

Evaluation of Patient Retention in The Methadone Maintenance Treatment Program at Embung Fatimah Hospital, Batam

Heldi Candra¹, Fifin Oktaviani^{2*}, Lita Riastienanda Putri³

¹*Department of Pharmacy, Faculty of Health Sciences, Universitas Batam, Batam, Indonesia*

²*Embung Fatimah Hospital, Batam, Indonesia*

³*Raja Ahmad Tabib Hospital, Riau Islands Province, Indonesia*

*Corresponding author email: fifinrezali06@univbatam.ac.id

Abstract

The Methadone Maintenance Therapy Program (MMTP) is a pharmacological harm-reduction intervention designed for opioid-dependent people who inject drugs. Patient retention serves as the principal indicator of MMTP success because it is directly related to reductions in risky behaviour, HIV transmission, and opioid-related mortality. This study aimed to evaluate the retention rate and methadone-dosing profile of the MMTP at Embung Fatimah Hospital, Batam, during January-December 2025. A descriptive observational retrospective design was applied to the historical cohort of patients ever registered in the MMTP (n=41); with active retention as consistent methadone dose receipt without absences of ≥ 14 consecutive days. Data were drawn from daily methadone dosing forms, monthly methadone usage reports, and the MMTP coordinator's recapitulation, and were analysed descriptively with independent cross-verification. The active retention rate was 4.88% (2 of 41 patients); both retained patients were males in the 25–49 years age category. Mean maintenance doses were 72.1 mg/day (range 65.0-82.5) for Patient 1 and 50.5 mg/day (range 45.2-56.7) for Patient 2, whereas total program consumption reached 40,930 mg over eleven months (mean 3,721 mg/month). Stock management with batch B40612J (expiry February 2027) was adequate. The retention level was markedly below the Ministry of Health's effective threshold ($>55\%$) and the Indonesian average (60-65%), although both retained patients received doses within the effective range. Further investigation of historical cohort dynamics and hospital-level retention strategies is therefore warranted.

Keywords: *Harm Reduction, Maintenance Dose, MMTP, Patient Retention*



This is an open access article under the [CC BY 4.0 license](https://creativecommons.org/licenses/by/4.0/).

1. Introduction

Narcotics and other psychoactive substance abuse remains a serious public-health challenge in Indonesia. The national prevalence survey conducted by the National Narcotics Board together with the National Research and Innovation Agency and Statistics Indonesia recorded a narcotic abuse prevalence of 1.73% among the population aged 15–64 years, equivalent to approximately 3.3 million people in 2023 (Badan Narkotika Nasional, 2024). Among these, people who inject opioids (PWID) face the highest risks of Human Immunodeficiency Virus (HIV) and hepatitis C transmission, criminal involvement, and overdose-related death. As part of its harm-reduction strategy, the Government of Indonesia has implemented the Methadone Maintenance Therapy Program (MMTP) since 2003 under Indonesian Ministry of Health Regulation No. 57 of 2013 concerning the Guidelines for the Implementation of the Methadone Maintenance Therapy Program (Kementerian Kesehatan Republik Indonesia, 2013).

Methadone is a long-acting synthetic opioid agonist that stabilises μ -opioid receptors, eliminates withdrawal symptoms, and reduces craving, allowing patients to discontinue the use of illicit opioids. A recent systematic review of contemporary evidence has confirmed that opioid agonist therapy, including methadone, significantly reduces all-cause mortality among patients with opioid dependence during the treatment period (Santo et al., 2021). Current national and international clinical guidelines position methadone and buprenorphine as first-line treatments for opioid use disorder (OUD), with comparable effectiveness in suppressing illicit opioid use and adverse events (Degenhardt et al., 2023; Yakovenko et al., 2024). These clinical benefits, however, can only be achieved when patients remain in treatment for an adequate duration. Patient retention therefore constitutes a critical proxy for clinical outcomes that is associated with reduced HIV transmission, improved quality of life, and social reintegration (Williams et al., 2023).

According to Indonesian Ministry of Health Regulation No. 57 of 2013, a patient is considered to remain in the program if there is no absence from dose collection for 14 consecutive days or more (Kementerian Kesehatan Republik Indonesia, 2013). MMTP retention rates vary widely between countries and service facilities. A 17-year cohort study in Georgia reported that the median retention duration declined from 6.6 to 0.3 years between 2008 and 2024 (Giorgobiani et al., 2025), while a study in Iran observed only 15.84% one-year retention among patients referred from compulsory rehabilitation centres (Radfar et al., 2023). In the United States, six-month retention ranged from 60% to 70% following the relaxation of take-home dose regulations during the COVID-19 pandemic (Krawczyk et al., 2023), with higher day-7 induction doses showing a significant association with 30-day retention (Sherrick, 2025). In Uganda, the 12-month retention among PWID receiving methadone therapy reached 55.2%, with maintenance doses of ≥ 60 mg/day acting as a consistent protective factor (Mudiope et al., 2024).

