



Monitoring Information System to Ensure Completion of Medical Procedure Informed Consent Forms at Hospital X

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Abstract: Medical action consent forms are known to be legal documents in the delivery of healthcare services. However, when they are not well completed, it affects the quality of services and the accountability of an institution. Recurring problems in documentation processes include incomplete data entry, late submissions, and substandard recording; all these increase risks for medical errors and administrative complications. A web-based information system was developed to address these systematic deficiencies using Rapid Application Development (RAD) methodology. Field observations and structured interviews with healthcare personnel were used as research tools in the design of this system. The development process continued through four iterative phases: requirements planning, user-centered design, system construction, and deployment evaluation. This platform comprises automated validation protocols that prevent incomplete submissions from being accepted into the database until all required fields have been completed by the user; real-time alert mechanisms for missing data fields within a submission; and streamlined interfaces optimized for clinical workflows. Functional testing shows statistically significant improvements in documentation efficiency and completion rates among medical staff documented by the system compared to those not documented by it. The system permits real-time documentation of procedures with lower error margins compared to existing methods plus shorter processing times than existing methods. This study found that RAD-based solutions present feasible approaches toward improving accuracy and speed in medical consent documentation while simultaneously achieving legal compliance and patient safety goals within hospitals. The platform uses technology-driven quality assurance mechanisms to solve longstanding challenges in documentation.

Keywords: Information System; Medical Consent Form; Rapid Application Development (RAD); Electronic Informed Consent; Documentation Completeness.

1. Introduction

Forms of consent for medical actions (Informed Consent) are the current legal instruments and ethical obligations that have become part of modern medical practice. These forms serve as proof that the patient has been adequately informed about the medical action and has given their consent consciously, voluntarily, and without any form of coercion. In the delivery of health services, informed consent is more than just a legal requirement; it is a manifestation of respect for the autonomy of patients, the integrity of the professions that provide health services, and the accountability of health service institutions. However, although it is very important to do so, proper and complete documentation of informed consent still faces a lot of problems in hospitals across Indonesia. According to Lorenzetti *et al.* (2018), major barriers were a lack of understanding among medical personnel about the legal and procedural aspects related to informed consent, time constraints in demanding clinical schedules, and an integrated monitoring and validation system within hospital workflows [1]. Therefore, negligence in documentation has become a common practice despite its grave consequences on legal compliance, ethics, and patient safety. According to research by Priskusanti *et al.* (2024), several hospitals in Indonesia reported that the rate of completion for informed consent does not exceed 60% which constitutes a potential risk for legal medical claims against hospitals and medical personnel who might be sued due to invalid or incomplete documentation [2].

Many hospitals have started using Hospital Management Information Systems (SIMRS) to help make their services more efficient and standardized. But according to Saputra Mokoagow *et al.* (2024), even though SIMRS has clinical and administrative modules, it does not yet have features that help monitor and report completed informed consents [3][4]. There are very few local implementations of e-consent modules that can check whether data is complete, send automatic notifications, and ensure legal validity. Internationally known experiences have shown quality improvements in documentation through electronic clinical information systems. Ayaz *et al.* (2021) reported that in China the compliance rate increased by 30% after implementing Electronic Informed Consent (EIC) systems with automatic validation features and real-time notifications [5]. Verreydt *et al.* (2021) talk about security requirements for data privacy in an e-consent system; authentication audit trails as well as non-repudiation are all needed for legally valid health information systems [6]. New technologies such as smart contracts and blockchain technology are used to manage medical consent documents in a way that is transparent, safe, and cannot be changed afterward. Amin *et al.* (2024) created a prototype based on smart contracts which enables dynamically verified digital consent thus opening up new possibilities for technically efficient systems that are also legally and ethically sound [7].

Given the gap between current documentation practices and available technological solutions worldwide, it is urgent to develop an information system that specifically addresses the completeness and validity of informed consent. Such systems must integrate digital documentation functions, automatic quality control, clinical education, and real-time compliance reporting to hospital management. Therefore, we designed and developed an information system for medical action consent form completion that enhances compliance, efficiency, and accountability in hospital medical documentation processes. The design employs structured software engineering approaches considering SIMRS interoperability and user experience aligned with healthcare personnel workloads and clinical workflows. We expect our system to set new best practices for bridging medical and legal requirements in modern Indonesian healthcare delivery.

2. Related Work

Electronic medical record systems have evolved to address persistent documentation challenges in healthcare facilities. Lorenzetti *et al.* (2018) conducted a systematic review identifying key barriers to physician documentation in emergency departments, including time constraints, insufficient legal understanding, and lack of integrated monitoring systems [1]. Priskusanti *et al.* (2024) reported that informed consent completion rates at Indonesian hospitals remain below 60%, creating substantial medical litigation risks [9]. Rosalinda *et al.* (2021) evaluated outpatient electronic medical record implementation at Hospital X Bandung, demonstrating that technology-supported systems enable faster and more accurate services compared to paper-based records [11]. Qoyum *et al.* (2025) and Setiawan (2024) examined medical record completeness at different Indonesian hospitals, revealing significant documentation deficiencies requiring systematic intervention [24][25].

