

Operational Analysis of BPJS Claim Duration: Coding Accuracy, Medical Record, Claim Document

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Abstract

The pending Health Social Security Administering Body (Badan Penyelenggara Jaminan Sosial/BPJS) claims remain a challenge affecting hospital operational continuity. This study aimed to determine and analyze the partial associations of Diagnosis Coding Accuracy, Medical Record Completeness, and Claim Document Completeness with BPJS claim duration, as well as their joint contribution to model fit. A quantitative approach with descriptive and verificative methods was applied using secondary data from 365 inpatient claim files from October-December 2025, selected through proportionate stratified random sampling. Data were analyzed using ordinal logistic regression, with hypotheses tested using the Wald test for partial associations and Model Fitting Information for joint model fit. Descriptive analysis showed that Diagnosis Coding Accuracy was appropriate in 91.2% of files, Medical Record Completeness in 90.1%, Claim Document Completeness in 97.5%, and BPJS claim duration was categorized as fast in 90.7% of files. Diagnosis Coding Accuracy was the only independent variable that showed a statistically significant partial association with BPJS claim duration, whereas Medical Record Completeness and Claim Document Completeness did not show statistically significant partial associations. Jointly, the three predictors provided a significantly better-fitting model than the intercept-only model.

Keywords: BPJS Claim Duration, Claim File Completeness, Diagnosis Coding Accuracy, Medical Record, Ordinal Logistic Regression

1. INTRODUCTION

Pending claims are one of the most common issues encountered in the Social Security Administering Body (*Badan Penyelenggara Jaminan Sosial/BPJS*) medical insurance claims process in hospitals. Empirical data show that the number of pending claims at Indonesian hospitals remains high. [Rizky, Muyasaroh, Valentina, Putra, and Karyono \(2026\)](#) found that in the first quarter of 2024, 129 pending inpatient claim files were at RSI Sultan Agung in Semarang. [Bella, Pratama, and Zaenal \(2024\)](#), at Sebelas Maret University Hospital recorded 183 pending claims during the August-October 2023 period. Nationally, this phenomenon of pending claims has become a serious problem that affects the smooth operation of hospitals in the country.

Various studies have shown that pending claims are influenced by a variety of factors, including administrative, clinical, and hospital management aspects. [Yurika \(2025\)](#) identified that the leading cause of pending claims is incomplete medical records and medical summaries (47.1%), followed by discrepancies in the coding of diagnoses and medical procedures (38.1%), and indications of repeat procedures that do not comply with regulations (14.8%). These findings indicate that the quality of medical record documentation and the accuracy of the coding process play a crucial role in ensuring the smooth processing of BPJS claims.

Incomplete medical records are one of the most common administrative factors leading to the return of claim files. [Tuzzahra, Hakim, Romodon, and Gunawan \(2024\)](#) found that incomplete medical records, missing documentation of medical procedures, and delays in receiving diagnostic test results were the main causes of pending claims. Documents such as the Participant Eligibility Letter (*Surat Eligibilitas Peserta/SEP*), medical summary signed by the Attending Physician (*Dokter Penanggung Jawab Pelayanan/DPJP*), results of diagnostic tests, and proof of medical procedures are the primary requirements that must be met before a claim is submitted to BPJS Medical Insurance ([BPJS, 2018](#)). If any of these documents is missing, the file will be returned, and the claim settlement process will be delayed.

In addition to administrative aspects, the accuracy of diagnostic coding is a critical factor in the claims verification process. Inaccurate coding can result from diagnoses that are not specific enough, differences in interpretation between hospital coders and BPJS verifiers, errors in determining the primary diagnosis, or a lack of competence among the coding staff ([Kusumawati & Pujiyanto, 2020](#)). [Ibrahim, Maulana, Anwar, Bilqis, Nurjayanti, Munawaroh, and Miladiyah \(2024\)](#) explained that a limited understanding of the International Classification of Diseases, Tenth Revision (ICD-10), and the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9 CM), as well as a lack of training, are the main causes of coding errors. Inaccurate coding can result in incorrect Indonesian Case-Based Group (INA-CBG) classifications, leading to claims that must be corrected or even put on hold.

A related phenomenon was also observed at PKU Muhammadiyah Gamping Hospital, the site of this study. [Mahesti \(2025\)](#) showed that during the period from January to December 2024, 389 BPJS inpatient claims were submitted, of which 383 claims (98.5%) were successfully processed, while 6 claims (1.5%) remained pending. The distribution of processed and pending inpatient claims during this period is presented in Figure 1.

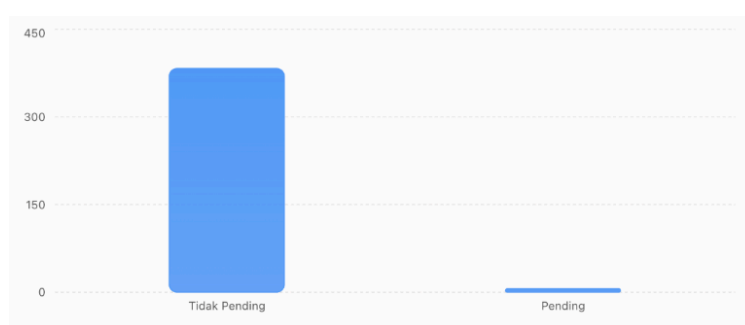


Figure 1. BPJS admission claims at PKU Muhammadiyah Gamping Hospital in 2024

The results of another study at PKU Muhammadiyah Gamping Hospital among patients who underwent cesarean sections also showed that pending claims still occurred. Of the 65 BPJS claim files analyzed, 63 (96.9%) were deemed eligible for payment and 2 (3.1%) remained pending. These findings indicate that pending claims are not only a general problem but also occur in specific types of medical services ([Setyawan, 2025](#)).

