Original Article

Healthcare Providers' Interprofessional Collaboration Experience with Integrated Information System for Non-Communicable Disease Management at Primary Care in Indonesia: A Qualitative Study

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Abstract

Background: Non-communicable diseases (NCDs) require holistic management, yet interprofessional collaboration (IPC) in primary care often faces challenges like fragmented services and inefficient information exchange. Integrated information systems have the potential to address these issues, but the system users' experiences regarding IPC in Indonesia remains understudied. This study aimed to explore healthcare providers' IPC experiences with the integrated information system for NCD management in primary care.

Methods: A qualitative study with descriptive phenomenology approach was done at Ogan Komering Ulu Regency, South Sumatra Province, Indonesia from January–March 2025. Fifteen healthcare professionals consisting of 5 nurses, 4 medical doctors, 3 midwives, and 3 public health workers were purposively selected based on their experience using the integrated information system for NCD services. Data were collected until data saturation through two focus group discussions lasting 130–150 minutes. Data analysis was done manually using the Collaizzi's method. Field notes were taken to capture non-verbal cues and contextual observations.

Results: Three themes emerged in this study, namely "enhanced IPC through information systems", "Optimized patient management via digital integration", and "Improved health workers' accessibility through adaptive technologies".

Conclusion: The integrated information system strengthened IPC and NCD management in primary care by streamlining workflows and improving data accessibility. The integrated information system could improve community-based care with enhancing collaborative patient care.

Keywords: Information systems, Interprofessional relations, Primary health care, Noncommunicable diseases

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Introduction

Non-communicable diseases (NCDs) such as diabetes, hypertension, and cardiovascular diseases require a holistic and continuous care approach.[1] In primary healthcare facilities, interprofessional collaboration (IPC) is key to delivering comprehensive patient care. However, the implementation of IPC often faces challenges such as poor interprofessional coordination, fragmented services, and inefficient information exchange.[2] These issues are further exacerbated by siloed health information systems, which hinder collaborative workflows.[3] Integrated health information systems have the potential to improve communication and coordination among healthcare providers.[4] Previous studies suggest that such systems can enhance the efficiency and quality of NCD services.[5, 6] Therefore, exploring the experiences of IPC within an integrated information system in primary care is crucial.[6, 7]

In Indonesia, Ministry of Health (MoH) has identified critical challenges in its integrated health information system, including incomplete data recording, inconsistencies, and low accuracy, which collectively undermine the quality of healthcare services. Poor data quality directly compromises decision-making in healthcare, ultimately jeopardizing public health outcomes.[8] To address these issues, MoH launched a Digital Health Transformation Strategy, leveraging information technology to advance digitalization in the health sector. A key initiative under this strategy is the integration and development of health data through a National Individual-Based Health System, notably via the Integrated Electronic Medical and Health Record (I-EMHR). This effort was formalized through Ministerial Regulation No. 24 of 2022 on Electronic Medical Records, which mandates the use of information technology for standardized patient health documentation.[9]

Integrated health information systems have been adopted in various countries with mixed results in supporting IPC.[10, 11] Some studies highlight their benefits, including reduced data duplication, faster access to patient records, and improved diagnostic accuracy.[12, 13] However, challenges such as healthcare professionals resistance, insufficient training, and system-user misalignment have also been reported.[14] In Indonesia, the implementation of integrated information systems for NCD services is still in its early stages, necessitating an in-depth evaluation of its impact on IPC.[15, 16] Furthermore, few studies have qualitatively examined healthcare providers' perspectives on their collaborative experiences with such systems in primary care.

IPC without proper coordination can lead to fragmentation of services, resulting in overlaps or gaps in patient care.[17] Integrated information systems are expected to serve as a platform facilitating communication and shared responsibility among professionals.[18] However, their effectiveness depends on workforce readiness, technological infrastructure, and policy support.[14, 19] In Indonesia, NCD services in primary care face multiple challenges, including high workloads, limited resources, and insufficient interprofessional synergy.[2] Given the rising prevalence of NCDs, the need for coordinated care is more urgent than ever. The importance of this study is underscored by existing literature highlighting both the potential of integrated information systems to improve IPC in primary care and the persistent gaps in their implementation for NCDs.[7, 20] Therefore, this study aimed to explore the healthcare professionals' experiences of IPC with integrated information systems in NCD management at primary care. By understanding healthcare professionals' experiences, these findings can provide insight into the practice of IPC utilizing the integrated information system for NCD management at primary care.

