

## Health Workers' Perceptions of Communication and Interprofessional Collaboration in Digital Primary Healthcare: A Cross-Sectional Study

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### ABSTRACT

Interprofessional collaboration is a pivotal strategy for delivering high quality health services during the current global digital transformation. Despite its critical importance, barriers such as professional dominance and frequent miscommunication continue to undermine collaborative efforts in clinical settings. This study analyzed the relationship and association between healthcare workers' perceptions of effective communication and the actual implementation of interprofessional collaboration within digital health practices. A descriptive analytic cross sectional design was employed using total population sampling of 152 healthcare professionals at a Primary Healthcare Center. Data were gathered through validated questionnaires focusing on digital adaptation and analyzed using Chi-Square tests and Odds Ratio analysis. Findings revealed that 55.3 percent of respondents perceived communication as effective and rated collaboration as good. A significant association was identified ( $p=0.011$ ) with an Odds Ratio of 7.680. This indicates that healthcare workers with positive communication perceptions are 7.68 times more likely to engage in high quality collaboration. Key challenges identified include hierarchical dominance, instruction miscommunication, and limited team based digital discussion platforms. Effectively, communication serves as the fundamental pillar of coordination in digital health environments. While digital tools such as telemedicine and internal messaging expedite information exchange, success depends on professional communication standards and nursing leadership as care coordinators. Finally, this research contributes a comprehensive and strategic framework emphasizing that nursing leadership as digital mediators is essential for bridging communication gaps, reducing potential clinical errors, and ensuring patient safety in the global Health 5.0 era.

**Keywords:** Digital Health Care, Interprofessional Collaboration, Effective Communication, Health Workers



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## 1. INTRODUCTION

Healthcare represents a fundamental global human right, entitling every individual to safe, high quality, and affordable services (Ho et al., 2022; Nampewo et al., 2022; Petre et al., 2023). Within modern health systems, primary healthcare centers serve as the frontline institutions responsible for delivering comprehensive promotive (Wu et al., 2022), preventive (AbdulRaheem, 2023), curative

(Kumpunen et al., 2022), and rehabilitative efforts (Charumbira et al., 2024). These institutions function as the primary gatekeeper between the community and the national health system, making their operational effectiveness a key determinant of public health success. However, according to Endalamaw et al. (2024), primary care currently faces complex multifaceted challenges, ranging from limited human resources to chronically increasing workloads. These pressures necessitate a paradigm shift from fragmented care models toward robust interprofessional collaboration (IPC) to ensure patient centered care. IPC is more than technical cooperation; it is a synergy emphasizing mutual respect, trust, open communication, and shared decision making among diverse healthcare professionals (Fox et al., 2024).

The urgency of IPC has intensified alongside the acceleration of digital transformation in the medical world (Dib & Belhiti, 2025; Geese & Schmitt, 2023). Advanced technologies such as Artificial Intelligence (AI), telemedicine, and various digital health applications have become integral parts of healthcare delivery systems (Grant et al., 2024; Saif-Ur-Rahman et al., 2023). According to Bida et al. (2023), the transition toward the Health 5.0 era demands that healthcare professionals possess not only clinical competence but also the ability to adapt to dynamic digital ecosystems. In this complex landscape, healthcare workers perceptions regarding communication effectiveness play a decisive role in the success of collaborative practices and the integration of digital tools within team based services (Nie et al., 2023). According to Hofmeister (2024), effective communication involves the clear, timely, and responsive exchange of information in both verbal and non verbal forms. Nikou et al. (2022) added that the effectiveness of such communication is not merely a technical output but is significantly influenced by individual digital literacy, professional experience, and the prevailing work environment. Although technology is designed to facilitate coordination, a profound understanding of communication standards remains the cornerstone for preventing digital miscommunication that risks patient safety.

The phenomenon of healthcare worker perceptions regarding communication in a digital context is highly subjective yet has systemic impacts. These perceptions often determine how technology is accepted and utilized in daily workflows. According to Meneses-La-Riva et al. (2025), when healthcare workers perceive communication as effective, they tend to demonstrate synergistic work behaviors such as close partnership and cooperation. Conversely, Jensen et al. (2023) stated that poor perceptions of digital communication can trigger information distortion and inaccurate clinical instructions. In primary care ecosystems, digital silo phenomena often emerge when healthcare workers prefer informal messaging platforms over integrated clinical information systems (Borycki & Kushniruk, 2022). This causes information flow to become fragmented and reduces team transparency, which ultimately weakens the overall quality of care coordination.

