Research Article

Analysis of ICD-9-CM Coding Accuracy in the Reimbursement Claim Process for INA-CBGs Compliance

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Abstract: This study aims to analyze the accuracy of ICD-9-CM coding in Cathlab procedure claims submitted to BPJS Kesehatan under the INA-CBGs reimbursement system at RSI Aisyiyah Malang. Accurate coding is critical for determining appropriate claim grouping and tariff calculation within Indonesia's national health insurance scheme. The research employed a mixed-methods approach, combining quantitative analysis of 244 Cathlab claims from 2024 with qualitative insights obtained through document review, interviews, and direct observation. The results showed that 182 claims (74.59%) were accepted as accurate and complete, while 62 claims (25.41%) were returned as pending. Common causes of claim inaccuracy included missing supporting documents (37.10%), incorrect ICD-9-CM codes (27.42%), and nonspecific diagnoses (19.35%). Procedural miscoding, such as omitting dual catheterization codes or stent-related procedure codes, was identified as a frequent issue, significantly impacting claim grouping and reimbursement. The study highlights systemic challenges related to documentation quality, coder competency, and institutional claim verification processes. These challenges result in delays, incorrect payments, and administrative inefficiencies, posing barriers to effective reimbursement. The findings underscore the importance of implementing Clinical Documentation Improvement (CDI) strategies, improving coder training, and transitioning to newer coding systems such as ICD-10 or ICD-11. Upgrading to these systems will support better coding accuracy, enhance claim processing efficiency, and ensure more appropriate reimbursement. Strengthening these components is essential to ensure the integrity of Indonesia's health financing system, improve operational workflows, and ensure that healthcare providers receive timely and accurate reimbursement for services rendered. This study provides a comprehensive evaluation of the current state of coding practices in Indonesian healthcare institutions and offers actionable recommendations for improving coding accuracy and claims processing.

Keywords: Claim accuracy; Health management; ICD coding; INA reimbursement; Medical compliance

1. Introduction

The National Health Insurance System (JKN) in Indonesia employs a reimbursement mechanism based on Indonesia Case-Based Groups (INA-CBGs) to manage healthcare service claims. INA-CBGs constitute a package-based financing model categorizing diagnoses and medical procedures into specific case groups, each associated with predetermined tariffs established by BPJS Kesehatan, Indonesia's social security administrative body (Maryati et al, 2021). Accurate coding of diagnoses and medical procedures, particularly utilizing the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM), plays an essential role in determining the tariffs for reimbursements within this framework.

According to the Health Information Management (HIM) theory, coding accuracy for diagnoses and medical procedures is integral to managing healthcare information, ensuring precision in medical documentation, and optimizing the efficiency of healthcare payment

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systems (Wardhana et al, 2020) Coding inaccuracies can lead to discrepancies in claim tariffs, denial of claims, and potential fraud risks (Lee et al, 2019). Consequently, medical coding professionally trained medical record personnel are pivotal in ensuring that all medical interventions are meticulously documented in alignment with prevailing coding standards.

Accuracy and diligence in medical record completion, particularly in assigning diagnostic and procedural codes, are crucial. Among medical services, Cathlab procedures, especially coronary stenting and angiography, demand heightened accuracy in coding due to their procedural complexity and strict regulatory guidelines under BPJS Kesehatan. According to O'Malley's Clinical Coding Accuracy theory, coding precision relies on three primary factors: comprehensiveness of medical documentation, coders' understanding of coding standards, and the robustness of claim validation systems employed by healthcare providers and BPJS Kesehatan.

Previous studies underscore the importance of coding accuracy in INA-CBG claim processes. Research by identified that inaccuracies in ICD-9-CM coding for cardiac surgery procedures could reduce claim approval rates by up to 15%. Similarly, Click or tap here to enter text. found procedural coding errors frequently stemmed from inadequate coordination among clinicians, medical record staff, and BPJS Kesehatan verification teams, reflecting systemic communication shortcomings. Moreover, demonstrated that in several hospitals, ICD-9-CM coding accuracy for Cathlab interventions reached only 80%, with errors predominantly occurring in stenting and angiography procedures. Such findings highlight the need for enhanced coding and verification practices to improve efficiency within the INA-CBG payment system.

