

Design of Inpatient Module for Hospital Management Information System (Case Study: Mataram University Hospital)

I Gede Restu Astikadeni*, Ida Bagus Ketut Widiartha, Dwi Ratnasari

Dept Informatics Engineering, Mataram University

Jl. Majapahit 62, Mataram, Lombok NTB, INDONESIA

Email: gderestuastika04@gmail.com, widi@unram.ac.id, dwi.ratnasari@unram.ac.id

**Corresponding Author*

Abstract Advances in information technology have encouraged healthcare services to adopt Hospital Management Information Systems (HMIS) to improve operational efficiency. However, the inpatient module at Mataram University Hospital still has issues such as irrelevant form content, a complex interface, and inefficient navigation. This study aims to design a prototype of the inpatient module using the User-Centered Design (UCD) method. UCD places users at the center of the design process and ensures that the system addresses actual needs. The development process followed the UCD stages, including understanding the context of use, specifying user requirements, producing design solutions, and evaluating the design iteratively through wireframes and prototypes. Evaluation was conducted using the User Experience Questionnaire (UEQ), and the system achieved high scores in five out of six aspects: Attractiveness, Clarity, Efficiency, Stimulation, and Novelty. These results indicate that the prototype offers a positive user experience and is suitable for future implementation and development.

Key words: Hospital Management Information System (HMIS), Inpatient Module, User Centered Design.

I. INTRODUCTION

In the current era of globalization, the development of information technology is widely applied in various fields, one of which is hospitals to assist in their operations [1]. Information systems have become a global trend that greatly affects the way of working in health services, namely by transforming paper-based clinical documentation to electronic or digital because it is more efficient in terms of the process of collecting, recording and managing patient data and providing faster and more accurate access to information for medical personnel [2]. Through this technological advancement, it is very helpful for hospitals to improve good service for the community which ultimately has a positive impact on the quality of hospital services [3].

According to the Minister of Health Regulation No. 82 of 2013 concerning Hospital Management Information System (SIMRS), every hospital is required to record and report all hospital operational activities in the form of Hospital Management Information System (SIMRS), the establishment of a hospital management information

system is carried out in order to improve the efficiency and effectiveness of hospital operations in Indonesia [4]. Hospital Management Information System (SIMRS) is a comprehensive and integrated information system designed to manage administrative, financial, and other clinical aspects of hospitals. As medical support, the implementation of SIMRS aims to improve the health service process and a more transparent and efficient data information service process, especially in hospital management by utilizing information systems [5].

One of the problems that is often a concern in health service activities in hospitals is the processing of patient data on hospitalization. Often the processing of patient data in hospitalization does not run effectively because it still uses manual bookkeeping media. Many obstacles experienced by the hospital include errors in recording, storing data, and duplication of patient data [6]. In addition, when the hospital is serving a large number of patients, it often makes health workers in the hospital ineffective in managing patient data, especially inpatients [7].

Based on direct observation at Mataram University Hospital, located in Mataram City, West Nusa Tenggara Province, this hospital is one of those that has implemented a Hospital Management Information System (SIMRS) to support daily operational activities. However, in its implementation, there are still some limitations, particularly in the inpatient care services. This was identified through interviews with IT staff and several medical personnel, including five nurses and one doctor, during the direct observation at the hospital. The interview results indicated that one of the challenges is the presence of several columns on the patient care forms that are considered unnecessary for data needs, making the data entry process inefficient. Additionally, some medical staff noted that the previous SIMRS interface was considered quite complex because it displayed features from other services and features that were not within the medical staff's access rights. The previous system also had a lengthy navigation flow. This often caused confusion when users wanted to quickly access a specific menu, especially in situations requiring a swift response. Medical staff also deemed it necessary to have a special feature to view information on the availability and condition of inpatient

rooms, as in the current information system, this information can only be accessed when users open the form to enter a patient, making it difficult to check quickly before the administrative process begins. This situation highlights the need for a redesign of the inpatient module to make it more efficient and aligned with users' actual needs and workflows, thereby reducing existing challenges and improving inpatient operations at the hospital.

Although this study focuses on the design of the inpatient module at Mataram University Hospital, several reference sources were obtained from previous studies conducted in other hospitals with the same topic. References from previous studies show that most of the inpatient systems developed are only limited to managing patient registration data, without supporting clinical processes such as recording examination results, diagnoses, or medical actions. In addition, integration has not been carried out with other clinical modules such as EMR, laboratory, or pharmacy to support the patient care process [7][3]. There are also other studies that design interfaces for inpatient systems, but are not accompanied by a usability testing process to validate the extent to which the interface can be accepted and used effectively by users[8]. These references are used as input and to add insight for the author that the inpatient system developed requires a clinical process that manages patient care and integration with other services that support the care process, and requires system interface testing to validate that the interface is acceptable to users.

To address these issues, this study focuses on developing a simpler prototype of the inpatient module within the Hospital Management Information System (HMIS) that is more relevant to user needs and can optimize inpatient service processes at Mataram University Hospital, particularly in managing patient care data and medical records. The User-Centered Design (UCD) method was applied as the development approach because it emphasizes user involvement throughout the design process. UCD ensures that the prototype aligns with users' actual needs and workflows through iterative evaluation and continuous improvement based on user feedback. Improvements made to the existing system include adjusting patient care forms to reflect current recording needs, redesigning the system interface to only display features according to the user's access rights, and simplifying feature flows to support faster and more efficient navigation. This research aims to produce a user-centered system prototype that can serve as a foundation for future development and implementation to enhance the efficiency and effectiveness of inpatient services at Mataram University Hospital.

