regulations related to pharmaceutical care, and clarifying the definition of pharmacists' rights and responsibilities online and offline.

Besides, the exchange of some medication themes was more of a dialogue, such as 'control of problem', 'seriousness of possible adverse effects of medication', 'precautions against observed adverse effects of medication', and 'drug interactions'. This was consistent with the goal of web-based pharmaceutical care consultation, which was to deal with drug-related problems, such as poor efficacy, adverse effect, and drug interactions after medication. The theme 'expression of concern regarding medication' was also more of a dialogue, indicting the humanistic spirit of pharmaceutical care. Pharmacists tried to relieve patients' anxiety about medication by providing professional services. Therefore, pharmacists can respond to patients' main counseling issues and show a humanistic spirit.

Table 5

Preponderance of initiative, dialogue ratio, and dialogical roles (N = 382).

Content themes	PI ^a	DR ^b	Specific themes	PI	DR	Pharmacists' dialogical roles ^c (%)			
						Listener	Participant	Information Provider	Instigator
Designation	-0.06	0.03	Medication named	-0.47	0.05	68.85	4.71	26.44	0.00
			Form of medication	-0.49	0.03	71.79	2.56	24.79	0.85
			Class named	0.79	0.01	9.38	1.04	89.58	0.00
Possible main effect	0.80	0.07	Expected effect on symptoms	0.68	0.09	6.82	9.09	84.09	0.00
			Action of medication	0.91	0.04	0.00	4.35	95.65	0.00
Observed main Effect	-0.66	0.49	Observed effects on symptoms	-0.84	0.34	62.50	29.69	3.91	3.91
			Control of problem	-0.48	0.64	13.11	60.66	22.95	3.28
Possible adverse effect	0.20	0.31	Possible adverse effects of medication	-0.12	0.44	14.63	41.46	41.46	2.44
			Seriousness of possible adverse effects of medication	-0.63	0.56	25.00	56.25	18.75	0.00
			Probability of possible adverse effects of medication	1.00	0.00	0.00	0.00	100.00	0.00
			Precautions against possible adverse effects of medication	0.56	0.22	0.00	22.22	77.78	0.00
Observed Adverse Effect	-0.22	0.31	Observed adverse effects of medication	-0.84	0.34	61.84	30.26	3.95	3.95
			Seriousness of observed adverse effects of medication	-	-	-	-	-	-
			Probability of observed adverse Effects of medication	1.00	0.00	0.00	0.00	100.00	0.00
			Precautions against observed adverse effects of medication	-0.80	0.59	34.15	56.10	7.32	2.44
Warnings	0.01	0.22	Drug interactions	-0.78	0.65	24.07	64.81	11.11	0.00
			Contraindications of medication	1.00	0.00	0.00	0.00	100.00	0.00
			Allergies/intolerance to medications	-0.20	0.00	60.00	0.00	40.00	0.00
Instructions	0.29	0.16	Dosage instructions	-0.28	0.28	50.40	13.60	21.60	14.40
			Pharmacist recommends medication only as needed	1.00	0.17	0.00	0.00	83.33	16.67
			Timeframe for expected effect	0.60	0.10	10.00	10.00	80.00	0.00
			Duration of treatment	-0.89	0.09	88.57	5.71	2.86	2.86
			Adjustment of dosage	0.29	0.32	5.88	29.41	61.76	2.94
			Opinion on strength of medication	1.00	0.00	0.00	0.00	100.00	0.00
Indication to re-consult	-	-	Indication to re-consult	-	-	-	-	-	-
Adherence	0.02	0.24	Adherence with medication	-0.29	0.47	17.65	47.06	35.29	0.00
			Commitment to take medication	-	-	-	-	-	-
			Consequences of non-adherence	0.33	0.00	33.33	0.00	66.67	0.00
			Solutions for non-adherence	-	-	-	-	-	-
Attitudes/Emotions	-0.50	0.50	Expression of attitude towards medication	0.84	0.06	6.49	1.30	87.01	5.19
			Expression of objections regarding medication	-1.00	0.80	20.00	80.00	0.00	0.00
			Expression of doubt about effect of medication	-1.00	0.50	50.00	50.00	0.00	0.00
			Expression of concern regarding medication	-0.85	0.62	30.77	61.54	7.69	0.00

Note: a. PI: Preponderance of initiative. The PI of content themes is the average PI of all the specific themes of this content. b. DR: Dialogue ratio. The DR of content themes is the average DR of all the specific themes of this content. c. The listener, participant, information provider and instigator in pharmacists' dialogical roles correspond to the information provider, instigator and listener, participant in patients' dialogical roles, respectively. - means not applicable because the frequency of these themes was zero.

