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The Effectiveness and Barriers of Medicine Review in Managing Elderly Polypharmacy

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Abstract:

Polypharmacy is increasingly common among elderly population. While the use of multiple medications may be clinical unavoidable due to multiple health conditions, however, non-essential and inappropriate polypharmacy can increase the risk of poorer health outcomes such as medication-related complications. The following paper evaluates the effectiveness of medication review intervention in addressing polypharmacy in older population, especially on the reduction of the number of medications used, adverse events and health expenditure. The barriers that affect the effectiveness of medication review service. The findings demonstrate that by identifying the inappropriate medication therapies and provide improved medication plans, medication review service can help to reduce the number of medications that was used by the patient, medication-related side effects and expenditure on healthcare. However, the effectiveness of medication review is challenged by both patient's health literacy and systemic barriers included time constrains and limited healthcare resources. Both factors could further compromise the effect of medication review in addressing polypharmacy. Consequently, it is clinical and practical essential to ensure that the use of multiple medications among elderly population are appropriate and clinical necessary, as this can help to improve the health outcome of the elderly patients and a more efficient allocation of the healthcare resources.

Keywords: Polypharmacy; medication review; elderly, effectiveness; barriers.

1. Introduction

With the rapid development of medicine, more health conditions can now be controlled or cured by using pharmaceutical products. As a result of development, the phenomenon of polypharmacy has become a significant topic in recent years, as certain patients require multiple medications due to different reasons. For instance, the elderly population can be more vulnerable to polypharmacy due to various chronic

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diseases [1]. The WHO explains that polypharmacy is the continuous use of five or more medications, including prescription medication, over-the-counter medication (OTC) and other supplements [1]. A recent study shows that approximately 37% of the global population experiences polypharmacy, with 39.1% of the adults aged 65 years and above using five or more medications and 13.3% of the ageing adults are taking more than ten medications regularly [2]. According to the Australian Institute of Health and Welfare report, approximately 40% of the Australians who aged 75 years and over were dispensed more than five drugs [3].

However, inappropriate use of multiple medications can result in several negative impacts on physical, mental, and financial. For example, hospitalization due to drug-drug interaction, medication adverse reactions, non-adherence and financial burden [1]. Medication optimization and deprescribing are the important frameworks that were introduced globally to help minimize or eliminate the negative influences of polypharmacy [1]. Nonetheless, suggestions and frameworks alone are not enough to improve medication use. In order to have a clinical benefit, these suggestions need to be converted into a proper intervention.

Internationally, many countries have established and implemented interventions that help with the management of polypharmacy in older populations. For example, Home Medicines Review (HMR) is a medication management initiative that the Australian government supported and requires multidisciplinary collaboration to help address polypharmacy among elderly individuals. Moreover, patients will refer by their doctor to a registered pharmacist to perform a medication review at the patient's residential place to perform medication check, identify any medication-related issues and provide medication management recommendations to the patient and their practitioner. Similarly, the Structured Medication Review (SMR) is a program that the United Kingdom government supported, aiming to optimize drug use by identifying inappropriate polypharmacy, encouraging deprescribing, and integrating medication management plans with patients' clinical expectations through a collaborative decision-making. The fundamental objective of both programs is promoting safe medication use, reduce the inappropriate multiple medication use and medication related harm. Globally, several research have investigated the effectiveness of medication review programs for elderly individuals living with polypharmacy, particularly focus on medication safety optimization and patients' health outcomes. Findings show that medication review can help identify, prevent, or reduce adverse events caused by potential inappropriate polypharmacy and improve patients' overall quality of life.

However, the benefits of medication review on polypharmacy remain different. Some paper suggests that there are no significant or minimal improvements on the number of medications used and overall patients' health conditions. These discrepancies between studies' results may not necessarily suggest that the medication review is an ineffective intervention but indicate that the performance of the intervention can be affected by other factors that result in different outcomes.

