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Medication Adherence to Bisoprolol and Patient Satisfaction With Community Pharmacy Services: A Cross-Sectional Study

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ABSTRACT

Medication adherence is critical in cardiovascular therapy, while patient satisfaction reflects the quality of community pharmacy services. This descriptive cross-sectional study at Nirmala Pharmacy, South Tambun, Indonesia (January–April 2025) consecutively recruited adult users of bisoprolol and measured adherence using the Morisky Medication Adherence Scale (MMAS-8), the Adherence to Refills and Medications Scale (ARMS), and pill count; patient satisfaction was assessed across reliability, responsiveness, assurance, empathy, and tangibles. Among respondents with complete adherence data, 57% showed moderate adherence on MMAS-8; 73% were adherent by pill count; and 73% were classified as low adherence by ARMS. Satisfaction was high overall (mean 83%, satisfied), with the highest scores in tangibles (90.6%) and assurance (85.6%). Despite high satisfaction with community pharmacy services, adherence to bisoprolol remained suboptimal and varied by measurement approach, underscoring the need for targeted adherence support through structured brief counseling, refill reminders, and regimen simplification in community pharmacy practice.

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ABSTRAK

Kepatuhan obat krusial dalam terapi kardiovaskular, sedangkan kepuasan pasien mencerminkan mutu layanan apotek komunitas. Studi deskriptif potong-lintang di Apotek Nirmala, Tambun Selatan, Indonesia (Januari–April 2025) merekrut pengguna bisoprolol dewasa secara konsekutif; kepatuhan diukur menggunakan Morisky Medication Adherence Scale (MMAS-8), Adherence to Refills and Medications Scale (ARMS), dan *pill count*; kepuasan dievaluasi pada lima dimensi: keandalan, ketanggapan, jaminan, empati, dan bukti fisik. Di antara responden dengan data kepatuhan lengkap, 57% menunjukkan kepatuhan sedang menurut MMAS-8; 73% patuh berdasarkan *pill count*; dan 73% diklasifikasikan sebagai kepatuhan rendah oleh ARMS. Kepuasan keseluruhan tinggi (rerata 83%, puas), dengan skor tertinggi pada bukti fisik (90,6%) dan jaminan (85,6%). Meskipun kepuasan terhadap layanan apotek komunitas tinggi, kepatuhan terhadap bisoprolol masih belum optimal dan bervariasi antar-metode pengukuran, sehingga diperlukan dukungan kepatuhan terarah melalui konseling singkat terstruktur, pengingat pengambilan ulang, dan penyederhanaan rejimen dalam praktik apotek komunitas.

Kata Kunci: Apotek komunitas; Pelayanan kefarmasian; Kepuasan pasien; Terapi beta-blocker; Kepatuhan obat

1. Introduction

Adherence is a form of active, conscious, and collaborative participation by patients in carrying out behaviours that support the healing process. This includes decision-making and goal setting, therapy and care planning, and implementing a lifestyle in accordance with medical advice [1]. Adherence to medication in the context of heart disease treatment plays a very crucial role, because regular use of medication helps to keep the heart stable. In the long term, this can contribute to a reduction in the risk of damage to vital organs, such as the kidneys and brain [2].

The treatment of coronary heart disease is not only aimed at relieving or eliminating clinical symptoms, but more essentially at maintaining heart function to improve the patient's life expectancy [3]. Beta blockers work by occupying beta-adrenergic receptors, thereby reducing the strength of contractions and heart rate through a decrease in preload and afterload. Bisoprolol belongs to the second generation of beta blockers, which are cardioselective because they selectively inhibit β1 receptors [4]. Beta-blocker therapy, especially bisoprolol at optimal doses, has been shown to be effective in reducing morbidity and mortality in patients with heart failure [5].

