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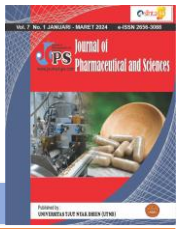

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Appropriateness of Antihyperlipidemic Prescribing at RSU Imelda Pekerja Indonesia: A Retrospective Medical Record Study

Ketepatan Peresepan Obat Antihiperlipidemia di RSU Imelda Pekerja Indonesia: Studi Retrospektif Rekam Medis

Mutiara Siahaan [a]*, Hotmarito Gulo [a]

[a] *Faculty of Health, Universitas Imelda Medan, Medan, Indonesia.*

*Corresponding author: Mutiarasiahaan85@gmail.com

Abstract

Background: Prescribing audits provide a basis for evaluating the appropriateness of antihyperlipidemic treatment in clinical practice. **Objective:** To describe prescribing patterns and assess documentation-based appropriateness at RSU Imelda Pekerja Indonesia, Medan. **Methods:** This descriptive study retrospectively reviewed medical records from March 2025 to February 2026. Data were collected in June 2026, and 51 patients were selected by purposive sampling. Patient, indication, drug, dose, and route appropriateness were assessed with reference to the 2021 Indonesian Society of Endocrinology (PERKENI) guidance. Data were summarized using frequencies, percentages, and exact 95% confidence intervals (CIs). **Results:** Women accounted for 32 patients (62.75%); the largest age group was 56–65 years (16; 31.37%). Simvastatin 20 mg, atorvastatin 20 mg, and fenofibrate 300 mg monotherapy were recorded in 26 (50.98%), 19 (37.25%), and four (7.84%) patients, respectively. Two patients (3.92%) received simvastatin 20 mg plus fenofibrate 100 mg. Statin monotherapy accounted for 88.24% of patients (95% CI, 76.13–95.56%). All 51 records were classified as appropriate for each criterion (100%; 95% CI, 93.02–100.00%). **Conclusion:** Statin monotherapy predominated, and no documented inappropriateness was identified within the five assessed criteria. These findings describe prescribing classifications, not comprehensive treatment safety or lipid-target attainment. Further evaluation should link prescribing decisions to individual cardiovascular risk and measured lipid outcomes.

Keywords: antihyperlipidemic drugs; hyperlipidemia; medical record review; prescribing appropriateness; statins.

Abstrak

Latar belakang: Audit peresepan memberikan dasar untuk mengevaluasi ketepatan pengobatan antihiperlipidemia dalam praktik klinis. **Tujuan:** Mendeskripsikan pola peresepan dan menilai ketepatannya berdasarkan dokumentasi di RSU Imelda Pekerja Indonesia, Medan. **Metode:** Penelitian deskriptif ini menelaah rekam medis periode Maret 2025–Februari 2026 secara retrospektif. Data dikumpulkan pada Juni 2026, dengan 51 pasien dipilih melalui purposive sampling. Ketepatan pasien, indikasi, obat, dosis, dan cara pemberian dinilai dengan mengacu pada panduan Perkumpulan Endokrinologi Indonesia (PERKENI) tahun 2021. Data disajikan sebagai frekuensi, persentase, dan interval kepercayaan (IK) eksak 95%. **Hasil:** Pasien perempuan berjumlah 32 orang (62,75%); kelompok usia terbanyak adalah 56–65 tahun (16; 31,37%). Monoterapi simvastatin 20 mg, atorvastatin 20 mg, dan fenofibrat 300 mg masing-masing tercatat pada 26 (50,98%), 19 (37,25%), dan empat (7,84%) pasien. Dua pasien (3,92%) menerima simvastatin 20 mg bersama fenofibrat 100 mg. Monoterapi statin mencakup 88,24% pasien (IK 95%, 76,13–95,56%). Seluruh 51 rekam medis diklasifikasikan tepat pada setiap kriteria (100%; IK 95%, 93,02–100,00%). **Kesimpulan:** Monoterapi statin mendominasi, dan tidak ditemukan ketidaktepatan yang terdokumentasi dalam lima kriteria yang dinilai. Temuan ini menggambarkan klasifikasi ketepatan peresepan, bukan keamanan terapi secara menyeluruh atau pencapaian target lipid. Evaluasi selanjutnya perlu menghubungkan keputusan peresepan dengan risiko kardiovaskular individual dan luaran lipid yang terukur.

