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# Review of medication therapy management provided by pharmacists to hypertension and diabetes patients in Indonesia

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**ABSTRACT**

Non-communicable diseases (NCDs) cause around 74% of deaths in the world, two of which are caused by hypertension and diabetes, which are chronic diseases. In general, it is characterized by high morbidity, polypharmacy and long-term treatment. This causes poor treatment compliance in the majority of respondents and has an impact on increasing disease complications, morbidity, mortality and treatment costs. Pharmacist intervention in managing NCDs has developed through a systematic, comprehensive medication management model approach such as the Medication Therapy Management (MTM) approach. This MTM model is designed to improve clinical outcomes from therapy, increase appropriate drug use, resolve treatment-related problems, improve respondents' quality of life and can provide good efficiency in avoiding risk factors for disease complications. This review was prepared to serve as comprehensive reference material regarding PTM. The method used is collecting scientific articles from national and international sources. The results obtained show that the MTM approach is an excellent pharmacist practice model in providing comprehensive pharmaceutical services for NCDs, especially hypertension and diabetes. The interventions that pharmacists can provide are comprehensive counseling by evaluating clinical results, compliance, knowledge, quality of life, perception of illness.



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# INTRODUCTION

Around 74% of deaths in the world (41 million) occur due to non-communicable diseases (NCDs). WHO data shows that the most common cause of death is cardiovascular disease in 17.9 million people every year, followed by cancer (9.3 million), respiratory diseases (4.1 million) and diabetes (1.5 million) (WHO, 2021). According to the International Diabetes Federation (IDF), Indonesia is ranked fifth in the country with the highest number of diabetes sufferers with 19.5 million in 2021 and it is predicted that there will be 28.6 million in 2045 (IDF, 2021). Meanwhile, the prevalence of hypertension will continue to increase sharply and it is predicted that by 2025 as many as 29% of

adults worldwide will suffer from hypertension. (WHO, 2021).

Chronic diseases are generally characterized by high morbidity, polypharmacy and long-term treatment. This causes poor treatment compliance in the majority of respondents and has an impact on increasing disease complications, morbidity, mortality and medical costs (Huang et al., 2022)(Eriyani et al., 2022)(Suling et al., 2023). The essence of respondent-oriented quality care is continuous monitoring and evaluation to ensure that therapy is used in an appropriate, safe and effective manner(Suarayasa, 2020)(Utami et al., 2021)(Ariyanti et al., 2023).

Chronic disease management interventions really require the role of clinical pharmacists as primary health care providers(Ernawati et al., 2020)(Sasanti et al., 2022)(Tasib et al., 2023). Not only acting as a drug seller and providing dispensing, but the role of pharmacists is currently expanded to include the concept of pharmaceutical services, making pharmacists as professionals in the health sector, as counselors/educators of respondents and as partners in collaboration with the health service team(Nugrohowati et al., 2020)(Susilawati et al., 2021)(Prasasti et al., 2024) (Toklu & Hussain, 2013).

Pharmaceutical practice is experiencing development through a systematic, comprehensive medication management model approach such as the MTM approach. This MTM model is designed to improve the clinical outcomes of a therapy, increase the appropriate use of medications, resolve treatment-related problems(Aditama et al., 2019)(Indah et al., 2023)(Handoko et al., 2024). The MTM approach to the practice of pharmaceutical services can improve the quality of life of respondents, increase medication adherence, provide good efficiency to avoid risk factors for disease complications, lead to reduced hospital readmissions, health care costs, and treatment-related problems(Pratama et al., 2021)(Khotimah et al., 2022)(Rostikarina, 2023)(Rostikarina & Aditama, 2024) (Ferries et al., 2019). This pharmacist-led MTM involves 5 core elements consisting of: medication therapy review, personal medication record, action plan related to medication, intervention or referral as well as documentation and follow-up (APA, 2008). In this review, we will review the latest MTM approach as a pharmaceutical practice model, the influence of MTM interventions on several outcomes such as medication adherence, respondents' quality of life, respondents' knowledge of disease and treatment and respondents' clinical outcomes. This review article can be used as a reference in determining effective MTM interventions to produce a positive impact from pharmacist interventions in the management of chronic hypertension and diabetes.