4.2. Limitations

There were some limitations to this study. First, as this study was conducted in the 'Good Doctor Website' in China, the characteristics of this platform may differ from other platforms. For example, when a patient asks a question, the pharmacist selected by this patient will respond through the 'Good Doctor Website' in China, but it is simultaneously sent to three participating pharmacists through the 'Ask your pharmacist' platform in Quebec [13]. Therefore, the results should be interpreted with cautiously in different environment. Second, in web-based pharmaceutical care consultation, both providers and patients have a great influence. For example, patients' knowledge and communication ability might have a great influence. However, we did not analyze them because they contained patient privacy information, which we could not obtain.

5. Conclusion

Pharmacists and patients exchanged less drug-related information in web-based pharmaceutical care consultation. The exchange was more patient-dominated behaviors and more of a monologue. Furthermore, pharmacists and patients were mainly information providers or listeners in communication, and the participation of both parties was insufficient.

Therefore, steps should be taken to encourage pharmacists and patients to participate in web-based pharmaceutical care consultation, such as improving the legal system governing web-based pharmaceutical care and strengthening pharmacist training and patient education.

Summary points

What was already known on the topic?

With the development of Internet technology and the COVID-19 pandemic, web-based pharmaceutical care consultation is increasingly necessary, welcomed and popular.

MEDICODE is a validated instrument developed to assess medication discussions during medical consultations and measure patient-provider participation in medication exchange.

What this study added to our knowledge?

Pharmacists and patients exchanged less drug-related information in web-based pharmaceutical care consultation.

The exchange in web-based pharmaceutical care consultation was more patient-dominated behaviors and more of a monologue.

Pharmacists and patients were mainly information providers or listeners in web-based pharmaceutical care consultation, and the participation of both parties was insufficient.

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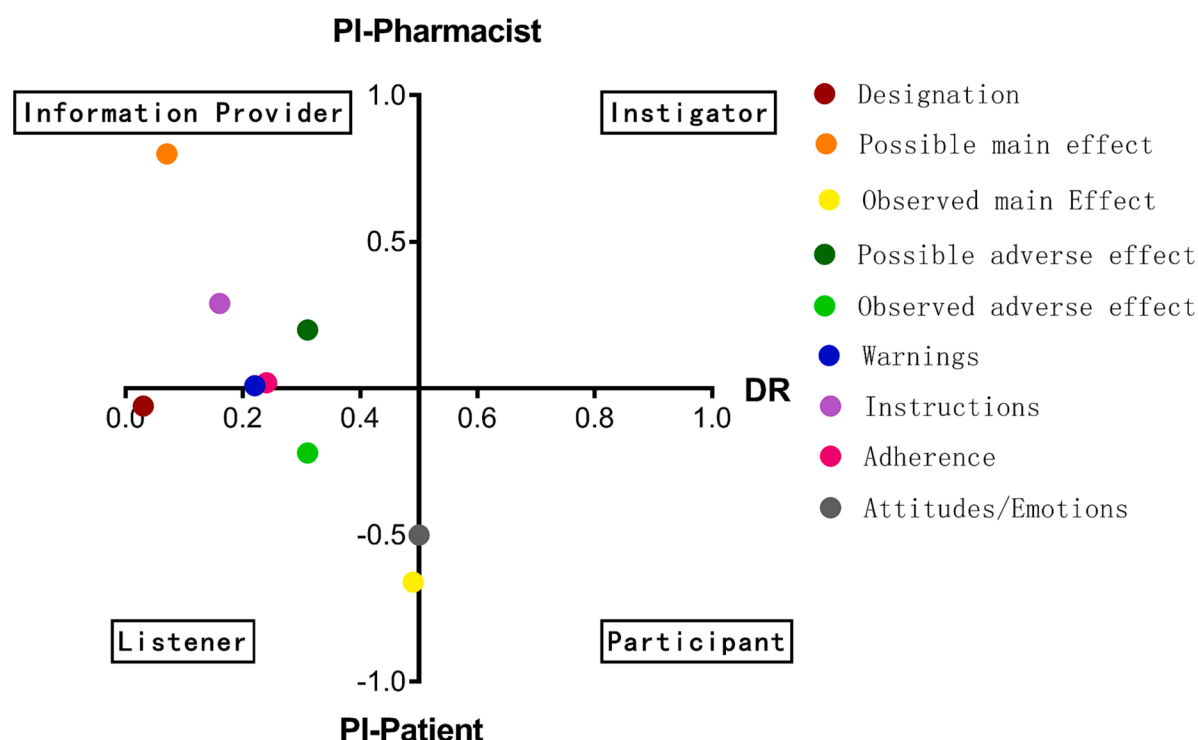


Fig. 1. Pharmacists' dialogical roles Note:PI: Preponderance of initiative; DR: Dialogue ratio.