Hospital Management Information Systems (SIMRS) have been widely adopted to improve operational efficiency, yet specific functions for informed consent monitoring remain underdeveloped. Saputra Mokoagow *et al.* (2024) found that while SIMRS accommodates clinical and administrative modules, specialized documentation validation features are scarce [5]. Agiwahyunto *et al.* (2024) analyzed electronic medical record data at hospitals but found limited attention to consent form completeness verification [14]. Security and legal validity represent critical concerns in electronic consent systems. Verreydt *et al.* (2021) outlined

security and privacy requirements for electronic consent, emphasizing authentication, audit trails, and non-repudiation as necessary for legally valid health information systems [6]. Yunengsih (2024) performed legal analysis of electronic medical consent in inpatient departments, examining regulatory compliance and legal enforceability [4]. Daud *et al.* (2024) analyzed the legal strength of electronic medical records as evidence in medical disputes, highlighting the need for robust digital signature mechanisms and data integrity protection [13]. Amin *et al.* (2024) proposed a smart contract-enabled informed consent strategy using blockchain technology to ensure transparent and immutable consent management [7].

Software development methodologies have been applied to healthcare information systems with varying approaches. Septyani *et al.* (2024) developed a medical archiving system using Rapid Application Development (RAD), demonstrating faster delivery cycles suitable for healthcare contexts [12]. Santoso and Amanullah (2022) implemented RAD for academic information systems, achieving efficient development timelines [16]. Rahmaliani *et al.* (2023) applied Agile Software Development for electronic medical record governance in inpatient mortality reporting, emphasizing flexibility and continuous improvement [23]. Abdussalaam and Oktaviani (2020) designed web-based information systems using prototyping methods, allowing iterative refinement based on user feedback [10]. Technical implementations have explored diverse technology stacks, with Chauhan *et al.* (2019) demonstrating database implementation using Python Flask framework for lightweight and flexible web application development [21]. Despite these advances, existing systems lack integrated solutions combining real-time validation, automated notifications, clinical workflow integration, and legal compliance verification specifically for informed consent documentation. Our research addresses this gap by developing a specialized information system ensuring completeness, validity, and accountability in medical action consent form management.

3. Research Method

3.1 Research Type and Approach

This study constitutes software engineering research aimed at developing a web-based information system to improve the completeness of medical action consent form documentation. The research employs a qualitative-descriptive and experimental-applied approach, where researchers actively participate in requirements analysis, system design, application development, and effectiveness evaluation based on user responses and system functionality assessment [10].

3.2 System Development Method

This research adopts the Rapid Application Development (RAD) methodology. RAD was selected based on the need for rapid and iterative system development with active involvement from users as primary stakeholders. The RAD model enables system construction within a relatively short timeframe without compromising quality and core functionality [11][12].

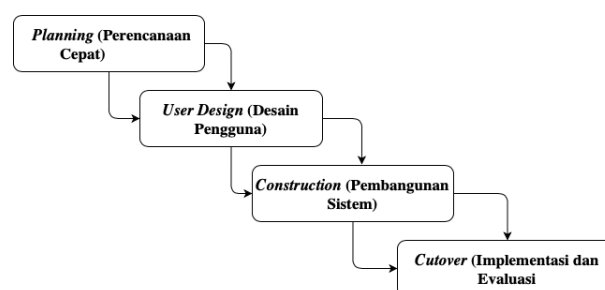


Figure 1. RAD Method Structure

The RAD methodology applied in this research consists of four stages:

- 1) Planning (Rapid Planning). This stage involves problem identification, user requirements gathering, and system solution planning. Researchers conducted direct field observations and interviews with medical personnel involved in medical action consent form documentation.
- 2) User Design. System design was performed participatively with stakeholders including physicians, nurses, and medical records officers. Initial prototypes were designed considering usability aspects and clinical workflow patterns.
- 3) Construction. System development utilized PHP programming language along with HTML/CSS/JavaScript and Bootstrap for frontend interface. Development proceeded iteratively with continuous integration of user feedback.

- 4) Cutover (Implementation and Evaluation). The system underwent functionality testing and end-user validation. This stage included user training and qualitative evaluation data collection regarding usability, documentation completeness, and user satisfaction.

3.3 Data Collection Techniques

Data for this research were obtained through several techniques; Interviews were conducted with physicians, nurses, and medical records officers to identify problems in consent form documentation and gather system requirements. Observations involved direct examination of medical action documentation workflows in service units. Document studies reviewed existing medical action consent form formats, medical record documentation regulations, and clinical documentation quality policies to ensure compliance with medical record regulations and facilitate transition from paper-based to electronic documentation [13].

4. Result and Discussion

4.1 Results

4.1.1 Existing System Analysis

Based on field observations and interviews with medical administration staff and healthcare personnel, medical action consent forms are still completed semi-digitally using paper media. This process occurs after medical procedures are performed, where physicians or nurses must manually fill out forms before submitting them to the medical records department for archiving. Several critical findings emerged from the existing system observation. Data completeness is frequently unmet, particularly regarding patient or physician signatures and procedure execution times. Recording processes are slow because medical personnel must document data during busy service periods. Documents are often lost or damaged due to the absence of digital backups. No automatic validation system exists, resulting in undetected input errors. These problems pose legal, administrative, and patient safety risks due to the lack of complete and accurate written evidence of performed medical procedures [14][15].

