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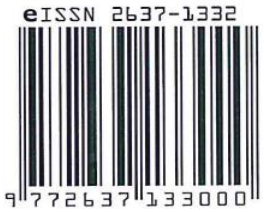

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CONTENTS

A Study on Knowledge of Antidotes and Antidotes Availability among Emergency and Medical Doctors in Central Region Malaysia Public Hospitals

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Abstract

Introduction: Poisoning is a significant global health concern, and its incidence was increasing in many parts of the world. Ensuring that doctors are well equipped with the necessary poisoning and antidotes knowledge is paramount to saving lives and minimising long-term health consequences.
Objective: This study aimed to evaluate the knowledge regarding antidotes and antidotes availability among emergency and medical doctors in three central region Malaysia hospitals, and to identify the preferred methods of acquiring antidote-related knowledge.
Methods: This was a cross-sectional study conducted from January to December 2019, using a validated questionnaire designed by clinical toxicologists and pharmacists. The study population in this study were medical and emergency departments' doctors from three public hospitals in the central region of Malaysia.
Results: Two hundred and thirty six doctors responded to the survey (response rate 84.3%). Emergency doctors had significantly better knowledge than medical doctors on antidotes availability (median score 26 vs 20, $p<0.001$) but there was no difference in terms of antidotes knowledge (median score 9 vs 10, $p=0.891$). Specialists and doctors with more working experience had significantly better scores in both knowledge of antidotes and antidotes availability ($p<0.05$). Most doctors prefer to acquire antidotes-related knowledge through continuous medical education, mobile apps, guidelines and literature.
Conclusion: There is a need to improve the knowledge of antidotes and antidote availability among the emergency and internal medicine doctors, especially among the junior practitioners. More training and teaching sessions in the management of toxicology cases are warranted.
Keywords: Antidote, knowledge, availability, emergency, medical doctors

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Introduction

Intentional and unintentional poisoning is a significant global health issue. In recent years, there is an alarming spike in poisoning cases. The United States (US) poisoning data has reported that poisoning fatalities have exceeded motor vehicles fatalities since 2008 (1). In 2017, poisoning was one of the ten principal causes of hospitalisation (7.2%) and deaths (1.56%) in Malaysian public hospitals (2). Non-opioid analgesics and antipyretics were found to be the most common poisoning agents involved in poisoning admissions locally. On the other hand, chemical agents were responsible for three-quarters of the total deaths in poisoning cases reported in Malaysia. Pesticides are chemical agents that are highly popular in intentional poisoning, hence, the Malaysian authorities have banned all paraquat-containing products as an initiative to decrease the mortality due to pesticides (3).

Despite the high prevalence of poisoning globally, the lack of availability of essential antidotes in healthcare facilities remains a worldwide problem (4). It was found that inadequate stocking of antidotes had occurred despite the existence of published national guidance for stocking of antidotes (4). In Malaysia, the availability and adequate stocking of antidotes is crucial as poisoning cases are becoming more prevalent. Nevertheless, the lack of availability of antidotes in Malaysia's hospital has been reported (5). Maintaining a sufficient antidote stock is a major concern as the timely-use of appropriate antidotes may

improve morbidity and mortality, reduce the requirement of medical interventions, reduce length of hospitalisation and can potentially be life-saving (4,6). World Health Organization (WHO) Guidelines for establishing a poison centre recommended that all antidotes will be needed within 30 minutes, therefore they should be stocked up adequately at all healthcare facilities (7).

Besides the availability of antidotes, appropriate knowledge of the antidotes is equally important for the successful management of poisoning cases (8). As timely use of antidotes and appropriate treatment are vital, healthcare professionals must be equipped with sufficient knowledge and adequate training in treating poisoned patients to avoid treatment delay and error (5,8). Moreover, hospitals should stock an adequate number and variety of antidotes, and healthcare providers are expected to be well aware of the availability of antidotes in the facility. To the authors' knowledge, there were no published studies on the antidote knowledge and its availability among doctors in central Malaysia. Hence, this study aimed to evaluate the knowledge of antidotes and the knowledge of antidote availability among emergency and internal medicine doctors in hospitals. The findings of this study could potentially help to improve the management of poisoning cases in Malaysia. Besides that, this study also aimed to investigate the preferred method of acquiring knowledge of antidotes among emergency and internal medicine doctors.

Methods

This was a cross-sectional study conducted using a self-administered questionnaire designed by clinical toxicologists and pharmacists to study the knowledge of antidotes and knowledge of availability of antidotes among emergency and internal medicine doctors in three public hospitals in the central region of Malaysia, which are Hospital Tengku Ampuan Rahimah (HTAR), Hospital Shah Alam and Hospital Banting. This study was conducted from January 2019 to December 2019. Houseman Officers (HO), Medical Officers (MO), and specialists in the emergency department (ED) and internal medicine department were included in the study. MO or HO with less than one month working experience in both departments were excluded.

Using the formula for estimating a mean without finite population correction with a level of confidence of 95%, mean score knowledge standard deviation of 5.42 and precision of 0.5, an estimation of 231 sample size was calculated for this study (8,9). The questionnaire was divided into three sections which were antidote knowledge, knowledge of antidote availability, and preferred method in acquiring knowledge. The first part on antidote knowledge consisted of 22 questions in which the respondents were required to name the antidote for the type of poisoning cases listed. In the second part of questionnaire, 50 types of antidotes were listed and the respondents had to identify if they were available in their facility by choosing "Yes" for available and "No" for not available. Each correct answer carried one score and each incorrect answer carried zero score. The maximum score that can be achieved for both sections was 72. If the participant was able to get half of the total score which was 36, it was deemed to be of average score. A score of more than 36 was above average whilst a score less than 36 was below average. The final part of the questionnaire on preferred method of acquiring knowledge consisted of eight methods e.g. literature search, continuous medical education, internet search, consulting clinical toxicologists, etc. The respondents were asked to choose their preferred method and they could pick more than one option.

The questionnaire was constructed in English language only and was validated through face validation by a panel of experts consisting of two clinical toxicologists and two senior pharmacists. Ten respondents were randomly chosen to examine the feasibility and suitability of the questionnaire (10). The data from pilot study were not included in the final data analysis. HO, MO, specialists and consultants in ED and internal medicine department in the three public hospitals were randomly selected and recruited into the study. By ratio method, the proportion of number of respondents recruited was divided based on the number of beds and staffs in the hospitals and the respective departments. This self-administered questionnaire required an estimation of fifteen to twenty minutes to be completed. The respondents were required to fill and sign a consent form before proceeding to answer it.

The data were analysed using Statistical Package for Social Sciences Software (SPSS) version 23.0. The data was presented in descriptive analysis. Mann-Whitney-Wilcoxon test and Kruskal-Wallis were used to study the association between the variables and outcome of interest (scores of antidote knowledge and antidote availability knowledge). Level of significance was set as less than 0.05. The results were also analysed based on the difficulty level of managing poisoning cases in section 1 questionnaire. The questions were categorised into three difficulty levels, namely simple, average and difficult, by a clinical toxicologist. Simple cases refer to cases where doctors were more familiar with the conditions and the antidotes were frequently used. Difficult cases, on the other hand, involve scenarios that doctors rarely

encounter and may not be familiar with the available antidotes that are indicated for those poisoning cases. In terms of the scoring system, each poisoning case represents one score. The maximum score for each level was calculated cumulatively. For example, simple poisoning cases have a score of five, average cases have a cumulative score of 15, and difficult cases have a cumulative score of 22. The list was shown in Table 1.

Table 1: Difficulty level of managing poisoning cases

Difficulty level	Poisoning Cases
Simple	Paracetamol, Organophosphate, Benzodiazepine, Opioids, Warfarin
Average	Toxic Alcohol, Heavy Metal, Iron, Digoxin, Cyanide, Dabigatran, Beta-Blocker, Heparin, Calcium Channel Blocker, Sodium Channel Blockers
Difficult	Hydrofluoric Acid, Methotrexate, Isoniazid, Valproic Acid, Sulphonylurea, Cocaine Induced Hypertension, Thallium

This study was conducted in compliance with ethical principles outlined in the Declaration of Helsinki and Malaysian Good Clinical Practice Guideline. Ethics approval was obtained from the Ministry of Health Medical Research and Ethics Committee (MREC) and the study was registered in the National Medical Research Register with identification number NMRR-19-959-45876.

Results

A total of 280 questionnaires were distributed and 236 (84.3%) were returned. The demographic data of the respondents were shown in Table 2.

Table 2. Demographic data of respondents (n=236)

Characteristics	n (%)	mean (SD)
Gender		
Male	86 (36.4)	
Female	150 (63.6)	
Age (years)		29.8 (4.1)
Hospital type		
Tertiary	213 (90.3)	
Non-tertiary	23 (9.7%)	
Specialty		
Emergency	121 (51.5)	
Internal medicine	115 (48.5)	
Years of working experience		
<3 years	146 (62.0)	
3-5 years	60 (25.7)	
5-10 years	17 (7.2)	
>10 years	13 (5.1)	
Rank		
Specialist	40 (16.9)	
Medical officer	95 (40.5)	
House officer	101 (42.6)	

Abbreviation: SD = Standard deviation

The overall median score for antidote knowledge was nine. Tertiary and non-tertiary hospitals, ED and internal medicine doctors performed equally in their knowledge score on antidotes. Among doctors of different ranking, specialists performed better, followed by MO and HO. This corresponded with the years of working experience whereby those with more years of working experience scored better as shown in Table 3.

Table 3. Respondents and their corresponding scores on antidote knowledge

Characteristics	Median score (IQR) [c]	*p*-value
Hospital type		
Tertiary hospital	9 (0,21)	0.674 [a]
Non-tertiary hospital	9 (5,17)	
Specialty		
Emergency	9 (0,21)	0.891 [a]
Internal Medicine	10 (0,20)	
Rank		
House Officer	8 (0,21)	<0.001 [b] *
Medical Officer	9 (1,21)	
Specialist	14 (8,20)	
Years of working experience		
<3 years	8 (0,21)	<0.001 [b] #
3-5 years	7 (3,15)	
5-10 years	12 (4,21)	
>10 years	14 (9,20)	

Abbreviation: IQR = Interquartile range

[a] Mann-Whitney-Wilcoxon test; [b] Kruskal-Wallis test; [c] possible score range for antidote knowledge was 0 to 22.

* Mann-Whitney test showed statistically significant difference between HO and Specialist, and between MO and Specialist.

[#] Mann-Whitney test showed statistically significant difference between <3 years and 5-10 years, <3 years and >10 years, 3-5 years and 5-10 years, and between 3-5 years and >10 years.

The seniority of doctors and their corresponding scores on the different difficulty levels of managing poisoning cases were shown in Table 4. For simple level questions, part of the HOs (30.7%) scored 4 out of 5 questions, followed by over half of MOs (63.5%) and specialists (80%) scored full marks i.e. 5 out of 5 questions. As for average level questions, specialists (25%) scored the highest which was 12 out of 15 antidote questions, while HO and MO scored 6 out of 15 and 8 out of 15 respectively. For difficult level questions, 11.9% of HO and 16.7% of MO scored 8 out of 22 and 9 out of 22 respectively, whilst 25% of specialists scored 14 out of 22.

