KESANS: International Journal of Health and Science
2808-7178 / 2808-7380
http://kesans.rifainstitute.com/index.php/kesans/index

Dental Referral Patterns at a JKN Primary Care Clinic in Indonesia: An Encounter-Based Sentinel Condition Analysis

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Article Information
Submitted: **7 August 2026**
Accepted: **24 August 2026**
Publish: **16 September 2026**

Keyword: Dental Referral; Sentinel Condition; JKN; Primary Health Care; Vertical Referral; Pulp Necrosis;

Abstract
Introduction: *Indonesia's tiered referral system under the National Health Insurance (JKN) evaluates primary care performance mainly through non-communicable disease referral indicators, leaving dental referral patterns largely unexamined.* ***Objective:*** *To quantify the contribution of dental services to overall vertical referral burden and analyze referral variation across the pulp disease continuum at JKN primary care clinic in Indonesia.* ***Methods:*** *A retrospective cross-sectional analysis examined 873 dental encounters from 5,435 routine P-Care visits within February 2025–March 2026. Two sentinel dental conditions, pulp necrosis (ICD-10 K04.1) and impacted teeth (K01.1), were analyzed against the internal contrast of pulpitis (K04.0) versus pulp necrosis, with vertical referral as outcome.* ***Results and Discussion:*** *Dental encounters accounted for 16.1% of all visits (873/5,435) but generated 17.0% of all referrals; referral proportion within the dental subgroup itself was a distinct 16.2% (141/873). Referral proportion rose sharply across the pulp continuum, from 12.7% for pulpitis to 35.5% for pulp necrosis (crude prevalence ratio 2.79; 95% CI 1.91–4.07). Impacted teeth showed the highest referral proportion (56.1%).* ***Conclusion:*** *Dental services represent a disproportionate, previously unrecognized contributor to referral burden at this clinic, with the pulp disease continuum revealing a referral gradient not attributable to differences in operator, unit, or study period.*

How to Cite **Lutfi Rachman, Fitria Nugraha Aini/Dental Referral Patterns at a JKN Primary Care Clinic in Indonesia: An Encounter-Based Sentinel Condition Analysis/Vol. 5, No. 12, 2026**
DOI https://doi.org/10.54543/kesans.v5i12.713
e-ISSN/p-ISSN **2808-7178 / 2808-7380**
Published by **CV. Rifainstitut/KESANS: International Journal of Health and Science**

Introduction

Indonesia's National Health Insurance program (Jaminan Kesehatan Nasional, JKN) positions primary care facilities as gatekeepers responsible for resolving cases within their clinical competence before issuing a vertical referral, defined here as any onward referral from a primary care facility (FKTP) to an advanced-level facility (FKRTL) for further diagnosis or treatment. Not every vertical referral reflects a gap in primary care capacity; many are clinically necessary and expected. To distinguish appropriate from potentially avoidable referrals, BPJS Kesehatan evaluates FKTP performance through Kapitasi Berbasis Kinerja (KBK), a capitation-linked scoring system in which one specific indicator, the non-specialistic referral ratio (Rasio Rujukan Non-Spesialistik, RRNS), carries the highest single weight among performance indicators, targeting a ratio below 2% (KemenpanRB, 2022). RRNS is narrower than vertical referral as a whole: it isolates only those referrals for diagnoses primary care facilities are expected to resolve without specialist input, described further below.

Formally, RRNS is defined as the proportion of referrals for diagnoses that fall within the 144 non-specialistic conditions FKTP are expected to manage definitively, divided by total referrals (BPJS Kesehatan, 2025). A national medical audit of non-specialistic referrals coded under the TACC (Time, Age, Complication, Comorbidity) framework found substantial documentation inconsistencies between diagnosis coding and medical records, with 32.8% of sampled cases showing mismatches between recorded diagnosis and TACC selection (Wakhyuni et al., 2021).