Several Indonesian studies have characterised retention rates and their determinants in primary-care and psychiatric-hospital settings. Udayani et al. (2020) at the Public Health Centre of Badung Regency documented an association between the duration of opioid use and the methadone dose with patient retention. In the setting of

Menur Psychiatric Hospital, Surabaya, Siswidiarsari et al. (2023) and Siswidiarsari (2024) demonstrated the effects of the duration of opioid use and methadone dose on retention scores. Nuramadani et al. (2022) at Sungai Bangkong Regional Psychiatric Hospital, Pontianak, reported a retention rate of 64.3% among PWID. HIV co-infection in MMTP patients undergoing concurrent antiretroviral therapy adds clinical complexity, as illustrated by Moku et al. (2023) in a case report from Prof. IGNG Ngoerah Central General Hospital, Denpasar, while adjunctive cognitive-behavioural intervention has been shown to improve mental health and long-term adherence in MMTP patients (Amiri et al., 2024).

Batam City is an international transit city in the Riau Islands Province characterised by relatively high narcotics circulation owing to its proximity to international crossings. MMTP services in this city are limited; one such service operates at Embung Fatimah Hospital, which has been running for several years. To date, no systematic evaluation of MMTP patient retention at hospital-based providers in Batam City has been published, even though profiling retention and dose patterns is essential as a basis for locally relevant interventions. To address this gap, the present study aimed to (1) describe the patient retention rate of the MMTP at Embung Fatimah Hospital, Batam, during January–December 2025; (2) characterise the methadone maintenance-dose pattern among the retained patients; and (3) evaluate the methadone consumption profile and program-level stock management. The findings are expected to provide empirical evidence to strengthen hospital-based MMTP services across the Riau Islands region.

2. Literature Review

2.1 The Concept of Retention in Methadone Maintenance Therapy Programs

Retention refers to the ability of a program to keep patients in treatment for a duration sufficient to produce the intended clinical outcomes. Operational definitions of retention vary between studies: some use cutoffs of three, six, or twelve months, while Indonesian Ministry of Health Regulation No. 57 of 2013 specifies the absence of any dose-collection gap of 14 consecutive days or more as the indicator of active retention (Kementerian Kesehatan Republik Indonesia, 2013). Mudiope et al. (2024) reported that MMTP retention analysed by the Kaplan–Meier method declined from 83.4% at three months to 55.2% at twelve months, indicating that measuring retention at multiple time points provides a more comprehensive picture than a single time-point measurement. This variability in definitions reinforces the need for a consistent reporting framework when comparing performance across facilities and across periods.

2.2 Maintenance Dose and Its Influence on Retention

The literature consensus places a methadone maintenance dose of ≥ 60 mg/day as the minimum effective threshold required to suppress withdrawal symptoms and craving, thereby sustaining retention (Sherrick, 2025; Yakovenko et al., 2024). The multicentre study by Sherrick (2025), which involved 14,489 patients across 64 opioid treatment programs in the United States during 2020–2023, demonstrated a dose-dependent association between the day-7 methadone dose and 30-day retention.

Siswidiyasari (2024) likewise reported that methadone dose influenced retention scores in an Indonesian psychiatric hospital setting. Optimisation of dose titration during the induction phase therefore becomes a clinical key to securing patients through the early treatment phase, which is the most vulnerable to drop-out.

2.3 Other Determining Factors

Beyond the maintenance dose, factors such as age, duration of opioid use, employment status, family social support, HIV comorbidity, and concurrent substance use also influence retention (Radfar et al., 2023; Udayani et al., 2020). The study by Diep et al. (2025) in Vietnam found that concurrent methamphetamine use was a leading risk factor for methadone non-adherence in the Southeast Asian context. Social stigma and limited geographical access have also been documented as structural barriers that can disrupt the retention chain, particularly in low- and middle-income countries (López-Ramírez et al., 2023). Technology-based psychosocial interventions involving peer support hold promise for strengthening retention by enhancing motivation and patient social connectedness (Siste et al., 2024).

2.4 Implications of Retention for Clinical Outcomes

Adequate retention is associated with significant reductions in all-cause mortality, overdose-related mortality, and HIV transmission, as well as with improvements in patient quality of life (Santo et al., 2021). The reduction in mortality risk remains consistent in older patients undergoing long-term MMTP (Nazmin et al., 2024). On this basis, retention evaluation at the level of the implementing facility becomes a strategic step to identify locally specific intervention points.