4.1.2 System Design

System design employed the Rapid Application Development (RAD) approach, enabling rapid and iterative development with active user involvement in design and testing processes [16]. The flowchart provides a graphical representation of process flows within the information system, illustrating relationships between entities, activity stages, and logical decisions occurring within the system. For this consent form completeness information system, the flowchart visualizes the process of data entry, validation, and reporting of medical action consent by patients, healthcare personnel, and medical records administrators.

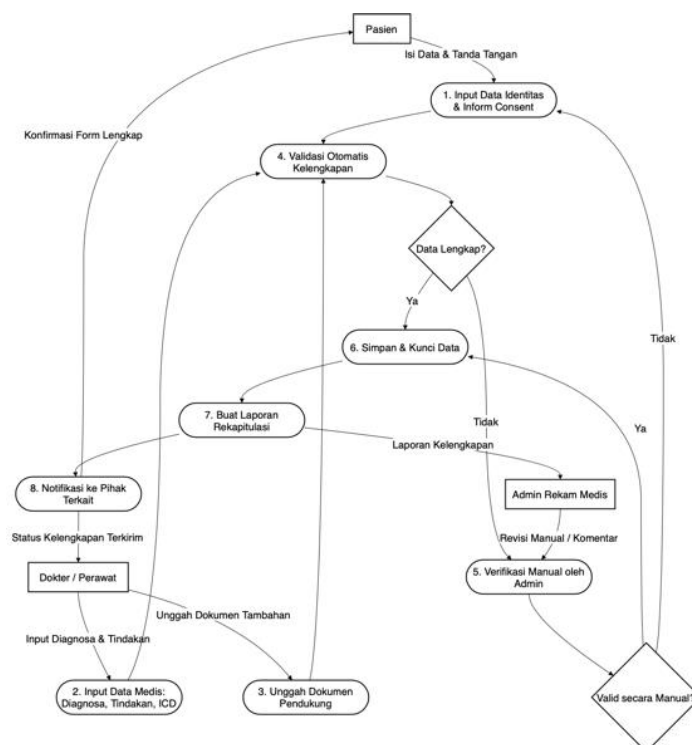


Figure 2. System Flowchart

The context diagram illustrates relationships between the system and external actors such as physicians, nurses, medical records administrators, and patients. The system receives data input from medical personnel and provides output in the form of form completeness status and summary reports [17].

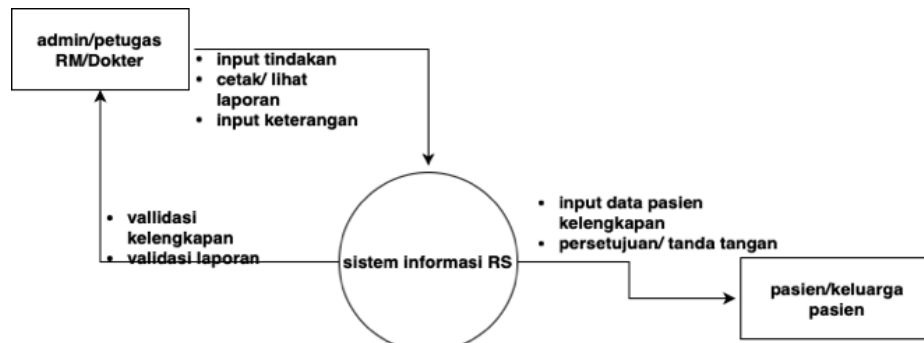


Figure 3. System Context Diagram

The DFD diagram depicts main processes running within the system, starting from user authentication based on roles, either as medical personnel or medical records administrators. After successful login, users are directed to the medical action consent form completion process. This form contains patient information, procedure and diagnosis details, and patient consent that must be completed thoroughly [18].

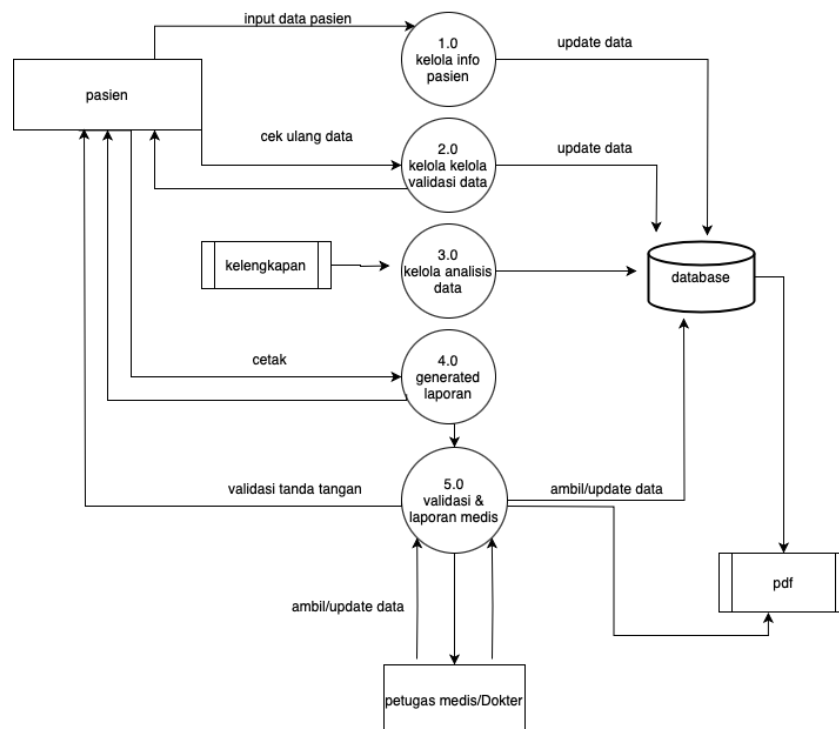


Figure 4. System DFD Diagram

The Entity Relationship Diagram (ERD) is structured based on database architecture. This diagram illustrates interconnections between main entities in the system, such as patients, users, medical personnel, procedure data, and validation results. Inter-entity relations are built considering data consistency and efficiency in storage and information retrieval processes [19].



