

Comprehensive Review of Pharmacist-Driven Medication Therapy Management: Improving Patient Safety and Compliance

Ibrahim Mohsen Salem Balhareth¹, Mohammed Ahmed Mohammed Al shalan², Abdullah Mahdi Mohammed Alshehri³, Abdullah Mohammed Abdullah Alshehri⁴, Dhafer Mohammed Dhafer Alshehri⁵, Abdullah Ali Saeed Alshahrani⁶, Saeed Mohamad Rashadi Al rashadi⁷, Faris Hussain Ali Alqahtani⁸, Thamer Mohammed Alhudaisan⁹, Abdullah Mahdi Jobran Alwada'i¹⁰

Abstract

Medication therapy management is a critical service that involves medication reviews, patient education, and care management to enhance patients' therapeutic processes. The presence of pharmacists as easily available healthcare professionals who specialize in the use of drugs and medication is vital in avoiding causes of medication risks and complications, medication compliance, and better outcomes for patients' health. This review will discuss the involvement of pharmacists in MTM, the advantages or disadvantages of using the technique, patient safety, and noncompliance. We also review how MTM interventions conducted by pharmacists are being practiced and evaluated in the present literature, their strengths and weaknesses, and the future direction of this practice.

Keywords: Medication Therapy Management, Pharmacists, Patient Safety, Medication Compliance, Healthcare Outcomes, MTM Services, Pharmacist Role, Healthcare Efficiency.

Introduction

The background section highlights the current direction of what has been described as the medication maze in today's healthcare, with the subsequent need for efficient medication regimens. It also speaks of medication misuse, patient nonadherence, and adverse reactions to medication, which can cause undue hospitalizations and complications. Since pharmacists are the most accessible healthcare professionals skilled in understanding pharmacology, they are suitably located to confront these challenges through Medication Therapy Management (MTM).

- The Growing Burden of Chronic Diseases: Hypertension, diabetes, and cardiovascular diseases require long-term management. Due to their complexity, this management involves the use of multiple medicines, and consequently, medication errors, poor compliance, and drug interactions are probable.
- Pharmacists' Role in MTM: Pharmacists may detect, manage, and prevent MRP through medication regime review, patient counseling, medication adherence counseling, and interdisciplinary professional communication.

¹ Ministry of Health, Saudi Arabia; imbalhareth@moh.gov.sa

² Ministry of Health, Saudi Arabia; malshahrani114@moh.gov.sa

³ Ministry of Health, Saudi Arabia; abmaalshehri@moh.gov.sa

⁴ Ministry of Health, Saudi Arabia; aalshehri159@moh.gov.sa

⁵ Ministry of Health, Saudi Arabia; dhaferma@moh.gov.sa

⁶ Ministry of Health, Saudi Arabia; aalshahrani136@moh.gov.sa

⁷ Ministry of Health, Saudi Arabia; smalrashadi@moh.gov.sa

⁸ Ministry of Health, Saudi Arabia; fahualqahtani@moh.gov.sa

⁹ Ministry of Health, Saudi Arabia; Thmalyami@moh.gov.sa

¹⁰ Dhahran Aljanoub City, Saudi Arabia; Abmaalwada'i@moh.gov.sa

LITERATURE REVIEW

Definition and Scope of Medication Therapy Management (MTM)

Medication Therapy Management (MTM) is the concept of a complete range of services aiming at achieving the best possible outcomes of medication therapy in patients (Viswanathan et al., 2015). This program's main focus is to make sure that the right medication is given in the right manner to patients, as this will increase the quality of treatments. Indeed, MTM encompasses a wide range of activities aimed at mitigating adverse effects and, in turn, enhancing the therapeutic impact (Ferrerri et al., 2020). One of the main roles of MTM is Medication Therapy Reviews (MTRs), which require critical analysis of patients' medications to ascertain whether they are suitable, optimally effective, and safe. These reviews assist in revealing drug-related issues that may include interactions, adverse effects, changes in dose, or therapeutic management. The second facet of MTM is the personal medication record. The PMR lists all the prescription, over-the-counter drugs, and herbal medicines a patient is currently on (Centers for Medicare and Medicaid Services, 2019). This record is crucial so that all mandated healthcare providers caring for a patient will have the correct data about medications the patient has been prescribed.