Table 4. Respondents and their corresponding scores based on difficulty level of managing poisoning cases

Professional ranking	Median Score (IQR)		
	Simple (Out of 5)	Average (Out of 15)	Difficult (Out of 22)
House officer (n=101)	4 (3,5)	6 (3,9)	8 (0,21)
Medical officer (n=96)	5 (4,5)	8 (5,14)	9 (1,21)
Specialist (n=39)	5 (4,5)	12 (7,15)	14 (8,20)

Abbreviation: IQR = Interquartile range

The scores of knowledge of antidote availability was shown in Table 5. The overall median score for antidote availability was 23. There was no statistically significant difference between tertiary and non-tertiary hospitals, although respondents from tertiary hospitals had higher median scores. Knowledge scores on antidote availability showed significant difference between ED and internal medicine departments (p<0.001). However, both ED and internal medicine only scored a median score of 26 (IQR 5,48) and 20 (IQR 0,42) respectively out of 50. When the knowledge on antidote availability was compared based on seniority and years of working experience, statistically significant differences were observed among the groups (p=0.006 and p=0.034, respectively).

Table 5. Respondents and their corresponding scores on knowledge of antidote availability

Category	Median score(IQR) [c]	*p*-value
Hospital type		
Tertiary hospitals	23.0 (0,48)	0.315 [a]
Non-tertiary hospital	19.0 (10,42)	
Specialty		
Emergency	26.0 (5,48)	<0.001 [a]
Internal Medicine	20.0 (0,42)	
Rank		
House Officer	21.0 (0,42)	0.006 [b]
Medical Officer	23.5 (4,45)	
Specialist	30.5 (7,48)	
Years of working experience		
<3 years	22.0 (4,45)	0.034 [b]
3-5 years	17.0 (2,44)	
5-10 years	26.0 (4,48)	
>10 years	29.5 (7,48)	

Abbreviation: IQR = Interquartile range

[a] Mann-Whitney-Wilcoxon test; [b] Kruskal-Wallis test; [c] possible score range for knowledge of antidote availability was 0 to 50.

As shown in Figure 1, the most preferred methods of acquiring toxicology knowledge were continuous medical education (CME) (84.8%) and followed by mobile applications (76.4%). Consultation with the National Poison Centre and clinical toxicologists were the least preferred methods.

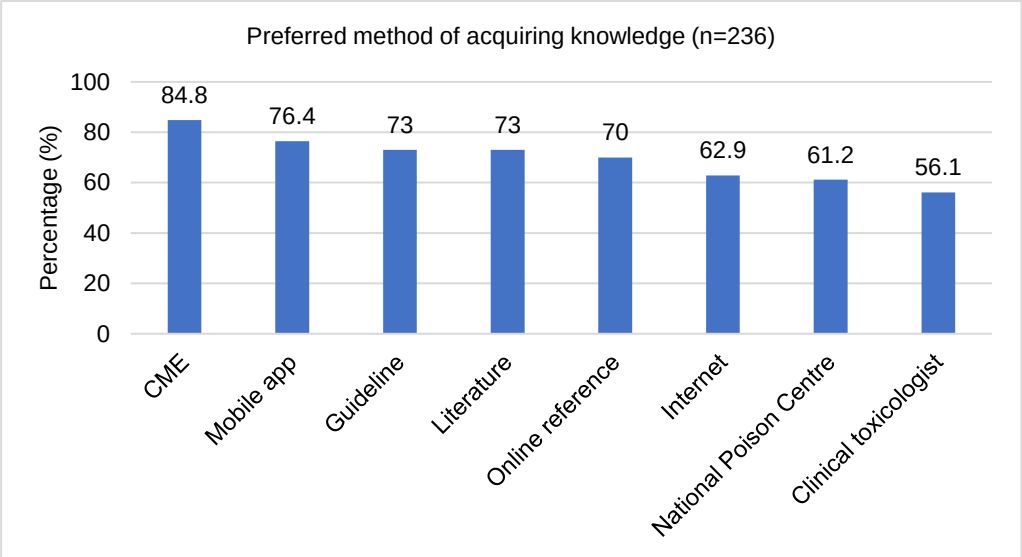

Figure 1. Preferred method of acquiring knowledge

Discussion

Undoubtedly, knowledge of antidotes is crucial as it is potentially lifesaving during intoxications. In our findings, there was no significant difference in antidote knowledge among ED and internal medicine doctors. Looking at the number of poisoning cases received in one of our study centres in year 2023, out of the 468 cases received at the ED, about 10% were admitted to medical wards or intensive care units, therefore the doctors in these wards were also involved in the management of toxicology cases. Studies by Khadka et al. and Liu et al. conducted in Kathmandu and China respectively reported that half of the poisoning cases admitted to the emergency department were transferred to intensive care units or medical wards, hence it was not surprising that the antidote knowledge survey results did not differ significantly based on their specialty (8, 11). According to Wax and Donovan (2000), the majority of emergency medicine board certified doctors (68%) have gone through fellowship training under the American College of Medical Toxicology but they were not the only disciplines who underwent training. Other disciplines who received toxicology training included paediatric medicine (18%) and internal medicine (17%) (12). Although

we did not collect data on the qualifications or previous training in clinical toxicology, the findings of our study might imply that the internal medicine doctors also had some degree of knowledge on antidotes based on previous knowledge gained during medical school and working experience.

Based on professional ranking, specialists from all study sites performed significantly better than MO and HO in terms of antidote knowledge. This may be due to higher level of exposure and training in medical toxicology during the specialists' residency programmes as compared to basic toxicology education in medical schools (13). The American College of Emergency Physicians (ACEP) stated that "emergency physicians should be qualified to render toxicologic care, and they should be prepared by training and by facility organisation to fulfil this function" (13). Hence, it was not surprised that specialists had better knowledge in antidotes. In contrast, toxicology was not widely taught in medical schools according to a study by Hays et al. Medical toxicology was not paid much attention to, and was integrated with other pharmacology lectures, which in the authors' opinion should be a separate course by its own during medical school years (14).

In our study, about three quarters of the doctors were able to answer the simple antidote knowledge questions. For example, paracetamol was considered one of the simple poisoning cases as paracetamol poisoning was common and it is an easily obtained over-the-counter medication. Furthermore, Malaysia has no restriction on the purchase of paracetamol-containing products (3). In one of our study sites, pharmaceutical drug poisoning was most prevalent, accounting for 35.5% of 468 cases, and these included paracetamol poisoning. Moving on, insecticide poisoning was also commonly reported in Malaysia due to its agricultural background. Studies have shown that organophosphorus pesticide poisoning was high among agricultural farmers. (15). It was also reported that the increased number of pesticide poisonings was caused by intentional ingestions. A 10-year retrospective analysis by the National Poison Centre, Malaysia reported 11,087 pesticide poisoning cases with an increasing trend over the years (16). Lastly, while the usage of opioids in Malaysia was still considered low when compared to other countries, the consumption of opioids had steadily increased from 2011 to 2014 (2). The rise in opioid usage had also led to an increase in opioid abuse, misuse, and overdose (17).

In contrast to simple antidote questions, average and difficult antidote questions were poorly answered. For average difficulty level questions, specialists scored the highest among all three rankings. The average level poisoning cases, such as toxic alcohol, were not uncommon as methanol poisoning had made headlines in Malaysia in recent years (18, 19). Poisoning cases involving hydrofluoric acid, methotrexate, and a few other agents were categorised as difficult questions in this study as these cases were more rarely seen compared to the rest as evident by the limited number of published studies regarding them. The published ones were mostly case reports such as methotrexate poisoning by Isoardi et al. (20) and hydrofluoric acid poisoning by Björnhagen et al. (21). Therefore, it was observed that most respondents did not score well for difficult level antidote questions. More efforts are needed to ensure that medical practitioners are equipped with adequate knowledge and skills to manage poisoning events.

Our results showed that those with more working experience performed better in antidote knowledge. However, these results were different from Liu et al. who reported that doctors in China with 3-10 years of work experience performed better than those with over 10 years experience. The authors attributed it to the fact that emergency medicine and toxicology is considerably a young specialty in China (8). Whereas on our side, doctors with more working experience had better knowledge as the knowledge can be accumulated by handling more poisoning cases over the years. Studies have reported that doctors with more working experience have more time to accumulate knowledge and skills, which may correlate with better quality of patient care and improved clinical outcomes (8, 22).

In terms of knowledge on antidote availability in healthcare facilities, there were limited published literatures up to date. Respondents from the tertiary hospitals performed better most likely because these hospitals stocked up more antidotes, hence their doctors were more familiar with their availability (23). Besides that, doctors from the ED were more familiar with the availability of antidotes in their respective hospitals compared to internal medicine. This was because poisoning cases were mainly handled by ED, and antidotes need to be given in a timely manner so some antidotes are available as floor stock in the ED. An expert panel has stated in an antidote stocking guideline that out of 44 recommended antidotes, half of it should be stocked in a location for immediate availability. Examples of immediately available antidotes are atropine, calcium gluconate, flumazenil, glucagon and sodium bicarbonate (23). In a study by Greenberg et al., it was reported that emergency physicians knew very well on the availability of common

antidotes such as atropine and diazepam, but were less aware of antidotes such as dimercaprol and pralidoxime (24).

In our study, although ED doctors and doctors from tertiary hospitals scored better in terms of knowledge on antidote availability, there was still room for improvement as the median scores were just about half of the total score. Similarly, the median antidote knowledge scores in most categories were less than half of the total score. A study from Punjab on the evaluation of antidote knowledge among doctors and pharmacists found that pharmacists had fair knowledge on common antidotes such as activated charcoal, atropine, calcium gluconate and sodium bicarbonate. On the other hand, antidotes which are rarely used such as digoxin immune fab, edetate calcium disodium, glucagon and physostigmine reported poorer knowledge levels (25). Another study from Korea reported that only 16.7% of pharmacists were being asked regarding drug overdose, and almost half of them had to obtain recommendation from other facilities or by searching through references. Up to 61.6% of the pharmacists had no knowledge on antidotes while the rest of them had attended education courses at least once (26). This highlighted that pharmacists' knowledge on antidote were lacking as well.

For the preferred method of acquiring knowledge, most of the doctors prefer acquiring knowledge through CME teaching sessions which can provide them a greater exposure in the management of toxicology cases. They also prefer acquiring knowledge through reliable and convenient references that provide fast and accurate answer. Mamary and Charles reported that self-directed modes such as literature review and internet search were most effective in improving doctors' performance, however instructor-directed modes such as attending conferences and teaching sessions still remained the most utilised methods for acquiring knowledge (27). The least preferred method of acquiring knowledge is through the National Poison Centre and consulting toxicologists. Based on a study by Brassard et al., the reasons hindering the attending doctor to consult a poison centre were time-consuming, complexity of managing an unstable patient while considering recommendations from the centre (28).

One of the limitations of the study was that a time limit was not able to be set for responders to answer the questionnaire. There is a possibility that respondents answered the questionnaire with the help of outside sources. Another limitation would be that about half of the doctors from tertiary hospitals who participated in the study were HOs whilst no HO participated from non-tertiary hospitals. This may have skewed the results of tertiary hospitals towards lower level of knowledge.

Conclusion

There is a need to improve the knowledge of antidotes and antidote availability among the emergency and internal medicine doctors, especially among the junior doctors. Most doctors prefer to acquire knowledge through continuous medical education, mobile apps, guidelines and literature. This study has given an overview of the baseline knowledge on antidotes in the central region of Malaysia and it warrants more training and teaching sessions to educate young doctors to provide them a greater exposure in the management of toxicology cases.

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Conflict of interest

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Investigating Pharmacists' Views on Implementing Pharmacy Research Priorities in Malaysia: Insights from Focus Group Discussions

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Abstract

Introduction: The Pharmacy Research Priorities in Malaysia (PRPM) was published to guide pharmacy research planning and direction in Malaysia.

Objective: This study aimed to explore the perceptions of MOH pharmacists in utilising this document during their research activities.