Figure 5. System ERD Diagram

The user interface design was created with a semi-manual approach that still supports workflow automation. The objective is to create a system that is easily understood and quickly used by medical personnel in dynamic work situations. Automatic validation is provided through visual indicators showing mandatory fields that remain incomplete. The system blocks the save process if important entries are incomplete. Additionally, the system provides a report page that can be filtered by time, medical personnel name, or form completeness status, with formats ready for printing or digital export [20].

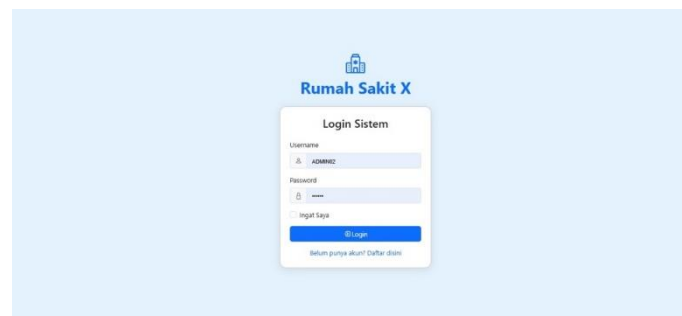


Figure 6. User Login Page

The database structure follows MySQL database schema for large-scale implementation. The database consists of a patient table containing basic patient information, a physician table storing medical personnel data, a user table containing system account data with access rights, a consent_procedure table for storing form completion data, and a completeness_analysis table recording validation status for each entry [21].

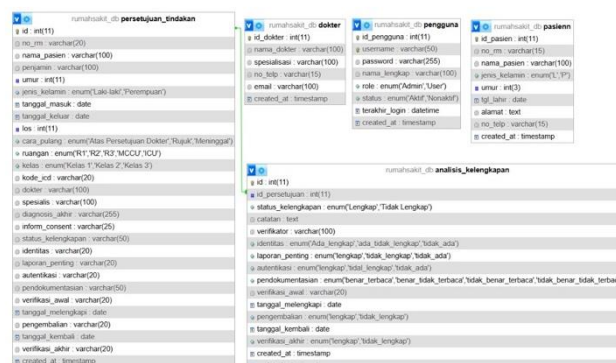


Figure 7. Database Structure

The application folder structure is designed modularly to facilitate management and continuous development. The controllers folder contains process logic such as data input and validation, models handle database schemas for database management, templates store HTML files, static stores CSS, JavaScript, and other visual assets, while db serves as the directory for SQLite file storage or external database connections [22].

4.1.3 System Implementation

System implementation was conducted in stages, starting from user interface development, validation mechanism implementation, to visual documentation through screenshots of the running system. In the initial implementation stage, the main interface was developed to provide structured access according to user roles. The login process includes role-based authentication, differentiating access rights between medical personnel (physicians and nurses) and medical records administrators [23]. After successful entry, users are directed to the main dashboard presenting a list of medical action consent forms. Each entry in this list displays data completeness status, facilitating users in monitoring data input progress.

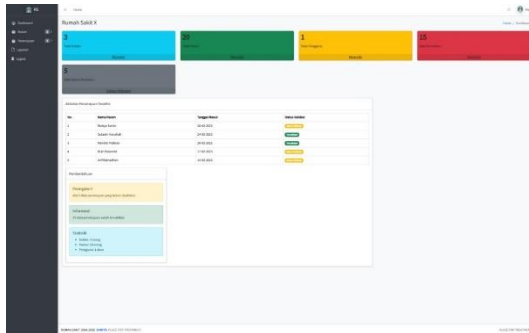


Figure 8. Application Dashboard Page

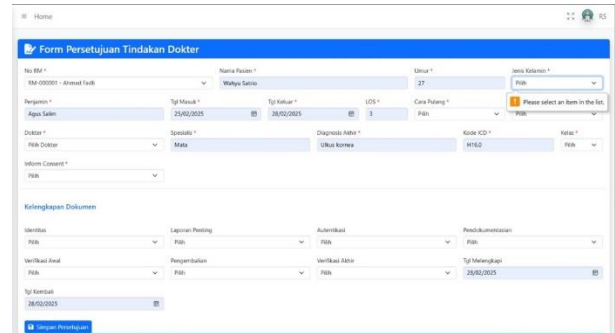


Figure 9. Physician Procedure Consent Form Page

The completion form is designed to contain essential elements such as patient identity, medical diagnosis, procedure details, and consent fields. Most of these input components are dynamic, such as medical procedure options and execution times available in dropdown format to minimize input errors [24]. Mandatory field validation is applied in real-time on this form. If any fields remain incomplete, the system automatically prevents the save process and provides warnings to users. The validation system relies not only on backend logic but also incorporates visual feedback through color usage. For instance, mandatory fields that remain incomplete are highlighted in red as visual warnings immediately recognizable by users. If users attempt to save incomplete data, the system displays automatic notifications (auto-alerts) explaining which sections require completion [25].