As population aging continually grows, the prevalence of polypharmacy among elderly individuals is likely to increase [1]. Thus, this reinforces the necessity of evaluating the effectiveness of medication review in addressing polypharmacy and its ability to achieve intended results in daily practice. Importantly, understand what are the barriers that prevent the implementation. Therefore, by gathering and summarizing the evidence from international studies, the following article aims to discuss the effectiveness of government-funded medication review service in managing elderly polypharmacy and explore the primary challenges that affect the effectiveness of the intervention. As this can provide a better understanding of how medication review can be effective in addressing elderly polypharmacy, while discussing the problems that lead to inconsistent efficacy, to support the future development of the policy and optimization of the intervention.

2. Number of Medications

There are many different factors that could contribute to polypharmacy despite multimorbidity. However, one of the key factors that contribute to inappropriate polypharmacy is that elderly patients often seek health advice from different healthcare providers, which can lead to multiple prescribers and incomplete health information disclosure. This could increase the risk of duplicate pharmaceutical treatment and prescribing cascades. Prescribing cascade can be explained by misinterpretation of the medication-related adverse reaction as a new health conditions, and the patient was received additional medications to manage the condition, which further increase the amount of the medication that patient uses. A study result shows that less than 20% of the elderly patients did not experiencing high-risk prescribing, and 16% of the people who experienced high-risk prescribing are classified with at least one potential prescribing cascade [1]. Moreover, elderly individuals rarely discuss their supplements and OTC medications (e.g., asthma inhalers, analgesics) use with their doctor and pharmacists actively. Multiple international studies demonstrate that more than half of the elderly people do not consult clinicians before using OTC and supplement products, leading to incomplete medication profiles without systematic review [1].

From the perspective of individual patient factors, elderly patients often believe that the use of multiple medications or continuously taking all the drugs they have been prescribed even short-term medication is essential and good for their health. For example, proton pump inhibitors (PPI), are used for relief of gastrointestinal disorders and are mainly intended for short-term use [1]. However, the study result indicates that nearly 50% of the people who aged 75 years and older use at least one prescription PPI, 42% of individuals continuously use it for longer than the recommended duration, and 31% remain on PPI for longer than 12 months [1]. This can be caused by limited health knowledge or cognitive impairment [4]. Evidence suggests that 80% of the elderly patients do not understand medication instructions, discontinue instruction, or think that it is important to continuously administer all their drugs with no concerns about the long-term use of multiple medications [4].

The effectiveness of medication review in reducing the number of medication intakes has been evaluated by various studies and has been consistently shown to highlight the efficacy in improving inappropriate polypharmacy. An international study shows that HMR identified minimum one inappropriate medication uses in almost all elderly individuals, and the use of unnecessary medications can be improved after conducting a pharmacist-led home medicine review, with an average of 0.5 medications reduction [5]. Evidence from another study indicates that after the review, 45.8% of the medications were removed from patients' homes due to being unnecessary [6]. Another 4-months study shows that a 15.8% reduction in the total number of medications used [7]. While this 4-month study reported a notable reduction, it was limited by a small sample size and single-center design, which may restrict generalizability. In contrast, a large-scale multicenter trial confirmed a similar reduction (14.2%), supporting the reliability of this outcome. Therefore, by performing a systematic medication review by health professionals, potential inappropriate polypharmacy, including duplicate pharmaceutical treatments, self-medication, medication use without indication or no longer beneficial, or limited efficacy, can be identified and discussed with the patient, and doctors to further improve the patient's medication management plan and medication burden.

3. Adverse Drug Reaction

Secondly, medication review has been consistently shown to play a crucial role in improving elderly patients' experiences of drug-related adverse events and overall quality of life. The pharmacokinetics and pharmacodynamics of the elderly individual can be compromised because of the age, which potentially increases their vulnerability to the side effects [6]. More importantly, the chances of experiencing adverse drug reactions could further increase when inappropriate polypharmacy exists. Recently, research showed that compared with elderly people without polypharmacy, individuals who are taking multiple medications were two times more likely to experience a side effect [6]. Additionally, findings suggest that when elderly patients are exposed to inappropriate polypharmacy, the opportunity for them to experience drug-drug interaction was more than three times higher than the people without polypharmacy [6].