Methods: Two online focus group discussions (FGD) were conducted among MOH pharmacists. Video recordings were transcribed verbatim. Qualitative analysis software, ATLAS.ti 22 was utilised for inductive thematic analysis, employing open and axial coding techniques to derive relevant themes and sub-themes.

Results: Five main themes emerged, which were [1] awareness of the MOH pharmacists towards PRPM; [2] perceptions of MOH pharmacists towards PRPM; [3] utilisation practices; [4] barriers in utilising the PRPM document; and [5] recommendations to improve the uptake of PRPM. Overall, the PRPM document was perceived as useful in guiding the pharmacists to conduct research, but they normally did not refer to it when conducting research. Instead, it was primarily used for reporting purposes. Several barriers were identified including exhaustive length of the document as well as partial understanding of its function and how to make use of it by the pharmacists. Minimal promotional activities conducted for the document also contributed to its low utilisation.

Conclusion: Overall, the PRPM document was perceived to be beneficial but the response received during FGDs showed low utilisation of the PRPM document among the pharmacists. Further study should be conducted to assess the uptake of this document by other pharmacy researchers beyond the MOH and initiatives should be taken to improve the PRPM utilisation.

Keywords: Document utilisation, research priorities, qualitative, focus group discussion, thematic analysis

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Introduction

The Pharmaceutical Services Programme (PSP), Ministry of Health Malaysia (MOH) published the Pharmacy Research Priorities in Malaysia (PRPM) in July 2018 (1). The primary aim of the PRPM document was to provide guidance for pharmacy research endeavours within the country. This initiative is important to generate essential data and evidence to bridge knowledge gaps and address national health issues in Malaysia. The PRPM encompasses five research priority domains, namely [1] Access to medicines, [2] Monitoring and evaluation of outcomes, [3] Quality and safe use of medicines and sustainability, [4] Optimisation of therapy and pharmacy services delivery, and [5] National databases/ big data analytics.

The PRPM document is publicly accessible at the official portal of PSP, MOH (www.pharmacy.moh.gov.my) and it has recorded 8625 reads on the portal as of October 2021. Lectures and webinars have been conducted at both national and state levels to enhance the awareness among MOH pharmacists. Despite these efforts, the actual distribution and utilisation of the document remained unknown. Since the PRPM primarily functions as a reference document, researchers in the pharmacy field in Malaysia are strongly encouraged, though not obligated, to align with the research domains outlined.

Given the substantial investments in encouraging MOH pharmacists' active involvement in research, understanding their perspectives and experiences with the PRPM is crucial. These insights will enable the development of targeted strategies to enhance the promotion, distribution, utilisation and adoption of the PRPM. The increased uptake of research priority areas outlined in the PRPM document will ensure that research projects undertaken by MOH pharmacists align with the research needs and critical evidence gaps in the country.

In this study, we aimed to explore MOH pharmacists' perceptions towards the PRPM document through focus group interviews. During the focus group discussions, we looked into three main questions which are: [1] What was the awareness and how was PRPM document being utilised by MOH pharmacists? [2] What were the barriers hindering the utilisation of PRPM document among MOH pharmacists? [3] Which interventions could alleviate the barriers and improve the utilisation of PRPM document among MOH pharmacists?

Methods

Study design

This qualitative exploratory study was conducted in December 2021. The phenomenology study design using focus group discussion (FGDs) was conducted among MOH pharmacists.

Study participants

Twelve MOH pharmacists spanning diverse research experiences, disciplines and geographical locations across Malaysia were recruited via purposive sampling (2,3). The goal was to capture insights not only from pharmacists who were actively engaged in research at their workplace but also from those with little or no involvement in any research activities, ensuring a diverse range of perspectives in the FGD deliberations. The participants were divided equally into two focus groups, ensuring a balanced mix of those actively conducting research and those with less experience in research to promote homogeneity within each group.

Data collection

Due to the social distancing measures and travel restrictions imposed amid the emergence of the Omicron variant during the COVID-19 pandemic, two online FGDs were conducted using a secure Cisco Webex video conferencing platform (4–6). The FGDs were conducted simultaneously and moderated by NIAM & SWH with assistance from NN & PLC for notetaking throughout the sessions. A topic guide, featuring semi-structured questions reviewed by the special taskforce responsible for establishing pharmacy research priorities in Malaysia was employed to facilitate the FGDs (Appendix I). The focus of the topic guide encompassed (1) awareness and utilisation of the PRPM document, (2) barriers to utilising the PRPM document, and (3) interventions to improve the utilisation of PRPM.

At the start of each FGD, the moderators introduced themselves and provided a brief explanation of the study's purpose. Participants were requested to complete an online informed consent form (Google Form) expressing their willingness to participate in the FGD and granting permission to record the session. The FGDs were primarily conducted in English with occasional usage of Bahasa Malaysia at participants' comfort. A debriefing session was conducted among the researchers upon the conclusion of the FGDs.

Data analysis

The video recordings of each FGD were transcribed verbatim. Participants' identifiers were removed to ensure anonymity and interviews in Bahasa Malaysia was transcribed as is, without translations but were coded in English. The transcripts were analysed using inductive thematic analysis on ATLAS.ti 22 for desktop (7). Labels were attached independently to the quotes using open coding by NIAM and NN. The codes were then compared and discussed among the researchers to create a codebook (8). Themes were expanded and merged to refine the codebook with any existing discrepancies being deliberated until a consensus was achieved in identifying relevant themes and sub-themes. Subsequently, axial coding was applied to unveil connections between open codes and to search for central themes. The study followed consolidated criteria for reporting qualitative studies (COREQ) guidelines (9). The selected quotes in Malay were translated into English for report writing and publication purposes. The translations were done by NIAM and were checked multiple times by other researchers (NN, HSW and CPL) to avoid miss-translation.

Results

Both FGDs lasted for approximately two hours. Initially, 12 participants were recruited (5,10) but due to urgent work demands, one participant from each group was excluded as they did not participate in the group discussions until the end. Consequently, there were only five participants for each group representing five different MOH health facilities and administration offices across Malaysia included in this study. A detailed overview of the participants was provided in Table 1. There were six females and four male participants with the majority falling within the 31-40 years age range. Seven participants had over ten years of experience as pharmacist in the public healthcare setting. Six participants had pursued postgraduate Master's degree, while only one participant had successfully obtained a doctoral degree. Two participants had no research experience and were not currently involved in any research projects. Six participants had more than five years of research experience and eight participants were either currently engaged in a research project or planning to start one.

Table 1: Participants' demographic characteristics (n=10)

Demographic characteristics	n
Gender	
Female	6
Male	4
Age (years)	
21-30	1
31-40	7
>40	2
Academic qualification	
Undergraduate degree	3
Postgraduate master's degree	6
Doctoral degree	1
Work experience as pharmacist (years)	
6-10	3
11-15	5
>15	2
Workplace setting	
MOH headquarters	3
Major specialist hospital	2
Minor specialist hospital	1
State hospital	2
State health department	2
Research experience (years)	
0	2
1-5	2
6-10	3
>10	3
Current involvement in any research project	
Currently involved in a research project	7
Planning to start a research project	1
Not at all	2

Thematic analysis of the data yielded five primary themes: (1) awareness of MOH pharmacists towards PRPM; (2) perceptions of MOH pharmacists towards PRPM; (3) utilisation practices; (4) barriers in utilising the PRPM document; and (5) recommendations to improve the uptake of PRPM. Each theme was further divided into several sub-themes.

Theme 1: Awareness of PRPM

Eight participants were aware of the PRPM document and its online availability on the PSP website, although their levels of understanding and exposure varied. They participated in a webinar session organised by the PSP, designed to introduce PRPM to all MOH pharmacists. Additionally, the state representatives of the MOH National Pharmacy Research and Development Committee (JKR&D) offered detailed explanations about PRPM to them.

P7: "The state-level management shared and introduced these priorities to us, encouraging us to refer to these priorities when conducting our research activities."
P1: "We joined the webinar session by the deputy director from the PSP."

Theme 2: Perceptions towards PRPM

The participants' perceptions regarding the document's function were largely in alignment with the objectives outlined by the PSP for the PRPM. While not mandatory for researchers to refer to the PRPM during the planning and execution of their research, it did provide them with new research ideas. The document's delineation of essential research areas and expected outcomes assisted researchers in determining which research topics should be given precedence. Prioritisation of research activities is expected to bridge the knowledge gap and ultimately support decision-making process aimed at enhancing pharmaceutical services in Malaysia.

P8: "The goal is to help our pharmacists to conduct research that contributes to our pharmacy service and aid the decision-making for new guidelines or policy changes."
P7: "It outlines all the research scopes and research areas. Soon, you can compare which treatment is better. The details are ranked for you to prioritise, with higher rankings indicating greater importance."
P1: "This document is useful for experienced researchers, helping them achieve the mentioned objectives to develop new policy and address knowledge gaps."

Moreover, from an organisational standpoint, the participants acknowledged that PRPM document played a crucial role in aligning the trajectory of pharmacy research with the vision and mission of the MOH in ensuring beneficial inputs to pharmaceutical services in Malaysia. It streamlined management efforts in offering support for policy development and decision-making processes.

P8: "… and from an organisational perspective, it's crucial to align with the vision and mission of the PSP. Otherwise, research may not be beneficial to our service."

Finally, the PRPM document is also perceived to facilitate optimisation of available resources including financial and manpower.

P7: "Personally, these domains and research scopes are established to direct resources and manpower areas prioritised by the PSP, emphasising their importance over other topics. Somehow it helps us stay focused on what needs attention."

Theme 3: Utilisation of PRPM when conducting research

The study investigated the participants' actual utilisation of the PRPM document and the factors motivating them to use it. Almost all participants reported that they did not refer to the documents when conducting their research. Research activities were typically initiated based on directives from immediate superiors or higher management within public healthcare facilities in Malaysia. Consequently, the practice of referring to the PRPM document before undertaking pharmacy research activities was not widespread among fellow pharmacists, as long as they complied with their superiors' instructions. Participants also indicated that their choice of research topics often stemmed from issues arising within their respective workplaces.

P3: "In reality, most researchers don't refer to this document before starting their research. For the pharmacists on the ground, priority setting doesn't impact them much. Once they have a research idea, they proceed with it regardless it aligns with the priorities or not."
P10: "I believe that when our bosses request for a study, we quickly form a research group and immediately begin the research activities. Therefore, we don't typically refer to the document first."

Instead of serving as a guide for researchers during their research endeavours, the PRPM document was more frequently employed as categorisation tool for the purpose of research reporting to the PSP.

P8: "Okay, it is certainly relevant but usual practice is to conduct the research first. For reporting purposes, we then review the research domains and categorise our topic accordingly. We don't typically refer to the document before conducting the research."

Theme 4: Barriers to Utilise PRPM

Two primary barriers were identified that impeded the utilisation of the PRPM document among MOH pharmacists. Firstly, the verbose explanations provided for each research domain in the document were considered non-user-friendly, making it challenging for pharmacists to navigate through the content. This aspect was perceived to potentially discourage the pharmacists from reading the entire document for a more comprehensive understanding.

P2: "Examining the document, I find it quite wordy and the explanation is not very user-friendly. If I just distribute it to the facilities, I doubt they will read it."

Secondly, participants harboured misconceptions and confusion regarding the functions of the domains and the relative rankings of the subdomains. This had hindered their optimal utilisation of the PRPM when conducting their research.

P2: "We frequently mix up the evaluation of outcome and optimisation of therapy domains."

P1: "I am well-acquainted with the domains and subdomains, but upon closer examination, I realised there is a relative ranking which I am not familiar with at all."