3. Research Method

3.1 Study Design and Approach

This study used a descriptive observational design with a retrospective approach to a historical cohort of MMTP patients. The design was selected because the primary aim was to characterise the retention profile and dosing patterns that had occurred during the observation period by tracing official documents maintained by the hospital. The retrospective approach is consistent with previous Indonesian MMTP studies (Nuramadani et al., 2022; Siswidiyasari et al., 2023; Udayani et al., 2020). The reporting followed the principles of observational transparency outlined in the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) framework so that each methodological step is reproducible and accountable.

3.2 Setting and Period

The study was conducted at Embung Fatimah Hospital, located at Jalan R. Soeprapto Block D Number 1–9, Batu Aji, Batam City, Riau Islands Province, as one of the MMTP-implementing health facilities in Batam. The data observation period covered January to December 2025, whereas the data collection, verification, and analysis phases were carried out from October 2025 to January 2026.

3.3 Population, Sample, and Sampling Technique

The population comprised all patients who had ever been registered in the MMTP at Embung Fatimah Hospital and who were recorded on the hospital's Daily Methadone Dosing forms. Total sampling was applied so that all members of the population meeting the inclusion criteria were included, yielding a sample size of 41 patients. The use of total sampling was justified by the relatively small population size and the descriptive nature of the study. Inclusion criteria were (1) patients aged ≥ 18 years at MMTP initiation, (2) those formally recorded in the monthly Daily Methadone Dosing documents of Embung Fatimah Hospital, and (3) those whose identity data and dosing history could be traced in the program archive. The exclusion criterion was the duplication of names that could not be verified against the enrolment archive.

3.4 Operational Definitions of Variables

The primary variable was the patient retention status during the observation period, categorised as either active retention or inactive (drop-out). Active retention was defined as the consistent receipt of methadone doses throughout January–December 2025 without any absence of 14 consecutive days or more, in accordance with Indonesian Ministry of Health Regulation No. 57 of 2013 (Kementerian Kesehatan Republik Indonesia, 2013). The inactive category (cumulative drop-out) was assigned to patients no longer receiving doses during the observation period, whether they had exited the program before 2025 or for other administrative reasons. Supporting variables included age group (categorised as <15, 15–19, 20–24, 25–49, and ≥ 50 years in line with the official reporting format), sex, monthly maintenance dose (mg/day) calculated as the total monthly consumption divided by the number of calendar days in that month, total monthly program consumption (mg), and stock management variables comprising opening stock, intake, closing stock, batch number, and expiry date.

3.4 Data Sources and Instruments

Data were drawn from four primary hospital documents. First, the monthly Daily Methadone Dosing form, which contains each patient's daily dose record signed by the MMTP Person-in-Charge. Second, the Monthly Methadone Usage Report, which contains opening stock, intake (date and quantity), total bottle volume, number of patients served, total consumption, closing stock, batch, and expiry date. Third, the recapitulation of active patients, new patients, and drop-out cases signed by the MMTP Coordinator. Fourth, the official transmittal letters to the Directorate General of Pharmaceutical and Medical Devices, c.q. the Directorate of Pharmaceutical Management and Services, serving as a supporting document for quality control. The recording instrument was a Microsoft Excel 2019 worksheet whose structure had been adapted to the study variables.

3.5 Data Collection Procedure

Data collection was carried out in three stages. The first stage involved identification of all patients ever registered in the MMTP based on hospital archives. The second stage was extraction of daily dosing data, monthly consumption, and stock management from

the primary documents into the Microsoft Excel 2019 worksheet according to the predetermined variables. The third stage consisted of double independent cross-verification by the researchers to ensure data-entry accuracy and the agreement of monthly totals between the Daily Methadone Dosing forms and the Monthly Methadone Usage Reports.

3.6 Data Analysis

Given the relatively small size of the actively retained subgroup, the analysis was performed descriptively without inferential statistical testing. Categorical data were presented as frequencies (n) and percentages (%), whereas numerical data (daily maintenance dose, total monthly consumption, and stock) were presented as means, standard deviations, and value ranges. Monthly trends were visualised using line charts for maintenance doses and bar charts for monthly consumption. All calculations were performed in Microsoft Excel 2019. Reference and citation management was conducted using Mendeley Reference Manager with metadata synchronisation based on Digital Object Identifier (DOI) for all journal articles cited, ensuring the accuracy and accountability of source attribution.

3.7 Data Quality Control

Data quality was controlled through four mechanisms: (1) double independent cross-verification at the data-entry stage; (2) the use of primary documents signed by the MMTP Person-in-Charge or the Program Coordinator; (3) confirmation that the monthly total consumption recorded on the Daily Methadone Dosing forms matched the Monthly Methadone Usage Reports; and (4) cross-audit using the official transmittal letters to the Directorate General of Pharmaceutical and Medical Devices. Any verification discrepancy greater than 2% was discussed by the researchers and the MMTP coordinator until consensus was reached.

