ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 4, Issue 9, Month: March 2025, Available at: https://hijnrp.journals.ekb.eg/

From Access to Usability: Telehealth Challenges and Opportunities Among Nursing Professionals

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Abstract:

Background: The rapid advancement of digital technologies has ushered in a new era for healthcare delivery, with telehealth emerging as a vital tool for enhancing access, continuity, and efficiency of care. **Aim**: Assess the perceptions of nurses and nurse managers regarding the challenges and opportunities associated with telehealth integration in nursing practice. **Design**: Descriptive cross-sectional study design was employed. **Setting**: The study was conducted using an online platform to reach a geographically diverse sample of registered nurses and nurse managers. **Subjects**: A total of 535 participants were recruited for the study, comprising 100 nurse managers and 435 staff nurses. **Data collection**: The study used Telehealth Usability Questionnaire (TUQ), a standardized and validated tool. **Results**: Pparticipants reported relatively high scores for Usefulness (Total Mean = 5.15 ± 0.94) and Ease of Use (Total Mean = 4.77 ± 1.13), suggesting positive perceptions of telehealth usability. **Conclusion**: There was a statistically significant positive correlation between telehealth usability and years of experience (**p = 0.04**). There were no significant correlations found with gender (**p = 0.08**) or age group (**p = 0.12**). **Recommendations:** Develop and implement a national telehealth capacity-building program that includes standardized training for all levels of nursing staff, focusing on technical skills, communication competencies, and ethical guidelines.

Keywords: Challenges, Opportunities, Nurse Managers, Nurses, Nursing Practice, Telehealth

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Introduction:

The rapid advancement of digital technologies has ushered in a new era for healthcare delivery, with telehealth emerging as a vital tool for enhancing access, continuity, and efficiency of care. In nursing practice, the integration of telehealth has become increasingly essential, especially in the wake of the COVID-19 pandemic, which accelerated the adoption of remote healthcare solutions worldwide (**Omboni et al., 2022).**

The COVID-19 pandemic served as a powerful catalyst for the transformation of nursing practice through telehealth, triggering widespread adoption of remote care models (**Abdolkhani et al., 2022**). Virtual nursing units, like those implemented at Vanderbilt University Medical Center and Froedtert, have emerged to provide experienced nurses remote oversight of bedside activities, offloading time-intensive tasks from in-person staff (**Clipper, 2023).**

Early outcomes demonstrate reduced burnout, improved mentoring, and enhanced patient satisfaction through virtual admission and discharge processes. These findings underscore the operational benefits of telehealth yet underscore a deeper managerial imperative: leadership support is essential for these models to transition from crisis stopgaps to sustainable practice (**Bannon, 2023).**

For nurse managers, the variables central to telehealth integration lie in perceived challenges—such as technological infrastructure deficits, workflow disruption, training insufficiencies, legal ambiguities, cybersecurity threats, and equity concerns—and opportunities, including operational efficiency, enriched patient engagement, and new mentorship avenues. Systematic reviews and national studies have cataloged these barriers: lack of integrated digital systems creates communication breakdowns and limited legal clarity stifles implementation. Meanwhile, benefits like remote discharge planning, facilitated chronic care, and staff flexibility have been certified as not only feasible but desirable by frontline teams and managers alike (**Olivencia, 2023).**

The role of **nurse managers** as both strategic and operational leaders has grown increasingly centrally. They are responsible for aligning institutional telehealth policies with clinical operations and staff capabilities. A qualitative study of hospital nurse leaders highlights how these managers lead transformational change through constant communication, coaching, and relationship building within technology-mediated teams—balancing remote leadership via platforms like Microsoft Teams and in-person interactions to build trust and maintain presence.