Theme 5: Recommendations to improve the uptake of PRPM

The participants shared their recommendations to overcome certain barriers and enhance the adoption or utilisation of the PRPM document. We categorised these recommendations according to the relevant stakeholders or responsible parties, as outlined below.

<u>Pharmaceutical Services Programme as top management</u>

The participants strongly suggested that the PSP enhance the promotion and dissemination methods of the document. They recommended exploring creative media such as interactive online platforms and concise multimedia presentations to simplify the document and capture the interest of readers.

P8: "… perhaps an interactive website could enable us to specify our interests before directing us to the most relevant domains but definitely not in the form of book or PDF."

P10: "Nowadays everyone searches for YouTube video to understand things when needed. A brief video like this would attract more people to look it up."

<u>State level pharmacy management</u>

As part of the state-level pharmacy management in the MOH, the JKR&D state representative plays a crucial role as a bridge between the PSP headquarter and the MOH pharmacists. Their responsibilities involve effectively disseminating the document and providing precise explanations to the pharmacists. The participants strongly suggested placing emphasis on the document's function, relative rankings and practical utilisation, particularly for junior pharmacists who are new to research. They also recommended that the JKR&D representatives conduct frequent follow-ups and provide updates to keep researchers aligned with the needs of the national pharmacy services.

P7: "In larger states like Sarawak, the JKR&D state representative should play a more active role by appointing a representative from each district. This approach will effectively disseminate this document to all pharmacists in their respective health facilities."

P2: "I believe it would be more beneficial to increase promotion on the domains and the sub-domains. Ideally, thorough explanations of the sub-domains and relative ranking should be provided to everyone."

P1: "New researchers might require guidance in understanding the document. While they can gain some insight through independent reading, additional guidance may be needed to prioritise research topics effectively."

Discussion

This exploratory study successfully delineated the awareness, perceptions, utilisation practice, barriers hindering pharmacists from utilising the PRPM document in pharmacy research and recommendations to enhance future uptake of PRPM document.

The study findings indicated that participants were aware of the PRPM document's existence and perceived it as a valuable tool for guiding prioritisation of research activities among pharmacists in Malaysia, especially when resources are constrained (11). Despite the perception that the document was

valuable and pertinent, MOH pharmacists were not observed to refer to it while conducting research at their respective workplaces. Instead, the document was primarily used as a categorisation tool for reporting pharmacy research activity. Quarterly, JKR&D state representatives compiled and submitted progress reports on research activities conducted by MOH pharmacists in their state to the national pharmacy research database (12). In this reporting process, researchers were required to identify the research priority domains their work belonged to by referring to the PRPM document. This usage pattern explains participants' perception of the PRPM document as a tool for categorising their research.

The primary intent of the PRPM document was to streamline research activities, facilitating the collection of relevant evidence to address national pharmaceutical issues (13). It included relative rankings to highlight areas in each domain requiring urgent research attention (14). However, the study revealed participants' misconceptions about the rankings' function and expectation that the document should offer detailed facilitation throughout their research activities. Importantly, it should be noted that the document was never intended as a code of practice for pharmacy research. The observed misconceptions among MOH pharmacists underscore the necessity for more effective promotion and educational activities concerning the PRPM document. For the forthcoming PRPM document, substantial efforts should be directed towards ensuring its widespread utilisation among researchers, considering the diverse healthcare needs and limited availability of resources in healthcare settings in Malaysia.

Several limitations were identified in this study. The COVID-19 pandemic posed challenges in collecting complete observational data such as overall body language as the FGDs were conducted online. Although video recordings were available, they mainly captured the participants' facade without providing a dynamic overview of interactions during the discussions. Hesitations in sharing opinions were noted, particularly among junior pharmacists. This might possibly be influenced by the presence of their superiors or senior pharmacists from their workplace. In order to foster flexibility and freedom in opinion sharing, future FGDs should involve participants from similar working grades. Despite these limitations, a notable strength of the study was the inclusion of participants not actively engaged in pharmacy research activities, ensuring a comprehensive documentation of acceptance and perspectives on the PRPM document.

Conclusion

This study has contributed to clarifying the awareness, perceptions and utilisation practices of MOH pharmacists regarding the PRPM document in the context of their research activities. It revealed that utilising PRPM document to guide or prioritise research activities is not a prevalent practice among them. Consequently, there is an urgent need to address the efficient and optimal utilisation of the document, particularly considering the limited resources available for research in Malaysia.

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Conflict of interest statement

The authors declare that they have no conflict of interest.

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Appendix I

Focus Group Discussion Guide

1. Have you heard about Pharmacy Research Priorities in Malaysia (PRPM)?
2. What do you know about the Pharmacy Research Priorities in Malaysia?
3. Have you referred the document?
4. Are you aware of the purpose and function of the document?
5. How relevant are the research priority areas listed in the PRPM document to your practice?
6. How important is it to have a document like PRPM?
7. How to encourage MOH pharmacists to refer to the document?
8. What do you think the Pharmaceutical Services Programme should do to improve the uptake of PRPM document?

Knowledge, Attitude and Practice Related to Unused Medicines Among Doctors, Pharmacists and Nurses: Developing and Validating a Tool

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Abstract

Introduction: The Medications Return Programme was introduced in Malaysia since 2010. The success of the programme depends in part on the knowledge about the programme, the attitude towards returning medicines to pharmacies, and the practice on unused medicines among healthcare providers.

Objective: This study aimed to develop scales to measure the knowledge about medications return programme, attitude towards returning medicines to pharmacy and practice on unused medicines, and assess the reliability and validity of these scales among doctors, pharmacists and nurses in Hospital Queen Elizabeth, Hospital Queen Elizabeth II, Hospital Wanita dan Kanak-Kanak Sabah and Hospital Mesra Bukit Padang.

Methods: Respondents were asked to self-administer the questionnaire twice on two occasions that were four to ten days apart. Items homogeneity was assessed by item-partial total correlation and Cronbach's alpha coefficient. Test-retest reliability was assessed by intraclass correlation coefficient (ICC). The construct validity of the knowledge scale was assessed by extreme groups comparison whereas that of attitude and practice scales was assessed by exploratory factor analysis.

Results: A total of 140 respondents comprising doctors, nurses, and pharmacists were included into the study. Alpha coefficients for knowledge, attitude, and modified practice scales were 0.264, 0.948, and 0.784 respectively. Test-retest reliabilities for the three scales were 0.59, 0.67, and 0.83 in the same order. In both attitude and modified practice scale, there was only one factor with eigen value more than one, and all items loaded highly only on that one factor. .

Conclusion: All the three scales have good psychometric properties on the population studied. Both knowledge and attitude scales consisted eight items whereas there were five items in the practice scale.

Keywords: medications return, unused medicines, attitude, knowledge, practice

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Introduction

Studies have shown that the use of medicines is increasing globally (1,2). Many of the medicines, however, remain unused and accumulated at home due to factors such as the non-optimal prescribing and dispensing practices, patient nonadherence, improvement in treated conditions, medication discontinuation, changes in treatment, medication expiration and patient deaths (3,4). Problems occur when these medicines were not stored and disposed properly as it can lead to accidental ingestions and poisonings, misuse, or abuse of the medicines (3-5). Besides that, improper disposal of medicines has also raised concerns among the environmentalists. The practice of pouring medicines down the sink or flushing them down the toilet can lead to the leakage of pharmaceuticals into landfills and waterways. Studies have found pharmaceutical traces in wastewater and drinking water, but little is known about the implications on human health and ecosystems in the long run (6).

Unused medicines return programmes have been implemented in various countries to overcome the problems. In the United States for example, prescription drug take back activities are held from time to

time by the government and community pharmacies to collect unused and unwanted medicines from patients as well as to educate them on safe medication disposal practice (5,7). In Canada, unused and expired medicines can be returned to any pharmacy in the country any day of the year (8). In Taiwan, medication disposal boxes are set up in many hospitals and community pharmacies to encourage the proper disposal of medicines (9).

In 2010, the Medications Return Programme was introduced by Pharmaceutical Services Programme, Ministry of Health Malaysia to encourage patients to return unused medicines to the pharmacies. The introduction of the programme reflected the growing concerns on the consequences of unused, unwanted, or expired medicines on public health. The main purposes of the programme were to protect the patients from the indiscriminate use of medicines and to properly dispose unused and expired medicines. To ensure a nationwide implementation of the programme, the Medications Return Programme Guideline was published and the programme was implemented in all pharmacies in the government hospitals and health clinics (10).

The successful implementation of the programme depends in part on the knowledge about the programme, the attitude towards returning medicines to pharmacy, and the practice on unused medicines among the caregivers, especially the healthcare professionals. However, to our best knowledge, there were no published validated tools to measure these concepts in this population at the time of the study. The Return and Disposal of Unused Medications (ReDiUM) tool, albeit measuring similar concepts, was not yet available at the time this study was conducted (11). Therefore, this study was conducted with the objectives to develop scales to measure the knowledge about medications return programme, attitude towards returning medicines to pharmacy and practice on unused medicines, and to assess the reliability and validity of these scales among doctors, pharmacists, and nurses in public hospitals.

Methods

Development of tool

The tool was developed by the study team, which included three pharmacists from Hospital Queen Elizabeth and Hospital Queen Elizabeth II, together with two other pharmacists from the same hospitals. The two non-study team pharmacists were selected based on their familiarity with the Medications Return Programme. First, a draft questionnaire was prepared by the study team (Appendix I). The first draft consisted of a general question (Q1), eight questions on knowledge about the Medications Return Programme (Q2-Q9), nine questions on attitude towards the programme (Q10-Q18), and eight questions on practice about unused medicines (Q19-Q26). The choice of items was based on published studies about unused medicines (3-9).

Second, the draft was discussed in multiple sessions of group discussions between the study team and the two non-study team pharmacists. At this stage, item Q18 was excluded. Consensus was reached that all the remaining items were relevant to the study objectives and at face value measure what they are purported to measure. The second draft was then created, with the addition of instructions for respondents and four questions on demographics: sex, age, profession, and years in service (Appendix II).

Third, the second draft was pre-tested on two doctors and a nurse. The pretest was carried out to ensure that the questions were comprehensible to the target respondents. Pharmacists were excluded from the pretest as they were already part of the members who devised the items. The second draft was then accepted as the final questionnaire.

Lastly, the scoring rules for each scale were decided (12). The score for the knowledge scale was the percentage of correct answers. The scores for attitude and practice scales were the total score divided by the maximum possible score times one hundred. All scales scores thus range from 0 to 100, with higher score indicating higher or better position on the corresponding concepts. The scores for each scale was considered as continuous measures, and it was not within the scope of this study to categorise the score into distinct categories.

Participants and settings

Doctors, nurses and pharmacists from four tertiary hospitals in Kota Kinabalu, Sabah, Malaysia were surveyed. The respondents were asked to self-administer the questionnaire twice on two occasions that were 4 to 10 days apart between April to July 2018. The hospitals involved were Hospital Queen Elizabeth, Hospital Queen Elizabeth II, Hospital Wanita Dan Kanak-Kanak Sabah and Hospital Mesra Bukit Padang. The respondents in each profession-hospital stratum was selected by convenience sampling. The eligible

participants were individually approached by the data collectors and those who consented to participate were recruited. The study was approved by the Ministry of Health Medical Research and Ethics Committee (MREC) with the reference number NMRR-16-2791-32502 (IIR).