While digital transformation promises high efficiency, research by Wang et al. (2023) shows various communication and collaboration barriers persist in clinical practice. Classic issues such as the misinterpretation of medical instructions and professional dominance remain significant obstacles (Latif et al., 2022). Professional dominance, where certain disciplines tend to overshadow others in decision making, creates a hierarchical environment that stifles the collaborative potential of a team (Qudrat-Ullah, 2025). In a digital context, these challenges are often exacerbated by the absence of integrated team discussion forums within health applications, leading to a reluctance among junior staff to express opinions or question ambiguous instructions. This phenomenon of junior staff silence represents a critical risk to patient safety because it prevents the detection of potential medical errors during care transitions or complex treatment planning. Furthermore, variations in digital literacy across generations and professions can create a digital divide within the team, where some members feel alienated from the new technologies being implemented.

The role of nursing leadership is becoming increasingly strategic in mitigating these barriers. As care coordinators and clinical leaders, nurses function as digital mediators who bridge technology with collaborative practices to enhance patient safety (Agius et al., 2025). Nursing leadership is a fundamental element in the successful implementation of digital technology (Laukka et al., 2023), given that nurses are primary users who interact intensively with technology and other health professions (Knop et al., 2024). Through transformational leadership styles, nurses can build an environment of interprofessional trust and reduce the negative impacts of hierarchical dominance. By facilitating open and technology supported communication, nurse leaders ensure that digital tools do not merely replace human interaction but actually strengthen the relational dimensions of team collaboration.

The implementation of electronic medical records and national health applications also brings new complexities to interprofessional dynamics (Geese & Schmitt, 2023; Robertson et al., 2022). While these systems are intended to expedite information exchange, their success relies heavily on documentation standardization and team commitment to real time data integration. Without structured digital coordination mechanisms, the implementation of advanced technologies such as clinical decision support systems risks failure because they are not harmoniously integrated into existing communication workflows. This study highlights that the human element, specifically perceptions of how well individuals can communicate with colleagues, remains the most significant predictor of whether a digital system will result in effective collaboration.

Despite the criticality of this issue, most previous research has focused on communication and collaboration within hospital settings (L. Gleeson et al., 2023). Hospital based studies tend to emphasize specialist actions and acute interventions (Gass et al., 2023), whereas primary care requires a focus on long term, holistic, and preventive coordination (Khatri et al., 2023). A notable research gap remains regarding healthcare workers perceptions of effective communication in digital based primary care ecosystems, particularly concerning the strategic role of nursing leadership in such environments. Failures in digital health integration are frequently linked to the human aspect of communication, yet studies analyzing these relationships at the primary care level remain sparse. This lack of empirical evidence hinders the development of interventions specifically designed to meet the unique needs of primary healthcare professionals in the digital era.

Therefore, this study aims to analyze the relationship and association between healthcare workers' perceptions of effective communication and the implementation of interprofessional collaboration within the digital primary healthcare ecosystem. The study is expected to contribute theoretically by developing a collaboration model grounded in effective communication and nursing leadership in the digital era. Practically, the findings provide a foundation for policymakers to establish digital communication training programs, strengthen technology based collaboration protocols, and optimize the role of nurses as team leaders to improve service quality and patient safety sustainably.

## 2. METHOD

This study employed a descriptive-analytic design with a cross-sectional approach to investigate the relationship between healthcare workers' perceptions of effective communication and the implementation of interprofessional collaboration (IPC). The research was conducted at a Primary Healthcare Center from June to August 2025, involving a total population of 152 active healthcare personnel, including physicians, nurses, midwives, pharmacists, laboratory staff, nutritionists, and medical record officers. A total sampling technique was utilized to capture a comprehensive representation of all professionals engaged in collaborative practices within the facility. Participants were selected based on inclusion criteria requiring at least six months of consecutive employment and the provision of written informed consent. Ethical approval for the study was granted by the Health Research Ethics Committee under Protocol Number 25-07-1614 and Ethical Clearance Number 1253/KEPK.F1/ETIK/2025.

Data were collected using a closed-ended Likert scale questionnaire, ranging from 1 to 5, which was developed based on the effective communication framework by Mackie et al. (2021) and Vermeir et al. (2015); and the IPC model by Moncatar et al. (2021), Elliot et al. (2025) and Bouton et al. (2023). The instrument was specifically modified to align with digital health practices and primary care settings. It comprised two primary sections: the first assessed perceptions of effective communication, including information clarity, timeliness, and digital platform adaptation; the second evaluated IPC implementation, focusing on role distribution, cooperative work processes, and coordination mechanisms. Instrument validity and reliability were established through expert judgment and a pilot test involving 10 respondents who were not part of the final sample, yielding a Cronbach's alpha value greater than 0.7.