As a result of polypharmacy, adverse drug reactions or drug-drug interactions, both the patient's physical and mental health can be dramatically affected. Available evidence shows that patients' quality of life can be negatively affected, and patients are more possible to experience preventable adverse reactions such as bruising, sedation, falls, and dizziness, where falls are the most commonly observed in elderly participants with polypharmacy [8]. In addition, a recent cohort study demonstrates that compared with the elderly without polypharmacy, individuals with polypharmacy had 1.32 times higher chances of hospitalization or visiting the emergency department [9]. Frequent hospital admissions and a complex treatment plan can adversely affect older patients' psychological well-being. Evidence shows that the risk of developing depression and anxiety can be significantly elevated due to loss of confidence about the treatment, immobilization due to a fall, and multiple hospital stays [6]. Therefore, this may eventually contribute to medication non-adherence and exacerbation of physical and mental health.

Nonetheless, medication review not only allows pharmacists to screen for any preventable adverse reactions but also provides an opportunity for the patient to report any uncomfortable experiences after taking the drugs. Study shows that pharmacists can identify at least one side effect per participant after consultation, and 80% of the side effects are preventable [8]. For example, using multiple antihypertensive agents can cause orthostatic hypotension, which is one of the most common reasons that lead to falls in elderly patients [8]. By evaluating the medication use, pharmacists were able to identify potential inappropriate treatments and provide recommendations to the prescribers to optimize safe medication use, which can help to prevent, reduce, or discontinue the drugs that contribute to adverse effects. When the medication is unavoidable, the patient can receive non-pharmacological suggestions to minimize the adverse experience from medications, such as fall prevention strategies [8]. Compared to usual healthcare, a 6% reduction in fall-related experience, about 7% of hospital admission reduction, and an improvement

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in quality-of-life score was observed in the intervention group, which supports the effectiveness of the medication review service [10]. Another study shows that participants who received medication review had almost a 50% lower chance of being admitted to the hospital compared to those who did not receive medication review [11]. While these findings are promising, some studies with shorter follow-up periods reported no significant reduction in hospital admissions, suggesting that the effectiveness of medication review may require longer-term monitoring to fully manifest. Hence, the effectiveness of HMR was confirmed by the study's results that implementing HMR can promote the identification of preventable adverse drug reactions, reduce the symptoms caused by drug-drug interactions, and enable patients to have a better quality of life. In conclusion, medication review effectively mitigates ADRs and drug-drug interactions in elderly polypharmacy patients, reducing fall risks, hospital admissions and psychological distress, thereby improving overall quality of life.

4. Economic Burden

Finally, besides improving the number of medication use and clinical outcomes, medication review has been shown to demonstrate considerable financial benefits by minimizing unnecessary expenses on medication and medication-related healthcare costs associated with polypharmacy in the elderly population. As discussed above, polypharmacy significantly contributes to increasing the number of medications used, preventable medication side effects, and drug-drug interactions, which can indirectly increase the chance of emergency visits and hospitalization. These cases can create a significant economic burden on the patient and the healthcare system. From the patient's perspective, the most significantly increased direct costs include medication and consultation fees; indirect expenses that result from polypharmacy include hospital stays, emergency services, and require additional healthcare workers due to loss of independence. A study conducted in the United States shows that the older population with polypharmacy has significantly higher average annual healthcare expenditure, $ 5778.97 higher than people without polypharmacy [12]. Evidence also lists that an additional $1178,67 contributes to prescription medication and $814.91 for hospitalization [12]. Additionally, higher chances of using unaffordable prescription drugs and health services were associated with polypharmacy. Greater healthcare resource, such as funding and human resources, needs to be allocated to managing the consequences of polypharmacy. Authors also mention that inadequate management of polypharmacy can over-stress the healthcare system [12]. In the long term, it increases the risk of overburdening the systems and resulting in additional negative impacts.