Sample size

Pre-study sample sizes were estimated as follows: The knowledge scale construct was planned to be assessed by extreme groups comparison. To detect a standardised effect size of 0.8 between any pair at 0.80 power and 0.05 alpha level, at least 25 respondents were needed in each group. Sample size formula: sample size per group equals to 16 divided by squared standardised effect size (13). The attitude and practice scales constructs were planned to be assessed by exploratory factor analysis. Based on a rule-of-thumb of at least 5 respondents per item, the sample size needed was at least 40.

Data analysis

Data were analysed using Stata/SE 15.1 (StataCorp LLC, College Station, TX, USA). The frequency of endorsement was described by the proportion of respondents who chose each response alternative to an item. Homogeneity of the items in each scale was assessed by Cronbach's alpha and item-partial total correlation coefficients. Test-retest reliability of each scale score was assessed by intraclass correlation coefficient (ICC). In general, the acceptable value for Cronbach's alpha is at least 0.70 (12). Meanwhile, the ICC value can be interpreted as follows: 0.00 to 0.40 poor to fair; 0.41 to 0.60 moderate; 0.61 to 0.80 substantial; 0.80 to 1.00 almost perfect (12). The choice of interval length for test-retest of 4 to 10 days was based on a previous study (14).

The construct validity of the knowledge scale was assessed by pairwise comparisons of the mean scores between doctors, nurses, and pharmacists. The 95% confidence interval of the mean differences were adjusted by Tukey multiple comparison procedure. The inclusion of doctors and nurses in the study, in addition to pharmacists, was to allow the assessment of construct validity by extreme groups comparison (12). It was postulated before the study that pharmacists would have the best knowledge about the programme. The postulation was based on the fact that the programme was introduced by the Pharmaceutical Services Programme itself (10) and it was previously reported that the pharmacist was the main source for information regarding the storage of medications (15).

The construct validity for the attitude and practice scales was assessed by exploratory factor analysis, using principal factor method. It was postulated before the study that all items would load highly (factor loading ≥ 0.4) on one factor only for both scales. All score estimations were made at 95% confidence level.

Results

One hundred and forty respondents that comprised 52 doctors, 42 nurses, and 46 pharmacists were included into the study. The characteristics of the respondents were shown in Table 1. Table 2 showed the frequency of endorsement for each item in the three scales. There were many response alternatives with proportion less than 0.2 or more than 0.8 which were not desirable but not critical.

Table 1: Demographics of respondents (*n*=140)

Variable	*n* (%)	Median (IQR)	Mean (SD)	95% CI
Age (years)		29.5 (5.0)		
Gender				
Male	35 (25.0)			
Female	105 (75.0)			
Profession				
Doctor	52 (37.1)			
Nurse	42 (30.0)			
Pharmacist	46 (32.9)			
Age by profession (years)				
Doctor		29.0 (3.5)		
Nurse		29.0 (9.0)		
Pharmacist		30.0 (4.0)		
Number of years in service				

Doctor	3.5 (3.5)		
Nurse	5.6 (5.8)		
Pharmacist	5.0 (5.3)		
Ever heard about the program?			
Yes	125 (89.0)		83.0, 94.0
No	15 (11.0)		-
Knowledge score (%)		74.1 (15.0)	71.4, 76.8
Attitude score (%)		87.7 (15.7)	85.1, 90.4
Practice score (%)		67.7 (18.1)	64.7, 70.8

Abbreviation: IQR = inter-quartile range, SD = standard deviation, CI = confidence interval

Table 2: Frequency (%) of endorsement for each item

Knowledge about Medications Return Programme* scale

Item	True	False	Don't Know
Q2	106 (84.0)	0 (0.0)	19 (15.2)
Q3	30 (24.2)	39 (31.5)	55 (44.3)
Q4	122 (97.6)	1 (0.8)	2 (1.6)
Q5	118 (94.4)	3 (2.4)	4 (3.2)
Q6	108 (86.4)	4 (3.2)	13 (10.4)
Q7	16 (12.8)	94 (75.2)	15 (12.0)
Q8	58 (46.4)	50 (40.0)	17 (13.6)
Q9	11 (8.9)	104 (83.9)	9 (7.3)

Attitude towards the return of medicines to the pharmacy scale

Item	Strongly disagree	Disagree	No opinion	Agree	Strongly agree
Q10	4 (2.9)	6 (4.4)	5 (3.7)	54 (39.4)	68 (49.6)
Q11	4 (2.9)	4 (2.9)	8 (5.7)	58 (41.4)	66 (47.1)
Q12	4 (2.9)	3 (2.1)	3 (2.1)	45 (32.1)	85 (60.7)
Q13	4 (2.9)	3 (2.1)	1 (0.7)	48 (34.3)	84 (60.0)
Q14	4 (2.9)	8 (5.7)	2 (1.4)	31 (22.1)	95 (67.9)
Q15	5 (3.6)	3 (2.1)	6 (4.3)	38 (27.1)	88 (62.9)
Q16	3 (2.1)	1 (0.7)	24 (17.1)	38 (27.1)	74 (52.9)
Q17	3 (2.1)	3 (2.1)	5 (3.6)	41 (29.3)	88 (62.9)

Practice on unused medicines scale

Item	Never	Sometimes	Frequently	Always
Q19	10 (7.1)	39 (27.9)	40 (28.6)	51 (36.4)
Q20	26 (18.6)	65 (46.4)	27 (19.3)	22 (15.7)
Q21	16 (11.5)	60 (43.2)	33 (23.7)	30 (21.6)
Q22	13 (9.3)	35 (25.0)	47 (33.6)	45 (32.1)
Q23	21 (15.1)	35 (25.2)	29 (20.9)	54 (38.9)
Q24	123 (87.9)	15 (10.7)	2 (1.4)	0 (0.0)
Q25	129 (92.8)	9 (6.5)	1 (0.7)	0 (0.0)
Q26	65 (46.4)	53 (37.9)	15 (10.7)	7 (5.0)

* Among respondents who reported ever heard of the Medications Return Programme (n=125).

Table 3 showed that the items in the Knowledge scale were not homogenous as shown by the low (less than 0.2) item-partial total correlation for all items except for two and very low coefficient alpha, 0.264. The test-retest reliability was borderline acceptable with ICC=0.59. Meanwhile, the items in the Attitude scale were homogenous with very high coefficient alpha, 0.948. The test-retest reliability was acceptable with ICC=0.67. As for the Practice scale, its psychometric properties were improved with the removal of item Q24, Q25, and Q26. The coefficient alpha and ICC for the modified Practice scale were 0.784 and 0.83, respectively.

Table 3: Item-partial total correlation and coefficient alpha if item removed

Knowledge about Medication Programme* scale			
Item	*n*	Item-partial total correlation	Alpha if item removed
Q2	125	0.20	0.178
Q3	124	0.15	0.200
Q4	125	0.04	0.265
Q5	125	0.12	0.237
Q6	125	-0.05	0.322
Q7	125	0.25	0.125
Q8	125	0.07	0.270
Q9	124	0.04	0.275
Scale alpha=0.264, Test-retest intraclass correlation=0.59			
Attitude towards returning medicines to pharmacy scale			
Item	*n*	Item-partial total correlation	Alpha if item removed
Q10	137	0.790	0.942
Q11	140	0.815	0.941
Q12	140	0.880	0.936
Q13	140	0.899	0.935
Q14	140	0.674	0.951
Q15	140	0.789	0.942
Q16	140	0.762	0.944
Q17	140	0.888	0.936
Scale alpha=0.948, Test-retest intraclass correlation=0.67			
Practice on unused medicines scale			
Item	*n*	Item-partial total correlation	Alpha if item removed
Q19	140	0.471	0.691
Q20	140	0.542	0.674
Q21	139	0.549	0.673
Q22	140	0.544	0.674
Q23	139	0.611	0.655
Q24	140	0.080	0.745
Q25	139	0.142	0.740
Q26	140	0.279	0.730
Scale alpha=0.730, Test-retest intraclass correlation=0.85			
Modified practice on unused medicines scale			
Item	*n*	Item-partial total correlation	Alpha if item removed
Q19	140	0.544	0.749
Q20	140	0.534	0.752
Q21	139	0.592	0.734
Q22	140	0.579	0.737
Q23	139	0.550	0.746
Scale alpha=0.784, Test-retest intraclass correlation=0.83			

* Among respondents who reported ever heard of the Medications Return Programme (n=125).

Table 4 showed that the pharmacists scored significantly higher than both nurses and doctors in terms of knowledge about the Medications Return Programme. There was no significant difference between the nurses and doctors.

Table 4: Pairwise comparison of knowledge scores between doctors, nurses and pharmacists

	Mean difference	95% confidence interval [a]
Nurse vs Doctor	-4.8	-11.8, 2.1
Pharmacist vs Doctor	13.5	6.9, 20.2
Pharmacist vs Nurse	18.4	11.6, 25.1

Looking at both attitude and practice scales, Table 5 showed that only one factor had eigen value more than 1 and all items loaded highly on that one factor only, which indicated that there was only one important construct for each scale.

Table 5: Factor analysis

Attitude towards returning medicines to pharmacy scale

Factor	Eigen value
Factor 1	5.683
Factor 2	0.227
Factor 3	0.159
Factor 4	0.076
Factor 5	-0.016
Factor 6	-0.051
Factor 7	-0.097
Factor 8	-0.116

Item	Factor 1	Factor 2	Factor 3	Factor 4	Uniqueness
Q10	0.8176	-0.2247	0.0100	0.1295	0.2643
Q11	0.8399	-0.2304	0.0486	0.0731	0.2338
Q12	0.9164	-0.1141	-0.1272	-0.1439	0.1103
Q13	0.9327	-0.0037	-0.1801	-0.0887	0.0898
Q14	0.7026	0.2407	-0.1552	0.1353	0.4060
Q15	0.8123	0.0870	0.1685	0.0047	0.3041
Q16	0.7863	0.0733	0.2348	-0.0822	0.3144
Q17	0.9100	0.1988	0.0254	0.0145	0.1315

Modified Practice on Unused Medicines Scale

Factor	Eigen value
Factor 1	2.025
Factor 2	0.069
Factor 3	-0.043
Factor 4	-0.103
Factor 5	-0.244

Item	Factor1	Factor2	Uniqueness
Q19	0.6096	-0.0267	0.6277
Q20	0.6122	0.1767	0.5940
Q21	0.6689	0.0836	0.5455
Q22	0.6588	-0.1578	0.5410
Q23	0.6299	-0.0696	0.5984

Discussion

More than ten years have elapsed since the introduction of the Medications Return Programme, our study showed that some healthcare professionals were still unaware of the programme. The low awareness was even more prevalent among the patients. According to a survey among outpatients in Sabah, only 54% knew about the programme (16). It was previously discussed that more publicity was needed to increase the programme uptake among the patients or the public (11,16). This could be materialised only if healthcare professionals have good knowledge about the programme and they themselves adopt proper practices on unused or unwanted medicines. The argument was supported by a finding that showed that

of the people who received advice on disposal practices from a well-informed healthcare professional, 75% disposed of their medicine appropriately (2). The tools from this study, if validated, would allow for the quantification of the three attributes studied namely knowledge about the Medications Return Programme, attitude towards returning medicines to pharmacy, and practice on unused medicines among healthcare professionals and thus provide insight on the matter.

To our knowledge, this was the first study to develop tools to measure knowledge, attitude, and practice about the Medications Return Programme among healthcare providers. A closely related tool, the Return and Disposal of Unused Medications (ReDiUM) tool, which measures similar concepts was available but with a different target group which was the public (11). Barring the knowledge domain, the items in ReDiUM revolved around similar themes to that of this study. The shared themes were the impact of improper medicines disposal on the environment, patient or individual safety issues, wastage of resources, and the proper ways to dispose unused medicines. Meanwhile, the main focus of the knowledge domain in ReDiUM was on how to properly dispose unused medicines, whereas the knowledge scale in this study was emphasising on healthcare providers' knowledge about the Medications Return Programme itself.