Various previous studies have identified factors contributing to pending claims, such as inaccuracies in diagnosis coding, incomplete medical records, incomplete claim documentation, and hospital management system factors. Research by [Mukaromah and Wahab \(2024\)](#) found that indications of repeat visits, unavailable diagnostic test results, coding errors, and system malfunctions were the main causes of pending claims. [Widaningtyas and Asmorowati \(2024\)](#) also reported that 68.11% of pending claims were related to coding issues, including incorrect code assignment, code reselection, and double coding. A recent scoping review by [Zalukhu and Permanasari \(2025\)](#) further synthesized the literature and identified coding inaccuracies, incomplete claim documents, information system limitations, human resource competence, and inconsistent Standard Operating Procedure (SOP) implementation as major factors contributing to pending claims in Indonesian hospitals. However, these studies predominantly focus on the occurrence and causes of pending claims rather than on the duration or timeliness of the claim settlement process.

Recent research has begun to examine the timeliness of National Health Insurance (*Jaminan Kesehatan Nasional/JKN*) claim settlement as an operational outcome. For example, [Rizky et al. \(2026\)](#) examined the determinants of JKN claim settlement timeliness at a general hospital and indicated that timeliness is an important aspect of hospital claim management. Similarly, research applying Lean Management to hospital insurance claims demonstrated that waste within the claim process can substantially increase process cycle time, highlighting the relevance of processing time as an indicator of administrative efficiency ([Friskasari, Suryawati, & Setyawan, 2019](#)). However,

quantitative evidence examining the relationship between coding accuracy, medical record completeness, and claim document completeness and claim duration remains limited. Unlike a pending-claim outcome, which primarily identifies whether a claim encounters a pending status, claim duration provides information on the timeliness of the overall claim settlement process. Therefore, examining claim duration allows differences in the speed of claim processing and resolution to be captured beyond a simple pending or non-pending classification. This makes claim duration a relevant operational outcome for evaluating the efficiency of hospital claim management.

2. LITERATURE REVIEW

2.1 Hospital Management

Hospital management is a specific application of general management principles to healthcare organizations, which have unique characteristics: they are capital-intensive, technology-intensive, labor-intensive, and heavily regulated. Hospital administration and management, as the process of integrating the management of hospital resources to deliver high-quality care based on principles established by national health policies and World Health Organization standards, encompasses the dimensions of equity, effectiveness, timeliness and access, efficiency, patient-centered care, and safety ([Supriyanto, Wartiningsih, Kodrat, & Djuari, 2023](#)). In the context of national regulations, Law No. 44 of 2009 on Hospitals stipulates that hospitals must be managed professionally to provide comprehensive individual health care services, while Minister of Health Regulation No. 82 of 2013 on Hospital Management Information Systems stipulates that hospital management functions, including data and information management, are intended to improve efficiency, effectiveness, professionalism, performance, and access to services.

This perspective is consistent with [Kurnawan, Yuliaty, Paramarta, and Kosasih \(2025\)](#), who explain that the implementation of hospital management strategies is not only focused on achieving organizational goals but also on the ability to identify, manage, and control various risks that may affect the quality of care and the operational sustainability of the hospital. Through an integrated risk management approach, every clinical and administrative process must be managed systematically so that potential risks can be minimized from the outset. Thus, hospital management not only serves to coordinate resources but also ensures that every process operates in accordance with standards through continuous control mechanisms.

From a hospital management perspective, BPJS claim processing represents an administrative and health-information management process that requires coordination among clinical services, medical records, coding, casemix, and claims administration. The quality of information produced at each stage may affect the subsequent verification process and ultimately the timeliness of claim settlement. Within this framework, Diagnosis Coding Accuracy, Medical Record Completeness, and Claim Document Completeness represent operational components of the claim management process, while BPJS Claim Duration represents an outcome reflecting the timeliness of that process. Therefore, the proposed model examines whether variation in these operational components is associated with differences in claim duration.

2.2 The National Health Insurance System/JKN and BPJS Medical Insurance

The National Health Insurance/JKN is a social security program in the health sector administered by the government as a form of social protection for all Indonesian citizens. This program is based on Law No. 40 of 2004 on the National Social Security System, which mandates the provision of comprehensive social security for every Indonesian citizen. Legally, the national health insurance system/JKN is defined as health protection that ensures participants receive health maintenance benefits and protection in meeting their basic health needs. This protection is provided to every person who has paid premiums or whose premiums are paid by the government, as regulated in Presidential Regulation No. 12 of 2013 on Health Insurance.

The national health insurance system program is designed based on a mandatory social insurance mechanism, ensuring that the entire population of Indonesia, regardless of economic status, has access to comprehensive health care services ([Erniaty & Harun, 2020](#)). In principle, this type of

social security system functions by collectively collecting contributions from participants to provide protection against socioeconomic risks that may affect participants and their family members ([Cahyo & Peristiowati, 2022](#)).

2.3 BPJS Claim and INA-CBG's

A BPJS medical insurance claim is a request for payment of healthcare costs incurred by JKN participants at healthcare facilities, submitted to BPJS medical insurance as the insurer. Claims are submitted collectively by hospitals on a monthly basis, accompanied by all required documentation proving that the services were provided in accordance with applicable regulations ([Septian and Nurjayanti, 2025](#)). In more technical terms, a claim can be defined as a demand or bill for compensation for services rendered, in which the hospital acts as the billing party and BPJS medical insurance as the party obligated to pay ([Ibrahim et al., 2024](#)). In an administrative context, a BPJS Kesehatan claim serves as comprehensive evidence of the entire range of medical services provided to a patient from the registration process, through diagnosis and medical procedures, to the patient's discharge. Therefore, the accuracy and completeness of the claim documents are absolute prerequisites for the claim to be accepted by the BPJS medical insurance's verifier ([Istianingsih et al., 2025](#)).