Despite this policy emphasis, the empirical literature on primary care facilities referral behavior in Indonesia has concentrated almost entirely on general medical and non-communicable disease presentations. A study across primary health centers (Puskesmas) in Yogyakarta and Central Java examined physician competence, medical equipment availability, drug availability, patient demand, distance to advanced-level facilities, and facility access as correlates of the non-specialistic referral ratio, but did not address dental services as a distinct analytic category (UGM repository, n.d.). This omission constitutes a clear research gap: dental encounters represent a substantial share of primary care visits, yet no identified Indonesian study has disaggregated dental referral behavior as its own analytic domain within the RRNS framework. Dental care occupies a structurally different position within JKN than general medical care. Coverage is limited to seven defined services (examination, premedication, emergency care, uncomplicated extraction, post-extraction medication, and related procedures) leaving many restorative and endodontic needs outside guaranteed benefit (Hariyani et al., 2021). Indonesia's dental caries prevalence has been estimated above 88%, with 45% of cases untreated (Ministry of Health, Republic of Indonesia, 2019), against a dentist workforce density of only 1.2 per 10,000 population in 2021, below that of Malaysia, Thailand, and the Philippines (Rahardjo et al., 2024). These structural constraints plausibly shape which dental conditions a primary care facilities can resolve internally and which require referral, yet this question has not been examined directly using routine JKN primary care data.

At the level of individual disease processes, the clinical literature establishes that irreversible pulpitis (K04.0) and pulp necrosis (K04.1) represent sequential stages of a single pathological continuum, both amenable to root canal treatment or, increasingly, pulpotomy as a less invasive primary care alternative (Fouad, 2022). Because the two diagnoses represent different points on the same continuum rather than categorically different conditions, comparing their referral proportions offers a way to isolate variation

attributable to disease stage from variation attributable to facility-level factors such as operator identity, equipment availability, or care setting—since both diagnoses are, by definition, managed within the same unit. No identified Indonesian study has exploited this internal contrast. Likewise, none has applied a *sentinel condition* (*tracer condition*) approach, which uses specific, well-defined diagnoses as indicators of system-level performance and has precedent in dental primary care evaluation internationally (Downer, 2001), to dental referral behavior in the JKN context. Accordingly, this study aimed to: (1) describe the contribution of dental services to overall vertical referral burden at Klinik Sabilillah; (2) analyze referral variation across the pulp disease continuum, contrasting pulpitis (K04.0) and pulp necrosis (K04.1); and (3) describe referral patterns for two sentinel dental conditions, namely pulp necrosis and impacted teeth (K01.1), by demographic and membership characteristics.

Method

This was a retrospective, analytic cross-sectional study using routinely collected primary care service data from Klinik Sabilillah, primary care clinic contracted under JKN in Malang City, East Java Province, Indonesia. Data were extracted from the clinic's P-Care system, the national primary care information platform used for JKN service documentation and claims. The study period of February 2025–March 2026, totaling 5,435 visit-level records, no time-trend analysis was attempted. Within this analytic window, dental encounters were identified through a keyword search of free-text diagnosis fields, yielding 873 dental encounters from 422 individual patients.

Two dental diagnoses were designated as sentinel (tracer) conditions on the basis of four a priori criteria: sufficient case volume for analysis, clear diagnostic boundaries, treatment falling within the recognized scope of primary care dental competence, and clinical relevance as a resource-intensive procedure (Downer, 2001). Pulp necrosis (K04.1) was selected as a marker of endodontic (root canal) capacity, and impacted teeth (K01.1) as a marker of minor oral surgical capacity.

Data were summarized as proportions and compared using the chi-square or Fisher's exact test, as appropriate. The primary analysis compared referral prevalence between pulpitis and pulp necrosis (422 encounters; 89 referrals) using modified Poisson regression with robust patient-clustered standard errors to estimate prevalence ratios (PRs), as outcome prevalence exceeded 10%. The impacted-teeth subgroup (41 encounters; 23 referrals) was analyzed descriptively and bivariately because of the limited number of events. All analyses were performed in SPSS ver. 27.

Research and Discussions

1. Result

Within the 12-month analytic window, 5,435 total visits were recorded at Klinik Sabilillah, of which 873 (16.1%) were dental encounters. Among 830 total vertical referrals issued by the clinic during this period, 141 (17.0%) originated from dental encounters, a share modestly disproportionate to the volume of dental visits. Notably, the referral proportion within the dental subgroup itself, 141 of 873 dental encounters (16.2%), closely matched the clinic-wide referral proportion of 15.3%, a numerical coincidence with the dental share of total visits reported above; this indicates that dental services as a whole did not diverge sharply from general referral behavior. As shown below, the divergence was concentrated within specific diagnoses rather than distributed evenly across all dental conditions.

