



Knowledge, Attitude and Practice of Malaysian Private Hospital Pharmacists on Medication Review

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ABSTRACT

Background: Medication review is emerging as one of the vital components of medication management to prevent medicine-related problems. Study demonstrated a high prevalence of potentially inappropriate medication use in private aged care facilities. There is a strong need for medication review in the private healthcare system in Malaysia to ensure pharmaceutical safety and effectiveness. This study aimed to determine the knowledge, attitude and practice of private hospital pharmacists on medication review service in Malaysia. **Method:** This cross-sectional study was carried out from October to November 2020 using an online questionnaire. Private hospital pharmacists in Malaysia were invited to participate in a validated 36-items questionnaire. Descriptive statistics, Mann-Whitney U test and Kruskal-Wallis H test were performed to analyse the data. **Results:** Survey questionnaires were completed by 104 private hospital pharmacists. 80 pharmacists (76.9%) presented with a high level of knowledge of medication review, while 92 pharmacists (88.5%) had a positive attitude. Approximately two-third (n = 68, 65.4%) was providing medication review in the pharmacy, whereas 45 of them (43.3%) did not obtain patient's medication history at the time of admission or as early as possible. Besides, only 69 of the participants (66.3%) reconciled patient's own medication with the prescribed medicines. Factors associated significantly with practice of medication review include age (p = 0.010) and years of experience as a private hospital pharmacist (p = 0.016). Three major perceived challenges of implementing medication review were lack of time (82.7%), insufficient training (79.8%) and lack of manpower (60.6%). **Conclusion:** In conclusion, private hospital pharmacists in Malaysia have high level of knowledge, a positive attitude and a fair practice regarding medication review service. Several challenges such as lack of time, insufficient training and lack of manpower might obstruct the practice of medication review service in the private hospitals.

INTRODUCTION

Medicines are the primary intervention for the prevention and treatment of illnesses and diseases. Medicines must be prescribed and administered appropriately to achieve the best pharmaceutical outcomes. Therefore, reviewing medicines and medicine-taking behaviour is critical in patient care plans and healthcare [1].

According to the guideline "A Guide to Medication Review 2008", medication review was defined as "a structured, critical examination of a patient's medicines to reach an agreement

with the patient about treatment, optimising the impact of medicines, minimising the number of medication-related problems and reducing waste". Medication review is emerging as one of the vital components in medication management to improve the quality, safety and appropriate use of medicines, thus preventing drug-related problems [2]. As drug experts in healthcare, pharmacists play an essential role in medication review service beyond regular pharmacy practices such as drug dispensing and patient counselling. In particular, clinical pharmacists work frequently and regularly interact with physicians, other healthcare professionals, and patients to

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ensure prescribed medicines contribute to the best possible outcomes [3].

Home Care Pharmacy Services (HCPS), or in Malaysia, known as Home Medication Review (HMR), provides home care facilities for patients treated at Ministry of Health (MOH) facilities to enhance patient's care after returning home from health facilities. The whole process of HCPS involves a comprehensive and systematic workflow, including drug reconciliation and medication review for quality use of medications and to resolve pharmaceutical care issues, such as adverse drug reactions, patient's adherence and medication storage. It has focused on patients from neurology, psychiatry and geriatric disciplines and those with chronic diseases and polypharmacy [4].

Medication review has proven to provide positive impacts for the patients. First of all, this service could reduce the number of prescribed medicines, improve medication appropriateness, promote proper polypharmacy, and determine potential and actual drug-related problems, thus reducing the frequency of hospitalisation and the number of deaths in geriatric. Moreover, it may assist in medication adherence and identification and resolution of challenging drug issues faced by nursing staff and caregivers [5]. HMR program has demonstrated to be beneficial in patients with chronic diseases, especially stroke, schizophrenia and type 2 diabetes mellitus (T2DM). Benefits of HMR include significantly reduced blood pressure, glucose level and cholesterol level in post-stroke patients, improved medication adherence, knowledge on medications and quality of life among schizophrenic patients and patients with T2DM [6-9].

