

The Relationship Between Medical Record Complexity and Completeness and Coding Accuracy in Injury and External Cause Cases

Hanifah^{1*}

Reza Widiantoro²

Tunjung Bayu Sinta³

Rakhman Dwi Sampurna⁴

^{1,2,3} Diploma III Program in Medical Records and Health Information, Universitas Mitra Husada

⁴ Applied Bachelor's Program in Health Information Management, Universitas Mitra Husada

*Corresponding author e-mail: hanifah1611@gmail.com

Abstract

The complexity and completeness of supporting information are essential for determining injury and external cause codes. The iDRG coding guidelines for injury cases require the addition of an external cause code, so complete information about the incident is needed. This study aimed to determine the association of complexity and completeness with iDRG coding accuracy and to compare iDRG and INA-CBG coding. The study used a mixed-methods approach with an explanatory sequential design. The quantitative component was analytical with a cross-sectional design, while the qualitative component was conducted through FGD. A purposive sample of 150 inpatient medical records of injury cases from January to June 2026 was selected. Data were collected through observation of inpatient medical records of injury and external cause cases, and through FGD with coder informants to identify the causes of incomplete documentation and inaccurate coding. The instrument used was a checklist. Data were analyzed using SPSS with the chi-square test and a difference test. The results indicated that the majority of medical records exhibited low complexity (71.3%), while completeness (90.0%) and iDRG coding accuracy (92.0%) were high. Neither complexity nor completeness significantly influenced iDRG code assignment, with p-values of 0.255 and 0.841, respectively ($p > 0.05$).

Keywords: completeness; coding accuracy; iDRG; injury; external cause

1. Introduction

Injury is a condition in which a person experiences physical impairment, such as reduced function of a body part resulting from trauma. In Indonesia, the proportion of injured body parts in 2018 amounted to 92,976 cases, with 12,213 injury cases recorded in Central Java (Kemenkes, 2018). Injuries claim 4.4 million lives worldwide every year and can occur intentionally, such as violence against oneself or others and suicide, or unintentionally, such as road traffic accidents, falls, drowning, burns, and poisoning (WHO, 2024). Given this variety of cases, clinical documentation is needed to support patient care, information management, and healthcare financing.

Medical records contain patient identity data, examinations, treatments, procedures, and other services provided to patients (Kemenkes, 2024). The completeness of medical record information is essential when coding diagnoses in order to produce accurate codes (Daniyah, Utami, & Khuluq, 2024; Hanifah, 2017). If a medical record is incomplete, the coder must reconfirm with the attending physician or relevant medical staff. This requires additional time, which delays the coding process (Maryati, Rosita, & Zanuri, 2019). In addition, the completeness of supporting information also supports the healthcare financing system and ensures the quality of statistical data (Maryati, Wannay, & Suci,

2018).

The Indonesian Diagnosis Related Group (iDRG) is a classification system based on clinical similarity in the use of healthcare resources, used as a package-based payment mechanism to support the implementation of the National Health Insurance (JKN) program, which previously used the Indonesian Case Based Groups (INACBG's) system. The guideline for determining iDRG diagnosis codes follows the provisions of the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10). Therefore, when determining codes, particularly for injury and external cause cases, the location and activity at the time of the incident must be documented. (Pusat Pembiayaan Kemenkes RI, 2025). Complex patient medical records and the need for detailed external cause information can increase the level of difficulty for coding staff during the coding process.

Previous research has shown a relationship between the completeness of medical records and the accuracy of diagnosis codes, with a p-value of 0.023 (Nasipta, Pomarida, & Eliyantho, 2024). Several previous studies have shown that injury codes in patient medical records already achieve an accuracy rate of more than 60%, but the accuracy rate for external cause codes remains low, at around 10–30% (Haerunnisa, Jayadie, Ismail, & Agustina, 2025; Widianoro et al., 2023). Code inaccuracy is caused by coding errors in the fourth and fifth digits, which relate to the location and activity of the incident. In addition, the absence of information related to external cause means that coding is not performed at all (Utami, Hastuti, & Sari, 2022). Code inaccuracy affects financing claims found in the grouper results of the e-Klaim application, so that non-compliant codes will be returned by the BPJS verifier (Indawati, 2019; Wahyuni, Khumaira, & Siska, 2024).

Although research on the accuracy of external cause codes has been widely studied, most previous studies have focused separately on the relationship between

medical record completeness and diagnosis code accuracy for injury and external cause cases. Research examining the complexity, completeness of medical records, and accuracy of iDRG coding for injury and external cause cases remains limited. This is because a patient's condition may also involve multiple trauma, more than one diagnosis, complications, and multiple medical procedures, all of which relate to the number of forms and clinical documentation in the medical record. In addition, research examining differences in accuracy between iDRG and INACBG coding for injury and external cause cases is also still limited. The novelty of this study lies in integrating medical record complexity and completeness with iDRG coding accuracy, as well as comparing the coding accuracy of iDRG and INACBG for injury and external cause cases. Based on a preliminary survey of 10 medical records of injury and external cause patients at PKU Muhammadiyah Karanganyar Hospital, 7 medical records (70%) were found to still contain incomplete information regarding the chronology of the incident. This affects the determination of the external cause code and can therefore contribute to coding inaccuracy. Based on this data, this study was conducted to analyze the relationship between medical record complexity and completeness with the accuracy of iDRG code determination for injury and external cause cases, and to compare the coding accuracy of iDRG and INA-CBG at PKU Muhammadiyah Karanganyar Hospital.