The analytical process involved descriptive statistics to characterize respondent profiles and variable distribution. To examine the relationship between healthcare workers' perceptions of effective communication and the implementation of interprofessional collaboration, a chi-square test was applied. Odds Ratio (OR) with a 95% confidence interval was calculated to assess the strength of association. The chi-square test was used because both perceived communication effectiveness and interprofessional collaboration were analyzed as categorical variables.

## 3. RESULTS AND DISCUSSION

### 3.1. Results

The initial stage of the analysis focused on assessing the individual distribution of the primary variables. The first variable evaluated was the healthcare workers' perceptions regarding the effectiveness of interprofessional communication within the digital health framework. The frequency distribution of these perceptions is summarized in Table 1.

**Table 1**

*Frequency Distribution of Healthcare Workers' Perceptions of Effective Communication (n=152)*

Perception of Effective Communication	Frequency (n)	Percentage (%)
Less Effective	68	44.7
Effective	84	55.3

Based on the data presented in Table 1, 55.3% of healthcare workers perceived interprofessional communication as effective, while 44.7% considered it less effective. This relatively balanced proportion

indicates that while a majority reported positive perceptions, significant communication challenges persist within the primary healthcare setting. The fact that nearly half of the respondents rated communication as "less effective" underscores the presence of barriers, such as information distortion and unclear instructions that require targeted intervention to optimize digital healthcare practice.

Following the assessment of communication, the study examined the implementation of interprofessional collaboration (IPC) among the participants. This analysis categorizes the quality of collaborative practices as either "Good" or "Poor" based on role distribution, cooperation, and coordination mechanisms. The results of this distribution are presented in Table 2.

**Table 2**

*Frequency Distribution of Interprofessional Collaboration Implementation (n=152)*

Interprofessional Collaboration Category	Frequency (n)	Percentage (%)
Poor	68	44.7
Good	84	55.3

The findings in Table 2 show that 55.3% of healthcare workers rated interprofessional collaboration as "good," whereas 44.7% rated it as "poor." This distribution pattern is identical to the perceptions of effective communication, suggesting a strong parallel between how staff communicate and how they collaborate. While the results indicate that IPC is generally functioning well, the substantial percentage of "poor" ratings highlights a critical need for improvement in digital coordination and team-based work processes.

The bivariate analysis was conducted to determine the statistical relationship between the perceived effectiveness of communication and the actual implementation of interprofessional collaboration. By cross-tabulating these two variables, the study aimed to identify if higher communication quality correlates with better collaborative outcomes. The results of this relationship are detailed in Table 3.

**Table 3**

*Relationship between Perception of Effective Communication and Interprofessional Collaboration*

Perception of Effective Communication	IPC: Poor n (%)	IPC: Good n (%)	Total n (%)	P-value	OR (95% CI)
Less Effective	48 (70.6%)	20 (29.4%)	68 (100%)	0.011	7.680
Effective	20 (23.8%)	64 (76.2%)	84 (100%)		(1.805–32.676)
Total	68 (44.7%)	84 (55.3%)	152 (100%)		

As shown in Table 3, among the 68 respondents who perceived communication as less effective, 70.6% reported poor interprofessional collaboration. In contrast, among the 84 respondents who perceived communication as effective, 76.2% reported good collaboration. The chi-square statistical test yielded a p-value of 0.011 ( $p < 0.05$ ), confirming a significant relationship between healthcare workers' perceptions of effective communication and IPC implementation. Furthermore, the Odds Ratio (OR) of 7.680 indicates that healthcare workers who perceive communication as effective are 7.68 times more likely to engage in successful interprofessional collaboration compared to those with negative perceptions. These results are further supported by field observations citing that addressing digital platform delays and reducing professional dominance can significantly enhance team synergy.

### 3.2. Synergy between Effective Communication and Interprofessional Collaboration in the Digital Era

The findings of this study demonstrate a statistically significant relationship between perceptions of effective communication and the implementation of interprofessional collaboration (IPC), yielding a p value of 0.011 and an Odds Ratio (OR) of 7.680. This indicates that healthcare professionals who perceive communication as effective are 7.68 times more likely to demonstrate high quality collaborative practices. This result reinforces the theoretical framework suggesting that clear, open, and responsive communication constitutes the primary foundation for successful collaboration among various professions. Within digital health settings, the effectiveness of collaboration is increasingly dependent on the ability of the team to adapt their communication through diverse digital platforms.

Theoretically, this finding aligns with the collaboration dimensions proposed by Orchard et al. (2018), Bouton et al. (2023) and Al-Twigey & AL-Fayyadh (2024) which include partnership, cooperation, and coordination. Effective communication facilitates distinct role distribution and synergistic work processes within the healthcare team. Research by Norful et al. (2022) and Dellafiore et al. (2025) further confirms that open communication is an absolute prerequisite for successful collaboration in primary healthcare settings. Without standardized communication protocols, the risk of medical instruction miscommunication and coordination failure increases significantly, which ultimately compromises patient safety outcomes.

