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User Interface Design for Detecting Potential BPJS Patient Fragmentation at Bhayangkara Level I Hospital, PUSDOKKES POLRI

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Abstract: Fragmentation of BPJS patient data is a problem arising from inconsistencies in visit records, particularly repeat visits occurring within seven days, which may result in fragmented service episodes, administrative discrepancies, and complications in the BPJS claim process. This study aimed to identify the potential fragmentation of BPJS patient visits and to design a user interface prototype as a supporting solution. A cross-sectional approach was applied through observation, interviews, and documentation, while system development used the Prototype method involving registration, casemix, and Hospital Management Information System (SIMRS) personnel. The findings showed that fragmentation was influenced by repeated visits, the absence of automated validation, and limitations of the existing system in detecting repeat visits within seven days. These conditions may affect data accuracy, service efficiency, and the smooth processing of BPJS claims. The proposed prototype incorporates integrated patient-history retrieval, automated validation, an early warning system, and claim-monitoring functions. Further testing and development are required before implementation so that the prototype can support the prevention of BPJS patient-visit fragmentation and improve claim administration.

Keyword: Fragmentation, Patient, BPJS, Claim, User Interface Prototype.

INTRODUCTION

The development of information technology over the past several decades has significantly affected various sectors, including healthcare. Regulation of the Minister of Health Number 24 of 2022 defines an electronic system as a series of electronic devices and procedures used to prepare, collect, process, analyze, store, display, announce, transmit, and disseminate electronic information. In the era of digital health transformation, healthcare facilities are required not only to provide conventional medical services but also to utilize technology and protect patient data. Law Number 27 of 2022 concerning Personal Data Protection also emphasizes the importance of digital literacy and human-resource competence so that healthcare personnel are able to use technology appropriately and minimize potential risks. Accordingly, the digitalization of health administration has become both a necessity and a response to the increasing complexity of healthcare services. Health information systems are

important organizational components that transform data into useful information to support decision-making and improve service quality and operational efficiency (Putri Hartuti et al., 2025; Regulation of the Minister of Health No. 18, 2022).

A hospital is a healthcare institution that provides comprehensive individual healthcare services, including inpatient, outpatient, and emergency care. Law Number 17 of 2023 concerning Health recognizes hospitals as healthcare facilities with an important role in improving public health through organized medical, supporting medical, and nursing services. Regulation of the Minister of Health Number 24 of 2022 requires healthcare facilities to implement Electronic Medical Records (EMRs) and to provide competent human resources, infrastructure, information technology, networks, and servers to support their implementation.

Alongside implementation of the National Health Insurance (JKN) program administered by BPJS Kesehatan, hospitals are also required to maintain efficiency and accountability. The BPJS claim-based payment system requires healthcare facilities to ensure that services comply with applicable provisions. Administrative inaccuracies and inconsistencies between medical services and claim requirements may result in rejected or pending claims and may adversely affect hospitals (Putri & Iqbal, 2025; Regulation of the Minister of Health No. 16, 2019).

Fragmentation is an important structural and operational challenge in BPJS healthcare services. In this study, fragmentation refers particularly to repeated outpatient visits at an Advanced Referral Health Facility for the same or related diagnosis within a period of less than seven days. Such conditions may create administrative problems and contribute to pending claims. BPJS Director Regulation Number 67 of 2021 and the operational context described in the study frame repeated visits within seven days as a key issue requiring verification.

Bhayangkara Level I Hospital, Puskokkes Polri, as a central Police referral hospital and an advanced BPJS healthcare facility, faces the potential fragmentation of BPJS patient services. Preliminary observations conducted in May 2026 identified repeated outpatient visits within seven days, increasing pending outpatient claims, limited structured training for medical and non-medical staff, and a user interface that did not adequately support early identification of fragmentation. Initial interviews with registration and casemix personnel also indicated that fragmentation-related pending claims were associated with the absence of comprehensive integration and the need for manual checking. Casemix reports for January-February 2026 recorded pending claims associated with repeat visits, including similar diagnoses within seven days (Casemix Audit Report, 2026).

These findings are consistent with Putri and Iqbal (2025), who reported that fragmentation in BPJS implementation may arise when outpatient visits for the same diagnosis occur repeatedly within less than seven days. Such cases create administrative constraints because the claim system may regard them as one episode of care, thereby contributing to pending claims and delayed reimbursement.

