Journal of Pharmacy

ORIGINAL ARTICLE

Open Access

Physicians' Perception on Prescribing Potentially Inappropriate Medications for Older Patients: A Qualitative Study from Malaysia

Umairah Mohd Roslan[1], Syahrir Zaini[1,2], Muhammad Eid Akkawi[1,3]*

ARTICLE HISTORY:

Received: 22 November 2023
Accepted: 26 January 2024
Published: 31 January 2024

KEYWORDS:

potentially inappropriate medication (PIM); older adults; qualitative research; Malaysia

HOW TO CITE THIS ARTICLE:

Umairah Mohd Roslan, Syahrir Zaini, Muhammad Eid Akkawi (2024). Physicians' Perception on Prescribing Potentially Inappropriate Medications for Older Patients: A Qualitative Study from Malaysia. *Journal of Pharmacy,* 4(1), 92-102.

doi: 10.31436/jop.v4i1.261

ABSTRACT

Introduction: Many quantitative studies reported that potentially inappropriate medication (PIM) is quite prevalent among older adult patients. However, the issue is less explored qualitatively from the perspective of physicians. **Objective:** To qualitatively explore hospital physicians' perception regarding PIMs, associated factors and the possible interventions to control this phenomenon. **Method:** A qualitative study using individual semi-structured and in-depth interview research method was constructed on 15 physicians serving in a Malaysian hospital. The purposive sampling technique was used at the beginning followed by the snowball sampling process. **Results:** It was found that the physicians have inadequate knowledge about PIM and the published PIM criteria . Several factors were perceived as barriers of appropriate prescribing. Firstly, physicians' lack of knowledge and training in geriatric medicine as well as lack of time. Secondly, some of the physicians were skeptical about the applicability of PIM criteria in daily practice due to limited alternative medications. Lastly, complexity of the cases due to multimorbidity, polypharmacy and patient's poor knowledge about their medications. The proposed interventions to optimize prescribing for older patients were education (for patients and physicians), optimization of healthcare workforce and activation of deprescribing. **Conclusions:** Prescribing for older patients is a complex process that is affected by numerous patient-related and doctor-related factors. Improvement strategies should target the patient, physicians and the work environment activating a joined-up working between the physician and other healthcare providers.

***Corresponding author:**

email: mhdeidak@gmail.com; mhdeidak@iium.edu.my
Address: Jalan Sultan Ahmad Shah, Indera Mahkota, 25200, Kuantan, Pahang, Malaysia.

Authors' Affiliation:

[1]*Department of Pharmacy Practice, Faculty of Pharmacy, International Islamic University Malaysia (IIUM), Kuantan 25150, Malaysia.*
[2] *Qualitative Research Group, Faculty of Pharmacy, International Islamic University Malaysia (IIUM), Kuantan 25150, Malaysia.*
[3]*Quality Use of Medicines Research Group, Faculty of Pharmacy, International Islamic University Malaysia (IIUM), Kuantan 25150, Malaysia.*

JOP

Introduction

Older adults' population is keep increasing worldwide including Malaysia. The percentage of older adults was expected to increase from 5% in 2010 to 14.5% by 2040 in Malaysia (Department of Statistics, 2016). Increasing age is usually associated with multimorbidity which requires the use of multiple medications (polypharmacy) to control the conditions. Multimorbidity, polypharmacy and age-related physiological and pathological changes affect the pharmacokinetics and pharmacodynamics of the medications leading to a higher incidence of adverse drug reactions (ADR), drug-drug interactions, drug-disease interactions and drug-related hospitalization (DRH) compared with younger populations (O'Connor et al., 2012). On top of that, older adults are usually excluded from clinical trials which led to the absence of solid evidence about the efficacy and safety of medications in this population. Consequently, medications approved based on efficacy studies that ruled out older patients are unlikely to suit these patients in daily practice (Beers et al., 2014). All of the above make prescribing medications for older patients quite challenging for physicians. Therefore, experts in the field of geriatric pharmacotherapy developed tools to identify medications that should be avoided in older patients which called potentially inappropriate medications (PIM). PIMs are group of medications that carry more risks than benefits when used in older people as there are safer and effective alternatives (O'Connor et al., 2012). The most commonly used generic lists are Beers criteria (Fick et al., 2019) and STOPP (Screening Tool of Older Person's Prescriptions) criteria (O'Mahony et al., 2015). So far, there is a plethora of published studies linked the use of PIM in older people with several negative health outcomes including ADR, DRH, reduced quality of life and increase healthcare expenses (Xing et al., 2019). Because of that, inappropriate prescribing in older people is getting more attention as it is highly prevalent in different healthcare settings. A recent systematic review from central and eastern Europe reported a median prevalence of 34.6% with a wide range of 6.5–95.8% based on the study setting and the used tool (Brkic et al., 2022). Another systematic review estimated the pooled prevalence of PIM to be 47% (Mekonnen et al., 2021). The prevalence in Malaysia was found also to be similar to these results. Two studies from Pahang state reported a prevalence of PIM among hospitalized patients of 55.3% using Beers criteria (Chee Teng et al., 2020) and 27% based on the STOPP criteria (Akkawi & Mohamed, 2018).