INA-CBG is a system for grouping diagnoses and procedures that serves as the basis for calculating the payment rates for claims made by BPJS medical insurance to tertiary-level referral healthcare facilities. This system is an adaptation of the Diagnosis Related Groups (DRG) system, which is widely used in various countries, with adjustments made to reflect the epidemiological conditions and characteristics of diseases in Indonesia ([Kemenkes RI, 2021](#)). Under the INA-CBG system, each episode, whether inpatient or outpatient, is grouped into a case group based on the primary diagnosis code using the ICD-10 and the procedure or treatment code using ICD-9-CM. Each case group has a rate set by the Ministry of Health, which reflects the average cost of care for that case group. This is stipulated in Ministry of Health Regulation No. 76 of 2016 concerning INA-CBG Guidelines for the Implementation of the JKN Program.

2.4 Coding Accuracy

Diagnosis coding is the process of converting diagnostic terms and medical procedures documented by physicians into standardized alphanumeric codes, performed by coders in accordance with the applicable international classification standards. Coding accuracy is defined as the alignment and consistency between the assigned codes and the patient's clinical condition as documented in the medical record, with reference to the ICD-10 for diagnosis codes and ICD-9-CM for procedure codes. The accuracy of diagnosis and procedure coding is critical because it facilitates the reporting of service information, particularly as a determinant of patient care costs ([Hapsari et al., 2024](#)). [Darmada et al. \(2026\)](#) further identified INA-CBG coding errors and incomplete medical records as contributing factors to BPJS claim returns, emphasizing the importance of coding accuracy and documentation completeness in hospital financial management. The reliability of electronic health information also requires effective data governance and security practices, as highlighted by [Ahmad and Alfina \(2026\)](#) in their examination of electronic health information systems in Indonesian hospitals.

In the National Health Insurance (JKN) system, the ICD-10 and ICD-9-CM codes generated by coders are processed through the Indonesian Case-Based Groups (INA-CBG) grouper application to determine the case-mix tariff group used as the basis for BPJS Kesehatan claim payments to hospitals, as stipulated in Minister of Health Regulation No. 26 of 2021 concerning the Guidelines for Indonesian Case-Based Groups in the Implementation of Health Insurance. Under this prospective payment system, reimbursement is determined by the applicable case-mix classification rather than the hospital's actual treatment expenditure. Accurate coding is therefore essential to appropriate tariff classification and claim verification. The coder plays a strategic role in connecting the clinical documentation prepared by the Physician in Charge Of Patient Care (DPJP) with the case-mix-based financing system and supporting data quality before verification by BPJS Kesehatan. From a broader administrative perspective, [Farah et al. \(2026\)](#) emphasize reliability, accuracy, and consistency as

important dimensions of BPJS Kesehatan service quality, reinforcing the importance of dependable administrative processes within the national health insurance system.

2.5 Medical Record Completeness

According to Minister of Health Regulation No. 24 of 2022 on Medical Records, a medical record is defined as a document containing the patient's identifying information, examinations, treatments, procedures, and other services provided to the patient ([Permenkes, 2022](#)). Medical records serve as a communication tool among healthcare providers, a basis for treatment planning and evaluation, legal evidence, material for research and education, a basis for healthcare financing, and a source of health statistics. The importance of medical records as sources of clinical information is reflected in the retrospective study by [Alfatah et al. \(2025\)](#), which utilized inpatient registration records to examine diagnoses, medical procedures, treatment duration, and patient outcomes. [Similarly, Trasia et al. \(2025\)](#) employed hospital medical records to investigate factors associated with postpartum hemorrhage, illustrating the value of documented clinical information for healthcare research and evaluation.

In the context of JKN financing, the completeness of medical records significantly affects the quality of statistics on diseases and health issues, as well as the process of reimbursing healthcare costs through the INA-CBG application, since medical record data are the primary source used by coders to assign diagnosis and procedure codes. The importance of clinical documentation is also illustrated by [Ervina et al. \(2025\)](#), who analyzed medical record data to examine relationships between clinical manifestations and laboratory findings in neonatal sepsis. Although this study did not investigate insurance claims, it demonstrates the broader analytical value of systematically documented clinical information. Complete and accurate medical records are therefore essential for supporting reliable diagnosis and procedure coding and reducing the risk of claim verification delays arising from missing clinical information.

Recent evidence also supports the relevance of medical record completeness in claim processing. [Sulrieni et al. \(2025\)](#) found in a primary healthcare facility that the completeness and timeliness of claim documentation were significantly associated with the smoothness of inpatient claim processing. Although conducted in a primary healthcare setting, these findings provide supporting evidence that the quality and timeliness of documentation may influence the claim verification process.

2.6 Claim Document Completeness

The BPJS claim file is a collection of administrative and medical documents submitted by a healthcare facility to BPJS medical insurance as the basis for a request for reimbursement of costs for services provided to the national health insurance system/JKN participants, as stipulated in BPJS Medical Insurance Regulation No. 7 of 2018 concerning Procedures for Claim Payments. The main components of the claim file include the Participant Eligibility Letter (SEP), medical summary, proof of services/procedures, results of supporting examinations, INA-CBG grouping results, as well as receipts or service summaries, all of which must be consistent with one another as a single body of evidence of service. The claim file serves as a document of accountability for the services provided and as the basis for determining the payment amount by BPJS Kesehatan to the hospital through the INA-CBG case-mix scheme.