2. Method

This study used a mixed-methods approach with an explanatory sequential design. The first stage was analytical quantitative research with a cross-sectional design. This was followed by a qualitative stage through a Focus Group Discussion (FGD) to obtain information on the factors causing information incompleteness and coding inaccuracy, in order to support the quantitative findings. The study was conducted at the Medical Records Unit of

PKU Muhammadiyah Karanganyar Hospital. The research was carried out from June to August 2026.

The variables in this study consisted of the independent variables, namely medical record complexity and completeness, and the dependent variable, namely the accuracy of diagnosis codes for injury and external cause cases. Medical record complexity refers to the level of intricacy of a patient's medical record in injury and external cause cases during the diagnosis coding process. Complexity was assessed using five indicators: multiple injury, more than one diagnosis, the presence of complications, more than one medical procedure, and variation in external cause. Each indicator was scored 1 or 2, where a score of 1 indicates low complexity and a score of 2 indicates high complexity. The total complexity score was obtained by summing the scores of the five indicators, yielding a minimum score of 5 and a maximum of 10. The total score was then categorized into three levels: low (5–6), moderate (7–8), and high (9–10).

Medical record completeness refers to the extent to which information components are filled in on the medical record forms of injury and external cause patients, covering patient identity, diagnosis, procedures, external cause, medical resume, supporting results, and physician verification. Five medical record forms were reviewed for completeness. Each form was given a score of 1 if all assessed components were complete, and a score of 0 if any component was incomplete. The completeness score was obtained by summing the scores of the five forms, yielding a total score ranging from 0 to 5. A total score of 0–2 was categorized as incomplete, and a total score of 3–5 was categorized as complete. This assessment reflects the study's operational criterion, indicating that at least 3 of the 5 forms must be available and complete.

Coding accuracy refers to the correctness of staff in assigning codes for injury and external cause cases in accordance with ICD-10 guidelines and the

coding provisions of iDRG and INACBG. A score of 1 was given if the code was accurate, and a score of 0 if the code did not comply with the provisions. Coding accuracy based on clinical information was assessed through validation by an independent coder with competence and experience in clinical coding.

The study population comprised all medical records of injury and external cause patients at PKU Muhammadiyah Karanganyar Hospital during the period January–June 2026. The population was then selected based on inclusion and exclusion criteria to obtain the eligible population. The inclusion criteria were: inpatients with injury and external cause cases, BPJS financing, the period January–June 2026, and medical records that were available and accessible. The exclusion criteria consisted of medical records that were unavailable or inaccessible. The sample size, determined using the Slovin formula, was 150 patient medical records out of 240 medical records that met the eligible population criteria. Sampling was carried out using a purposive sampling technique, selecting medical records that met the inclusion and exclusion criteria.

Data were collected through documentation study, namely direct observation of the medical records of inpatients with injury and external cause cases, to assess the complexity and completeness of the medical records, coding accuracy, and to compare iDRG and INACBG coding. A Focus Group Discussion (FGD) was then conducted to support the quantitative findings by exploring information on the obstacles encountered during the diagnosis coding process and the causes of information incompleteness and coding inaccuracy. The instrument used was a checklist to determine the level of medical record complexity and completeness as well as iDRG and INACBG coding accuracy.

This study obtained ethical approval with number 105/KEPK-STIKesMHK/EC/VI/2026. During the data collection and processing process, patient confidentiality was maintained by not

recording patients' personal identities. Medical record data were used solely for research purposes and were accessible to the researcher in accordance with the authorization granted by the hospital.

Data were analyzed using SPSS. The collected data were analyzed using univariate and bivariate analysis. Univariate analysis was conducted to determine the characteristics of medical record complexity and completeness, as well as the number and percentage of code accuracy for injury and external cause cases. Bivariate analysis was conducted to determine the effect of medical record complexity and completeness on the accuracy of iDRG and INACBG codes. Data analysis used the chi-square test, and the McNemar test was used to determine differences between iDRG and INACBG codes.

3. Result and Discussion

Medical Record Complexity

The medical record complexity variable was assessed based on five indicators: multiple injury, more than one diagnosis, complications, more than one medical procedure, and variation in external cause. Each indicator was scored 1 (low) or 2 (high), so the total score ranged from 5 to 10. Based on this total score, complexity was categorized into three levels: low (score 5–6), moderate (score 7–8), and high (score 9–10).