II. LITERATURE REVIEW

Several previous studies have developed an inpatient management information system to improve service efficiency. First, the study [7] designed a web-based inpatient and outpatient management application. This system provides a main admin login feature, account management for registration, inpatient, and outpatient

admins, and recording doctor and patient data. In addition, the system also displays patient room information and a new patient registration form.

The second study [3] also developed an inpatient information system at Syarif Hidayatullah Hospital. This system offers features that can be accessed by both visitors and admins. Visitors can view information on hospital facilities, doctor schedules, and inpatient status, while admins have features to enter data on doctors, nurses, patients, and medical procedures.

The third study [6] developed an Inpatient Management Information System at the Ngemplak I Sleman Health Center to overcome the constraints of manual recording of medical records that take up space and slow down data searches. This system is designed to be web-based and includes all the main features of inpatient management, namely: patient registration, examination, treatment, data collection, recording of consumables, reporting, and payment. The implementation results show that the system is able to accelerate the process of recording and searching patient data and support the quality of more structured medical record data.

In addition to research on inpatient information systems, previous studies have also developed information systems by implementing the UCD method. The first study [9] developed a mobile-based public service application for electronic ID card (E-KTP) registration using the UCD method. The UCD process includes four main stages: understanding the context of use, identifying user needs, designing interface wireframes, and evaluating the prototype with real users. This method was chosen because it allows designers to adapt the system based on real user behavior and feedback. The use of UCD was considered suitable because it focuses on user experience, promotes iterative improvements, and ensures that the final interface matches user expectations in terms of clarity and usability. The second study [10] applied the User-Centered Design (UCD) method in designing a web-based IT asset management information system at a regional police communication division. The UCD approach was used throughout the design stages, including identifying user context, gathering user requirements, producing design solutions, and evaluating usability. The development focused on ensuring that the system was easy to use, aligned with users' real workflows, and addressed challenges in asset monitoring and data duplication. The iterative evaluation confirmed that UCD effectively guided the design toward user expectations and functional efficiency.

Third study [11] applied the User-Centered Design (UCD) method in the development of a mobile-based public service application called "Sampahocity." The UCD approach was implemented through a structured process that included defining the context of use, identifying user and organizational requirements, generating design solutions, and conducting usability evaluations. The development aimed to produce an interface that is user-friendly, accessible, and aligned with the expectations of

everyday users. The evaluation results showed a high level of user satisfaction, indicating that the application successfully met user needs and expectations regarding usability.

Another study [12] also designed the SIMRS interface display to be more optimal using the User Centered Design (UCD) method. This study shows that the application of the UCD method has been proven to be able to significantly improve user experience and provide direction for developing a more user-friendly system.

The next research related to the testing method is found in a study [13] that applied the User Experience Questionnaire (UEQ) method to evaluate the user interface of an e-commerce mobile application. The research focused on measuring six key aspects of user experience: Attractiveness, Clarity, Efficiency, Dependability, Stimulation, and Novelty. After users interacted with the prototype, the results showed that most scales scored positively and were classified in the “Good” and “Excellent” categories based on UEQ benchmarks. This demonstrated that UEQ is effective for assessing early-stage system prototypes and provides valuable insights into how users perceive the usability and emotional impact of the interface

Another study [14] also used the User Experience Questionnaire (UEQ) to evaluate the user interface of a trouble ticket application designed with the Supergolden Ratio layout method. The evaluation focused on six dimensions of user experience: Attractiveness, Clarity, Efficiency, Dependability, Stimulation, and Novelty. The test involved 50 participants from IT departments within the Bali Provincial Government. The results showed that five dimensions—Attractiveness, Clarity, Efficiency, Dependability, and Stimulation—achieved “Excellent” ratings, while Novelty was rated as “Good.” These findings suggest that UEQ effectively captured user perceptions and confirmed that the interface met high usability and user experience standards.

Based on several previous studies, this research focuses on designing a Hospital Management Information System (SIMRS) by applying the User-Centered Design (UCD) method to develop the structure and prototype of the inpatient module without implementing system code. The design aims to support the documentation of patient care activities through digital forms, covering referrals to supporting services such as laboratory, surgery, and radiology. Additional features include electronic prescriptions and the generation of patient documents such as control and referral letters. Through this UCD-based design approach, the system is expected to offer better usability, reduce errors, and align more closely with the actual needs of hospital staff and workflows.

III. RESEARCH METHOD

This study adopted the User-Centered Design (UCD) method to design the structure and interface prototype of the inpatient module in a Hospital Management Information System (SIMRS). The research does not

involve system implementation or coding but focuses entirely on the system planning and interface design stages. UCD was selected because it emphasizes user involvement throughout the design process, making it highly suitable for projects that aim to create interfaces aligned with actual user needs and workflows.

The UCD method offers several advantages. Its iterative process allows for continuous refinement of design through direct user feedback. By involving users from the beginning, UCD ensures that the system addresses real problems faced by users rather than assumptions from developers. This results in a design that is not only functionally effective but also more intuitive, usable, and relevant to the working environment of its users. Therefore, UCD is well-suited for developing healthcare systems where usability and clarity are critical to supporting service quality.

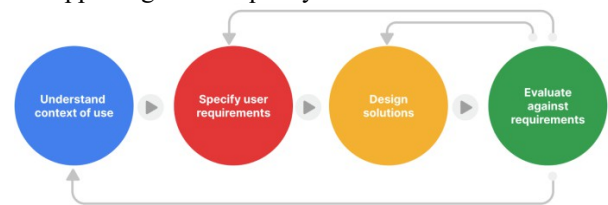


Fig. 1. Research flow

Figure 1 illustrates the research methodology used in this study by applying the User-Centered Design (UCD) approach. The diagram shows an iterative process consisting of four main stages: understanding the context of use, specifying user requirements, designing solutions, and evaluating the design against user needs. This cyclic process emphasizes continuous user involvement and feedback throughout the design phase, enabling the prototype to evolve and improve based on actual user insights.