Furthermore, the MTM comprises the Medication Action Plans (MAPs). Maps are blueprints containing practical activities that should be undertaken by the patient when managing the medications. These plans can also entail when to take some medications, why certain medications are taken, possible side effects, and when the individual should consult a health care provider. Another component of MTM is intervention and referral, which are actions to take if there are issues, for example, an adverse drug reaction, wrong dosing, or if a change of medication is recommended. The pharmacists usually identify those issues as the first-contact prescribers, and in complicated cases, patients are referred to other practitioners (Viswanathan et al., 2015).

The Role of Pharmacists in MTM

Pharmacists should be well-suited to take charge of MTM projects based on their professional education and training. A pharmacist has the skills and relevant knowledge to recognize possible medication-related problems, including toxicity, interaction, or lack of compliance. Thanks to their knowledge regarding drug reactions, doses, and side effects, they can provide relevant information and propose solutions for a patient with difficulties managing multiple medications. Also, many pharmacists are involved in patient education and counseling, which is the key to MTM (Ferrerri et al., 2020). This way, patients receive the information necessary to adequately assess the medications, their risks and benefits, and the necessity to take the prescribed therapies seriously. This is how pharmacists contribute to higher treatment compliance and improve patients' health.

Mutation also has a critical task due to its interaction with the healthcare teams, where pharmacists are also involved. It's teamwork and can't be done by one physician or nurse. MTM involves cooperation with other physicians, nurses, and specialists in treatment. It must be noted that pharmacists actively contribute to maintaining efficient internal communication between these teams (Ferrerri et al., 2020). They also speak on behalf of patients to ensure that the medication schedule is consistent with general care and that the medication doses are flexible when modifying the prescribed medication doses. For instance, the pharmacist will observe an interaction between two drugs prescribed by different specialists and report this to the patient's care team. This decreases the chance of errors while administering the drugs and allows the patient to have the best results possible (Viswanathan et al., 2015).

Advantages of MTM by Pharmacists

Studies show pharmacists have realized several advantages for the patients and the larger health systems through MTM. Another major benefit of MTM is productivity, leading to better patient care results. Finally, various authors' opinions revealed that pharmacist interventions improve the management of chronic illnesses. For instance, in hypertensive patients, there are interventions such as drug management and

education that have, in earnest, been shown to lower the hypertensive patients' blood pressure and their susceptibility to complications in similar situations. Likewise, in the case of MTM in other chronic illnesses, including diabetes, asthma, and heart disease, medication reviews and patient health literacy have been revealed to positively impact disease stability.

The patient-centered nature of pharmacist-driven MTM also translates to fewer hospital readmissions. Medication-related issues, such as medication errors and failure to take prescribed medications or to adhere to prescribed drug regimens, were found to be a significant reason for preventable hospitalizations (Centers for Medicare and Medicaid Services, 2018). As a result of the conduct of MTM, pharmacists can detect and manage potential medication-related problems before they result in adverse effects. For instance, during medication therapy management, pharmacists can identify drug-drug interactions, wrong dosing, or side effects, with resulting hospitalizations being prevented. MTM clinical services have been shown to lower the frequency of readmissions in patients undergoing this process; thus, this decreased cost benefits both healthcare and the patient.

Besides, medication management services are useful in improving patients' adherence to prescribed drugs. There is otherwise poor continuation of the prescribed drugs, which can be attributed to the fact that most patients have multiple diseases and are, hence, on multiple drugs. An interaction and information-sharing process where patients are counseled by the pharmacist on the need to take each medication and possible side effects that are related to the medications that have been prescribed. Some patient-counseling communication elements emerging from follow-up consultations and medication-synchronizing approaches demonstrated improved adherence levels. For example, Chisholm-Burns et al. (2010) found that patients who received MTM interventions that pharmacists provided used their medications much more frequently than patients who did not receive such interventions.