Despite the recognized significance of coding accuracy, substantial gaps remain in understanding the specific factors influencing coding precision within Cathlab contexts, particularly regarding the correlation between coding accuracy and supporting claim documentation completeness. Most research has broadly examined general surgical or medical procedures, leaving a paucity of detailed investigation into specialized, high-complexity interventions like Cathlab procedures, ,. Addressing this gap, the present research uniquely focuses on the interrelation between coding accuracy using ICD-9-CM and the comprehensiveness of supporting documentation in claims submissions for Cathlab services. This study offers novelty by explicitly investigating ICD-9-CM coding precision and the completeness of claim evidence, providing targeted insights applicable specifically to Cathlab procedures. Furthermore, by incorporating a detailed analysis of factors such as coder competency, documentation comprehensiveness, and institutional claim validation mechanisms, the research adds valuable knowledge to the literature on healthcare reimbursement and clinical coding accuracy within Indonesia's INA-CBG system.

Given these contexts and identified gaps, this research aims explicitly to analyze ICD-9-CM coding accuracy regarding supporting evidence completeness within INA-CBG payment processes for Cathlab procedures conducted at RSI Aisyiyah. By identifying critical factors

influencing coding accuracy and assessing their impact on reimbursement outcomes, the study seeks to generate practical recommendations to enhance coding precision and claims process efficiency. Ultimately, this investigation not only addresses existing academic and practical knowledge gaps but also contributes toward optimizing INA-CBG implementation, thereby improving overall healthcare financing efficiency and accuracy in Indonesia.

2. Literature Review

2.1. Medical Coding Accuracy and Health Information Management

Medical coding is a foundational process in health information systems that transforms diagnoses, medical procedures, and services into standardized codes. According to the Health Information Management (HIM) framework, accurate coding is essential not only for medical documentation but also for facilitating reimbursement, quality measurement, and healthcare planning. The International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM), remains a pivotal taxonomy in many reimbursement systems, including Indonesia's INA-CBGs framework, due to its structured representation of clinical conditions and interventions.

Theories in HIM emphasize the centrality of coding accuracy in ensuring financial integrity and data quality. The Theory of Data Quality outlines four dimensions accuracy, completeness, consistency, and timeliness that apply directly to coding practices. Coding accuracy, specifically, relates to the correct application of the most precise codes that reflect the patient's documented conditions and procedures. Inaccuracies, whether from human error or systemic misinterpretation, can result in claim denials, overpayment, underpayment, or even legal sanctions for fraudulent claims.

Moreover, Transaction Cost Theory can be used to analyze the economic implications of poor coding accuracy in healthcare systems. In the context of INA-CBGs a case-based prospective payment system every incorrect code potentially leads to mismatched tariffs and thus incurs avoidable transaction costs. From an institutional economics perspective, hospitals aim to minimize these inefficiencies by investing in competent coders and internal audits to maintain compliance with coding standards and optimize reimbursement.

2.2 Coding Compliance in INA-CBGs and the Role of ICD-9-CM

The Indonesian Case-Based Groups (INA-CBGs) system, implemented under the National Health Insurance (Jaminan Kesehatan Nasional, JKN), mirrors the Diagnosis-Related Groups (DRG) model used globally. It requires healthcare providers to classify inpatient services into diagnosis and procedure groupings using ICD-9-CM codes for reimbursement purposes. According to BPJS Kesehatan regulations, each INA-CBG group has a predetermined tariff, making precise coding imperative ,.

Research underscores several systemic and human factors affecting ICD-9-CM coding compliance in INA-CBGs. On the institutional level, coding compliance is shaped by coder training, clinical documentation quality, software infrastructure, and audit mechanisms. A

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qualitative study by found that inadequate clinical documentation from physicians significantly hampers accurate coding, as coders often rely solely on discharge summaries and medical records. This deficiency not only compromises reimbursement accuracy but may distort morbidity statistics and burden national health accounts.

Empirical findings from Indonesian hospitals indicate variation in compliance rates. For example, studies report ICD-9-CM coding compliance ranging from 68% to 85% depending on the region and coder experience. The inconsistency is also due to insufficient regulatory enforcement and limited use of automated coding tools that assist in code validation. While some tertiary hospitals have instituted internal audits and clinical coding review committees, such practices remain absent in many regional health facilities, contributing to errors in claims submission and delays in BPJS reimbursements.