Table 1. Frequency Distribution of Medical Record Complexity Indicators for Injury and External Cause Patients

Complexity Indicator	Category	Frequency (n)	Percentage (%)
Multiple Injury	1 Injury	122	81.3
	>1 Injury	28	18.7
Number of Diagnoses	1 Diagnosis	121	80.7
	>1 Diagnosis	29	19.3
Complications	None	130	86.7
	Present	20	13.3
Complexity Indicator	Category	Frequency (n)	Percentage (%)
Medical treatment	1 Treatment	6	4
	>1	144	96

	Treatment		
External Cause Variation	1 Type	150	100
	>1 Type	0	0

Based on Table 1, most patients experienced only one type of injury, namely 122 patients (81.3%), while 28 patients (18.7%) experienced multiple injuries, or injuries to more than one body location. Multiple injury conditions require a more complex coding process, as coding staff must determine the principal diagnosis based on the condition that uses the most healthcare resources, in accordance with ICD-10 provisions and iDRG guidelines. The more injury sites involved, the greater the potential for errors in selecting both the principal and secondary diagnosis codes.

In terms of the number of diagnoses, 121 patients (80.7%) had only one diagnosis, while 29 patients (19.3%) had more than one diagnosis. The presence of secondary diagnoses or comorbidities in injury cases adds to the complexity of the coding process, since each diagnosis must be coded separately and accurately to produce the correct iDRG grouping. Regarding complications, 130 patients (86.7%) did not experience complications during treatment, while 20 patients (13.3%) did. Complications occurring during inpatient care require more detailed clinical documentation from the attending physician, so that sufficient information is available for the coding process.

The medical procedure indicator showed that the majority of patients, 144 patients (96.0%), underwent more than one medical procedure during treatment, while only 6 patients (4.0%) underwent only a single procedure. The large number of medical procedures performed in injury cases is a common characteristic, as injury patients often require various procedures ranging from diagnostic procedures and surgical procedures to follow-up care. This result reflects the high intensity of care provided to inpatient injury patients at PKU Muhammadiyah Karanganyar Hospital. As for external cause variation, all 150 patients

(100%) had only one type of external cause, meaning this indicator was constant and showed no variation within the study population.

Table 2. Frequency Distribution of Medical Record Complexity Categories for Injury and External Cause Patients

Complexity Category	Score	Frequency (n)	Percentage (%)
Low	5-6	107	71.3
Moderate	7-8	38	25.3
High	9-10	5	3.3
Total		150	

Based on Table 2, most medical records of injury and external cause patients at PKU Muhammadiyah Karanganyar Hospital fell into the low complexity category, namely 107 patients (71.3%), followed by the moderate category with 38 patients (25.3%), and the high category with 5 patients (3.3%).

Although most cases were classified as low complexity, the presence of 38 cases (25.3%) with moderate complexity and 5 cases (3.3%) with high complexity indicates meaningful clinical variation within the study population. High-complexity cases generally involved a combination of multiple injury, more than one diagnosis, the presence of complications, and numerous medical procedures. In the context of iDRG coding, such cases are theoretically likely to make it more difficult for coding staff to determine the correct code, due to the large amount of clinical information that must be reviewed and classified simultaneously.

A study conducted by (Nanda, Dewi, Yulia, & Satrya, 2025) on the accuracy of injury and external cause codes at RSIJ Sukapura found that the clinical complexity of cases is one of the factors contributing to variation in coding quality. According to Hatta (2015) thorough and detailed clinical documentation is the main foundation for producing accurate diagnosis codes, and the level of case complexity directly affects the need for such information completeness.

Medical Record Completeness

Table 3. Frequency Distribution of Medical Record Completeness Indicators for Injury and External Cause Patients

Completeness Indicator	Category	Frequency (n)	Percentage (%)
Initial Triage	Incomplete	28	18.7
	Complete	122	81.3
Integrated Progress Notes	Incomplete	0	0.0
	Complete	150	100
Incident Chronology	Incomplete	47	31.3
	Complete	103	68.7
Medical Resume	Incomplete	0	0.0
	Complete	150	100.0
Supporting Examination	Incomplete	2	1.3
	Complete	148	98.7

Based on Table 3, the CPPT (Integrated Progress Notes) and medical resume forms were completely filled in for all 150 medical record documents (100%). This shows that both forms have become part of the routine clinical documentation whose consistency is well maintained at PKU Muhammadiyah Karanganyar Hospital. The initial triage form was found to be incomplete in 28 documents (18.7%), the incident chronology form was incomplete in 47 documents (31.3%), and the supporting examination form was incomplete in 2 documents (1.3%). The incompleteness of the incident chronology is a major concern, as this information forms the basis for determining the external cause code under iDRG guidelines.