4. Result

4.1 Patient Retention Rate

During the period January–December 2025, a total of 41 patients had ever been registered in the MMTP at Embung Fatimah Hospital, based on the monthly Daily Methadone Dosing forms. Of these, 2 patients (4.88%) were classified as actively retained, whereas 39 patients (95.12%) had not received doses throughout the entire observation period (Table 1). The MMTP Coordinator's monthly recapitulation consistently recorded 2 active patients, 0 new patients, and 0 patients formally declared drop-outs, indicating that the cohort transition from active to inactive had occurred before the observation period began. Both retained patients were males in the 25-49 years age category, consistent with the typical MMTP patient profile in Indonesia, which is generally dominated by males of productive age (Nuramadani et al., 2022; Udayani et al., 2020).

The 4.88% retention rate is markedly below the effective threshold set by the Indonesian Ministry of Health, which specifies a first-year drop-out rate of <45% or,

equivalently, a retention rate >55% (Kementerian Kesehatan Republik Indonesia, 2013), as well as below the rates reported by other Indonesian MMTP studies. It should be emphasised that the retention rate reported in this study is cumulative-historical rather than the classical annual retention, because the denominator includes all patients ever registered since the program began at Embung Fatimah Hospital, not only those initiated in 2025.

Table 1. Patient retention rate of the Methadone Maintenance Therapy Program at Embung Fatimah Hospital based on the Daily Methadone Dosing form, January–December 2025 (n=41)

Retention category	n	%
Active retention (consistent dosing throughout 2025 without ≥14-day absence)	2	4.88
Inactive (cumulative drop-out before and during 2025)	39	95.12
Total	41	100.00

Source: Daily Methadone Dosing forms and MMTP Coordinator recapitulation, Embung Fatimah Hospital, January–November 2025.

4.2 Profile of Actively Retained Patients

The characteristics of the two patients who successfully maintained retention are presented in Table 2. Patient 1 received a mean daily maintenance dose of 72.1 mg/day (range 65.0–82.5 mg/day) with the mode within the 70–75 mg/day range, whereas Patient 2 received a mean daily maintenance dose of 50.5 mg/day (range 45.2–56.7 mg/day). The dosing pattern of Patient 1 was consistently above the 60 mg/day effective-dose threshold commonly cited in the international literature (Sherrick, 2025; Williams et al., 2023), while Patient 2 remained near the lower boundary of the effective range (≥40 mg/day). Doses were administered daily at the service unit, combined with Take Home Doses (THD) on certain days adjacent to the patients' scheduled visits.

Table 2. Monthly maintenance-dose profile of the two actively retained MMTP patients at Embung Fatimah Hospital, January–November 2025

Month	Patient 1 total (mg)	Patient 1 mean (mg/day)	Patient 2 total (mg)	Patient 2 mean (mg/day)	Days
January	2,550	82.3	1,700	54.8	31
February	2,100	75.0	1,400	50.0	28
March	2,100	67.7	1,400	45.2	31

April	2,475	82.5	1,700	56.7	30
May	2,125	68.5	1,450	46.8	31
June	2,170	72.3	1,550	51.7	30
July	2,240	72.3	1,600	51.6	31
August	2,030	65.5	1,450	46.8	31
September	2,170	72.3	1,550	51.7	30
October	2,170	70.0	1,550	50.0	31
November	1,950	65.0	1,500	50.0	30
December*	—	—	—	—	31
Mean Jan–Nov	2,189	72.1	1,532	50.5	—

*Note: *December 2025 data were not yet available at the time of manuscript preparation and will be completed at manuscript finalisation. The mean daily dose was calculated from monthly total consumption divided by the number of calendar days in that month.*

4.3 Methadone Consumption and Program Stock Management

Total program methadone consumption during the first eleven months of 2025 reached 40,930 mg, with a monthly mean of 3,721 mg/month (Table 3). The highest consumption was recorded in January (4,250 mg) and April (4,175 mg), corresponding to the increase in Patient 1's maintenance dose to 82–83 mg/day during those months. The lowest consumption was recorded in November (3,450 mg), coinciding with the reduction of Patient 1's dose to 65.0 mg/day. Methadone stock intake was carried out periodically: 20,000 mg on 19 February 2025 (batch B40612J, expiry February 2027), 10,000 mg on 17 June 2025, and an additional 10,000 mg in early October 2025. The closing stock at the end of November 2025 was 12,245 mg, sufficient to meet the program's needs for the following two months without further intake.

