Jurnal Teknologi Informasi dan Pendidikan
Volume 19, No. 1, March 2026
https://doi.org/10.24036/jtip.v19i1.1096

P.ISSN: 2086 – 4981
E.ISSN: 2620 – 6390
tip.ppj.unp.ac.id

Workflow Automation in Digital Medication Reminder Systems to Enhance Patient Adherence

Salsabila Intania Bestari[1*]✉, Syafrijon[1], Randi Proska Sandra[1], Ahmaddul Hadi[1]
[1]Faculty of Engineering, Universitas Negeri Padang, Padang, Indonesia
**Corresponding Author: salsabilabestari09@gmail.com*

Article Information

Article history:

No. 1096
Rec. January 05, 2026
Rev. February 24, 2026
Acc. February 28, 2026
Pub. March 07, 2026
Page. 132 – 149

Keywords:

- *Workflow automation*
- *AI agent*
- *N8N*
- *Medication reminder systems*
- *Pharmacotheraphy*

ABSTRACT

Pharmacotherapy is a form of treatment that utilizes pharmaceutical products as a medium for healing. The effectiveness of this therapy largely depends on patient adherence and consistency in taking medication as prescribed by physicians. Unfortunately, in practice, many cases of non-adherence occur, leading to medication errors and reduced treatment outcomes. This study proposes a solution by employing workflow automation technology combined with several API integrations, such as WhatsApp API and Google Calendar API, to provide a broader and more accessible user experience. The proposed system is a web-based platform connected to n8n, a workflow automation tool that supports integration with third-party applications like WhatsApp and Google Calendar. First-party users, such as doctors and hospital operators, can input patients' medication schedules into the system. The system then sends reminders and confirmations to second-party users (patients) via WhatsApp, while also synchronizing schedules through Google Calendar. WhatsApp was selected due to its popularity and accessibility in Indonesia, while Google Calendar was chosen as one of the most widely used calendar applications worldwide. This research is expected to contribute to pharmacotherapy support by providing a simple yet practical technological approach to improve medication adherence.

How to Cite:

Bestari, S. I., & et al (2025). Workflow Automation in Digital Medication Reminder Systems to Enhance Patient Adherence. Jurnal Teknologi Informasi Dan Pendidikan, 19(1), 132-149. https://doi.org/10.24036/jtip.v19i1.1096

This open-access article is distributed under the Creative Commons Attribution-ShareAlike 4.0 International License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. ©2023 by Jurnal Teknologi Informasi dan Pendidikan.

1. INTRODUCTION

Pharmacotherapy is a therapeutic approach that employs pharmaceutical products or drugs to treat specific health conditions. This therapy, also referred to as pharmacological or drug therapy, plays an essential role in alleviating symptoms, addressing underlying diseases, and preventing the occurrence of other illnesses (prophylaxis). In medical practice, pharmacotherapy holds a crucial position in managing both acute and chronic diseases, ensuring that patients can achieve optimal health outcomes [1] . Physicians typically prescribe medications with carefully adjusted dosages per day, and the effectiveness of these treatments strongly relies on the patient's adherence to the prescribed schedule. A common example can be seen in the use of antibiotics, which must be taken regularly to maximize effectiveness. Irregular use may lead to drug resistance, where bacteria no longer respond to treatment.

For individuals suffering from chronic illnesses such as diabetes, hypertension, or heart disease, adherence to prescribed medication is not only intended to reduce symptoms but also to maintain health stability over the long term. Patients with chronic diseases usually require continuous therapy and regular medical supervision, such as monthly check-ups, to avoid complications or worsening conditions. However, adherence remains a persistent challenge. Many patients fail to follow their medication regimens consistently due to busy lifestyles, aging-related factors, or memory limitations. These lapses lead to treatments that are less effective, with some patients experiencing relapse or deterioration in their condition. Such cases highlight the pressing challenge within healthcare systems, particularly among elderly populations and patients with reduced mobility.

The seriousness of this issue is reflected in several empirical studies. For example, research conducted by Nisak (e.g. in [2]) on hypertensive patients at an elderly health post in Gudang Village, Situbondo, revealed that 67.7% (65 patients) demonstrated low medication adherence, 10.4% (10 patients) showed moderate adherence, and only 21.9% (21 patients) reported high adherence. A similar study by Wagiyanti *et al.* (e.g in [3]) on elderly patients in Bandardawung Village, Karanganyar, produced comparable findings, with 40.8% classified as having low adherence, 32.7% moderate adherence, and 26.5% high adherence. These results confirm that low adherence rates are a recurring pattern across different patient groups and locations, emphasizing the urgent need for innovative strategies to improve adherence and thereby enhance long-term treatment effectiveness.

Alongside these challenges, technological advancements present significant opportunities to support healthcare practices. The rapid digital transformation has driven various organizations to adopt Artificial Intelligence (AI) technology to enhance productivity and operational efficiency [4]. The development of AI technology has revolutionized various aspects of human life, including the medical field. AI refers to computer systems capable of performing tasks that typically require human intelligence, such as learning, reasoning, pattern recognition, and decision-making .

One increasingly prominent application of AI is the AI Agent, an artificial intelligence-based system capable of acting autonomously or semi-autonomously in completing specific tasks. AI Agents encompass various forms such as chatbots, Robotic Process Automation (RPA), adaptive multi-agent systems, and machine learning-based agents designed to support decision-making and work process automation[4]. RPA itself uses automation technology to imitate business tasks performed by humans, while Digital Automation Platforms enable developers to connect various applications and automate workflows efficiently[6].