Medication review facilitates cost reduction mainly by effectively identifying and addressing medication-related issues, including unneeded or inappropriate drugs, avoidable adverse drug reactions, and drug-drug interactions. By adjusting the medication management plan to promote medication adherence, prevent further development of complications, and exacerbation of the diseases, it can be an effective strategy to reduce avoidable expenses. Following the medication review, the mean annual pharmaceutical expenditure per individual was reduced by more than €40 [11]. Moreover, medication review can be treated as a preventive intervention and can be done in a community setting, compared to the negative consequences that need to be treated in a hospital; this initiative is a more effective way of reducing unnecessary healthcare costs [11]. A controlled study done in Europe shows that for patients without a medication review, hospitalization expenses were €301, which is €207 higher than the people in intervention group [11].

In elderly individuals with polypharmacy, systemic medication review has shown financial benefits in government healthcare expenditure. Cost-effectiveness is a common method used to evaluate whether the intervention can produce meaningful clinical health benefits at a desirable cost compared with alternative or current initiatives. A Randomized controlled trial has reported that medication review can result in average cost savings of 1857 Swiss Francs and a gain of 0.026 Quality-Adjusted Life Year [13]. This means that patients who received the medication review reduced 1857 Swiss Francs less in healthcare expenditure each of person and experienced improvement in quality of life. This supports that medication review not only reduces costs but also positively affects the health outcome in older people with polypharmacy. Hence, the medication review initiatives play an important role in reducing the financial pressure that was cause by the polypharmacy on both patient and healthcare system was supported by the international studies. In summary, by identifying and reducing the use of inappropriate medications, the unnecessary medication expenses, hospital stays, and emergency visits can be minimized, consequently, the economic burden of polypharmacy on both patient and healthcare systems can be reduce.

5. Barriers to Medication Review Effectiveness

The effectiveness of medication review can be challenged by multiple factors, even though there is growing evidence

supporting the effectiveness of medication review initiatives in addressing polypharmacy, promoting safe medication use, improving health and economic outcomes. Some studies suggests that medication review service provide minimal or no improvement. Therefore, it is essential to discuss the factors that reduce the efficacy of the medication review intervention. There are two most significant factors that contribute to the minimal or no improvement after implementing the medication review service, which is patient's attitude and systemic challenges, both factors directly affect the efficacy of medication review service in managing inappropriate polypharmacy, improving patient's health and reduce economic expenditure, which lead to an undesirable result.

Firstly, limited knowledge about health primarily affects the impact of medication review. Medication review is not solely reliant on pharmacists, it also requires patients' cooperation, which provides all the information that is needed, so that the pharmacists can perform a comprehensive review to discover the potential inappropriate polypharmacy, provide constructive feedback, and management recommendations.

However, a common situation was reported by pharmacists is poor engagement during the conversation, and the fundamental cause of little communication is lack of health literacy, which could contribute to low awareness of the effect of medication review and the necessity of report all medications that they are currently using, not just prescription drugs but also OTC products and supplements [4]. For instance, it can be hard to perform a comprehensive medication review when patient failing to disclose the use of OTC medications and supplements, hence, lead to an incomplete analysis of the medication lists. This would further affect the ability of the health professionals to identify inappropriate pharmacological treatments which are the key step for medication review. Information gathering can be hard due to the patient's insufficient disclosure of drug use and involvement. Without detailed information, the analysis result can be misleading.

As a result of incomplete information, it can be difficult for pharmacists to develop tailored advises, which further compromises the purpose and intended impact of the medication review intervention. In addition, patient's attitude towards the change of medication plan can be influence by the health knowledge. Elderly patient can refuse to adhere to a modified medication regimen due to limited health literacy. Non-adherence can reduce the benefits of the intervention [4]. Therefore, when all patient factors are combined, the effectiveness of medication review in identifying polypharmacy related problems can be lower and eventually preventing the opportunity to stop or avoid the adverse events resulting from inappropriate polypharmacy and improving patient's health conditions.