Table 3. Methadone consumption and program stock management of the MMTP at Embung Fatimah Hospital, January–November 2025

Month	Opening stock (mg)	Intake (mg)	Usage (mg)	Closing stock (mg)	Notes
January	13,175	—	4,250	8,925	Batch F21036J
February	8,925	20,000	3,500	25,425	Batch B40612J, exp Feb 2027
March	25,425	—	3,500	21,925	—
April	21,925	—	4,175	17,750	—
May	17,750	—	3,575	14,175	—
June	14,175	10,000	3,720	10,455	Intake on 17 June 2025

July	10,455	—	3,840	6,615	—
August	6,615	10,000	3,480	13,135	Supplementary intake
September	13,135	—	3,720	9,415	—
October	9,415	10,000	3,720	15,695	Intake in early October
November	15,695	—	3,450	12,245	—
December*	12,245	—	—	—	Data pending
Total Jan–Nov	—	40,000	40,930	—	Mean 3,721 mg/month

*Note: *December 2025 data were not yet available at the time of manuscript preparation and will be completed at manuscript finalisation. Methadone liquid concentration: 10 mg/mL.*

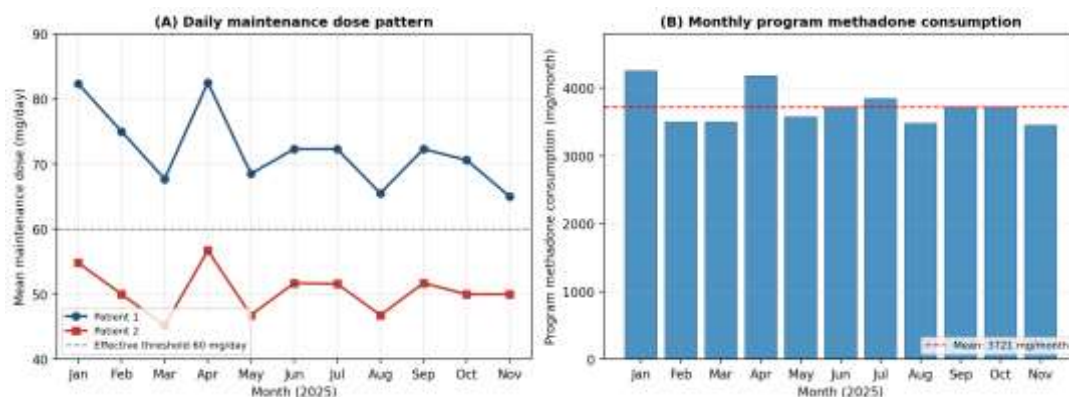


Figure 1. Methadone administration profile of the actively retained patients in the Methadone Maintenance Therapy Program at Embung Fatimah Hospital, January–November 2025: (A) daily maintenance-dose pattern; (B) monthly program methadone consumption.

Figure 1 displays two complementary patterns. Panel A shows that Patient 1 maintained a dose above the 60 mg/day effective threshold throughout the eleven months of observation, with two peak points in January (82.3 mg/day) and April (82.5 mg/day) that were consistent with the individual clinical need. Patient 2 remained within a relatively stable range of 45–57 mg/day but was consistently lower than Patient 1. Panel B shows that the total monthly program consumption followed the dose dynamics of Patient 1 as the largest contributor, with a mean of 3,721 mg/month and a relatively narrow range (3,450–4,250 mg). The relative stability of dose and consumption patterns indicates that both retained patients exhibited good daily adherence and did not experience large dose fluctuations of the kind generally associated with treatment non-adherence.

5. Discussion

The principal finding of this study is the low MMTP patient retention at Embung Fatimah Hospital, Batam City, namely 4.88% during January–December 2025. This figure is markedly below the effective threshold of the Indonesian Ministry of Health (>55%)

(Kementerian Kesehatan Republik Indonesia, 2013), the Indonesian average of 60–65% reported in earlier studies (Nuramadani et al., 2022; Udayani et al., 2020), and the international rates of 55–70% reported in the United States and Uganda (Krawczyk et al., 2023; Mudiope et al., 2024). The interpretation of this figure, however, requires caution because the denominator (n=41) represents the cumulative number of patients ever registered throughout the program's history at this hospital, rather than a new cohort initiated in 2025. In other words, most of the inactive patients had left the program during earlier periods, and 2025 itself recorded no new enrolment and no formal drop-outs.

Several potential factors may explain the low historical retention of this program. First, the geographic position of Batam as an international transit city implies a high level of population mobility, including among PWID, so that some patients are likely to have relocated or obtained services at other facilities. The study by Diep et al. (2025) in Vietnam confirms that mobility and concurrent substance use particularly methamphetamine are leading risk factors for non-adherence in the Southeast Asian context. Second, the limited availability of counsellors and the absence of structured psychosocial services may contribute to early-phase drop-out. The study by Siste et al. (2024) demonstrated that technology-based psychosocial interventions involving peer support can strengthen retention among Indonesian patients with substance use disorders. Third, social stigma and limited daily transportation access to the service unit can act as structural barriers that are difficult to overcome without a satellite-service policy (López-Ramírez et al., 2023). Radfar et al. (2023) further emphasised the importance of service-structure factors in retention, with compulsorily referred patients showing lower retention than voluntarily enrolled patients.

