



Perception and Readiness of Community Pharmacists on the Use of Mobile Smart Phone as a Health Monitoring Tool

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ABSTRACT

Introduction: Recently, the integration of mobile phone apps into healthcare system is increasing as a result of the availability of medical applications. This study determined the perception of readiness of community pharmacists on the use of mobile smartphone as a health monitoring tool and the relationships between perception and readiness with selected demographic variables of the respondents. **Methods:** A cross-sectional survey was conducted by distributing a modified 15-item instrument to a convenience sample of pharmacists (n = 245) across Malaysia by post. Statistical analyses were performed using SPSS version 20. **Results:** Response rate was 31.4% (n= 77). The mean age of the respondents was 35.5 ± 6.52 years. The sample consisted of mostly women (71.4%). Overall, there were moderate “positive responses” across the two domains. Positive perception ranged from 54.5% to 66.2% and positive readiness ranged from 55.8% to 64.9%. No significant associations between perception and readiness with the selected demographic variables were detected (age, gender, location and outlet type). **Conclusions:** This study demonstrated that there was generally positive perception of mobile phone use for pharmaceutical care among community pharmacists in Malaysia. They were also ready to adapt it to improve pharmaceutical care delivery to patients.

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Introduction

Many people visit community pharmacies as their first point of call when unwell because of the abundance of non-prescription products in the market. As such community pharmacists are strategically positioned to serve as gatekeepers into the healthcare system for self-medicating patients (1). Globally, a number of studies have been carried out to describe pharmacy practice, the role of a pharmacist in healthcare system and the pharmacy education. (2-5). Services such as medication reviews, compliance support to

elderly patients and propagation on various health promotion programmes are now provided by community pharmacists as many studies have shown the positive impact in terms of overall health outcomes (2), quality of life (5), cost-effectiveness of the patient oriented services (3) as well as improved drug use (4).

Despite the expanding role of community pharmacists all over the world, the implementations of such an extended role have been limited in the local scenes. The slow transformation and evolution of the

pharmaceutical care practice might be due to the prescribing and dispensing activities by the general medical practitioners (GPs). In the Malaysian context, the GPs have been given the legal right of dispensing (6). The 1952 Poison Act 23 (7) and other laws in place granted the right for registered GPs practicing in private clinics to prescribe and dispense medications in their clinics. As a result, for many years most community pharmacies (CP) are focused on the sale and supply of non-prescription and healthcare products. In spite of the unfavourable conditions imposed by legal and historical limits (6), there is a trend towards the provision of patient-oriented activities such as patient counselling and the provision of drug information.

Recently there is integration of mobile phone into healthcare system as a result of the availability and qualitative medical applications (8). However, the prevalence and usage of electronic references in community pharmacies in Malaysia was reported to be low (9). In addition, the demand for and perception of mobile phone health services in community pharmacists population is virtually unknown. The result of 3 the current study will enable us understand community pharmacists perception and readiness on the use of mobile smartphone as health monitoring tool.

Mobile health monitoring include the use of mobile devices in collecting community and clinical health data, delivery of healthcare information to practitioners, researchers, and patients, real-time monitoring of patient vital signs, and direct provision of care via mobile telemedicine (10). Health monitoring tool is defined as the pharmacists' assistance of patients on drug information and drug management for better pharmaceutical care outcomes using mobile smart phone (11).

Aims of Study

This study aimed to determine the perception and readiness of community pharmacists on the use of mobile smartphone as a health monitoring tool. The study also examined the relationships

between perception and readiness with selected demographic variables of the respondents.

Method

Ethical approval

The UniSZA Human Resources Ethic Committee reviewed and approved the study with reference number: UniSZA.N/1/628- (67). The lists and addresses of the community pharmacies in east coast region of Peninsular Malaysia were obtained from the state pharmacy departments upon a formal request (Terengganu, Kelantan and Pahang). Participation in this study was voluntary, and the participants were asked to sign a consent form before completing the questionnaire. No findings that could identify individual participants were published.

