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Effectiveness of the Chronic Disease Management Program (Prolanis) on the Incidence of Vertical Referral at Klinik Sabilillah, Malang City: A Retrospective Study Based on Electronic Health Records

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Abstract
Introduction: *The Chronic Disease Management Program (Prolanis) is a BPJS Kesehatan strategy to control chronic disease at primary care facilities and reduce unnecessary referrals to advanced-level facilities, yet its real-world effectiveness requires further evidence.* ***Objective****: To analyze Prolanis effectiveness on vertical referral using electronic visit-record data.* ***Methods:*** *A retrospective cross-sectional study used secondary data from Klinik Sabilillah, Malang City, for March 2025–March 2026. Because Prolanis participants tend to be older with chronic diagnoses, analysis was restricted to visits diagnosed with hypertension/diabetes or Prolanis status for comparability, analyzed with chi-square, odds ratio, and logistic regression adjusted for age and gender.* ***Results and Discussion:*** *Overall vertical referral was 15.01%. Without adjustment, no significant difference was found between Prolanis and non-Prolanis participants (OR=1.046; 95% CI 0.858–1.275; p=0.692), due to a large age difference (55.0 vs 31.7 years; p<0.001). Vertical referral was lower among Prolanis participants in the comparable group (15.49% vs 24.86%; OR=0.554; 95% CI 0.376–0.818; p=0.004), consistent after adjusting for age and sex (Adjusted OR=0.540; 95% CI 0.371–0.809).* ***Conclusion:*** *Prolanis reduced vertical referral risk by 45–46% among comparable chronic disease patients. Unadjusted comparisons risk misleading conclusions. These findings support strengthening Prolanis coverage as a referral-control strategy in Primary Health Care Facility*

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Introduction

Indonesia's National Health Insurance (JKN) system operates on a tiered-referral principle, in which primary health care facilities act as gatekeepers that screen cases before referring them to advanced-level referral facilities. This principle is intended to ensure the efficiency of health financing while maintaining quality tiered care, yet referral patterns from Primary Health Care Facility to hospitals in Indonesia still show substantial variation and are not always driven by clear medical indication (Ayu et al., 2026). A national claims-based analysis covering 2017–2024 found that 14% of primary care visits resulted in referral to a higher-level facility, with referral likelihood significantly associated with patient age and sex (Ayu et al., 2026), underscoring that referral outcomes at the primary care level are shaped by patient characteristics that must be accounted for when evaluating any referral-control intervention.

Hypertension and diabetes mellitus remain leading contributors to this referral and financing burden. Data from the 2023 Indonesian Health Survey (IHS) indicate a hypertension prevalence of 30.8% among adults aged ≥18 years and a diabetes mellitus prevalence that continues to rise nationally (Badan Kebijakan Pembangunan Kesehatan, 2024), while the World Health Organization has identified uncontrolled hypertension as one of the leading global drivers of cardiovascular mortality and a major target for primary-care-level control efforts (World Health Organization, 2023). To address this burden at the primary care level, BPJS Kesehatan operates the Chronic Disease Management Program (Prolanis), a proactive care model for participants with hypertension and type 2 diabetes mellitus that combines medical consultation, group education, and regular health monitoring, complemented by the Referral-Back Program (PRB) for participants whose condition has stabilized after specialist care (BPJS Kesehatan, 2014; BPJS Kesehatan, 2019). Both programs are intended, in principle, to reduce unnecessary escalation of care from Primary Health Care Facility to Advanced Referral Health Facility.

Existing Indonesian literature on Prolanis has predominantly examined its association with medication adherence and clinical control rather than with referral outcomes directly. Karina et al. (2022) found a significant association between Prolanis participation and medication adherence with blood pressure control among hypertensive patients, and Farida et al. (2021) reported a similar positive relationship between patient knowledge and therapy adherence. At the same time, implementation studies indicate that program performance varies considerably across facilities: an evaluation of Prolanis at Primary Health Care Facility in Malang City found that achievement of the Controlled Prolanis Participant Ratio differed substantially between health centers despite adequate resources (2023), and a 2025 qualitative evaluation at a primary clinic found the program not yet effective, constrained by low participant adherence and irregular activity schedules (Syarifah et al., 2025).