The maintenance-dose profiles of the two actively retained patients provide important information. Patient 1 consistently received a dose above the 60 mg/day effective threshold, a pattern aligned with international recommendations and with studies that have established a dose-dependent relationship between methadone dose and retention (Sherrick, 2025; Siswidiarsari, 2024; Yakovenko et al., 2024). The multicentre study by Sherrick (2025), covering 64 opioid treatment programs in the United States, demonstrated that patients with higher day-7 doses had greater odds of 30-day retention. Patient 2, who remained within the 45–57 mg/day range, was nevertheless able to maintain retention, suggesting that the individual effective threshold may vary between patients. The study by Nuramadani et al. (2022) in Pontianak likewise found that retention was determined not only by dose but also by the duration of opioid use and patient psychosocial status. These observations reinforce the importance of individualised dose titration in MMTP.

Methadone stock management at Embung Fatimah Hospital was well-executed and well-documented. Regular stock intake involving a single batch (B40612J), which remains valid until February 2027, reflects careful demand planning. The mean total consumption of 3,721 mg/month provides a basis for estimating an annual program requirement of approximately 44,000–45,000 mg, commensurate with serving two active patients at mean maintenance doses above 50 mg/day. The pharmacotherapy aspects—including batch, expiry, and recording accuracy are consistent with Article 9 of Indonesian Ministry of Health Regulation No. 57 of 2013 on the Guidelines for the

Implementation of MMTP (Kementerian Kesehatan Republik Indonesia, 2013), which requires strict pharmaceutical documentation for this Class II narcotic preparation.

Comorbidity and clinical complexity among MMTP patients with HIV undergoing antiretroviral therapy add further strategic considerations. Moku et al. (2023) described the complexity of managing MMTP patients also receiving antiretroviral therapy, which is relevant to the need for integrated MMTP and HIV clinic services at the hospital level. Although the HIV status of patients was not documented in the records analysed in this study, expanding integrated comprehensive services is an important strategic consideration for strengthening clinical management. Adjunctive cognitive-behavioural interventions, shown to improve the mental health and life expectancy of MMTP patients (Amiri et al., 2024), merit consideration as part of an integrated MMTP service package at the hospital level. This context is relevant because the reductions in mortality reported by Santo et al. (2021) and Nazmin et al. (2024) are achieved primarily among patients who remain in treatment for an adequate duration.

The practical implications of this study include four main points. First, the need for an in-depth retrospective audit of the 39 inactive patients to identify critical drop-out points and the possibility of patient referral to satellite facilities. Second, strengthening the documentation of baseline characteristics (age, duration of opioid use, HIV status, employment status, and family support) for every patient enrolled, so that risk-factor analysis can be conducted in the future. Third, optimising titration and the maintenance dose to reach the effective threshold of ≥ 60 mg/day, consistent with current evidence (Sherrick, 2025; Yakovenko et al., 2024). Fourth, strengthening family-based psychosocial interventions and peer involvement as integral components of the MMTP (Amiri et al., 2024; Siste et al., 2024).

This study has several limitations. Its single-centre design means that generalising the findings to other MMTP facilities should be done with caution. The unavailability of baseline characteristic data for the 39 inactive patients prevented risk-factor analysis. In addition, the one-year observation period is insufficient to capture long-term retention dynamics. Further research using a multicentre prospective cohort design in the Riau Islands, with an observation duration of ≥ 24 months and measurements of patient quality of life, would provide more comprehensive evidence for improving MMTP services at the level.

6. Conclusion

The active retention rate of patients in the Methadone Maintenance Therapy Program at Embung Fatimah Hospital, Batam City, during January-December 2025 was 4.88% (2 of 41 patients ever registered), which is markedly below the effective threshold set by the Indonesian Ministry of Health ($>55\%$). Both actively retained patients were males in the 25–49 years age category, with mean maintenance doses of 72.1 mg/day and 50.5 mg/day, both within the effective dose range. The total program methadone consumption during the first eleven months of 2025 was 40,930 mg, with a monthly mean of 3,721 mg/month, and stock management was adequate through periodic intake using batch B40612J, which remains valid until February 2027. A retrospective audit of the

historical cohort of inactive patients, strengthening of baseline-characteristic documentation, optimisation of the maintenance dose, and reinforcement of family-based psychosocial interventions are recommended to improve MMTP patient retention in subsequent periods.