A. Understand Context of Use

The first stage is to understand the context of use, which aims to identify who the users are, what their objectives and tasks are, and the environment in which the system will be used. In this study, this was done through observation and interviews with medical and administrative staff at the hospital. This stage helped to understand how the existing system works and identify problems in the inpatient service process.

B. Specify User Requirements

The second stage, specifying user requirements, aims to define what users need and expect from the system in order to support their tasks effectively. This stage involves organizing and analyzing data collected from the previous phase, such as user goals, challenges, and workflows, to translate them into clear system requirements. In this study, the process includes creating user stories to describe the needs for the system from the user's perspective, as well as developing use case diagrams to describe the system features that users need. This helps organize user needs into design inputs that can be implemented.

C. Design Solutions

The third stage involves designing solutions, where the system interface is developed based on the defined user requirements. This includes planning the layout, navigation flow, and interactive elements that users will interact with. To support the interface design process, activity diagrams were created to model user workflows and system processes, while Entity Relationship Diagrams (ERD) were used to represent the structure of data stored and managed by the system. In this stage, wireframes and interactive prototypes were also developed as early representations of the user interface, allowing iterative refinement based on feedback in later stages.

D. Evaluate Against Requirements

The fourth stage, evaluating against requirements, aims to assess whether the design meets user needs and expectations. In each iteration, designs were reviewed and evaluated together with users to gather feedback and identify areas for improvement. This user-centered evaluation process ensured that revisions were based on real user insights rather than assumptions. Once the full set of interface designs was completed, a final usability evaluation was conducted using the User Experience Questionnaire (UEQ). This assessment measured various aspects of user experience to determine how well the prototype performed in terms of usability, clarity, and overall user satisfaction.

For the UEQ questionnaire, there are 26 statement items shown in Fig. 2. Each item consists of a pair of opposite adjectives and is answered by users using a scale of 1 to 7. All of these items are grouped into six main categories, as shown in Table 1. Each category reflects a specific dimension of the user experience and contributes to assessing the usability and emotional impact of the system design being tested.

	1	2	3	4	5	6	7		
annoying	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	enjoyable	1
not understandable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	understandable	2
creative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	dull	3
easy to learn	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	difficult to learn	4
valuable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	inferior	5
boring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	exciting	6
not interesting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	interesting	7
unpredictable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	predictable	8
fast	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	slow	9
inventive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	conventional	10
obstructive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	supportive	11
good	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	bad	12
complicated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	easy	13
unlikable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	pleasing	14
usual	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	leading edge	15
unpleasant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	pleasant	16
secure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	not secure	17
motivating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	demotivating	18
meets expectations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	does not meet expectations	19
inefficient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	efficient	20
clear	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	confusing	21
impractical	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	practical	22
organized	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	cluttered	23
attractive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	unattractive	24
friendly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	unfriendly	25
conservative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	innovative	26

Fig. 2. User Experience Questionnaire (UEQ) testing items

TABLE I. UEQ ITEM CATEGORIES

Categories	Items
Attractiveness	1, 12, 14, 16, 24, 25
Perspicuity	2, 4, 13, 21
Efficiency	9, 20, 22, 23
Dependability	8, 11, 17, 19
Stimulation	5, 6, 7, 18
Novelty	3, 10, 15, 26

As for the calculation and analysis of UEQ (User Experience Questionnaire) scores, it can be done using the UEQ Data Analysis Tool [14].

IV. RESULTS AND IMPLEMENTATION

A. Understand Context of Use

In the first stage of the design process, the activity focused on understanding the context of use by directly observing the inpatient care workflow at Mataram University Hospital. This field observation aimed to gain insight into how the existing inpatient system operates, including the steps taken by medical staff, administrative procedures, and the flow of information between units.

To complete the observation, interviews were conducted with hospital stakeholders, including IT staff and medical personnel encountered during the field visit. These interviews provided valuable perspectives regarding the challenges faced in the current system and helped clarify user needs. Several key questions used during the interview process are presented in Table II.

TABLE II. INTERVIEW QUESTIONS LIST

No	Interview Questions
1	How is the current inpatient care workflow implemented in the hospital?
2	Who are the actors or personnel involved in the inpatient care process?
3	What is the patient administration process from admission to discharge?
4	What data is required when a patient is admitted and discharged from the hospital?
5	How is the documentation of patient care activities carried out during hospitalization?
6	What types of data are recorded throughout the inpatient care process?
7	How is the request flow for supporting services such as laboratory, radiology, or surgery handled?
8	What problems are commonly encountered while using the current system?
9	Are there any features in the current system that do not meet user needs or are difficult to use?
10	What are your expectations for an ideal inpatient system in the future?

Based on the observations and interviews conducted at Mataram University Hospital, several key problems faced by users in the current inpatient system were identified. These issues were discovered through direct interactions with hospital staff and stakeholders, and reflect challenges in daily workflows, data management, and system usability. Before identifying these problems, the roles of users involved in the inpatient system were first identified. The result of this user identification can be seen in Table 3,

while a summary of user-reported problems is presented in Table 4.

TABLE III. USER IDENTIFICATION

User	Description
Doctor	Users are responsible for seeing patients under their care, recording actions taken, recording examination results, requesting services, writing patient needs letters, and writing prescriptions.
Nurse	User are responsible for managing inpatients, recording treatment and examination processes, checking room availability, submitting service requests, viewing prescriptions, and printing follow-up and referral letters.

