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DEVELOPMENT AND FEASIBILITY EVALUATION OF SIMANIS PLUS FOR DIGITAL PROLANIS MANAGEMENT AND INTEGRATED DENTAL AND ORAL HEALTH SERVICES

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Abstract

Background: The Chronic Disease Management Program (Prolanis) requires continuous and integrated management of patients with chronic diseases, particularly diabetes mellitus and hypertension. However, manual data recording and limited integration of general health, chronic disease, and dental and oral health information may hinder effective service management. **Objective:** This study aimed to develop and evaluate the feasibility of SIMANIS Plus as a digital platform for Prolanis management and integrated dental and oral health services. **Methods:** This Research and Development study employed the Rapid Application Development (RAD) model. The study included 33 Prolanis patients selected through total sampling. SIMANIS Plus was developed based on a needs assessment and validated by experts in information technology, medical records and health information, and healthcare service quality. Feasibility was evaluated using a 21-item questionnaire based on the SERVQUAL dimensions of tangibles, reliability, responsiveness, assurance, and empathy. Data were analyzed using the Wilcoxon signed-rank test. **Results:** SIMANIS Plus integrates patient registration, health profiles, blood pressure and blood glucose monitoring, health history, schedules and notifications, chronic disease education, dental and oral health education, communication with dental health professionals, dashboards, and monitoring reports. The evaluation demonstrated significant improvements in perceived service quality across all SERVQUAL dimensions: tangibles (p=0.001), reliability (p=0.002), responsiveness (p=0.001), assurance (p=0.004), and empathy (p=0.001). **Conclusion:** SIMANIS Plus was successfully developed and demonstrated feasibility as a digital platform for supporting Prolanis management and integrating dental and oral health services. The system may support more organized, integrated, and patient-centered Prolanis care.

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Introduction

Health is an essential component in achieving public welfare as stated in the 1945 Constitution of the Republic of Indonesia. Current health problems have shifted from infectious diseases to non-communicable diseases (NCDs), particularly hypertension and diabetes mellitus. Changes in lifestyle, unhealthy dietary patterns, lack of physical activity, and environmental factors contribute to the increasing prevalence of degenerative diseases. Based on WHO data and the 2023 Indonesian Health Survey (SKI), NCDs remain the leading cause of death worldwide, with hypertension and diabetes prevalence in Indonesia remaining high(Julianto et al., 2025).

BPJS Kesehatan established the Chronic Disease Management Program (PROLANIS) in 2010 as part of the Indonesian Government's efforts to control chronic diseases. The program aims to improve the quality of life of participants with chronic diseases through health education, regular health monitoring, lifestyle modification, and continuous disease management(Handoyo, 2023).

However, initial observations at the Primary Clinic of Poltekkes Kemenkes Semarang showed that PROLANIS implementation is still conducted manually, causing challenges in patient data recording, medical history retrieval, service documentation, health education scheduling, and activity management. The limited use of digital technology has reduced the effectiveness and efficiency of PROLANIS services, indicating the need for an integrated information system.

The development of SIMANIS Plus (Plus Chronic Disease Management Information System) is proposed as a solution to support PROLANIS management by integrating patient data recording, activity monitoring, health education, physical activity management, and dental health consultation services digitally. This system is expected to improve healthcare workers' efficiency, strengthen communication with participants, and enhance the quality of PROLANIS services at the Primary Clinic of Poltekkes Kemenkes Semarang(Sumadewi & Kerans, 2024).

Previous studies have shown that digital health information systems can improve the efficiency, accuracy, and accessibility of documentation and reporting in primary healthcare settings (Hanafi et al., 2025; Mulya et al., 2024; Haniasti et al., 2023). However, most of these systems were developed for general administrative purposes, such as patient registration and service reporting, and were not specifically designed to support disease-specific chronic disease management programs such as Prolanis.