Many studies investigated the factors associated with prescribing PIMs and the barriers to medications optimization for older patients. They identified several patient-related (such as polypharmacy, multimorbidity and inadequate knowledge) and prescriber-related (such lack of knowledge and time, clinical inertia and poor communication with other healthcare providers [HCP]) factors (Xu et al., 2021). Although the majority of these studies quantitatively investigated the prevalence of PIM and associated factors, there are a few studies that assessed this issue qualitatively from the patient's, physician's and nurse's perspectives (Cullinan et al., 2014; Xu et al., 2021). However, most of the published qualitative trails focused on a specific drug class (e.g., benzodiazepines or antidepressants) or on older patients with a particular disease (e.g., dementia). Additionally, almost all of those studies were conducted in primary care settings involving general practitioners (GPs). Available studies from Malaysia are only quantitative focusing on the prevalence and pattern of PIMs with no data available about the prescribers' points of view regarding this phenomenon (Chang et al., 2021). While it is important to identify the prevalence, causes and consequences of prescribing PIM among geriatric patients in Malaysian hospitals, we believe that hearing openly from physicians about their perception of PIM is pivotal to planning for strategic interventions to reduce PIM prescribing in Malaysian hospitals. To the best of the authors' knowledge, there is no qualitative study investigated the issue of appropriate prescribing in older patients neither in Malaysia. The objective of this study is to qualitatively explore the perception of physicians serving in a Malaysian hospital regarding PIMs and the associated factors as well as the possible interventions to control this phenomenon.

Methods

Study Design and Sampling Strategy

This qualitative study was conducted among physicians serving in a teaching hospital in Pahang, the largest state of Peninsular Malaysia. The purposive sampling technique was used at the beginning followed by the snowball sampling process. The physicians were recruited from internal Medicine, cardiology as well as ear, nose and throat (ENT) departments. These three departments were chosen because the physicians in these departments deal with most of the older adult patients in the hospital. All the physicians are serving in the outpatient specialist clinics and in the general medical wards. The physicians were approached during their break time at clinics and an appointment was made if the physician was willing to participate in this study. Six physicians declined to participate in the study due to their packed work schedule. Along with verbal explanation, participant information sheet (PIS) was given to the participants detailing the objectives of the research and the methodology. The interviews were conducted at the participants' workplace in a separated calm room. Each participant received honorarium of 150 Ringgit Malaysia after the end of the interview.

Data Collection

Semi-structured individual face-to-face interviews were performed by a female pharmacist researcher (UMR). The researcher received an intense training on conducting qualitative interviews by an expert in this field. The interview protocol was developed based on previous qualitative and quantitative studies. Then, SZ and MEA (Pharmacy PhD holders) were involved in checking the feasibility of the interview protocol content. It was designed to cover three aspects related to medication prescribing for older patients, namely: physicians' knowledge and perception about prescribing for older patients; factors associated with PIM; the proposed interventions to reduce PIM. The phenomenological approach was also implemented in the data collection which involves an interactive interview with a range of people to elicit a detailed personal description of a phenomenon's lived experience from a small number of individuals who have experienced it. Before the interview, the interviewer explained again about the goals of the study and the structure of the interview. The interview protocol was started with broad predefined, mainly open-ended, questions (table 1). Based on the answers given by the participants, further questions were arisen spontaneously in a free-flowing conversation allowing for in-depth interview related to the aspects of interest. That was the reason for choosing semi-structured interviews for data collection as it is a flexible method for both interviewer and interviewees (McIntosh & Morse, 2015). The interviews were conducted fully in English language with an average duration of 40-60 minutes per session. Every session was recorded using a phone recorder application and notes were taken on paper during the interviews for data transcription purposes. Data collection was started in October and completed once reaching the data saturation point in December 2022.

Data Analysis

After each interview, the audio data was labelled and pseudo-anonymized to protect the privacy of the participants and the confidentiality of the study. Then, the raw audio data was transcribed verbatim using the 'transcribe' feature on Microsoft Word® 365 software. The transcription included using different languages, slang, and pronunciation errors except for the grammar because all of the participants were note English native speakers, therefore their grammar may not be too accurate. Also, small details such as brief space out or intonation changes were excluded depending on the theme of the discussion with the respondents (Clyne et al., 2016). Besides, the re-checking process was done to ensure all of the audio data have been transcribed accurately before the data analysis process. The transcripts were given back to the participants for comments or corrections. No correction/comment was received back from them. Data were sorted by UMR and MEA into small sections based on the contents summarization or impression, and they were coded to create key themes and subthemes as well as a storyline so that it will help to understand and relate more to the research questions. A deductive coding approach was used whereby the data is tested whether it is consistent with the prior assumptions, theories and hypotheses. The theories begin from significant themes, topics, or models which emerge from raw data through repeated analyzation and comparison. After organizing the pre-defined codes into a set, NVivo software was used to assist with organizing the data for analysis. By using this software, it ensures the data can be coded efficiently and also the sources are kept together so that it will be easier to be retrieved for further analysis (Zamawe, 2015). Data collection was discontinued once reaching the data saturation points where no new information appeared. Data saturation started to appear after analysing the data obtained from interviewing the 13th participant. Two additional physicians were interviewed to make sure that no new response will be given. Consolidated criteria for Reporting Qualitative research (COREQ) checklist (Tong et al., 2007) was used to validate this qualitative research ensuring that all criteria were fulfilled. (appendix)

Results

Out of the 21 physicians approached, 15 of them (5 female and 10 male) agreed to participate in the study. There were six consultants/specialists (3 from ENT; 1 from cardiology; 1 from the medical), five medical officers (MO) (2 from cardiology, 3 from medical) and four registrars (all from medical) who are senior MO on their journey to pursue as a specialist. After coding the data, ten integrated subthemes were emerged. They were arranged under the predefined themes (Table 2).