In Malaysia, pharmacy practice has evolved from a product-oriented to a more patient-oriented service. Doctors in the government hospitals prescribe according to the drug formulary of the hospital, and prioritise the use of generic drugs. Medicines dispensed to the patients are supervised by pharmacists [10]. In contrast, doctors in the private practice possess the legal right to prescribe and dispense medicines, and brand prescribing is the norm. The low generic prescription rate is due to their negative perceptions about safety, quality and efficacy of generic medicines [11]. The absence of prescribing and dispensing separation in the private sector could lead to possible profit-oriented medical and pharmacy practices. Dispensing doctors was found to prescribe seven times more medicines than non-dispensing doctors. Nevertheless, out of convenience and the interest of cost-savings, many patients choose to purchase medications for chronic diseases from community pharmacies without medical consultation and follow-ups with doctors from the hospital, which ultimately compromise patient safety and hinder cost-effective medication use [12,13]. A cross-sectional study demonstrated that residents of aged care facilities were highly vulnerable to

potentially inappropriate medication use, indicating a need for a periodic medication review to minimise morbidity [14].

The emergence of medical tourism and private healthcare insurance have resulted in the fast development of private hospitals, which in turn lead to the role expansion of private hospital pharmacists [15]. Aside from the conventional role as an inpatient and outpatient pharmacist, private hospital pharmacists have the opportunity to involve in clinical services in the wards, therapeutic drug monitoring, clinical oncology pharmacy, medication adherence clinic as well as parenteral nutrition services and so on [16]. However, there are no reports on the extend of the provision of medication review service in the private hospitals. A few studies had reported the medication review service which was primarily carried out by pharmacists in the public hospitals [6-9,17]. Impacts of medication review and its challenges were emphasised in these studies [6-9], while one study discussed the KAP among pharmacists on medication therapy management in public hospital [17].

To the best of our knowledge, there is no study that has assessed the knowledge, attitude and practice of private hospital pharmacists on medication review in Malaysia. Ultimately, the main objective of this research was to determine the knowledge, attitude and practice (KAP) of private hospital pharmacists on medication review services in Malaysia. It also aimed to identify the perceived challenges and barriers of implementing medication reviews by private hospital pharmacists in Malaysia.

METHOD

Study Design and Setting

We conducted a cross-sectional survey on knowledge, attitude and practice on medication review among private hospital pharmacists in Malaysia. Self-administered questionnaires were distributed online through emails from October 2020 to November 2020. We utilised online resources such as private hospital official websites, the Official Portal of Pharmaceutical Services Programme, and Yellow Pages Malaysia to identify all private hospitals located in Malaysia and their contact numbers. We also obtained the email addresses of pharmacy department or the pharmacists for questionnaire distribution.

Sample Size Calculation

The total population size of registered pharmacists in private hospitals and clinics in Malaysia was estimated at 417 [18]. However, the number of pharmacists involved in the medication management of inpatients and outpatients were unclear. Therefore, all private hospital pharmacists were invited to participate in the study through email.

Inclusion Criteria

Participants who are eligible to participate in this study include: (I) a fully registered pharmacist (FRP) under the Pharmacy Board, (II) currently works in private hospitals, (III) works in private hospitals for at least one year, (IV) able to understand English and (V) agrees with the informed consents to participate in the study voluntarily.

Exclusion Criteria

The exclusion criteria include: (I) a pharmacist assistant or provisionally registered pharmacist (PRP), (II) works in government hospitals or government clinics, or private clinics, (III) works in private hospitals for less than one year, and (IV) unable to understand English.

Subject Recruitment and Data Collection

Universal sampling was carried out because the number of pharmacists working in private hospitals was unknown, while compensating for any refusal to respond. Data were obtained by compiling responses from questionnaires distributed through email invitations to the respective pharmacy department of the private hospitals. The participants were required to complete the questionnaires sent via Google Forms. Participants were given options to provide their departmental or personal email addresses, or they could choose to complete the survey as anonymous. Three follow-up reminders were conducted by email after each three consecutive days, and along the follow-up process we excluded the email addresses that were provided by participants in the completed survey. Phone calls were also made to the pharmacy departments to check if the online survey has been well received, as well as to serve as a final reminder on the survey.

Ethical Consideration

The SEGI University Research Ethics Committee approved the study. Informed consent was obtained by clicking the 'agree' option in the questionnaire. Participants' names were excluded to ensure anonymity. They were informed that their participation was entirely voluntary, and their answers in this study will remain confidential.