Table 4. Frequency Distribution of Medical Record Completeness Categories for Injury and External Cause Patients

Completeness Category	Frequency (n)	Percentage (%)
Incomplete	15	10
Complete	135	90
Total	150	100

Overall, based on Table 4, 135 medical records (90.0%) were categorized as complete, while 15 medical records (10.0%) were categorized as incomplete. Table 4 shows the 150 medical records that were reviewed. The completeness category was

based on the total score of all the indicators that had been established. Although the incident chronology form had the highest level of incompleteness, at 47 medical records, incompleteness in this single component did not automatically render the entire medical record incomplete. Nevertheless, an overall completeness rate of 90.0% represents a fairly good achievement and reflects adequate medical record management efforts. The high completeness of the Integrated Progress Notes and medical resume forms indicates that medical staff have understood the importance of documentation for the continuity of care.

Based on observation, information related to the incident is sometimes recorded on the initial triage form, but is not always documented elsewhere in the patient's medical record. Therefore, in addition to the incident chronology form, the initial triage form can also be used to support the external cause coding process. Going forward, greater attention needs to be focused on the initial triage and incident chronology forms so that overall medical record completeness can reach the optimal standard in accordance with Minister of Health Regulation No. 24 of 2022 concerning Medical Records.

Of the five forms observed, the incident chronology form was the one most frequently not fully completed, being incomplete in 47 documents (31.3%). This is a significant finding, as the incident chronology form serves as the primary source of information for determining the external cause code under iDRG guidelines. The incompleteness of this form directly affects coding staff's ability to determine the fourth character of the external cause code (location of the incident) and the fifth character (activity at the time of the incident).

(Widianoro et al., 2023) in their study at dr. Soeradji Tirtonegoro Hospital, found that incompleteness of supporting information in medical records—particularly information regarding the mechanism and location of injury—was the

main cause of inaccuracy in external cause codes for head injury cases. Accordingly, strengthening the procedure for completing the incident chronology form should be a priority improvement to be followed up by the medical record management of PKU Muhammadiyah Karanganyar Hospital.

iDRG Code Determination Accuracy

Table 5. Frequency Distribution of iDRG Code Determination Accuracy for Injury and External Cause Cases

iDRG Code Accuracy	Frequency (n)	Percentage (%)
Inaccurate	12	8
Accurate	138	92
Total	150	100

Based on Table 5, most iDRG code determinations for injury and external cause cases at PKU Muhammadiyah Karanganyar Hospital were accurate, namely 138 cases (92.0%), while 12 cases (8%) were inaccurate. This 92% accuracy rate reflects a relatively high quality of coding in the assignment of iDRG codes by the hospital's coding staff. A code was deemed accurate if all code components recorded in the medical record—both the principal diagnosis code and the external cause code as a secondary diagnosis—complied with ICD-10 coding guidelines and iDRG provisions.

The code inaccuracies found in 12 cases (8.0%) were generally caused by errors in the fourth or fifth character of the external cause code, which reflects the location of the incident and the activity at the time of injury. Based on the focus group discussion, staff reported that this occurred when the information in the medical record was not specific enough to determine these digits, creating a barrier for coding staff in assigning the code and thereby contributing to diagnosis code inaccuracy. Coders stated that this information should have been recorded in detail by medical staff on the incident chronology and initial triage forms. This condition may also occur due to insufficient thoroughness on the part of coding staff in reviewing other supporting information.

The high accuracy rate found in this

study may be related to the fact that most cases were classified as low complexity, meaning the coding workload per record was relatively light. In addition, the fully completed Integrated Progress Notes and medical resume forms provided an adequate clinical information base for the coding process. This accuracy rate is considered good and reflects an adequate quality of coding by the medical record staff at PKU Muhammadiyah Karanganyar Hospital. Another study reported that 100% of the external cause codes for head injury diagnoses at dr. Soeradji Tirtonegoro Hospital were inaccurate, with the main cause being incompleteness of supporting information in the medical records (Widianoro et al., 2023).

Compared with various previous studies on similar cases, the accuracy rate found in this study is considerably higher. Fadhillah & Herfiyanti (2021) in their study on the accuracy of external cause codes at dr. M. Salamun Air Force Hospital, found a much lower accuracy rate, as did the study by Puspitasari & Rahadiyanto (2022) at RA. Kartini Jepara Regional Hospital, which found 0% accurate external cause codes among the 66 documents examined.

Although the proportion of inaccuracy is relatively small, the figure of 8.0% still warrants serious attention because it directly affects the smoothness of iDRG claims. Inaccurate codes will be detected by BPJS Kesehatan verifiers during the verification process, potentially causing claim files to be returned for code correction. This claim return process not only causes payment delays but also increases the workload of medical record staff and may pose a risk of financial loss to the hospital if corrections cannot be made optimally.

INACBG Code Determination Accuracy

Based on Table 6, the accuracy rate of Indonesia Case-Based Groups (INACBG) code determination for injury and external cause cases at PKU Muhammadiyah Karanganyar Hospital reached 94.7%, or 142 cases, while 8 cases (5.3%) were deemed inaccurate. The slightly higher INACBG

accuracy rate compared to iDRG (94.7% versus 92.0%) indicates a difference in the level of precision between the two coding systems within this study population. This difference can be understood given that the iDRG system requires more detailed code specifications than INACBG, particularly for the fourth and fifth characters of the external cause code.