Table 1 presents referral proportions for the two sentinel conditions against the non-sentinel dental caseload. Impacted teeth showed the single highest referral proportion of any diagnosis in the dataset (56.1%, 23/41), followed by pulp necrosis (35.5%, 55/155); both substantially exceeded the non-sentinel dental baseline of 9.3% (63/677), and both differences were statistically significant (chi-square $p<0.001$ for each comparison against the non-sentinel category).

Table 1
Referral proportions by sentinel condition category

Category	n encounters	n referred	% referred	p-value
Pulp necrosis (K04.1) — Sentinel 1	155	55	35.5%	<0.001
Impacted teeth (K01.1) — Sentinel 2	41	23	56.1%	<0.001
Non-sentinel dental encounters	677	63	9.3%	reference
Total dental encounters	**873**	**141**	**16.2%**	

Source: Primary Data 2026

The internal contrast between pulpitis and pulp necrosis, two sequential stages of the same pathological process managed by the same clinical unit across the same study period, showed a marked and statistically significant gradient (Table 2). Patients presenting with pulp necrosis were referred at nearly three times the proportion of those presenting with pulpitis (crude PR 2.79, 95% CI 1.91–4.07). Because both diagnoses were managed within the same facility, by the same pool of operators, over the same analytic window, this gradient is unlikely to be explained by facility-level factors that vary over time or across units. It more plausibly reflects the greater procedural complexity of managing an already-necrotic pulp, though data on operator identity, equipment availability, and case severity were not available to test this directly.

Table 2
Referral proportion and crude prevalence ratio, pulpitis versus pulp necrosis

Diagnosis	n	n referred	% referred	Crude PR (95% CI)	p-value
Pulpitis (K04.0)	267	34	12.7%	1.00 (reference)	–
Pulp necrosis (K04.1)	155	55	35.5%	2.79 (1.91–4.07)	<0.001

For pulp necrosis, referral proportion showed an inverse age gradient relative to the pattern typically observed for general vertical referrals: the youngest age group (0–17 years) showed the highest referral proportion (46.3%, 19/41), compared with 32.1% (34/106) among those aged 18–59 and 25.0% (2/8) among those aged 60 and above. By sex, referral proportion was higher among female patients (42.2%, 43/102) than male patients (22.6%, 12/53).

For impacted teeth, referral proportion was 56.8% (21/37) in the 18–59 age group; case counts in the 0–17 group (n=4) and the 60-and-above group (no encounters recorded) were too small to report proportions meaningfully. By sex, referral proportion was similar between female (57.6%, 19/33) and male (50.0%, 4/8) patients, though the small stratum sizes limit the precision of this comparison and it is reported descriptively only.

As part of the analytic process leading to the sentinel-condition design described above, we also examined an exploratory three-category classification of dental competence: primary care facilities competence, resource-dependent, and mandatory referral. This classification used the full, unrestricted dataset, and it was not performed blind to referral outcomes. It showed that most referrals in the "resource-dependent" category came from just two diagnoses, pulp necrosis and impacted teeth. When these

two diagnoses were removed, the referral proportion of the remaining resource-dependent diagnoses became statistically indistinguishable from the primary care facilities-competence category. This finding is what motivated the shift to the sentinel-condition, disease-continuum approach used as the primary analysis above. Because the competence coding was not blinded, this finding is reported here as part of our analytic reasoning, not as a validated result on its own.