2.7 BPJS Claim Duration

BPJS medical insurance claims processing time can be defined as the period of time required from the submission of claim documents by the hospital until the approval and payment of the claim by BPJS Kesehatan. In a broader context, the claim processing time reflects the overall efficiency of the claims administration process, starting from the preparation of documents within the hospital, the submission of documents to BPJS medical insurance, verification by BPJS medical insurance's verifiers, and up to the issuance of a decision on the claim status ([Cahyo & Peristiowati, 2022](#)).

2.8 Hypothesis Development

Taken together, previous studies indicate that the BPJS claim process is influenced by the quality of clinical documentation, the accuracy of coding, and the completeness of administrative claim documents. However, the existing evidence has predominantly examined these factors in relation to pending claims, claim returns, or administrative delays, while quantitative evidence concerning their relationship with claim duration remains limited. Therefore, the present study integrates these three factors into a single analytical model to examine whether their variation is associated with differences in the duration of BPJS claim settlement.

The accuracy of diagnostic coding affects the processing time of BPJS claims because the coding process is a critical step in the INA-CBG-based payment system. Diagnosis and procedure codes established according to ICD-10 and ICD-9-CM form the basis of the grouping process used to determine the claim rates submitted to BPJS medical insurance. If codes are assigned inaccurately, the grouping results may differ from the patient's clinical condition, potentially leading to discrepancies during the claim verification process. A study by [Widaningtyas and Asmorowati \(2024\)](#) showed that coding issues were the leading cause of pending inpatient claims, accounting for 68.11% of cases. [Bella, Pratama, and Zaenal \(2024\)](#) They also explained that inaccuracies in diagnostic coding are one of the main reasons claims are returned because they do not match the patient's clinical data. In line with this, [Muharrom and Gunawan \(2024\)](#) found that the accuracy of diagnostic codes contributes significantly to the occurrence of pending claims, whereas [Nabila, Santi, Tabrani, and Deharja \(2020\)](#) stated that coding errors lead to a claim review process, thereby prolonging the time it takes to settle BPJS claims. The higher the accuracy of diagnostic coding performed by coding staff, the faster the claim verification process will be, resulting in a shorter claim settlement time. Conversely, the lower the accuracy of diagnostic coding, the greater the likelihood of pending claims, which leads to longer BPJS claim settlement times.

H₁: Diagnostic coding accuracy is significantly associated with the duration of BPJS claims at PKU Muhammadiyah Gamping Hospital in Yogyakarta

The completeness of medical records affects the duration of BPJS claims because medical records are the primary source of information in the claims process. Documents such as the SEP, medical summaries signed by the attending physician, results of diagnostic tests, and evidence of medical procedures form the basis for coding, the preparation of claim files, and verification by BPJS Kesehatan. If any of these documents is incomplete, it can hinder the verification process, potentially leading to the return of the claim file (pending claim) and prolonging the claim processing time. Research by [Herman, Farlinda, Ardianto, and Abdurachman \(2020\)](#) shows that incomplete medical records are one of the main causes of delays in BPJS inpatient claims. [Nuraini, Damayani, and Wijayanti \(2021\)](#), [Yurika \(2025\)](#), and [Maisaroh and Sismulyanto \(2024\)](#) found that the completeness of medical records plays a crucial role in preventing pending claims, as it supports accurate coding and streamlines the claim verification process. The more complete the medical records included in a claim submission, the smoother the verification process, and the shorter the claim processing time. Conversely, incomplete medical records increase the risk of pending claims, which results in longer BPJS claim processing times.

H₂: Medical record completeness is significantly associated with the duration of BPJS claims at PKU Muhammadiyah Gamping Hospital

The completeness of claim documents may affect the BPJS claim duration because claim documents provide essential information for the verification process. Documents such as the SEP, medical summaries signed by the attending physician, results of diagnostic tests, and evidence of medical procedures support the preparation and verification of claims files. If any of these documents are incomplete, the verification process may be hindered, potentially leading to the return of the claim file (pending claim) and prolonging the claim processing time. [Santiasih, Simanjorang, and Satria \(2021\)](#) indicate that the completeness of claim documents is one of the factors associated with pending BPJS Kesehatan inpatient claims. This finding is consistent with [Tuzzahra, Hakim,](#)

[Romodon, and Gunawan \(2024\)](#), who reported that incomplete administrative and medical supporting documents were among the causes of claim rejection. [Ais and Akhrruddin \(2024\)](#) reported that administrative problems and incomplete documentation contribute to pending claims. In addition, [Ibrahim, Maulana, Anwar, Bilqis, Nurjayanti, Munawaroh, and Miladiyah \(2024\)](#) and [Maulida and Djunawan \(2022\)](#) reported that incomplete claim files can delay the verification process and prolong the claim settlement. Therefore, more complete claim documentation is expected to facilitate verification and contribute to shorter claim-processing times.

H₃: Claim document completeness has a significant association with the duration of BPJS claims at PKU Muhammadiyah Gamping Hospital

The accuracy of diagnostic coding, completeness of medical records, and completeness of claim files are a series of interrelated processes within the BPJS Kesehatan claims system. The claims process begins with the completion of medical records by the attending physician, followed by the assignment of diagnosis and procedure codes by coding staff, the INA-CBG grouping process, the preparation of claim files, internal hospital verification, and finally verification by BPJS Kesehatan. Therefore, the quality at each stage affects the smoothness of the subsequent processes and determines the duration of the claims process. Incomplete medical records can hinder the accuracy of diagnostic coding, while coding inaccuracies have the potential to result in inappropriate INA-CBG grouping. In addition, incomplete claim files hinder the verification process, thereby increasing the risk of pending claims and prolonging the duration of the claims process. Research by [Cahyo and Peristiowati \(2022\)](#) indicates that various factors in the claims process simultaneously contribute to delays in BPJS claims. These findings are supported by [Nuraini et al. \(2021\)](#) and [Istianingsih, Mudiono, Rachmawati, and Suyoso \(2025\)](#), who state that claim delays are influenced by a combination of factors, including documentation, coding accuracy, staff competence, and the claims management system. The better these three aspects are, the smoother the verification process becomes, resulting in shorter claim processing times. Conversely, weaknesses in one or more of these aspects increase the risk of pending claims, which leads to longer BPJS claim processing times.