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These findings reinforce the idea that managerial engagement is not just a variable but a pivotal mechanism for telehealth integration (**Ogunkoya, 2024).**

One persistent challenge identified by nurse managers is the lack of comprehensive infrastructure and training. Digital health rollouts during COVID-19 often bypassed informatics teams, leaving frontline staff and managers to scramble for workarounds (**Chagani, 2024).** Countries like Italy report fragmented digital ecosystems and regulatory ambiguity—managers face unclear data governance, partial interoperability, and inconsistent reimbursement policies, impeding seamless integration. These technical and regulatory challenges amplify administrative burdens on nurse managers, limiting the health's potential (**Arner et al., 2022).**

Virtual care also challenges existing nursing workflows. Staff report time-consuming setup processes, fragmented team communication, and missing integration with auxiliary services like social work or interpretation—issues greatly felt by managers ensuring quality of care. Remote modalities like RPM generate large data flows, requiring managers to redesign rolls around data interpretation and interdepartmental coordination. This reshaping of task assignments and communication structures is both an opportunity and a complexity (**Thomas, 2024).**

Ethical, legal, and equity concerns permeate managerial perceptions. Telenursing introduces new accountability dilemmas—licensure across jurisdictions, security of electronic records, and ensuring patient autonomy and confidentiality in remote settings. Managers must also confront digital disparities: rural, elderly, or Medicaid populations often face connectivity barriers and literacy challenges that hamper equitable telehealth access. Addressing these requires managerial oversight, policy-making agility, and resource targeting (**Schweickert et al., 2024).**

Yet, the **opportunities** perceived by managers are equally compelling. Telehealth opens pathways for operational gains: at Duke University, virtual nursing reduced discharge delays from 5.7 to 2.8 hours while maintaining high satisfaction scores. Audio-only models have supported chronic disease management in underserved communities—even when video was not feasible—and managers observe broad organizational impacts from reduced staffing pressure to enhanced patient interaction continuity (**White, 2022).**

Despite promising outcomes, nurse managers express caution against precipitous adoption. Leadership literature emphasizes that change fatigue, workforce burnout, and

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sustainability issues emerge without evidence-based strategy, workflow integration, and outcome tracking. Managers advocate for pilot testing, readiness assessments, and phased implementation supported by outcome data—turning telehealth from a pandemic fix into a core delivery mode (**Rosamond, 2023).**

Most notably, there remains a significant **research gap**: while dozens of studies examine patient or frontline nurse experiences, few focus on nurse managers' perspectives on **both** challenges and opportunities. Their dual role in operationalizing telehealth while guiding teams offers a unique advantage that can inform institutional frameworks, educational needs, and policy direction. Studies in Turkey, Australia, Canada, and Italy pinpoint managerial strain, empowerment, and regulatory frustration—but lack systematic qualitative exploration of their evolving role (**Agarwal et al., 2022).**

By centering nurse managers' perceptions, this study fills a critical gap in understanding the leadership dimension of telehealth integration. It explores the two primary variables—perceived challenges and opportunities—through a lens that captures strategic planning, workforce development, ethical oversight, and equity considerations. These insights promise to support scalable, equitable, and sustainable telehealth models anchored in leadership readiness, infrastructure investment, and continuous quality improvement—ensuring that digital health becomes not only innovative, but also intentional and inclusive in nursing practice.

Aim of the study

The present study aimed to assess the perceptions of nurses and nurse managers regarding the challenges and opportunities associated with telehealth integration in nursing practice.

Research questions: -

This study was answered the following question: -

What are nurses and managers' perception of challenges and opportunities associated with telehealth integration?

Material and Methods

Study Design:

This descriptive cross-sectional study design was employed to comprehensively assess the perceptions of nurses and nurse managers regarding the challenges and opportunities associated with telehealth integration in nursing practice. This design is suitable for providing a broad overview of the current perceptions within the target population at a specific point in time,

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identifying key variables, and exploring potential relationships between them. Given the exploratory nature of examining telehealth integration in this context, this design allows for a detailed description of the phenomena as perceived by the participants.

Setting and Participants:

The study was conducted using an online platform to reach a geographically diverse sample of registered nurses and nurse managers currently working in clinical settings where telehealth technologies are applied or considered for implementation. This online approach was chosen to facilitate data collection during potential restrictions (e.g., pandemics) and to enhance the accessibility for nurses working in various locations. Inclusion criteria were established to ensure the relevance of participants' experiences: licensed nurses with a minimum of six months of work experience in a clinical setting and access to online communication platforms. The minimum work experience criterion was included to ensure that participants had sufficient exposure to professional nursing practice to provide informed perspectives on telehealth integration.