TABLE IV. IDENTIFIED USER PROBLEMS

Identified Problem	Cause of the Problem
Some documentation forms are no longer suitable for current needs	There have been changes in medical data requirements, making it necessary to revise and update several form fields.
The system interface appears overly complex and confusing to users	The system displays all available features, including those outside the user's access rights, resulting in a cluttered and unfocused interface.
The system's navigation flow feels long and inefficient	Accessing specific features requires navigating through multiple major modules, leading to an impractical usage flow.
No dedicated feature is available to check room availability	Room availability information can only be accessed after filling out the patient registration form, which complicates the early screening process.

B. Specify User Requirements

In the specify user requirements stage, the data collected from previous observations and interviews were analyzed to identify the users' needs for the system. This analysis aimed to determine what features are necessary and how the system should function to support users' daily tasks. As a result, a table of user stories was developed to represent the required features through real-life usage scenarios. In addition, a system requirements specification was produced to define the necessary functions, workflows, and components the system must include to effectively support inpatient care services. The user stories are presented in Table 5, and the system requirements specification is shown in Table 6.

TABLE V. USER STORIES

Actor	Code	Feature
Nurses and Doctors	US-01	Officers and Doctors can make a record of the patient's treatment process during hospitalization
		<i>Acceptance Criteria:</i> There is a form to record the patient care process during hospitalization
	US-02	Officers and doctors can make requests to support services for patient needs.
		<i>Acceptance Criteria:</i> There is a form for making requests to support services
	US-03	Officers and Doctors can create letters for patient service purposes
		<i>Acceptance Criteria:</i> There is a form to create a patient care letter

Nurses	US-04	Officers can admit, transfer and discharge inpatients. <i>Acceptance Criteria:</i> There are forms for entering, transferring and discharging inpatients.
	US-05	Officers can view the list and availability information of inpatient rooms <i>Acceptance Criteria:</i> There is a list menu and availability information from inpatient rooms
	US-06	Officers can view patient recipes given by doctors <i>Acceptance Criteria:</i> There is a menu to view the patient's prescription history
Doctor	US-07	Doctors can see the inpatients they treat <i>Acceptance Criteria:</i> There is a menu to view the list of inpatients being treated
	US-08	Doctors can create drug recipes for inpatients <i>Acceptance Criteria:</i> There is a form to create an inpatient drug recipe
	US-09	Doctors can provide diagnosis and treatment procedures for patients. <i>Acceptance Criteria:</i> There is a form for inputting patient diagnoses and treatment procedures.

From Table V it can be seen that there are nine user stories consisting of three user stories involving actors nurses and doctors, three user stories specifically for actors, and three use stories specifically for doctors. These user stories serve to describe the main features required by each actor in the system.

TABLE IV. IDENTIFIED USER PROBLEMS

Identified Problem	Cause of the Problem
Some documentation forms are no longer suitable for current needs	There have been changes in medical data requirements, making it necessary to revise and update several form fields.
The system interface appears overly complex and confusing to users	The system displays all available features, including those outside the user's access rights, resulting in a cluttered and unfocused interface.
The system's navigation flow feels long and inefficient	Accessing specific features requires navigating through multiple major modules, leading to an impractical usage flow.
No dedicated feature is available to check room availability	Room availability information can only be accessed after filling out the patient registration form, which complicates the early screening process.

The requirements specifications for this system are outlined in Table 5, which includes both functional and non-functional requirements. Functional requirements specify what doctors and nurses need from the system. Non-functional requirements specify what the system

needs to be more effective in supporting and reducing operational challenges in inpatient management.

After formulating the user stories and system requirements, use cases were developed to illustrate the interactions between users and the system. These use cases help clarify real usage scenarios, ensure all functional needs are addressed, and serve as a reference for the interface design in the next phase.

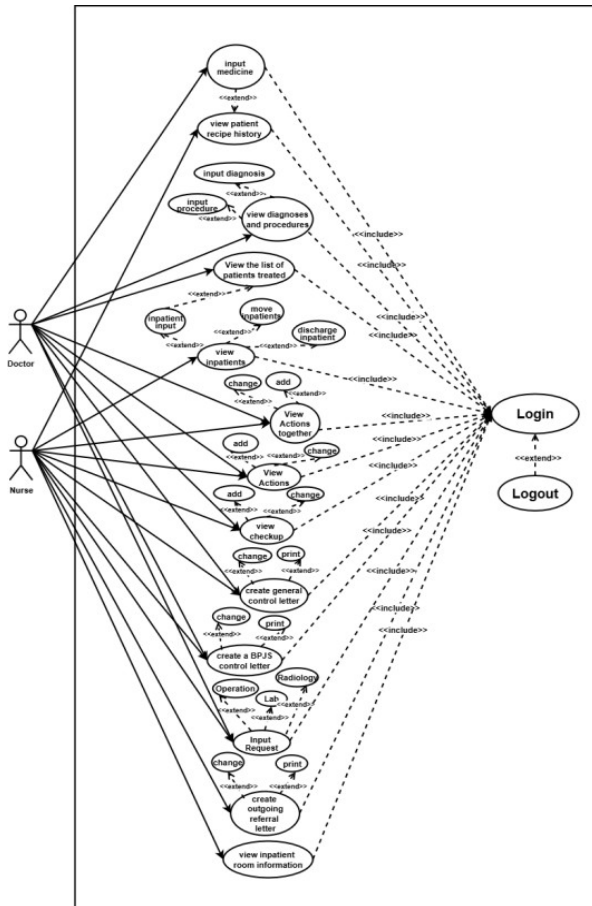


Fig. 3. Use case diagram

Figure 3 shows that there are two actors involved in this system, namely nurse and doctors. These two actors have several activities in common, namely performing actions, conducting checkup, making requests, making patient needs letters, logging in and logging out. For specific activities, nurses/midwives can manage inpatients, see a list of rooms, and see patient drug prescriptions, while doctors can see a list of patients being treated, provide diagnoses and patient treatment procedures, and make drug prescriptions for patients.