Workflow management systems, as a relatively new technology, are designed to make work more efficient, integrate heterogeneous application systems, and support inter-organizational processes in e-commerce applications[7]. Workflow Automation Tools (WATs) offer tremendous advantages in orchestrating tasks and services. Although workflow composition in WATs is offered in a low-code format, unsupervised and autonomous execution of tasks and transactions between various software systems can be performed even if these systems are completely unrelated. However, since workflows orchestrate external systems, building and optimizing workflows can be a difficult and time-consuming task, particularly because there is no guarantee that execution will not fail or that unexpected problems will arise during the evolution of the orchestrated systems[6]. Nevertheless, Workflow Automation offers substantial benefits, such as increased productivity, reduced error rates, and better resource allocation for more strategic activities[7].

In designing a workflow, it is necessary to outline the task components along with the entities that execute them in order to manage and coordinate their execution. Tasks within a workflow are executed automatically by the system, although under certain conditions they can be performed manually. The main characteristics of modern workflow systems include high scalability thanks to cloud-native architecture, extensive integration capabilities in hybrid and multi-cloud environments, and enhanced automation intelligence through technologies such as RPA, AI, and ML. These capabilities enable the system to automatically execute cognitive tasks and predictive analytics.

One of the widely used open-source platforms for implementing Workflow Automation is n8n, an open-source and fair-code workflow automation platform that allows users to design automation processes without writing code from scratch. The platform supports more than 200 application integrations and provides a visual interface for assembling work processes in a modular fashion. The strength of n8n lies in its flexibility in handling data from various sources and executing complex processes on a scheduled or real-time basis[8]. As an open-source workflow automation tool, n8n offers extensive integration flexibility and can be run in a self-hosted manner, giving users full control over the data being processed. Previous research has shown that the implementation of n8n-based automation technology can reduce error rates by more than 90% and increase data processing speed by up to 89%[9].

P.ISSN: 2086 – 4981
E.ISSN: 2620 – 6390
tip.ppj.unp.ac.id

Within the scope of this research, n8n is used in combination with the AI Agent framework to develop an automated medication reminder system. The system is designed to integrate with Google Calendar as a scheduling tool and WhatsApp as a communication channel, both of which are commonly used by patients. Through this integration, patients are expected to receive timely and routine reminders to take their medications according to prescribed schedules. This approach demonstrates the potential of combining workflow automation with AI technology to provide a simple yet practical solution that directly addresses the problem of low medication adherence.

2. RESEARCH METHOD

2.1 Research Stages

This study focuses on the development of a medication reminder system by optimizing the use of n8n as a workflow platform that integrates various APIs. The Agile methodology was employed, as it emphasizes intensive teamwork through iterative and incremental development, enabling the creation of high-quality software efficiently in terms of both cost and time. Agile methodology has become a primary focus of software research since the agile manifesto was announced in 2001, with a study by Dingsøyr et al. (2012)[10] demonstrating significant evolution in conceptual structure and a drive toward theory-based approaches in this field. This approach emphasizes collaborative, iterative, and responsive values toward changing requirements, which fundamentally distinguishes agile from the traditional waterfall model. A case study by Azanha et al. (2017)[11] revealed increased team motivation, staff satisfaction, better requirements control, and higher system quality, as well as a 75% reduction in development time compared to traditional methods. Within the Agile approach, the Dynamic Systems Development Method (DSDM) was applied due to its suitability for developing integrated systems. DSDM, first introduced in the United Kingdom in 1994, is a framework that accelerates software development by prioritizing iterative and incremental processes with a strong emphasis on software quality[12].

The system developed in this research functions as an automatic medication reminder that operates when the scheduled time to take medication arrives. The workflow automation requires logical flows that can be tested and refined quickly. By using the DSDM model, the system was tested from the early stages, including message delivery and scheduling functions, enabling iterative identification and correction of errors as well as continuous adjustment to user needs.

Jurnal Teknologi Informasi dan Pendidikan
Volume 19, No. 1, March 2026
https://doi.org/10.24036/jtip.v19i1.1096

2.2 System Design

2.2.1 Use Case Diagram

Diagrams are essential tools in software engineering for visualizing various aspects of a system. Use case diagrams illustrate interactions between external actors and the system through a series of use cases that represent core functionality[13].

The Use Case Diagram explains what the system should do, without going into technical details such as data structures, algorithms, and other implementations—which will be explained by other diagrams such as class diagrams or interaction diagrams. In addition, this diagram also shows who the users (actors) of the system are and what functions they use, namely who will interact directly with the system being built[14].

Users, also referred to as actors, play the role of the main actors who use the application. There are three types of users in this application: operators, who act as the main administrators of the application and can input doctor data, patient data, and patient medication schedules; doctors, who can only input patient medication schedules; and patients, who receive schedules as previously inputted by operators or doctors. For further clarification, the Use Case Diagram for this application can be seen in Figure 1 below:

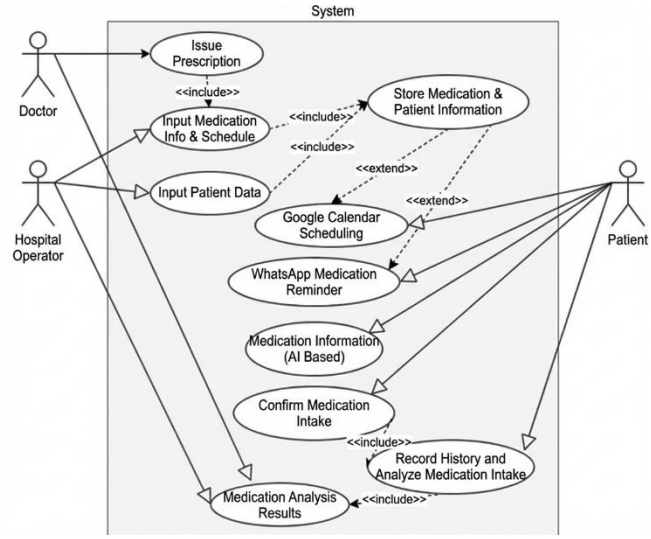


Figure 1. Use Case Diagram of Medication Reminder System

2.2.2 Activity Diagram

The Activity Diagram is a UML diagram that focuses on the flow of activities of a single process[15]. By separating the actors and focusing on a single actor, the activity diagram can describe the sequence of processes in more detail.