H₄: Diagnosis coding accuracy, medical record completeness, and claim document completeness jointly contribute to the overall fit of the BPJS claim duration model

3. RESEARCH METHODOLOGY

3.1 Object of the Study

The research object is typically defined as the focus of the researcher's cognitive activities, that is, the process or phenomenon that gives rise to a problem and is selected for study ([Lazorenko, 2024](#)). The subjects of this study were diagnosis codes, medical records, patient claim files, and the duration of BPJS Kesehatan claims at PKU Muhammadiyah Gamping Hospital in Yogyakarta. This study analyzed the duration of BPJS claims based on two categories: fast (≤ 30 days) and slow (more than 30 days), the accuracy of diagnosis coding, the completeness of medical records, and the completeness of BPJS claim files.

3.2 Type and Data Source

This study employs a quantitative approach using descriptive and verifiable methods. In this study, the descriptive method is used to describe conditions, characteristics, or phenomena as they are, while the verifiable method is used to test the validity of theories, hypotheses, or relationships between variables ([Sutrisno & Haryani, 2017](#)). A quantitative approach was chosen because the study aimed to measure and analyze the effects of independent variables, namely, the accuracy of diagnostic coding, completeness of medical records, and completeness of claim files on the dependent variable, which is the duration of BPJS claims.

This study used secondary data, that is, data that had been collected and documented by the hospital as part of its health care management and BPJS claims processing. Secondary data were chosen because the required information was systematically available in the hospital's medical records

and claims information system, thereby enabling an objective analysis free from the potential for respondent bias that often occurs in primary data collection.

3.3 Population and Sample

The study population consisted of all completed BPJS Kesehatan inpatient claim files processed at PKU Muhammadiyah Gamping Hospital during the period of October-December 2025. The unit of analysis consisted of claim files per inpatient care episode. Based on preliminary data from the JKN Unit, the population size was estimated at 4,186 claim files. The sampling technique used was proportionate stratified random sampling, with stratification based on the month the claim was submitted. This technique was chosen to ensure that each month is proportionally represented, making the sample more representative and minimizing bias resulting from differences in claim volume across periods. The sample size was determined using the Slovin formula with a 5% margin of error; the minimum sample size required for this study was 365 BPJS inpatient claim files.

3.4 Data Collection Techniques

The data collection technique used in this study was a document review method supported by a structured checklist. A documentary study is a data collection technique conducted by systematically examining and analyzing relevant documents to obtain the necessary information in accordance with the research objectives. The data collection procedure was carried out in the following stages. First, the researchers submitted a research permit application to the Director of PKU Muhammadiyah Gamping Hospital and the authorized Health Research Ethics Committee, accompanied by a research proposal and the checklist instrument to be used. Second, after obtaining approval, the researcher coordinated with the head of the medical records unit, the head of the casemix unit, and the person in charge of BPJS claims to access the necessary data in accordance with the established inclusion and exclusion criteria. Third, the researchers selected a sample based on the list of claim files submitted during the study period. Fourth, the researchers reviewed each sample claim file using the prepared checklist, noting the completeness of medical records, the accuracy of coding, the completeness of the claim files, and recording the claim submission and settlement dates from the hospital's information system. All data were recorded on data collection forms and subsequently transferred to a spreadsheet format for statistical analysis. The entire data collection process was conducted while maintaining the confidentiality of patient identities in accordance with research ethics principles and applicable personal data protection regulations.

3.5 Testing Methods

Data were analyzed using SPSS version 26 and Microsoft Excel. Descriptive analysis was performed to summarize the distribution of each research variable. The dependent variable, BPJS claim duration, was categorized into two ordered categories, namely slow (coded 0) and fast (coded 1), representing the relative timeliness of claim processing. Because the two categories represent an ordered progression from slower to faster claim settlement, the outcome was specified as an ordered categorical variable. Accordingly, ordinal logistic regression was applied to estimate the association between the predictor variables and the likelihood of being classified in the higher, faster claim-duration category. With only two ordered categories, the model has a single cumulative threshold, and its interpretation corresponds to a two-category logistic model.

4. RESULTS AND DISCUSSION

4.1 Results

PKU Muhammadiyah Gamping Hospital in Yogyakarta was selected as the study setting to examine the BPJS claim management process. This study focused on claim administration and its relationship with medical record management and BPJS claim documentation. Data were obtained from inpatient BPJS medical records and claim files that had been processed by the hospital. The management of BPJS claims at the hospital involves several interconnected units in the preparation and verification of documentation. Data collection was coordinated with the heads of the medical records and case mix units and the person responsible for BPJS claims. The involvement of these units indicates that the claims process requires not only administrative completeness but also accurate clinical information and coding contained in service documentation.

The documents reviewed included patient identification, anamnesis, physical and supporting examination results, medical summaries signed by the attending physician, nursing records, and evidence of medical procedures. The claim files included claim submission forms, Participant Eligibility Letters (SEP), INA-CBG grouping sheets, and verification documents processed by BPJS Kesehatan verifiers. The completeness of these documents was assessed as part of the evaluation of diagnosis coding accuracy, medical record completeness, and claim document completeness.