Table 6. Frequency Distribution of INACBG Code Determination Accuracy for Injury and External Cause Cases

INACBG Code Accuracy	Frequency (n)	Percentage (%)
Inaccurate	8	5.3
Accurate	142	94.7
Total	150	100

This 5.3% INACBG inaccuracy rate is lower than the 8.0% iDRG inaccuracy rate. The difference in inaccuracy rates between the two systems indicates that some cases considered inaccurate under iDRG standards can still be categorized as accurate under INACBG standards. This suggests that the transition of the coding system from INACBG to iDRG demands stricter standards in terms of diagnosis code and external cause code specification, thus requiring adaptation in both the competence of coding staff and the completeness of clinical documentation.

Relationship Between Medical Record Complexity and iDRG Code Determination Accuracy

Table 7. Medical Record Complexity and iDRG Code Determination Accuracy for Injury and External Cause Cases

MR Complexity	Inaccurate		Accurate		Total	
	(n)	(%)	(n)	(%)	(n)	(%)
Low	10	9.3	97	90.7	107	100
Medium	1	2.6	37	97.4	38	100
MR Complexity	Inaccurate		Accurate		Total	
	(n)	(%)	(n)	(%)	(n)	(%)
High	1	20	4	80	5	100
Total	12	8	138	92	150	100

Based on Table 7, of the 107 patients with low medical record complexity, 10 patients (9.3%) had inaccurate iDRG codes and 97 patients (90.7%) had accurate codes.

In the moderate complexity group (38 patients), only 1 patient (2.6%) had an inaccurate code, while 37 patients (97.4%) had accurate codes. In the high complexity group (5 patients), 1 patient (20%) had an inaccurate code and 4 patients (80%) had accurate codes.

Table 8. Chi-Square Test Results for Medical Record Complexity and iDRG Code Determination Accuracy for Injury and External Cause Cases

Statistical Test	Value	df	P-value
<i>Pearson Chi-Square</i>	2.730	2	0.255
<i>Likelihood Ratio</i>	2.938	2	0.230
<i>Linear-by-Linear Association</i>	0.223	1	0.637
N	150		

Based on the chi-square test results in Table 8, the Pearson Chi-Square value was 2.730 with a p-value = 0.255 ($p > 0.05$). This result indicates that there is no statistically significant relationship between medical record complexity and iDRG code determination accuracy. The highest inaccuracy percentage was found in the high complexity group (20.0%), followed by the low complexity group (9.3%), and the lowest in the moderate complexity group (2.6%). This does not indicate a linear relationship between complexity and code inaccuracy, which is partly influenced by the imbalance in sample size across categories, causing the percentage estimate in the high complexity group to be statistically less stable.

Conceptually and based on the study hypothesis, medical record complexity should affect diagnosis code accuracy, since more complex cases require deeper clinical information analysis and greater coding skill from staff. The qualitative component, through the focus group discussion, explored coding staff's experience in dealing with high-complexity cases. Staff reported having to read supporting information more carefully, particularly for patients with multiple conditions within a single episode of care.

Table 9. Association Measures for Medical Record Complexity and iDRG Code Determination Accuracy

Association Measure	Value	p-value
<i>Phi</i>	0.135	0.255
<i>Cramer's V</i>	0.135	0.255
<i>Contingency Coefficient</i>	0.134	0.255

Table 9 shows that the strength of association between the two variables is also very weak, as reflected by a Cramer's V value of 0.135, indicating that variation in the level of medical record complexity contributes only a very small amount to variation in iDRG code accuracy in this study.

It should be noted that these chi-square test results need to be interpreted with caution, given that the expected count was less than 5. This condition reduces the validity of conventional chi-square test interpretation, as the basic assumptions of the test were not fully met. This limitation is due to the small number of inaccurate cases (only 12 cases) and the very small number of cases in the high complexity category (only 5 cases), so the possibility of a Type II error (failing to detect an effect that actually exists) needs to be considered. Further research with a larger sample size and a more even distribution across complexity categories, particularly with more high-complexity cases, is needed to draw stronger conclusions regarding the effect of medical record complexity on iDRG code accuracy.

Relationship Between Medical Record Completeness and iDRG Code Determination Accuracy

Based on Table 10, of the 15 patients with incomplete medical records, 1 patient (6.7%) had an inaccurate iDRG code and 14 patients (93.3%) had accurate codes. Of the 135 patients with complete medical records, 11 patients (8.1%) had inaccurate codes and 124 patients (91.9%) had accurate codes.