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CRediT authorship contribution statement

Chen Haihong: Conceptualization, Data curation, Formal analysis, Funding acquisition, Resources, Writing – original draft, Project administration. **Shao Rong:** Conceptualization, Writing – review & editing. **Xiong Yuqi:** Conceptualization, Writing – review & editing. **Wen Zhiyi:** Resources, Writing – review & editing. **Wang Dan:** Writing – review & editing, Funding acquisition. **Liu Xueyi:** Resources, Writing – review & editing. **Yang Fan:** Conceptualization, Formal analysis, Writing – review & editing, Supervision.

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.

References

- [1] R.J. Cipolle, L.M. Strand, P.C. Morley, *Pharmaceutical Care Practice: The Patient-Centered Approach to Medication*, 3rd ed., McGraw-Hill, New York, 2012.
- [2] D.P. Lyra, C.E. Rocha, J.P. Abriata, F.R.E. Gímenes, M.M. Gonzalez, I.R. Pelá, Influence of Pharmaceutical Care intervention and communication skills on the improvement of pharmacotherapeutic outcomes with elderly Brazilian outpatients, *Patient Educ. Couns.* 68 (2007) 186–192, <https://doi.org/10.1016/j.pec.2007.06.004>.
- [3] J. Pelicano-Romano, M.R. Neves, A. Amado, A.M. Cavaco, Do community pharmacists actively engage elderly patients in the dialogue? Results from pharmaceutical care consultations, *Health Expect.* 18 (2015) 1721–1734, <https://doi.org/10.1111/hex.12165>.
- [4] Y. Wang, M. Chang, *Pharmaceutical Care Consultation*, Beijing Science and Technology Press, Beijing, 2011.
- [5] W. Callon, M.C. Beach, A.R. Links, C. Wasserman, E.F. Boss, An expanded framework to define and measure shared decision-making in dialogue: a 'top-down' and 'bottom-up' approach, *Patient Educ. Couns.* 101 (2018) 1368–1377, <https://doi.org/10.1016/j.pec.2018.03.014>.
- [6] C. Richard, E. Glaser, M.-T. Lussier, Communication and patient participation influencing patient recall of treatment discussions, *Health Expect.* 20 (2017) 760–770, <https://doi.org/10.1111/hex.12515>.
- [7] M. van Dijk, L. Blom, L. Koopman, D. Philbert, E. Koster, M. Bouvy, L. van Dijk, Patient-provider communication about medication use at the community pharmacy counter, *Int. J. Pharm. Pract.* 24 (2016) 13–21, <https://doi.org/10.1111/ijpp.12198>.
- [8] R. Kayyali, et al., Shared decision making and experiences of patients with long-term conditions: has anything changed? *BMC Health Serv. Res.* 18 (2018) 763, <https://doi.org/10.1186/s12913-018-3575-y>.
- [9] Y. Wan, Y. Zhang, M. Yan, What influences patients' willingness to choose in online health consultation? An empirical study with PLS-SEM, *Ind. Manage. Data Syst.* 120 (2020) 2423–2446, <https://doi.org/10.1108/IMDS-11-2019-0633>.
- [10] Central People's Government of the People's Republic of China. Opinions of the general office of the state council on promoting the development of 'internet+ healthcare', http://www.gov.cn/zhengce/content/2018-04/28/content_5286645.htm (accessed 22 November 2022).
- [11] Central People's Government of the People's Republic of China. Opinions on accelerating high-quality development of pharmaceutical care, http://www.gov.cn/xinwen/2018-11/28/content_5344128.htm (accessed 22 November 2022).
- [12] H. Chen, Y. Xiong, Z. Zhang, Q. Zhou, D. Wang, X. Wang, X. Zhang, Theoretical model and measurement of shared decision making in web-based pharmaceutical care consultation, *Digit. Health* 8 (2022) 20552076221089790, <https://doi.org/10.1177/20552076221089790>.
- [13] V. Turcotte, A. Chagnon, L. Guénette, Experience and perspectives of users and non-users of the Ask your pharmacist teleconsultation platform, *Explor. Res. Clin. Soc. Pharm.* 2 (2021), 100031, <https://doi.org/10.1016/j.rcsop.2021.100031>.
- [14] Y. Jiang, R. Lu, M. Ou, Q. Zhou, Z. Du, H. Zhu, Application of 'Internet +' pharmaceutical consultation services in psychiatric hospital during the epidemic, *Asian J. Psychiatr.* 82 (2023), 103532, <https://doi.org/10.1016/j.ajp.2023.103532>.
- [15] C. Zhong, C. Wan, L. Yu, H. Lin, Establishment and practice of multi-dimensional medication consultation system based on 'Internet+'. Evaluation and analysis of drug-use in hospitals of China 22 (2022) 252–256, <https://doi.org/10.14009/j.issn.1672-2124.2022.02.029>.
- [16] C. Richard, M.-T. Lussier, MEDICODE: an instrument to describe and evaluate exchanges on medications that occur during medical encounters, *Patient Educ. Couns.* 64 (2006) 197–206, <https://doi.org/10.1016/j.pec.2006.02.002>.
- [17] C. Richard, M.-T. Lussier, Nature and frequency of exchanges on medications during primary care encounters, *Patient Educ. Couns.* 64 (2006) 207–216, <https://doi.org/10.1016/j.pec.2006.02.003>.
- [18] C. Richard, M.-T. Lussier, Measuring patient and physician participation in exchanges on medications: dialogue ratio, preponderance of initiative, and dialogical roles, *Patient Educ. Couns.* 65 (2007) 329–341, <https://doi.org/10.1016/j.pec.2006.08.014>.
- [19] A. Sibley, S. Latter, C. Richard, M.-T. Lussier, D. Roberge, T.C. Skinner, S. Craddock, K.M. Zinken, Medication discussion between nurse prescribers and people with

