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RATIONALITY AND COST COMPARISON OF OUTPATIENT TYPE 2 DM THERAPY UNDER INA-CBGS: A LITERATURE REVIEW

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ABSTRACT

This literature review evaluates the rationality of Type 2 Diabetes Mellitus (T2DM) therapy and analyzes the cost comparison between treatment expenses and Indonesian Case-Based Groups (INA-CBGs) tariffs for outpatient hospital care. The findings indicate that evidence-based therapy is essential for improving clinical effectiveness and cost efficiency. Several studies have highlighted significant discrepancies between actual outpatient treatment costs and INA-CBGs tariffs, with pharmaceutical expenses being the primary factor contributing to hospital cost deficits. A review was conducted using 11 peer-reviewed studies from 2019 to 2024, selected based on inclusion criteria such as relevance to outpatient T2DM therapy under INA-CBGs, full-text availability, and publication in Indonesian or English language. This review recommends policy adjustments to strengthen a transparent claims system, optimize an evidence-based national formulary, and enhance complication prevention strategies to improve the efficiency of DM management in Indonesia.

Keywords: *rationality of therapy, Type 2 Diabetes Mellitus, treatment cost, INA-CBGs, hospital, outpatient*

INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by insulin resistance and a progressive decline in insulin secretion, leading to chronic hyperglycemia (PERKENI, 2021). This condition disrupts the metabolism of carbohydrates, fats, and proteins, which, if not properly managed, can lead to serious microvascular and macrovascular complications, such as nephropathy, retinopathy, and cardiovascular diseases (Wima Anggitasari et al., 2024). According to the guidelines of the American Diabetes Association (ADA), T2DM management involves a combination of lifestyle modifications, pharmacological therapy, and regular blood glucose monitoring (Yusi Anggriani et al., 2020). In Indonesia, the prevalence of T2DM is increasing. Based on the *Survei Kesehatan Indonesia (SKI)* conducted in 2023, the prevalence of type 2 Diabetes Mellitus (T2DM) increased by 11.7% among the population aged ≥15 years based on blood glucose measurements. The International Diabetes Federation (IDF) projects that the number and prevalence of individuals with diabetes aged 20–79 years in Indonesia will continue to increase in the coming years. To address the challenges posed by this disease, the government, through the *Badan Penyelenggara Jaminan Sosial Kesehatan (BPJS Kesehatan)*, has designated DM as one of the priority diseases in the Chronic Disease Management Program (*Program Pengelolaan Penyakit Kronis* – Prolanis).

However, the success of T2DM management in the Prolanis program heavily relies on the rationality of the prescribed therapy. Previous studies have shown that irrational drug use remains a major barrier, reducing therapeutic effectiveness and increasing the risk of complications and financial strain on patients. Rational therapy is defined by the appropriateness of indication, correct drug selection, accurate dosage, suitable administration route, and appropriate frequency of use.

On the economic side, the Indonesian Case-Based Groups (INA-CBGs) system, used under the National Health Insurance (*Jaminan Kesehatan Nasional* – JKN) scheme, sets predetermined reimbursement rates based on diagnosis-related groups. Although designed to streamline costs, this package-based payment method often does not reflect the actual cost of T2DM treatment, especially in outpatient settings. This mismatch may compromise the availability of optimal therapies in hospitals in the future.

While previous studies have examined either cost or therapy rationality in isolation, there are still limited articles that comprehensively address both aspects in the context of T2DM outpatient care under the INA-CBGs system. Therefore, it is crucial to evaluate the rationality of T2DM therapy and analyze the cost comparison between actual treatment expenses and INA-CBGs tariffs. This study aimed to provide a comprehensive overview of the therapeutic effectiveness, cost efficiency, and quality of healthcare services in the management of patients with type 2 DM in hospitals, particularly outpatient care. By conducting this evaluation, strategic recommendations can be formulated to enhance T2DM management from both clinical and economic perspectives, ultimately supporting the JKN Prolanis program's long-term success.