P.ISSN: 2086 – 4981
E.ISSN: 2620 – 6390
tip.ppj.unp.ac.id

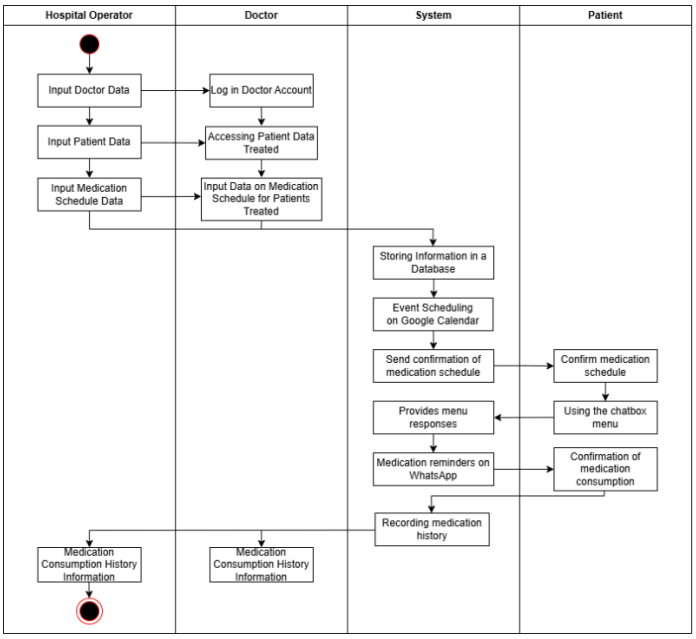


Figure 2. Activity Diagram of Medication Reminder System

In this study, activity diagrams were used to describe the user process in using the developed system. Figure 2 above explains the sequence of the system starting from the system operator as the highest authority who can input, edit, and delete any data from the system. Next, the operator and doctor can input the medication schedule and obtain data records of patient medication consumption that have been recorded based on patient confirmation of the predetermined medication schedule.

2.2.3 Flowchart

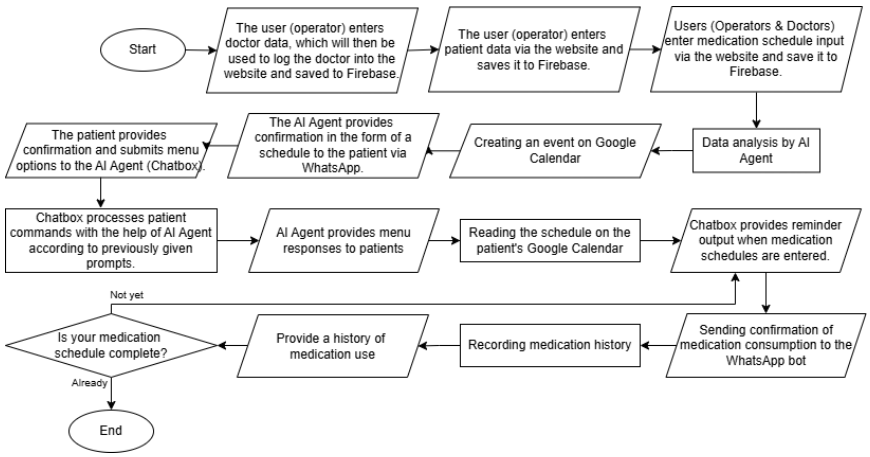


Figure 3. Flowchart of Medication Reminder System

Jurnal Teknologi Informasi dan Pendidikan
Volume 19, No. 1, March 2026
https://doi.org/10.24036/jtip.v19i1.1096

A Flowchart is a diagram that describes the workflow of a system as a whole. This diagram explains the sequence of steps or procedures that occur within the system, and shows what processes are carried out in the system[16].

The flowchart in Figure 3 describes the process that occurs in the system. It begins with the operator entering doctor data on the website so that the doctor can monitor the patients under their responsibility. Next, the operator and doctor can input the patients medication schedules, which will then be entered into a collection in the Firestore database. The data will be processed by the AI Agent to generate confirmation of schedules and medication scheduling in Google Calendar. At each scheduled medication time, WhatsApp will send a reminder message and a request for confirmation regarding whether the medication has been taken.

2.2.4 Database Diagram

Database diagrams function as visual representations that illustrate relationships between tables in a database system. By displaying primary key–foreign key connections, diagrams facilitate data design, maintenance, and integration[17]. These diagrams help ensure structural consistency by visualizing referential integrity rules and dependencies between entities. The visualization of table relationships also supports audit trails and reproducibility by enabling the tracking of schema changes over time. Therefore, database diagrams not only facilitate understanding of data architecture but also enhance the efficiency of information system development and scientific collaboration. Figure 4 explains the overall database requirements of the system, both entity requirements and the relationships between primary keys and foreign keys.



Figure 4. Database Diagram of Medication Reminder System

P.ISSN: 2086 – 4981
E.ISSN: 2620 – 6390
tip.ppj.unp.ac.id

2.3 System Testing

The research conducted employed Integration Testing as the testing method. The reason is that each API is integrated and affects the performance of the other APIs. Similarly, the AI Agent is integrated with other nodes. If an error occurs in one of the integrated nodes or APIs, the entire system process is also affected. Integration Testing is both a type and a stage in the software testing process. Since integration is defined as a set of interactions, all designed interactions between components need to be thoroughly tested. The system architecture and design can provide information about the internal interactions between parts of a system. However, to test the interaction between one system and another, a deeper understanding of how the two systems work together is required[18].