Sample Size:

A total of 535 participants were recruited for the study, comprising 100 nurse managers and 435 staff nurses. This sample size was deemed adequate to provide a representative view of perceptions within the target population and allowed for meaningful comparisons between the two groups (nurse managers and staff nurses).

Data Collection Tool:

To assess participants' perceptions regarding the usability of telehealth services, the study employed the Telehealth Usability Questionnaire (TUQ), a standardized and validated tool developed by **Parmanto et al. (2016).** The TUQ consisted of 21 items distributed across six key domains: Usefulness, Ease of Use and Learnability, Interface Quality, Interaction Quality, Reliability, and Satisfaction and Future Use. Each item is rated on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree), with higher scores indicating greater perceived usability. The score for each domain is calculated by averaging the responses to the items within that domain, while the overall usability score is computed as the average of all 21 items. Scoring system:

- Scores from **1.0 to 3.9** reflect **low usability** (negative perception),
- Scores from **4.0 to 4.9** indicate a **neutral to moderate usability** perception,
- Scores from **5.0 to 7.0** suggest **high usability** (positive perception).

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The questionnaire was pilot tested with a small group of nurses (n=50) who were similar to the target population to ensure clarity, face validity, and ease of use. Feedback from the pilot test was used to refine the questionnaire before full deployment. The reliability of the adapted questionnaire was assessed using Cronbach's alpha, and the results indicated acceptable internal consistency (Cronbach's alpha = 0.82).

Data Collection Procedure:

The online survey was distributed over a four-week period via email and social nursing forums to maximize reach and participation. An introductory message accompanied the survey link, explaining the study's purpose, assuring confidentiality, and providing contact information for the researchers. Informed consent was obtained electronically from all participants prior to their participation in the study. Participants were informed that their participation was voluntary and that they could withdraw at any time without penalty. Reminder emails were sent at one-week intervals to increase the response rate.

Ethical Considerations:

Ethical approval was obtained from Faculty of nursing, Helwan University No. [46 - 27/1/2025] prior to the commencement of data collection. The study adhered to the ethical principles of respect for persons, beneficence, and justice. Participation was voluntary, and informed consent was obtained from all participants. Anonymity was ensured by collecting data without any personal identifiers. Confidentiality was maintained throughout the study; data were stored securely and accessed only by the researchers. Participants were informed of their right to withdraw from the study at any time.

Data Analysis:

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 28. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participants' demographic characteristics and their responses to the questionnaire. Categorical data were presented as frequencies and percentages, while continuous data were presented as means and standard deviations. Comparisons between nurse managers and staff nurses were conducted using independent sample t-tests for continuous variables (e.g., TUQ scores) and chi-square tests for categorical variables (e.g., telehealth utilization). The significance level was set at $p < 0.05$ for all statistical tests.

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Results

Table 1: Demographic Characteristics of Participants (n = 535)

Variable	Category	Nurse Managers (n=100)	Staff Nurses (n=140)	Total (n=435)
Gender	Male	28 (28.0%)	131 (30.1%)	159 (29.7%)
	Female	72 (72.0%)	304 (69.9%)	376 (70.3%)
Age (years)	20–30	15 (15.0%)	125 (28.7%)	140 (26.2%)
	31–40	45 (45.0%)	186 (42.8%)	231 (43.2%)
	41–50	30 (30.0%)	93 (21.4%)	123 (23.0%)
	>50	10 (10.0%)	31 (7.1%)	41 (7.7%)
Experience (years)	<5	10 (10.0%)	93 (21.4%)	103 (19.3%)
	5–10	35 (35.0%)	190 (43.7%)	225 (42.1%)
	>10	55 (55.0%)	152 (34.9%)	207 (38.7%)

Table 1 presents the demographic characteristics of the 535 participants in this study. The majority of participants were female (70.3%), reflecting the gender distribution typically observed in the nursing profession. The age distribution shows that the largest group of participants was between 31-40 years (43.2%), indicating a workforce with a substantial proportion of mid-career professionals. In terms of experience, the highest proportion of nurses had 5-10 years of experience (42.1%), suggesting a relatively experienced sample.