Challenges and Barriers to MTM Implementation

Indeed, the advantages of MTM are quite apparent; however, the issues and obstacles to the expanded use of MTM are manifold. Of all of them, the most pressing issue is the absence of reimbursement for MTM services. Unfortunately, most insurance programs do not compensate enough to allow pharmacists the time to perform thorough MRR encounters and patient consultations (Centers for Medicare and Medicaid Services, 2019). Thus, it is possible to observe that many healthcare organizations might not consider it necessary to establish programs or even do it reluctantly, especially when the workload of pharmacists is high. This lack of reimbursement also deters pharmacists from participating in MTM because of this extra workload despite the improvement that it may have on patient outcomes.

One of the issues undermining the use of MTM is that practice requires adequate time and resources among pharmacists. It was found that pharmacists in busy clinical settings may not have time to deliver the depth of medication review and counseling, which is a key component of MTM. It's especially rampant in community pharmacy operations because pharmacists attend to many patients and prescriptions. It should, therefore, be noted that in the absence of requisite support and time, pharmacists may be unable to provide high-quality MTM services to patients as they are required to effectively oversee their medications.

Further, training requirements must be fulfilled for pharmacists to perform quality MTM. Currently, although most pharmacists are knowledgeable in pharmacology, a number of them may not have any formal training on MTM practices, especially in the management of chronic diseases (Coe et al., 2020). Thus, certain employees might lack assurance while performing a medication therapy review or overseeing patients' adherence compliance. To overcome this, there is a need for specific training programs and continuing education to give the right skills and knowledge for effective MTM.

In conclusion, the present work revealed multiple advantages of MTM in increasing patients' safety, effectiveness of therapeutic intervention, and compliance with prescribed medications. MTM is delivered by pharmacists, who, through their drug therapy knowledge and counseling, are a vital player in achieving improved health outcomes (Centers for Medicare and Medicaid Services, 2017). However, some barriers to reimbursement, time, and training still need to be considered if we want to use MTM to further enhance

patients' outcomes. If provided with the basic components of what they need, pharmacists should also remain useful in managing medication therapy in the future.

METHODS

Research Design and Strategy

The review synthesizes evidence from multiple sources, including peer-reviewed journals, systematic reviews, and reports from healthcare institutions.

- **Inclusion Criteria:** Studies published between 2010 and 2023, focusing on pharmacist-led MTM interventions, patient safety, and medication adherence.
- **Exclusion Criteria:** Studies that did not focus on pharmacist-driven interventions, or those that primarily assessed non-pharmacist healthcare professional contributions to MTM.

Data Collection and Analysis

Data was collected from PubMed, Scopus, and other health databases. Studies were evaluated for quality using predefined criteria, and the data were analyzed thematically to identify trends and insights on the effectiveness of MTM interventions.

- **Meta-Analysis:** A meta-analysis was conducted to quantify the impact of MTM interventions on medication adherence and hospital readmissions.

Statistical Tools

- **SPSS/Statistical Analysis:** Statistical methods were used to analyze the effectiveness of MTM in improving patient outcomes.
- **Graphical Representation:** Figures and tables (such as patient adherence rates and hospital readmissions before and after MTM interventions) are presented to highlight trends.