Existing digital Prolanis and primary-care information systems generally record general health parameters, particularly blood pressure and blood glucose levels, while healthcare providers manage dental and oral health data separately or leave them undocumented (Dewi et al., 2025). This separation limits healthcare providers' ability to identify oral manifestations associated with chronic systemic conditions. Periodontal disease has also been closely associated with the progression of diabetes mellitus and hypertension. (Anggraini et al., 2024).

Digital Prolanis information systems currently focus on chronic disease monitoring and have not yet integrated dental and oral health consultation services within a single platform. This condition indicates the need for an integrated system that can connect general health services with dental and oral health services while supporting the digitalization of Prolanis management. The development of SIMANIS Plus addresses this gap. The principal novelty of SIMANIS Plus lies in its integration of a dental and oral health consultation module into a comprehensive digital Prolanis management system. The consultation module enables participants to submit oral health complaints, receive health education, and communicate directly with dental and oral health therapists. The digital Prolanis management system also facilitates patient data recording, activity scheduling, and health education.

This integration supports the early identification and management of oral health problems associated with diabetes mellitus and hypertension. The integration also supports more comprehensive and patient-centered chronic disease care by connecting general health monitoring with dental and oral health services..

Method

Research and Development (R&D) methodology was employed in this study using a mixed-method approach that integrated qualitative and quantitative methods. This approach was applied to develop the SIMANIS Plus (Plus Prolanis Management Information System) application as an innovation to improve the quality of Prolanis services at the Primary Clinic of Poltekkes Kemenkes Semarang.

The development process followed several stages, including needs assessment, system design, application development, expert validation, implementation, and evaluation**.** Needs assessment was conducted through interviews and observations involving clinic managers and Prolanis healthcare providers, supported by literature reviews and preliminary surveys. Findings obtained from this stage were used as the basis for designing SIMANIS Plus features, including digital health record management, Prolanis activity scheduling, educational materials for hypertension and diabetes mellitus management, and dental and oral health consultation services (Rosari et al., 2024).

Application development was carried out using the Rapid Application Development (RAD) method, which enables iterative system development based on user requirements. SIMANIS Plus was designed with a role-based access system to accommodate different user needs, including Prolanis participants, administrators, and dental and oral health therapists. This approach ensures efficient system management and optimal utilization according to each user's responsibilities.

Application feasibility was evaluated through expert validation involving three experts with relevant expertise in information technology, medical record and health information management, and healthcare quality management. Assessment was performed using a Likert-scale questionnaire to evaluate system functionality, usability, data security, and overall quality based on the ISO 9126 software quality standard(Rizqi et al., 2025)**.**

System effectiveness was assessed using a pre-experimental design with a one-group pretest-posttest approach. Implementation of SIMANIS Plus was conducted among Prolanis participants, followed by an evaluation of service quality before and after application utilization. Measurement of service quality was performed using the SERVQUAL instrument**,** which consists of five dimensions: reliability, responsiveness, assurance, empathy, and tangibles(Irawan et al., 2023.).

Study population included all Prolanis participants registered at the Primary Clinic of Poltekkes Kemenkes Semarang, consisting of 33 participants. Research subjects were categorized into three groups: informants for the needs assessment stage, expert validators for application evaluation, and end users involved in application implementation. Sampling techniques included total sampling based on the research objectives and study requirements.

Qualitative descriptive analysis was applied during the information-gathering phase, while quantitative analysis was performed to evaluate application effectiveness. Statistical analysis involved the Shapiro–Wilk normality test, followed by either a dependent t-test or Wilcoxon signed-rank test according to data distribution. This study obtained ethical approval from the Health Research Ethics Committee Ministry of Health, Semarang Health Polytechnic, under approval number 148/EA/F.XXIII.38/2026, dated February 6 2026. All participants signed informed consent prior to data collection(Utami et al., 2024).