7. Acknowledgment

The authors thank Embung Fatimah Hospital, Batam, particularly the MMTP team and pharmacy staff, for their support during data collection. Appreciation is also extended to the Department of Pharmacy, Faculty of Health Sciences, Universitas Batam, for administrative assistance. The authors declare no conflict of interest.

REFERENCES

- Amiri, P., Rasouli-Azad, M., Afshari, B., Chehri, A., Amiri, M., & Rezaie, Z. (2024). Effectiveness of cognitive-behavioral therapy on mental health, life expectancy, and happiness in patients receiving methadone maintenance treatment. *Journal of Education and Health Promotion*, 13, 391. https://doi.org/10.4103/jehp.jehp_781_23
- Badan Narkotika Nasional. (2024). *Hasil survei nasional pengukuran prevalensi penyalahgunaan narkoba tahun 2023* [National survey on the prevalence of narcotics abuse in 2023]. Pusat Penelitian Data dan Informasi Badan Narkotika Nasional. <https://puslitdatin.bnn.go.id/konten/unggahan/2024/03/Hasil-Surnas-Lahgun-Narkoba-2023.pdf>
- Degenhardt, L., Clark, B., Macpherson, G., Leppan, O., Nielsen, S., Zaharoulis, E., Larance, B., Santo, T., Hickman, M., Gisev, N., Tran, L. T., Lewer, D., Gowing, L., Mattick, R. P., & Farrell, M. (2023). Buprenorphine versus methadone for the treatment of opioid dependence: A systematic review and meta-analysis of randomised and observational studies. *The Lancet Psychiatry*, 10(6), 386–402. [https://doi.org/10.1016/S2215-0366\(23\)00095-0](https://doi.org/10.1016/S2215-0366(23)00095-0)

- Diep, N. B., Trang, N. T., Huy, D. D., Van, H. T. H., Truc, T. T., Van Dung, D., Hojabri, M., Borus, R., Sotak, J., Le Minh, G., Pham, K., Lin, C., & Li, L. (2025). Non-adherence to methadone treatment and concurrent opioid use among people on methadone maintenance treatment using methamphetamine in Vietnam. *Journal of Substance Use and Addiction Treatment*, 173, 209686. <https://doi.org/10.1016/j.josat.2025.209686>
- Giorgobiani, L., Todadze, K., & Ruadze, E. (2025). Seventeen years of experience: A retrospective cohort analysis of methadone maintenance treatment program patterns in Georgia. *Harm Reduction Journal*, 23(1), 16. <https://doi.org/10.1186/s12954-025-01365-y>
- Kementerian Kesehatan Republik Indonesia. (2013). *Peraturan Menteri Kesehatan Republik Indonesia Nomor 57 Tahun 2013 tentang Pedoman Penyelenggaraan Program Terapi Rumatan Metadona* [Regulation of the Minister of Health of the Republic of Indonesia Number 57 of 2013 on the Guidelines for the Implementation of the Methadone Maintenance Therapy Program]. Kementerian Kesehatan Republik Indonesia.
- Krawczyk, N., Rivera, B. D., Levin, E., & Dooling, B. C. E. (2023). Synthesising evidence of the effects of COVID-19 regulatory changes on methadone treatment for opioid use disorder: Implications for policy. *The Lancet Public Health*, 8(3), e238–e246. [https://doi.org/10.1016/S2468-2667\(23\)00023-3](https://doi.org/10.1016/S2468-2667(23)00023-3)
- López-Ramírez, E., Huber, M. J., Matías-Pérez, D., Santos-López, G., & García-Montalvo, I. A. (2023). Opioid harm reduction and stigma: Proposed methods to improve the perception of people with addiction. *Frontiers in Psychiatry*, 14, 1197305. <https://doi.org/10.3389/fpsyt.2023.1197305>
- Mokalu, S., Aryani, L. N. A., Hariandja, S. H., & Leni, N. M. (2023). Faktor risiko pada pasien dengan terapi rumatan metadon dan antiretroviral: Sebuah laporan kasus [Risk factors in a patient with methadone maintenance and antiretroviral therapy: A case report]. *Intisari Sains Medis*, 14(3), 1135–1139. <https://doi.org/10.15562/ism.v14i3.1897>
- Mudiope, P., Mutamba, B. B., Komuhangi, L., Nangendo, J., Alamo, S., Mathers, B., Makumbi, F., & Wanyenze, R. (2024). Retention of people who inject drugs enrolled in a "medications for opioid use disorder" (MOUD) programme in Uganda. *Addiction Science & Clinical Practice*, 19(1), 39. <https://doi.org/10.1186/s13722-024-00468-4>