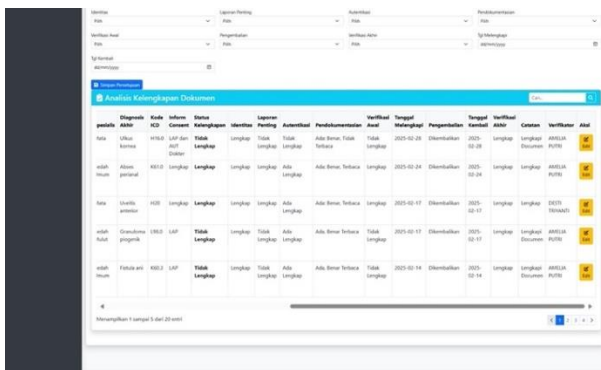


Figure 10. Physician Procedure Consent Form Page

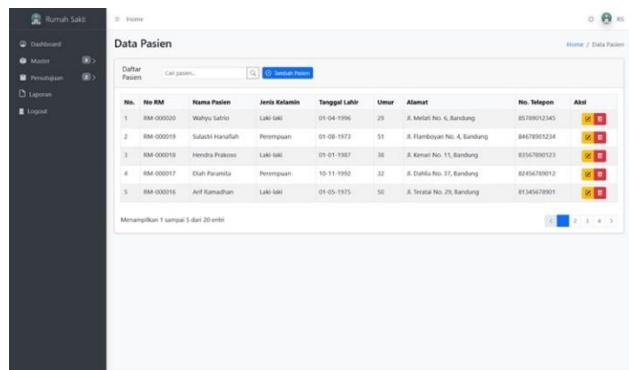
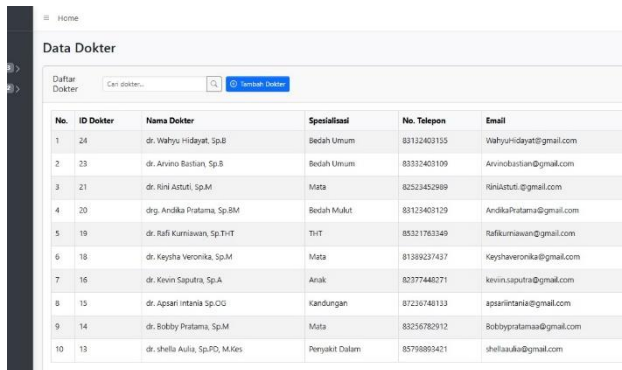


Figure 11. Patient Data Page

As part of implementation documentation, displayed screenshots serve as visual evidence of system features that have been executed. These are data pages displayed for each function, customized according to user needs. The Patient Data Page serves as the main information center for patient demographic data at the hospital. All registered patient data is displayed in table format consisting of medical record numbers, full names, gender, date of birth, age, address, and telephone numbers. A search feature is provided to facilitate quick access to specific patient data. Administrators or medical records officers can also add new patient data through dedicated buttons and perform updates or deletions through available action icons. The existence of this page is crucial in ensuring completeness and connectivity of patient data with other modules in the system, including medical action consent forms.

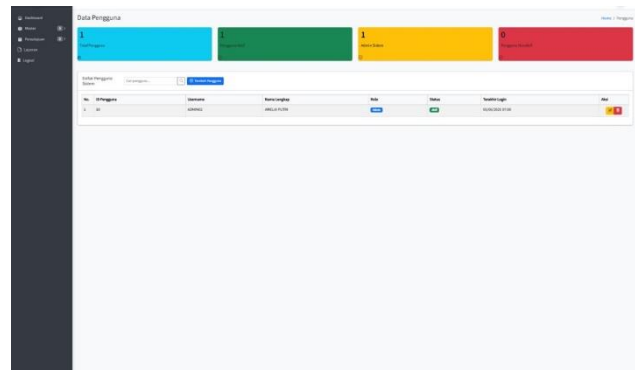
The Physician Data Page is designed to facilitate management of medical personnel information at the Hospital. Through this page, administrative staff or system administrators can perform input, updates, and deletion of physician data on duty. Displayed information includes physician identity such as physician ID, full name with title, specialization, telephone number, and email address. A search feature is also available to facilitate physician data searches based on specific keywords. Add data, edit, and delete functionalities are displayed as intuitive action icons, facilitating usage. This page becomes an important part in supporting medical documentation processes, particularly in medical action consent systems requiring accurate and integrated physician data.