Table 2: Utilization of telehealth services by studied subjects (n = 535)

Telehealth Variable	Nurse Managers (%)	Staff Nurses (%)	Total (%)
Using telehealth generally	27%	48%	44.0%
Using telehealth during COVID-19	82%	68%	70.5%
Use of smartphones for telehealth	91%	93%	92.6%
Synchronous communication method	61%	59%	59.4%
Preferred platform: WhatsApp	70%	64%	65.1%
Telehealth training received	48%	37%	39.0%

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Table 2 illustrates the utilization of telehealth services among the participants. 44.0% reported using telehealth generally, while a significant percentage of all participants (70.5%) reported using telehealth during the COVID-19 pandemic, highlighting the rapid adoption of this technology in response to the crisis. Notably, the use of smartphones for telehealth was very high across both groups, with 92.6% of total participants utilizing smartphones. WhatsApp was the preferred platform for telehealth communication (65.1%). However, only 39.0% of the total participants reported receiving telehealth training, indicating a potential gap in formal preparation for telehealth implementation. These findings suggest that while telehealth use is common, particularly via smartphones, formal training may be an area needing improvement.

Table 3: Mean scores of telehealth domains among studied subjects (n = 535)

TUQ Domain	Nurse Managers (Mean ± SD)	Staff Nurses (Mean ± SD)	Total (Mean ± SD)
Usefulness	5.35 ± 0.84	5.10 ± 0.97	5.15 ± 0.94
Ease of Use	5.05 ± 1.05	4.70 ± 1.15	4.77 ± 1.13
Interface Quality	5.22 ± 0.98	4.85 ± 1.04	4.92 ± 1.03
Interaction Quality	4.65 ± 1.15	4.40 ± 1.20	4.45 ± 1.19
Reliability	4.50 ± 1.22	4.20 ± 1.18	4.26 ± 1.19
Satisfaction & Future Use	5.00 ± 1.10	4.75 ± 1.15	4.80 ± 1.14

Table 3 presents the mean scores for the Telehealth Usability Questionnaire (TUQ) domains. Overall, participants reported relatively high scores for Usefulness (Total Mean = 5.15 ± 0.94) and Ease of Use (Total Mean = 4.77 ± 1.13), suggesting positive perceptions of telehealth usability. However, the Interaction Quality and Reliability domains received slightly lower mean scores (Total Mean = 4.45 ± 1.19 and 4.26 ± 1.19, respectively), indicating potential areas for improvement in these aspects of telehealth systems. Nurse managers tended to have slightly higher mean scores across all domains compared to staff nurses, suggesting more favorable perceptions, although the practical significance of these differences should be considered.

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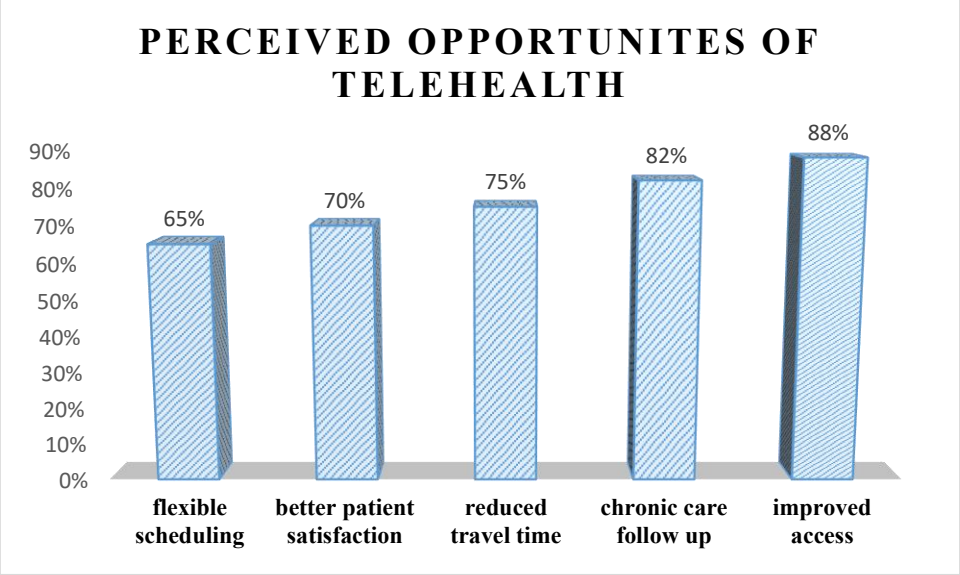