Result

A. Information Collection Result

Information was collected through interviews with the Head of the Primary Clinic of Poltekkes Kemenkes Semarang, Prolanis Coordinator, Prolanis Administrator, Dentist, and Dental and Oral Therapist regarding the current data management process of the Prolanis program(Dewi et al., 2025).

Interview results indicated that the implementation of Prolanis data collection and processing is still conducted manually and has not been integrated into a digital system. Data from routine activities, health examinations, documentation, and participant monitoring are recorded separately according to each healthcare provider's duties, resulting in difficulties in data synchronization, retrieval, and comprehensive analysis(Irawan et al., 2024.).

The management of dental and oral health data among Prolanis participants is also recorded separately from chronic disease data, limiting the ability to identify oral manifestations related to chronic conditions and support holistic patient management. Furthermore, manual documentation creates challenges in maintaining data consistency, efficiency, and continuity of participant monitoring.

Based on these findings, the Prolanis activities are conducted monthly, including health examinations, health education, physical activity, and counseling sessions. During examinations, healthcare providers record blood glucose levels, blood pressure, health complaints, and participant activities. However, the current system has not optimally supported integrated data management and evidence-based decision-making. Therefore, an integrated digital-based Prolanis management system is needed to improve service effectiveness, efficiency, and comprehensive chronic disease management(Utami et al., 2024).

B. SIMANIS Plus Design

SIMANIS Plus was designed as an integrated digital information management system to address the limitations identified in the current Prolanis management process, particularly regarding manual documentation, fragmented data management, limited participant monitoring, and the absence of integrated dental and oral health records. The system design was developed based on the results of the needs assessment involving Prolanis stakeholders at the Primary Clinic of Poltekkes Kemenkes Semarang.

The design process followed the Research and Development (R&D) framework, consisting of preliminary research, product development, validation, effectiveness testing, and dissemination stages. Findings from the preliminary stage indicated the need for a digital platform capable of integrating participant health records, Prolanis activities, educational materials, and dental health services. These requirements became the basis for developing the SIMANIS Plus system architecture and functional features.

SIMANIS Plus design was structured using a role-based system approach, allowing different users to access features according to their responsibilities. The system consists of participant and healthcare provider interfaces to support effective communication, documentation, and monitoring of Prolanis activities.

Prolanis participants, SIMANIS Plus provides several features, including a health record management module that enables access to personal health information, such as blood pressure monitoring, blood glucose levels, health condition categories, previous medical history, and health recommendations. This feature supports continuous monitoring of chronic disease conditions and facilitates participants in understanding their health status.

The Prolanis activity scheduling feature was developed to improve participant adherence and engagement by providing information regarding routine activities, including health examinations, health education, physical activity sessions, counseling, and monitoring and evaluation activities. Notification

functions were integrated into the system to provide reminders related to scheduled activities.

Health education module was designed to support promotive and preventive efforts by providing digital educational materials related to hypertension, diabetes mellitus, and other non-communicable diseases. This feature enables participants to access and review health information beyond face-to-face Prolanis activities(Mulya et al., 2024).

A distinctive feature of SIMANIS Plus is the integration of the dental and oral health consultation module, which complements the existing Prolanis management system. Through this feature, participants can submit dental and oral health complaints, receive preventive and promotive education, and obtain professional guidance from dental and oral therapists. The integration of oral health information aims to support a more holistic approach to chronic disease management(Santoso et al., 2025).

For healthcare providers, SIMANIS Plus provides an administrative dashboard that supports program management, including participant data management, health record input, activity scheduling, educational content management, consultation monitoring, and user management. The dashboard facilitates healthcare providers in accessing and managing Prolanis information systematically and efficiently(Anggraini et al., 2024).

System validation was conducted to assess the feasibility, functionality, usability, and quality of the developed application. The evaluation focused on whether the designed features were able to meet user requirements and support the improvement of Prolanis service management. Furthermore, effectiveness testing was conducted to evaluate changes in service quality after SIMANIS Plus implementation.