Kata kunci: obat antihiperlipidemia; hiperlipidemia; telaah rekam medis; ketepatan peresepan; statin.

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Introduction

Hyperlipidemia is characterized by elevated circulating cholesterol, triglycerides, or both and is an important modifiable contributor to atherosclerotic cardiovascular disease (ASCVD). The broader term dyslipidemia also encompasses reduced high-density lipoprotein cholesterol (HDL-C). Treatment selection depends on low-density lipoprotein cholesterol (LDL-C), the pattern of lipid abnormalities, and individual cardiovascular risk [1–3]. Risk-stratified lipid management is also emphasized in the Cardiological Society of India guidance [4].

Rational medicine use requires appropriate medicine selection, dosing, duration, safety, and affordability in relation to clinical need [5,6]. Medical record audits evaluate documented prescribing against predefined criteria and can inform local quality-improvement priorities. Prescribing appropriateness is one component of this evaluation and is distinct from adherence, lipid-target attainment, and clinical outcomes.

Sex and age are relevant to the interpretation of prescribing patterns. Recent reviews describe changes in lipid metabolism across the female life course, including the menopausal transition, and emphasize individualized cardiovascular risk assessment [7,8]. These demographic characteristics therefore provide context for evaluating treatment use.

Indonesian studies have evaluated prescribing rationality at Puskesmas Bahodopi, drug interactions at RSU Royal Prima Medan, and lipid responses to simvastatin and atorvastatin at Hasanuddin University Hospital [9–11]. These studies provide context for an institution-specific prescribing audit at RSU Imelda Pekerja Indonesia. This study aimed to describe antihyperlipidemic prescribing patterns and assess five documentation-based appropriateness criteria with reference to the 2021 guidance of the Indonesian Society of Endocrinology (PERKENI) [2].

Methods

Study design, setting, and sample

This descriptive observational study retrospectively reviewed medical records at RSU Imelda Pekerja Indonesia, Medan, Indonesia. The observation period was March 2025–February 2026, and data were collected in the hospital medical records department in June 2026. The sample comprised 51 patients with documented hyperlipidemia who received antihyperlipidemic therapy and were selected by purposive sampling. The patient was the unit of analysis.

Variables and assessment of appropriateness

The variables comprised sex, age group, medicine and recorded strength, treatment category, and prescribing appropriateness. Five criteria were evaluated with reference to PERKENI 2021: patient, indication, drug, dose, and route of administration [2]. Each criterion was classified as appropriate or inappropriate using the documentation-based definitions summarized in Table 1.

Data analysis

Counts and percentages were calculated using 51 patients as the denominator and rounded to two decimal places. Treatment categories were mutually exclusive. Two-sided exact 95% confidence intervals (CIs) for individual proportions were calculated post hoc using the Clopper–Pearson method [12]. These intervals describe model-based binomial uncertainty and do not account for purposive selection or documentation bias.

Each appropriateness criterion was analyzed separately using the same 51 patients. The analysis was restricted to descriptive summaries, consistent with the study objective. No association tests or comparative assessments of treatment effectiveness or safety were performed.

Table 1. Documentation-based criteria for assessing prescribing appropriateness.

Criterion	**Documentation-based definition**
Patient	Compatibility with the recorded condition; no documented absolute contraindication.
Indication	Consistency of the diagnosis and reported lipid assessment with treatment.
Drug	Medicine selection for the documented lipid disorder.
Dose	Agreement of the recorded dose with reference recommendations.
Route	Oral administration consistent with dosage form and recorded instructions.