The low level of homogeneity among the items in the Knowledge scale was not a reason to dismiss the scale. To be technically precise, it should be called Knowledge index instead of Knowledge scale. The difference between the two terms is that the former comprises items that are not related to each other, in that a person who knows the answer to one item might not know the answer for another item, in contrary to the latter where a person who scores high on one item should also score high on other items. For example, a nurse who never worked in an inpatient ward would not be expected to know with certainty the answer for items Q8 and Q9. To borrow the terms from structural equation modelling (SEM), an index comprises causal indicators (the arrows point to the construct from the items) whereas a scale comprises effect indicators (the arrows point from the construct to the items) (12). Homogeneity is thus not a concern for an index. If the index can differentiate between those who were expected to have high knowledge and those who were expected to have low knowledge, its construct is established. It appears that our Knowledge scale was able to differentiate between pharmacists and the others as evidenced by the significant differences between them. The proposed theory that pharmacists have the best knowledge was well supported by the study results. As for the borderline acceptable ICC, it was postulated that it might be due to learning effect whereby some respondents might have looked up the information about the programme after the first occasion.

The Attitude scale had a very high level of items homogeneity as well as acceptable ICC of at least 0.6 (12). In fact, some of the items might be redundant as shown by very high item-partial total correlation (more than 0.8), which is the correlation between an item score and the total score excluding that item. The exploratory factor analysis supported the pre-study postulation that the items were the reflections of one concept only, which was the attitude towards returning medicines to pharmacy.

Meanwhile, the Practice scale's initial psychometric properties had called for modification. It appeared that items Q24, Q25, and Q26 were different from the rest as evidenced from the low item-partial total correlations. Their removal had improved the scale's internal consistency considerably and all the remaining items loaded highly on one factor only as expected before the study. It was postulated that the three items were more reflective of patients' practices and the rest were more reflective of healthcare providers' practices. As evidenced in Table 1, four out of the five remaining items in the Practice scale started with the phrase "I advised my patients".

In examining both the Attitude and Practice constructs, the original solutions were not rotated because they agreed well with the pre-study expectation and intended way of interpretation. It should be stressed that the principal factor method was used in the factor analysis instead of the traditional principal-component factor method. The reason was that the later method assumed that uniqueness is zero (17). Uniqueness is the percentage of variance for an item that is not explained by the common factors and 1 minus uniqueness is called communality. High uniqueness indicates that the item is not well explained by the factors. The results showed that the uniqueness for the items in Practice scale were quite high which suggested the need to modify the existing items or add new items to the scale. Even though some of the items had proportion of endorsement less than 0.2 or more than 0.8, their deleterious effects on the psychometric properties of both scales were offset by the high average item-partial total correlations (12).

This study had several limitations. The generalisation of all the estimations made in this study to a larger population of doctors, nurses, and pharmacists may not be warranted statistically as the sampling

was not random and was limited to public tertiary hospitals in Kota Kinabalu. The lack of differentiation between inpatient and outpatient staff might have affected the study validity, but the extent to which was unknown. It was suggested that future studies should employ probability sampling if estimation of the scores was the main objective. Nevertheless, the results of this study could aid in estimating the sample size for future studies. The real value of this study, however, was in providing empirical evidence about the reliability and validity of the three concepts studied. Still, it must be cautioned that validity and reliability of a score are dynamic in that they may be different in different populations. A confirmatory factor analysis must be performed before the scales can be recommended for use in practice.

Conclusion

The final tool developed consisted three measuring scales, with eight items in the knowledge about medications return programme scale, eight items in the attitude towards returning medicines to pharmacy scale and five items in the practice on unused medicines scale. All three scales were reliable and valid empirically on the population studied. The validity and reliability of the tool must be further studied before it can be widely used.

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Conflict of interest statement

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Appendix I

SECTION A (*General item)*

Please tick* |_/_| *ONE box only.

1.	I have heard about “Program Pemulangan Ubat” before.	|__| Yes---1 |__| No---2

SECTION B (*Knowledge about Medications Return Program*)

Please tick* |_/_| *ONE box only.

2.	“Program Pemulangan Ubat” is a nationwide program.	|__| True---1 |__| False---2 |__| Don’t know---3
3.	“Program Pemulangan Ubat” involves both private and government pharmacies.	|__| True---1 |__| False---2 |__| Don’t know---3
4.	“Program Pemulangan Ubat” is a service provided by the pharmacy counter.	|__| True---1 |__| False---2 |__| Don’t know---3
5.	Through “Program Pemulangan Ubat”, the patients can return their unused medicines to the pharmacy counter by themselves.	|__| True---1 |__| False---2 |__| Don’t know---3
6.	Through “Program Pemulangan Ubat”, the patients can return their unused medicines to the pharmacy counter via the nurses.	|__| True---1 |__| False---2 |__| Don’t know---3
7.	Through “Program Pemulangan Ubat”, the patients can return their unused medicines to the pharmacy counter via their doctors.	|__| True---1 |__| False---2 |__| Don’t know---3
8.	Through “Program Pemulangan Ubat”, the patients can return their unused medicines to the pharmacy counter via their relatives.	|__| True---1 |__| False---2 |__| Don’t know---3

9. "Program Pemulangan Ubat" is only for outpatients.

|__| True---1
|__| False---2
|__| Don't know---3

****

Q2, Q4, Q5, Q6, Q7, Q8: Recode into "1" if answer "True", "0" if otherwise

Q3, Q9: Recode into "1" if answer "False", "0" if otherwise

Compute K_Score = (Q2+Q3+Q4+Q5+Q6+Q7+Q8+Q9)/8*100

Higher K_score is better knowledge.

SECTION C (*Attitude (perceptual, behavioural and cognitive) towards Medication Returns Program*)

Do you agree with the following statements? Please circle ① ONE number only.

(1=Strongly disagree, 2=Disagree, 3=No opinion, 4=Agree, 5=Strongly agree)

	Strongly disagree	Disagree	No opinion	Agree	Strongly agree
"Program Pemulangan Ubat" can encourage the patients to return the unused medicines.	1	2	3	4	5
"Program Pemulangan Ubat" can prevent medication errors by the patients.	1	2	3	4	5
"Program Pemulangan Ubat" can ensure patients' safety.	1	2	3	4	5
"Program Pemulangan Ubat" can prevent misuse of medicines.	1	2	3	4	5
"Program Pemulangan Ubat" can prevent abuse of medicines.	1	2	3	4	5
"Program Pemulangan Ubat" can reduce wastage of medicines.	1	2	3	4	5
"Program Pemulangan Ubat" can ensure proper medicines disposal.	1	2	3	4	5
"Program Pemulangan Ubat" can protect the environment.	1	2	3	4	5
"Program Pemulangan Ubat" is a valuable service.	1	2	3	4	5

****

Compute A_score=(Q10+Q11+Q12+Q13+Q14+Q15+Q16+Q17+Q18)/45*100

Higher A_score is more positive attitude.

SECTION D (*Practice about unused medicines*)

Please read the following statements and choose the answer that reflects you the most. Please circle ① ONE number only.

(1=Never, 2=Sometimes, 3=Frequently, 4=Always)

	Never	Sometimes	Frequently	Always
19. I advised my patients to return the unused medicines to the pharmacy.	1	2	3	4
20. I advised my patients about proper medicines disposal.	1	2	3	4
21. I advised my patients about the risk of keeping unused medicines at home.	1	2	3	4
22. I advised my patients about the possible wastage of unused medicines at home.	1	2	3	4
23. I returned any unused medicines to the pharmacy.	1	2	3	4
24. I disposed any unused medicines in the sink.	1	2	3	4
25. I disposed any unused medicines in the toilet.	1	2	3	4
26. I disposed any unused medicines in the trash bin.	1	2	3	4

****

Recode Q24 INTO q24, Q25 INTO q25, Q26 INTO q26: 1=4; 2=3; 3=2; 4=1

Compute P_score=(Q19+Q20+Q21+Q22+Q23+q24+q25+q26)/32*100

Higher P_score is better practice.

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Appendix II

SECTION A (General item)

BAHAGIAN A (Item umum)

Please tick |_/_| ONE box only.

Sila tandakan |_/_| SATU kotak sahaja.

1. I have heard about "*Program Pemulangan Ubat*" before.

   (Saya pernah dengar tentang Program Pemulangan Ubat sebelum ini.)

   |__| Yes---1
   |__| No---2

If you checked the "**No"** box, **skip section B** and proceed to section C, D and E.

Jika anda menanda kotak **"No"**, ***langkau bahagian B*** *dan terus ke bahagian C, D and E.*

SECTION B (Knowledge about Medications Return Program)

BAHAGIAN B (Pengetahuan tentang Program Pemulangan Ubat)

Please tick |_/_| ONE box only.

Sila tanda |_/_| SATU kotak sahaja.

2. "*Program Pemulangan Ubat*" is a nationwide program.

   (Program Pemulangan Ubat ialah program seluruh negara.)

   |__| True---1
   |__| False---2
   |__| Don't know---3

3. "*Program Pemulangan Ubat*" involves both private and government pharmacies.

   (Program Pemulangan Ubat melibatkan kedua-dua farmasi kerajaan dan swasta.)

   |__| True---1
   |__| False---2
   |__| Don't know---3

4. "*Program Pemulangan Ubat*" is a service provided by the pharmacy.

   (Program Pemulangan Ubat ialah satu perkhidmatan yang disediakan oleh farmasi.)

   |__| True---1
   |__| False---2
   |__| Don't know---3

5. Through "*Program Pemulangan Ubat*", a patient can return her unused medicines to the pharmacy counter by herself.

   (Melalui Program Pemulangan Ubat, seseorang pesakit boleh memulangkan ubat yang tidak digunakan lagi ke kaunter farmasi dengan sendiri.)

   |__| True---1
   |__| False---2
   |__| Don't know---3

6. Through "*Program Pemulangan Ubat*", a nurse can return a patient's unused medicines to the pharmacy counter.

   (Melalui Program Pemulangan Ubat, seseorang jururawat boleh memulangkan ubat yang tidak digunakan lagi oleh pesakit ke kaunter farmasi.)

   |__| True---1
   |__| False---2
   |__| Don't know---3

7. Expired medicines will not be accepted when returned to pharmacy under "*Program Pemulangan Ubat*". *(Ubat yang telah luput tarikh tidak akan diterima apabila dipulangkan ke farmasi di bawah Program Pemulangan Ubat.)*	|__| True---1 |__| False---2 |__| Don't know---3
8. Under "*Program Pemulangan Ubat*", it is compulsory for an inpatient to return his unused medicines that he brought from home to the clinical pharmacist or nurse in the ward. *(Di bawah Program Pemulangan Ubat, seseorang pesakit dalam diwajibkan untuk memulangkan ubatnya yang dibawa dari rumah yang tidak digunakan lagi kepada pegawai farmasi klinikal atau jururawat di dalam wad.)*	|__| True---1 |__| False---2 |__| Don't know---3
9. "*Program Pemulangan Ubat*" is only for outpatients. *(Program Pemulangan Ubat hanyalah untuk pesakit luar sahaja.)*	|__| True---1 |__| False---2 |__| Don't know---3

SECTION C (Attitude towards the return of medicines to the pharmacy)

BAHAGIAN C (Sikap terhadap pemulangan ubat ke farmasi)

Do you agree with the following statements? Please circle ① ONE number only.

Adakah anda bersetuju dengan pernyataan berikut? Sila bulatkan ① SATU nombor sahaja.