In this context, user interface design plays an important role in transforming complex data into information that can be understood quickly by users. User-centered interface design can improve system usability and support users in completing tasks more effectively and efficiently (Hanafi et al., 2025). An early warning system using visual indicators, automatic notifications, and warning pop-ups may assist personnel in detecting potential fragmentation in real time. The study therefore focused on designing a monitoring user interface prototype capable of detecting potential BPJS patient fragmentation through integrated visualization of visit data.

The proposed user interface is expected to assist healthcare personnel in identifying repeat visits within a single episode of care so that data entry and claim verification become more accurate. By reducing administrative errors, the interface may contribute to lowering the number of pending claims. On this basis, the study was entitled 'User Interface Design for Detecting Potential BPJS Patient Fragmentation at Bhayangkara Level I Hospital, Puskokkes Polri.'

METHOD

The system-development method used in this study was the Prototype method. Prototyping is a software-development approach that combines rapid requirements gathering and design and enables developers and users to work intensively together to ensure that system requirements are appropriately addressed (Pricillia & Zulfachmi, 2021; Pressman & Maxim, 2020).

The prototype-design stages consisted of: (1) cross-sectional observation and interviews with registration and casemix personnel to identify system requirements and existing problems; (2) identification of field problems in the existing system; (3) design and development of a prototype based on defined user requirements; and (4) limited testing and evaluation by users, followed by revision of the prototype according to user feedback.

This study used a cross-sectional observational approach and purposive sampling supported by qualitative and quantitative data to describe the potential fragmentation of BPJS patients at Bhayangkara Level I Hospital, Puskor Polri. Data were collected at a specific period to obtain an actual picture of field conditions.

Purposive sampling was used to select personnel with direct knowledge, experience, and involvement in BPJS patient services, including outpatient registration personnel, casemix personnel, and SIMRS personnel. These participants were considered capable of providing relevant information regarding service workflows, patient-data management, and obstacles that could contribute to BPJS patient-data fragmentation.

The user interface design process began with identification of user requirements through observation and interviews. Problems identified included difficulty retrieving patient information, inconsistencies in data entry, and the absence of an automated mechanism for detecting repeat visits within seven days. Functional requirements included flexible patient searching, automatic validation based on unique identifiers such as NIK and BPJS numbers, and repeat-visit detection. Non-functional requirements included ease of use, rapid access, and a simple interface.

The initial prototype was designed using a User-Centered Design approach and was aligned with the users' workflow. The design included navigation structure, patient-data input forms, search results, and patient visit-history displays. Figma was used to create an interactive high-fidelity design so that the workflow for detecting fragmentation could be simulated as closely as possible to actual conditions. The prototype was then tested on a limited basis to obtain feedback regarding usability, clarity, and feature effectiveness.

The interface emphasized integrated patient data. The system was designed to display patient history in a centralized view and generate notifications when possible duplicate records or repeat visits within seven days were detected. This approach was intended to assist users in making appropriate decisions during patient registration and visit recording.

Research and Prototype Development Framework

Observation of Patient Registration → Identification of SIMRS and Casemix Problems → Prototype System

RESULTS AND DISCUSSION

Result

The study was conducted from May to June 2026 at Bhayangkara Level I Hospital, Puskor Polri. Fragmentation data for March-May 2026 are presented below.

Table 1. Number of Fragmentation Cases, March-May 2026

No.	Month	Number of Claims	Fragmentation Cases	Percentage
1	March	17,163	121	0.7%

2	April	220,977	216	0.09%
3	May	18,294	361	1.9%
	Total	256,434	798	2.69%

The source document reports the highest number of fragmentation cases in May (361 cases), while May also had the highest reported percentage at 1.9%. The findings were associated with limitations in the previous application, particularly weak integration of historical visit data, which could contribute to fragmented records and pending claims.

Table 2. Fragmentation Criteria within One BPJS Claim Episode

No.	Month	One with Clinic	Episode with Another	One with Supporting Service	Episode with Inpatient Care	Total	
1	March		113		2	6	121
2	April		203		4	9	216
3	May		347		4	10	361
	Total		663		10	25	698

According to Table 2, potential fragmentation increased during the observation period. The most frequently identified category was one episode involving another clinic (663 cases), followed by one episode involving inpatient care (25 cases) and one episode involving supporting services (10 cases). The findings indicate that repeat visits within seven days were predominantly associated with patient movement or visits to another clinic within the same episode of care.

Table 3. Summary of Interviews with Key Informants

No.	Informant	Position	Interview Finding
1	Outpatient Registration Officer	Head of Medical Records Installation	Personnel must manually review patient visit histories through several system menus, which requires additional time.
2	SIMRS Officer	Head of SIMRS Installation	Patient visit history is available, but personnel must open specific menus to review previous visits, so checking still requires several steps.
3	Casemix Officer	Casemix Team Leader	Previous visit information is not immediately visible during claim review, requiring manual checking.