Source: patient medical records; clinical reference: PERKENI 2021 [2].

Research Ethics

This study received ethical approval and institutional permission from RSU Imelda Pekerja Indonesia, Medan, under letter number 577/RSU.IPI/V/2026. Patient confidentiality was maintained throughout the medical record review.

Results and Discussion

Results

Patient characteristics

Of the 51 patients, 32 were women (62.75%) and 19 were men (37.25%). The largest age group was 56–65 years (16; 31.37%), followed by ≥66 years (14; 27.45%) and 46–55 years (13; 25.49%). Overall, 30 patients (58.82%) were aged ≥56 years. Table 2 presents the demographic distribution and exact 95% CIs, and Figure 1 illustrates the age distribution.

Table 2. Demographic characteristics of patients with hyperlipidemia (N = 51).

Characteristic	**Category**	**n**	**%**	**95% CI, %**
Sex	Female	32	62.75	48.08–75.87
	Male	19	37.25	24.13–51.92
Age, years	18–25	1	1.96	0.05–10.45
	26–35	0	0.00	0.00–6.98
	36–45	7	13.73	5.70–26.26
	46–55	13	25.49	14.33–39.63
	56–65	16	31.37	19.11–45.89
	≥66	14	27.45	15.89–41.74

CI, confidence interval. Percentages are based on 51 patients.

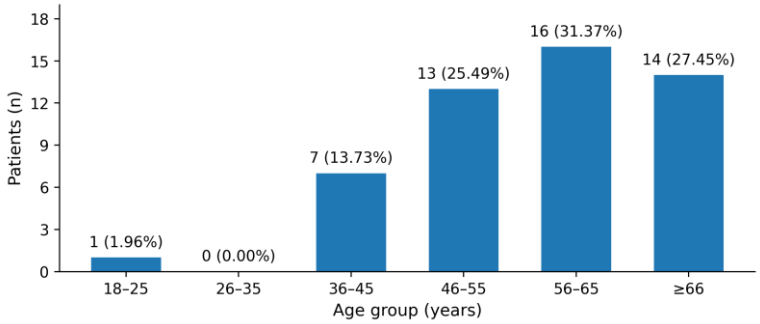

Figure 1. Age distribution of the 51 patients. Labels indicate patient counts and percentages.

Antihyperlipidemic prescribing patterns

Statin monotherapy was recorded in 45 patients (88.24%; 95% CI, 76.13–95.56%). Simvastatin 20 mg was the most frequent treatment (26; 50.98%), followed by atorvastatin 20 mg (19; 37.25%). Four patients (7.84%)

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received fenofibrate 300 mg monotherapy, and two (3.92%) received simvastatin 20 mg plus fenofibrate 100 mg. Overall, 47 patients (92.16%) received a statin-containing regimen (Table 3; Figure 2).

Table 3. Recorded antihyperlipidemic regimens and strengths (N = 51).

Medicine and recorded strength	Treatment	n	%	95% CI, %
Simvastatin 20 mg tablet	Monotherapy	26	50.98	36.60–65.25
Atorvastatin 20 mg tablet	Monotherapy	19	37.25	24.13–51.92
Fenofibrate 300 mg capsule	Monotherapy	4	7.84	2.18–18.88
Simvastatin 20 mg tablet + fenofibrate 100 mg capsule	Combination	2	3.92	0.48–13.46
Total		51	100.00	—

Recorded strengths are shown; dosing intervals were not reported. Categories are mutually exclusive, and percentages may not sum to 100% owing to rounding. CI, confidence interval.