Among the three general approaches in integration testing, the researcher used the Top-Down method because the system relies heavily on user input. The tool used for testing is the n8n platform directly, since n8n provides an execution log that can run each node either separately or entirely at once.

3. RESULTS AND DISCUSSION

3.1 System Implementation

In the development process, the system is divided into two forms, namely a simple website as user input (doctor and operator) and also the n8n workflow which processes each input into outputs in the form of scheduling on Google Calendar and WhatsApp. Both play an important role and influence each other so that the medication reminder system runs optimally. The website input data entered by the user will be stored in the Firestore database as the database used. Later, the workflow will use the Firebase node to call each data collection in the available Firestore database. The system is considered successful if the website and workflow work properly and can perform the intended functions

3.1.1 Workflow Configuration with n8n

N8n, as a platform for building workflows, plays an important role in creating the WhatsApp chatbot system and automatic scheduling on Google Calendar, both of which are integrated with each other. The developed medication reminder system has three workflows that collaborate to perform tasks effectively. Each workflow has different inputs and tasks. Each workflow is described as follows:

3.1.1.1 Workflow 1 – Send Confirmation

Figure 5 illustrates the workflow responsible for receiving each input in the form of data additions (Create) to the medication_schedules collection sent via webhook triggers. The trigger for workflow 1 is a change in data that occurs when users (doctors and

Volume 19, No. 1, March 2026
https://doi.org/10.24036/jtip.v19i1.1096

operators) input medication schedules for patients. The website backend will send the data changes to webhook 1, then webhook 1 will start collecting all patient-related data and forward it as input to the AI Agent. The AI Agent has an AI Model, for which the author uses Gemini AI, specifically the gemini 2.5 pro model as the processing brain for every process in the AI Agent. The AI Agent will then create a schedule on Google Calendar and send a confirmation message to the patient.

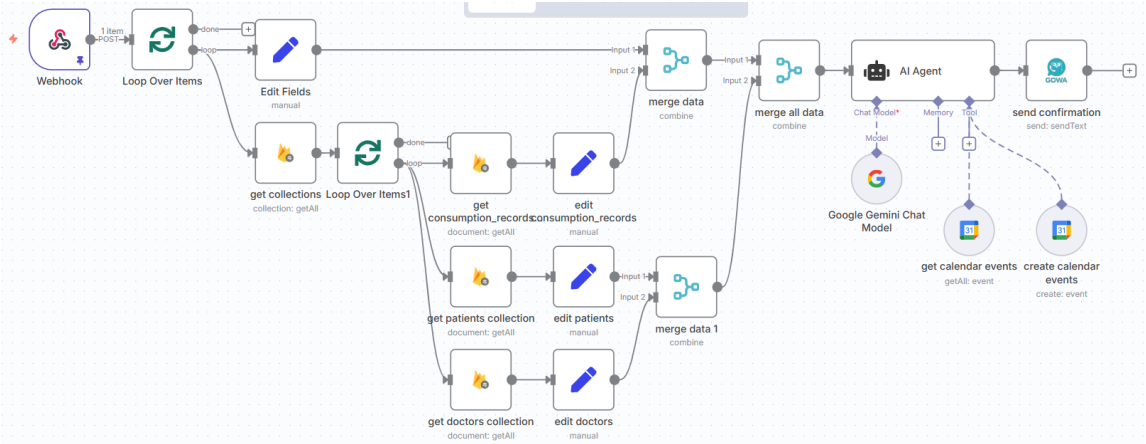


Figure 5. Workflow 1 - Send Confirmation

3.1.1.2 Workflow 2 – Patient Integration with Chatbox

Figure 6 explains workflow 2, which is responsible for handling every interaction between users (patients) and the chatbox. Workflow 2 is activated when the system receives a message from a patient. Incoming messages are processed by collecting relevant patient data, then classified into three categories: menu messages, confirmation messages, and questions referring to the /ask menu.

Menu messages are forwarded to the AI Agent for processing, and the system then sends a reply to the patient in the form of a chatbot. Meanwhile, confirmation messages are also processed by the AI Agent using the Gemini 2.5 Pro model, where the received data is recorded as a status update in the consumtion_record collection as part of medication compliance tracking.

P.ISSN: 2086 – 4981
E.ISSN: 2620 – 6390
tip.ppj.unp.ac.id

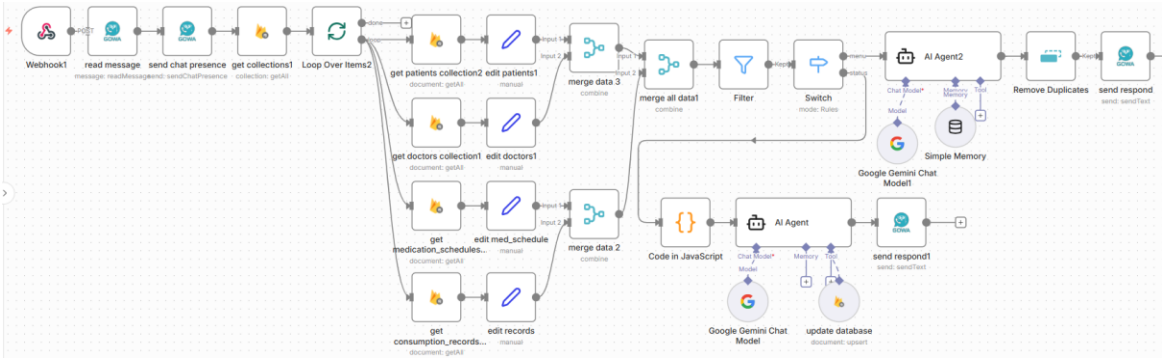


Figure 6. Workflow 2 – Patient Integration with Chatbox

3.1.1.3 Workflow 3 – Send Reminder

Workflow 3 in Figure 7 is a workflow that runs periodically and undergoes continuous updates. In this workflow, the schedule trigger checks the schedule data stored in Firestore every 5 minutes. If a matching schedule is found, the trigger will be activated to collect the relevant patient data.