Study design and data collection

This was a cross-sectional study using convenience sampling whereby all community pharmacists in the East Coast region of Peninsular Malaysia were sent a set of questionnaire by post (total = 172). Instructions on how to return the completed questionnaire was included together with a letter explaining the purpose of the research was attached, accompanied by a consent form which was signed by each participant. Health monitoring tool was defined in the information sheet distributed to the participants to avoid misunderstanding the phrase. The completed questionnaires were returned by post, email or through WhatsApp. Due to an initial poor response rate (11.04%; 19/172), the design was modified to snowball method in which pharmacists known by the principal investigator in other regions (Kedah, Penang, Selangor, Kuala Lumpur, Johor, Sabah and Sarawak) were sent sets of questionnaires which they distributed to their fellow pharmacists. Additional 73 questionnaires were distributed making the overall total 245 sets. Each of the returned questionnaires was cross-checked using names, addresses of the pharmacies and the identification numbers of the pharmacists to ensure there were no redundancy. Data collection was carried out from September to November, 2014.

Instrument

The set of questionnaire has two forms. A Personal Data Form consisted of simple structured questions sampling 1) age 2) gender 3) marital status 4) ethnicity 5) university attended 6) year of graduation 7) duration of practice 8) educational level 9) type of work 10) urban/rural 11) nationality 12) possession of mobile phone 13) type of mobile phone owned and 14) number of mobile phone owned. The second form consisted of questions on Perception and Readiness about usage of communications technology in the pharmacy. The Perception domain has eight items and the Readiness has seven. Perception was measured using Likert scale responses from 1 (Strongly Disagree) to 5 (Strongly Agree) while readiness was rated as 0 (No), 1 (Maybe) or 2 (Yes). The items in the questionnaire were finalised after the content and face validity process by two experts in the field. To re-categorise the groups, mean scores for the various items in the two domains were calculated. Participants were then regrouped into "More Positive" perception and "Less Positive" perception in the Perception domain. In the Readiness domain, the groups were either "More Ready" or "Less Ready". Participants who had a total perception or readiness score (mean score) higher than their respective median were regarded as 5 having a "More Positive" perception and being "More Ready" respectively, whereas those with a total score equal to or lower than the median were regarded as having "Less Positive" perception" and being "Less Ready" respectively. The "unsure" response for perception domain and "maybe" response for readiness domain were included in the calculated mean with the values of 3 and 1 respectively. From our study, the value of Cronbach's alpha reliability for Perception and Readiness total scale was 0.868 while sub-scale alpha coefficients were 0.830 and 0.820 respectively.

Statistical Analysis

Data was analysed using the predictive analytics software (PASW) Advanced Statistics version

20.0 (formally called SPSS Advanced Statistics). Socio-demographic data was analysed descriptively and presented as frequencies and percentages. Chi-square test was used to determine the association between perception and readiness with the selected demographic variables of the respondents. Score differences were considered statistically significant when the p-value was less than 0.05 ($p < 0.05$).

Result

Demography

A total of 77 pharmacists participated in the study giving a response rate of 31.4%. Descriptive statistics of the sample are provided in Table 1. The mean age of the pharmacist was 35.5 ± 6.52 years with a range of 27-55 years. The sample consisted of mostly women 71.4%. All pharmacists had either a Bachelor of Science in Pharmacy (BSc) or a Bachelor of Pharmacy (B.Pharm) degree and 74.0% were married. Majority attended Malaysian universities (61.5%). Most were Malaysian Chinese (50.6%). More than two-thirds reported possessing additional experience (82.4%) and the majority of the pharmacies were independent stores (57.1%). All the pharmacists were using at least one smartphone.

Pharmacists' perception on the use of mobile smart phone as a health monitoring tool

About 56% of the respondents agreed that mobile communications technology will help in tracking patient health record and 58.4% said it will improve drug adherence. When asked about patients' physical attendance in pharmacies, patients' knowledge of disease and medication, and on work efficiency, 54.5%, 63.6% and 61.0% of the respondents respectively agreed that mobile communication technology will improve each aspect. On whether the service will reduce pharmacist workload, only 31.2% agreed, while higher percentage remained unsure (39.0%). Majority believed that patients may like it (54.5%), and 66.2% said it would be beneficial to both the pharmacists and the patients.