In the digital ecosystem, coordination no longer relies solely on face to face interaction but also on real time information exchange through management information systems. Erku et al. (2023), Grant et al. (2024) and Ferreira et al. (2025) emphasize that team effectiveness in primary care is heavily determined by the ability to integrate clinical data digitally. The results showing that 55.3 percent of respondents (n=84) hold positive perceptions toward communication and collaboration reflect an emerging technological adaptation in primary care environments. Consequently, strengthening digital communication competence is a determinant factor for future team collaboration success in the era of digital health transformation.

### 3.3. Digital Communication Challenges and Professional Hierarchy Dynamics

Although the majority of respondents provided positive assessments, the study identified that 44.7 percent of healthcare workers (n=68) still encounter significant barriers in communication and collaboration. Dominant obstacles include the miscommunication of medical instructions, professional dominance in clinical decision making, and limited digital team discussion forums. These barriers suggest that communication is influenced not only by technical aspects or infrastructure but also by organizational culture and rigid professional hierarchy structures.

Hald et al. (2021) and Noyes (2022) noted that hierarchical communication structures often reduce collaborative effectiveness because team members may feel hesitant to provide feedback or express opinions openly. Furthermore, Nordmann et al. (2023) and Dib & Belrhiti (2025) emphasize that gaps in digital platform understanding and the absence of clear interprofessional communication protocols often trigger technology integration failures within healthcare teams.

Another challenge is the reliance on informal messaging platforms such as WhatsApp for professional tasks. This finding is supported by Montgomery et al. (2024) and Glenton et al. (2024), healthcare professionals prefer informal communication due to convenience and routine. However, dependence on informal tools without professional documentation standards poses risks of information distortion and workflow delays. Yousefi et al. (2025) also added that failures in implementing advanced technology like artificial intelligence in primary care are often rooted in weak communication integration among different professions.

### 3.4. The Strategic Role of Nursing Leadership as Digital Service Coordinator

Nurses play a strategic role as care coordinators and primary facilitators of interprofessional communication due to their high intensity interactions with patients and other health professions. The findings highlight that communication barriers and coordination failures often emerge when there is a lack of strong facilitation from clinical leaders or senior nurses in managing team dynamics. Therefore, nursing leadership is a critical factor in fostering inclusive communication and ensuring digital technology is utilized collaboratively for the benefit of patients.

This leadership role is reinforced by Laukka et al. (2023) and Wymer et al. (2023), which states that nursing leadership is a fundamental element in the successful implementation of digital technology in healthcare. Nurses acting as digital mediators can accelerate clinical decision making processes and reduce medical error risks through optimal digital platform utilization. Research by Li et al. (2023) and Khan et al., (2024) demonstrates that supportive leadership styles can enhance knowledge sharing behavior among medical staff, which directly strengthens team collaboration.

Furthermore, Stucky et al. (2022), Schilling et al. (2022) and Ominyi et al. (2025) emphasize that transformational nursing leadership can build interprofessional trust and reduce hierarchical dominance. With nurses possessing strong informatics competence and digital leadership skills, the integration of technologies such as electronic medical records and telemedicine can proceed more smoothly. These findings underscore that successful digital transformation in primary care requires more than just sophisticated infrastructure; it necessitates clinical leaders who can guide the team toward a collaborative and transparent digital work culture.

## 4. CONCLUSION

This study concludes that effective communication among healthcare professionals is a key factor associated with successful interprofessional collaboration within the digital transformation era. Analysis of 152 participants indicates that positive perceptions of communication significantly increase the likelihood of achieving high quality collaboration. This research offers a theoretical contribution through the development of a collaboration model emphasizing nursing leadership and digital literacy in primary care settings. Practically, these findings serve as a foundation for policy development regarding technology based communication protocols to improve healthcare service quality sustainably.

The primary limitation of this study lies in the cross sectional design, which restricts the ability to infer definitive causal relationships between communication and collaboration variables. Data collection relying on self reported perceptions may also be influenced by subjective interpretation or professional

hierarchies within the workplace. Furthermore, since the research was conducted at a single primary healthcare facility, the findings may not fully represent other settings with different staffing patterns or digital maturity levels.

Future research is encouraged to employ longitudinal designs or mixed method approaches to provide a deeper understanding of team collaboration dynamics over time. Expanding the research scope to multiple primary healthcare centers would improve the generalizability of the results. Additionally, further studies should focus on evaluating the effectiveness of specific digital literacy training programs for healthcare professionals to minimize communication barriers and strengthen interprofessional synergy in the future.

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