Next, the AI Agent processes the data to compose medication reminder messages, then sends them to patients as reminder notifications according to the predetermined schedule.

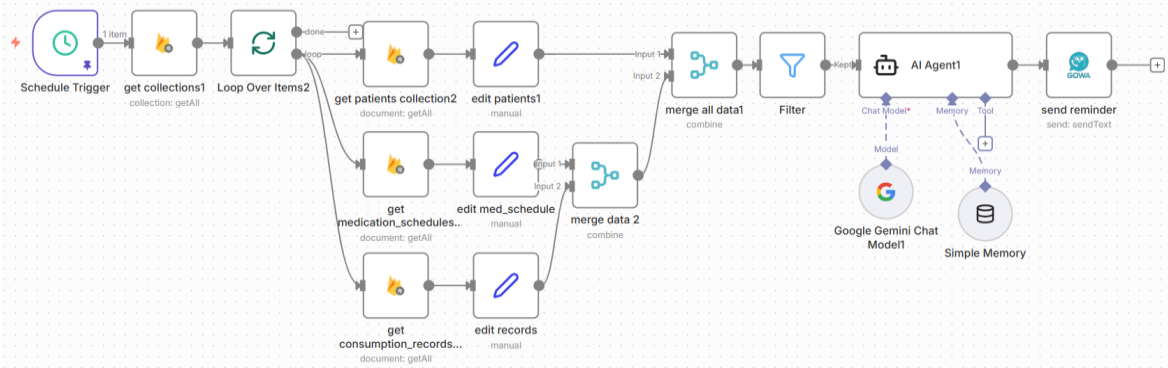


Figure 7. Workflow 3 – Send Reminder

3.1.2 Web-Base Interface Development

This website was built using the React framework—a JavaScript library commonly used to build dynamic and interactive website interfaces. The resulting website has different interfaces for each user role. If the user role is an operator, the navigation menu contains five options (Dashboard, Patient Management, Medication & Schedule, Consumption Records, and Doctor Management). This is because operators have the authority to manage and add doctor data as needed. In addition, operators can add and manage patient data, while doctors can only view patient data added by operators.

Volume 19, No. 1, March 2026
https://doi.org/10.24036/jtip.v19i1.1096

Doctor users have only four options (Dashboard, Patient Data, Medication & Schedule, and Consumption Records). Doctors have almost all operator menus except for doctor management. Although doctors have limited access, they can still manage and add medication schedules for patients under their care. Thus, doctors can work compatibly according to their function.

The system starts with the Login page. Figure 8 shows the Login Page where users enter their registered email address and password to access the platform, or select "Register Now" to create a new account.

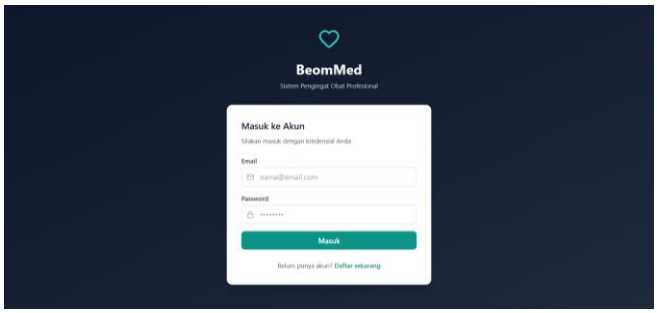


Figure 8. Log In Page

Figure 9 shows the Registration page, where users are required to provide information such as their full name, email address, user role, and password. This data is stored in Firebase and used for verification during login.

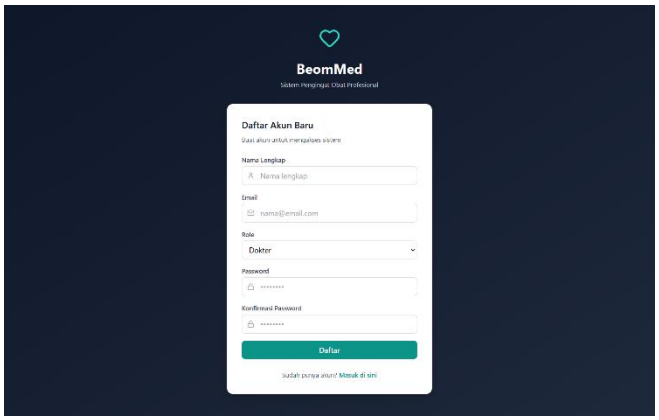


Figure 9. Register Page

Once logged in, users are directed to the Dashboard shown in Figure 10, which displays data summaries such as total patients, medications, active schedules, daily consumption, adherence levels, and trends over the past six months. Operators and doctors have different privileges—operators can access and manage all patient data, while doctors can only view data related to their assigned patients.

P.ISSN: 2086 – 4981
E.ISSN: 2620 – 6390
tip.ppj.unp.ac.id

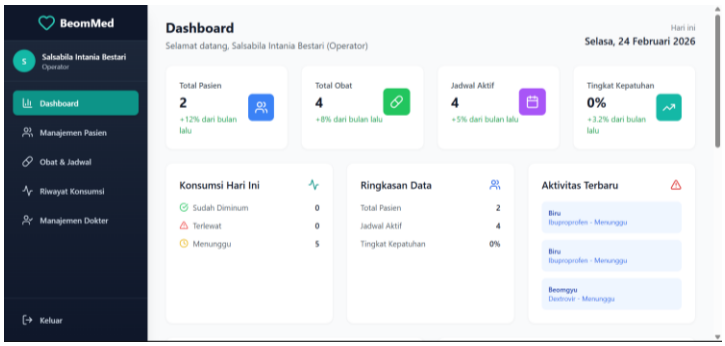


Figure 10. Dashboard Page

The Patient Management section in Figure 11 allows users to view patient data, including personal details, contact information, medical conditions, and allergies. Operators have the additional ability to add new patients through a form, and the data is stored in the Firestore database under the patients collection.