Furthermore, the INA-CBGs system itself is subject to critique due to the rigidity of its tariff structures. A study by highlighted that hospitals sometimes engage in "upcoding" assigning higher-weighted codes to maximize reimbursements, particularly for complex cases. This practice, while unethical, reflects systemic flaws in tariff adjustment for comorbidities and severity levels. Therefore, coding compliance must be assessed not only as a technical process but also within its ethical and regulatory dimensions.

2.3 Challenges and Strategic Improvements for Coding Accuracy

Ensuring accurate ICD-9-CM coding in reimbursement systems such as INA-CBGs is fraught with challenges, both operational and structural. Operationally, coder competency remains a pressing concern. Despite the existence of standard coding guidelines issued by the Ministry of Health, implementation is uneven across institutions. A survey conducted by noted that only 42% of hospitals provide mandatory annual training for coders, leading to skill degradation and coding misclassification.

Another barrier is the disconnect between clinical and administrative personnel. The concept of Clinical Documentation Improvement (CDI), prevalent in countries like the U.S. and Australia, is not yet systematically adopted in Indonesia. CDI programs aim to bridge the gap by improving physician documentation quality and engaging coders in concurrent documentation processes ,. In the absence of CDI, coders often make interpretive assumptions that may not align with physician intent, jeopardizing coding integrity. On the structural side, technological limitations impede real-time error detection and code verification. Integrated Hospital Information Systems (HIS) with embedded coding support, decision trees, and cross-code validation tools can significantly enhance accuracy but are underutilized due to cost constraints and infrastructure disparities. Moreover, INA-CBGs still relies on ICD-9-CM, a system considered outdated compared to ICD-10 and ICD-11, which offer greater specificity and alignment with contemporary medical knowledge ,.

To address these challenges, scholars and policymakers advocate for a multifaceted strategy. First, capacity-building for coders must become institutionalized, with mandatory certification, periodic evaluations, and integration into professional licensing schemes.

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Second, hospitals should institutionalize CDI teams to enhance coding reliability through collaborative documentation practices. Third, the transition to more advanced classification systems like ICD-10-CM or ICD-11 should be expedited, with simultaneous training and systems updates to avoid transitional confusion.

Additionally, audit mechanisms both internal and by BPJS need to shift from punitive to developmental frameworks. By providing constructive feedback and structured audit reports, BPJS can promote a culture of quality improvement rather than fear-driven compliance. Leveraging AI-based coding support tools and predictive analytics also holds promise for future improvements, especially in high-volume hospitals dealing with complex multi-morbidity cases.

3. Proposed Method

3.1. Research Design

This study employed a descriptive research design integrating both quantitative and qualitative approaches to comprehensively evaluate the accuracy of ICD-9-CM coding in the context of Cathlab procedure claims submitted to BPJS Kesehatan through the INA-CBGs system. The quantitative dimension focused on identifying and calculating the rate of accurate, revised, or rejected claims based on clinical documentation and coding audit findings. This was achieved through statistical analysis of archival data from medical records and claim forms.

Meanwhile, the qualitative component sought to explore underlying factors contributing to coding inaccuracies. This was accomplished through in-depth interviews and direct observations, enabling the researchers to interpret behaviors, workflows, and contextual dynamics influencing the coding process. By adopting a convergent parallel design , both datasets were collected and analyzed simultaneously but independently, and later integrated to provide triangulated insights into both the numerical trends and human experiences affecting coding compliance. The research was conducted at RSI Aisyiyah Malang, a referral Islamic hospital in East Java, Indonesia, with a dedicated unit for health information management and claim submission. This setting was chosen due to its active participation in the INA-CBGs system and the availability of both complete documentation and access to key information such as coding staff and internal verifiers.

3.2. Data Source

The study utilized two categories of data: document-based quantitative records and field-based qualitative insights. The population consisted of all Cathlab-related inpatient claims submitted by RSI Aisyiyah Malang to BPJS Kesehatan during the fiscal year 2024. The claims were categorized based on their status post-submission either accepted without revision, flagged for revision, or rejected due to errors or discrepancies in coding.