Physicians' perception and knowledge about PIM

All of the 15 participants reported that they are not familiar with the term potentially inappropriate medication (PIM) specifically or directly. Also, they have never heard of the published special criteria for prescribing in older adults such as STOPP criteria or Beers criteria. They have never encountered any of those criteria during study or throughout their profession as a physician. However, most of them do know the general understanding of inappropriate medication and were aware of some medications that should be avoided or should be given with caution to older adult patients.

> *"Based on my understanding... potentially inappropriate medication. Some kind of medication that we give to patient that might cause more harm to the patient. Maybe in terms of the side effect, the incorrect indication." (Dr. Af., MO4)*

> *"Based on my initial impression, basically I think it is*

about certain medication that should not be prescribed to the old patient in certain aspects or certain areas or in regards to certain dosing or maybe in underlying disease in certain locations." (Dr. Mu., Registrar 3).

On the other hand, we found that some of the physicians does not differentiate between PIM and drug related problems.

"For me, in appropriate medication. Number one. We give the wrong medication to the patient. They may not be based on the correct diagnosis. Number 2, the wrong route of administration. So maybe we change from oral to IV. Next is the dose dosage right? Maybe wrong dosage right? So, it should be also inappropriate and then the timing and frequency. Maybe some medication is required at certain particular time and then we give different time or supposedly, four times we give two times so. That would be also inappropriate." (Prof M., Consultant 2)

With further discussion, some of the physicians were able to give example of medications that should be used with cautions in older adults.

"Not enough knowledge. For example. Prescribing excessive sedation or usually we like to use alprazolam but in geriatric patients, they tend to be very sensitive to that. So, you know, they will have more sedative effect compared to other population group" (Dr. Ad., MO3)

"Of course, the first in my opinion is actually the painkillers. Because I see a lot of side effects from the painkillers in my patient, they are geriatric patient, so they are fragile. They are renal impairment patients, so they will develop side effects from all those painkillers whether the peptic ulcers or even the worsening of renal functions. That's the most common… because actually if you ask the geriatric patient the main problem is actually pain. I think we need to be careful in selecting the most less side effect painkillers for the patient." (Dr. S, MO 1)

Most of the physicians did not see PIM as a big issue during their practice. This is because they follow the guidelines, they are experienced staff and they have never encountered, any serious side effects or hospitalization related to PIM prescribing.

"OK, to be honest, I think it's not. It's not common. It's not common here. First, probably because here we have, we have specialists and medical officers. We don't have houseman officers (junior doctors)" (Dr. H., R1)

"Not so sure actually but I think no (not a big issue) because we already follow all the guidelines, discussion, experiences and judgement. So inshaAllah (hopefully) so far, not really I think. (Dr. N., Specialist 2).

Causes of PIM prescribing

Patient-related factors: Complexity of the cases

Most of the participants see older patients as complicated cases due to their comorbidities and being treated by multiple doctors in different healthcare settings. This will make it difficult to trace patient's current diseases and medications especially that most of the older adults having inadequate knowledge about their medical history.

"Right now, we are tracing (medication) based on the patient appointment book. If patient bring the book or the medication itself, then we will know the medications of the patient but if the patient didn't bring the medications or book, it will be difficult for us as well. So, when the patient didn't bring the book, we might give the same medication twice or double the dose maybe." (Dr. Af, MO 4).

"Polypharmacy can lead to PIM. Because sometimes they took from 2 centers then might overlap and sometimes double the doses. Or maybe different types of drugs for the same indication. So that can cause harm to the patient now." (Dr. Ab, Registrar 2).

Physician-related factors

Lack of knowledge and training in geriatric medicine

Participants referred to the lack of knowledge about diseases, medications and special precautions for older adults as a key factor for prescribing PIM. This was confirmed by other participants who admitted of having inadequate knowledge about geriatric medicine/pharmacotherapy and that they treat elderly patients as any other adult patients, i.e., they standardize the treatment for all patients as they do not have any contraindication to the prescribed medication.

"For us, we don't really have any specific training for geriatrics like what kind of special attention that they need? Because we tend to treat everyone as the same standard. So, we're not really giving specific care about the geriatrics. Really, we treat everyone standardly." (Dr. Ad, MO 3)

"One thing for me, one thing is actually the education itself, (because) not all of us are exposed to many geriatric patients. It's more to experience and practice, I think." (Dr. S, MO 1)

"OK. Number one maybe lack of knowledge of the disease of the elderly. Number 2 maybe some of them cannot differentiate between elderly and non-elderly. So maybe they just standardize all the prescription to

the either elderly or non-elderly. Number 3 maybe because certain condition maybe they are not really familiar of certain diagnosis. And then they mix up elderly and non-elderly management." (Prof. M, Consultant 4)

Almost all of the interviewees have limited understanding about the job scope of geriatrician despite knowing the existence of geriatric medicine in Malaysia. On top of that, some of them were not aware whether there is a geriatrician in the hospital or not. Additionally, the participants do admit that geriatric training is still lacking among physicians because of the lack of exposure to this field in Malaysia.

"If we talk about geriatric population, I don't think we have a lot of exposure here because we don't have geriatric consultant yet. We will receive one maybe next year. So, we are not properly guided to manage geriatric patients. We just managed them as in general population." (Dr. F, MO 2)

Following the previous question, medical officers were asked about their interest of being specialist in geriatric medicine. They were reluctant because they considered it as a relatively new subspecialty in Malaysia and also because dealing with older patients require extra patience and passion.