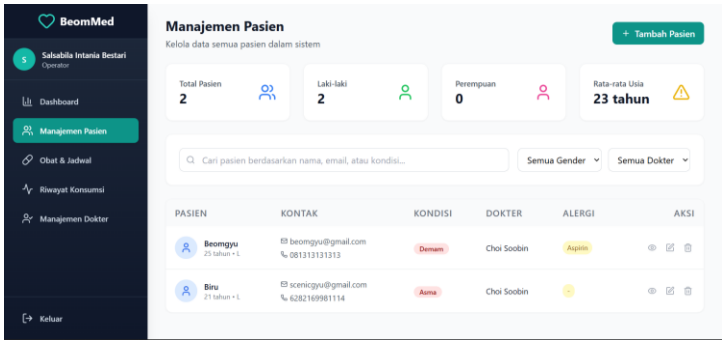


Figure 11. Patient Management

Meanwhile, the Medication & Schedule section in Figure 12 provides access to each patient's active medication schedules. Both operators and doctors can add or manage medication schedules, though operators can do so for all patients. Each schedule entry includes details such as medication name, dosage, frequency, start and end dates, consumption times, and usage instructions, which are stored in the medication_schedules collection.

Jurnal Teknologi Informasi dan Pendidikan
Volume 19, No. 1, March 2026
https://doi.org/10.24036/jtip.v19i1.1096

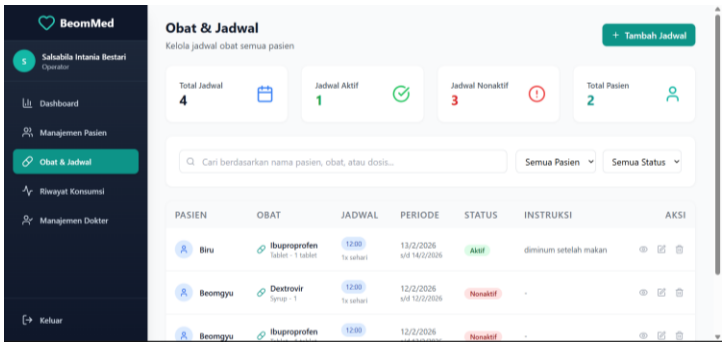


Figure 12. Medication & Schedule Page

Figure 13 explains The Consumption Records section displays patients' medication intake history retrieved from the consumption_records collection. Initially, the "actual time" column is empty with a "Pending" status, which updates when patients confirm medication intake through WhatsApp reminders. The system then classifies responses as "Taken," "Late," or "Missed," influencing each patient's adherence level.

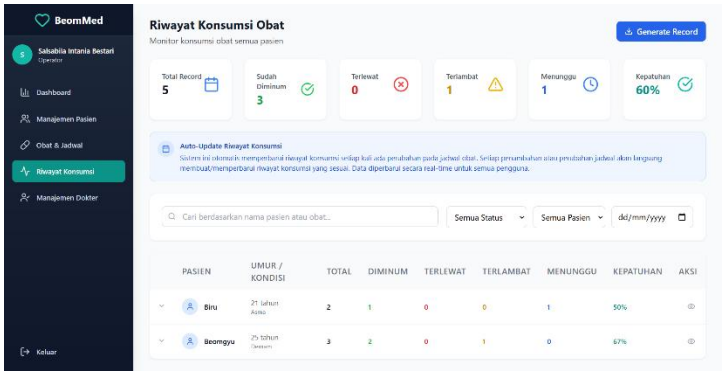


Figure 13. Consumption Records Page

Finally, operators have exclusive access to the Doctor Management section attached to Figure 14, which allows them to add, edit, or delete doctor data such as name, contact information, specialization, practice license, affiliated hospital, and experience. All information is stored in the doctors collection within Firestore.

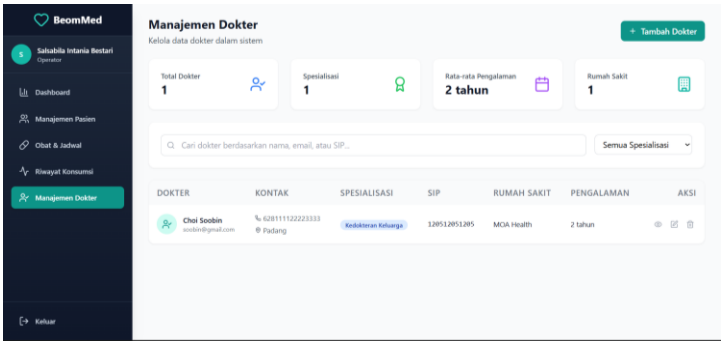


Figure 14. Doctor Management Page

P.ISSN: 2086 – 4981
E.ISSN: 2620 – 6390
tip.ppj.unp.ac.id

3.2 System Testing

3.2.1 Workflow Automation Testing

Workflow serves as one of the main components that play a crucial role in the developed medication reminder system, ensuring that every trigger and node configured beforehand operates and integrates properly. The chosen testing method is Top-Down Integration Testing, where testing is performed progressively from the top to the bottom, following the system's control flow. This approach is suitable because each node in the workflow is interdependent—if one node fails, the entire process halts. Although the system consists of several workflows with different operational paths, each runs independently yet in parallel: Workflow 1 manages schedule creation and confirmation, Workflow 2 handles patient responses via WhatsApp, and Workflow 3 sends reminders based on Google Calendar schedules.

The chatbox functions as an interactive communication medium between the system and patients, offering several response options to assist with medication management. When patients type /menu, the chatbox displays available commands such as /schedule, /records, /analysis, /info, /ask, and /help, as shown in Figure 15.