(1=Strongly disagree, 2=Disagree, 3=No opinion, 4=Agree, 5=Strongly agree)

(1=Sangat tidak setuju, 2=Tidak setuju, 3=Tiada pendapat, 4=Setuju, 5=Sangat setuju)

	Strongly disagree	Disagree	No opinion	Agree	Strongly agree
10. Returning unused medicines to the pharmacy can prevent medication errors by the patients. *Pemulangan ubat yang tidak digunakan lagi ke farmasi dapat menghalang kesilapan pengubatan oleh pesakit-pesakit.*	1	2	3	4	5
11. Returning unused medicines to the pharmacy can ensure patients' safety. *Pemulangan ubat yang tidak digunakan lagi ke farmasi dapat menjamin keselamatan pesakit-pesakit.*	1	2	3	4	5
12. Returning unused medicines to the pharmacy can prevent misuse of medicines. *Pemulangan ubat yang tidak digunakan lagi ke farmasi dapat menghalang penggunaan ubat yang salah.*	1	2	3	4	5
13. Returning unused medicines to the pharmacy can prevent abuse of medicines. *Pemulangan ubat yang tidak digunakan lagi ke farmasi dapat menghalang penyalahgunaan ubat.*	1	2	3	4	5

14. Returning unused medicines to the pharmacy can reduce wastage of medicines. *Pemulangan ubat yang tidak digunakan lagi ke farmasi dapat mengurangkan pembaziran ubat.*	1	2	3	4	5
15. Returning unused medicines to the pharmacy can ensure proper medicines disposal. *Pemulangan ubat yang tidak digunakan lagi ke farmasi dapat menjamin pelupusan ubat yang sesuai.*	1	2	3	4	5
16. Returning unused medicines to the pharmacy can protect the environment. *Pemulangan ubat yang tidak digunakan lagi ke farmasi dapat melindungi alam sekitar.*	1	2	3	4	5
17. Returning unused medicines to the pharmacy is a good practice. *Pemulangan ubat yang tidak digunakan lagi ke farmasi adalah amalan yang baik.*	1	2	3	4	5

SECTION D (Practice about unused medicines)

BAHAGIAN D (Amalan berkaitan ubat yang tidak digunakan lagi)

Please read the following statements and choose the answer that reflects you the most. Please circle ① ONE number only.

Sila baca pernyataan-pernyataan berikut dan pilih jawapan yang paling mencerminkan diri anda. Sila bulatkan ① SATU nombor sahaja.

(1=Never, 2=Sometimes, 3=Frequently, 4=Always)

(1=Tidak pernah, 2=Kadang-kadang, 3=Kerap, 4=Sentiasa)

	Never	Sometimes	Frequently	Always
19. I advised my patients to return the unused medicines to the pharmacy. *Saya nasihatkan pesakit-pesakit saya untuk memulangkan ubat yang tidak digunakan lagi ke farmasi.*	1	2	3	4
20. I advised my patients about proper medicines disposal. *Saya nasihatkan pesakit-pesakit saya tentang pelupusan ubat yang sesuai.*	1	2	3	4
21. I advised my patients about the risk of keeping unused medicines at home. *Saya nasihatkan pesakit-pesakit saya tentang risiko menyimpan ubat yang tidak digunakan lagi di rumah.*	1	2	3	4
22. I advised my patients about the possible wastage of unused medicines at home. *Saya nasihatkan pesakit-pesakit saya tentang kemungkinan pembaziran ubat yang tidak digunakan lagi di rumah.*	1	2	3	4

23. I returned any unused medicines to the pharmacy. *Saya memulangkan apa-apa sahaja ubat yang tidak digunakan lagi ke farmasi.*	1	2	3	4
24. I disposed any unused medicines in the sink. *Saya membuang apa-apa sahaja ubat yang tidak digunakan lagi ke dalam sinki.*	1	2	3	4
25. I disposed any unused medicines in the toilet. *Saya membuang apa-apa sahaja ubat yang tidak digunakan lagi ke dalam tandas.*	1	2	3	4
26. I disposed any unused medicines in the trash bin. *Saya membuang apa-apa sahaja ubat yang tidak digunakan lagi ke dalam tong sampah.*	1	2	3	4

SECTION E (Demography)

BAHAGIAN E (Demografi)

Please tick |_/_| ONE box only or write in the box where appropriate.

Sila tanda |_/_| SATU kotak sahaja atau tulis di dalam kotak yang mana sesuai.

1. Sex
   (Jantina)
   |__| Male---1
   |__| Female---2
2. Age
   (Umur)
   |__||__|year
3. Profession
   (Pekerjaan)
   |__| Doctor---1
   |__| Nurse---2
   |__| Pharmacist---3
4. Years of service (government)
   (Tahun dalam perkhidmatan (kerajaan))
   |__||__|year |__||__|month

----------*TERIMA KASIH*----------

PARTICIPANT ID: |__||__||__

SCORING RULES FOR ANALYSIS:

Knowledge about Medications Return Program (Q2 to Q9)

Q2, Q4, Q5, Q6: Recode into “1” if answer “True”, “0” if otherwise

Q3, Q7, Q8, Q9: Recode into “1” if answer “False”, “0” if otherwise

Compute K_Score = (Q2+Q3+Q4+Q5+Q6+Q7+Q8+Q9)/8*100

Higher K_score is better knowledge.

Attitude towards the return of medicines to the pharmacy (Q10 to Q17)

For each question: score 1 if the answer is Strongly disagree, score 2 if the answer is Disagree, score 3 if the answer is No opinion, score 4 if the answer is Agree and score 5 if the answer is Strongly agree.

Compute A_score=(Q10+Q11+Q12+Q13+Q14+Q15+Q16+Q17)/40*100

Higher A_score is more positive attitude.

Practice about unused medicines (Q19 to Q26)

For each question: score 1 if the answer is Never, score 2 if the answer is Sometimes, score 3 if the answer is Frequently and score 4 if the answer is Always.

Rename Q24 INTO q24, Q25 INTO q25, Q26 INTO q26 and recode the scores as follows: 1=4; 2=3; 3=2; 4=1

Compute P_score=(Q19+Q20+Q21+Q22+Q23+q24+q25+q26)/32*100

Higher P_score is better practice.

Postpartum Pain Score and Analgesic Use in Hospital Kemaman

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Abstract

Introduction: Pain has been a major distress in postpartum women. Failure to treat pain appropriately in the early postpartum period might increase the risk of postpartum complications.
Objective: The objectives of this study were to evaluate the pain score of postpartum women at discharge and two weeks after discharge, and to identify the correlation between the pain score and the quantity of analgesic consumed.
Methods: This prospective observational study included women who had undergone child delivery at Hospital Kemaman during the period of March to August 2020. Pain score was measured using the Ministry of Health (MOH) pain scale. Information on patients' pain score and quantity of oral analgesic prescribed was collected at hospital discharge. Two weeks after the discharge, information on pain score, quantity of unused analgesics, additional analgesics used and postpartum complications was collected via phone calls.
Results: A total of 168 patients with a mean ± standard deviation (SD) age of 30.3 ± 5.3 year were involved in this study. They were all Malay with a mean ± SD parity of 2.6 ± 1.2. The majority (82.1%) of them had spontaneous vaginal deliveries. Most of the patients (53.5%) had a moderate pain score in the ward. At hospital discharge, 57.2% of them had a mild pain score. Pain had resolved in the majority of the patients (76.2 %) after two weeks of discharge, while 21.4% still experienced mild pain. There was a poor positive correlation between the pain score at discharge and the quantity of analgesics consumed after two weeks discharge ($r= -0.183$, $p<0.05$).
Conclusion: Careful assessment of pain scores among postpartum patients upon discharge was important to ensure optimal quantity of analgesics were provided to them upon discharge to prevent postpartum complications and fostering a healthy maternal-new born bonding at home.
Keywords: Postpartum pain, analgesic, pain score

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Introduction

It is common to experience pain, fatigue, and discomfort after childbirth especially during the early postpartum period (1). On the first postpartum day, 95% of women with first- and second-degree perineal tears and 75% of women who gave birth over intact perineum reported experiencing perineal pain (2). In addition, generalised body ache, breast and nipples tenderness following lactation and headache also contribute to the severity of postpartum pain in mothers. Untreated acute pain during the early days of post-delivery is associated with the development of persistent pain, greater opioid use, and postpartum depression (3). As the pain level and experience vary among individual, postpartum pain must be treated based on the severity and intensity of the pain.

Paracetamol is commonly used as the first-line pain relief in postpartum management, as well as during breastfeeding. The other preferred choices of analgesics are ibuprofen and diclofenac (4). Mothers who receive paracetamol in their early postpartum had reported adequate perineal pain relief and were less likely to require additional analgesics compared to mothers who only receive a placebo (5). On the other hand, the concurrent use of paracetamol and diclofenac sodium in post-caesarean section was shown to fasten the onset and prolong the duration of the analgesic action, thus decreasing the demand for analgesics and improved the patients' quality of life (6).

A previous pilot study done among postpartum patients after two weeks post discharge revealed that the amount of analgesics provided at discharge was inadequate (7). In Hospital Kemaman, all postpartum patients were supplied with a standard quantity of analgesic upon discharge, which are ten capsules of mefenamic acid for spontaneous vaginal delivery (SVD), and paracetamol (ten tablets) and diclofenac sodium (ten capsules) for Caesarean delivery (8). This might risk under-or overprescribing to certain patients (9). Therefore, this study was conducted to evaluate the pain score of postpartum women at discharge and two weeks after discharge, and to identify the correlation between the pain score and the quantity of analgesic consumed. It was hoped that understanding the pain scores can provide some insights to improve the prescribing of analgesic that can better tailor to individual's need. In addition, this study provided the opportunity to revise the practice of pain management for postpartum mothers in Hospital Kemaman.

Methods

This study was registered with the National Medical Research Register (NMRR) (NMRR-20-474-53232). Ethical approval was granted by the MOH Medical Research and Ethics Committee (MREC). This prospective observational study was carried out a postpartum care ward in Hospital Kemaman, Terengganu. All patients who had undergone child delivery during the period of March to August 2020 were reviewed for inclusion into the study. Patients were identified through prescription delivery notifications to the pharmacy by nurses. All consented postpartum women were included, excluding patients with limited Malay proficiency, had complicated Caesarean delivery as defined by hysterectomy, bowel or bladder injury, as well as those who needed reoperation or had an immediate wound complication, hospital stays greater than seven days following delivery and admission to an intensive care unit.

The sample size was calculated using Krejcie and Morgan's calculator (10). The average population of postpartum women at Hospital Kemaman was 280 per month. Using the table given, the recommended sample size was 162 individuals. Considering 20% of any missing data, the final calculated sample size was 195.

Patients' demographics, type of delivery, and analgesic used in the ward were gathered from the bed head ticket (BHT) and medication chart. These information was recorded into the data collection forms which comprised of three parts. Part one of the data collection form was completed during the patient's stay in the ward, while part two and three of data collection was completed at discharge and two weeks after discharge. For part one data collection, patients were interviewed 24 hours after normal delivery or 72 hours after caesarean delivery. This was in line with the standard practice at Hospital Kemaman to observe the maternal health. During the data collection, patients were asked to assess their pain score during the hospital stay and at discharge, as well as their perception about analgesics including the perceived adequacy of pain management and limiting factor in the usage of analgesic during these periods. Information about the type and quantity of oral analgesics prescribed upon discharge was also collected. Two weeks post discharge, data was collected again via phone call, including information on pain score, quantity of unused analgesics, additional analgesics used, patients' perception about analgesics and postpartum complications. Patients were considered lost to follow up if they were not reachable by telephone after three consecutive days.