Overall, SIMANIS Plus was designed as a comprehensive digital solution that integrates chronic disease monitoring, health education, activity management, and dental health services within the Prolanis framework. The system design supports improved data integration, efficient healthcare management, and more patient-centered chronic disease services at the Primary Clinic of Poltekkes Kemenkes Semarang.

C. Expert Validation

Three experts evaluated the SIMANIS Plus model, consisting of a medical record and health information expert, an information technology expert, and a healthcare service quality expert. The validation process was conducted using a questionnaire consisting of 21 assessment items, which were evaluated according to each validator's area of expertise. The medical record expert assessed data management, documentation systems, and information accuracy; the information technology expert evaluated system functionality, usability, security, and technical performance; while the healthcare service quality expert assessed the suitability of the system in supporting service effectiveness, efficiency, and quality improvement of Prolanis implementation.

Data analysis was performed using the Interclass Correlation Coefficient (ICC) to determine the level of agreement among validators, resulting in an ICC value of 0.037, categorized as Excellent, indicating that SIMANIS Plus model incorporates four key functional modules designed to optimize chronic disease management and clinical workflows: a Longitudinal Health Record module for digital tracking of blood pressure and blood glucose metrics; an Automated Service Scheduling system that delivers real-time notifications for Prolanis events to mitigate clinic congestion; Differentiated Health Education Repositories providing targeted, evidence-based content for hypertension, diabetes, and general non-communicable diseases; and a novel Oral-Systemic Care Module that integrates teledental consultations and periodontal risk screening to address the bidirectional inflammatory link between oral health and systemic chronic conditions.



Figure 1. SIMANIS Plus (Prolanis Plus Health Information Management System)

Based on the research conducted at the Primary Clinic of Poltekkes Kemenkes Semarang, the development of SIMANIS Plus (Prolanis Plus Health Information Management System) was carried out based on user needs to support the digital management of Prolanis services. The characteristics of respondents

showed that the majority were female, consisting of 20 respondents (60.6%), while male respondents accounted for 13 respondents (39.4%). Based on age, most respondents were in the 41–50 years age group, with 8 respondents (24,2%). The respondents' education level was dominated by Bachelor's degree holders, with 11 respondents (33,3%), while based on occupation, most respondents were Civil Servants (PNS), totaling 21 respondents (63.6%).

Development of SIMANIS Plus resulted in several main features, including patient data management, health monitoring, digital education through a holistic oral health e-flipbook, consultation through a chat feature, Prolanis activity management, and report generation. Educational materials can be accessed through barcode scanning and WhatsApp links, facilitating Prolanis participants in obtaining oral health information.

The evaluation of application use through pretest and posttest measurements showed an increase in patients' knowledge after receiving education through SIMANIS Plus. This indicates that SIMANIS Plus can serve as a supporting medium to improve access to education, health monitoring, and more effective management of Prolanis services.

Table 1. Demographic Characteristics of Research Subjects

Characteristics	Prolanis Participants	
	N	**%**
Gender		
Male	13	39,4
Female	20	60,6
Education Level		
Senior High School	7	21,2
Diploma (D3)	5	15,2
Bachelor's Degree (S1)	11	33,3
Master's Degree (S2)	7	21,2
Doctoral Degree (S3)	3	9,1
Age		
21-30	6	18,2
31-40	6	18,2
41-50	8	24,2
51-60	7	21,2
61-70	5	15,2
71-80	1	3,0
Occupation		
Student	5	15,2
Housewife	4	12,1
Civil Servant	21	63,6
Retired	3	9,1

Source: Primary Data, 2026

Table 2. Results of Prolanis Service Quality Analysis Before and After Implementation of SIMANIS PLUS