Table 10. Medical Record Completeness and iDRG Code Determination Accuracy for Injury and External Cause Cases

MR	Inaccurate	Accurate	Total
Completeness	n (%)	(n) (%)	(n) (%)

ss						
Incomplete	1	6.7	14	93.3	15	100
Complete	11	8.1	124	91.9	135	100
Total	12	8.0	138	92.0	150	100

Descriptively, the percentage of iDRG code inaccuracy in the incomplete medical record group (6.7%) was slightly lower than in the complete medical record group (8.1%). This pattern appears to contradict the initial hypothesis; however, such a very small difference cannot be meaningfully interpreted without statistical testing.

Table 11. Chi-Square Test Results for Medical Record Completeness and iDRG Code Determination Accuracy for Injury and External Cause Cases

Statistical Test	Value	df	p-value
<i>Pearson Chi-Square</i>	0.040	1	0.841
<i>Continuity Correction</i>	0.000	1	1.000
<i>Fisher's Exact Test</i>			1.000
<i>Linear-by-Linear Association</i>	0.040	1	0.842
N	150		

Table 12. Association Measures for Medical Record Completeness and iDRG Code Determination Accuracy

Association Measure	Value	p-value
<i>Phi</i>	-0.016	0.841
<i>Cramer's V</i>	0.016	0.841
<i>Contingency Coefficient</i>	0.016	0.841

Based on the chi-square test results in Table 11, the p-value was 0.841, with Fisher's Exact Test yielding a p-value of 1.000 ($p > 0.05$). These results clearly indicate that there is no statistically significant relationship between medical record completeness and iDRG code determination accuracy for injury and external cause cases at PKU Muhammadiyah Karanganyar Hospital in 2026. A Cramer's V value of 0.016 indicates an almost non-existent strength of association between the two variables.

This finding does not mean that medical record completeness is unimportant for coding accuracy. The lack of statistical significance found specifically in this study is more likely due to the characteristics of

the data distribution than to the actual relationship between the two variables in general. The highly imbalanced data distribution—with only 15 incomplete cases compared to 135 complete cases—together with the very small number of inaccurate cases (12 cases), produced cross-tabulation cells with very low expected counts. This technically caused the chi-square test to have very low power to detect any differences that might actually exist.

From a substantive perspective, the incompleteness found in this study has fairly unique characteristics. The majority of incomplete cases (15 cases) had incompleteness in only a single form, so the essential information needed for code assignment could still be obtained from other forms that remained complete. Unlike a situation in which a medical record is severely incomplete across many forms at once, this condition allowed coding staff to still produce relatively accurate codes. This is consistent with the finding for the incident chronology form, where although 47 documents (31.3%) were individually incomplete for this form, only 15 documents were categorized as overall incomplete, because the other forms remained well filled in.

Sri *et al.*, (2025) emphasized that the incompleteness of medical information with the greatest impact on coding accuracy is incompleteness occurring in forms that contain essential clinical information—that is, information that cannot be obtained from other sources in the medical record. In this study, although the incident chronology form was frequently incomplete, coding staff appeared able to use information from the fully completed CPPT and medical resume forms to fill this information gap. This adaptive capability reflects adequate coding staff competence, but also carries a risk of subjectivity, since assumed information may differ from what actually occurred.

Differences Between iDRG and INACBG Coding for Injury and External Cause Cases

Table 13. iDRG Code Accuracy and INACBG Code Accuracy for Injury and External Cause Cases

iDRG Accuracy	INACBG Inaccurate		INACBG Accurate		Total	
	(n)	(%)	(n)	(%)	(n)	(%)
Inaccurate	8	66.7	4	33.3	12	100
Accurate	0	0.0	138	100	138	100
Total	8	5.3	142	94.7	150	100

Based on Table 13, of the 12 cases inaccurate under the iDRG standard, 8 cases (66.7%) were also inaccurate under the INACBG standard, while 4 cases (33.3%) were still assessed as accurate under INACBG despite being inaccurate under iDRG. Of the 138 cases accurate under iDRG, all of them (100%) were also accurate under INACBG. No case was found to be accurate under iDRG but inaccurate under INACBG, indicating that the iDRG standard is stricter than INACBG.

Table 14. Chi-Square and Kappa Test Results for Differences in iDRG and INACBG Code Accuracy for Injury and External Cause Cases

Statistical Test	Value	p-value
Pearson Chi-Square	97.183	<0.001
Fisher's Exact Test		<0.001
Kappa	0.786	<0.001
N	150	

Table 15. McNemar Test Results for Paired Differences in iDRG and INACBG Code Accuracy for Injury and External Cause Cases

Tabulation Cell	n
iDRG Inaccurate — INACBG Inaccurate	8
iDRG Inaccurate — INACBG Accurate	4
iDRG Accurate — INACBG Inaccurate	0
iDRG Accurate — INACBG Accurate	138
<i>p-value McNemar</i>	0.125

The chi-square test results in Table 14 show a Pearson Chi-Square value of 97.183 with a p-value < 0.001, indicating a highly statistically significant difference in the distribution of accuracy between iDRG and INACBG codes. Meanwhile, the McNemar test results in Table 15 show a p-value = 0.125 ($p > 0.05$), indicating that the difference in coding accuracy between iDRG and INACBG is not statistically significant. In other words, the difference in the number of inaccurate cases between iDRG (12 cases) and INACBG (8 cases) did not reach

statistical significance in the paired comparison. The McNemar test result is the primary test for determining differences between iDRG and INACBG codes, as this study used the same medical records for both.