A purposive sampling method was applied to ensure the relevance and analytical utility of selected documents. Three sampling criteria were used:

    a.   Total Cathlab Claims submitted during the study period: 244 files.

    b.   Revised or Pending Claims as flagged by BPJS auditors: 62 files.

    c.   Accepted Claims without Revision serving as a comparative benchmark: 182 files.

These samples were drawn from the hospital's coding and billing database and stratified to reflect diverse outcomes and potential patterns in coding practices. The rationale behind this stratified purposive sampling was to facilitate a comparative analysis of claims accuracy across different validation statuses. For qualitative data, key informants were selected based on their professional role and involvement in claim processing. These included three medical recorder coders, one senior health information manager, and two internal verifiers. Their perspectives were crucial for understanding systemic and procedural challenges influencing ICD-9-CM code selection and claim preparation.

3.3. Data Collection

The study deployed triangulated data collection techniques to ensure depth and accuracy of findings:

3.3.1 Document Review

Quantitative data were collected through a structured review of patient discharge summaries, clinical documentation, finalized ICD-9-CM codes, and submitted INA-CBGs claim files. Each document was examined using a checklist instrument that assessed:

    a.   Completeness of clinical documentation

    b.   Code specificity and alignment with clinical descriptors

    c.   Match between assigned codes and INA-CBGs groupings

This review was guided by the ICD-9-CM coding standards and national claim submission guidelines from BPJS Kesehatan.

3.3.2 In-depth Interviews

Semi-structured interviews were conducted with key stakeholders involved in the coding and verification processes. An interview protocol was developed focusing on themes such as:

    a.   Interpretation of coding rules and coding dilemmas

    b.   Interactions between physicians and coders

    c.   Experience with claim rejections or revisions

    d.   Institutional procedures for code validation

Interviews were audio-recorded with consent and transcribed verbatim for subsequent analysis. These interviews enabled exploration of tacit knowledge and experiential insights often missed in document-based analysis.

3.3.3 Participant Observation

To understand the practical workflow, the researcher conducted non-participant observation in the hospital's medical records unit and claim submission division. A structured observation sheet was used to document:

    a. The coding sequence and code selection process

    b. Communication patterns between clinical and coding staff

    c. Use of coding software or automated tools

    d. Review procedures prior to claim submission

Observations provided a direct lens into the coding environment and institutional culture, contributing contextual richness to the qualitative analysis.

3.4. Data Analysis

The integration of quantitative and qualitative data followed a multi-layered analytical strategy:

3.4.1 Quantitative Analysis

The numerical data from reviewed claim documents were analyzed using descriptive statistics, focusing on frequencies and proportions. Key metrics included:

    a. Percentage of accurate versus inaccurate claims

    b. Distribution of revised vs unrevised files

    c. Common categories of coding errors (e.g., incomplete codes, misclassified procedures)

These analyses were performed using SPSS Version 25.0 and presented in tables and graphs to visualize the scope of compliance and error patterns.

3.4.2 Qualitative Analysis

Transcribed interview data and observational field notes were analyzed using content analysis, following the stages of open coding, axial coding, and thematic development (Elo & Kyngäs, 2008). NVivo software was employed to facilitate data coding, clustering, and interpretation. Emergency themes included:

    a. Documentation challenges

    b. Inter-professional coordination issues

    c. Resource constraints (training, infrastructure)

    d. Ethical dilemmas in "upcoding" or forced adjustments

The qualitative analysis provided a nuanced understanding of structural, cognitive, and procedural dimensions influencing coding behavior.

3.4.3 Triangulation and Validation

To enhance the credibility and trustworthiness of findings, the study employed data triangulation, comparing information across documents, interviews, and observations. Additionally, member checking was conducted by sharing thematic summaries with selected respondents to verify the interpretations. This triangulation process allowed the researcher to cross-validate patterns, reduce bias, and provide a more robust synthesis of the multifaceted factors affecting ICD-9-CM coding accuracy.