# RESEARCH METHOD

This review article is based on scientific articles, reviewing the impact of MTM interventions on the management of hypertension and diabetes in Indonesia. The search process considered relevance, type of article (original research) and publication between 2018 and 2024. PubMed, Google Scholar and NCBI databases were searched to retrieve studies of interest using relevant terms including "medication therapy management", "pharmacist intervention", " health center", "pharmacy", "chronic diseases", "non-communicable diseases", "hypertension", "diabetes", "adherence", "quality of life", "clinical outcomes", "knowledge" and "illness perception". This review focuses on studying the interventions carried out by pharmacists with the MTM practice model in increasing medication adherence, improving quality of life, improving clinical outcomes and increasing knowledge among respondents, especially hypertension and diabetes.

# RESULTS AND DISCUSSIONS

The study selection process is explained in Figure 1. There were 13 articles that were screened after removing duplicates and displaying the full article text. A total of eight articles were ultimately included in the review.

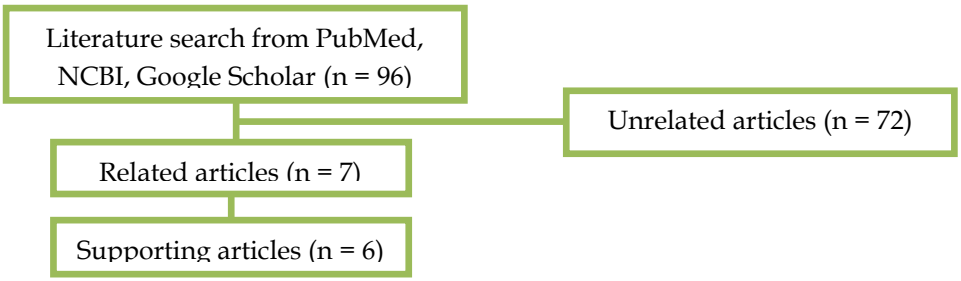


**Figure 1**. Literature flow chart

## Discussion

Table 1. Characteristics of included studies

| Writer, Year | MTM Intervention | Disease | City, Location, Number of samples | Study design and length of research | Assessment / Evaluation | Research Instrument |
|---|---|---|---|---|---|---|
| Purwanti Ningsih, 2020 | - MTR<br>- *Drug Therapy Problems*<br>- Education<br>- Counseling<br>*Pill-count* | DM | - Sragen Regency,<br>- Restu Medika Pharmacy<br>- 55 people in the control group<br>51 people in the intervention group | Quasi experimental Pretest & posttest with control group 4 months | Obedience<br>Clinical results<br>Quality of life | *Pill count*<br>Laboratory<br>DQOL Questionnaire |
| Malina, 2020 | - Assessment<br>- Education: benefits of taking medication, how to use DM medication, how to control blood sugar and signs of side effects<br>- Identify drug problems<br>- counseling on respondent problems<br>Documentation in smart books | DM | - Yogyakarta City<br>- Tegalrejo Health Center<br>- Gedongtengen Health Center<br>- Jetis Health Center<br>20 correspondents | Quasi experimental Pretest & posttest one group 1 month | Obedience<br>Quality of life | MGLS Questionnaire<br>DQLCTQ Questionnaire |
| Trinovita sari, 2020 | - Assessment<br>- Education: MTR and PMR<br>- Counseling: MRAP, documentation, follow up<br>- *Leaflets* | DM | - Yogyakarta City<br>- Tegalrejo Health Center<br>- Gedongtengen Health Center<br>- Jetis Health Center<br>25 correspondents | Quasi experimental Pretest & posttest one group 1 month | Knowledge<br>Quality of life | DKT Questionnaire<br>DQOL Questionnaire |
| Yasin, 2021 | - Assessment: | DM | - Yogyakarta | Quasi | Pain perception | BIP-Q |