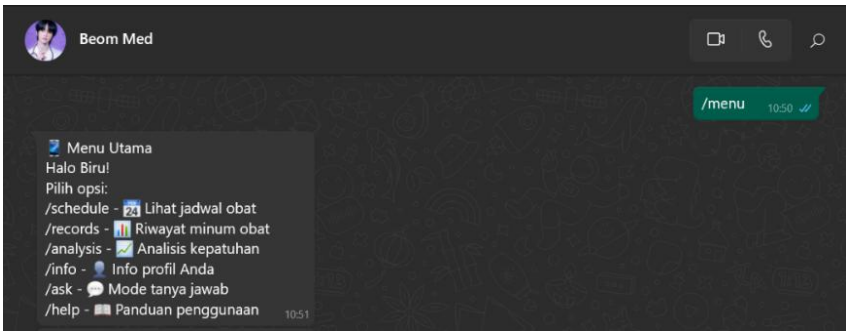


Figure 15. Chatbox Menu Display

Through /schedule, patients can view details about their prescribed medication, including drug name, dosage, schedule, usage instructions, and attending doctor. The /records command allows patients to review their medication history and confirm intake, which is automatically recorded in the consumption_records collection. The /analysis feature provides an overview of the patient's adherence level based on previous data, while /info displays personal health details such as medical conditions, allergies, and emergency contacts. Using /ask, patients can inquire about topics like side effects, food interactions, or symptoms, and the system responds with relevant medical information and doctor contact details. Finally, /help provides guidance on how to use the system, including confirmation steps, quick commands, and how to report issues such as adverse reactions.

3.2.2 Website and API Functionaluty Testing

Backend website testing was carried out using Postman, similar to the testing process on the WhatsApp REST API previously. By utilizing environment variables and collection variables, Postman can provide detailed information regarding the success rate of the API execution integrated into the website.

Out of a total of 75 test subjects executed, all succeeded with a 100% success rate, which means no failures were found in the testing process. This indicates that every function in the backend system can run as expected.

The testing lasted for 4 seconds and 570 milliseconds, with an average response time of 118 milliseconds. The endpoints with the fastest response times were Get Patient by ID and Query Patients by Doctor, each with a duration of 40 milliseconds. Meanwhile, the endpoint with the longest response time was Sign Up, namely 764 milliseconds. However, this time is still considered reasonable because the registration process requires additional execution.

The main technologies used in backend development include Firebase Authentication for user authentication, Firestore Database as a medium for data storage and management, and Google Cloud Platform to support Firebase infrastructure, including the use of an API key.

In the testing of each endpoint, the user authentication category produced response times ranging from 50 to 764 milliseconds, with Sign In at 289 milliseconds and Get User Info at 261 milliseconds. For patient management, the response times ranged between 40 and 65 milliseconds, where Get All Patients required 52 milliseconds and Update Patient Document required 65 milliseconds. In doctor management, the response times recorded were 58 milliseconds for Create Doctor Document and 68 milliseconds for Get All Doctors.

Meanwhile, medication schedule management showed consistent response times, namely 51 milliseconds for both Create and Get All Medication Schedules. In managing medication consumption records, the times obtained were 42 milliseconds for Get All Consumption Records, 55 milliseconds for Update Consumption Record Status, and 63 milliseconds for Create Consumption Record. Lastly, for advanced queries, the response times ranged between 40 and 54 milliseconds, with Query Patients by Doctor being the fastest (40 milliseconds) and Query Consumption Records by Status requiring 54 milliseconds. Overall, these results prove that the backend implementation is capable of delivering optimal performance with a full success rate in every test.

3.3 Discussion

Several previous studies are relevant to this research, both in terms of technological utilization and the objectives to be achieved. The study by Gifary, Renaldi, and Santikarama [19] developed a cloud-based medication reminder system integrating WhatsApp, email,

P.ISSN: 2086 – 4981
E.ISSN: 2620 – 6390
tip.ppj.unp.ac.id

and mobile notifications through a Node.js backend and a MongoDB database. The results demonstrated the effectiveness of synchronized notifications in supporting patient compliance, although slight delays occurred at a certain user scale. The similarity with this research lies in the use of the WhatsApp API for medication reminders, while the difference lies in the choice of technology, where the previous study employed cloud-based job scheduling, whereas this study utilizes the workflow automation platform n8n integrated with an AI Agent.

Another study by Ramadhani et al. [8] designed an automated chatbot leveraging n8n and AI technology for interaction analysis and independent reporting. The similarity with this research is seen in the use of n8n and the concept of workflow automation, but the purpose differs: that study focused on data processing and automated reporting, whereas this research emphasizes medication reminders integrated with WhatsApp and Google Calendar. Meanwhile, Putra [20] developed an AI-based WhatsApp bot for non-profit organizations using the Kelompok.id platform, which proved efficient in supporting communication and membership management. The similarity lies in the utilization of n8n, artificial intelligence, and WhatsApp integration, but the focus differs, as Putra's research targeted non-profit organizations, while this research focuses on the healthcare domain through a medication reminder system.

4. CONCLUSION

This research successfully developed an automatic medication reminder system with an interactive web-based interface and a chatbox feature. The system was designed to be practical, enabling operators and doctors to input medication schedules directly, while patients received automated scheduling through Google Calendar and reminder notifications via WhatsApp. Testing, both through direct use of the website and execution of the entire workflow on n8n, confirmed that the system functioned as intended. Each connected node operated according to its role, ensuring that subsequent nodes were executed based on the results of the previous ones. These findings demonstrate that the application of workflow automation, supported by AI Agents and API node integration, was effectively implemented in building an automatic medication reminder system.