Figure 1: Perceived Opportunities of Telehealth

Figure 1 illustrates the perceived opportunities of telehealth as reported by the participants. The findings indicate that flexible scheduling (65%) and improved access (88%) were identified as the greatest opportunities. This suggests that nurses highly value the flexibility and increased reach that telehealth offers. All the opportunities listed were perceived positively by a majority of participants, with over 65% agreement, highlighting an overall optimistic view of telehealth's potential benefits.

Table 4: Challenges faced by studied subjects in telehealth implementation (n = 535)

Challenge	Frequency (n)	Percentage (%)
Poor Internet service	357	66.7%
Limited technical skills	323	60.4%
Patient non-cooperation	301	56.3%
Lack of institutional support	268	50.0%
Time constraints due to workload	257	47.9%
Lack of training programs	234	43.8%
Legal and ethical concerns	178	33.3%

Table 4 details the specific challenges encountered by nurses in telehealth implementation. Poor internet service was the most significant challenge, reported by 66.7% of nurses (n=357). Limited technical skills (60.4%, n=323) and patient non-cooperation (56.3%, n=301) were also prevalent. Additionally, half of the nurses reported facing a lack of institutional support (50.0%, n=268), and time constraints due to workload (47.9%, n=257). Lack of training programs and legal/ethical concerns were also reported, though to a lesser extent. These results underscore the multi-faceted nature of the obstacles hindering effective telehealth implementation.

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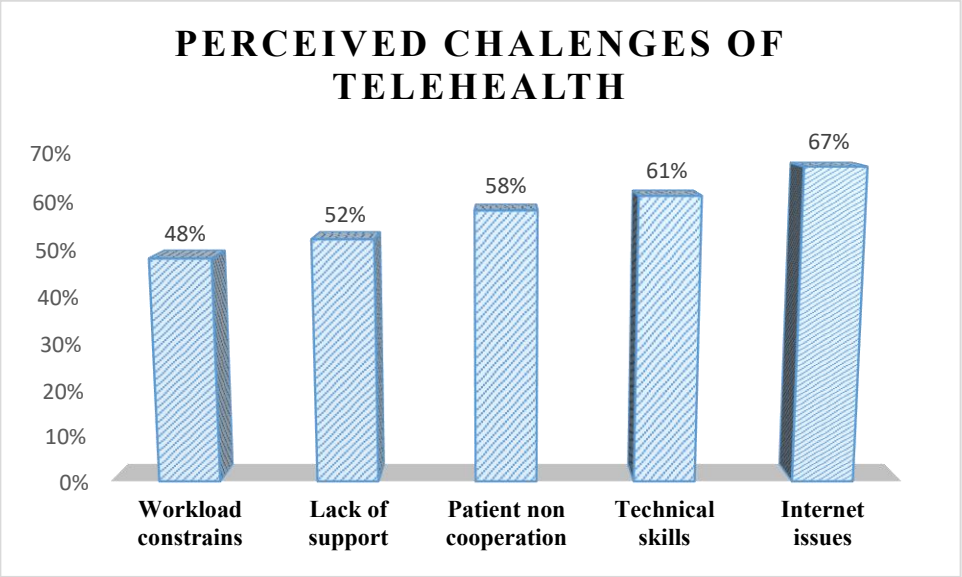

Figure 2: Perceived challenges of Telehealth

Figure 2 presents the perceived challenges faced by nurses in telehealth implementation. Poor internet service was the most frequently reported challenge (66.7%) , followed by limited technical skills (60.4%). Patient non-cooperation was also a substantial challenge, reported by 56.3% of the participants. These findings highlight significant obstacles that need to be addressed to ensure successful telehealth integration. The relatively high percentages across all challenges indicate that multiple factors are impeding the smooth implementation of telehealth.