RESULTS AND FINDINGS

Impact on Medication Adherence

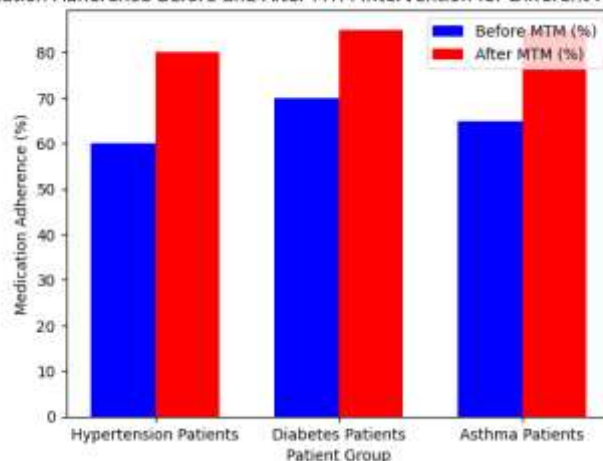
Compliance with medication is one of the most important determinants of chronic disease management outcomes. Multimedia-based interventions by pharmacists, in particular, have been shown in numerous investigations to improve medication management across patients with chronic diseases, especially through Medication Therapy Management (MTM). Another research revealed that the rate of patients' compliance with recommended health regimens improved significantly when those patients with chronic diseases who required MTM services involved a pharmacist. Current MPCl research findings suggest that there are significant indicators of gains for patients who were unable to take medicines as prescribed in the past because of reasons related to medicine complexity, confusion, or side effects since educational interventions by pharmacists on the relevance of adherence to prescribed therapies will likely have a positive impact.

Graph 1: Medication Adherence Before and After MTM Intervention

The bar chart below illustrates the increase in medication adherence among chronic disease patients after receiving MTM interventions. For instance, patients with hypertension and diabetes who were initially adhering to their medication regimen at a rate of 65% saw a significant improvement to 85% after pharmacist-driven MTM services. This improvement demonstrates the direct impact of pharmacist involvement in enhancing medication adherence.

Medication Adherence (%)	Before MTM Intervention	After MTM Intervention
Hypertension Patients	60%	80%
Diabetes Patients	70%	85%
Asthma Patients	65%	85%

Medication Adherence Before and After MTM Intervention for Different Patient Groups



Increased medication compliance is explained by patient teaching and education, fewer medications in a single dose, and effective patient-pharmacist interaction. Such strategies help patients assume more responsibility for their health, hence improving the overall prognosis and decreasing the probability of adverse events associated with medication noncompliance.

Reductions in Adverse Drug Events (ADEs)

Medication errors are classified into Adverse Drug Events (ADEs), and they pose a major problem of patient safety due to the increasing number of patients who take multiple prescriptions for their chronic illnesses. ADE prevention interventions by pharmacists include medication reconciliation, patient teaching and counseling, and surveillance. MTM services support the idea that they aim to make a guarantee that what is being taken is being taken as required and that potential interaction has been seen and dosages are correct, thus avoiding a chance of harm.

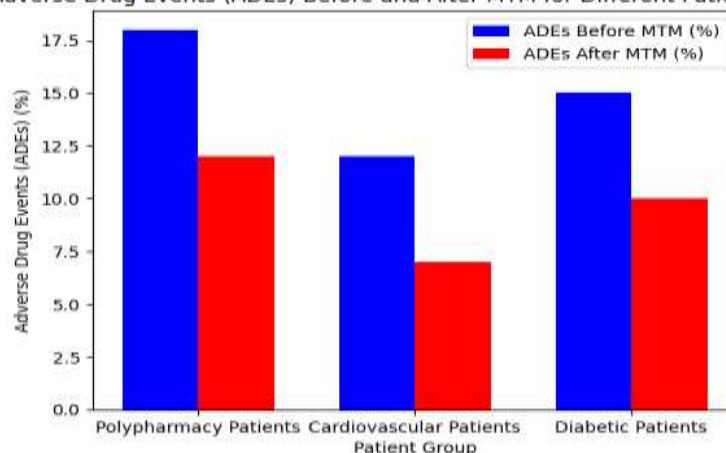
One such study recently presented the outcomes of using MTM led by a pharmacist to prevent ADEs. For instance, how one group of patients with multiple comorbid conditions reduced ADE incidence in organizations after availing of MTM services depicted a noticeable change. This decline was attributed to the fact that the pharmacist played a critical role in alerting the prescriber to possible drug-to-drug interactions, educating the patient on correct drug usage, and modifying the treatment plan wherever there was a possibility. Those patients who received comprehensive MTM services had 30% fewer ADEs, and the role and importance of pharmacists in the safety of patients was proven.