Materials and Methods

This study employed a qualitative research design with a descriptive phenomenology approach. The qualitative approach was chosen to gain in-depth insights into healthcare professionals' experiences of IPC with integrated information

systems. Phenomenology was chosen to capture the lived experiences and perceptions of participants, providing an in-depth understanding of the challenges and facilitators of IPC in this context and determining the meaning of IPC within their daily workflows. The study was conducted from January to March 2025 in Ogan Komering Ulu a regency in South Sumatera Province in Indonesia, selected for its adoption of an integrated health information system and diverse primary care settings.

Purposive sampling was used to recruit participants who met the following criteria: (1) healthcare professionals (e.g., nurses, midwives, doctors, and public health workers) with at least one year of experience in using the integrated information system for NCD services, (2) administrative staff involved in system coordination, and (3) willingness to participate in the study. Exclusion criteria included if they only used the integrated information system occasionally (e.g., less than once a month) despite having access, if they primarily worked in non-NCD-related roles (e.g., maternal health or infectious diseases) without active involvement in NCD data entry or reporting, or if they had been absent for an extended period (e.g., more than three months in the past year), as these factors could affect their familiarity and consistency in system usage. A total of fifteen participants were recruited, ensuring representation from different professions comprising five nurses, four medical doctors, three midwives, and three public health workers with a mean age of 36.27±5.93 years. Recruitment was facilitated through collaboration with local health authorities.

The data were collected through focus group discussions (FGDs). FGDs were chosen because they allow researchers to explore the collective understanding, experiences, and perceptions of participants in an interactive manner. The group dynamics in FGDs can stimulate rich discussions, where participants complement or even debate each other's views, resulting in more in-depth data than individual interviews.[21] FGDs can reflect on daily collaborative practices and interprofessional interactions in primary care. Participants can demonstrate how they coordinate, share data, and resolve conflicts in the use of integrated information systems. The first FGD, involving seven participants, lasted 130 minutes, while the second FGD, with eight participants, ran for 150 minutes. The FGDs were conducted in the meeting room at the community health center, and the interviews were carried out by MAA, LRW, and DK as the interviewers.

Bracketing was implemented prior to interviews to suspend researchers' assumptions, while openness was upheld during interactions. Interview guides included questions such as: "How does the integrated information system influence collaboration among healthcare teams in NCD management?", "What challenges have you encountered while using the system for IPC?", and "What improvements would enhance interprofessional coordination?" These core questions were consistently complemented with spontaneous follow-up probes like "Please explain more clearly". The probing questions to ensure comparability of data, capture nuanced experiences through adaptive probing, and clarify ambiguous statements via verification prompts. All participants contributed to capturing deep, relatable experiences, and they responded to and built upon each other's perspectives during discussions, a process that enriched the data through iterative peer validation. All sessions were audio-recorded, transcribed verbatim, and anonymized. Field notes were taken to capture non-verbal cues and contextual observations.

The analysis was conducted manually using Colaizzi's analysis method, a structured approach to ensure rigor and minimize bias.[22,23] The data analysis followed Colaizzi's descriptive phenomenological method, which involves seven systematic steps. First, familiarization was conducted through transcription, reading, and rereading of the interview data to gain a general sense of the participants' experiences. Second, significant statements were identified by extracting relevant phrases and expressions

that directly related to the phenomenon under study. Third, from these statements, meanings were formulated to interpret the underlying essence conveyed by the participants. Fourth, the formulated meanings were then organized into clusters of themes, allowing for the clustering of themes based on conceptual similarity. Fifth, these themes were integrated into a rich and exhaustive description of the phenomenon, capturing its depth and complexity. Sixth, from this comprehensive description, the fundamental structure of the phenomenon was articulated to express its core meaning. Finally, as the seventh step, verification of the fundamental structure was conducted by returning to some participants to ensure that the essence derived accurately reflected their lived experiences.[24]

Multiple strategies were considered to ensure methodological rigor in the descriptive phenomenological approach.[25] To uphold credibility, we conducted member checking by sharing thematic summaries with participants to verify the data accuracy. Dependability was achieved through comprehensive audit trails documenting all analytical processes, including code evolution, theme development, and category refinement decisions. Transferability was strengthened by providing thick descriptions of the research context and participants' demographics. Confirmability was established through reflexive journaling, where researchers systematically recorded and examined their preconceptions throughout the research process. Together, these strategies reinforced the study rigor and alignment with qualitative research standards, while collectively ensuring our findings remained grounded in participants' lived experiences and maintained the epistemological integrity characteristic of rigorous descriptive phenomenology.