"To deal with geriatric, you need to love the geriatric population. Not all can handle the geriatric population where we need someone who able to understand them, love them and happy to take care of them. I think because all the physicians have the same knowledge about managing but geriatric specialist physician have deeper understanding and deeper knowledge and passion towards managing the population, yeah." (Dr. F, MO 2)

Lack of time

Several physicians raised an issue of staff shortage - especially in the wards- which leads to lack of time allocated for each patient.

"Factors can include lack of time because of the business of the ward round and now here (outpatient clinic), we already have lot of patients. So yeah, perhaps that's the part of the contributing factors to cause.." (Dr. H, Registrar 1)

The applicability of the geriatric specific criteria

Some of the interviewees were skeptical about the applicability of these criteria in practice. According to them, this is mainly because of the limited number of drugs available as alternative to the medications to be avoided. Therefore, they sometimes see that prescribing PIM is unavoidable.

"Yeah, so what's the point? You ban everything but you don't get alternative in which patient need that type of group of medications. And the alternatives must be the same price or cheaper. Because the geriatric populations is increasing in numbers. So, if the price is expensive, it will cause more burden to us actually so cost is something that we have to bear in mind because we are under subsidised system." (Dr. AZ Consultant 2)

"Sometimes it's difficult to find alternative. The medication is not available in the hospital. Patients have to buy outside. Sometimes the alternative is quite expensive" (Dr. Ad MO3)

Interventions to enhance appropriate prescribing

Participants were asked about the possible interventions that could be taken in order to reduce prescribing PIM in general and specifically in this hospital. The answers can be summarized in three subthemes: Education, optimization of healthcare workforce and activation deprescribing.

Education and effective communication

As patient's ignorance was reported as one of the factors for PIM prescribing, the interviewees emphasized on educating the patients about their diseases/medications and the effective communication with the physicians and other healthcare professionals.

"Normally educated patient they also want to know their medication. So, they know this medication is for what? What are the side effect right? How to take them right? For the elderly, some are also really educated, so no problem. The one that I think we need to give counselling or education is those who are not really educated. Or maybe they not really concern about the medication." (Prof. M, Consultant 4)

"I think communication with the patient is the key. Emphasizing enough to the patient and relatives regarding their diseases, why do they need to take the medication. The importance of compliance and stuff like that to ensure that if the patient polypharmacy they know how to take correctly because some medication have specific way to take it." (Dr. Ab, Registrar 2)

Education issue is also extended to the physicians who believed that they did not get enough education and training about geriatric pharmacotherapy.

"Yeah, it's important for us physician to at least get the list of high-risk medications, so that we are more careful to prevent the side effects." (Dr. H, Registrar 1)

Optimization of healthcare workforce

This includes increasing the number of physicians and

having a joined-up working approach. All of the participants agreed that discussion the patient's case with other specialists, pharmacists and healthcare providers is a top-tier approach to result in the best health outcomes for the older adult patients. Despite understanding the significance of the joined-up working, most of them commented that discussions with pharmacists are done only for certain cases which might include dose adjustment for renal patients.

> *"So, we did consult with the pharmacist who joined the round, but here (outpatient clinic) we don't have yet a clinical pharmacist, but sometimes if we are not sure, we will consult the pharmacist, but most of the cases the pharmacy department call us if they have any concern about the prescription…So I think that's very important for discussing with the other teams, especially the pharmacist or consultant." (Dr. H)*

Activation of Deprescribing

The interviewees believe that deprescribing unnecessary drugs does contribute to a more appropriate prescribing for older patients.

> *"Yeah, I mean sometimes maybe the patient is indicated for that medication, but then because of the side effects, we need to stop. Whatever causing harm to patient and risk outweigh benefit, we need to stop. I think that's the way we go about it. It's a bit difficult. That's why we always have to weigh benefit and the risk of all of the medication. If you think it's more risk, then that's it." (Dr. S, MO 1)*

However, the process is quite challenging because most of older adult patients come with comorbidities and being treated in different medical centres (fragmentation of care). In addition, the cost and limited options of medications in certain facilities stave off the process, therefore, some patients might still be prescribed despite the unsuitability of the drugs.

> *"If we actually detect that early then yes, definitely there's benefit. But again, like you said, if patient need that medication, do you have any alternatives or not? what are the alternative that has better or at least similar effect? We shouldn't go downgrade right? By right (they should have) the same or better effect. But again, we have to choose between risk and benefit. Again, is there any alternative that can be given or not? You can ban everything, but if you are not giving alternative then how we can treat patients." (Prof. A, Consultant 2).*

Another obstacle for activation of deprescribing is the absence of local guidelines for deprescribing which makes the decision of deprescribing solely based on the physician's knowledge and judgment.