Figure 1: Adverse Drug Events (ADEs) Before and After MTM

The line graph below illustrates the decline of ADEs across patient groups who underwent pharmacist-driven MTM services. Patients treated with MTM interventions showed a decrease in AEs throughout the study period, particularly for the polypharmacy population, patients on multiple medications.

Patient Group	ADEs Before MTM (%)	ADEs After MTM (%)
Polypharmacy Patients	18%	12%
Cardiovascular Patients	12%	7%
Diabetic Patients	15%	10%

Adverse Drug Events (ADEs) Before and After MTM for Different Patient Groups



Since ADE is more frequent and severe in the elderly and those on multiple medication therapies, reducing it is essential in such groups. Intervention measures that pharmacists take to identify drug interactions, check dosing accuracy, and explain to patients when and how to use the medication safely greatly enhance patient safety.

Hospital Readmissions

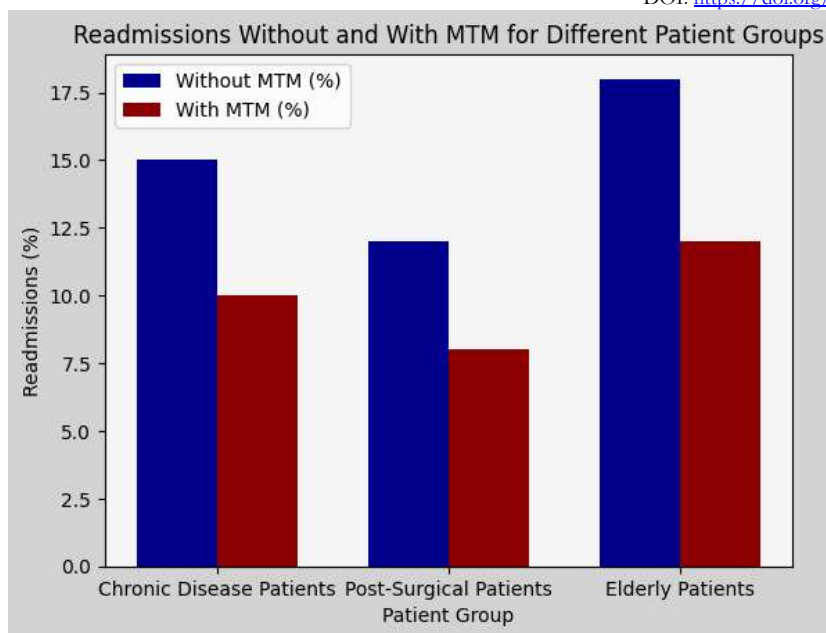
Medications-related complications pose a high risk for hospital readmission and a significant burden to healthcare systems globally. These readmissions develop from errors in medication, insufficient post-discharge directions, and failure to stick to medication regimens. Pharmacist-driven MTM services can handle these issues effectively and have also been proven to reduce hospital readmission. Input from pharmacists in post-discharge care, such as medication review and counseling, greatly helps the patient to remain compliant with the prescriptions given by their doctors and also avoid possible mistakes with the new medicines.

In an article on the impact of MTM conducted by a pharmacist, the author noted that MTM services reduced hospital readmission. Patients who have already gone through MTM programs have a result that indicates a 20 percent reduction in readmissions compared to those patients with no engagement in the MTM programs. These taught strategies were centered on the power of being prepared to incur potential problems during patients' discharge, including details about patient directions on the usage of specific drugs, conforming drug interactions explanation, and, as well, confirmation whether patients understood the subsequent appointment procedures. This proactive measure averted issues that arose to warrant rehospitalization and would have cost much more.