Questionnaire

A 36 item-questionnaire was constructed with reference to official practice guidelines and a validated questionnaire on medication review [2,17,19-20] (Refer Appendix on descriptions of sections in the questionnaire). Four pharmacists with experiences in clinical pharmacy and medication review reviewed the questionnaire's content to ensure its content is relevant to the local practice setting. Face validation of the

questionnaire was established with a pre-test on nine private hospital pharmacists before the actual study. The questionnaire was amended and refined based on the comments and feedback from respondents, such as sentence restructuring.

The participants' summated score of each KAP domain was divided into three levels based on Bloom's cut-off point [21]. Respondents who scored 80% and above were categorised as having a high level of knowledge, positive attitude or good practice. Respondents that acquired 60% to 79% were on a moderate level, whereas respondents with less than 60% had a low level, negative attitude and poor practice on medication review.

Statistical Analysis

Statistical Package for the Social Sciences (IBM SPSS®) software, version 26, was used to analyse data gathered from all respondents. Data were presented in descriptive statistics, as frequency and percentage (%) for categorical data, whereas median (interquartile range) for continuous data. Correlation between levels of KAP on medication review was analysed by Spearman's Rank Order Correlation test because they were ordinal data. Mann-Whitney U and Kruskal-Wallis H statistical tests were performed to assess the association between sociodemographic characteristics and each KAP total score. The data obtained were not normally distributed. A level of p -value ≤ 0.05 was considered to be statistically significant.

RESULT

Sociodemographic Characteristics

One hundred and four respondents completed the survey questionnaires. Table I below summarises the sociodemographic characteristics of the respondents. They were predominantly female ($n = 76$, 73.1%), Chinese ($n = 69$, 66.3%), had Bachelor's degree as their highest education level ($n = 83$, 79.8%), graduated in Malaysia ($n = 67$, 64.4%) and have one to five years of experience as a private hospital pharmacist ($n = 53$, 51.0%). The same number of respondents ($n = 44$, 42.3%) come from the same age group of between 21 and 30 and between 31 and 40.

Knowledge on Medication Review

Knowledge of private hospital pharmacists on medication review was categorised as high. The median score was 9.0 (IQR 1.0), with a minimum of 5 points and a maximum of 9 points obtained by the respondents. The majority of the participants ($n = 80$, 76.9%) had a high level of knowledge regarding medication review, while 20.2% ($n = 21$) and 2.9% ($n = 3$) had a moderate and low level, respectively.

Nine statements were used to assess the knowledge of pharmacists on medication review (Table II). Approximately all of the pharmacists (n = 100, 96.2%) knew the definition of medication review. They were also aware that this service aims to optimise the impact of treatment for an individual patient (n = 101, 97.1%), to improve the quality of life, safety and appropriate use of medicines (n = 104, 100%), to identify problems for action by the prescriber, patient or both but can also be regarded as an educational intervention to support patient knowledge and adherence (n = 91, 87.5%). However, 37.5% of the participants (n = 39) were unsure of the three types of medication review service, namely prescription review, compliance and concordance review and clinical medication review. All respondents were aware that patients should have the chance to raise questions and highlight problems related to their medicines. In addition, 96.2% (n = 100), 98.1% (n = 102) and 81.7% (n = 85) of the respondents correctly opined that "medication review conducted with the patient should include prescribed medicines, over-the-counter medicines and complementary medicines", "medication review should be

undertaken systematically by a competent person" and "medication review should be documented in the patient's notes", respectively. There was a significant association between gender with knowledge score on medication review (p = 0.030) among all pharmacists participating in this study (Table III).