Table 1. Descriptive analysis

Variables	Category	Code	Frequency	Percentage (%)
Coding Diagnose Accuracy (X_1)	Not Suitable	0	32	8.8
	Suitable	1	333	91.2
	Total		365	100
Medical Records Completeness (X_2)	Not Suitable	0	36	9.9
	Suitable	1	329	90.1
	Total		365	100
Claim Document Completeness (X_3)	Not Suitable	0	9	2.5
	Suitable	1	356	97.5
	Total		365	100
BPJS Claim Duration (Y)	Slow	0	34	9.3
	Fast	1	331	90.7
	Total		365	100

Table 1 the frequency distribution results, Diagnosis Coding (X_1) had 333 data points (91.2 %) in Category 1, indicating that most diagnosis codes fell into the “appropriate” category. A total of 32 data points (8.8 %) fell into Category 0, indicating that the diagnosis codes were inappropriate. These results show that Diagnosis Coding in the research data was dominated by the “appropriate” category. Based on the frequency distribution results, medical records (X_2) had 329 data points, or 90.1%, in Category 1, indicating that the majority of medical records fall into the “complete” or “appropriate” category. A total of 36 data points, or 9.9%, fell into Category 0, indicating that the medical records were incomplete or inappropriate. These results show that medical records in the research data are predominantly in the “appropriate” category.

Based on the frequency distribution results, Claim Files (X_3) had 356 data points, or 97.5%, in Category 1, indicating that the majority of claim files fall into the “complete” or “compliant” category. A total of 9 data points, or 2.5%, fell into Category 0, indicating that the claim files were incomplete or non-compliant. These results indicate that Claim Files have the highest proportion in the “compliant” category compared to the other independent variables. Based on the frequency distribution results, claim duration (Y) had 331 data points, or 90.7%, in Category 1, indicating that the majority of claims fall within the duration range defined as Category 1. A total of 34 data points, or 9.3%, fell into category 0. These results indicate that the claim duration in this study was predominantly in Category 1.

Table 2. Hypothesis testing

Variables	B	Wald	Sig.	Decision
Diagnosis Coding Accuracy (X_1)	1.710	15.754	<0.001	Significant
Medical Records Completeness (X_2)	0.764	3.585	0.058	Not Significant
Claim Document Completeness (X_3)	-0.624	0.832	0.362	Not Significant

Table 2 shows Diagnosis Coding (X_1) yielded a Wald value of 15.754 with a significance level of <0.001 is < 0.05. These results indicate that Diagnosis Coding has a significant effect on the duration of BPJS claims. The coefficient value of 1.710 indicates a positive association, meaning that

appropriate Diagnosis Coding is associated with a greater likelihood of being classified in the fast claim-duration category. Therefore, H_1 is accepted.

Medical Records (X_2) yielded a Wald value of 3.585 with a significance level of $0.058 > 0.05$. These results indicate that medical records do not have a significant effect on BPJS claim duration. The coefficient value of 0.764 indicates a positive direction, but this effect is not statistically significant at the 5% level. Therefore, H_2 is rejected. Claim File (X_3) yields a Wald value of 0.832 with a significance level of $0.362 > 0.05$. These results indicate that Claim File does not have a significant effect on BPJS Claim Duration. The coefficient value of -0.624 indicates a negative direction, but this effect is not significant. Therefore, H_3 is rejected.

Table 3. Simultaneous test

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	100.906			
Final	71.607	29.299	3	<0.001
Link function: Logit.				

Table 3 shows the Model Fitting Information results showed a Chi-Square value of 29.299 with 3 degrees of freedom (df) and a significance value of $p < 0.001$. The model incorporating Diagnosis Coding Accuracy, Medical Record Completeness, and Claim Document Completeness provided a significantly better fit than the intercept-only model. This indicates that the three predictors, considered jointly, contribute to the model of BPJS claim duration, although only Diagnosis Coding Accuracy showed a statistically significant partial association. Therefore, H_4 is accepted.

Table 4. Pseudo R-square test

Pseudo R-Square	
Cox and Snell	0.177
Nagelkerke	0.289
McFadden	0.140

Table 4 shows the Nagelkerke pseudo- R^2 value was 0.289, indicating that the model had a pseudo- R^2 of 28.9%. This value should be interpreted as a measure of model fit rather than as the proportion of variance explained in the same sense as R^2 in linear regression analysis.

4.2 Discussion

4.2.1 Diagnosis Coding Accuracy on the Duration of BPJS Claims

The Wald test results yielded a coefficient for Diagnosis Coding Accuracy of 1.710, with a Wald value of 15.754 and a p -value of <0.001 ; thus, this variable was found to have a significant effect on BPJS Claim Duration. A positive coefficient indicates that appropriate Diagnosis Coding is associated with a greater likelihood of claims being classified in the fast category, given that the dependent variable is coded as slow = 0 and fast = 1. Thus, the positive coefficient should be interpreted in relation to the numerical coding of the outcome, rather than as an indication of a longer claim duration.

The data in the study showed that the majority of claims had appropriate Diagnosis Coding 333 claims, or 91.2% of the 365 claims. Meanwhile, 32 claims (8.8 %) had inappropriate Diagnosis Coding. This proportion indicates that the diagnosis coding process in the study generally proceeded well, as most claims had diagnosis codes that matched the available service information. Although most of the coding was accurate, the test results showed that this variable still had a significant effect on the duration of the BPJS claims. This indicates that differences in coding accuracy in a small number of files can still affect the claims process, as the accuracy of diagnosis codes is closely related to the verification and settlement of the claims. The results of this study show that coding accuracy is

one of the aspects that must be considered to ensure smooth operation of the claims administration process.