The screenshot shows a web interface titled 'Data Dokter'. It includes a search bar and a table with the following data:

No.	ID Dokter	Nama Dokter	Spesialisasi	No. Telepon	Email
1	24	dr. Wahyu Hidayat, Sp.B	Bedah Umum	8312403155	WahyuHidayat@gmail.com
2	23	dr. Arvinio Basitjan, Sp.B	Bedah Umum	8332403109	ArvinioBasitjan@gmail.com
3	21	dr. Rini Astuti, Sp.M	Mata	82523452999	RiniAstuti@gmail.com
4	20	dr. Andika Pratama, Sp.BM	Bedah Mulut	83123403129	AndikaPratama@gmail.com
5	19	dr. Rafi Kurniawan, Sp.THT	THT	8531763349	Rafikurniawan@gmail.com
6	18	dr. Keysha Veronika, Sp.M	Mata	81389237437	KeyshaVeronika@gmail.com
7	16	dr. Kevin Saputra, Sp.A	Anak	82377440271	kevin.saputra@gmail.com
8	15	dr. Apasari Intania, Sp.OG	Kandungan	87226748133	apasarintania@gmail.com
9	14	dr. Bobby Pratama, Sp.M	Mata	83256782912	Bobbypratama@gmail.com
10	13	dr. Sheila Aulia, Sp.PD, M.Kes	Penyakit Dalam	85798893421	sheilaaulia@gmail.com

Figure 12. Physician Data Page

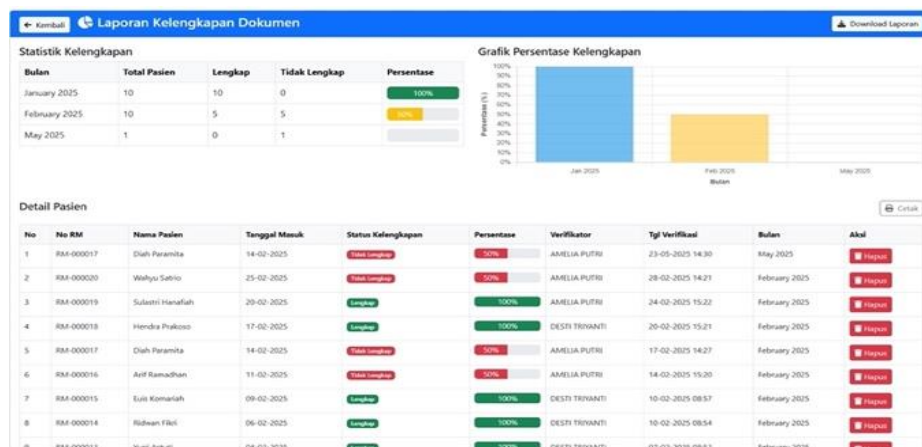


The screenshot shows a web interface titled 'Data Pengguna'. It features four colored cards representing user statistics: Total Pengguna (3), Aktif (1), Sistem Administrator (1), and Tidak Aktif (1). Below these is a table with the following data:

No.	Username	Nama Pengguna	Role	Status	Terakhir Login	Mail
1	admin	AMELIA PUTRI	ADMINISTRATOR	Aktif	2024-02-08 10:00	

Figure 13. User Data Page

The User Data Page functions as a user account management module within the information system. System users generally consist of administrators and medical staff with different access rights. This page displays statistical summaries in the form of total users, active users, system administrators, and inactive users in informative colored card visuals. Below, a table displays user details such as user ID, username, full name, role, account status, and last login time. System administrators can add new accounts, perform edits, and deactivate or delete inactive users. This module is important for ensuring system security and structured and well-documented access rights management. This visual documentation functions not only as a technical supplement but also helps readers understand the system's operation comprehensively even without direct application interaction. With these features, all users can be controlled by administrators and all activities can proceed effectively according to hospital needs [26][27].



The screenshot shows a web interface titled 'Laporan Kelengkapan Dokumen'. It includes a table for 'Statistik Kelengkapan' and a bar chart for 'Grafik Persentase Kelengkapan'.

Bulan	Total Pasien	Lengkap	Tidak Lengkap	Persentase
January 2025	10	10	0	100%
February 2025	10	5	5	50%
May 2025	1	0	1	0%

The bar chart shows the percentage of completeness for each month: January 2025 (100%), February 2025 (50%), and May 2025 (0%).

Below the chart is a table for 'Detail Pasien' with the following data:

No	No RM	Nama Pasien	Tanggal Masuk	Status Kelengkapan	Persentase	Verifikator	Tgl Verifikasi	Bulan	Aksi
1	RAM-000017	Diah Paramita	14-02-2025	Tidak Lengkap	0%	AMELIA PUTRI	23-02-2025 14:30	May 2025	Report
2	RAM-000020	Wahyu Satrio	25-02-2025	Tidak Lengkap	0%	AMELIA PUTRI	28-02-2025 14:21	February 2025	Report
3	RAM-000019	Sulastri Hanaifah	20-02-2025	Lengkap	100%	AMELIA PUTRI	24-02-2025 15:22	February 2025	Report
4	RAM-000018	Hendra Prakoso	17-02-2025	Lengkap	100%	DESI TRIWANTI	20-02-2025 15:21	February 2025	Report
5	RAM-000017	Diah Paramita	14-02-2025	Tidak Lengkap	0%	AMELIA PUTRI	17-02-2025 14:27	February 2025	Report
6	RAM-000016	Azif Ramadhan	11-02-2025	Tidak Lengkap	0%	AMELIA PUTRI	14-02-2025 15:20	February 2025	Report
7	RAM-000015	Euis Komariah	09-02-2025	Lengkap	100%	DESI TRIWANTI	10-02-2025 08:57	February 2025	Report
8	RAM-000014	Rahwan Fikri	06-02-2025	Lengkap	100%	DESI TRIWANTI	10-02-2025 08:54	February 2025	Report
9	RAM-000013	Yuni Astuti	04-02-2025	Lengkap	100%	DESI TRIWANTI	07-02-2025 08:52	February 2025	Report

Figure 14. Completeness Report Page

Generated reports can be automatically produced and become neatly organized PDF report results, and these report results can be categorized according to hospital audit needs.