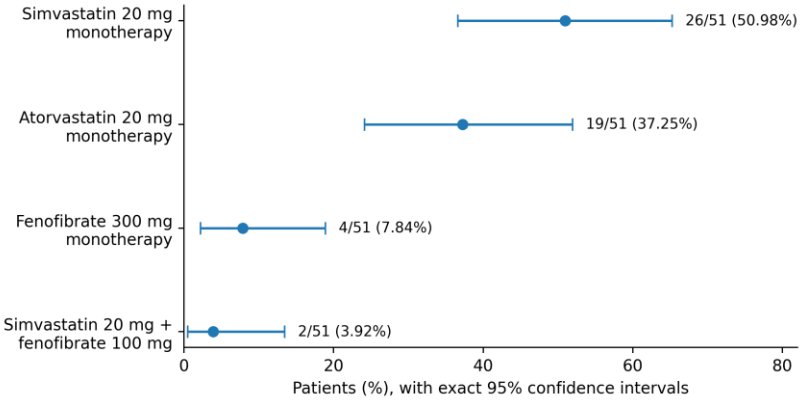

Figure 2. Distribution of antihyperlipidemic treatment categories. Points indicate percentages, and whiskers represent exact 95% confidence intervals.

Assessment of prescribing appropriateness

All 51 records were classified as appropriate for each of the five criteria, with no record classified as inappropriate (Table 4). The proportion classified as appropriate was 100.00% for each criterion (95% CI, 93.02–100.00%).

Table 4. Documentation-based appropriateness classifications (N = 51).

Criterion	Appropriate, n	Inappropriate, n	Appropriate, %	95% CI, %
Patient	51	0	100.00	93.02–100.00
Indication	51	0	100.00	93.02–100.00
Drug	51	0	100.00	93.02–100.00
Dose	51	0	100.00	93.02–100.00
Route of administration	51	0	100.00	93.02–100.00

CI, confidence interval. Each criterion was evaluated separately in the same 51 patients.

Discussion

Principal findings

Statin monotherapy predominated, and all evaluated records met the five documentation-based appropriateness criteria. These findings describe prescribing within the assessed sample. They do not establish optimal treatment intensity, adherence, biochemical response, or cardiovascular benefit, which require additional clinical and follow-up information.

The uniformly high classification rate may reflect a ceiling effect in a binary assessment. In particular, reliance on the absence of documented contraindications may classify an uncertain prescription as appropriate when relevant clinical information is missing. The available results cannot determine the extent of this potential misclassification. Explicit assessment rules, a separate category for insufficient information, and independent review would strengthen subsequent audits.

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Sex and age distribution

Women accounted for almost two-thirds of the sample. Ambikairajah et al. and Ko and Kim describe menopause-associated differences in lipid profiles, while more recent reviews emphasize changes in lipid metabolism across reproductive stages [7,8,13,14]. Menopausal status, hormonal exposure, adiposity, and lifestyle were not characterized in this study; the observed sex distribution therefore cannot be attributed to a specific biological mechanism.

Patients aged ≥56 years accounted for more than half of the sample. Delbari et al. examined dyslipidemia and associated factors among older adults in the population-based Ardakan cohort in Iran [15]. The different sampling settings limit direct comparison with the present hospital-based review. The age distribution describes the treated sample rather than the population prevalence of hyperlipidemia.

Statin selection and intensity

When administered once daily, simvastatin 20 mg and atorvastatin 20 mg are moderate-intensity statin regimens according to PERKENI 2021 [2]. However, the strengths reported in this study do not establish the administration schedule or the intensity required by an individual patient. European guidance and its 2025 update emphasize cardiovascular risk, tolerability, and measured LDL-C response in treatment selection [3,16]. Individual risk categories and follow-up LDL-C values were not reported, preventing evaluation of whether treatment intensity matched clinical need.

Table 5 summarizes risk-specific LDL-C goals from PERKENI 2021 as a clinical framework for interpreting prescribing [2]. Agreement with a reference dose range does not establish achievement of an individual lipid target. Latif et al. evaluated lipid responses to simvastatin and atorvastatin, illustrating an outcome-based approach that complements prescribing review [11]. The higher frequency of simvastatin use in this study indicates utilization, not comparative therapeutic superiority.

Table 5. Guideline-based LDL-C goals and clinical considerations for lipid-lowering treatment.