Variable	Measurement	Mean ± SD	Difference	p-value
Reliability	*Pre*	14.42 ± 1.542		
	Post	20.67 ± 1.451	6.25	0.001
Responsiveness	*Pre*	13.58 ± 1.542		
	Post	20.61 ± 1.435	7.03	0.002
Assurance	*Pre*	14.15 ± 1.564		
	Post	20.58 ± 1.415	6.43	0.001
Empathy	*Pre*	14.12 ± 1.635		
	Post	20.67 ± 1.339	6.55	0.004
Tangible	*Pre*	14.21 ± 1.673		
	Post	20.73 ± 1.353	6.52	0.001

The effectiveness analysis of paired data with non-normal distribution using the Wilcoxon test showed significant differences across all service quality dimensions. The Reliability dimension obtained a p-value of 0.001 (p-value < 0.05), indicating that SIMANIS Plus effectively improved reliability in Prolanis services. The Responsiveness dimension showed a p-value of 0.002 (p-value < 0.05), demonstrating the effectiveness of SIMANIS Plus in improving service responsiveness. The Assurance dimension obtained a p-value of 0.001 (p-value < 0.05), indicating improved assurance aspects in service delivery. The Empathy dimension showed a p-value of 0.004 (p-value < 0.05), indicating that SIMANIS Plus improved empathy in service provision. Meanwhile, the Tangible dimension obtained a p-value of 0.001 (p-value < 0.05), demonstrating an improvement in tangible aspects of service quality.

These findings indicate that the implementation of SIMANIS Plus significantly improved service quality across all dimensions, including reliability, responsiveness, assurance, empathy, and tangible aspects. Therefore, SIMANIS Plus was considered an effective system for supporting Prolanis management and improving service quality(Hanafi et al., 2025).

D. Product *Sistem Manajemen Prolanis Plus (SIMANIS Plus)*

The product developed in this study is a digital innovation called SIMANIS Plus (Prolanis Plus Health Information Management System)**,** which was developed to support the monitoring, evaluation, and reporting of Prolanis participant data at the Primary Clinic of Poltekkes Kemenkes Semarang. This system was designed based on the needs of Prolanis healthcare providers, including administrators, physicians, and dental and oral therapists, to improve the effectiveness of health service management.

SIMANIS Plus includes several main features, such as user login, participant profiles, health history records, Prolanis activity schedules, educational materials on hypertension, diabetes, non-communicable diseases (NCDs), oral health, and direct dental health consultation. The health history feature facilitates the recording and monitoring of patients' health conditions, while the digital education feature enables participants to access health information easily and continuously.

Furthermore, the dental health consultation feature facilitates interaction between Prolanis participants and dental health professionals to support promotive and preventive healthcare services. Overall, SIMANIS Plus functions as an integrated information system that supports data management, health education, health monitoring, and the improvement of Prolanis service quality in primary healthcare facilities(Hidayat et al., 2024.).

DISCUSSION

A. Identification of Previous Prolanis Documentation and Reporting System

Information gathering was conducted through interviews with five key informants, including the Primary Clinic coordinator of Poltekkes Kemenkes Semarang, Prolanis coordinator, Prolanis administrator, general practitioner, and dental and oral therapist. The identification process was carried out to determine existing problems in the Prolanis documentation and reporting system.

Interview results indicated that Prolanis data management is still performed manually, where collected data must be recapitulated and categorized before being entered into Google Spreadsheet, resulting in longer processing time. The current documentation format is also limited, focusing mainly on blood pressure and blood glucose monitoring, without supporting comprehensive chronic disease management(Haniasti et al., 2023).

In addition, examination history records are not systematically documented by the Prolanis administrator, causing participants to have limited access to their overall health information. Limited consultation time during clinic visits also affects the delivery of health recommendations, as some participants leave before receiving complete examination results and appropriate follow-up advice. These findings indicate the need for an integrated digital system to improve documentation, monitoring, and continuity of Prolanis services(Salombe et al., 2025).