Despite this body of work, few real-world studies directly compare the incidence of vertical referral between Prolanis and non-Prolanis participants, and those that exist rarely control for confounding by age and disease burden (Azhezinova, 2026). This study addresses that gap by examining the effectiveness of Prolanis on vertical referral at an Primary Health Care Facility using retrospective electronic visit-record data. To account for confounding, the analysis restricts comparison to a similar reference population and applies multivariable logistic regression. The findings aim to provide real-world evidence

for BPJS Kesehatan policy evaluation and for strengthening primary care quality in Indonesia.

Method

This study used an analytical observational design with a retrospective cross-sectional approach. The data source was secondary electronic patient visit-record data from Klinik Sabilillah, Malang City, East Java, covering the service period from March 2025 to March 2026. The unit of analysis in this study was the service visit (episode of care), rather than the individual patient, since a single participant could have more than one visit during the observation period.

The study population comprised all service visits recorded in the Klinik Sabilillah electronic record system during the study period of March 2025–March 2026, totaling 5,329 visits were obtained and used in the descriptive analysis and the whole-population analysis. No a priori sample size calculation was performed, as the study used the entire available electronic data population for the period (total population sampling / secondary-data census). For the primary inferential analysis, the population was restricted to a clinically comparable subpopulation, namely visits whose diagnosis field contained the keywords hypertension and/or diabetes (diabetes/diabetic), combined with all visits with Prolanis status (Hypertension, Diabetes Mellitus, or both), yielding a subpopulation of 1,083 visits. This restriction strategy was applied to control for confounding arising from differences in diagnosis composition between Prolanis and non-Prolanis participants in the general Primary Health Care Facility population, which includes non-chronic cases such as dental, ophthalmologic, and acute infectious conditions that naturally follow a different referral pattern.

The dependent (outcome) variable was the occurrence of vertical referral, a binary variable derived from the service discharge status field, categorized as "Vertical Referral" versus other categories ("Outpatient", "Horizontal Referral", "Discharge at Own Request"). The main independent (exposure) variable was Prolanis participation status, categorized as a registered Prolanis participant (Hypertension, Diabetes Mellitus, or both) versus not registered. The covariates controlled for in the multivariable analysis were age (years, continuous) and sex (male/female).

Data were analyzed using the SPSS version 27. Analysis proceeded in stages: (1) descriptive analysis to characterize the visit population; (2) bivariate analysis using chi-square (χ^2) tests and odds ratio (OR) calculations with 95% confidence intervals to assess the association between Prolanis status and vertical referral, performed on both the whole population and the comparable subpopulation; and (3) multivariable analysis using binary logistic regression with vertical referral as the dependent variable and Prolanis status, age, and sex as independent variables within the comparable subpopulation. 95% confidence intervals for the adjusted odds ratio were estimated using non-parametric bootstrap resampling with 2,000 replications. A p-value <0.05 was considered statistically significant.

Result and Discussions

1. Result

During the study period (March 2025–March 2026), 5,329 service visits were recorded at Klinik Sabilillah, Malang City, East Java. The proportion of female visits was higher (60.65%) than male visits (39.35%). The median patient age was 35 years (range

0–84 years; mean 35.65 years, SD 21.69), with a fairly even distribution across age groups, from children/adolescents (<18 years; 25.73%) to older adults (≥60 years; 16.34%). A total of 910 visits (17.08%) were from registered Prolanis participants, comprising the Hypertension category (11.09%), Diabetes Mellitus (3.72%), and combined Diabetes Mellitus–Hypertension (2.27%). Full characteristics of the study population are presented in Table 1.

Table 1
General Characteristics of the Visit Population (n=5.329)

Characteristic	n	%
Gender		
Female	3.232	60.65
Male	2.097	39.35
Age group (years)		
<18	1.371	25.73
18–44	1.932	36.25
45–59	1.155	21.67
≥60	871	16.34
Prolanis participation status		
Not registered	4.419	82.92
Hypertension	591	11.09
Diabetes Mellitus	198	3.72
DM + Hypertension	121	2.27
Referral-Back Program (PRB) status		
Registered in PRB	307	5.76
Not registered in PRB	5.022	94.24
Service discharge status		
Outpatient	4.519	84.80
Vertical referral	800	15.01
Horizontal referral	9	0.17
Discharge at own request	1	0.02