Pharmaceutical services are services provided directly and responsibly to patients in relation to pharmaceutical preparations and medical devices, with the aim of achieving optimal results to improve the quality of life of patients [6]. The general objectives of pharmaceutical services include efforts to ensure the quality, benefits, safety, and efficacy of pharmaceutical preparations and medical devices. Clinical pharmacy services in pharmacies are an important component of pharmaceutical services that are provided directly and responsibly to patients [7].

Patient satisfaction is an emotional response that arises as a result of an assessment of the performance of the healthcare services received, after comparing them with previous expectations [8]. The fulfilment of patient satisfaction provides various benefits, including the creation of a harmonious relationship between service providers and patients, encouraging repeat visits, increasing loyalty, fostering word-of-mouth promotion, increasing profit opportunities, and strengthening patient attachment to the services provided [9]. Patient satisfaction with pharmaceutical services is one indicator for assessing the quality of pharmaceutical services. In addition to serving as a

promotional tool for pharmacies, measuring patient satisfaction also aims to convey the services provided by pharmacies to patients [10].

Cardiovascular diseases remain a leading cause of morbidity and mortality worldwide, and long-term effectiveness of therapy depends heavily on patients' medication adherence [1],[2],[3]. In routine practice, community pharmacies are often the most accessible point of care for people living with chronic cardiovascular conditions, positioning pharmacists to deliver counseling, refill coordination, and other adherence-support services [4],[5].

Bisoprolol, a cardio-selective β1-adrenergic receptor blocker, is widely prescribed for hypertension, angina, and heart failure [6]. Despite its proven benefits, maintaining consistent use can be challenging in real-world settings due to chronic treatment duration, polypharmacy, and patient-level barriers such as forgetfulness or beliefs about medicines [7],[8]. These challenges underscore the need to measure and understand adherence using tools that capture different facets of patient behavior and system constraints.

Adherence is commonly assessed using self-report scales and objective proxies. The Morisky Medication Adherence Scale (MMAS-8) primarily captures self-reported behaviors and beliefs; the Adherence to Refills and Medications Scale (ARMS) emphasizes barriers to obtaining refills and taking medicines on schedule; and pill count provides an objective proxy of medication consumption, albeit with limitations (e.g., unobserved loss or sharing) [9],[10],[11]. Because these instruments reflect distinct constructs, discordant classifications are plausible and clinically meaningful.

In parallel, patient satisfaction is an important indicator of service quality in community pharmacy practice. Drawing on the SERVQUAL framework, satisfaction is often operationalized across reliability, responsiveness, assurance, empathy, and tangibles [12]. However, satisfaction and adherence do not measure the same phenomenon: patients may report high satisfaction with service processes while struggling to follow complex or long-term regimens [13],[14]. Understanding how satisfaction coexists with different adherence profiles can guide targeted, pharmacy-based interventions.

Evidence from low- and middle-income settings—particularly Indonesia—remains limited regarding triangulated measurement of bisoprolol adherence together with multidimensional patient satisfaction in community pharmacies [15]. Addressing this gap, this study aimed (i) to assess adherence to bisoprolol using three complementary approaches (MMAS-8, ARMS, and pill count), (ii) to evaluate patient satisfaction across five SERVQUAL dimensions, and (iii) to explore the alignment—or lack thereof—between adherence classifications and satisfaction levels in a community pharmacy setting in Indonesia.

2. Methods

Study Design and Setting

A descriptive cross-sectional study was conducted at Nirmala Pharmacy, South Tambun, Indonesia (January–April 2025). Service delivery followed Indonesian pharmacy regulations and quality-assurance principles for basic health services [7],[8].

Participants (Eligibility Criteria)

Adults (≥18 years) dispensing bisoprolol, able to communicate, and providing written informed consent were included. Individuals unwilling or unable to complete the questionnaire, and records with incomplete key variables, were excluded.

Sampling and Sample Size

Consecutive sampling was used, enrolling all eligible customers during the study window. The full analytic sample was N = 100 for respondent characteristics and patient satisfaction. Because complete information was required to compute all adherence metrics, adherence analyses were restricted to complete cases (n = 44).