Another significant barrier is related to the systemic factor that influenced the implementation and effectiveness of the medication review intervention. Active collaboration between different healthcare professionals and time involvement are the two essential elements to establish an effective and comprehensive medication review [14]. Nonetheless, these two requirements are often hard to achieve and maintain within a busy working environment. Currently, the pharmacists who are assigned to conduct medication review are mainly community pharmacists, who are also responsible for dealing with routine pharmacy tasks like dispensing prescription, basic medication consultation and stock checking. Furthermore, after the consultation, pharmacists also require filling in the paperwork and discuss the findings with other health professionals to establish the management plan. Consequently, this can significantly increase the workload for community pharmacists and require additional time involvement. In addition, it is essential to ensure that the patient can follow the new medication management plan and to check any improvement on medication-related issues. However, this would also require additional time and effort when compared to daily pharmacy work. Community pharmacists often lack sufficient time for medication review due to routine dispensing tasks. As a result of time consuming, it can be difficult to perform a detail medication review to collecting all the information that was required, thus, reducing the effectiveness of medication review in identifying and preventing medication-related side effects, and reducing inappropriate drug use. Currently, the reimbursement for medication review to pharmacists is a fixed and one-time payment issued after the completion and submission of the medication review report [14]. The way how government subsidizes could further reduce the willingness of pharmacists to provide the medication review service [14], and result in limited human resources that can be allocated to promote and implement the medication review service. Therefore, an insufficient time and health professionals' engagement may lead to the unsuccessful implementation of the medication review. In summary, both patient and systemic challenges can significantly reduce the effectiveness of medication review. It is essential to address both systemic and patient factors to improve and maximize the effectiveness of the medication review service, so that the advantages of the intervention can be fully expressed and benefit the society.

6. Conclusion

This paper evaluated the effectiveness and main barriers

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of the medication review intervention that help in addressing polypharmacy among the elderly population. In conclusion, a medication review that involves multidisciplinary collaboration can act as a considerable effective intervention for managing inappropriate and unnecessary polypharmacy was supported by several international studies, however, the effectives can be affected by some barriers.

The evaluation result support that medication review can be an effective intervention in reducing inappropriate polypharmacy by emphasizing on rational use of medication rather than simply reducing the number of medications. More importantly, it can help to prevented and minimized the medication-related negative experiences like adverse reactions and drug-drug interactions by encouraging safe medication use and stop the inappropriate drug therapies. As a consequence of reduced inappropriate polypharmacy, the chances of emergency department visits and hospitalization can be directly prevented and reduced, which further help to reduce the costs on medications and addressing polypharmacy related problems included advance medical service requirements for elderly patients and government. Hence, allows better allocation of the healthcare resources. Furthermore, both patient factors and systemic challenges that contributed to the mixed study findings regards the effectiveness of medication review have been identified during the study. It can be hard to engage and gather information during the conversation due patient's limited health knowledge, this can significantly influence the effectiveness of medication review. Finally, systemic barriers including increased workload, insufficient time and subsidization can form additional challenges that further decrease the effectiveness of the medication review to achieving ideal results.

The study findings highlight how important the medication review program is in managing inappropriate polypharmacy among elderly patients and optimizing medication use. Additionally, emphasize the necessity and importance of continuously improving medication review program to achieve desired results on both clinical and economic levels.

However, there are some limitations of the paper need to be acknowledged. Most of the studies are short-term research and rely on self-reported outcomes. Nonetheless, certain medication cannot be stopped abruptly to prevent withdraw symptoms and require time to see the reduction of adverse reactions. These could potentially lead to an incomplete assessment of the long-term effectiveness of the medication review introduce bias in outcome measure and affect the reliability of the outcomes. To assess the long-term efficacy of the medication review program, future study should consider follow an international outcome measure to evaluate the clinical changes and establishing a longer study period. For the development of medication review program, consider continually improving patients' health literacy on safe medication use. Additionally, promoting multidisciplinary collaboration, including social works to assist pharmacists to collecting information, so that the health professionals can provide a better patient-center care. Therefore, a more cost-effective program can be developed and to maximize the benefit for the population that is suffering polypharmacy.

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