Discussion

The interviews showed a lack of understanding of PIM concept among the physicians and unawareness of existence of special criteria for prescribing in older adults. This finding was not unexpected because previous study on 82 physicians from other two hospitals in Pahang portrayed that 60% of them never heard of those criteria and only 7.3% had ever used such criteria in practice (Akkawi & Nik Mohamed, 2018). Other qualitative studies from other countries reported similar findings about the limited knowledge of physicians on PIM and published PIM criteria (Anderson et al., 2014; Voigt et al., 2016). This result is directly correlated to the fact that there is a lack of education and training related to geriatric medicine for undergraduate and postgraduate physicians. This issue is perceived by our participants as one of the factors contributing to prescribing PIMs. Data from 2018 depicted that out of 34 registered institutions under the Ministry of High Education Malaysia, only five of them included geriatric medicine as part of the undergraduate curriculum which resulted in a very low number of geriatricians around Malaysia (Tan et al., 2018). Another qualitative study has also found that lack of specific education and training of the physicians was a barrier to appropriate prescribing for older patients (Cullinan et al., 2015). All participants were open for any recommendations from the pharmacists about prescribing for older adults. Additionally, they were keen to know the list of medications to be avoided because they believe that this would be useful in their daily practice. This finding contradicts what has been reported in another qualitative study where the general practitioners (GPs) were skeptical about the usefulness of the PIM criteria in the real world as they are designed based on a controlled research environment. Most of the participants in that study think that altering a medication is worse than continuing a PIM which led physicians to find that those criteria may not be useful in the daily practice (Clyne et al., 2016). Another doctor-related barrier to appropriate prescribing was the lack of time. The physicians complained about the increasing number of patients -including older patients- in both inpatient and outpatient settings with no change in the number of the involved physicians. This issue increases the workload and shortens the time allocated for each patient, especially as there are no houseman officers (junior doctors) available in this hospital. Voigt et al in their study also showed that lack of time during consultation at practices was mentioned by most of family physicians as a barrier of appropriate prescribing (Voigt et al., 2016). Furthermore, a systematic review also reported low number of staff, heavy work burden and lack of time as reasons of inappropriate treatment of older adults (Lundby et al., 2019).

Another perceived cause of prescribing PIM by our participants was impracticality of the PIM criteria in some cases due to limited available options for the treatment.

They mentioned that the recommendations and proposed alternatives are based on studies conducted mainly in the western world which might not be applicable in Malaysia. The physicians did admit that the medication may not be perfectly suitable for the patient but the limitation of medications choices in certain facilities -especially in rural areas- hinder the chance of providing a better choice to them. This finding is supported by a German study where family practitioners revealed that prescribing PIM is sometimes unavoidable because of having no alternative especially in patients with multiple comorbidities (Voigt et al., 2016).

Complexity of the geriatric cases was reported by all participants as a substantial contributor towards inappropriate prescribing. Polypharmacy, multiple comorbidities and patient's ignorance were perceived as factors contributing to the complexity of the cases. All of these factors were identified as barriers of appropriate prescribing in other qualitative studies (Anderson et al., 2014; Clyne et al., 2016). The number of prescribers involved in the treatment was reported in the literature as a predictor of PIM prescribing (Holmes et al., 2013). In tandem with that, our participants refer to inability to do medication reconciliation as a main barrier to appropriate prescribing. This problem was attributed to having multiple prescribers in different centers (fragmentation of care) and patient's ignorance about their medical history. Patients are referred from secondary and tertiary care facilities to the hospital due to certain conditions. The problem is that most of the healthcare facilities in Malaysia including Ministry of Health (MOH) settings have not implemented any electronic system to record their patients' medical histories. All of the participants mentioned that they usually try to trace back as much as they can, especially if the medication can put the patients at a dangerous risk such as warfarin. However, if the medications still cannot be retrieved, this will cause errors and PIM which can be due to double dose or drug-drug interaction.

To reduce inappropriate prescribing in older adults, the interviewed physicians agreed on several interventions. First and foremost was enhancing physicians' knowledge and offering training related to geriatric pharmacotherapy. Some of the participants suggested that familiarization of medications and treatment, continuous self-practice and revision are paramount to a better prescribing outcome for older adult patients. A previous study concluded that awareness-raising strategies helped to improve the poor insight of prescribers regarding prescribing PIM. It was also suggested that greater attention from healthcare professionals is needed whereby familiarization themselves with evidence of PIM criteria and thorough medication review of PIM can prevent unnecessary harm associated with polypharmacy (Abdulah et al., 2018). Likewise, educational interventions for healthcare professionals regarding appropriate prescribing were effective in reducing PIM prescribing (Rodrigues et al., 2022). Similar promising results were reported from Malaysia as well (Akkawi et al., 2020). In order to cover the shortage in the field of geriatric medicine in Malaysia, the MOH Malaysia continuously fund fellowships for geriatric training every year which has led to an increasing number of geriatricians from only 14 in 2014 to 39 in 2018. However, the numbers are still insufficient compared to the current aging population now (Tan et al., 2018).

The second proposed intervention was optimization of the workforce by providing more staff and activating the joined-up working environment. Although all the participants agreed that sharing decisions with pharmacists would reduce PIM, the majority of them revealed that their discussion with the pharmacists take place only for certain conditions like dose adjustment in patients with renal impairment. Therefore, they believe that having a clinical pharmacist in each unit may help them optimizing prescriptions for older patients. The positive impact of pharmacist in reducing PIM in older patients in hospital settings is well established in the literature (Alosaimy et al., 2019; Ammerman et al., 2019). Nevertheless, the implementation of this strategy in the wards is laborious (Alosaimy et al., 2019).

Enhancing the physicians' knowledge and exposure to geriatric medicine and involving a pharmacist in the treatment decisions would pave the road for a seamless deprescribing process. Deprescribing of unnecessary medications was referred by the participants as an essential approach to reduce PIM and enhance patients' clinical outcomes. It was found that providing deprescribing guidelines can help physicians to identify the appropriate medications and thus preventing ADEs and in older patients (Lundby et al., 2019; Schuling et al., 2012).