Source: Primary Data 2026

Of all visits, 800 (15.01%) resulted in vertical referral to an fkrtl, 9 visits (0.17%) involved horizontal referral, and 1 visit (0.02%) was classified as discharge at own request. The diagnoses most frequently associated with vertical referral overall included dental and oral conditions (necrosis of pulp, pulpitis, impacted teeth), refractive eye disorders (myopia, hypermetropia), and cardiovascular and metabolic disease (hypertensive heart disease, chronic ischaemic heart disease, diabetes mellitus with complications), reflecting the limited capacity of basic specialist services at the Primary Health Care Facility level for certain conditions.

Comparison of the proportion of vertical referral between Prolanis and non-Prolanis participants across the entire visit population showed no statistically significant difference. The proportion of vertical referral among Prolanis participants was 15.49% (141/910), slightly higher than among non-Prolanis participants at 14.91% (659/4,419) (OR=1.046; 95% CI 0.858–1.275; χ^2=0.157; p=0.692) (Table 2).

Table 2
Bivariate Analysis of Prolanis Status and Vertical Referral Incidence in the Whole Population (n=5.329)

Group	n	Vertical Referral n (%)	OR (95% CI)	p-value
Prolanis participants	910	141 (15.49)	1.046 (0.858–1.275)	0.692
Non-Prolanis participants (reference)	4.419	659 (14.91)	1.00	-

**OR = Odds Ratio; CI = Confidence Interval.*

This result initially appears to suggest that Prolanis is not associated with a reduction in vertical referral. Closer examination, however, reveals a very large difference in baseline characteristics between the two groups: the mean age of Prolanis participants was 55.0 years (SD=15.7), substantially older than non-Prolanis participants, who had a mean age of 31.7 years (SD=20.6) (independent t-test, t=32.39; p<0.001). Non-Prolanis visits in the whole dataset largely comprised non-chronic cases such as dental, ophthalmologic, and acute infectious visits among younger age groups, which naturally follow very different referral patterns and indications from chronic disease cases. This difference in age composition and diagnosis type has the potential to mask the true effect of Prolanis when comparisons are made without adjustment across the whole population.

To address this confounding, the analysis was restricted to the subpopulation of visits with a hypertension and/or diabetes mellitus diagnosis, plus all visits with Prolanis status (n=1,083 visits). Within this subpopulation, the mean ages of the two groups were relatively more comparable, though not identical (Prolanis participants: 55.0 years vs. non-Prolanis participants with a DM/HT diagnosis: 49.3 years). The analysis showed that the proportion of vertical referral among Prolanis participants (15.49%; 141/910) was significantly lower than among non-Prolanis participants with a DM/HT diagnosis (24.86%; 43/173) (OR=0.554; 95% CI 0.376–0.818; χ^2=8.380; p=0.004) (Table 3).

Table 3
Bivariate Analysis of Prolanis Status and Vertical Referral Incidence Within the Comparable Hypertension/Diabetes Mellitus Subpopulation (n=1.083)

Group	n	Vertical Referral n (%)	OR (95% CI)	p-value
Prolanis participants	910	141 (15.49)	0.554 (0.376–0.818)	0.004*
Non-Prolanis participants with DM/HT diagnosis (reference)	173	43 (24.86)	1.00	-

**Significant at p<0.05. The reference group comprises visits with a hypertension and/or diabetes mellitus diagnosis that were not registered as Prolanis participants.*

This finding indicates that, among a population with a comparable chronic disease burden, Prolanis participation is associated with an approximately 45% reduction in the risk of vertical referral compared with patients with a similar clinical profile who did not participate in the program. To test the consistency of this association after simultaneously controlling for age and sex, a binary logistic regression was performed on the comparable subpopulation (n=1,083). The multivariable logistic regression showed that Prolanis participation remained a significant independent predictor of reduced vertical referral risk, with an Adjusted OR of 0.540 (95% bootstrap CI 0.371–0.809), meaning that

Prolanis participants had an approximately 46% lower risk of vertical referral compared with non-participants of comparable clinical condition and demographic characteristics. Age (Adjusted OR=1.008; 95% CI 0.997–1.020) and male sex relative to female (Adjusted OR=1.362; 95% CI 0.998–1.859) showed no statistically significant association with vertical referral once jointly controlled with Prolanis status, although the direction of the age association was consistent with expected clinical patterns (Table 4).