Table 1. Demographic characteristics of the respondents (n=77).

Variable	Frequency	Percentage(%)
Age (mean±SD)	35.5 ± 6.52 years	
19-28	6	7.8
29-38	47	61.0
39-48	20	26.0
48-59	4	5.2
Gender		
Male	22	28.6
Female	55	71.4
Marital status		
Single	19	24.7
Married	57	74.0
Divorced	1	1.3
Qualification		
BSc/B.Pharm	63	81.8
MSc	13	16.9
Ph.D	1	1.3
Country of university attended		
Australia	10	13.0
Malaysia	48	62.3
UK	19	24.7
Ethnicity		
Malay	33	42.9
Chinese	39	50.6
Bumiputra Sabah	5	6.5
Location of pharmacy		
Urban	49	63.5
Semi-urban	22	28.6
Rural	6	7.8
Type of outlet		
Chain-store	33	42.9
Independent store	44	57.1
Other experience		
Hospital	65	84.4
Academia	2	2.6
Industry	1	1.3
Others	9	11.7
Number of mobile phones owned		
1	67	87.0
2	8	10.4
3	2	2.6

Table 2 illustrated the distribution of the respondents across the various sates involved.

Terengganu had the highest number of response (17) while Kuala Lumpur had the least (3).

Table 2 Distribution of pharmacists' responses across the states.

S/N	State	Responses	Total sent	Percentage
1	Johor	10	10	100.0
2	Kedah	6	10	60.0
3	Kelantan	5	73	6.8
4	Kuala Lumpur	3	3	100.0
5	Pahang	4	66	6.0
6	Penang	4	10	40.0
7	Sabah	16	20	80.0
8	Selangor	4	10	40.0
9	Sarawak	8	10	80.0
10	Terengganu	17	33	51.5
Total		77	245	

Table 3. Pharmacists' perception on the use of mobile smartphone as a health monitoring tool (n=77).

Statement	Response n (%)				
	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
1. The use of mobile communications technology will help in tracking patient's health records.	22 (28.6)	43 (55.8)	12 (15.6)	0	0
2. The use of mobile communications technology will help increase patient's physical attendance in pharmacy.	11 (14.3)	42 (54.5)	17 (22.1)	6 (7.8)	1 (1.3)
3. The use of mobile communications technology will increase patient's knowledge on diseases and medications.	18 (23.4)	49 (63.6)	9 (11.7)	1 (1.3)	0
4. Patients may like the use of mobile communications services.	11 (14.3)	42 (54.5)	21 (27.3)	3 (3.9)	0
5. The use of mobile communications technology will improve drug adherence.	9 (11.7)	45 (58.4)	22 (28.6)	1 (1.3)	0
6. The use of mobile communications technology will reduce pharmacy workload.	7 (9.2)	24 (31.2)	30 (39.0)	14 (18.2)	2 (2.6)
7. The use of mobile communications technology will increase work efficiency.	10 (13.0)	47 (61.0)	16 (20.8)	4 (5.2)	0
8. The service will be beneficial to both pharmacists and patients.	14 (18.2)	51 (66.2)	12 (15.6)	0	0

Pharmacists' readiness to use mobile smartphone as a health monitoring tool

On whether they would like to use communication technology-based system in their pharmacy, 63.6% answered "Yes" and 62.3% were ready to use mobile phone as a health

monitoring tool. More than half were willing to undergo proper training on how to run the mobile phone system (64.9%). However, only 35.1% would invest extra money to set up and maintain the system while more than half were not willing to make it 24-hour service (51.2%).

Table 4. Pharmacists' readiness to use mobile smartphone as health monitoring tool (n=77).