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4. Results and Discussion

This study was conducted at Rumah Sakit Islam (RSI) Aisyiyah Malang, with a focus on assessing the accuracy of clinical coding in claims for cardiac catheterization (Cathlab) procedures submitted to BPJS Kesehatan under the INA-CBGs system. A total of 244 claim files submitted throughout 2024 formed the basis of analysis. These claims were retrospectively reviewed to determine their compliance with coding and documentation standards, especially in the use of ICD-9-CM codes, which serve as the primary classification system in INA-CBGs-based reimbursement.

The goal of this analysis was to quantify the proportion of claims that were approved without revision, those flagged for revision (pending claims), and to categorize the reasons behind coding inaccuracies or documentation deficiencies that led to claims being marked as incomplete.

4.1. Result

Of the 244 Cathlab claims reviewed, 182 claims (74.59%) were accepted as accurate and complete, while 62 claims (25.41%) were returned or held (pending) due to non-compliance with coding or documentation requirements. This distribution is summarized in Table 1.

Table 1. Accuracy of Cathlab Claims Submitted to BPJS Kesehatan (2024)

Claim Status	Number of Claims	Percentage (%)
Accurate and Complete	182	74.59%
Pending or Incomplete	62	25.41%
Total	**244**	**100.00%**

Most accurate claims demonstrated proper documentation and coding alignment, including precise use of ICD-9-CM procedure codes and supporting clinical documentation such as physician notes, catheterization lab reports, and imaging results. This approval rate reflects the effectiveness of internal verification protocols for a significant portion of cases. However, the 25.41% pending rate suggests systemic weaknesses that warrant deeper analysis. To further investigate the causes of inaccuracy, the 62 pending claims were categorized based on the reasons cited during internal and external (BPJS) review processes. These categories included missing documents, incorrect ICD-9-CM codes, nonspecific diagnoses, incomplete administrative data, and other miscellaneous issues.

Table 2. Categorization of Pending Claims by Reason

No	Pending Reason Category	Number of Claims	Percentage (%)
1	Missing Supporting Documents	23	37.10%
2	Incorrect Procedure Code (ICD-9-CM)	17	27.42%
3	Unclear or Nonspecific Primary Diagnosis	12	19.35%
4	Incomplete Administrative Documentation	7	11.29%
5	Miscellaneous (Further Clarification)	3	4.84%
	Total	**62**	**100.00%**

The most prevalent issue (37.10%) was the absence of essential supporting documentation, such as EKG results, echocardiography reports, or detailed clinical records. These documents are required to validate the necessity and complexity of the procedure, especially under INA-CBGs reimbursement criteria, which rely on severity-adjusted

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groupings. In 27.42% of the cases, coders applied inaccurate or incomplete ICD-9-CM procedure codes, failing to match them with the actual interventions performed. For example, coding diagnostic coronary angiography using a single code (88.56) without the necessary accompanying code (37.23) to reflect combined right and left cardiac catheterization resulted in claim rejections. Approximately 19.35% of the claims were flagged due to nonspecific or unclear primary diagnoses, such as listing "chest pain" without elaborating on the underlying ischemic or coronary pathology. INA-CBGs require that diagnoses not only match coding logic but also reflect treatment relevance, especially in high-cost procedures. A smaller proportion of claims (11.29%) were returned due to administrative errors, including unsigned physician notes, missing consent forms, and date mismatches between admission, procedures, and discharge summaries.

A closer examination of coding discrepancies revealed common error patterns involving Cathlab-related procedures:

a. Diagnostic Coronary Angiography (DCA) performed using two catheters was frequently undercoded with only 88.56, without the companion code 37.23 for combined catheterization. This omission led to the reclassification or rejection due to underrepresentation of procedural complexity.

b. In Percutaneous Coronary Intervention (PCI) cases, coders often failed to add auxiliary codes indicating:

    1) The number of vessels treated (e.g., 00.40–00.43)

    2) The number of stents implanted (e.g., 00.45–00.48)

    3) Whether the intervention involved bare-metal or drug-eluting stents

The absence of these codes obscured the scope of the procedure, impacting the INA-CBGs grouping algorithm and reimbursement tariff. For Percutaneous Transluminal Coronary Angioplasty (PTCA) where no stent was placed, claims were sometimes incorrectly assigned codes associated with stent implantation (36.06 or 36.07), leading to grouping mismatches and claim rejections. Such inconsistencies not only compromise reimbursement but also carry implications for hospital-level case-mix reporting and national health expenditure statistics. The remaining 4.84% involved miscellaneous issues, often requiring further clarification by BPJS reviewers. These cases typically involved complex procedural pathways, such as repeat interventions or complications not clearly documented.