Outcomes and Measures

Primary outcome — Medication adherence

Adherence was assessed using three complementary approaches commonly applied in Indonesian cardiovascular populations. First, MMAS-8 (eight-item self-report; higher scores indicate better adherence) was categorized in line with local adherence research practice [1],[17]. Second, ARMS (Adherence to Refills and Medications Scale; lower scores indicate better adherence) used categories aligned with prior Indonesian studies in heart disease [2],[17]. Third, pill count was calculated:

$$\text{Adherence (\%)} = \frac{\text{pills dispensed} - \text{pills remaining}}{\text{prescribed daily dose} \times \text{days in the assessment period}} \times 100,$$

with adherence defined as >80% doses taken, consistent with operational practice in comparable local studies [1],[12].

Secondary outcome — Patient satisfaction with pharmaceutical services

Satisfaction was measured using a SERVQUAL-based instrument across five dimensions—reliability, responsiveness, assurance, empathy, and tangibles—as established in the service-quality literature and applied in Indonesian pharmacy/hospital settings [18],[19],[20]. Items used a Likert [1–5] scale; each dimension score was expressed as % of maximum and summarized into an overall mean. Category thresholds followed prior Indonesian pharmacy studies: Very Satisfied (88.31–100%), Satisfied (76.61–88.30%), Moderately Satisfied (65.00–76.60%), Not Satisfied (25.00–64.99%) [6],[12].

Data Collection Procedures

A structured questionnaire (content reviewed and pilot tested for clarity) was administered by trained staff in a private area after dispensing to minimise social-desirability bias. Adherence items preceded satisfaction items. Participants were included in the pill-count subset only when dispensing records and returned packs/blisters permitted computation with the above formula; otherwise, they remained in the full sample for non-adherence outcomes (resulting in n = 44 for adherence). Collected variables included sociodemographic characteristics (sex, age group, education, distance to pharmacy) and clinical factors (comorbidity, therapy type, number of medicines—polypharmacy defined as ≥5—and treatment duration <5/≥5 years), all summarised for N = 100.

Data Management, Missing Data, and Statistical Analysis

Questionnaires were checked on site; data were double-entered and cross-verified before analysis. Adherence outcomes (MMAS-8, ARMS, pill count) were analyzed using complete-case analysis (n = 44; listwise deletion), whereas patient satisfaction and respondent characteristics were summarized for the full sample (N = 100); no imputation was performed. Categorical variables are presented as frequencies (%) and continuous/percentage scores as means (SD) or medians (IQR), as appropriate. Analyses were conducted in IBM SPSS Statistics, version 27 (IBM Corp., Armonk, NY, USA). Reporting followed the STROBE guideline for cross-sectional studies. Internal consistency of the satisfaction instrument was evaluated using Cronbach's alpha (α) for

each SERVQUAL dimension and for the total scale (Likert 1–5 items). The pill-count classification (>80% doses) was pre-specified as the primary adherence endpoint.

Institution Approval

The study was approved by Ibnu Chaldun University Jakarta of No KEPK/FF-UNIV/IV/0123/IV/2025. All participants provided written informed consent prior to enrolment.

3. Results and Discussion

Respondent Characteristics

Most respondents were female (63%), with males comprising 37%. The cohort skewed younger: 17–25 years (38%) and 26–35 years (35%) were most common, followed by 36–45 (12%), 46–55 (10%), and 56–65 (5%). Educational attainment was dominated by senior high school (52%), then tertiary (31%), junior high (10%), and primary (7%). By occupation, homemakers (33%) were most frequent, then self-employed (19%), students (15%), health workers (11%), civil servants/state-owned enterprise employees (6%), others (14%), and unemployed (2%). Geographic access was generally favorable: 28% lived <1 km, 46% 1–5 km, and 26% >5 km from the pharmacy. Visit patterns indicated sustained engagement: first visit (23%), 2–5 visits (25%), >5 visits (52%) (**Table 1**).