- diabetes: an analysis of content and participation using MEDICODE, J. Adv. Nurs. 67 (2011) 2323–2336, <https://doi.org/10.1111/j.1365-2648.2011.05686.x>.
- [20] P. Man, An empirical study on the interactive behavior of physicians and patients in online health community: a case study of haodf.com, Chin. J. Health Policy. 9 (2016) 65–69, <https://doi.org/10.3969/j.issn.1674-2982.2016.11.011>.
- [21] WHO Collaboration Center for Drug Statistics Methodology. ATC/DDD Index, https://www.whocc.no/atc_ddd_index/ (accessed on 14 March 2023).
- [22] M.-T. Lussier, C. Richard, E. Glaser, D. Roberge, The impact of a primary care e-communication intervention on the participation of chronic disease patients who had not reached guideline suggested treatment goals, Patient Educ. Couns. 99 (2016) 530–541, <https://doi.org/10.1016/j.pec.2015.11.007>.
- [23] C.C. de Jong, W.J. Ros, G. Schrijvers, The effects on health behavior and health outcomes of Internet-based asynchronous communication between health providers and patients with a chronic condition: a systematic review, J. Med. Internet Res. 16 (2014) e19.
- [24] W. Zhang, F. Zhou, Y. Fei, Repetitions in online doctor-patient communication: frequency, functions, and reasons, Patient Educ. Couns. 107 (2023), 107565, <https://doi.org/10.1016/j.pec.2022.11.007>.
- [25] S. Chen, X. Guo, T. Wu, X. Ju, Exploring the online doctor-patient Interaction on patient satisfaction based on text mining and empirical analysis, Inform. Process. Manage. 57 (2020), 102253, <https://doi.org/10.1016/j.ipm.2020.102253>.
- [26] K. Kumar, K. Raza, P. Nightingale, R. Horne, K. Shaw, S. Greenfield, P. Gill, A mixed methods protocol to investigate medication adherence in patients with rheumatoid arthritis of White British and South Asian origin, BMJ Open 3 (2013) e001836.
- [27] K. Koyanagi, et al., Prescription factors associated with medication non-adherence in Japan assessed from leftover drugs in the SETSUYAKU-BAG campaign: focus on oral antidiabetic drugs, Front. Pharmacol. 7 (2016) 212, <https://doi.org/10.3389/fphar.2016.00212>.
- [28] D. Yao, X. Xi, Y. Huang, H. Hu, Y. Hu, Y. Wang, W. Yao, A national survey of clinical pharmacy services in county hospitals in China, PLoS One 12 (2017) e0188354.
- [29] Q. Liu, Study on the Construction of Prescription Rights System of Pharmacists in China. MD Thesis, Nanjing University of Chinese Medicine, CHN (2019.68.).