Table I. Sociodemographic characteristics of the respondents (n = 104)

Characteristics	Frequency	Percentage (%)
Gender		
Male	28	26.9
Female	76	73.1
Age		
21-30	44	42.3
31-40	44	42.3
41 and above	16	15.4
Race		
Malay	24	23.1
Chinese	69	66.3
Indian	9	8.7
Others ^a	2	1.9
Highest education level		
Bachelor's	83	79.8
Master's	21	20.2
Country where the undergraduate degree is taken		
Malaysia	67	64.4
United Kingdom	27	26.0
Others ^b	10	9.6
Pharmacy practice roles		
Outpatient	63	60.6
Inpatient	57	54.8
Store	31	29.8
Clinical	21	20.2
Drug information centre	20	19.2
Management	15	14.4
Others ^d	13	12.5
Years of experience		
1-5	53	51.0
6-10	30	28.8
11-15	13	12.5
16 and above	8	7.7

^a Punjabi and Iban

^b Australia and Taiwan

^c Pharmacists practising more than one role (n = 220)

^d Medication Therapy Adherence Clinic (MTAC), Total Parenteral Nutrition (TPN), Cytotoxic Drug Reconstitution (CDR) and Nuclear

Table II. Knowledge on medication review among private hospital pharmacists in Malaysia

Statements	Frequency (%)		
	True	False	Not sure
Medication review is defined as a structured, critical examination of a patient's medicines to reach a treatment agreement, optimising the impact of medicines, minimising the number of medication-related problems and reducing waste.	100 (96.2)	0 (0)	4 (3.8)
Medication review aims to improve or optimise the impact of treatment for an individual patient.	101 (97.1)	0 (0)	3 (2.9)
Medication review aims to improve the quality, safety and appropriate use of medicines.	104 (100)	0 (0)	0 (0)
Medication review aims to identify the prescriber, patient, or both problems for action but can also be regarded as an educational intervention to support patient knowledge and adherence.	91 (87.5)	0 (0)	13 (12.5)
There are three types of medication review: Prescription review, Compliance and concordance review and Clinical medication review.	64 (61.5)	1 (1.1)	39 (37.5)
Medication reviews conducted with the patient should include prescribed medicines, over-the-counter medicines and complementary medicines.	100 (96.2)	1 (1.1)	3 (2.9)
All patients should have the chance to raise questions and highlight problems about their medicines.	104 (100)	0 (0)	0 (0)
Medication review should be undertaken systematically by a competent person.	102 (98.1)	1 (1.1)	1 (1.1)
Medication review should be documented in the patient's notes.	85 (81.7)	5 (4.8)	14 (13.5)

Attitude on Medication Review

Generally, private hospital pharmacists in Malaysia exhibited a positive attitude towards medication review service as the median score of attitudes was equal to 27.0 (IQR 5.0) (Table IV). The minimum and maximum scores were 6 and 30, respectively. A large proportion of the participants (n = 92, 88.5%) had a positive attitude, 10.6% (n = 11) were neutral and

only 1.0% (n = 1) were negative towards medication review service.

Table III. Factors associated with knowledge score of private hospital pharmacists on medication review in Malaysia

Characteristics	Median (IQR)	Z ^a	X ² (df) ^b	P-value
Gender				
Male	8.0 (2.0)	-2.165	-	0.030
Female	9.0 (1.0)			
Age				
21-30	8.5 (1.0)	-	0.152 (2)	0.927
31-40	9.0 (1.0)			
41 and above	9.0 (1.8)			
Race				
Malay	8.5 (1.0)	-	4.499 (3)	0.212
Chinese	9.0 (1.0)			
Indian	7.0 (3.0)			
Others	7.5 (0.0)			
Highest education level				
Bachelor's	8.0 (1.0)	-1.369	-	0.171
Master's	9.0 (1.0)			
Country where the undergraduate degree is taken				
Malaysia	8.0 (2.0)	-	1.719 (2)	0.423
United Kingdom	9.0 (1.0)			
Others ^b	9.0 (1.0)			
Years of experience				
1-5	8.0 (2.0)	-	3.823 (3)	0.281
6-10	9.0 (1.3)			
11-15	9.0 (1.5)			
16 and above	9.0 (0.8)			

^a Mann-Whitney U test

^b Kruskal-Wallis H test

Almost all of the respondents (n = 98, 94.2%) agreed that reviewing a patient's medication profile and providing interventions to prevent adverse effects were important roles of pharmacists besides the process of normal dispensing functions. Similarly, 95.2% (n = 99) believed that patients would receive adequate and beneficial information regarding their chronic diseases and medicines with medication review service. Ninety-eight pharmacists (94.2%) also agreed that medication review service is valuable by considering the three types of medication review. Nevertheless, only more than three-quarters of the participants (n = 82, 78.8%) supported that patients' health outcomes improved when a pharmacist monitors medications compared to other healthcare professionals. There was a high expression of agreement with the statements saying that applying medication review service requires more knowledge than basic information of pharmacy practice (n = 97, 93.3%) and providing medication review service allows pharmacists to participate in patient care at a border spectrum (n = 99, 95.2%). A significant association was observed in different races on attitude scores pertaining to medication review (p = 0.001), as shown in Table V below.