RESEARCH METHODS

Literature Search Strategy

The search for relevant studies was carried out through electronic databases such as PubMed, ScienceDirect, and Google Scholar, utilizing specific keywords relevant to this topic, including *"Rationality of DM therapy," "Cost of DM therapy," "INA-CBGs and DM," "Cost-effectiveness of DM," "Optimization of DM therapy," "National formulary for DM,"* and *"INA-CBGs claims."* The selected studies included publications from the last five years (2019– 2024) to ensure that the information remained up-to-date and aligned with the current INA-CBGs system.

Literature Criteria

The inclusion criteria required that articles be published between 2019 and 2024, written in either Indonesian or English, available in full-text format, and published in peer-reviewed journals. Furthermore, the studies had to specifically address topics related to the rationality of T2DM therapy or cost comparisons involving the INA-CBGs system. Articles were excluded if they were unrelated to the research focus, lacked sufficient data to support the analysis, or were duplicates of previously selected studies.

Literature Search Process

The article selection process in this study followed a PRISMA-based approach to ensure transparency and systematic screening of the literature. A total of 40 articles were identified, of which 28 were screened based on their titles, abstracts, and keywords. After full-text evaluation, 11 articles met the inclusion criteria and were included in the analysis.

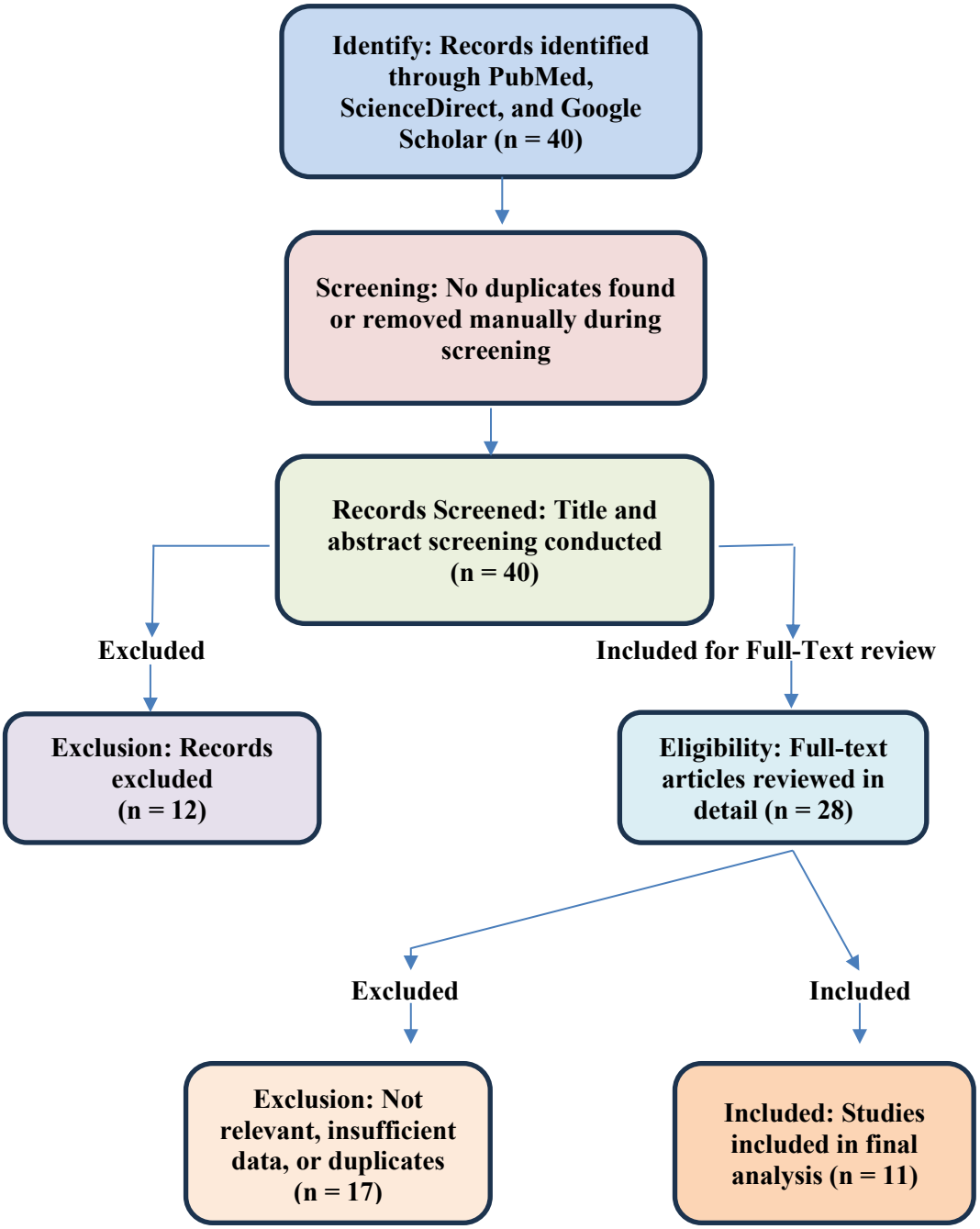

Figure 1. PRISMA flow diagram illustrating the article selection process, from identification to inclusion of the 11 final studies in the review.

RESULTS AND DISCUSSION

The journal review on the **Evaluation of Rationality and Cost Comparison Analysis of Diabetes Mellitus Therapy for Outpatients under the INA-CBGs System in Hospitals** is summarized in Table 1.

Table 1. Evaluation of Rationality and Cost Comparison Analysis of Diabetes Mellitus Therapy for Outpatients under the INA-CBGs System in Hospitals

Author	Year	Evaluation Method	Results
Wima Anggitasari et al.	2024	Assessment of therapy accuracy (indication, dosage, medication) and treatment costs against INA-CBGs tariffs	Therapy accuracy reached 100% for indications, 97.8% for medications, and 91.1% for dosage, with glimepiride being the most frequently prescribed drug. This accuracy is relevant for ensuring cost efficiency in DM therapy.