| | | | | | | |
|---|---|---|---|---|---|---|
| | MTR<br>- Education and counseling: MRAP<br>- Treatment monitoring: documentation & follow up<br>- Documentation in smart books | | City<br>- Tegalrejo Health Center<br>- Gedongtengen Health Center<br>- Jetis Health Center<br>- 20 correspondents | experimental<br>Pretest & posttest one group<br>1 month | Clinical results | Questionnaire<br>Laboratory |
| TDS Pratama, 2020 | - MTR<br>- PMR<br>- MRAP<br>- *Intervention*<br>- *Follow up*<br>- Documentation in smart books | HT | - Yogyakarta City<br>- Umbulharjo II Community Health Center<br>- Mergangsan Community Health Center<br>- Mantrijeron Community Health Center<br>- 20 correspondents | Quasi experimental<br>Pretest & posttest one group<br>1 month | Clinical results<br>Quality of life | Tensimeter<br>SF-36 Questionnaire |
| Asadina, 2021 | - MTR: assessment<br>- Intervention: Counseling related to solutions to respondents' complaints, related to the drugs received by respondents and their use<br>- MRAP: education through leaflets<br>- *Follow up*: follow-up visit service | HT | - Yogyakarta City<br>- Umbulharjo II Community Health Center<br>- Mergangsan Community Health Center<br>- 300 correspondents | Quasi experimental<br>Pretest & posttest one group<br>1 month | Knowledge<br>Obedience | HK-LS Questionnaire<br>MG-LS Questionnaire |
| Rostikarina, 2023 | - *Drug Related Problems*<br>- *Home care*MTM based | HT | - Yogyakarta City<br>- Nurul Ichsan Pujon Clinic<br>- 20 people in the control group<br>- 20 people in the intervention group | Quasi experimental<br>Pretest & posttest two groups<br>1 month | Clinical results<br>Obedience | Tensimeter<br>21 Questions |

Information: MTR: Medication Therapy Review, PMR: Personal Medication Record, MRAP: Medication Related Action Plan, DM: Diabetes Mellitus, HT: Hypertension.

**Pharmacist intervention using Medication Therapy Management**

In three of the seven studies in our review, pharmacists conducted interventions using the MTM model for hypertensive respondents (TDS Pratama et al., 2020), (Asadina et al., 2021), (Rostikarina, 2023), the other four studies conducted interventions for diabetes respondents (Malina et al., 2020), (Trinovitasari et al., 2020), (Purwantiningsih et al., 2021) (Yasin et al., 2021). The seven studies implemented the 5 core elements of MTM with the flexibility of each to suit the research location. The five core elements are: Medication Therapy Review (MTR), Personal Medication Record (PMR), Medication Related Action Plan (MRAP), Intervention/Referal, and Documentation and Follow Up.

**Impact of Pharmacist Interventions on Hypertension Clinical Outcomes**

Research conducted by TDS Pratama on clinical results showed that there was a general reduction in blood pressure. Respondents experienced improvements in reducing blood pressure even though they had not yet reached the therapy target. MTM-based pharmacist intervention had a significant positive impact on reducing blood pressure with a P value <0.05, namely P 0.001 for systolic blood pressure and P 0.016 for diastolic pressure (TDS Pratama et al., 2020). This is in accordance with research from Wittayanukorn regarding the evaluation of MTM for cardiovascular disease: after MTM intervention from pharmacists, there was a significant increase in the quality of life of respondents (S. et al., 2013). Meanwhile, Rostikarina's research results showed a significant difference in the diastolic group, p=0.00<0.05. Of the test group respondents before being given the intervention, there were 2 respondents (10%) who reached the blood pressure target based on InaSH 2019. After being given the intervention, there were 9 respondents (45%) who reached the blood pressure target, where there was 1 respondent who had already had blood pressure before the intervention. controlled but after intervention the increase in blood pressure became uncontrolled. Meanwhile, 8 respondents had uncontrolled blood pressure before the intervention, but after the intervention it became controlled. And 1 respondent showed that his blood pressure remained stable before and after the intervention (Rostikarina, 2023).