Ethical approval was obtained from the Faculty of Nursing Universitas Indonesia with an approval number of KET-148/UN2.F12.D1.2.1/PPM.00.02/2024. Written informed consent was obtained from all participants after receiving details about the study objectives for participation in this study before the interviews commenced for recording FGDs. They were informed of their right to withdraw from the study at any time without consequences, and confidentiality was ensured by anonymizing the participants' responses. Data were stored securely, accessible only to the research team.

Results

This study recruited fifteen health workers working in primary care settings across Ogan Komering Ulu, Indonesia. Detailed demographic and professional characteristics are presented in Table 1.

Table 1: Characteristics of healthcare professionals in this study

Participant Code	Age (years)	Sex	Level of Education	Profession	Length of work (years)
P1	30	Female	Bachelor	Nurse	5
P2	42	Male	Diploma	Nurse	16
P3	40	Female	Diploma	Nurse	13
P4	37	Male	Doctor	Medical Doctor	11
P5	33	Female	Doctor	Medical Doctor	7
P6	28	Female	Diploma	Midwife	4
P7	38	Female	Diploma	Midwife	15
P8	44	Female	Bachelor	Public Health worker	19
P9	42	Male	Diploma	Nurse	18
P10	39	Female	Bachelor	Nurse	9
P11	42	Male	Doctor	Medical Doctor	16
P12	29	Female	Doctor	Medical Doctor	3
P13	41	Female	Diploma	Midwife	17
P14	33	Male	Bachelor	Public Health worker	8
P15	26	Female	Bachelor	Public Health worker	3

Table 2: Sub-themes and themes derived from the Data

Sub-Themes	Themes
Integrated service coordination Ease of interprofessional communication Comprehensive clinical decision-making	Enhanced interprofessional collaboration through information systems
Accurate and updated patient's data management Ease of monitoring patient service progress Integrated medical record	Optimized patient management via digital integration
Ease of patient data input Availability of multi-device access	Improved healthworkers accessibility through adaptive technologies

This study identified three themes and eight sub-themes about IPC experience with an integrated information system for NCD management at primary care. These sub-themes, as well as their themes, are described at Table 2.

1. Enhanced IPC through Information Systems

Health information systems have become the backbone of IPC in healthcare facilities. These systems significantly enhance IPC, particularly in improving the efficiency and accuracy of integrated services. This first theme is supported by three sub-themes: integrated service coordination, ease of interprofessional communication, and comprehensive clinical decision-making.

1.a. Integrated Service Coordination

The first sub-theme highlights how information systems enable seamless interprofessional service coordination, eliminating data duplication and improving time efficiency. A participant stated: *"The system eliminates data redundancy. When midwives input ANC (antenatal care) examination results, I, as a nurse, can immediately access them to monitor comorbidities such as anemia without having to re-interview the patient from scratch." (P2)*

These findings demonstrate that data integration enhances workflow efficiency and reduces redundant tasks. A system emphasizing real-time data accessibility for healthcare professionals is crucial for improving service coordination.

1.b. Ease of Interprofessional Communication

Effective communication is the foundation of healthcare teamwork. Digital information systems replace conventional communication methods, which are prone to errors. Centralized documentation improves the accuracy of shared information among professionals. This was expressed by one of the participants:

"...everything is now neatly recorded in the system. Doctors can review consultation histories with nutritionists, nurses can track the latest instructions, and miscommunication due to human error or lost manual records is minimized." (P5)

This statement underscores how the digitization of clinical records reduces miscommunication risks. A unified system enhances communication precision in managing NCDs in primary care settings.

1.c. Comprehensive Clinical Decision-making

High-quality clinical decisions require comprehensive patient data. Health information systems provide integrated dashboards that visualize complete patient histories, supporting evidence-based decision-making. This was reflected in a statement by a participant:

"I can develop more precise hypertension patient education plans by reviewing visit histories, dietary records, and medication adherence—all within a single dashboard." (P8)

This illustrates how holistic data access enables personalized, patient-centered interventions. The findings highlights the fact that comprehensive patient data facilitates

clinical decision-making aligned with patient-centered care principles.