Practice on Medication Review

Practice on medication review was regarded as fair with a median score of 4.0 (IQR 2.0), a minimum score of 0 and a maximum score of 6. 41.3% (n = 43) and 40.4% (n = 42) of the participants had a good and poor practice on medication review, respectively.

Pharmacists' practice on medication review was determined by six questions (Table VI). Among all pharmacists, approximately two-thirds (n = 68, 65.4%) provided medication review service in the pharmacy, whereas 45 (43.3%) did not obtain patient's medication history at the time of admission or as early as possible. Besides, only 69 participants (66.3%) reconciled patient's medication with the prescribed medicines on admission and discharge, and less than half of the respondents (n = 47, 45.2%) performed medication chart review throughout patient's admission. There was a higher expression that pharmacists provided medication education to patients during hospitalisation and on discharge (n = 82, 78.8%), and they usually refer to updated treatment guidelines for diseases or drug information resources (n = 83, 79.8%). Table VII below shows that sociodemographic characteristics associated significantly with practice score on medication review include age (p = 0.010) and years of experience as a private hospital pharmacist (p = 0.016).

Correlation between Knowledge, Attitude and Practice on Medication Review

The correlation between KAP was analysed by Spearman's Rank Order Correlation test to explore their relationships. Based on the result, knowledge had a moderate positive correlation with attitude regarding medication review, which is statistically significant (r = 0.467, p < 0.001). However, no correlation was observed between knowledge and practice, as well as between attitude and practice.

Perceived Challenges and Barriers of Implementing Medication Review

The top three major challenges perceived were lack of time (n = 86, 82.7%), insufficient training (n = 83, 79.8%) and lack of manpower (n = 63, 60.6%). More than half of the participants (n = 61, 58.7%) did not have adequate information technology (IT) support to provide medication review. Half of them indicated that the availability of space or private counselling area was a challenge and believed that a high budget is required to implement medication review service. Other barriers reported include lack of experience (n = 27, 26%), interprofessional collaboration (n = 22, 21.2%), patients' cooperation (n = 18, 17.3%), pharmacists' proactivity (n = 7, 6.7%) and limited resources (n = 3, 2.9%).

Table IV. Attitude on medication review among private hospital pharmacists in Malaysia

Statements	Frequency (%)				
	SA	A	N	D	SD
Besides the processes of normal dispensing functions, reviewing patients' medication profiles and providing interventions are essential as pharmacist roles to prevent adverse effects.	64 (61.5)	34 (32.7)	5 (4.8)	0 (0)	1 (1.0)
Patients would receive adequate and beneficial information about their chronic diseases and medication therapies from their providers by applying medication review service.	64 (61.5)	35 (33.7)	3 (2.9)	1 (1.0)	1 (1.0)
By considering the three types of medication review: Prescription review, Compliance and concordance review and Clinical medication review, do you agree that medication review service is valuable?	62 (59.6)	36 (34.6)	4 (3.8)	1 (1.0)	1 (1.0)
A patient's health outcomes would be improved when a pharmacist monitors medications compared to other healthcare providers.	44 (42.3)	38 (36.5)	20 (19.2)	1 (1.0)	1 (1.0)
Applying medication review service requires more knowledge than basic information of pharmacy practice.	62 (59.6)	35 (33.7)	6 (5.8)	0 (0)	1 (1.0)
Providing medication review service is a unique opportunity for pharmacists to participate in patient care at a broader spectrum.	66 (63.5)	33 (31.7)	4 (3.8)	0 (0)	1 (1.0)

SA - Strongly Agree; A – Agree; N – Neutral; D - Disagree; SD - Strongly Disagree

Table V: Factors associated with attitude score of private hospital pharmacists on medication review in Malaysia