Heni Setyoningsih et al.	2023	Evaluation of rationality in combination therapy (oral and insulin) on blood glucose levels	Only 40% of the therapies were deemed rational, with oral insulin combination therapy significantly reducing blood glucose levels ($p=0.003$). The effectiveness of this combination therapy supports cost efficiency in the management of DM.
Arief Nur Hidayat et al.	2023	Evaluation of the rationality of oral antidiabetic therapy on glucose reduction effectiveness	The accuracy of therapy was 100% for patient selection, medication, dosage, and administration intervals. The combination of ADO (biguanide + sulfonylurea) was proven effective in reducing blood glucose levels after three months of therapy (fasting blood glucose decreased from an average of 138 mg/dL to 125 mg/dL, $p<0.05$).
Tri Purnama Sari	2022	Comparison of outpatient costs between hospital rates and INA-CBGs tariffs for BPJS patients	Actual outpatient costs were higher than INA-CBGs tariffs, with the largest discrepancies observed in patients with BPJS Class III. The claims system affects cost efficiency.

Author	Year	Evaluation Method	Results
Budi Hidayat et al.	2022	Analysis of direct costs in type 2 DM management using INA-CBGs data	The average annual outpatient cost for patients with type 2 DM without complications was $421, significantly lower than for patients with complications ($930 per year). This cost difference highlights the importance of preventing complications to align with INA-CBGs tariffs.
Leny Ramadhan, MGS Aritonang, Yusi Anggriani	2021	Evaluation of hospital tariff discrepancies with INA-CBGs for outpatient cases	Among the 500 patients, 62.6% had a negative discrepancy (hospital costs exceeded INA-CBGs tariffs). The largest gap was attributed to medication costs (56.82%), highlighting the need for efficient drug use.
Fitriyani, Retnosari Andrajati, Yulia Trisna	2021	Cost-effectiveness analysis of Metformin-Insulin (Met-Ins) and Metformin-Sulfonylurea (Met-SU) combination therapies	Met-SU therapy was more cost-effective than Met-Ins. The cost for the Met-Ins group was significantly higher, indicating the need for efficiency evaluations to minimize cost gaps with INA-CBGs tariffs. No significant difference was observed in the reduction of HbA1c levels between the two groups (p=0.608).
Dwi Febriyani, Farida Anwari, Adinugraha Amarullah	2021	Evaluation of oral antidiabetic therapy profiles in outpatient cases	Glimepiride was the most frequently prescribed medication (91.89%), followed by the Glimepiride-Metformin combination (88%). Evaluation and education on the use of combination therapy are essential to reduce cost discrepancies with INA-CBGs tariffs.