Last but not least, patient's education and effective communication with the prescribers was repeatedly mentioned by the interviewees as a key factor for appropriate prescribing. Engaging older patients in making decision regarding their treatment is limited -in top of other factors- by the poor knowledge of this group about their diseases and medications (Clyne et al., 2016). Based on that, enhancing patient's medical knowledge and communication would contribute to appropriate prescribing. For example, discussing the negative effects of long-term use of benzodiazepines for older patients led to a significant reduction in the use of this class of medication. (Tannenbaum et al., 2014). Effective communication with the patients was also considered as an essential factor for appropriate prescribing. Paternalistic doctor-patient relationship was reported in several qualitative studies as a barrier to appropriate prescribing (Clyne et al., 2016; Spinewine et al., 2005). Whitin this relationship, the patient just follows -without any discussion- what the physician prescribes who is viewed as an authority figure (a parent)

that makes decisions for the best patient's interest.

Recently, a group of Malaysian researchers developed the Malaysian potentially inappropriate prescribing screening tool (MALPIP) to be used while prescribing for older adults in the Malaysian healthcare settings (Chang et al., 2023). The findings of the current study could help policy makers on the implementation of that tool in daily practice. For instance, as lack of time was reported as one of the barriers towards appropriate prescribing, MALPIP can be converted to a clinical decision support software (CDSS) and connected to the hospital prescribing system. The CDSS will alert the prescriber when detecting any PIM based on the patient's information and proposed prescription. CDSS was reported to be effective in improving medication appropriateness and in reducing the incidence of nontrivial ADRs in the intervention group compared with the control group (O'Sullivan et al., 2016).

The current study has some limitations. First, the snowball technique of sampling may lead to a biased sample composition bias as participants invite colleagues who usually share common thoughts and background. Second, the study was conducted in one hospital only and did not use random sampling which may limit the generalizability of its findings. Having said that, the sample involved in this study was diverse in terms of specialty and level of experience. Additionally, data collection was halted after reaching saturation point.

Conclusions

The in-depth interview with the hospital physicians found that they have inadequate knowledge about PIM and the related published criteria. Several factors were perceived as barriers of appropriate prescribing. Doctor-related factors included lack of knowledge and training in geriatric medicine/pharmacotherapy as well as lack of time due to low number of staff and compared with the high number of patients encountered every day. Some of the physicians were skeptical about the applicability of PIM criteria in daily practice due to limited options of the available medications. Patient-related factors were summarized by the theme of complexity of the cases which is attributed to the presence of multimorbidity, having polypharmacy and patient's poor knowledge about their medications. The proposed interventions to optimize prescribing for older patients were patient's education as well as encouraging effective communications with the physicians, optimization of healthcare workforce and activation of deprescribing. This study not only reveals the existing challenges but also provides a roadmap for targeted interventions that can lead to improved prescribing practices for older patients in Malaysia. The significance of these findings impacts public health outcomes and contributing to the ongoing discourse on geriatric pharmacotherapy in the region. As we move forward, it is imperative to consider these insights in the development of policies and practices that prioritize the well-being of older adults in healthcare settings.

Ethical Considerations

Ethical approval was obtained from the IIUM Research Committee (IREC 2022-130) and from the research unit of the hospital (IIR 22-37) before conducting the study. A consent form was collected from each participant before proceeding with the interview.

Funding

This study was funded by the research management centre grant, International Islamic University, Malaysia (RMCG20-048-0048).

Acknowledgment

The authors would like to thank the physicians who agreed to participate in the study. Also, we extend our thanks to Mr. Mohamad Mokhsen and Mr. Chee Zen Wei who helped in approaching the participants.

Disclosure of interest

The authors declare no conflict of interest related to this work. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Author Contributions

Conceptualization: M.E.A., S.Z. Methodology: M.E.A., S.Z., U.M.R. Formal analysis: U.M.R., M.E.A. Writing original draft: U.M.R. Writing review & editing: M.E.A., S.Z., U.M.R.

References

Abdulah, R., Insani, W. N., Destiani, D. P., Rohmaniasari, N., Mohenathas, N. D., & Barliana, M. I. (2018). Polypharmacy leads to increased prevalence of potentially inappropriate medication in the indonesian geriatric population visiting primary care facilities. *Therapeutics and Clinical Risk Management*, *14*, 1591–1597. https://doi.org/10.2147/TCRM.S170475

Akkawi, M. E., Haniki, M., Mohamed, N., Aznan, M., & Aris, M. (2020). The impact of a multifaceted intervention to reduce potentially inappropriate prescribing among discharged older adults: a before-and-after study. *Journal of Pharmaceutical Policy and Practice 2020 13:1*, *13*, 1–11. https://doi.org/10.1186/s40545-020-00236-0

Akkawi, M. E., & Mohamed, M. H. N. (2018). Influence of hospitalization on potentially inappropriate prescribing among elderly patients in a Malaysian community. *Tropical Journal of Pharmaceutical Research January*, *17*(1), 151–160.

Akkawi, M. E., & Nik Mohamed, M. H. (2018). Are physicians and clinical pharmacists aware and knowledgeable enough about inappropriate prescribing for elderly patients? Findings from Malaysia. *European Journal of Hospital Pharmacy* , *25*(e1), E29–E34. https://doi.org/10.1136/ejhpharm-2017-001391

Alosaimy, S., Vaidya, A., Day, K., & Stern, G. (2019). Effect of a Pharmacist-Driven Medication Management Intervention Among Older Adults in an Inpatient Setting. *Drugs & Aging 2019 36:4*, *36*(4), 371–378. https://doi.org/10.1007/S40266-018-00634-9

Ammerman, C. A., Simpkins, B. A., Warman, N., & Downs, T. N. (2019). Potentially Inappropriate Medications in Older Adults: Deprescribing with a Clinical Pharmacist. *Journal of the American Geriatrics Society*, *67*(1), 115–118. https://doi.org/10.1111/JGS.15623