Characteristics	Median (IQR)	Z ^a	X ² (df) ^b	p-value
Gender				
Male	27.0 (4.8)	-0.295	-	0.768
Female	27.5 (5.0)			
Age				
21-30	27.0 (5.8)	-	0.250 (2)	0.882
31-40	27.5 (5.8)			
41 and above	27.0 (2.0)			
Race				
Malay	30.0 (2.5)	-	16.455 (3)	0.001
Chinese	27.0 (5.0)			
Indian	25.0 (3.5)			
Others	27.5 (0.0)			
Highest education level				
Bachelor's	27.0 (5.0)	-0.181	-	0.856
Master's	27.0 (6.0)			
Country where the undergraduate degree is taken				
Malaysia	27.0 (5.0)	-	2.474 (2)	0.290
United Kingdom	26.0 (5.0)			
Others	29.0 (3.5)			
Years of experience				
1-5	27.0 (6.0)	-	4.162 (3)	0.244
6-10	28.5 (4.0)			
11-15	27.0 (4.5)			
16 and above	29.0 (2.5)			

^a Mann-Whitney U test

^b Kruskal-Wallis H test

DISCUSSION

Knowledge on Medication Review

The respondents' knowledge on medication review was at a high level, indicating that private hospital pharmacists are aware and familiar with the concept of medication review. This result is comparable to a local study, in which a large

proportion of the respondents (92.5%) had a high level of knowledge on medication therapy management (MTM) [17]. Likewise, studies had found that community pharmacists in the USA, Qatar and Lebanon had adequate knowledge about medication use review and medication therapy management [19,22-23]. Consequently, our findings prove that pharmacists' knowledge is not a barrier to performing this extended service.

This study shows that female pharmacists had a higher level of knowledge in medication review than their male counterparts ($p = 0.030$). Similar to the study executed by Al-Tameemi and Sarriff, where better knowledge in medication therapy management existed in females [17]. It was also reported that the topic of pharmaceutical care was more appealing to female pharmacists compared to male pharmacists [24].

Table VI. Practice on medication review among private hospital pharmacists in Malaysia

Questions	Frequency (%)	
	Yes	No
Are you providing medication review service in the pharmacy?	68 (65.4)	36 (34.6)
Do you obtain patient's medication history at the time of admission or as early as possible?	59 (56.7)	45 (43.3)
Do you reconcile patient's medication with the prescribed medicines on admission and discharge?	69 (66.3)	35 (33.7)
Do you perform medication chart review throughout the patient's admission?	47 (45.2)	57 (54.8)
Do you provide medication education to the patient during hospitalisation and on discharge?	82 (78.8)	22 (21.2)
Do you usually refer to updated treatment guidelines for diseases or drug information resources?	83 (79.8)	21 (20.2)

Table VII: Factors associated with practice score of private hospital pharmacists on medication review in Malaysia

Characteristics	Median (IQR)	Z ^a	X ² (df) ^b	p-value
Gender				
Male	4.0 (2.0)	-0.269	-	0.788
Female	4.0 (2.0)			
Age				
21-30	3.0 (3.0)	-	9.291 (2)	0.010
31-40	4.0 (2.8)			
41 and above	5.0 (1.8)			
Race				
Malay	4.0 (2.8)	-	2.812 (3)	0.422
Chinese	4.0 (2.5)			
Indian	5.0 (1.0)			
Others	3.0 (0.0)			
Highest education level				
Bachelor's	4.0 (2.0)	-0.375	-	0.708
Master's	4.0 (3.0)			
Country where the undergraduate degree is taken				
Malaysia	4.0 (2.0)	-	0.033 (2)	0.984
United Kingdom	4.0 (2.0)			
Others ^b	4.0 (2.8)			
Years of experience				
1-5	3.0 (3.0)	-	10.268 (3)	0.016
6-10	4.0 (3.0)			
11-15	5.0 (2.0)			
16 and above	5.0 (2.5)			