Table 1. Characteristics of respondents (N = 100)

Variable	Category	n	%
Sex	Female	63	63
	Male	37	37
Age (years)	17–25	38	38
	26–35	35	35
	36–45	12	12
	46–55	10	10
	56–65	5	5
Education	Primary (SD)	7	7
	Junior high (SMP)	10	10
	Senior high (SMA)	52	52
	Tertiary (Diploma/University)	31	31
Occupation	Homemaker	33	33
	Self-employed	19	19
	Student	15	15
	Health worker	11	11
	Civil servant/State-owned enterprise	6	6
	Other	14	14
	Unemployed	2	2
Distance to pharmacy	<1 km	28	28
	1–5 km	46	46
	>5 km	26	26
Visit frequency	First visit	23	23
	2–5 visits	25	25
	>5 visits	52	52

Notes: Values are n (%).

This working-age, female-leaning profile mirrors Indonesian cardiovascular cohorts frequently observed in outpatient/pharmacy settings [14],[15],[16].In line with local evidence, education and structural access (proxied here by distance and refill frequency) are relevant to day-to-day medication use: higher educational attainment and closer access tend to facilitate understanding of regimens and timely refills, whereas

lower education or longer travel may hinder routine implementation [1],[2],[17]. Given that most participants lived within ≤5 km and reported repeated visits, subsequent adherence patterns are plausibly shaped more by clinical complexity (e.g., polypharmacy, long treatment duration) than by pure access barriers—an interpretation revisited when contrasting MMAS-8, ARMS, and pill-count results.

Clinical Characteristics (N = 100)

Clinical complexity was common in this cohort. Comorbidity was present in 75% of respondents, and combination therapy was used by 68%, with 32% on monotherapy. Polypharmacy (≥5 medicines) affected 66%, while 34% used <5 items. Treatment duration ≥5 years was reported by 64% (36% <5 years). These patterns indicate long-term cardiovascular management with substantial regimen burden in routine community-pharmacy care (**Table 2**).

Table 2. Clinical characteristics (N = 100)

Variable	Category	n	%
Comorbidity	Yes	75	75
	No	25	25
Therapy type	Combination	68	68
	Monotherapy	32	32
Number of medicines	≥5 (polypharmacy)	66	66
	<5	34	34
Treatment duration	≥5 years	64	64
	<5 years	36	36

Taken together, high rates of comorbidity, combination therapy, and polypharmacy plausibly increase dosing complexity and day-to-day implementation challenges, helping explain the discordance observed across adherence instruments (self-report behaviors on MMAS-8, refill/timing barriers on ARMS, and consumption proxy via pill count). Long treatment duration also raises the risk of treatment fatigue, whereas multi-drug regimens add cognitive and logistical load—mechanisms repeatedly noted in Indonesian cardiovascular literature linking structural/clinical factors to adherence variability [14],[15],[16],[17].

Medication Adherence (complete cases, n = 44)

Adherence estimates differed by instrument. On MMAS-8, most respondents were moderately adherent (25/44; 56.8%), with low 9/44 (20.5%) and high 10/44 (22.7%). Using pill count, 23/44 (52.3%) were adherent (>80% doses). By ARMS, 32/44 (72.7%) were classified as low adherence and 12/44 (27.3%) as high adherence (**Table 3**)

Table 3. Medication adherence by instrument (n = 44, complete cases)

Instrument	Category	n	%
MMAS-8	Low (0–<6)	9	20.5
	Moderate (6–<8)	25	56.8
	High (8)	10	22.7
Pill count	Adherent (>80%)	23	52.3
	Non-adherent (≤80%)	21	47.7
ARMS	High adherence (≤15)	12	27.3
	Low adherence (≥16)	32	72.7

Note: Cut-offs follow the Methods (MMAS-8 low/moderate/high; ARMS ≤15 vs ≥16; pill count >80% adherent)