Anderson, K., Stowasser, D., Freeman, C., & Scott, I. (2014). Prescriber barriers and enablers to minimising potentially inappropriate medications in adults: A systematic review and thematic synthesis. *BMJ Open*, *4*(12), e006544. https://doi.org/10.1136/bmjopen-2014-006544

Beers, E., Moerkerken, D. C., Leufkens, H. G. M., Egberts, T. C. G., & Jansen, P. A. F. (2014). Participation of Older People in Preauthorization Trials of Recently Approved Medicines. *Journal of the American Geriatrics Society*, *62*(10), 1883–1890. https://doi.org/10.1111/JGS.13067

Brkic, J., Fialova, D., Okuyan, B., Kummer, I., Sesto, S., Capiau, A., Hadziabdic, M. O., Tachkov, K., & Bobrova, V. (2022). Prevalence of potentially inappropriate prescribing in older adults in Central and Eastern Europe: a systematic review and synthesis without meta-analysis. *Scientific Reports*, *12*(1). https://doi.org/10.1038/s41598-022-19860-8

Chang, C. T., Ang, J. Y., Islam, M. A., Chan, H. K., Cheah, W. K., & Gan, S. H. (2021). Prevalence of drug-related problems and complementary and alternative medicine use in Malaysia: A systematic review and meta-analysis of 37,249 older adults. *Pharmaceuticals*, *14*(3), 1–17. https://doi.org/10.3390/ph14030187

Chang, C. T., Chan, H. K., Cheah, W. K., Tan, M. P., Ch'ng, A. S. H., Thiam, C. N., Abu Bakar, N. A., Yau, W. K., Abu Hassan, M. R., Rajan, P., Tan, K. C., Ambigapathy, S., Vengadasalam, P., Zaman Huri, S., Arvinder-Singh, H., Thum, C. C., Chung, W. M., Ooi, J. H., Sabki, N. H., … Lee, S. W. H. (2023). Development of a Malaysian potentially inappropriate prescribing screening tool in older adults (MALPIP): a Delphi study. *Journal of Pharmaceutical Policy and Practice*, *16*(1). https://doi.org/10.1186/s40545-023-00630-4

Chee Teng, C., Jean Yean, Y., & Sai Hong, L. (2020). A Study on Potentially Inappropriate Medications in Geriatric Patients Admitted to the Medical Wards in Bentong Hospital Using Beers Criteria. *Pharmacy Research Reports*, *3*(1).

Clyne, B., Cooper, J. A., Hughes, C. M., Fahey, T., & Smith, S. M. (2016). 'Potentially inappropriate or specifically appropriate?' Qualitative evaluation of general practitioners views on prescribing, polypharmacy and potentially inappropriate prescribing in older people. *BMC Family Practice*, *17*(1), 1–9. https://doi.org/10.1186/s12875-016-0507-y

Cullinan, S., Fleming, A., O'Mahony, D., Ryan, C., O'Sullivan, D., Gallagher, P., & Byrne, S. (2015). Doctors' perspectives on the barriers to appropriate prescribing in older hospitalized patients: A qualitative study. *British Journal of Clinical Pharmacology*, *79*(5), 860–869. https://doi.org/10.1111/bcp.12555

Cullinan, S., O'Mahony, D., Fleming, A., & Byrne, S. (2014). A meta-synthesis of potentially inappropriate prescribing in older patients. *Drugs and Aging*, *31*(8), 631–638. https://doi.org/10.1007/s40266-014-0190-4

Department of Statistics. (2016). *Population Projection (Revised), Malaysia, 2010-2040*. https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=118&bul_id=Y3kwU2tSNVFDOWp1YmtZYnhUeVBEdz09&menu_id=L0pheU43NWJwRWVSZklWdzQ4TlhUUT09

Fick, D. M., Semla, T. P., Steinman, M., Beizer, J., Brandt, N., Dombrowski, R., DuBeau, C. E., Pezzullo, L., Epplin, J. J., Flanagan, N., Morden, E., Hanlon, J., Hollmann, P., Laird, R., Linnebur, S., & Sandhu, S. (2019). American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults. *Journal of the American Geriatrics Society*, *67*(4), 674–694. https://doi.org/10.1111/jgs.15767

Holmes, H. M., Luo, R., Kuo, Y. F., Baillargeon, J., & Goodwin, J. S. (2013). Association of potentially inappropriate medication use with patient and prescriber characteristics in Medicare Part D. *Pharmacoepidemiology and Drug Safety*, *22*(7), 728–734. https://doi.org/10.1002/PDS.3431

Lundby, C., Graabæk, T., Ryg, J., Søndergaard, J., Pottegård, A., & Nielsen, D. S. (2019). Health care

professionals' attitudes towards deprescribing in older patients with limited life expectancy: A systematic review. *British Journal of Clinical Pharmacology*, *85*(5), 868–892. https://doi.org/10.1111/bcp.13861

McIntosh, M. J., & Morse, J. M. (2015). Situating and constructing diversity in semi-structured interviews. *Global Qualitative Nursing Research*, *2*. https://doi.org/10.1177/2333393615597674

Mekonnen, A. B., Redley, B., de Courten, B., & Manias, E. (2021). Potentially inappropriate prescribing and its associations with health-related and system-related outcomes in hospitalised older adults: A systematic review and meta-analysis. *British Journal of Clinical Pharmacology*, *87*(11), 4150–4172. https://doi.org/10.1111/bcp.14870