Table 5: Relationship between TUQ Score and sociodemographic data

Variable	Category	Mean TUQ Score	SD	*p*-value
Gender	Male	5.10	0.90	0.08
	Female	5.30	0.87	
Age Group	20–30 years	5.05	0.95	0.12
	31–40 years	5.25	0.91	
	41–50 years	5.35	0.89	
Experience	<5 years	4.95	0.98	0.04 *
	5–10 years	5.20	0.93	
	>10 years	5.40	0.84	

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Helwan International Journal for Nursing Research and Pratctice
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Table 5 examines the relationship between the overall TUQ score and selected demographic variables. The results revealed a statistically significant difference in TUQ scores based on experience level ($p = 0.04$). Specifically, nurses with less than 5 years of experience reported significantly lower TUQ scores (Mean = 4.95) compared to those with 5-10 years (Mean = 5.20) and those with more than 10 years of experience (Mean = 5.40). This suggests that more experienced nurses tend to have more positive perceptions of telehealth usability. No statistically significant differences were found in TUQ scores based on gender or age group. These findings indicate that experience level may be an important factor influencing nurses' acceptance and perception of telehealth technology.

Discussion:

The purpose of this study was to assess the perceptions of nurses and nurse managers regarding the challenges and opportunities associated with telehealth integration in nursing practice through assessing the nurses and managers' perception of opportunities associated with telehealth integration and assessing the nurses and managers perception of challenges associated with telehealth integration.

The findings indicated that near to three quarters of participants were female, aligning with global and regional nursing workforce trends. This gender predominance is consistent with the traditional feminization of the nursing profession, particularly in Arab countries where nursing remains a female-dominated field. The results reflect cultural norms and educational trends where women are more likely to pursue nursing careers in Egypt.

In agreement, a study by **Alenezi et al. (2023)** on workforce demographics in Saudi hospitals found that approximately 74% of nurses were female. Likewise, WHO's 2021 State of the World's Nursing Report confirmed that women represent 90% of the global nursing workforce (**Llop-Gironés et al., 2021**). In contrast, a study in Ethiopia showed a more balanced gender distribution, attributed to targeted recruitment of male nurses to address gender disparities and improve workforce diversity (**Berhanu Hundera et al., 2024).**

Concerning Age Distribution, the largest section of participants was aged between 31–40 years with more than two fifths, indicating a relatively young yet experienced workforce. This age group may reflect the career peak where clinical competence, managerial potential, and adaptability to innovation like telehealth are often observed. As regard Experience Level A significant portion of participants had between 5–10 years of experience (42.1%), followed by those with more than 10 years (38.7%). This reflects a mature workforce with substantial clinical exposure, which is crucial for adopting and implementing new technologies like telehealth.

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As regards Telehealth Utilization During the COVID-19 pandemic, nearly three quarters of participants reported telehealth use, indicating an urgent and widespread adoption. Interestingly, staff nurses nearly half reported higher general telehealth use than nurse managers (more than one quarter, suggesting differing roles in direct patient care versus administrative oversight. These findings are consistent with the work of **Hao et al., (2022).** in South Korea, which showed increased telehealth adoption among bedside nurses during the pandemic due to infection control measures. Contrasting results were found by **Laukka et al., (2023).,** where nurse managers demonstrated higher engagement with telehealth platforms, attributed to their role in coordination and digital health leadership.

Regarding Telehealth Training Only more than one third of participants had received formal telehealth training, highlighting a significant barrier to effective integration. Nurse managers reported slightly higher training rates (48%) compared to staff nurses (37%). This gap may limit the ability of nursing staff to deliver care confidently and safely via digital platforms. Similar challenges were reported by Alruwaili et al., (2024). in Saudi Arabia, who noted that over 60% of nurses lacked formal telehealth training, despite high usage rates. In contrast, a U.S.-based study by **Lavoie-Tremblay et al. (2024)** found that over 75% of nurses had undergone institutional telehealth training, which correlated positively with higher satisfaction and usability scores.