Observational data and informal verification logs during fieldwork at RSI Aisyiyah revealed several process-related factors that influenced the coding accuracy:

a. Time constraints and workload pressures on coders often led to reliance on discharge summaries rather than full clinical notes.

b. The absence of a Clinical Documentation Improvement (CDI) program meant coders had limited opportunities to clarify ambiguous documentation with physicians.

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c. Internal verification procedures existed but were not always synchronized with updated BPJS claim submission protocols, particularly those concerning procedural bundling and documentation requirements for complex cases.

These observations highlighted systemic challenges within the hospital's health information management and coding functions, suggesting a need for better integration between clinical documentation, coding processes, and claim validation mechanisms.

4.2. Discussion

The results of this study illustrate a clear picture of the state of ICD-9-CM coding compliance in Cathlab-related claims submitted to BPJS Kesehatan at RSI Aisyiyah Malang during 2024. With an acceptance rate of 74.59%, the hospital shows a moderate level of success in aligning its coding and documentation practices with INA-CBGs reimbursement standards. However, the remaining 25.41% of claims that were flagged as pending indicate ongoing issues that require critical reflection. This discussion aims to interpret the results considering existing literature, systemic challenges, and strategic opportunities for improvement.

The relatively high acceptance rate can be seen as a positive indicator of institutional awareness and partial effectiveness of internal verification systems. This rate falls within the range reported by other studies on INA-CBGs claims accuracy in Indonesia. For example, observed coding compliance rates between 70–80% across secondary and tertiary healthcare providers, particularly in Java-based hospitals. Nevertheless, the fact that one in four claims still fails to meet the threshold for reimbursement reveals a troubling inefficiency. In a national health insurance system that depends heavily on volume-based claims and timely reimbursements, a 25% pending rate can translate into substantial revenue loss and administrative burden.

One of the key findings in this study was that the most frequent reason for pending claims was missing supporting documents. This reflects a widespread problem in Indonesian hospitals where clinical documentation is either incomplete, inconsistently recorded, or not aligned with coding expectations. Supporting reports such as EKG results, echocardiography images, or physician progress notes are not only vital for patient care but are also required for INA-CBGs grouping, particularly in cardiac interventions. This finding supports previous work by, who found that insufficient documentation was the leading cause of claim rejection in 17 major hospitals. The absence of a structured clinical documentation improvement (CDI) program may explain the inconsistency. Without a dedicated team to bridge the gap between clinical and administrative units, documentation often lacks the granularity necessary for accurate coding and billing.

Equally significant is the finding that nearly 27.42% of pending claims were due to incorrect or incomplete ICD-9-CM procedure codes. This includes omissions such as the failure to combine codes for coronary angiography involving two catheters (88.56 and 37.23) or the absence of auxiliary codes that indicate the number of inserted and vessels treated

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during percutaneous coronary interventions (PCI). These errors point to gaps in coder competency and highlight the limitations of the ICD-9-CM classification system itself. Compared to ICD-10 or ICD-11, ICD-9-CM offers limited specificity, making it more difficult to represent complex procedures accurately. Argue that continued reliance on ICD-9-CM hampers Indonesia's ability to report and finance modern healthcare effectively. The situation is compounded when coders rely solely on discharge summaries, which often exclude nuanced procedural details required for accurate classification.

The mismatch between clinical practice and coding also exposes hospitals to financial and ethical risks. In several cases, this study found that stent placement codes were entered even when no stents were used, or PCI-related codes were missing when stents were in fact deployed. These inconsistencies, although often unintentional, may be flagged as fraud by BPJS reviewers. Emphasize that such discrepancies can lead to audit sanctions, reputational harm, or even legal action. Moreover, these errors distort national healthcare data, misrepresent case complexity, and may result in unjustified resource allocation. From the lens of Transaction Cost Theory, such coding inefficiencies increase administrative costs, slow down reimbursement cycles, and erode institutional trust in the healthcare financing process.