C. Design Solutions

After the user needs and system features were defined, the process moved to the design solutions stage. In this phase, design solutions were developed based on the previously identified requirements. The goal is to translate the specifications into system structure and user interface designs that align with real user workflows. The design process began with the creation of an activity diagram and

entity relationship diagram (ERD) to model workflow and data. Then, wireframes and interface prototypes were produced to visualize the system's intended appearance. This design phase was conducted iteratively, with continuous user feedback to ensure the resulting solution is relevant, functional, and user-friendly.

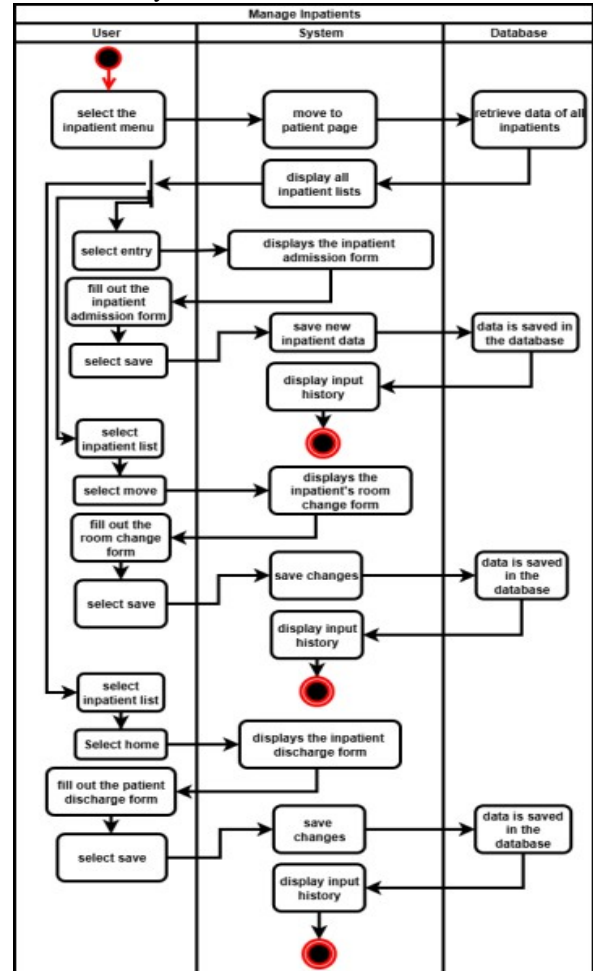


Fig. 4. Activity diagram of managing patients

The flow of inpatient management activities, including admission, transfer, and discharge, as carried out by nurse, is shown in Fig. 4. The process begins with the officer selecting the patient menu, which then displays a list of patients along with options for entering, transferring, or discharging. To admit a new patient, the officer selects the entry menu, which prompts the patient entry form. For patient transfer or discharge, the officer first selects the patient and then chooses either the transfer or discharge menu, which will display the corresponding form.

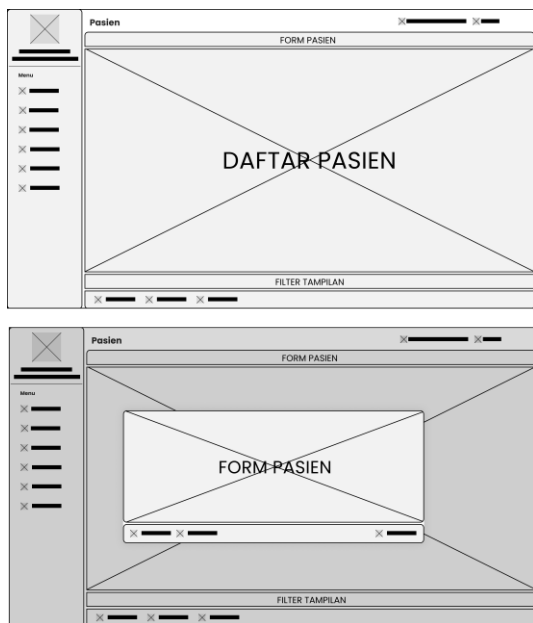


Fig. 8. Wireframe of patient management feature

Figure 8 shows the wireframe design of the patient management feature that will be used by nurse to manage inpatients, such as admission, transfer, and discharge. The interface displays a list of inpatients and a form that adjusts according to the menu selected by the nurse or midwife. This design was created as an improvement to the previous system, where the inpatient data input process was considered inefficient because the forms were displayed separately on different pages, requiring users to switch screens. Therefore, this wireframe was designed by combining the patient list and form in a single view to simplify navigation and allow faster access to features that support inpatient care activities.

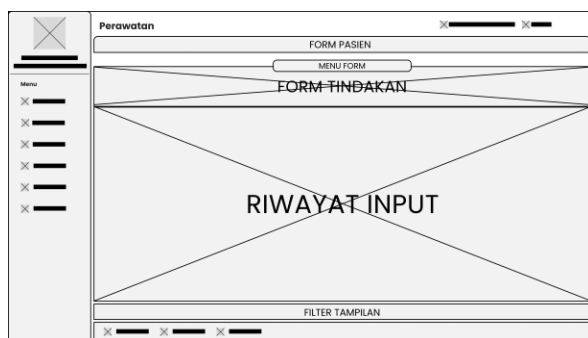


Fig. 9. Wireframe of the manage actions feature

The next wireframe design is the action management feature, as shown in Fig. 9. This feature will be used by nurse and doctors to manage medical actions. The wireframe displays the layout of the action input form along with the history of previously entered actions. This design was created as an improvement to the previous system, where action records were not presented in a structured way, making it difficult for users to review past data. Therefore, this wireframe combines the input form and

action history into a single view to enhance accessibility and ease of use.