Table 4
Multivariable Logistic Regression Results for Vertical Referral Within the Comparable Subpopulation (n=1083)

Variable	Adjusted OR	95% CI (bootstrap)	Interpretation
Prolanis participation (yes vs no)	0.540	0.371–0.809	Significant, protective
Age (per year)	1.008	0.997–1.020	Not significant
Gender (male vs female)	1.362	0.998–1.859	Not significant

CI estimated using non-parametric bootstrap resampling (2,000 replications).

Overall, the consistency in direction and magnitude between the bivariate association within the comparable population (OR=0.554) and the adjusted multivariable association (Adjusted OR=0.540) strengthens confidence that the protective association between Prolanis and vertical referral is not solely attributable to the age difference between groups, but rather suggests a genuine program effect on patients' clinical condition control.

2. Discussion

This study reveals an important finding: the apparent effectiveness of Prolanis on vertical referral incidence depends heavily on how the reference population is defined. A naïve comparison across the whole Primary Health Care Facility visit population showed no significant difference (OR=1.046; p=0.692), yet after restriction to a population with a comparable chronic disease burden and adjustment via multivariable logistic regression, a consistent and statistically significant protective association emerged (Adjusted OR=0.540; 95% CI 0.371–0.809). This pattern is a classic illustration of confounding by indication, in which the group receiving the intervention (in this case, Prolanis) differs systematically in baseline characteristics from the group not receiving it, such that unadjusted comparisons can either mask or exaggerate the true effect of the intervention. As a methodological caveat, because the unit of analysis in this study was the visit (not the patient) and the design was a retrospective cross-sectional study at a single Primary Health Care Facility, the associations identified remain associative in nature and should be interpreted cautiously before being generalized causally to other Primary Health Care Facilitys.

The finding that Prolanis is associated with a reduced risk of vertical referral within a comparable chronic disease population is conceptually consistent with the normative aim of the program as designed by BPJS Kesehatan, namely to improve participants' quality of life through risk-factor control, early complication detection, and improved medication adherence at the primary care level (BPJS Kesehatan, 2014). This result is also consistent with the findings of Karina et al. (2022), who reported a significant association between Prolanis participation and medication adherence with blood pressure control among hypertensive patients, as well as with the findings of Farida et al. (2021) regarding the role of therapy adherence in clinical outcomes among hypertensive patients

at Primary Health Care Facilitys. The convergence of these findings strengthens the plausibility that the mechanism of improved medication adherence facilitated by Prolanis contributes to a reduced risk of clinical deterioration leading to vertical referral.

Nevertheless, other findings point to variation in Prolanis performance across facilities. Purnamasari and Ningrum (2023) reported that achievement of the Controlled Prolanis Participant Ratio at Primary Health Care Facilitys in Malang City varied considerably, with some health centers failing to meet program targets despite adequate human resources, facilities, and standard operating procedures. Similarly, Meiriana et al. (2019) affirmed that the success of Prolanis for hypertension depends heavily on the consistency of implementing all program components (consultation, education, monitoring), rather than merely on the number of registered participants. This variation suggests that the protective association found in the present study most likely reflects the effectiveness of program implementation at the specific Primary Health Care Facility studied, and should not be assumed to generalize automatically to all Primary Health Care Facilitys in Indonesia, which vary considerably in capacity and quality of program implementation.

An important distinction between this study and much of the prior program literature lies in the methodological approach to confounding control. Most evaluations of Prolanis at the Primary Health Care Facility level in Indonesia are descriptive-qualitative in nature or compare clinical indicators before and after program participation within the same participant group (a before-after design), without an adequate external comparison group (Meiriana et al., 2019; Purnamasari & Ningrum, 2023). This study complements that evidence with a between-group comparative approach that explicitly controls for age, sex, and diagnosis comparability, thereby yielding a more methodologically defensible effect estimate. These findings are also relevant to the primary-referral quality concerns raised by Hardhantyo et al. (Hardhantyo et al., 2016), who found that a substantial proportion of referrals from Primary Health Care Facilitys in DKI Jakarta for diabetes mellitus and hypertension cases exhibited poor medical indication and documentation quality, suggesting that some referrals could genuinely be prevented through more optimal chronic disease management at the primary level, consistent with the direction of the present findings.