- Nazmin, F., Nath, T. S., Limbaña, T. A., Murugan, V., Garcia, J., & Singareddy, S. (2024). Systematic review on mortality in the elderly on methadone maintenance treatment. *Cureus*, 16(9), e68910. <https://doi.org/10.7759/cureus.68910>
- Nuramadani, N., Susanti, R., & Purwanti, P. (2022). Analisis hubungan dosis dan nilai retensi terapi metadon bagi pengguna narkotika suntik di Program Terapi Rumatan Metadon Rumah Sakit Jiwa Daerah Sungai Bangkong Pontianak [Analysis of the relationship between dose and retention scores of methadone therapy among injecting drug users in the Methadone Maintenance Therapy Program at Sungai Bangkong Regional Psychiatric Hospital, Pontianak]. *Jurnal Mahasiswa Farmasi Fakultas Kedokteran Universitas Tanjungpura*, 6(1), 1–12.
- Radfar, S. R., Vahedi, M., Stowe, M. J., Yunesian, M., Salehi, M., Rafei, P., & Rawson, R. A. (2023). One-year retention of methadone maintenance treatment in patients referred from compulsory residential treatment centers in Iran. *Frontiers in Psychiatry*, 14, 1139307. <https://doi.org/10.3389/fpsyt.2023.1139307>
- Santo, T., Jr., Clark, B., Hickman, M., Grebely, J., Campbell, G., Sordo, L., Chen, A., Tran, L. T., Bharat, C., Padmanathan, P., Cousins, G., Dupouy, J., Kelty, E., Muga, R., Nosyk, B., Min, J., Pavarin, R., Farrell, M., & Degenhardt, L. (2021). Association of opioid agonist treatment with all-cause mortality and specific causes of death among people with opioid dependence: A systematic review and meta-analysis. *JAMA Psychiatry*, 78(9), 979–993. <https://doi.org/10.1001/jamapsychiatry.2021.0976>
- Sherrick, R. C. (2025). Relationship between methadone induction dosing and retention in treatment in opioid treatment programs. *Journal of Addiction Medicine*, 19(4), 446–448. <https://doi.org/10.1097/ADM.0000000000001473>
- Siste, K., Ophinni, Y., Hanafi, E., Yamada, C., Novalino, R., Limawan, A. P., Suryani, E., Beatrice, E., Sen, L. T., & Christian, H. (2024). Relapse prevention group therapy in Indonesia involving peers via videoconferencing for substance use disorder: Development and feasibility study. *JMIR Formative Research*, 8, e50452. <https://doi.org/10.2196/50452>
- Siswidiarsari, A. (2024). Pengaruh penggunaan dosis metadon terhadap nilai retensi pasien Program Terapi Rumatan Metadon [The effect of methadone dose on retention scores of patients in the Methadone Maintenance Therapy Program]. *Parapemikir: Jurnal Ilmiah Farmasi*, 13(2), 1–8. <https://doi.org/10.30591/pjif.v13i2.6588>
- Siswidiarsari, A., Sasadara, M. M. V., & Wirasuta, I. M. A. G. (2023). Pengaruh lama penggunaan narkotika dan psikotropika terhadap nilai retensi pasien di Rumah

Sakit Jiwa Menur Surabaya [The effect of duration of narcotics and psychotropic use on patient retention scores at Menur Psychiatric Hospital, Surabaya]. *Parapemikir: Jurnal Ilmiah Farmasi*, 12(2), 1–7. <https://doi.org/10.30591/pjif.v12i2.4971>

Udayani, N. N. W., Prihatin, W. E. S., & Meriyani, H. (2020). Faktor-faktor yang mempengaruhi retensi pasien metadon di UPT Puskesmas Kabupaten Badung [Factors influencing methadone patient retention at Public Health Centres in Badung Regency]. *Jurnal Ilmiah Medicamento*, 6(2), 106–110. <https://doi.org/10.36733/medicamento.v6i2.878>

Williams, A. R., Krawczyk, N., Hu, M. C., Harpel, L., Aydinoglo, N., Cerda, M., Rotrosen, J., & Nunes, E. V. (2023). Retention and critical outcomes among new methadone maintenance patients following extended take-home reforms: A retrospective observational cohort study. *The Lancet Regional Health – Americas*, 28, 100636. <https://doi.org/10.1016/j.lana.2023.100636>

Yakovenko, I., Mukaneza, Y., Germé, K., Belliveau, J., Fraleigh, R., Bach, P., Poulin, G., Selby, P., Goyer, M.-È., Brothers, T. D., Rehm, J., Hodgins, D. C., Stewart, S. H., Wood, E., & Bruneau, J. (2024). Management of opioid use disorder: 2024 update to the national clinical practice guideline. *Canadian Medical Association Journal*, 196(38), E1280–E1290. <https://doi.org/10.1503/cmaj.241173>