LAPORAN DETAIL KELENGKAPAN DOKUMEN PASIEN										
Periode: 01 Januari 2025 - 28 Februari 2025										
Ditampilkan pada: 11 Maret 2025 17:01:40										
No	No RM	Nama Pasien	Tgl Masuk	Tgl Keluar	Revisi	Dokter	Status	Perawatan	Verifikasi	Tgl Verifikasi
1	R04-00010	Wahyu Santia	15-02-2025	28-02-2025	01	dr. Rini Anant, Sp.M	Check Lengkap	100%	AMELIA PUTRI	28-02-2025 14:21
2	R04-00019	Susanto Huseinifiah	20-02-2025	24-02-2025	01	dr. Wahyu Hidayat, Sp.B	Check Lengkap	100%	AMELIA PUTRI	24-02-2025 15:22
3	R04-00018	Hendra Prasanto	17-02-2025	20-02-2025	01	dr. Rini Anant, Sp.M	Check Lengkap	100%	AMELIA PUTRI	20-02-2025 15:21
4	R04-00017	Dani Prasanto	14-02-2025	17-02-2025	01	dr. Andika Prasanto, Sp.BM	Check Lengkap	100%	AMELIA PUTRI	17-02-2025 14:30
5	R04-00016	Laili Ramadhani	11-02-2025	14-02-2025	01	dr. Wahyu Hidayat, Sp.B	Check Lengkap	100%	AMELIA PUTRI	14-02-2025 15:20
6	R04-00015	Erisa Kusumah	09-02-2025	12-02-2025	01	dr. Rini Anant, Sp.M	Check Lengkap	100%	AMELIA PUTRI	12-02-2025 08:17
7	R04-00014	Rafwan Fidi	06-02-2025	10-02-2025	01	dr. Andika Prasanto, Sp.BM	Check Lengkap	100%	AMELIA PUTRI	10-02-2025 08:34
8	R04-00013	Yoni Lantip	04-02-2025	07-02-2025	01	dr. Wahyu Hidayat, Sp.B	Check Lengkap	100%	AMELIA PUTRI	07-02-2025 08:12
9	R04-00012	Handung Santosa	03-02-2025	05-02-2025	01	dr. Rini Anant, Sp.M	Check Lengkap	100%	AMELIA PUTRI	05-02-2025 01:06
10	R04-00011	Dina Oktaviani	01-02-2025	03-02-2025	01	dr. Andika Prasanto, Sp.BM	Check Lengkap	100%	AMELIA PUTRI	03-02-2025 01:07
11	R04-00010	Laili Kusumawati	23-01-2025	27-01-2025	01	dr. Wahyu Hidayat, Sp.B	Check Lengkap	100%	AMELIA PUTRI	27-01-2025 08:47
12	R04-00009	Dani Nanda	18-01-2025	23-01-2025	01	dr. Andika Prasanto, Sp.BM	Check Lengkap	100%	AMELIA PUTRI	23-01-2025 08:33
13	R04-00008	Zulfikar Nurazman	21-01-2025	24-01-2025	02	dr. Rini Anant, Sp.M	Check Lengkap	100%	AMELIA PUTRI	24-01-2025 08:32
14	R04-00007	Taufik Hidayat	15-01-2025	18-01-2025	01	dr. Wahyu Hidayat, Sp.B	Check Lengkap	100%	AMELIA PUTRI	18-01-2025 15:12
15	R04-00006	Lili Suryani	13-01-2025	16-01-2025	01	dr. Rini Anant, Sp.M	Check Lengkap	100%	AMELIA PUTRI	16-01-2025 15:11
16	R04-00004	Nurul Hidayah	10-01-2025	11-01-2025	01	dr. Wahyu Hidayat, Sp.B	Check Lengkap	100%	AMELIA PUTRI	11-01-2025 15:09
17	R04-00003	Rafwan Kusumawati	11-01-2025	14-01-2025	02	dr. Andika Prasanto, Sp.BM	Check Lengkap	100%	AMELIA PUTRI	14-01-2025 15:10
18	R04-00002	Siti Marlina	05-01-2025	10-01-2025	01	dr. Wahyu Hidayat, Sp.B	Check Lengkap	100%	AMELIA PUTRI	10-01-2025 15:08
19	R04-00001	Dedi Husein	07-01-2025	09-01-2025	02	dr. Rini Anant, Sp.M	Check Lengkap	100%	AMELIA PUTRI	09-01-2025 15:08
20	R04-00000	Almard Fidi	03-01-2025	06-01-2025	01	dr. Andika Prasanto, Sp.BM	Check Lengkap	100%	AMELIA PUTRI	06-01-2025 15:09