2. Discussion

This study found that dental services contributed disproportionately to the vertical referral burden of Klinik Sabilillah (16.1% of visits generating 17.0% of referrals), and that referral proportion varied sharply within a single disease continuum—from 12.7% for pulpitis to 35.5% for pulp necrosis. These findings extend the Indonesian RRNS literature, which has concentrated on non-communicable disease and general medical referrals (UGM repository, n.d.; Wakhyuni et al., 2021), into a clinical domain that has received comparatively little empirical attention despite its measurable contribution to referral volume. The referral proportion observed for pulp necrosis in this study (35.5%) is broadly consistent with the clinical understanding that irreversible, necrotic pulp pathology often requires procedures, principally root canal treatment, that exceed the routine equipment and time capacity of many primary dental care settings, a constraint documented in feasibility studies of root canal alternatives such as full pulpotomy in general dental practice (Do et al., 2022). The clinical literature further establishes that irreversible pulpitis and pulp necrosis are sequential points on the same pathological continuum, both amenable in principle to conservative endodontic management (Fouad, 2022). The referral gradient identified at Klinik Sabilillah suggests that as pulp pathology progresses toward necrosis, rather than showing a uniform high or low referral proportion across the continuum, the clinic's capacity to manage the case internally declines. This decline appears independent of any change in facility, operator, or study period, since these were held constant by design in this internal contrast.

This pattern is corroborated by an independent descriptive study at another JKN-contracted primary dental clinic in Yogyakarta, which similarly found pulp necrosis and impacted teeth to be the two leading diagnoses among referred dental cases, together accounting for the majority of referred patients (Heningtyas et al., 2025). The convergence of findings across two independently studied clinics suggests that the referral pattern identified here may reflect a broader structural feature of dental service delivery within Indonesian FKTP rather than an idiosyncrasy of a single facility, though confirmation would require a multi-site study. This pattern differs from findings on dental referral in other health systems, where general dental practitioners have been shown to serve as a substantial referral source into secondary and tertiary oral health services for reasons including diagnostic uncertainty and case complexity (Ravaghi et al., 2021). Whereas that literature generally examines referral into specialist dental services from general dental practice, the present study examines referral out of a JKN-contracted primary care clinic into the hospital-based referral to advanced-level facilities tier. This represents a distinct referral relationship, shaped by Indonesia's capitation and gatekeeping structure rather than by discretionary specialist consultation norms.

The high referral proportion for impacted teeth (56.1%) is consistent with international recognition of impacted tooth management, particularly surgical extraction, as a procedure commonly requiring resources and expertise beyond routine general dental practice (NCBI Bookshelf, n.d.). This lends external plausibility to the resource-capacity

interpretation offered for the sentinel findings in this study, even though the present dataset cannot directly measure equipment availability, operator training, or case severity.

For Klinik Sabilillah and similar primary care facilities, these findings suggest that dental referral reduction efforts may be incomplete if they do not separately address endodontic and minor oral surgical capacity, since such efforts are commonly framed around general medical diagnoses in KBK improvement guidance. The pulp-continuum finding in particular indicates a specific, actionable target. Strengthening capacity for definitive pulp necrosis management, potentially including staff training in pulpotomy as a less resource-intensive alternative to full root canal treatment, could plausibly reduce a documented source of avoidable referral. However, this remains an inference requiring prospective evaluation rather than a demonstrated causal effect. For BPJS Kesehatan and KBK policy design, this study raises a methodological caution rather than a policy prescription. RRNS as officially defined restricts its numerator to the 144 designated non-specialistic diagnoses (eClinic, 2025), a threshold this study's diagnosis-level classification could not fully verify against the current official list. The magnitude of dental referral observed at Klinik Sabilillah nonetheless suggests that a dental-inclusive breakdown of referral performance indicators could give primary care facilities more specific, actionable feedback than an undifferentiated composite score, rather than allowing dental services to be subsumed silently within an aggregate ratio.

Conclusion

Dental services contributed disproportionately to the vertical referral burden of Klinik Sabilillah relative to their share of overall visit volume, a finding that was stable when re-estimated after excluding three calendar months with materially incomplete or unrepresentative records. Within the pulp disease continuum, referral proportion nearly tripled between pulpitis and pulp necrosis despite both being managed by the same clinical unit across the same analytic window, indicating that referral variation in this domain is more plausibly linked to disease stage and associated procedural demands than to facility-level factors that vary over time. Impacted teeth showed the highest referral proportion of any diagnosis examined. These findings position dental services, and endodontic capacity specifically, as an underexamined but measurable component of primary care referral performance within Indonesia's JKN system.

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