The pain score was assessed using the Ministry of Health (MOH) pain scale. This is a standardised pain scale tool used in all government hospital facilities in Malaysia. This scale consisted a numerical rating scale and a visual analogue scale. The pain score was categorised into; 0 for no pain, 1–3 for mild, 4–6 for moderate, and 7–10 for severe pain (9). The questions in the data collection form were asked in Malay if the patients were confused or unable to understand English. A discussion took place before the data collection sessions to ensure standardisation in asking the questions in Malay language among the investigators.

The data was analysed using SPSS version 24. Demographic variables were presented descriptively as frequencies (n) and percentages (%) and mean ± standard deviation (SD). Paired t-test was employed to compare the mean pain score during ward stay, upon discharge, and two weeks after discharge. Pearson correlation was used to find the correlation between the pain score after discharge and the quantity of analgesics used. P-value less than 0.05 was set as statistically significant.

Results

A total number of 201 patients were enrolled in the study. However, 33 patients were unable to be reached via phone call two weeks after discharge, resulting in a final number of 168 patients. All patients included in this study were Malay (100%) with a mean ± SD age of 30.3 ± 5.3 years old. The mean duration of

hospital stay was 2.7 ± 1.2 days, while the mean parity was 2.6 ± 1.2. There were 138 (82.1%) patients who had SVD and 28 (16.7%) patients underwent caesarean section (Table 1).

Table 1: Demographic and obstetric characteristics of the patients (n=168)

Characteristics	Frequency, n (%)	Mean ± SD
Age (years)	-	30.3 ± 5.3
Race		-
Malay	168 (100)	
Duration of hospital stay (days)	-	2.7 ± 1.2
Parity	-	2.6 ± 1.2
Co Morbidities		-
Gestational Diabetes Mellitus	45 (26.8)	
Pregnancy Induced Hypertension	5 (3.0)	
Asthma	5 (3.0)	
Type of Delivery		-
Spontaneous Vaginal Delivery	138 (82.1)	
Cesarean	28 (16.7)	
Delivery with instrument	2 (1.2)	

Abbreviation: SD = Standard deviation

Half of the patients (53.6%) had a moderate pain score in the ward. During hospital discharge, the proportion of patients experiencing moderate pain decreased to 14.9% with the majority (57.1%) reporting a mild pain score. Majority of the patients (75.6 %) experienced no pain two weeks after hospital discharge, while 21.4% of them were still experiencing mild pain. Out of the five patients who reported moderate pain with a pain score of 4, three of them had Caesarean delivery (Table 2).

Table 2: Pain category at different time post-delivery (n=168)

Time of pain assessment	Pain category*	n (%)
Highest pain score in ward post delivery	No pain	0 (0.0)
	Mild	60 (35.7)
	Moderate	90 (53.6)
	Severe	18 (10.7)
Pain score at discharge	No pain	46 (27.4)
	Mild	96 (57.1)
	Moderate	25 (14.9)
	Severe	1 (0.6)
Highest pain score at home	No pain	5 (3.0)
	Mild	75 (44.6)
	Moderate	79 (47.0)
	Severe	9 (5.4)
Pain score 2 weeks post discharge	No pain	127 (75.6)
	Mild	36 (21.4)
	Moderate	5 (3.0)
	Severe	0 (0.0)

* Pain score: 0 (no pain), 1-3 (mild pain), 4-6 (moderate pain), 7-10 (severe pain)

The mean pain score at discharge was significantly lower than in ward [mean difference (MD) 2.31; 95% confidence interval (CI) 2.06, 2.56; p< 0.001]. The mean pain score two weeks post discharge also showed a significant reduction compared to pain score at discharge (MD 1.35, 95% CI 1.117, 1.573; p<0.001) (Table 3). There was a poor positive correlation between the pain score at discharge and the quantity of analgesics consumed at home (r=0.183, p<0.05) (Figure 1).

Table 3: Comparison of mean pain score reported in ward, upon discharge and at two weeks post discharge (n=168)

	Mean ± SD	Mean Difference (95% CI)	p value[a]
Highest pain score in ward post delivery	4.15 ± 1.69	2.31 (2.063, 2.556)	< 0.001
Pain score upon discharge	1.85 ± 1.54		
Pain score upon discharge	1.85 ± 1.54	1.35 (1.117, 1.573)	< 0.001
Pain score at 2 weeks post discharge	0.50 ± 1.04		

[a] paired t test was applied
Abbreviation: CI = Confident interval

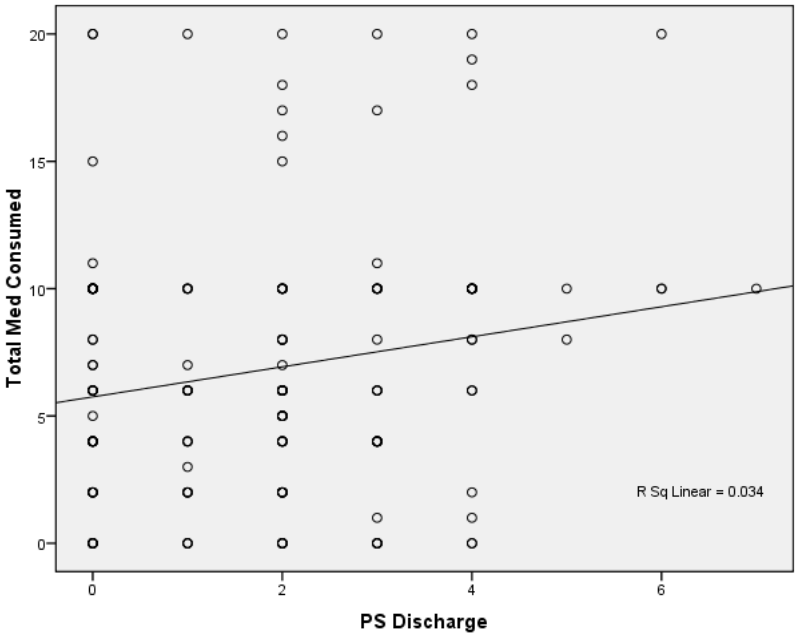

Figure 1: Plot of the relationship between the pain score during patient discharge and the number of tablets consumed

Further analysis from this study on patients' perception of dispensed analgesic quantity revealed that 65.5% of the patients felt they received an appropriate amount of analgesic upon discharge, while 20.2% believed that they were given too much medication. The mean duration of analgesics used at home was 4.3 ± 3.5 days. One of the limiting factors in the usage of analgesic was the concern about the effect of analgesics on breastfeeding and baby (15%, n=16). Among the 168 patients surveyed, only ten (6%) had to purchase additional analgesics which included seven patients who had SVD, two with Caesarean deliveries, and one with vacuum-assisted delivery (Table 4).

The most common delivery complications-related pains were breast engorgement (60.7 %) followed by uterine contraction (33.3 %), and nipple pain (21%). In addition, 17.1% and 16.9% of the patients experienced uterine cramping and haemorrhoids, respectively. Nonetheless, 25 patients (14.8%) did not develop any delivery complications and none of the patients experienced any side effects from analgesic usage (Table 4).

Table 4: Patient outcome

Patient outcome	Frequency, n (%)	Mean ± SD
Patients' perception of analgesic quantity dispensed		
Too little	24 (14.3)	
Appropriate	110 (65.5)	
Too many	34 (20.2)	
Limiting factor in using analgesic		
No pain or tolerable pain	104 (97.2)	
Worried on the effects of analgesic on breastfeeding and baby	16 (15)	
Worried on the side effects of analgesic	6 (5.6)	
Duration of analgesic use post discharge (days)		4.3 ± 3.5
Self-bought analgesic	10 (6)	
Delivery complications-related pains		
Breast engorgement	102 (60.7)	
Uterine contraction	56 (33.3)	
Nipple pain	36 (21)	
Uterine cramping	30 (17.9)	
Haemorrhoid	21 (16.1)	
Side effect	0 (0)	

Abbreviation: SD = Standard deviation

Discussion

Our study aimed to evaluate the pain scores of postpartum women and to find the correlation between the pain scores at discharge and the quantity of analgesic consumed post-discharge. Overall, the majority of patients experienced mild pain during discharge, and most of them reported receiving an adequate amount of analgesics.

According to the Fahey 2017, the proper management of childbirth-related pain entails the adequate assessment of patients' complaints of pain during the postpartum period and the timely identification of postpartum complications. Thus, it requires assessing the quality, location, intensity, onset and duration of pain as well as the aggravating and alleviating factors (11). Hence, the gaps in the common practices in our hospital setting need to be identified and proper action must be planned to improve postpartum pain management.

In this study, all patients were regularly administered analgesics in the ward and pain score was improved during discharge. This was similar to a previous study which found that patients who receive analgesics in the early postpartum had adequate perineal pain relief and were less likely to require additional analgesic (5). Bateman et al. (2017) concluded that most patients experienced reduction in pain after child birth where they had moderate pain at discharge but improved to mild pain in the second week after delivery (12). In a similar trend, majority of the patients in this study had mild pain score in the ward but then experienced no pain at all after two weeks. Difference in population selection might influence the pain reduction as the majority of our patients had SVD compared to the previous study.

In a review study by Vermelis et al., they found that the prevalence rate of chronic pain after caesarean delivery was between 6-18% (13). In this study, 75.6% patients including patient with normal delivery and caesarean experienced no pain followed by mild pain (21.4%) and moderate pain (3%) after two weeks of delivery. The number of parities was also related to pain tolerence in postpartum patients which might influence the pain assessment as both pain and previous delivery experiences were considered one of the modulators of the pain threshold (14). No patient reported experiencing severe pain in our study. In terms of complications, it was common to have painful perineum, uterus cramping, and breast engorgement during confinement (15-17). In this study, majority of our patients reported having breast engorgement. The breast pain related to engorgement can occur in women who are not lactating including women who have suffered perinatal loss. Hence, timely management of this pain as well as patient education on strategies to decrease and eventually stop milk production is essential. The pain relief agents that can be offered to these women to manage the discomfort are paracetamol or ibuprofen (11). The same analgesic agents were considered safe for use in lactation as they achieve very low milk levels and have not been linked to the harm of infants due to high protein binding (18-20).

The second highest reported complication related to the delivery was uterine contraction, which might be due to the breast-feeding mother who are more likely to have stronger uterine contractions in the postpartum period due to the endogenous oxytocin release of lactation (14). A Cochrane review and meta-analysis that included nine studies and 750 women suggested that NSAIDs are more effective than

paracetamol in the management of pain from normal uterine involution (21). Since pain score recorded during discharge might not reflect the intensity of pain due to the late onset of some complications, accurate pain assessment is essential since it helps healthcare providers to make a correct intervention, prescribe appropriate medications and reduce complications.

Standard analgesic regimen in Hospital Kemaman might be unable to adequately address pain for some patients that need extra pain management as pain threshold, pain predictors, genetic and other demographic factors varied from person to person. There were some limitations of this study. First, it was conducted in a limited number of patients that might not represent the population. Secondly, an unbalance number of patients having Caesarean section delivery and SVD might influence the findings. Thirdly, other confounder that might influence the pain severity were not explored in this study.

Conclusion

The majority of the patients in Hospital Kemaman had moderate pain score during their hospital stay, and the pain resolved two weeks after discharge. Careful assessment of pain scores among postpartum patients before discharging the patients is important to ensure that appropriate analgesics in optimal quantity were dispensed.

Acknowledgement

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Conflict of Interest Statement

No external funding was received and the authors declared no conflict of interest.

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