Sri Wusono, Julita Hendrartini, Dwi Handono Sulistyo	2020	Assessment of hospital tariff discrepancies with INA-CBGs for JKN services	Outpatient service costs for JKN patients were 20.3% higher than INA-CBGs tariffs (January–June 2017). The largest negative discrepancy originated from the pharmaceutical costs (53.7%). Hospitals are advised to improve service efficiency and strengthen the implementation of a national formulary.
Yusi Anggriani et al.	2020	Evaluation of insulin use profiles in type 2 DM outpatients	A total of 99% of patients used analog insulin, with an analog premixed insulin (35%) as the primary choice. The evaluation suggests potential cost savings by optimizing human insulin use according to the national formulary to support cost efficiency and rational therapy.
Endang Yuniarti et al.	2019	Analysis of drug rationalization strategies by healthcare professionals using INA-CBGs	Rationalization strategies included rejection, substitution with cheaper/less effective drugs, and reduction of drug quantity. INA-CBGs restrictions were perceived to lower service quality. Evidence-based decision-making procedures are recommended to ensure fairness in the implementation of INA-CBGs.

Rationality of T2DM Therapy

The rationality of therapy in Type 2 Diabetes Mellitus (T2DM) is central to ensuring therapeutic effectiveness while maintaining cost-efficiency (Anggitasari et al., 2024). Rational therapy includes accuracy in indications, appropriate drug selection, optimal dosage, and suitable routes of administration. Several studies indicate high compliance with these standards such as 100% accuracy in indication, 97.8% in drug selection, and 91.1% in dosing. Glimepiride emerged as the most commonly prescribed oral antidiabetic, likely due to its efficacy, affordability, and inclusion in the national formulary.

Yet, these metrics may mask deeper inconsistencies. Rationality in combination therapies remains problematic: only 40% of oral-insulin combinations met the rationality criteria (Setyoningsih et al., 2023). While clinical evidence supports the use of combination therapy such as biguanide and sulfonylurea in improving glycemic control (Hidayat et al., 2023), the adoption of such approaches is often constrained by financial and institutional factors rather than clinical judgment alone. These findings suggest that rational therapy in T2DM cannot be separated from systemic and structural conditions.

Cost Discrepancies under the INA-CBGs System

The INA-CBGs system aims to streamline healthcare reimbursement, yet numerous studies highlight a significant mismatch between standardized tariffs and real treatment costs. For instance, the real cost of T2DM outpatient treatment frequently exceeds INA-CBGs tariffs, especially in lower-class BPJS services (Sari, 2022). Similarly, outpatient service costs for JKN patients were reported to be 20.3% higher than INA-CBGs tariffs, with pharmaceutical spending accounting for over half of this gap (Wusono et al., 2020).

This discrepancy exerts significant financial pressure on hospitals. (Ramadhan et al., 2021) found that 62.6% of 500 patients experienced negative discrepancies where treatment costs exceeded tariff coverage, with drug costs being the primary contributor (56.82%). This environment forces hospitals to reduce services or opt for cheaper drug regimens, which may compromise quality. Standardized tariffs, although efficient on paper, fail to reflect the diverse clinical needs of patients in actual practice.

High Use of Analog Insulin: Cost vs Practice

Despite their significantly higher cost, analog insulins remain the dominant therapeutic choice. (Yusi Anggriani et al., 2020) found that 99% of patients used analog insulin, with premixed analog formulations (35%) being the most commonly prescribed formulation. This trend prompts important questions: Why is analog insulin still widely used if more affordable options, such as human insulin, exist?

One possibility is the perceived clinical advantage of analog insulins, including better glycemic control, lower hypoglycemia risk, and patient convenience. These advantages may influence prescriber habits and patient adherence. However, the continued use of costly analogs may also reflect a lack of enforcement or revision of national policy frameworks and hospital formularies. If cost-effective alternatives are not prioritized or incentivized, physicians may default to familiar prescription patterns, regardless of economic efficiency.