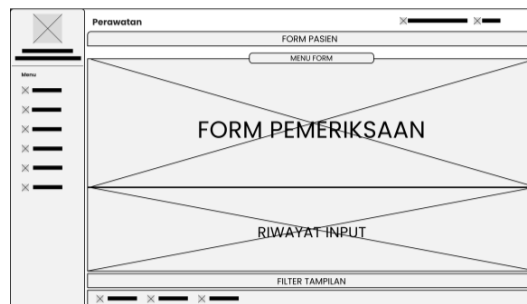


Fig. 10. Wireframe of the inspection management feature

Figure 10 shows the basic framework of the checkup management feature that will be used by nurse and doctors to manage patient examination results. The layout includes an input form for checkup data and a history of previous entries. This design was developed as an improvement to the previous system, where examination data were not clearly displayed in a single place, and users had to navigate through different sections to access patient history. Therefore, this wireframe combines the input and history components in a single view to improve access and support faster clinical decision-making. It serves as a guide for designing the detailed interface of the checkup management feature.

After completing the wireframe, the process continued with the development of the system's interface prototype. The prototype was built based on the wireframe structure, enhanced with visual details, interactivity, and navigational flow that closely resembles the real system. The goal of this stage was to present a more tangible version of the system design, allowing users to evaluate and provide direct feedback. This process was carried out iteratively, where feedback from users was used to refine the design until a user-friendly and needs-oriented interface was achieved.

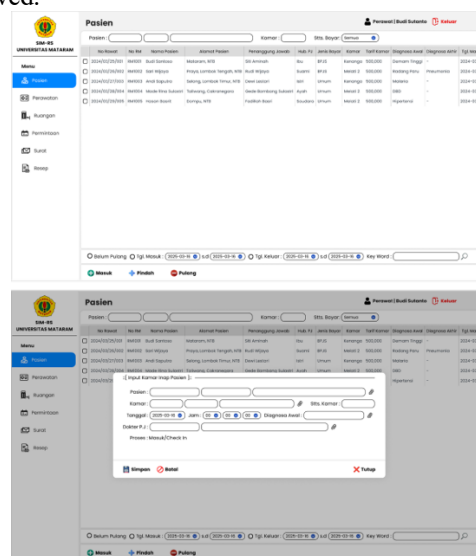


Fig. 11. Prototype of patient management feature

Figure 11 shows the prototype result of the inpatient management feature that can be accessed by nurse. In this menu, officers can view a list and detailed information of patients currently hospitalized. They can also manage patient processes such as admission, transfer, and discharge by selecting the corresponding buttons below, which will display a form based on the chosen action. This prototype was developed based on the previous wireframe design shown in Fig. 8, aiming to improve usability by combining the patient list and input form in a single, integrated view to support more efficient workflows.

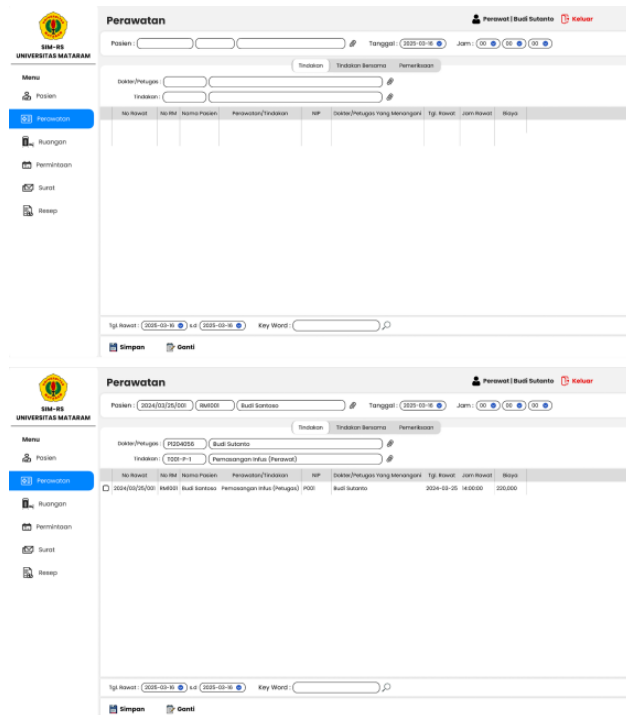


Fig. 12. Prototype of the manage actions feature

The results of the action management feature prototype are shown in Fig. 15. This feature can be accessed by nurses and doctors. In this menu, users can record medical actions performed on patients by filling in the patient and action forms. Once the data is entered, the system will display the action history. Staff and doctors can also modify or delete existing entries through the menu at the bottom. The top image shows the display before any actions are recorded, while the bottom image shows the display after actions have been entered. This prototype was developed based on the wireframe design shown in Fig. 9, with improvements aimed at combining action input and history in one interface to enhance usability and facilitate faster access to patient care records.