B. Feature Needs Analysis of Chat Function to Support Dental and Oral Health Consultation Services for Prolanis Participants

Based on the needs analysis, Prolanis participants require accessible, rapid, and sustainable dental and oral health consultation services without requiring direct visits to healthcare facilities. This need is particularly important because most Prolanis participants have chronic diseases, such as diabetes mellitus and hypertension, which increase the risk of oral health problems, including periodontal disease, xerostomia, dental caries, and oral infections. The development of a chat feature in SIMANIS PLUS was intended to address these needs by enabling participants to submit complaints, receive dental and oral health education, and consult directly with dental therapists or dentists according to their needs. This feature facilitates effective two-way communication between participants and healthcare(Pratama & Aisah, 2025)

providers, allowing early identification of oral health problems while improving accessibility and continuity of care. In terms of service quality, the chat feature is associated with the responsiveness and empathy dimensions of the SERVQUAL model, as it enables healthcare providers to provide timely responses and personalized support for participants. Furthermore, this innovation strengthens promotive and preventive efforts through continuous education and health monitoring, thereby supporting comprehensive chronic disease management. This finding is consistent with Aisy Dina (2025), who

stated that Prolanis service strategies require a comprehensive approach involving promotive, preventive, curative, and rehabilitative efforts through collaboration among patients, families, healthcare providers, and communities. Therefore, integration of dental and oral health consultation services through the SIMANIS PLUS chat feature has the potential to improve service quality and support sustainable improvement of Prolanis management.

Taken together, these findings suggest that the observed improvements in perceived service quality are best explained not simply by the presence of a digital tool, but by the way SIMANIS Plus restructures the underlying service process: consolidating fragmented manual records into a single accessible source reduces retrieval and documentation time, while the chat-based consultation channel shortens the pathway between a participant's complaint and a professional response. This interpretation is consistent with the SERVQUAL framework, in which reliability and responsiveness are process-dependent dimensions, whereas tangible and assurance dimensions relate more directly to the perceived credibility of the platform itself. It should also be noted that the pre-post design used to assess effectiveness cannot rule out the possibility that participants' responses were influenced by increased attention during the study period rather than by the system alone, and this should be considered when interpreting the magnitude of the reported improvements.

C. Study Limitations

This study has several limitations. First, the small sample size (33 participants) from a single clinic limits the statistical power and generalizability of the findings to other Prolanis settings. Second, the one-group pretest-posttest design without a control group limits the ability to attribute improvements in perceived service quality solely to SIMANIS Plus. Third, the use of self-reported SERVQUAL measures may introduce social desirability bias and does not assess objective clinical outcomes. Fourth, the short evaluation period does not allow assessment of the long-term sustainability of SIMANIS Plus. Future studies should involve larger multi-site samples, control or comparison groups, longer follow-up periods, and objective clinical indicators to provide stronger evidence of its effectiveness.

CONCLUSION

Based on findings of this study, it can be concluded that SIMANIS Plus (Prolanis Plus Health Information Management System) is a feasible and effective education model and information system for improving quality of Prolanis services at Primary Clinic of Poltekkes Kemenkes Semarang**.** Implementation of SIMANIS Plus optimizes information management processes through digitalization of data recording, processing, storage, and reporting of Prolanis participant data, resulting in more effective and efficient healthcare services.

Evaluation results demonstrated that SIMANIS Plus met feasibility criteria in terms of system quality, functionality, interface design, and usability based on expert assessment. Furthermore, implementation of SIMANIS Plus significantly improved quality of Prolanis services across dimensions **of** reliability, responsiveness, assurance, empathy, and tangible aspects (p-value < 0.05). SIMANIS Plus contributes to improving documentation accuracy, accelerating access to health information, facilitating consultation processes, enhancing patient confidence, and supporting transformation of healthcare services toward a more modern, systematic, and sustainable digital-based system(Febriawati et al., 2022).

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