From a clinical mechanism perspective, the reduced risk of vertical referral among Prolanis participants can be explained through several pathways consistently described in program implementation guidelines: periodic health status monitoring, group education that improves patients' understanding of and adherence to therapy, scheduled medical consultations that allow earlier therapy adjustment before deterioration, and a visit-reminder system that reduces the risk of loss to follow-up (BPJS Kesehatan, 2014). These mechanisms theoretically act to prevent the acute clinical deterioration that constitutes an indication for vertical referral, such as hypertensive crisis, acute diabetes mellitus complications, or uncontrolled coronary heart disease—conditions also identified in this study as the dominant diagnoses accompanying vertical referral among Prolanis participants (hypertensive heart disease, chronic ischaemic heart disease, coronary artery aneurysm). For participants whose condition has stabilized after referral, the Referral-Back Program (PRB) scheme further enables routine control and medication refills to be conducted again at the Primary Health Care Facility without repeated visits to the fkrtl, potentially reducing the number of repeat referral visits (BPJS Kesehatan, 2019; Pertiwi et al., 2017).

Nevertheless, this study also shows that a proportion of vertical referrals among Prolanis participants persisted (15.49%), indicating that the program does not provide an absolute guarantee against referral, but is more accurately understood as a factor that reduces referral probability at the population level. Referrals that continue to occur among Prolanis participants likely reflect cases with advanced complications that genuinely require specialist care at an fkrtl according to medical indication, consistent with the principle of rational tiered referral rather than program failure per se. It should also be noted that the dataset used in this study did not include information on duration of Prolanis participation, level of participant visit adherence to the program schedule, or controlled clinical indicators (such as HbA1c or measured blood pressure), so the specific mechanisms underlying the protective association identified cannot be elaborated further and warrant future research incorporating more comprehensive clinical variables.

The implications of these findings for primary health care, BPJS Kesehatan, and health policy are considerable. First, for Primary Health Care Facilitys, these findings support the urgency of expanding Prolanis coverage among at-risk populations with a hypertension or diabetes mellitus diagnosis who are not yet registered, given that this group showed the highest proportion of vertical referral (24.86%) in this study. Second, given the variation in program achievement across facilities reported in prior studies (Purnamasari & Ningrum, 2023), the success of Prolanis appears to depend on the consistency with which all program activity components are implemented, so Primary Health Care Facilitys need to monitor not only the number of registrations but also the level of activity and visit adherence among registered participants—consistent with the Controlled Prolanis Participant Ratio (RPPT) indicator that forms part of Primary Health Care Facility performance assessment under the Performance-Based Capitation scheme (Hermansyah et al., 2025; Kurniawan et al., 2016). Third, for BPJS Kesehatan as the program administrator, these findings provide real-world evidence that investment in preventive-promotive programs at the primary level has the potential to reduce the burden of referral to Advanced Referral Health Facility, which in turn may contribute to the overall financing efficiency of the JKN system, while further reinforcing the relevance of the RRNS and RPPT indicators as Primary Health Care Facility performance incentive instruments. Fourth, from a broader health policy perspective, these results support strengthening early-detection strategies and proactive enrollment of chronic disease patients into chronic disease management programs across all Primary Health Care Facilitys, as well as strengthening referral quality audits as recommended by Hardhantyo et al. (Hardhantyo et al., 2016), so that referrals to Advanced Referral Health Facility are genuinely focused on cases that medically require specialist care.

Conclusion

This study concludes that participation in the Chronic Disease Management Program (Prolanis) is associated with a reduced risk of vertical referral among patients with a comparable hypertension and/or diabetes mellitus diagnosis, with an estimated risk reduction of approximately 45–46% compared with patients of similar clinical condition who did not participate in the program. By contrast, unadjusted comparisons across the whole Primary Health Care Facility visit population showed no significant difference, indicating substantial confounding due to large differences in age and disease burden between Prolanis and non-Prolanis participants. These findings underscore the importance of appropriate analytical approaches, through restriction to a comparable

reference population and multivariable statistical adjustment, when evaluating the effectiveness of health programs using routine service (real-world) data, so that resulting conclusions do not mislead policymakers.

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