**Impact of Pharmacist Interventions on Diabetes Clinical Outcomes**

Purwantiningsih's research on diabetes respondents, the fasting blood sugar (GDP) values of respondents before intervention in both groups had uncontrolled average GDP values. After the MTM intervention was carried out, there was an increase in the difference in clinical results in the control group by (Δ±SD 9.82±61.54) and the intervention group by (Δ±SD 26.61±42.04). Statistical results show that the magnitude of the increase in the clinical outcomes of respondents between the control and intervention groups is significantly different (p=0.010). The intervention group experienced a greater increase in clinical outcomes than the control group. This shows that the implementation of MTM service interventions led to an increase in the clinical outcomes of DM respondents (Purwantiningsih et al., 2021). In contrast to the results of Yasin's research, there was an overall average increase in GDP levels between before and after the MTM intervention of 1.3 mg/dL. Data after being given the MTM intervention showed that 50% of respondents had controlled GDP levels (≤130 mg/dL) and 35% of respondents had improved, experiencing a decrease in GDP levels even though they had not reached the target, while 15% of respondents experienced an increase in GDP levels of >130 mg/dL (Yasin et al. al., 2021). This is in accordance with research conducted by Michiel which stated that the intervention provided by pharmacists for type 2 DM patients did not significantly improve clinical outcomes at a good level of compliance, but had a significant impact on reducing HbA1c values and increasing patient knowledge regarding the disease (Michiels et al., 2019).

**Impact of Pharmacist Intervention on Compliance**

Asadina's research on the compliance of hypertensive respondents using the Morisky Green Level Scale (MGLS) questionnaire showed that the compliance score in counseling increased (Δ±SD 1.1±0.3), while the control group did not show an increase in compliance score (Δ±SD 0.2 ±0.2). The p value was obtained = 0.025, so statistically it shows that there is a significant difference between the difference in scores before and after the compliance assessment for the control and counseling groups.(Asadina et al., 2021). Compliance scores from the results of Rostikarina's research on hypertension respondents using a questionnaire consisting of 21 questions, 100% percent of the test group (20 people) showed non-compliance before the intervention, then the level of compliance increased to 9 people who were still not compliant and 11 people were. comply after being given intervention. Test and control groups with p=0.00, which means that MTM-based home care pharmaceutical services have an effect on compliance with hypertension respondents(Rostikarina, 2023). These two studies are in line with previous research conducted by Ramanath in 2012 that there was a significant difference between the compliance of the control group and the intervention group.(Ramanath et al., 2012). The results of Purwantiningsih's research regarding the impact of MTM intervention on compliance using the pill-count method showed that there was an increase in the difference in compliance in the control group by (Δ±SD 1.07±8.25) and the intervention group by (Δ±SD 5.76±9, 17). The results of statistical tests show that the magnitude of the increase in respondent compliance between the control and intervention groups is significantly different at p=0.001. The intervention group experienced a greater increase in compliance than the control group. This shows that the implementation of MTM service interventions causes an increase in DM patient compliance(Purwantiningsih et al., 2021). Research conducted by Malina in assessing diabetes patient compliance used the Morisky-Green Levine Medication Adherence Scale (MGLS) questionnaire which consists of 4 questions with a score range of 0-4, where the lowest score indicates high compliance. The results of the study showed that the average compliance score of respondents before the intervention was (Δ±SD 2.2±0.41) and after being given the MTM intervention was (Δ±SD -0.4±0.50). This shows that DM patients' treatment compliance increased significantly after receiving MTM intervention, with a p value = 0.005(Malina et al., 2020).