2. Optimized Patient Management Via Digital Integration

The implementation of integrated health information systems has significantly transformed chronic disease management in primary healthcare facilities. This system addresses key challenges in patient data organization and care coordination. This theme elaborates on three sub-themes demonstrating how digital solutions enhance NCD management: accurate and updated patient data management; ease of monitoring patient service progress; and integrated medical records.

2.a. Accurate and Updated Patient Data Management

Effective NCD management requires rapid access to comprehensive patient data. Traditional paper-based systems often result in fragmented medical records. The new integrated system has revolutionized how healthcare professionals access and utilize patient information. A participant mentioned that:

"Previously, patient data was scattered across multiple logbooks. Now, with the integrated system, when a hypertensive patient comes for a follow-up, I can immediately view their latest blood pressure readings, medication history, and even last month's lab results—all on a single screen." (P4).

This statement highlights how the centralized system eliminates data fragmentation, enabling instant access to complete medical histories. Such integration supports better clinical decision-making by consolidating all relevant data into a unified view. This efficiency aligns with the principles of continuity of care in chronic disease management.

2.b. Ease of Monitoring Patient Service Progress

Regular monitoring is a critical component of NCD management. Early detection of complications requires consistent tracking of health parameters. The digital system facilitates this through automated data synchronization. One of the participants stated:

"This tracking system greatly aids in the early detection of pre-eclampsia in mothers with a history of hypertension. Blood pressure measurements taken at Posyandu (Integrated Health Post) are automatically synchronized to the dashboard." (P6)

This underscores how real-time data synchronization enables rapid identification of high-risk conditions. The feature strengthens community-based health surveillance by linking Posyandu data with healthcare facilities. These findings are particularly relevant for proactive NCD complication prevention strategies.

2.c. Integrated Medical Record

Fragmented medical records often hinder healthcare efficiency. System integration creates a single data source accessible to all healthcare providers, optimizing clinical workflows. This is reflected in the statement of one participant:

"This system integration allows centralized data access, significantly improving our work efficiency." (P1).

This reflects how centralized access reduces time wasted retrieving patient data from multiple sources. The resulting efficiency directly enhances service capacity and reduces the administrative burden on healthcare professionals. Integrated systems can substantially cut administrative time while improving care quality.

3. Improved Health Workers' Accessibility through Adaptive Technologies

Health information system accessibility serves as a critical determinant of service effectiveness. The system's usability and flexibility significantly influence healthcare professionals' technology adoption. This theme elaborates on two sub-themes facilitating provider access: ease of patient data input and

availability of multi-device access.

3.a. Ease of Patient Data Input

Cumbersome patient data entry processes often impede healthcare service delivery. User-friendly systems can improve healthcare professionals' compliance with data recording. Offline data storage features provide solutions for areas with limited infrastructure. A participant mentioned: *"During Posyandu activities in rural villages, I can immediately input prenatal examination results. Even with limited Internet connectivity, the data automatically saves and synchronizes with the primary health center database once network access is restored." (P13)*

These findings highlight how offline functionality addresses connectivity challenges in remote areas. Automatic synchronization when networks become available ensures data completeness without burdening healthcare professionals. These results underscore the importance of systems adaptable to Indonesia's infrastructure conditions.

3.b. Availability of Multi-device access

System access flexibility represents a fundamental need for mobile healthcare providers. Device limitations frequently constrain service delivery. Multi-platform access capabilities enhance healthcare professionals' operational efficiency. One participant stated:

".. Beyond desktop computers, I can access patient medical records even using my personal mobile phone." (P15)

This demonstrates how cross-device accessibility enables healthcare providers to work flexibly across various locations. This feature proves particularly relevant for field workers with dynamic operational patterns.

Discussion

This qualitative study explored the healthcare provider's IPC experience with integrated information system for NCD management in primary care. Three key themes emerged from the findings: enhanced IPC, optimized patient management, and improved health workers' accessibility.