O'Mahony, D., O'Sullivan, D., Byrne, S., O'Connor, M. N., Ryan, C., & Gallagher, P. (2015). STOPP/START criteria for potentially inappropriate prescribing in older people: version 2. *Age and Ageing*, *44*(2), 213–218. https://doi.org/10.1093/ageing/afu145

O'Sullivan, D., O'Mahony, D., O'Connor, M. N., Gallagher, P., Gallagher, J., Cullinan, S., O'Sullivan, R., Eustace, J., & Byrne, S. (2016). Prevention of Adverse Drug Reactions in Hospitalised Older Patients Using a Software-Supported Structured Pharmacist Intervention: A Cluster Randomised Controlled Trial. *Drugs and Aging*, *33*(1), 63–73. https://doi.org/10.1007/s40266-015-0329-y

O'Connor, M. N., Gallagher, P., & O'Mahony, D. (2012). Inappropriate Prescribing: Criteria, Detection and Prevention. *Drugs & Aging*, *29*(6), 437–452. https://doi.org/10.2165/11632610-000000000-00000

Rodrigues, D. A., Plácido, A. I., Mateos-Campos, R., Figueiras, A., Herdeiro, M. T., & Roque, F. (2022). Effectiveness of Interventions to Reduce Potentially Inappropriate Medication in Older Patients: A Systematic Review. *Frontiers in Pharmacology*, *13*, 3454. https://doi.org/10.3389/FPHAR.2021.777655

Schuling, J., Gebben, H., Veehof, J. G., & Haaijer-Ruskamp, F. M. (2012). *Deprescribing medication in very elderly patients with multimorbidity: the view of Dutch GPs. A qualitative study*. http://www.biomedcentral.com/1471-2296/13/56

Spinewine, A., Swine, C., Dhillon, S., Franklin, B. D., Tulkens, P. M., Wilmotte, L., & Lorant, V. (2005). Appropriateness of use of medicines in elderly inpatients: Qualitative study. *British Medical Journal*, *331*(7522), 935–938. https://doi.org/10.1136/bmj.38551.410012.06

Tan, M. P., Kamaruzzaman, S. B., & Poi, P. J. H. (2018). An analysis of geriatric medicine in Malaysia-riding the wave of political change. *Geriatrics (Switzerland)*, *3*(4). https://doi.org/10.3390/geriatrics3040080

Tannenbaum, C., Martin, P., Tamblyn, R., Benedetti, A., & Ahmed, S. (2014). Reduction of Inappropriate Benzodiazepine Prescriptions Among Older Adults Through Direct Patient Education: The EMPOWER Cluster Randomized Trial. *JAMA Internal Medicine*, *174*(6), 890–898. https://doi.org/10.1001/JAMAINTERNMED.2014.949

Tong, A., Sainsbury, P., & Craig, J. (2007). Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*, *19*(6), 349–357. https://doi.org/10.1093/intqhc/mzm042

Voigt, K., Gottschall, M., Köberlein-Neu, J., Schübel, J., Quint, N., & Bergmann, A. (2016). Why do family doctors prescribe potentially inappropriate medication to elderly patients? *BMC Family Practice*, *17*(1), 1–11. https://doi.org/10.1186/s12875-016-0482-3

Xing, X. X., Zhu, C., Liang, H. Y., Wang, K., Chu, Y. Q., Zhao, L. B., Jiang, D. C., Wang, Y. Q., & Yan, S. Y. (2019). Associations Between Potentially Inappropriate Medications and Adverse Health Outcomes in the Elderly: A Systematic Review and Meta-analysis. *Annals of Pharmacotherapy*, *53*(10), 1005–1019. https://doi.org/10.1177/1060028019853069

Xu, Z., Liang, X., Zhu, Y., Lu, Y., Ye, Y., Fang, L., & Qian, Y. (2021). Factors associated with potentially inappropriate prescriptions and barriers to medicines optimisation among older adults in primary care settings: A systematic review. In *Family Medicine and Community Health* (Vol. 9, Issue 4). BMJ Publishing Group. https://doi.org/10.1136/fmch-2021-001325

Zamawe, F. C. (2015). The implication of using NVivo software in qualitative data analysis: Evidence-based reflections. *Malawi Medical Journal*, *27*(1), 13–15. https://doi.org/10.4314/mmj.v27i1.4

Table 1: Predefined broad questions of the interview protocol.

1. What do you know about potentially inappropriate prescribing? Are you familiar with the term PIM/PIM?
2. Are you familiar with START or Beers criteria? Have you ever used them?
3. What are the causes that may lead physicians to prescribe potentially inappropriate medication for older inpatients?
4. What are the factors contributing to PIM? Is lack of knowledge/training/time one of them?
5. What intervention can be applied in this hospital to optimize prescribing for older patients?
6. Do you think any discussion with other colleagues (e.g., within physicians or with pharmacists) are important prior any prescribing activity towards geriatric patients? Do you practice that?
7. What do you think about deprescribing process? How could it be applied?

Table 2: Themes and subthemes emerged after data analysis.

Theme 1	Physicians' knowledge and perception about PIM
	Understanding of the PIM term
	Familiarization with the available PIM lists
	Perception on the importance of PIM issue
Theme 2	Factors associated with prescribing PIM
	Complexity of the cases
	Lack of knowledge and training in geriatric medicine
	Lack of time
	Perception on the applicability of the PIM lists
Theme 3	Interventions to reduce prescribing of PIM
	Education and effective communications
	Optimization of the workforce
	Activation of deprescribing