**Impact of Pharmacist Intervention on Knowledge**

Asadina's research in measuring knowledge of hypertensive patients using the Hypertension Knowledge Level Scale (HK-LS) questionnaire showed that the average result of hypertensive respondents had moderate knowledge (Δ±SD 14.3±3.766) and increased after MTM to high knowledge (Δ ±SD 20.32±2.399). The score increased from before the intervention on each question, which means there was an increase in respondents' knowledge of hypertension(Asadina et al., 2021). Trinovitasari's research on diabetes patient compliance using the Diabetes Knowledge Test (DKT) questionnaire showed that the average knowledge score before the intervention was (Δ±SD 8.9±2.3) and increased after being given the MTM intervention to (Δ±SD 11.6± 1.5). Even though there has been an increase, the results after being given MTM, the knowledge score is still in the medium knowledge range. However, based on the p value = 0.000, statistically the difference in scores before and after the intervention is significantly different. So it can be said that MTM service intervention can significantly increase the knowledge of diabetes mellitus patients(Trinovitasari et al., 2020). These results are in line with the results of Ndefo's research on 37 diabetes patients which explained that the average knowledge score of diabetes patients increased from 8.47 before being given MTM services to 9.57 after receiving MTM services with a maximum score of 10.(Ndefo et al., 2017).

**Impact of Pharmacist Interventions on Quality of Life**

Tiara's research regarding the results of statistical tests on quality of life scores for hypertensive patients using the SF-36 questionnaire showed that there was a significant difference

in the data before MTM was carried out and after MTM was carried out (P<0.05). In the analysis of the SF-36 questionnaire, it was found that the posttest results (Δ±SD 60.40±6.66) had a value greater than the pretest value (Δ±SD 54.44±8.91). The questionnaire includes 36 questions with 8 domains and a scoring range of 0-100. (TDS Pratama et al., 2020). Meanwhile, the results of Trinovitasari's research regarding the quality of life of diabetes patients showed that the average Diabetes Quality of Life (DQOL) questionnaire score before being given the intervention was (Δ±SD 50.56±3.9) and after being given the intervention increased to (Δ±SD 52 .84 ± 4.3). Based on the p value = 0.003, the two values are significantly different. Overall the DQOL questionnaire has a value range of 13-65. The higher the value of the questionnaire results obtained, the higher the patient's quality of life(Trinovitasari et al., 2020). The same research was conducted by Purwatiningsih regarding the quality of life of diabetes patients using the DQOL questionnaire and showed that there was an increase in the difference in quality of life in the control group of (Δ±SD 0.76±3.24) and the intervention group of (Δ±SD 2.71±4, 83). The results of statistical tests show that the magnitude of the increase in respondents' quality of life between the control and intervention groups is significantly different at p=0.018. The intervention group experienced a greater increase in compliance than the control group. This shows that the MTM service intervention led to an improvement in the quality of life of DM patients (Purwantiningsih et al., 2021). Malina used a different questionnaire, namely the Diabetes Quality of Life Clinical Trial Questionnaire (DQLCTQ) in assessing the impact of MTM intervention on diabetes patient compliance. The results of the research showed that the patient's quality of life score before the intervention was given was (Δ±SD 73.82±7.918) to (Δ±SD 76.42±5.623) after the MTM intervention with a difference of (Δ±SD 2.605±5.601). These results show that there is a significant improvement in quality of life, p=0.033. Statistically, it can be interpreted that there is a difference in the average quality of life score before and after MTM intervention by pharmacists for diabetes patients (Malina et al., 2020).

**Impact of Pharmacist Intervention on Pain Perception**

Yasin's research on describing the perception of illness in diabetes patients used the Brief Illness Perception Questionnaire (BIP-Q) with a score range of 0-80. The results obtained before the intervention were 49.95 and after being given the MTM intervention it increased by 0.5 to 50.45. This illustrates that there has been an improvement in the respondent's perception of the DM disease they suffer from, although the difference is small between the conditions before and after the MTM intervention. There are 8 domains described in the research, the domains that have increased after the MTM intervention are the domain of time, self-control, drug control, disease concerns and understanding about managing the disease, while the domains that have decreased are the domains of perceived consequences, identity and emotional(Yasin et al., 2021).

# CONCLUSION

The review findings that we compiled provide evidence that pharmacists who provide MTM services have a role in improving clinical outcomes in diabetes and hypertension respondents, when compared with not providing MTM services. MTM services provided by pharmacists provide opportunities to help respondents, especially high-risk and vulnerable populations. Considering that diabetes and hypertension are the most common chronic conditions in Indonesia. Future research could be conducted to support providing more targeted and definitive evidence regarding the value of these MTM services.

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