Risk category	LDL-C goal (mg/dL)	Clinical consideration
Low	<130	Indication for pharmacotherapy depends on the overall clinical context.
Moderate	<100	Treatment intensity depends on the required LDL-C reduction and clinical context.
High	<100	Treatment selection incorporates baseline LDL-C and disease-specific indications.
Very high	<70	Established ASCVD generally warrants high-intensity or maximally tolerated statin treatment.
Extreme	<55	Additional lipid-lowering therapy may be needed when the target remains unmet.

LDL-C, low-density lipoprotein cholesterol; ASCVD, atherosclerotic cardiovascular disease. Targets follow the risk categories in Table 13 of PERKENI 2021 [2]. This table provides guideline context; patient-specific risk categories are not reported.

Fenofibrate and combination therapy

Fenofibrate-containing therapy was recorded in six patients, including two receiving simvastatin concurrently. Deerochanawong et al. and Farnier et al. describe a selective role for fenofibrate in triglyceride-related disorders, with treatment decisions guided by the clinical context [17,18]. Baseline triglycerides, lipid phenotype, and prior treatment response were not reported, limiting clinical interpretation of each fibrate-containing regimen.

The recorded fenofibrate strengths were 300 mg in monotherapy and 100 mg in combination therapy. PERKENI 2021 describes manufacturer-dependent dosing, making the exact formulation relevant to dose interpretation [2]. Product identity, administration frequency, and renal function are therefore important when evaluating these regimens. The PROMINENT commentary concerns pemafibrate rather than fenofibrate and illustrates the distinction between triglyceride lowering and cardiovascular outcomes [19].

Safety and drug interactions

Simvastatin–fenofibrate therapy requires assessment of muscle toxicity risk, particularly in patients with renal impairment or concomitant interacting medicines. Simvastatin prescribing information identifies fibrates as a myopathy risk, specifies dose limits with verapamil, diltiazem, amiodarone, and amlodipine, and contraindicates concomitant gemfibrozil [20]. Atorvastatin is also susceptible to cytochrome P450 3A4 (CYP3A4)-mediated interactions and an increased risk of muscle toxicity with fibrates [21].

Medication review should include assessment of muscle symptoms and creatine kinase testing when clinically indicated, rather than routine serial testing in every asymptomatic patient [2]. Concomitant

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medicines, renal function, symptoms, and creatine kinase results were not included in the aggregate results, precluding estimation of interaction prevalence or adverse-event rates.

Comparison with local and international evidence

In a retrospective study of 153 patients at Puskesmas Bahodopi, Sari et al. reported appropriate diagnosis, indication, and drug selection in 100%, dose in 140/153 (91.50%), and administration in 141/153 (92.16%) [9]. Their assessment included administration timing and gemfibrozil-containing regimens, whereas the present route criterion concerned oral administration. Differences in assessment definitions and case mix limit direct comparison of the reported percentages. Sinaga et al. investigated antihyperlipidemic drug interactions at another Medan hospital, addressing a safety domain not separately quantified in the present study [10].

In China, Ji et al. followed LDL-C goal attainment in 8,905 readmitted patients with hypertriglyceridemia and reported consistent target attainment in 27.1% [22]. Their longitudinal biochemical endpoint differs from a documentation-based prescribing classification. The studies summarized in Table 6 demonstrate complementary approaches to evaluating treatment use and lipid control.

Table 6. Comparison of study designs, assessment domains, and reported outcomes.

Study / setting	Design and sample	Assessment domain	Main result
Present study; RSU Imelda Pekerja Indonesia, Medan	Retrospective descriptive review; 51 patients; purposive selection.	Five documentation-based prescribing criteria; PERKENI 2021.	100% classified as appropriate for each criterion; lipid outcomes not assessed.
Sari et al., 2022; Bahodopi primary care, Indonesia. [9]	Retrospective record/prescription review; 153 patients, 2019.	Diagnosis, indication, drug, dose, and administration.	Dose 91.50%; administration 92.16%; other reported criteria 100%.
Ji et al., 2025; Changzhou, China. [22]	Retrospective longitudinal analysis; 8,905 readmitted patients with hypertriglyceridemia.	Repeated LDL-C measurements; risk-specific targets under Chinese guidance.	Consistent LDL-C target attainment in 27.1%.