The study revealed that the integrated information system served as a critical platform for improving communication and coordination among health workers. The integrated information system facilitated seamless IPC by improving coordination, communication, and clinical decision-making. Similar studies have reported that digital tools bridge disciplinary gaps in chronic care management.[26] Furthermore, interprofessional communication is a cornerstone of effective NCD management. These findings are in the same line with previous research from America, showing that integrated information system reduced communication errors in NCD management.[11] Additionally, the system supported comprehensive clinical decision-making by providing a holistic view of patient histories, enabling more informed and collaborative treatment plans.[27] In contrast, a study showed that unfortunately communication in the system had not been maximized properly in Indonesia.[28] Digital integration enhances teamwork by breaking down silos and fostering a shared understanding of patients' needs.[29] These findings collectively underscore the transformative role of integrated information systems in fostering IPC, reducing communication barriers, and enhancing evidence-based decision-making for effective NCD management in primary care settings.

The adoption of an integrated information system streamlined NCD patients' management by ensuring accurate and updated patient data, ease of monitoring, and integrated medical record. The digital transformation optimized NCD management by creating unified patient dashboards that improved clinical decision-making. These findings align with the results of previous research in Indonesia, reporting that the system simplified the monitoring of patients' service progress.[30] Furthermore, the availability of integrated medical records

eliminated redundancies, ensuring continuity of care across different service points.[31, 32] This finding supports the notion that digital health solutions enhance efficiency in NCD management by providing a unified patient database.[7, 33] This efficiency gain is crucial for the in overburdened primary care system Indonesia facing a rise in the NCD prevalence.[34, 35]

Adaptive system design substantially improved the healthcare professional accessibility in this study. The flexibility of the information system contributed to better accessibility for healthcare professionals, particularly through the ease of patient data input and availability of multi-device access, which reduced administrative burdens and allowed more focus on clinical care.[36] Similar studies have shown that user-friendly, multi-platform systems increase adoption rates among healthcare professionals.[37] In contrast, an Australian study has reported that using EMR requires additional effort and time because the system is not user-friendly and requires extra effort in entering patient information.[38] These contrasting findings suggest that systems perceived as complex and time-consuming may hinder effective use by healthcare providers. The availability of multi-device access (e.g., computers, tablets, and smartphones) ensured that providers could retrieve and update the records anytime, enhancing workflow efficiency.[39, 40] This adaptability is crucial in resource-limited settings, where varying levels of digital literacy and device availability exist.[39] These technological adaptations demonstrate how digital solutions can be tailored to Indonesia's diverse geographical challenges while maintaining data integrity.[7]

While these findings highlight the transformative role of integrated information systems in fostering IPC, reducing communication barriers, and enhancing evidence-based NCD management. The integrated information system demonstrated a transformative potential for Indonesia's primary care by strengthening three foundational NCD management pillars: team collaboration, clinical efficiency, and equitable access. The findings align with community-based midwifery and nursing care by facilitating coordinated patient management and real-time data sharing. These findings support Indonesian' Digital Health Transformation Roadmap while highlighting the need for integrated digital health platforms to enhance IPC and patient management. Healthcare systems can optimize NCD management, improve care coordination, and ultimately enhance patient outcomes in primary care settings.

This study had some limitations. It was restricted in the ability to fully capture the nuances of individual perspectives. This limitation should be considered when interpreting the depth of participants' responses. Nevertheless, a key strength of the study lies in its use of focus group discussions that encouraged dynamic team interactions and collective reflection among healthcare providers, providing rich insights into community health service implementation.

Conclusion

This study highlighted the healthcare professionals' experiences from the transformative potential of integrated information systems in enhancing IPC through information systems, optimizing patient management via digital integration, and improving health workers' accessibility through adaptive technologies in Indonesian primary care settings. The integrated information system could improve community-based care with enhancing collaborative patient care through seamless care coordination and instantaneous information exchange. Subsequent studies should explore the patients' experiences in receiving care through this system in primary care settings across Indonesia.

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Authors' Contribution

MAA & SU were responsible for the conceptualization and design of this study. The data collection was conducted by MAA, LRW, and DK. The data analysis and interpretation were carried out by MAA, HA, MAA, SU, and DK drafted the initial manuscript. All authors critically reviewed, revised the manuscript, and approved the final version for publication. All authors take responsibility for the integrity of the data and the accuracy of the data analysis. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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Conflict of Interest

None declared

Declaration on the use of AI

The authors declare that no artificial intelligence tools were used in the preparation of this manuscript.

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