Hospital Trade-Offs and Long-Term Risks

Hospitals operating under budgetary pressure often have to make difficult trade-offs. (Ramadhan et al., 2021) observed that to remain financially sustainable, some hospitals limited laboratory tests and restricted access to high-cost medications. Although these strategies reduce short-term expenses, they may increase the risk of poor long-term outcomes.

Chronic conditions, such as T2DM, require sustained, evidence-based management. Undertreatment or diagnostic limitations may lead to preventable complications, including nephropathy, neuropathy, and retinopathy. These complications not only decrease the patients' quality of life but also increase healthcare costs in the long run. When hospitals are forced to prioritize short-term savings over long-term patient health, the fundamental goals of universal health care are undermined.

Unintended Consequences of Cost-Cutting

Efforts to comply with INA-CBGs tariffs through cost-cutting measures may have unintended negative consequences. (Yuniarti et al., 2019) reported that rationalization strategies, such as rejecting expensive medications, substituting them with less effective alternatives, or reducing prescription volume, can harm service quality and patient satisfaction. Patients may perceive such treatment as insufficient, which could lower adherence and increase the risk of complications.

In several countries, such as the United Kingdom and Canada, cost-containment strategies for diabetes care are accompanied by rigorous cost-effectiveness assessments and flexible formulary systems that allow exceptions for high-risk patients. Unlike Indonesia's INA-CBGs system, which tends to apply fixed reimbursement schemes, these countries implement dynamic policies that consider long-term outcomes and readmission risks in their DRG systems. Lessons from these systems highlight the importance of aligning financial incentives with patient-centered care to avoid undertreatment and ensure better health outcomes (Folland et al., 2017).

Based on this review, although rational DM therapy aims to provide effective and efficient treatment, the INA-CBGs payment system still has limitations in accommodating optimal therapies. Some recommendations that could improve the effectiveness of the INA-CBGs system in DM therapy include: (1) **Adjusting INA-CBGs tariffs based on real hospital cost data** to better reflect patient clinical needs (Sari, 2022); (2) **optimizing the national formulary** to ensure that more effective therapies can be provided without financially burdening hospitals (Yuniarti et al., 2019); (3) **increasing flexibility in the INA-CBGs claim system** so that hospitals do not have to reduce essential patient services (Ramadhan et al., 2021); and (4) **strengthening complication prevention programs** to reduce long-term healthcare costs within the national health system (Hidayat et al., 2023).

Overall, this literature review highlights that DM therapy management for outpatients requires adherence to clinical standards and policy integration that supports cost efficiency without compromising service quality. The discrepancy between actual costs and INA-CBGs tariffs, particularly in the pharmaceutical component, remains a challenge that necessitates innovation in pharmaceutical management and evidence-based therapy evaluations.

Moving forward, close collaboration between healthcare providers, policymakers, and researchers is needed to create a system that is more adaptive to patient needs while ensurin cost efficiency. Enhancing transparency in claims management and implementing an evidence-based national formulary could be significant first steps. Additionally, technology-driven approaches, such as big data analytics or machine learning, could be utilized to analyze therapy patterns and provide more accurate recommendations for patient management.

In conclusion, the successful evaluation of therapy rationality and cost efficiency will not only impact healthcare budget management but also contribute to improving patients' quality of life. By integrating data, policies, and clinical practices, a more sustainable healthcare system can be established in the future.

CONCLUSION

This review highlights a critical gap between rational T2DM therapy and the reimbursement mechanisms of the INA-CBGs system. By systematically analyzing recent studies, this review offers a comprehensive synthesis of how therapy selection, particularly in the use of insulin analogs and combination treatments, is often constrained by tariff limitations. The key contribution of this review lies in identifying the unintended clinical and financial consequences of cost-based restrictions on DM therapy.

To address these challenges, actionable strategies include revising national formulary guidelines to better reflect real-world effectiveness, enabling conditional flexibility for high-risk patients, and enhancing transparency in the claims process. Moreover, focusing on complication prevention through timely and appropriate therapy offers dual benefits: improved patient outcomes and reduced long-term healthcare costs. These targeted insights provide a foundation for more adaptive, evidence-informed policies to support the sustainability of the *Program Pengelolaan Penyakit Kronis – Prolanis* and national healthcare delivery in Indonesia.

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