Percentages for Sari et al. are taken from the detailed results tables [9]. LDL-C, low-density lipoprotein cholesterol. Differences in populations and assessment domains preclude direct comparison of care quality.

Contemporary guideline context

The 2025 European Society of Cardiology/European Atherosclerosis Society (ESC/EAS) focused update and the 2026 American College of Cardiology/American Heart Association (ACC/AHA) multisociety guideline emphasize risk-informed lipid management and treatment intensification when indicated [16,23]. Risk modifiers, lipoprotein(a), and selected apolipoprotein B measurements can refine assessment. Ezetimibe or proprotein convertase subtilisin/kexin type 9 (PCSK9)-directed treatment may be appropriate when cardiovascular risk and LDL-C response warrant additional therapy [16,23]. Because these patient-level determinants were not characterized, the absence of such medicines from the recorded categories does not establish undertreatment.

PERKENI 2021 was the clinical reference for this audit. The 2025 European update appeared during the observation period, whereas the 2026 US guideline was released after February 2026 [16,23]. These newer recommendations provide context for subsequent evaluations and were not used to reclassify the study results.

Implications for pharmaceutical care

Adherence remains a relevant consideration beyond prescribing classification. Llanes et al. discuss barriers to long-term statin use in Asian populations, and Nilamsari et al. evaluated an Indonesian tailored intervention using adherence and LDL-C measurements [24,25]. These approaches illustrate the value of linking prescribing review to medication-taking behavior and follow-up lipid testing.

A pharmacist–prescriber pathway could integrate cardiovascular risk assessment, documented lipid targets, product-specific dose verification, interaction screening, and follow-up LDL-C testing. Periodic audits could prioritize statin–fibrate combinations and prescriptions with insufficient clinical documentation. Potential quality indicators include the proportion of patients with a recorded risk category and lipid target, completed medication reconciliation, appropriate follow-up testing, and target attainment among patients

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with evaluable results. Reporting non-assessable items separately would improve the interpretability of audit findings.

Strengths and limitations

This study reports explicit patient counts and separate results for five prescribing criteria. The single-center setting, purposive sampling, small sample, and limited characterization of the sampling frame restrict generalizability. Retrospective documentation is vulnerable to information bias, while missing clinical details may lead to misclassification of uncertain prescriptions as appropriate. The direction of selection bias and the magnitude of classification bias cannot be determined from the available results. Inter-rater reliability could not be evaluated because independent ratings were not reported.

Patient-level lipid concentrations, comorbidities, ASCVD history, renal and hepatic function, formulation details, and concomitant medicines were not included in the aggregate results. These limitations prevent independent clinical verification of indication, drug selection, and individualized dose suitability. Adherence, adverse events, cost-effectiveness, and longitudinal outcomes were not assessed. Treatment comparisons would also be susceptible to confounding by indication. The findings are therefore limited to the analyzed records and should not be generalized to all hospital patients or the wider population. A subsequent audit with a defined sampling frame, explicit assessment procedures, and linked lipid measurements would support a more comprehensive evaluation.

Conclusions

Among 51 patients with hyperlipidemia at RSU Imelda Pekerja Indonesia, statin monotherapy predominated, with simvastatin 20 mg recorded most frequently. No documented inappropriateness was identified for patient, indication, drug, dose, or route of administration within the assessed criteria. This documentation-based finding does not establish comprehensive treatment safety or lipid-target attainment. Further evaluation should link prescribing decisions to individual cardiovascular risk, formulation-specific dosing, concomitant medicines, and longitudinal lipid outcomes.

Conflict of Interest

The authors declare no conflict of interest.

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