Substantively, the four cases that were inaccurate under iDRG but still accepted as accurate under INACBG represent the most meaningful finding of this analysis. These four cases reflect the difference in specification between the two systems: iDRG requires the external cause code to extend to the fifth character, which reflects the activity at the time of injury, whereas INACBG is more tolerant of codes that extend only to the fourth character. This difference in specification requirements is the main source of discrepancy between the two coding systems in the context of injury and external cause cases.

Ikhwan, Syamsuriansyah & Irawan (2016) found that in the INACBG system, incompleteness of the external cause code does not always affect the accuracy of case grouping, because the INACBG system focuses more on the principal injury diagnosis code to determine the payment group. This finding is consistent with the pattern found in this study, in which cases inaccurate under iDRG but still accurate under INACBG were cases whose principal diagnosis code was correct but whose external cause code was incomplete at the fourth or fifth character level. This condition directly reflects a fundamental difference between the two systems: INACBG is more tolerant of incomplete external cause codes, while iDRG explicitly requires the completeness of such codes as part of the grouping process.

Based on the focus group discussion, coding staff explained that they are required to be more thorough in reviewing medical records, since iDRG coding requires more detailed incident information than INACBG. Participants explained that each system has a different grouping mechanism, such that the location and activity of the incident are not required in INACBG coding. Rosliana *et al.*, (2023) in their study at the Emergency

Department of RSIJ Pondok Kopi, concluded that differences in coding requirements between different systems require coding staff to have a deep understanding of the applicable guidelines, rather than relying solely on experience with previous systems.

This study has several limitations that should be considered when interpreting the results. This study was conducted at only one healthcare facility, so the coding process may differ at other healthcare facilities. In addition, the study was conducted over a limited period, which may mean it does not yet capture the full variation in the characteristics of injury and external cause cases. The number of subjects in the high complexity group was relatively small compared to the other groups. There are also limitations in the scoring system used to assess medical record complexity and completeness, based on the criteria established for this study.

4. Conclusion

In this study of 150 inpatient medical records of injury and external cause cases at PKU Muhammadiyah Karanganyar Hospital (January-June 2026), most records (71.3%) fell into the low complexity category, completeness was classified as good (90.0%), and iDRG coding accuracy was high (92.0%). No significant association was found between medical record complexity or completeness and iDRG coding accuracy ($p = 0.255$ and $p = 1.000$, respectively), and there was no significant difference between iDRG and INA-CBG coding ($p = 0.125$). Because of the cross-sectional design, the findings describe associations at a single point in time and do not indicate causal relationships. The absence of a significant association may be due to limited variation in the data, as most medical records had low complexity and high completeness. The focus group discussion (FGD) with coders identified incomplete incident information as the main obstacle to diagnosis coding accuracy.

These findings have practical implications for medical record

management and coding improvement. The medical record quality control system needs to be strengthened, particularly the completeness of the incident chronology form for injury and external cause cases. A standard operating procedure (SOP) should be established requiring the attending physician to document the incident chronology, including the location and activity at the time of injury, before the patient is discharged. Coding improvement can be supported by training coders on iDRG external cause code specifications and by periodic coding audits. Future studies are recommended to use larger samples, involve more than one hospital, and include more varied levels of complexity and completeness.

5. Acknowledgments

We would like to thank PKU Muhammadiyah Karanganyar Hospital for granting permission for this research. We also thank the Rector of Universitas Mitra Husada for the support provided, as well as all parties involved who assisted in the process of this research. We also extend our gratitude to the Ministry of Education, Culture, Research, and Technology for providing the Early-Career Lecturer Research Grant.

6. References

- Daniyah, R., Utami, S. E., & Khuluq, M. A. (2024). Hubungan Kelengkapan Dokumen Rekam Medis dengan Akurasi Coding ICD -10 Di Rumah Sakit Islam Masyitoh Bangil. *Jurnal Rekam Medis Dan Informasi Kesehatan*, 5(1), 33-44.
- Fadhilah, G. N., & Herfiyanti, L. (2021). External cause. *Cerdika : Jurnal Ilmiah Indonesia*, 1(8), 960-970.
- Haerunnisa, Jayadie, A., Ismail, H., & Agustina. (2025). Faktor - Faktor yang Mempengaruhi Ketidakakuratan External Cause pada Diagnosis Cedera di RSU Thalia Irham Panciro Kabupaten Gowa Triwulan I Tahun 2025. *Inovasi Kesehatan Global*, 2(4), 333-