The interviews indicate that identification of BPJS patients with repeat visits within seven days was not yet supported by an automatically integrated mechanism. Personnel therefore had to check visit histories individually, which slowed the process and could delay the detection of claim fragmentation.

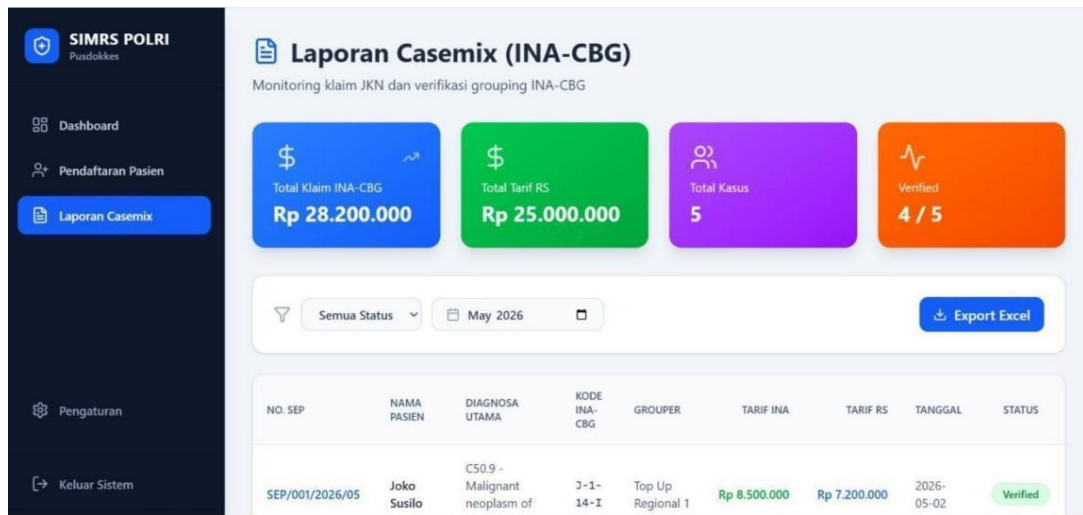


Figure 1. System Flowchart for Detecting Potential BPJS Patient Fragmentation
Source: Processed by the researcher (2026).

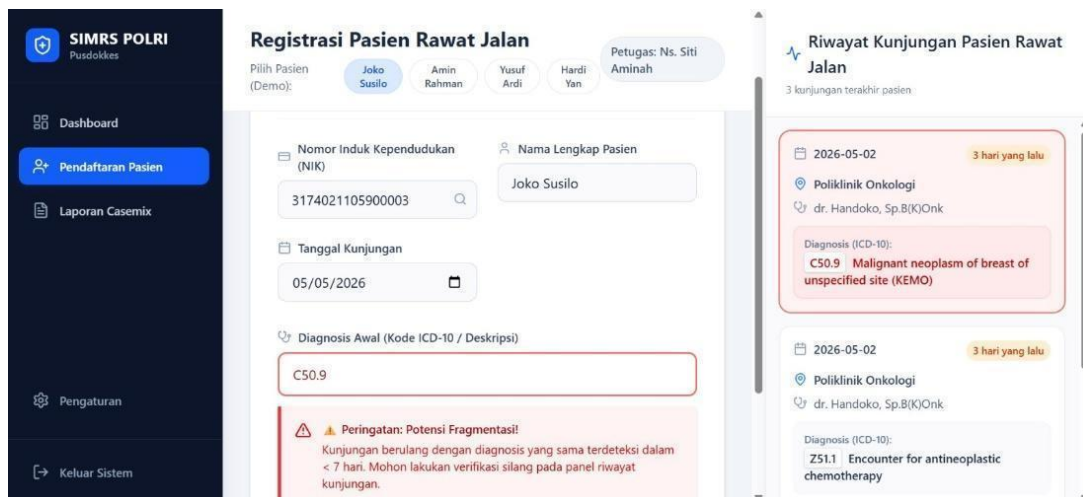


Figure 2. SIMRS POLRI Login Interface
Source: Processed by the researcher (2026).



Figure 3. Outpatient Main Dashboard User Interface
Source: Processed by the researcher (2026).



Figure 4. Patient Registration and Fragmentation Detection User Interface

Source: Processed by the researcher (2026).