^a Mann-Whitney U test

^b Kruskal-Wallis H test

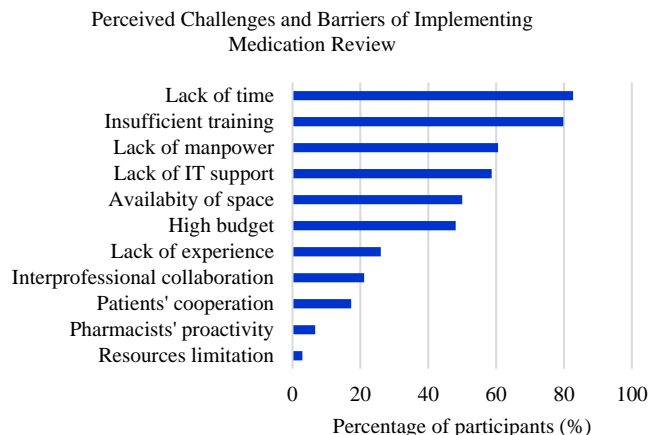


Figure I. Perceived Challenges and Barriers of Implementing Medication Review

Attitude on Medication Review

Moreover, pharmacists participating in this study exhibited a positive attitude towards medication review, where a majority of the respondents agreed or strongly agreed with most of the statements. The result is in line with articles published locally and internationally which indicated positive attitudes of pharmacists toward MTM implementation [17,19,22,25–28]. Al-Tameeni and Sarriff revealed that pharmacists were interested and willing to provide MTM service for patients in the future, in which they agreed that this extended service would improve the quality of health service [17]. Similarly, studies show that pharmacists perceived medication review as a unique opportunity for them as an extended role to participate in a broader range of patient care [19,26].

Among all the six statements given in the questionnaire, the proportion of participants who agreed that "Patient's health outcomes would be improved when a pharmacist monitors medications compared to other healthcare providers" is slightly lower (78.8%). The reason is that medication management does not solely depend on pharmacists. Interprofessional collaboration, especially between general practitioners and pharmacists, is crucial as it has successfully resolved many drug-related problems and has proven to enhance health outcomes [29]. The positive attitude was significantly associated with race, where Malay ethnicity scored the highest ($p = 0.001$), while other sociodemographic characteristics did not influence the scoring on attitude regarding medication review. A study conducted in Malaysia has reported the influence of ethnicity on pharmacists' attitude in providing minor ailment service [30]. As Malaysia is a multi-ethnic nation, further in-depth qualitative study will be useful to explore how ethnicity affects pharmacists' attitude on medication review service.

Practice on Medication Review

Based on our study, practice on medication review among private hospital pharmacists was regarded as fair. More than half of the respondents (65.7%) were providing medication review service in their pharmacy. In the USA, it was also reported that nearly half of the pharmacists were practising targeted and comprehensive medication review with follow-up care [23,28]. Although more than half of the respondents provide medication review service, 43.3% of the respondents did not obtain patient's medication history at the time of admission or as early as possible, and 54.8% did not perform medication chart review throughout the patient's admission. The practice and process of medication review seems to be inconsistent across different hospitals. This could be due to the absence of a standardised protocol on medication review in Malaysia for hospital pharmacists.

Despite the low frequency in providing medication review service, most of the respondents in this study provided medication education to patients during hospitalisation and on discharge, which is also one of the critical principles for a medication review.

Statistical analysis revealed that age and years of experience were associated with practice on medication review. Respondents aged 41 years and above had the highest score compared to younger pharmacists ($p = 0.010$), and the median score increased as the age increase. Besides, participants with 11 to 15 years of experience scored the highest ($p = 0.016$). These findings might be due to older pharmacists have more experience and have been in contact with patients for a longer time, hence are more familiar with daily pharmacy practices to practice medication review than younger pharmacists. Apart from these, gender, race, education level, and country where undergraduate degree was taken did not significantly affect medication review practice.

Correlation between Knowledge, Attitude and Practice on Medication Review

There was a statistically significant but moderate positive correlation between knowledge and attitude levels, suggesting private hospital pharmacists with higher knowledge have better attitudes toward medication review implementation in Malaysia. In other words, the positive attitudes could be explained by their better understanding and awareness of medication review. Supported by a study relevant to MTM, where 95.0% of the respondents were very aware of MTM, most of them believed that pharmacists are willing and should be involved in MTM services [23]. Nevertheless, no correlation was found between knowledge and practice and between attitude and practice, which reveals that the frequency of practising medication review would not be increased even if the

pharmacists had better knowledge and attitude. Although pharmacists generally have good knowledge on medication review, the practice can be hindered by the barriers in the implementation of medication review service, such as lack of resources and compatibility of the service with local hospital practice [31].