These differences are expected because each tool captures a distinct construct: MMAS-8 reflects self-reported taking behaviors/beliefs, ARMS emphasizes refill/timing barriers, and pill count is a possession/consumption proxy that cannot detect dose dumping, loss, or sharing. In Indonesian cardiovascular populations, patient-level and structural factors (education, family/peer support, access) often shape adherence, so self-report and barrier-focused tools can classify adherence more strictly than stock-based measures [1],[2],[17]. The cohort's regimen complexity (combination therapy and polypharmacy) further adds scheduling burden, which plausibly depresses ARMS classifications—consistent with local reports in long-term CHD/CAD medicine use [15],[16],[17]. Taken together, the three instruments provide complementary lenses on adherence and are useful for designing pharmacy-based support (e.g., refill reminders, brief counseling, and regimen simplification).

Patient Satisfaction Across Five Dimensions (N = 100)

Overall satisfaction averaged 83.0% (Satisfied). By dimension, scores were Tangibles 90.6% (Very satisfied), Assurance 85.6% (Satisfied), Responsiveness 81.1% (Satisfied), Empathy 80.0% (Satisfied), and Reliability 77.4% (Satisfied). This pattern indicates strong ratings for the physical facilities/material resources and professional assurance, with other service-process domains remaining within the "Satisfied" band (**Table 4**).

Table 4. Patient satisfaction across SERVQUAL dimensions (N = 100)

Dimension	Score (%)	Category
Reliability	77.4	Satisfied
Responsiveness	81.1	Satisfied
Assurance	85.6	Satisfied
Empathy	80.0	Satisfied
Tangibles	90.6	Very satisfied
Overall mean	83.0	Satisfied

High Tangibles reflects very favorable ratings of physical facilities/cleanliness and infrastructure, consistent with SERVQUAL theory and Indonesian pharmacy/hospital reports [19],[20],[21]. Strong Assurance indicates that staff knowledge and competence—and the clarity of medication information—reinforce patient confidence in services [18],[20]. Responsiveness (81.1%) suggests timely help and attention to concerns, while Empathy (80.0%) captures courteous, attentive interactions and reasonable costs [19]. The relatively lower Reliability (77.4%) points to room for strengthening process consistency and stock availability—an aspect often highlighted in local service-quality studies [6],[12]. Importantly, satisfaction gauges service experience rather than day-to-day regimen execution; thus, high satisfaction can coexist with suboptimal adherence when structural or therapy-related burdens persist, which aligns with Indonesian evidence on adherence determinants in cardiovascular care [1],[2],[17].

This single-site, cross-sectional study at Nirmala Pharmacy, South Tambun, Indonesia limits generalisability. Adherence estimates relied on complete-case analysis (n = 44), so selection bias due to missingness cannot be excluded. Each adherence measure has constraints—MMAS-8/ARMS depend on self-report or barrier emphasis, while pill count cannot verify ingestion or account for loss/sharing—potentially yielding discordant classifications. The SERVQUAL scores reflect perceived service experience rather than clinical effectiveness and were not re-validated psychometrically

here. Analyses were descriptive (no hypothesis testing or multivariable modelling), and objective refill metrics or clinical outcomes were not collected.

4. Conclusion

In this single-site community-pharmacy study at Nirmala Pharmacy, South Tambun, Indonesia, adherence varied across instruments while patient satisfaction with services was high. This divergence suggests that positive service experiences do not automatically translate into consistent day-to-day medicine-taking, likely reflecting differences in what each tool measures and the cohort's regimen complexity (e.g., polypharmacy and longer treatment duration). These insights point to the need for targeted, pharmacy-based adherence support—such as brief counselling at dispensing, refill reminders, and regimen simplification—alongside continued service-quality maintenance. Future multi-site work integrating objective refill metrics and clinical outcomes is warranted to confirm and extend these observations.

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Conflict of Interest:
The authors declare no conflict of interest related to this study.

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