Question	Response n (%)		
	Yes	No	Maybe
1. Would you like to use communication technology-based services in your pharmacy?	49 (63.6)	1 (1.3)	27 (35.1)
2. Are you ready to use mobile phone (particularly) as a health monitoring tool?	48 (62.3)	6 (7.8)	23 (39.9)
3. Are you willing to undergo proper training to run the mobile phone system?	50 (64.9)	2 (2.6)	25 (32.5)
4. Are you willing to invest extra money to set up and maintain the mobile phone system?	27 (35.1)	15 (19.5)	35 (45.5)
5. Are you willing to make mobile phone a 24-hour service?	12 (15.6)	40 (51.9)	25 (32.5)
6. Would you encourage your customers/patients to use this mobile phone service?	43 (55.8)	3 (3.9)	31 (40.3)
7. Would you recommend the mobile phone service to other colleagues?	43(55.8)	4 (5.2)	30 (39.0)

Table 5. Associations between perception and readiness with the selected demographic variables (n=77).

Variables	PERCEPTION (%)			READINESS (%)		
	More Positive	Less Positive	p-value	More Ready	Less Ready	p-value
Age						
19-38	21 (27.3)	32 (41.5)	0.377	28 (36.4)	25 (32.5)	0.112
39-58	7 (9.1)	17 (22.1)		8 (10.4)	16 (20.7)	
Gender						
Male	6 (7.8)	16 (20.7)	0.365	11 (14.3)	11 (14.3)	0.718
Female	21 (27.3)	34 (44.2)		25 (32.4)	30 (39.0)	
Location						
Urban	19 (24.6)	30 (39.0)	0.367	22 (28.5)	27 (35.1)	0.666
Rural/Semi Urban	8 (10.4)	20 (26.0)		14 (18.2)	14 (18.2)	
Outlet type						
Chain	10 (13.0)	23 (29.8)	0.448	18 (23.4)	15 (19.4)	0.235
Independent	17 (22.1)	27 (35.1)		18 (23.4)	26 (33.8)	
Country of the university attended						
Malaysia	20 (26.0)	28 (36.4)	0.213	26 (33.8)	22 (28.5)	0.093
Others	8 (10.4)	21 (27.3)		10 (13.0)	19 (24.7)	

*Chi-square test for relatedness. Statistical significance was set at p<0.05.

Associations between Perception and Readiness with selected demographic variables

Table 5 shows no significant association between perception and age ($p = 0.337$) perception and gender ($p = 0.365$), perception and location of pharmacy ($p = 0.367$), perception and outlet type ($p = 0.448$) as well as perception and country of the university attended by the respondents ($p = 0.213$). Also, no significant associations were exhibited between readiness and all the five variables tested (age, gender, location of the pharmacy, outlet type and country of the university attended). But interestingly, younger pharmacists displayed more positive tendencies as 75.0% of those with more positive perception were within the age range of 19-38. More than two-thirds were females (77.8%), 70.4% were from urban settings and 63.0% work in independent pharmacies. In the case of the pharmacists who were more ready, 77.8% were also within 19-38 years. Again about 70.0% were females, 61.1% were from urban settings and 50.0% work in independent pharmacies.

Discussion

In the present study, the perception and readiness of pharmacists on the use of mobile smartphone as a health monitoring tool were determined. The availability of patients' medication records is unquestionably important to the functioning of community pharmacies to ensure good pharmaceutical care. Moreover out-patient medication administration has been identified as the most error-prone procedure within the entire medication delivery process. Most of these errors occurred when patients bought prescribed and over the counter (OTC) medicines from different pharmacies and later use them at home with little or no guidance or direct monitoring (12). It has been suggested that electronic patient health record system can help prevent medication errors, reduce potentially inappropriate prescribing and prevent harm to patients (13). Consequently, the initial perception and readiness of pharmacist are important for this system to be successful.