Perceived Challenges and Barriers of Implementing Medication Review

Challenges and barriers to the provision of medication review had been pointed out in several studies [17,19,22,23,25,28,32-33]. This study identifies the top three challenges perceived by private hospital pharmacists, which were lack of time, insufficient training and lack of human resources to implement medication review service. Time deficiency was often reported with a workforce shortage, especially by pharmacists working in small private hospitals. The reason is that 60% of the pharmacists in Malaysia are serving in the public sector, which means there is limited staff available to perform pharmacy-related activities in private hospital settings. Thus, private hospital pharmacists have inadequate time to apply medication review [34]. Nonetheless, applying MTM will allow pharmacists to spend more time and become more involved in a patient's care plan, thus enhancing patient medication adherence and minimising hospitalisation [17].

Training and education programs are importantly needed to equip pharmacists with competent skills to identify medication-related problems [33]. It was reported that while pharmacy graduates develop expertise in therapeutics of medicines, undergraduate training generally lacks significant patient contact. This provides limited training opportunities for the development of clinical and communication skills, which is important for medication review practice [35]. A supervised pharmacy student-led medication review had been proven as a potential experiential learning opportunity for pharmacy students [36]. The use of medication review tools should be emphasised in the undergraduate study to encourage and support the future pharmacy graduates to participate in this extended service.

On the contrary, more than half of the respondents do not think medication review implementation requires a high budget. However, it is different from a local study carried out in Hospital Pulau Pinang that showed cost as one of the most common obstacles [17]. The disparity could be due to limited health budget support for medication review services in the government public hospitals.

Collaboration between healthcare professionals, including prescribers and nurses, was reported as an additional challenge. It is explained by the absence of prescribing and dispensing separation in private practices. A formal patient referral

mechanism for pharmacist medication review service by other health care providers can be useful, and there should be a mechanism to allow pharmacists and prescribers to discuss or receive feedback on the issues and outcome of the medication reviews [37]. Interprofessional education should also be implemented in all medical and pharmacy schools so that students have an understanding and agreement on role specifications between different health professionals [29]. Interprofessional training of structured medication review can be organised for pharmacists together with other health professionals to allow all parties to understand the role and process of medication review. This can also increase the pharmacist's confidence level in cooperating with other health professionals through medication review [38].

The results from the current study are subjected to a few limitations. Firstly, this was a cross-sectional study limited to a particular time point, and the study period was short for only a two-month time. Therefore, it is unable to predict any changes in the KAP of participants in the future. Secondly, only 103 private hospital pharmacists participated in this study, out of an estimate of 417 pharmacists working in private hospitals or clinics [18]. Therefore, the results may not generalise well. Thirdly, this survey was vulnerable to non-response bias from those unwilling or unable to respond because the questionnaire was distributed primarily by email address, and there was a high possibility that the email invitation went to spam. Apart from that, the use of close-ended questionnaire might have caused a high level of knowledge, because all the questions are positively phrased and straightforward to answer. Lastly, factors associated with KAP might be affected by the imbalance sociodemographic characteristic of the respondents in this study.

CONCLUSION

Overall, this study provided some insights that the private hospital pharmacists in Malaysia had a high level of knowledge, a positive attitude and a fair practice regarding medication review service. There was also a significant positive correlation observed between knowledge and attitude on medication review. This study highlighted several challenges and barriers that might obstruct the practice of medication review service in the hospitals, with lack of time and insufficient training being the most agreed challenges. The high knowledge level and positive attitude toward medication review bode well for the profession, however its challenges need to be acknowledged and tackled in order to enhance its provision. Some of the strategies may include training on medication review for pharmacists, interprofessional education on medication review within the hospital, and having more trained private hospital pharmacists who conduct medication review service.

In this digital age, medication review process can be integrated into the electronic hospital information system which allows the hospital pharmacists to analyse, store, and share patients' medical and treatment information with the prescribers, which can improve the prescribers' and pharmacists' decision-making during the medication review process [39]. Nevertheless, views of the pharmacists as well as other stakeholders of private healthcare providers on the enablers, barriers as well as the strategies to overcome the barriers of medication review implementation in private healthcare institutions should be further explored through an in-depth qualitative study.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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