The findings of this study are consistent with [Muharrom and Gunawan \(2024\)](#) who explain that the accuracy of diagnostic codes is a key element in the claims process because coding errors can lead to pending claims. These findings are also consistent with [Nabila et al. \(2020\)](#), who found that coding inaccuracies are among the factors that can cause claims to be delayed. [Yurika \(2025\)](#) also indicated that coding inaccuracies are associated with delays in the claims process. These findings are consistent with the conceptual framework of diagnosis coding accuracy, in which accurate coding supports the consistency of clinical information and facilitates INA-CBG grouping and claim verification processes. This situation aligns with hospital management concepts that view the management of health information and administration as part of organizational control, since obstacles at one stage can affect the reimbursement process at the next.

4.2.2 Medical Records Completeness on the Duration of BPJS Claims

Medical Record Completeness was not significantly associated with BPJS Claim Duration at the 5% significance level. Although the coefficient was positive ($B = 0.764$), the p -value (0.058) did not provide sufficient statistical evidence to support a partial association. One possible explanation is the limited variation in this predictor: 90.1% of the medical records were classified as complete, while only 9.9% were incomplete. When most observations fall into the same category, the ability of the analysis to distinguish differences in claim duration across categories may be limited. Therefore, the non-significant finding should not be interpreted as evidence that medical record completeness is unimportant in the claims process. Rather, under the conditions of this study, the observed variation in medical record completeness may have been insufficient to demonstrate a statistically significant association with claims duration.

The data from the study show that 329 records (90.1%) had complete medical records, while 36 records (9.9%) were classified as incomplete. This indicates that the majority of medical records used in the claims process met the required completeness standards. The high proportion of compliant medical records resulted in relatively limited variation across files; therefore, the effect of medical record completeness on claim duration did not yield significant results. The non-significant results also suggest that medical record completeness has not yet become a primary distinguishing factor affecting claim duration in the study sample. Most files were in a compliant condition, so the claims process did not encounter significant variations in the completeness of medical records. This situation may explain why the coefficient's direction indicates a positive relationship, but its significance value of 0.058 remains slightly above the 0.05 threshold.

Previous research by [Putri \(2023\)](#) found that the completeness of medical records had no effect on the timeliness or duration of BPJS Kesehatan claims. This finding reinforces the results of this study, as the completeness of medical records was not shown to be a factor that significantly determines the duration of BPJS claims. This suggests that the presence of complete medical records does not necessarily accelerate the claims process directly, as claim resolution also involves administrative steps and verification processes that can affect the time required for resolution. The results of this study are not entirely consistent with previous research that found a relationship between the completeness of medical records and the claims process. [Nuraini et al. \(2021\)](#) found that incomplete medical records are one of the factors that can cause delays in filing BPJS claims. [Yurika \(2025\)](#) also indicates that incomplete medical records are a factor associated with pending claims.

These differing findings may be related to the nature of the study data, which showed a relatively high level of medical record completeness, thereby limiting variation among observations. The descriptive results also showed that most medical record data fell into the “compliant” category. Medical records continue to play a crucial role in the claims process because they provide information that serves as the basis for documenting healthcare services and financing. However, the test results indicate that this level of completeness has not yet been a factor that significantly influenced the duration of BPJS claims.

4.2.3 Claim Document Completeness on the Duration of BPJS Claims

Claim Document Completeness was not significantly associated with BPJS Claim Duration ($B = -0.624$; $p = 0.362$). The negative coefficient indicates the direction of the estimated association, but the non-significant result means that this direction should not be interpreted as evidence of a meaningful partial association. The descriptive distribution provides an important context for this finding: 97.5% of the claim files were classified as compliant, whereas only 2.5% were non-compliant. The limited variation in claim document completeness may have reduced the model's ability to identify a statistically detectable difference in claim duration between the observed categories. Therefore, the finding should be interpreted as a lack of sufficient statistical evidence within this sample rather than as evidence that claim document completeness has no relevance to the claims process. The non-significant results also indicate that claim document completeness has not yet become a major distinguishing factor regarding claim duration in the study sample. Most files were in compliant condition, so the claims process did not encounter significant differences in the completeness of claim documents.

The results of this study are consistent with previous research by [Putri \(2023\)](#), which indicates that the completeness of claim documents has no correlation with the timeliness of BPJS claims. This finding is relevant to the results of this study because document completeness is not always a determining factor in the speed of the claims process when the files of the study participants are relatively complete. The claim settlement process can also be influenced by other stages, such as administrative review, the verification process, the accuracy of data entry, and the claim settlement mechanism; thus, the completeness of the files does not always have a direct impact on the duration of the claim process.

This finding differs from the study by [Herman et al. \(2020\)](#), which links coding issues and missing documentation to the occurrence of pending claims. The results of the study by [Ais and Akharruddin \(2024\)](#) also indicate that incomplete documentation and coding errors can lead to pending BPJS claims. These differing results may be influenced by the nature of the research data, which shows that nearly all claim files were classified as complete. A total of 97.5% of claim files fell into the “compliant” category; therefore, the differences in conditions among observations were relatively small, and the statistical effect of Claim File Completeness on Claim Duration did not yield significant results.

These findings are consistent with hospital management concepts that regard administrative completeness as an integral part of claims management. The implementation of the INA-CBG system requires accurate diagnostic and procedural information, as well as complete supporting documentation, to ensure that the verification process proceeds in accordance with regulations. The study results indicate that when most files are already complete, Claim File Completeness does not significantly differentiate BPJS Claim Duration.