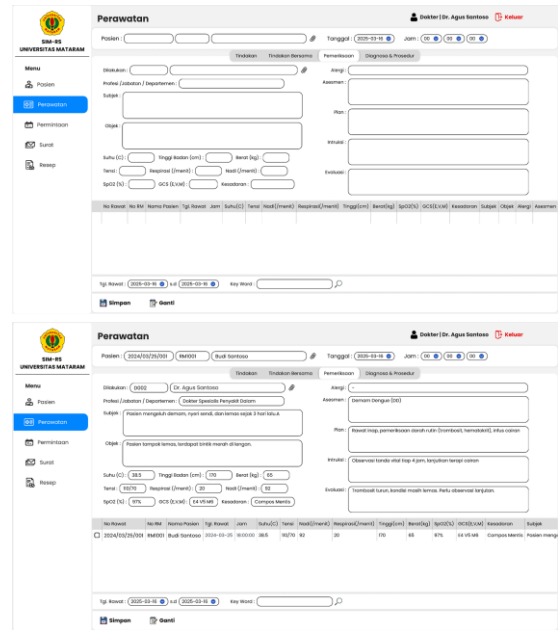


Fig. 13. Prototype of the inspection management feature

The image shown in Fig. 16 is the result of the prototype examination management feature that can be accessed by staff and doctors. In this menu, users can enter patient examination results by filling out the patient form at the top and the examination form below. Once the data is entered, the system will display the history of examinations. Staff and doctors can also modify or delete the examination history using the buttons at the bottom. The top image shows the interface before any data is entered, while the bottom image shows the interface after the examination data has been submitted. This prototype was developed based on the wireframe design in Fig. 10, aiming to combine examination input and history into a single display to simplify access and improve the efficiency of clinical documentation.

D. Evaluate Against Requirements

In the evaluate design stage, the proposed design solution was iteratively evaluated together with users during each development cycle. The goal of this evaluation was to gather direct user feedback regarding the interface layout, navigation flow, and system functionality. During the evaluation process, users provided several important inputs, such as the need to simplify the interface to focus only on essential functions, rearrange the navigation flow to make it more intuitive, and adjust the data input forms to reflect the actual information needed in patient care. These insights were crucial in refining the design and producing a final prototype that better meets user needs and expectations.

After the prototype was refined through several rounds of user evaluation, a comprehensive usability test was conducted using the User Experience Questionnaire (UEQ). This trial involved 30 respondents from Mataram University Hospital, consisting of users in the roles of doctors and nurses. The evaluation aimed to assess users'

perceptions of their overall experience when interacting with the system, covering six key aspects: Appeal, Clarity, Efficiency, Reliability, Stimulation, and Uniqueness. The questionnaire was prepared and distributed to selected respondents, and the collected data was used to calculate the final score. The following are the results of the UEQ testing conducted.

Scale	Mean	Comparison to benchmark
Attractiveness	1,66	Good
Perspicity	1,90	Good
Efficiency	1,77	Good
Dependability	1,48	Above Average
Stimulation	1,53	Good
Novelty	1,20	Good

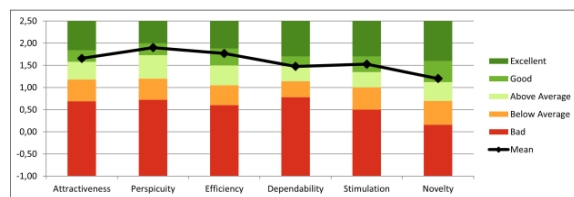


Fig. 14. UEQ test benchmark results

Based on the results of the User Experience Questionnaire (UEQ) benchmark test shown in Figure 16, it can be concluded that the system shows quite good performance in providing an overall user experience. Of the six scales tested, five scales are in the “Good” category, namely Attractiveness (1.66), Clarity (1.90), Efficiency (1.77), Stimulation (1.53), and Novelty (1.20). This shows that the scores on the five scales are above 10% of other systems in the UEQ database, but still below 75% of other systems.

Meanwhile, on the Dependability scale (1.48), the system scored in the “Above Average” category, meaning its performance is better than 25% of other systems in the database, but still below 50% of other systems. This result may indicate that users felt somewhat unsure about the system’s consistency, reliability, or their sense of control while using it. One possible reason for this is that the prototype design, while simplified, might still lack clear feedback or confirmation mechanisms after user actions, such as visual cues or success messages leading to lower trust and dependability perceptions. Improving response feedback or adding validation indicators could help improve the score in this aspect in future iterations.

Visually, the graph shows that most of the mean values are in the light green to dark green zone, which represents good to very good performance. However, the Dependability and Novelty aspects show slightly lower mean values than the others, indicating that while users are generally satisfied, they see room for improvement in terms of system reliability and the freshness of its features.

Overall, these results reflect that the system has provided a positive user experience, although some aspects can still be further developed to enhance reliability perception and offer a more innovative user interface.

V. CONCLUSION AND SUGGESTION

A. Conclusion

Based on the results of the research that has been conducted, it can be concluded that:

1. The Inpatient Module in SIMRS was successfully developed using the User-Centered Design (UCD) method. This approach effectively aligned system functions with user needs through iterative design and continuous user feedback. The resulting interface design addresses previously identified issues such as complex layouts and lengthy navigation, resulting in a simpler and more user-friendly experience. The success of the system is supported by positive UEQ test results, where five out of six aspects Attractiveness, Clarity, Efficiency, Stimulation, and Novelty were rated as “Good”.
2. UEQ evaluation showed a positive user experience, with five out of six aspects Attractiveness, Clarity, Efficiency, Stimulation, and Novelty rated as “Good.” This indicates that the prototype meets user expectations and is suitable for further development.

B. Suggestion

1. The developed prototype should be continued to the implementation stage in the hospital environment to assess its real-world effectiveness.
2. Future system development may consider adding extended treatment forms to accommodate changes in hospital operational standards and support more comprehensive medical documentation.