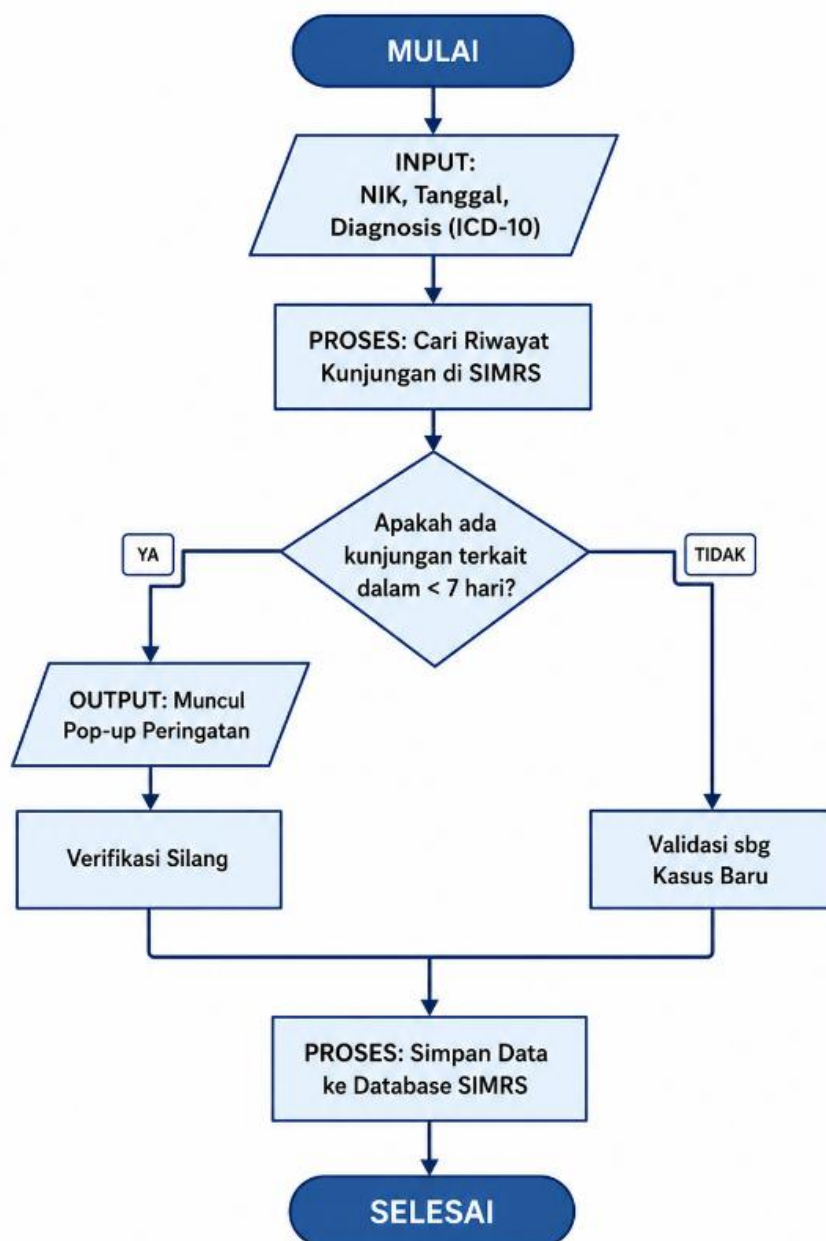


Figure 5. Casemix Report Monitoring User Interface

Source: Processed by the researcher (2026).

The proposed early-warning workflow begins when registration personnel enter a patient's NIK, visit date, and initial diagnosis based on ICD-10. The system then queries the SIMRS database for previous service history. A decision node evaluates whether a visit with the same or a related diagnosis occurred within the previous seven days. When this condition is met, the system generates a visual warning indicating 'Potential Fragmentation' and displays the relevant visit history so that personnel can perform cross-verification. If no qualifying history is identified, the visit is validated as a new episode of care and stored in the hospital database.

Limited prototype testing indicated that the proposed system could assist personnel in identifying patient data more accurately and could reduce the potential for fragmentation. Personnel considered the prototype helpful for directing the data-entry process and reducing errors in recording visits. The design therefore provides an initial solution for improving data accuracy and supporting BPJS claim compliance.

Prototype Interface Components

System Login Screen

The login screen functions as the primary security gateway. Registration and casemix personnel enter a username and password for authentication, ensuring that medical-record and BPJS visit data can only be accessed by authorized users.