For future development, the system can be enhanced by adding a patient role on the website, allowing patients to monitor their medication history and view adherence analysis in graphical and tabular formats. The chatbox feature could also be expanded with additional interactive menus to further engage patients in timely medication consumption. Such improvements are expected to help minimize issues related to low medication adherence and medication errors, thereby strengthening the system's contribution to supporting pharmacotherapy.

REFERENCES

[1] J. Susilo and I. Kurniawati, *Buku Ajar Farmakologi*. Yogyakarta: Penerbit Kbm Indonesia, 2024.
[2] K. Nisak, "Tingkat Kepatuhan Minum Obat pada Pasien Hipertensi Anggota Posyandu Lansia di Desa Gudang Kabupaten Situbando," 2022. [Online]. Available: http://repository.stikesdrsoebandi.ac.id/id/eprint/586
[3] Wagiyanti, N. R. Faizah, and A. W. Utami, "Tingkat Kepatuhan Minum Obat pada Pasien Hipertensi Anggota Posyandu Lansia Bina Bahagia di Desa Bandardawung Kecamatan Tawangmangu Kabupaten Karanganyar," *J. Kesehat. Tujuh Belas*, vol. 5, no. 2, pp. 316–322, 2024.
[4] M. T. Robani, F. R. Aderiyana, N. S. Manahan, M. P. Wilantara, Fathoni, and A. Ibrahim, "Analisis Literatur Mengenai Peran AI Agent dalam Efisiensi Automasi Digital," *JOISIE (Journal Inf. Syst. Informatics Eng.*, vol. 9, no. 1, pp. 77–90, 2025, doi: 10.35145/joisie.v9i1.4964.
[5] L. D. A. Saputri, "Perkembangan Artificial Intelligence (AI) sebagai Alat Diagnostik, Monitoring, dan Pencegahan yang Efisien dalam Bidang Dermatologi, Venerologi, dan Kedokteran Estetika" *J. Multiling.*, vol. 5, no. 1, pp. 539–550, 2025.
[6] A. Tuyishime, F. Basciani, A. Di Salle, J. L. Cánovas Izquierdo, and L. Iovino, "Streamlining Workflow Automation with a Model-Based Assistant," *2024 50th Euromicro Conf. Softw. Eng. Adv. Appl.*, pp. 180–187, 2024.
[7] E. A. Stohr and J. L. Zhao, "Workflow Automation: Overview and Research Issues," *Inf. Syst. Front.*, vol. 3, pp. 281–296, 2001.
[8] A. Ramadhani, M. D. Yantoro, M. F. Akmal, M. Mahfud, and Fauzi, "Chatbox Otomatis dengan n8n dan AI untuk Analisis Data dan Pelaporan Hasil," *J. Ris. Tek. Komput.*, vol. 2, no. 2, pp. 18–23, 2025, doi: 10.69714/x1p94182.
[9] R. D. Wicaksono and D. U. Soraya, "Cloud-Based Digital Invoice Automation Improves Accuracy and Efficiency for Small and Medium Enterprises," *Indones. J. Innov. Stud.*, vol. 27, no. 1, pp. 6–16, 2025.
[10] T. Dingsøyr, S. Nerur, V. Balijepally, and N. B. Moe, "A decade of agile methodologies: Towards explaining agile software development," *J. Syst. Softw.*, vol. 85, no. 6, pp. 1213–1221, 2012.
[11] A. Azanha, A. R. T. T. A. J. B. de C. J. Antoniolli, and P. Domingos, "Agile project management with Scrum: A case study of a Brazilian pharmaceutical company IT project," *Int. J. Manag. Proj. Bus.*, vol. 10, no. 1, pp. 121–142, 2017.
[12] Q. A'yun, A. S. Lestari, N. A. Hernadi, and H. Hernadianto, *Manajemen Penjaminan Mutu Perguruan Tinggi*. Bandung: Penerbit Widina Media Utama, 2025. [Online]. Available: https://repository.penerbitwidina.com/publications/591010/manajemen-penjaminan-mutu-perguruan-tinggi
[13] T. A. Kurniawan, "Pemodelan Use Case (UML): Evaluasi Terhadap beberapa Kesalahan dalam Praktik," *J. Teknol. Inf. dan Ilmu Komput.*, vol. 5, no. 1, pp. 77–86, 2018.
[14] M. Seidl, M. Scholz, C. Huemer, and G. Kappel, *UML @ Classroom: An Introduction to Object-Oriented Modeling*. Springer, 2015.
[15] S. Mulyani, *Metode Analisis dan Perancangan Sistem*. Bandung: Abdi Sistematika, 2017.
[16] Kusrini and A. Koniyo, *Tuntunan Praktis Membangun Sistem Informasi Akuntansi dengan Visual Basic dan Microsoft Sql Server+cd*. Yogyakarta: Penerbit ANDI, 2007.
[17] T. Carver *et al.*, "Artemis and ACT: viewing, annotating and comparing sequences stored in a relational database," *Int. Soc. Comput. Biol.*, vol. 24, no. 23, pp. 2672–2676, 2008.

P.ISSN: 2086 – 4981
E.ISSN: 2620 – 6390
tip.ppj.unp.ac.id

[18] S. Desikan and G. Ramesh, *Software Testing: Principles and Practice*. Bangalore: Pearson Education India, 2006.

[19] A. F. Gifary, F. Renaldi, and I. Santikarama, "The Use of Synchronization Technology on The Effort of Minimizing Medication Non-Adherence," *Proc. 3rd Asia Pacific Int. Conf. Ind. Eng. Oper. Manag.*, pp. 1083–1090, 2022, doi: 10.46254/AP03.20220212.

[20] W. A. Putra, "Skema Proyek Perangkat Lunak/Keras Bot WhatsApp Berbasis Kecerdasan Buatan pada Kelompok.ID," B.S. thesis, Universitas Teknologi Digital Indonesia, Yogyakarta, Indonesia, 2025.