The study also sheds light on the limitations of current verification and quality control mechanisms. Although RSI Aisyiyah Malang has implemented internal claim reviews, interviews and observations revealed that these processes were not always in sync with the evolving standards set by BPJS. The hospital lacks automated coding support systems and a dedicated CDI unit both of which have been shown in international studies to significantly improve claim accuracy and reimbursement outcomes. For instance, found that U.S. hospitals with CDI programs reported a 20–30% increase in revenue integrity and a reduction in claim denial rates.

Furthermore, coder interviews indicated that continuing education and competency-based training were either sporadic or limited in scope. This is problematic given that ICD-based coding is not only a technical skill but also a judgment-based process that requires constant updating, especially for high-cost procedures such as cardiac catheterization. As have noted, the lack of standardized national certification for coders in Indonesia results in variability of skill, which in turn leads to inconsistent claims quality across healthcare providers. These discrepancies have implications not only for hospital reimbursement but also for broader policy goals in universal health coverage and cost containment.

From a comparative standpoint, these challenges are not unique to Indonesia. Studies in Malaysia and the Philippines have shown similar trends in claim inaccuracy due to documentation and coding gaps in DRG-based systems, however, countries that have adopted ICD-10-CM or ICD-11 along with national CDI strategies and integrated health information systems have demonstrated better alignment between clinical services and payment systems. Indonesia's gradual transition to ICD-11, while welcome, must be

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accompanied by systemic changes in education, infrastructure, and audit culture if it is to succeed in improving claim compliance and healthcare equity.

Considering the findings, it becomes evident that improving ICD coding accuracy and claim compliance requires a multipronged strategy. At the institutional level, hospitals must invest in coder training, implement internal audits before submission, and establish documentation teams that can work directly with physicians. At the policy level, the Ministry of Health and BPJS should standardize training and certification for coders and provide clear, regularly updated guidelines that reflect the complexity of modern medical care. Technology must also play a role through the adoption of coding decision support systems, automated cross-checking tools, and interoperable hospital information systems that link clinical records with claim submission platforms.

Hence, while RSI Aisyiyah Malang has demonstrated relatively strong compliance in INA-CBGs claim submissions, this study reveals that deeper systemic issues persist. The lack of documentation quality, coder support, and institutional safeguards against errors highlights an urgent need for reform, especially as Indonesia prepares for broader health system modernization. Addressing these barriers will not only reduce claim rejection rates but also contribute to a more efficient, equitable, and accountable national health financing ecosystem.

5. Conclusions

This study investigated the accuracy of ICD-9-CM coding compliance in Cathlab procedure claims submitted to BPJS Kesehatan at RSI Aisyiyah Malang, within the INA-CBGs reimbursement system. The findings revealed that 74.59% of claims were accepted without revision, while 25.41% were flagged as pending due to documentation deficiencies and coding inaccuracies. The most prevalent causes of pending claims included missing supporting clinical documents, incorrect procedure codes, and vague primary diagnoses. These results indicate a moderate level of compliance but highlight substantial room for institutional and systemic improvement.

The discussion underscored the critical impact of clinical documentation quality, coder competency, and system support tools on claim accuracy. Inadequate integration between clinical and administrative workflows, as well as the continued reliance on the outdated ICD-9-CM classification system, were found to contribute significantly to claim rejections. Comparative analysis with national and international literature confirmed that these challenges are common in DRG-like systems but are especially problematic in the absence of Clinical Documentation Improvement (CDI) programs and structured coder training.

This study is limited by its single-site design, which may not fully capture variations in coding practices across different hospital types and regions. Additionally, it focused exclusively on Cathlab procedures, limiting generalizability to other clinical departments. Despite these limitations, the study contributes meaningful insights into the operational dynamics of coding compliance in Indonesian hospitals and reinforces the need for holistic

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interventions at both institutional and policy levels. Enhancing coder education, implementing CDI teams, transitioning to ICD-11, and strengthening audit mechanisms can significantly improve claim accuracy. In doing so, hospitals can ensure not only financial sustainability but also uphold the credibility and efficiency of Indonesia's universal health coverage system.

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