Monitoring Dashboard (Outpatient Dashboard)

The dashboard serves as a centralized real-time operational information display. It presents daily metrics such as total patients, patients still waiting, patients currently in clinics, and completed services, together with patient distribution and recent patient lists.

Registration and Early Warning System

This interface represents the core proposed solution. After personnel enter the patient's NIK and initial ICD-10 diagnosis, the system cross-validates the data against the patient's history. If the same or a related diagnosis is detected within seven days, a warning block indicating potential fragmentation is displayed and the relevant previous visits are shown for rapid verification.

Claim Reporting and Monitoring (Casemix INA-CBG)

This page supports casemix personnel in managing and monitoring JKN claims. It displays financial and claim-performance summaries, verification status, SEP information, and detailed claim records to facilitate administrative monitoring and reduce pending or rejected claims associated with fragmented visits.

System Inputs and Outputs

The principal inputs are: user authentication credentials; patient search identifiers such as NIK, name, and BPJS number; visit date and initial ICD-10 diagnosis; and report filters such as claim status and reporting period. The principal outputs are: an operational monitoring dashboard; an Early Warning System notification for potential fragmentation; integrated patient visit history showing dates, clinics, and diagnoses; and a casemix evaluation report containing administrative and financial claim information.

Discussion

This study aimed to identify the potential fragmentation of BPJS patient visits and to design a user interface prototype as a solution. Based on observation and interviews at Bhayangkara Level I Hospital, Puskokkes Polri, fragmentation was identified particularly in

repeat visits occurring within seven days and in service-visit data that were not automatically linked in the existing system.

The BPJS patient-service workflow begins with registration and administrative verification, followed by medical examination and recording of service results in SIMRS. Interviews with registration, casemix, and SIMRS personnel indicated that repeat visits for the same or related complaints may occur within a short period. Although such visits may still belong to a single episode of care, the existing system does not automatically identify the previous visit at the point of registration or claim review. As a result, users must manually examine patient histories.

This condition can fragment one episode of care into several visit records that are not clearly linked. Fragmentation can reduce the completeness of information available to healthcare personnel and may affect claim processing. Under the operational claim rules described in the study, repeat visits within seven days for the same or related diagnosis require careful verification. If they are recorded as independent new cases without appropriate validation, claims may be rejected or placed in pending status, increasing administrative workload and delaying reimbursement.

To address these issues, the prototype was designed using a user-oriented approach based on input from registration, casemix, and SIMRS personnel. Major features include flexible patient searching by name, NIK, or BPJS number; automatic validation; detection of repeat visits within seven days; integrated presentation of previous visit history; and visual early-warning notifications.

The Early Warning System is particularly important because it enables users to identify a potentially fragmented episode before completing registration or claim processing. Displaying the previous visit date, clinic, and diagnosis in the same interface can reduce the number of manual steps required for verification. The casemix monitoring interface further supports claim evaluation by presenting claim status and administrative information in a centralized display.

Overall, the proposed interface is not merely a visual redesign. It functions as a decision-support mechanism intended to improve data quality, reduce user error, accelerate verification, and support more accurate BPJS claim administration. Nevertheless, because the prototype was tested only on a limited basis, further system development, integration, and implementation testing are required before its actual effect on fragmentation and pending-claim rates can be established.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The design of a user interface for detecting potential BPJS patient fragmentation at Bhayangkara Level I Hospital, Puskokkes Polri, has an important role in improving patient-data management. Fragmentation in patient visit data demonstrates that the existing system does not yet fully support accurate and integrated data entry, searching, and management. The prototype was designed using a User-Centered Design approach and emphasized usability, interface clarity, and workflow efficiency. Features including flexible patient searching, automated validation using unique identifiers, integrated patient history, and detection of repeat visits within seven days provide an initial solution to the identified fragmentation problem. Limited prototype testing indicated that the interface could facilitate system use, accelerate patient-data retrieval, and assist personnel in identifying possible duplicate or repeat visits. Further development and implementation are required to determine its effectiveness in reducing fragmentation and improving BPJS claim administration in actual hospital operations.

Recommendations

The prototype should be developed toward implementation at Bhayangkara Level I Hospital, Puskor Polri, particularly to support detection of repeat BPJS patient visits within seven days. Integration between service units and BPJS claim processes should be strengthened to reduce duplicate or fragmented data and improve information consistency. Periodic interface evaluation, stronger validation based on NIK and BPJS numbers, and training for system users are also recommended. Future studies should evaluate a real-time fragmentation-monitoring system and quantitatively assess its effect on claim accuracy, pending-claim rates, service efficiency, and user performance.

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