4.2.4 Diagnosis Coding Accuracy, Medical Record Completeness, and Claim File Completeness Simultaneously on the Duration of BPJS Claims

The simultaneous analysis indicates that the three predictors, considered together, provide additional information for explaining BPJS claim duration beyond the intercept-only model. This finding suggests that claim duration is related to a combination of coding accuracy, medical record completeness, and claim document completeness rather than to a single administrative component in isolation. However, the significant overall model should not be interpreted as evidence that each predictor has a significant individual effect, as only diagnosis coding accuracy showed a statistically significant partial association in the present analysis.

This result is in line with the study by [Cahyo and Peristiowati \(2022\)](#), which analyzes various factors related to delays in submitting BPJS claims using a quantitative approach. The findings of this study also support the results of previous research indicating that the claims process is related to several administrative elements, such as the accuracy of coding, completeness of medical records, and completeness of claim files. This interpretation is also consistent with recent evidence showing that

pending claims can have substantial operational and financial implications for hospitals, reinforcing the importance of effective claim management and timely settlement ([Hermaningtyas et al., 2026](#)). These findings are also consistent with the hospital management perspective presented in this study, in which claims processing is viewed as an integrated administrative, health information, and financing process requiring coordination across organizational units.

5. CONCLUSIONS

5.1 Conclusion

Diagnosis Coding Accuracy was significantly associated with BPJS Claim Duration. Given that claim duration was coded as slow = 0 and fast = 1, a positive coefficient indicates a greater likelihood of claims being classified in the fast category when diagnosis coding was appropriate. This finding indicates that diagnosis coding accuracy is associated with BPJS claim duration under the conditions of the study, even though most files already had appropriate coding. The completeness of medical records did not significantly affect the duration of BPJS claims. Although the coefficient's direction is positive, the strength of the relationship is not yet sufficient to be considered statistically significant at the 5% level. Thus, under the conditions of this study, the completeness of medical records was not proven to be a major distinguishing factor in determining whether claims were settled quickly or slowly. The completeness of the claim files also did not significantly affect the duration of BPJS claims. The coefficient direction was negative; however, the test results did not provide sufficient statistical evidence to confirm such an effect. These results objectively reflect that the completeness of claim files in a study sample in which nearly all files were already complete has not been proven to significantly determine claim duration. The model incorporating Diagnosis Coding Accuracy, Medical Record Completeness, and Claim Document Completeness provided a significantly better fit than the intercept-only model ($\chi^2 = 29.299$, $df = 3$, $p < 0.001$). The Nagelkerke pseudo- R^2 was 0.289, which should be interpreted as a measure of model fit rather than the proportion of variance in BPJS claim duration explained by the three predictors.

5.2 Research Limitations

The distribution of categories across all research variables was relatively unbalanced. Most records fell into the “appropriate” category for X_1 , X_2 , and X_3 , and the “fast” category for Y , with proportions exceeding 90%. This situation limits the variation in data across files, thereby reducing the model's ability to detect significant effects on variables with a small proportion of mismatches, such as Medical Record Completeness and Claim File Completeness. This also affects the interpretation of the results, where the absence of a significant effect on these two variables must be understood in the context of limited data variation, rather than solely as evidence of the absence of a conceptual relationship. This study used secondary data sourced from medical records and claim files documented by the hospital. The quality and completeness of the data depend heavily on the accuracy of documentation during the provision of care; therefore, the researchers had no direct control over the initial data recording process. The study was conducted at a single hospital, PKU Muhammadiyah Gamping Hospital, with a three-month sampling period from October to December 2025. Due to the limited scope of the study in terms of location and time period, the research findings may not necessarily be generalizable to other hospitals or different time periods, given that the characteristics of the claims process can vary across healthcare facilities and over time. The relatively high proportion of fast claim-duration cases may also limit the model's ability to detect associations, particularly for predictors with very small proportions of incomplete or inaccurate cases. Future studies with more balanced outcome distributions and larger samples may provide greater statistical power to identify factors associated with BPJS claim duration.

5.3 Suggestions and Directions for Future Research

Hospitals should maintain and continue to improve the accuracy of diagnostic coding, given that the study results indicate that diagnostic coding accuracy has a significant impact on the duration of BPJS claims. The process of verifying the completeness of medical records should be maintained, even though this study did not find that the completeness of medical records had a statistically significant effect on claim duration. Furthermore, the completeness of claim documents must be maintained through an internal verification process prior to claim submission, even though the study

results did not indicate a statistically significant effect on claim duration. Hospitals are advised to conduct periodic evaluations of the entire claim submission and verification process, particularly by examining the relationship between the accuracy of diagnostic coding, the completeness of medical records, and the completeness of claim documents. A comprehensive evaluation can help hospitals identify stages that have the potential to cause delays and determine the necessary corrective actions. Furthermore, coordination among the units involved in the claims process needs to be strengthened, particularly between the clinical services, medical records, coding, and claims administration departments. Future researchers are advised to extend the study period and increase the sample size, broaden the scope of the study, include additional variables related to the BPJS claims process, consider analytical methods appropriate for the characteristics of the data distribution particularly if an imbalance in the number of cases is found across claim duration categories, and develop more detailed measurements of the research variables, especially regarding the accuracy of diagnostic coding, the completeness of medical records, and the completeness of claim files. This will help identify the specific components or indicators that play the most significant role in the BPJS claim settlement process.

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AUTHOR CONTRIBUTIONS

IS contributed to research conceptualization, methodology, data collection, statistical analysis, and original manuscript preparation. K contributed to research supervision, methodology validation, and interpretation of findings. FY contributed to theoretical framework development, literature review, and manuscript revision. TN contributed to data analysis, results interpretation, and manuscript review. VP contributed to research supervision, critical manuscript evaluation, and final editing. All authors reviewed and approved the final version of the manuscript.

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