- 338.
- Hanifah. (2017). *Tinjauan Keakuratan Kode Infeksi Saluran Kemih Berdasarkan ICD-10 di RSUD dr. Soehadi Prijonegoro Sragen*. STIKes Mitra Husada Karanganyar.
- Hatta, G. R. (2015). *Pedoman Manajemen Informasi Kesehatan di Sarana Pelayanan Kesehatan* (2nd ed.). Jakarta: Universitas Indonesia (UI-Press).
- Ikhwan, Syamsuriansyah, & Irawan, M. M. P. (2016). Tinjauan Ketepatan Kode Diagnosis Cedera Dan Penyebab Luar Cedera (External Causes) Pasien Rawat Inap Di Rumah Sakit Islam Siti Hajar Mataram. *Jurnal Manajemen Informasi Kesehatan Indonesia*, 4(2), 52–60.
- Indawati, L. (2019). Analisis Akurasi Koding Pada Pengembalian Klaim BPJS Rawat Inap Di RSUP Fatmawati Tahun 2016. *Jurnal Manajemen Informasi Kesehatan Indonesia*, 7(2), 105–113.
- Kemenkes, R. (2018). *Laporan Riskesdas 2018 Nasional.pdf*. Jakarta: Badan Penelitian dan Pengembangan Kesehatan.
- Kemenkes, R. (2024). *Peraturan Menteri Kesehatan Republik Indonesia Nomor 19 Tahun 2024 Tentang Penyelenggaraan Pusat Kesehatan Masyarakat*. 4(02), 7823–7830.
- Maryati, W., Rosita, R., & Zanuri, A. P. (2019). Hubungan Antara Kelengkapan Informasi Medis Dengan Keakuratan Kode Diagnosis Carcinoma Mammæ. 9(1), 24–31.
- Maryati, W., Wannay, A. O., & Suci, D. P. (2018). Hubungan Kelengkapan Informasi Medis dan Keakuratan Kode Diagnosis Diabetes Mellitus. 1(2), 96–108.
- Nanda, F., Dewi, D. R., Yulia, N., & Satrya, B. A. (2025). Analisis Ketepatan Kode Cedera dan Penyebab Luar Cedera pada RME Rawat Darurat di RSII Sukapura. *Jurnal Ilmiah Kedokteran Dan Kesehatan*, 4(2), 56–73.
- Nasipta, G., Pomarida, S., & Eliyantho, G. V. (2024). Hubungan Kelengkapan Rekam Medis Dengan Keakuratan Kode Typhoid Fever Rawat Inap Rumah Sakit Santa Elisabeth Medan. *Jurnal Kesehatan* 4(2), 61–66.
- Pusat Pembiayaan Kemenkes RI. (2025). *Indonesian Coding Standard*. Jakarta: Kementerian Kesehatan RI.
- Puspitasari, N. N., & Rahadiyanto, C. (2022). Tinjauan Ketepatan Kodefikasi External Cause Kasus Cedera Dokumen Rekam Medis Pasien Rawat Inap Berdasarkan Icd-10 Di Rumah Sakit Umum Daerah RA. Kartini Kabupaten Jepara Triwulan I 2022. *Emviro Jurnal Ilmiah Penelitian Kesehatan*, 2(2), 52–58
- Roslina, A., Indawati, L., Fannya, P., & Yulia, N. (2023). Tinjauan Ketepatan Kode Diagnosa dan External Cause Kecelakaan Lalu Lintas di IGD RSII Pondok Kopi. *Jurnal Ilmiah Kesehatan Masyarakat*, 2(3), 535–545.
- Sri, E., Hastuti, D., Syajidah, A. M., & Rohmania, E. (2025). Hubungan Kelengkapan Informasi Medis Dengan Keakuratan Kode Diagnosis Penyakit Pada Rekam medis Rawat Inap di RSU Universitas Muhammadiyah Malang Tahun 2024. 10(2), 240–249.
- Utami, Y. T., Hastuti, N. M., & Sari, A. (2022). Keakuratan Kode Diagnosis Cedera Dan External Cause Di Rsud Ir. Soekarno Sukoharjo. 458–466.
- Wahyuni, A., Khumaira, N. F., & Siska. (2024). Hubungan Kelengkapan Rekam Medis Terhadap Akurasi Pengkodean ICD-10 dan ICD-9. *Jurnal Rekam Medik Dan Informasi Kesehatan*, 5(3), 243–249.
- WHO. (2024). Injuries and Violence. Retrieved from World Health Organization website: <https://www.who.int/news-room/fact-sheets/detail/injuries-and-violence>
- Widiantoro, R., Wariyanti, A. S., Barat, B. K., Indah, G. P., Tengah, J., Ir, J., ... Tengah, J. (2023). Tinjauan Keakuratan Kode External Cause Diagnosis Cedera Kepala Berdasarkan ICD-10 Pada Rekam Medis Pasien Rawat Inap Di RSUP dr . Soeradji Tirtonegoro. *Indonesian Journal of Health Information Management (IJHIM)*, 3(1), 1–7.