Figure 15. Report Results in PDF Format

RUMAH SAKIT X				
LAPORAN STATISTIK KELENGKAPAN DOKUMEN				
Periode: 01 Januari 2025 - 28 Februari 2025				
Total Bulan Dilaporkan: 2 bulan				
Bulan	Total Pasien	Lengkap	Tidak Lengkap	Persentase
January 2025	10	10	0	100%
February 2025	10	5	5	50%

Figure 16. Report Results in PDF Format

4.1.4 System Testing

System testing was conducted using Blackbox Testing methods, focusing on examining system functionality from end-user perspectives without examining internal code structure. The objective is to ensure that each main feature works as expected. Testing began with the login feature, which is the main gateway for user access to the system. Users were tested with various scenarios such as entering valid, incorrect, and empty login data. Subsequently, testing was performed on data entry forms. The system was tested from input completeness, data format validation, to its ability to provide automatic warnings when data is incomplete [28][29].

Table 1. Blackbox Testing System Results

Tested Feature	Test Scenario	Input Provided	Result	Remarks
Login (Authentication)	User enters valid username & password	Username: admin02, Password: admin123	Valid	As expected
Login	User enters incorrect username	Username: wronguser, Password: admin123	Valid	Login validation works
Dashboard Access	User successfully logs in as admin	Role: medical records admin	Valid	Access rights match role
Dashboard Access	User successfully logs in as physician	Role: physician	Valid	Access rights match role
Form Completion	All fields filled completely and correctly	Complete patient data + medical procedure	Valid	Input process successful
Form Completion	Mandatory field (e.g., diagnosis) not filled	Diagnosis field: empty	Valid	Real-time validation works
Form Completion	Data format incorrect (e.g., numbers in text field)	Diagnosis: 1234	Valid	Character format validation needed
Auto-alert Notification	User presses 'Save' button when mandatory field empty	Execution time field empty	Valid	Error notification displays automatically
Medical Procedure Dropdown	User selects medical procedure from dropdown	Dropdown: 'Antibiotic Administration'	Valid	Dynamic dropdown functions
Summary Report Display	User accesses completeness report page	Navigate to Completeness Report page	Valid	Ensures summary report visible
Generate PDF Report	User clicks button to generate report in PDF format	Click Export PDF or Print Report button	Valid	Ensures PDF report generation function works
PDF Report Content	User opens generated PDF report file	Open downloaded PDF file	Valid	Ensures data integrity and format in PDF report
Logout	User clicks logout button	Click 'Logout'	Valid	Session closed properly

4.2 Discussion

The Medical Action Consent Form Completeness Information System developed using the Rapid Application Development method successfully addresses critical documentation challenges identified in the

existing paper-based system. The RAD methodology proved appropriate for this healthcare context, enabling rapid iterative development with continuous stakeholder involvement from physicians, nurses, and medical records officers, ensuring alignment with actual clinical workflows [12][16]. The implementation of real-time validation mechanisms with color-coded visual feedback effectively prevents incomplete data entry, directly addressing the data completeness issues prevalent in the previous system [24][25]. This automated validation approach reduces human error and ensures all mandatory fields are completed before data submission, thereby improving documentation quality and legal compliance [14]. The role-based authentication system successfully differentiates access rights between medical personnel and administrators, enhancing system security and workflow management consistent with healthcare information system requirements [23].

The transition from semi-digital paper-based documentation to a fully electronic system mitigates risks associated with document loss, damage, and lack of backup, while providing organized digital archiving [9][11]. The PDF report generation feature with customizable filtering options addresses hospital audit needs and administrative reporting requirements, supporting healthcare quality assurance processes [26][27]. The modular system architecture facilitates future maintenance and scalability, essential for long-term healthcare information system sustainability [18][21]. Blackbox testing results confirmed that all main system features function as expected, with stable performance meeting user expectations [28][29]. However, enhanced character format validation in certain input fields remains necessary to further strengthen data integrity. Overall, this system successfully transforms medical consent documentation processes into a validated and auditable information system, reducing legal, administrative, and patient safety risks associated with incomplete medical documentation [13][15]. The system demonstrates that technology-based solutions can significantly improve efficiency and accuracy of health services when properly designed and implemented [19].

5. Conclusion

The Medical Action Consent Form Completeness Information System was built following the Rapid Application Development method to resolve urgent documentation issues in the current process. An iterative model with active user involvement resulted in a feasible system design that meets real hospital requirements. The proposed system improves efficiency, accuracy, and completeness of data in medical action consent form filling. User-centered design plus automatic validation mechanisms are based on achieving these goals. Automatic validation features and notifications about incomplete entries reduce the number of empty forms, input mistakes, and delays in documentation effectively. Blackbox testing results prove that all functions of the system work well and as expected by users. The shift from paper to electronic documentation gives hospitals a dependable tool for overseeing medical consent records. Real-time validation stops incomplete submissions while role-based access control guarantees suitable security levels. PDF report generation with adjustable filters meets audit needs and supports administrative reporting demands. The modular structure permits future maintenance plus system growth as hospital needs change. Hospitals should adopt digital consent management systems to enhance data integrity and workflow efficiency moving forward. RAD methodology was successfully implemented in healthcare settings proving that when rapidly developed approaches are correctly aligned with clinical workflows and staff input they can deliver functional solutions.

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