Our findings showed that community pharmacists in Malaysia generally have a good

perception on the use of mobile phone in health monitoring although, significant percentages were not sure if the service would reduce pharmacy workload (39.5%). They felt that it would be an additional task without replacing any of the existing ones. However a previous study revealed that mobile phone text messaging had improved medication compliance and safety while decreasing workload for the pharmacist (14). The same study also found that there was increased patient satisfaction, increased patient-pharmacist interaction and improved patients' compliance. Our present study discovered that the pharmacists basically agreed that use of mobile phone in health monitoring will increase patients' physical attendance (53.9%), improved patients' satisfaction (53.9%), improve drug adherence (57.9%). Contrary to the findings of Indermitte et al., (2007), the pharmacists in our study agreed that the service would increase work efficiency although concerns about workload were expressed (15). A study conducted by Ford et al. (2006), to document pharmacists' clinical interventions at a 78-bed military facility found that the mean number of reported interventions increased from 103 per month prior to programme implementation to 268 per month with the PDA-based system (16). This further proved that the use of mobile phone technology could increase work efficiency and at the same time workload concerns need to be adequately addressed.

In terms of readiness, majority of the respondents expressed their readiness across all the items except for two. On whether they are willing to invest money to set up and maintain mobile phone system, only 35.5% said, "yes" a while higher percentage remained undecided (44.7%). In a U.S study among New York community pharmacists on their awareness and readiness for Medication Therapy Management (MTM), reimbursement and allocation of resources were the most discussed challenges/barriers to the provision of pharmacist-provided MTM services (17). They then concluded that lack of understanding of structure, reimbursement challenges, and the need for collaboration between pharmacist and providers were key components of pharmacists'

willingness to provide services. This suggested that the government must be willing to invest money for a successful set up and maintenance of the system. Additionally, programmes and seminars to enhance pharmacists' understanding of both physical and financial implications of the system need to be initially implemented. This is because 19.5% of our respondents were not willing to invest extra money and a larger percentage (44.7%) remained undecided. Majority were not willing to make it a 24-hour service (52.6%) and 31.6% were undecided. About 56% of our pharmacists would encourage customers/patients to use the proposed mobile phone service and also recommend it to other colleagues. O'Connor et al. (2009) evaluated the use of smartphone technology to support the work practices of healthcare professionals and the intervention was perceived to improve patients' care and safety (18). Encouragingly, 87% of the professionals wanted to continue with the service after the study was completed. Although there were no significant associations between perception and readiness with the selected demographic variables (age, gender, location outlet type and country of the university attended), it is interesting to note that "positive perception" was higher among younger pharmacists (74.1%) and those working in the urban settings (70.4%). This may be due to the fact that younger people are more technology-savvy and there is generally more technological awareness and advancement in the urban areas (19). Furthermore, urban areas are usually the home for big companies and industries and many of them have embraced computer technology because of the benefits of automated information processing. Additionally, more positive perception was expressed by pharmacists from independent store compared to those of chain store. Chain stores are usually owned by companies which often have privacy rules. This would affect the pharmacists' freedom of expression due to the fear of expulsion hence, independent stores owners can voice out their opinions more freely. Similar pattern could be seen in the result of association between readiness and the selected demographic variables. The results of the present study implied that pharmacists across Malaysia were

basically willing to embrace the positive changes that current communication technology is bringing into healthcare delivery system to improve pharmaceutical care particularly using mobile phones. This should motivate future large-scale investigations to determine the effects of such technology on workload, efficiency and patient satisfaction in order to permit wider generalisation of its usability.

Nonetheless, several study limitations that may affect results generalisation must be mentioned. The convenience sampling and small sample size did not rule out selection bias, hence the findings may not reflect an accurate perception and readiness of pharmacists for Malaysia in total. Furthermore, the initial poor response could have also affected the outcomes.

Conclusion

Overall, this study has indicated that there was generally a positive perception on mobile phone use for pharmaceutical care services among community pharmacists in Malaysia. They were also quite ready to adapt it to improve pharmaceutical care delivery to patients. However, factors such as age, gender, pharmacy location, outlet type and country of the university attended by the respondents were found not to influence the perception and readiness of the pharmacists. Therefore, smartphone devices possess a huge potential in providing a medium for real-time information and comprehensive documentation which could eliminate the need for separate multiple other tools such as office files, pagers, desktop computers. Such promising capacities certainly require a departure from the traditional methods of data storage and information retrieval in community pharmacies.

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