REFERENCES

- [1] Y. Pernando, E. Lia Febrianti, and A. Andhika, “Analisa Dan Perancangan Sistem Informasi Pasien Rawat Inap (Studi Kasus : Rumah Bersalin Azimar Anas Padang),” *JURTEKSI (Jurnal Teknologi dan Sistem Informasi)*, vol. 5, no. 2, pp. 139–146, Jun. 2019, doi: 10.33330/jurteks.v5i2.358.
- [2] Minanton, Habsyah Saparidah Agustina, and Nurfitri Khoirunnisa, “Asuhan Keperawatan Elektronik Dalam Pendidikan Praktik Klinik Mahasiswa Keperawatan di Rumah Sakit,” *JURNAL PROMOTIF PREVENTIF*, vol. 6, no. 6, pp. 836–845, 2023, [Online]. Available: <http://journal.unpacti.ac.id/index.php/JPP>
- [3] M. Abdillah, “Perancangan Sistem Informasi Rawat Inap Rumah Sakit Syarif Hidayatullah Tangerang Selatan,” *Jurnal Mahasiswa Teknik Informatika*, vol. 8, no. 3, 2024.
- [4] Suryantoko, I. Agnes, and A. Faisol, “Penerapan Sistem Informasi Manajemen Rumah Sakit Guna Meningkatkan Mutu Pelayanan Di RUMKITAL Marinir Cilandak,” vol. 4, no. 2, pp. 2865–6583, 2020, [Online]. Available: <http://ejournal.urindo.ac.id/index.php/MARSI>
- [5] R. Ramadhani Dharmawan, L. Ramadani, and S. Informasi, “Perancangan Arsitektur Enterprise Dalam Pengembangan SIMRS Bidang Pelayanan Penunjang Menggunakan TOGAF ADM (Studi Kasus: Rumah Sakit XYZ),” *Jurnal Teknik Informatika dan Sistem Informasi*, vol. 9, no. 3, 2022, [Online]. Available: <http://jurnal.mdp.ac.id>

- [6] R. Surtiyan Surya, R. Kurniawan, and I. Muhimmah, "Pengembangan Sistem Informasi Manajemen Rawat Inap Puskesmas Ngemplak 1 Sleman," Seminar Nasional Informatika Medis (SNIMed) VIII, p. 49, 2017.
- [7] R. P. Robot, R. Sengkey, and Y. D. Y. Rindengan, "Aplikasi Manajemen Rawat Inap dan Rawat Jalan di Rumah Sakit," *Jurnal Teknik Informatika*, vol. 13, no. 2, 2018.
- [8] P. Ayu Minarni and L. Wati, "Perancangan User Interface Sistem Informasi Rekam Medis Rawat Inap Klinik PKU Muhammadiyah Pringsewu," *Jurnal Ilmiah Kesehatan*, vol. 13, no. 2, 2024, [Online]. Available: <https://ejournal.umpri.ac.id/index.php/JIK|230>
- [9] S. L. Ramadhan, I. Fitri, and A. Rubhasy, "Perancangan User Experience Aplikasi Pengajuan E-KTP Menggunakan Metode UCD Pada Kelurahan Tanah Baru," *Jurnal Teknik Informatika dan Sistem Informasi*, vol. 8, 2021, [Online]. Available: <http://jurnal.mdp.ac.id>
- [10] Supardianto and A. Binsar Tampubolon, "Penerapan UCD (User Centered Design) Pada Perancangan Sistem Informasi Manajemen Aset TI Berbasis Web di Bid TIK Kepolisian Daerah Kepulauan Riau," *Journal of Applied Informatics and Computing (JAIC)*, vol. 4, no. 1, 2020, [Online]. Available: <http://jurnal.polibatam.ac.id/index.php/JAIC>
- [11] A. H. Luthfi and I. Arfiani, "Perancangan UI/UX Aplikasi Sampahocity Menggunakan Pendekatan UCD (User Centered Design)," *Jurnal Ilmu Komputer dan Sistem Informasi (JIKOMSI)*, vol. 7, no. 1, pp. 24–36, 2024.
- [12] A. Rizqa Habibi Putra Sangadji, "Prototype Ui/Ux Sistem Informasi Manajemen Rumah Sakit (Simrs) Berbasis Mobile Dengan Metode User Centered Design Tugas Akhir," 2025.
- [13] R. Sidiq Wibowo and I. Aknuranda, "Evaluasi Pengalaman Pengguna dan Perbaikan Rancangan Antarmuka Pengguna Sistem Informasi Akademik Mahasiswa Universitas Brawijaya," 2021. [Online]. Available: <http://j-ptiik.ub.ac.id>
- [14] G. A. Herdiana, I. B. A. Swarmardika, and R. S. Hartati, "Pengukuran User Experience (Ux) Desain Aplikasi Trouble Ticket Menggunakan Metode Supergolden Ratio," *SINTECH (Science and Information Technology) Journal*, vol. 5, no. 1, pp. 42–48, Apr. 2022, doi: 10.31598/sintechjournal.v5i1.1093.
- [15] R. Sidiq Wibowo and I. Aknuranda, "Evaluasi Pengalaman Pengguna dan Perbaikan Rancangan Antarmuka Pengguna Sistem Informasi Akademik Mahasiswa Universitas Brawijaya," 2021. [Online]. Available: <http://j-ptiik.ub.ac.id>
- [16] H. Rania, A. Aranta, and M. Hrisikesa, "Analisis Sistem Informasi Rumah Sakit Universitas Mataram Menggunakan Metode System Usability Scale," *JBegaTI*, vol. 4, no. 1, 2023.