Table 1: Hospital Readmission Rates with and without MTM

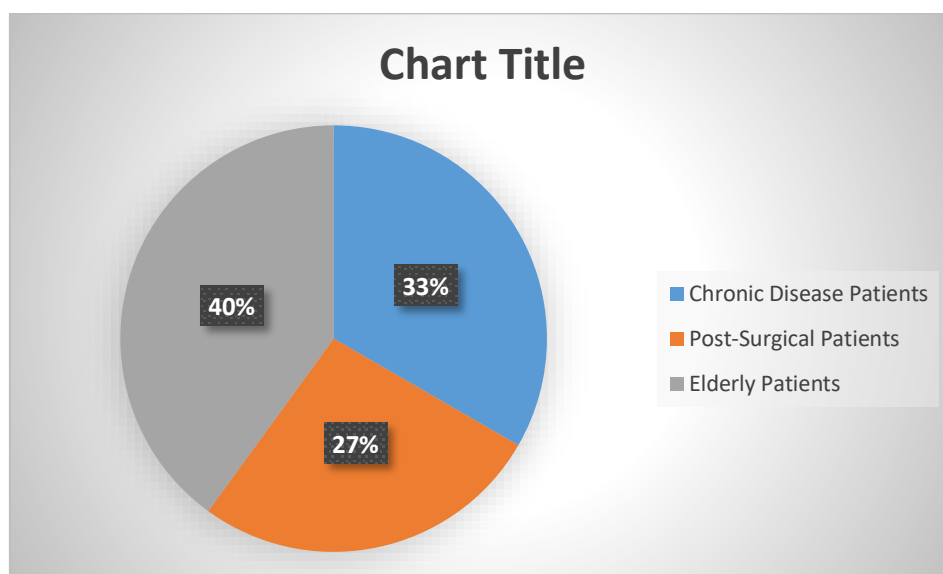
The table below compares the hospital readmission rates for patients who received pharmacist-led MTM services versus those who did not:

Patient Group	Readmissions Without MTM (%)	Readmissions With MTM (%)
Chronic Disease Patients	15%	10%
Post-Surgical Patients	12%	8%
Elderly Patients	18%	12%



The table demonstrates that patients who underwent pharmacist-driven MTM services have had a reduced readmission rate by various patients. These low readmission rates are evidence of the inclusion of pharmacists as the solution to direct patient education on medicine use, dosing, and general adherence to physicians' prescriptions and instructions and the prevention of drug-related problems that lead to readmissions.

These studies' findings reveal major advantages of MTM solutions led by pharmacists. There are, therefore, conspicuous effects resulting from such interventions on medication compliance, ADE incidence, and hospitalization reruns. These outcomes are driven by explicit medication management principles and shared responsibilities by pharmacists and other members of interprofessional healthcare teams for patient education and team collaboration. However, with the progression of healthcare programs, pharmacists must become part of the comprehensive medication management program to reduce the risks associated with medication therapy. The data indicates that MTM implemented by pharmacists is an effective intervention for addressing key concerns in the delivery of healthcare and should be embraced as an approach to examine and manage chronic illnesses and prevent medication-associated adverse effects.



DISCUSSION

The Effectiveness of MTM in Improving Patient Safety and Compliance

As the above findings indicate, this Medication Therapy Management (MTM) driven by pharmacists improves patient safety and medication compliance. They are involved in patient safety promotion through medication reconciliation, detecting and preventing potential medication misadventures, and offering counseling on correct medication use. Several of these interventions have been proven to significantly decrease levels of ADEs since the issue of interactions between different drugs, as well as the failure of the patient to understand what the doctor is giving him/her, is tackled. For instance, pharmacists continuously observe the signs of possible medication-related problems, including adverse effects and main and interacting risks, and adapt treatments based on that (Bloomfield et al., 2020). Therefore, by monitoring compliance with medication use, the pharmacist avoids complications likely to lead to hospitalization or even death.

Furthermore, the ongoing research confirmed that pharmacist-run MTM boosts patients' medication compliance even more in individuals with chronic conditions. Through individual counseling, medication therapy management, and follow-up, a person understands the value of medication adherence. This ensures the patients deal with challenges like misunderstanding, forgetting the right schedule for dosing, or potential side effects of taking the drugs. Therefore, patients have better clinical conditions, fewer complications, and better quality of life when adherence is increased (Centers for Medicare and Medicaid Services, 2016). Research shows that patients with chronic illnesses, for instance, hypertension, diabetes, or asthma, have higher levels of medication compliance with the involvement of pharmacists.

Barriers to Effective Implementation of MTM

However, MTM has been proven to have improved outcomes, and several challenges have been seen to resist its enhancement. There is one major concern, and that problem is the absence of reimbursement for MTM services to be claimed. Currently, many insurance plans offer insufficient reimbursement rates for pharmacist-delivered services, and the range of these services consequently remains quite small, a particularly acute problem in today's financially constrained environment. Inadequate remuneration will cause practitioners to be reluctant to implement or incorporate MTM programs into their services.

Additionally, internal and external pressures, such as time and workload challenges, limit pharmacists' adequate time to conduct full medication reviews and patient counseling. Heating up, several healthcare institutions are experiencing a shortage of qualified personnel or exceedingly large patient troupes, limiting the depth and quality of MTM subordinate activities. However, MTM programs are implemented unevenly in various healthcare sectors (Bloomfield et al., 2020). Whereas some systems actively endorse the importance of pharmacist participation in medication administration, others may not capture all these benefits and thus restrict MTM activities.

Policy Recommendations: Major policy shifts are required to overcome these barriers. The key to wider implementation of MTM lies in solving the reimbursement problem through expanding the list of insurance plans that cover MTM and raising awareness of MTM among healthcare providers and patients. Further, training programs for care providers, patients, and policymakers to enhance appreciation of the effective roles of pharmacist-driven MTM in health outcomes could also help.

Future Directions for MTM

Future researchers, therefore, need to conduct research that assesses the sustainable benefits of MTM on overall health costs and effects on the populace. Although studies have established that MTM directly has short-term impacts on patients' compliance with medication and medication safety, more research is required to know how MTM can lead to a reduction of overall health costs, such as readmissions, ADRs, and other complications. Furthermore, the use of technology in the delivery of MTM services can be

pointed out as a greatly promising factor in improving its efficiency. For example, electronic systems of ordering and administering medications, tele pharmacy consultations, and health app technologies may help pharmacists and patients touch base more explicitly, enabling pharmacists to remotely coordinate the management of medication regimens in real-time (Porter et al., 2022). These technologies could also enhance the possibility of reaching individuals from rural and poorly served areas with MTM services, thus enhancing the scalability of these approaches.

As MTM develops further, it will be mandatory to enhance the involvement of this strategy in acute and chronic care facilities, including the involvement of the pharmacists as members of the interdisciplinary team. Such studies should also explore the possibilities of MTM programs carried out by independent pharmacists in other populations of patients, including the elderly and clients with polypharmacy, to get to the deeper benefits offered across different healthcare needs.

CONCLUSION

Medication therapy management led by a pharmacist is a vital tool to enhance patient safety, medication compliance, and clinical results. However, it is acknowledged that there are some issues to address with the MTM services, like reimbursement issues and scarcity of resources for delivering such services. However, the available literature provides significant evidence to support the efficacy of MTM services in minimizing medication errors, improving patient compliance, and reducing healthcare costs. More specifically, increased availability is the key MTM component that should become a policy priority and receive additional funding and attention in the training of pharmacists.

RECOMMENDATIONS

Expand Reimbursement Policies: Encourage insurance companies to provide reimbursement for MTM services to ensure that more patients benefit from pharmacist-driven interventions.

Increase Training and Education for Pharmacists: Ensure that pharmacists receive continuous education and training in MTM to enhance their role in patient care.

Integrate Technology in MTM Services: Utilize electronic health records and medication management systems to streamline the delivery of MTM services and improve patient outcomes.

Promote Collaboration Across Healthcare Teams: Strengthen interdisciplinary communication between pharmacists, physicians, and other healthcare providers to improve the overall management of patients' medication regimens.

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