Regarding TUQ Domain Scores Participants showed generally positive perceptions of telehealth, particularly regarding usefulness (Mean = 5.15) and ease of use (Mean = 4.77), though interaction quality (4.45) and reliability (4.26) were rated lower. Nurse managers had slightly higher ratings across all domains, which may reflect their broader exposure to the system's strategic aspects.

These findings align with the work of **Vaismoradi et al., (2024).**, who found that nurses valued the convenience and speed of telehealth but were concerned about system stability and patient communication. However, in a study by **Pedersen et al., (2023).**, nurses rated interaction quality significantly higher, potentially reflecting better infrastructure and training support in high-income countries.

Perceived Opportunities of Telehealth the majority of Participants strongly recognized improved access (and flexible scheduling nearly two thirds as major opportunities. This suggests that telehealth enhances equity and convenience in care delivery, particularly in resource-limited or rural areas. These findings are consistent with the observations of **Abdallah et al., (2024).** in Egypt, who emphasized telehealth's role in bridging geographic barriers to care.

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Conversely, in a study by **Du et al., (2022)** in China, access was not a major concern due to already well-developed infrastructure; instead, focus was placed on efficiency and patient satisfaction.

Regarding Perceived Challenges of Telehealth Poor internet connectivity two thirds limited technical skills more than three fifths, and patient non-cooperation more than half were the top challenges reported. These issues highlight the infrastructural and human factors hindering telehealth success in Egypt. In agreement, a study by **Hussein & Ahmad, (2024).** in Alexandria highlighted similar challenges, particularly emphasizing the burden of unreliable internet on nurse morale and service quality. However, a contrasting study by **Kang et al.,cvxwsq12 (2024).** in South Korea found that while technical challenges were minimal, ethical concerns and patient data privacy were top concerns—reflecting contextual variations in telehealth implementation hurdles.

TUQ Scores by Experience A statistically significant difference in TUQ scores was observed based on experience level ($p = 0.04$), with more experienced nurses reporting higher usability scores. This suggests that professional maturity and repeated exposure to clinical systems foster more positive perceptions of digital tools. These findings echo those of **Alotaibi et al., (2023).** in Saudi Arabia, who found a strong positive correlation between years of nursing experience and telehealth confidence. In contrast, **Kamei et al., (2024).** in Japan found no significant correlation between years of experience and telehealth satisfaction, attributing this to mandatory digital literacy training for all nursing staff, regardless of tenure.

TUQ Scores by Gender and Age no statistically significant differences were found in TUQ scores by gender or age group, indicating that perceptions of telehealth usability are relatively uniform across these demographics. This neutrality supports the findings of **Majumdar et al., (2023).** in India, who also reported no gender or age-based disparities in telehealth attitudes among nurses. On the other hand, **Zarei et al., (2025).** in Iran found slightly higher usability scores among younger nurses, linking it to their higher digital fluency and openness to technology.

Conclusion

found that while telehealth is increasingly used by nurses—mainly through smartphones and apps like WhatsApp—its general use remains limited due to lack of training, poor internet service, and technical challenges. Nurses viewed telehealth as useful and easy to use, though issues with reliability and communication persist. There was statistically significant positive correlation found between telehealth usability and years of experience (**$p = 0.04$**). there were no significant correlations were found with gender (**$p = 0.08$**) or age group (**$p = 0.12$**).

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Implications for Practice:

To advance the effective integration of telehealth in nursing practice, it is essential to strengthen telehealth education through targeted training programs that address both technical proficiency and interpersonal communication in virtual care. Particular focus should be given to improving nurses' competence in domains that scored lower, such as interaction quality and system reliability. These programs should be integrated into both pre-service education and ongoing professional development, with attention to the needs of less experienced nurses who reported lower usability perceptions.

Equally important is the role of nurse managers in facilitating telehealth adoption. As they demonstrated more favorable perceptions across key usability domains, nurse leaders should be positioned as mentors and role models, guiding staff in best practices and troubleshooting challenges. Institutions should also foster a supportive infrastructure by investing in stable digital systems and formalizing telehealth protocols to ensure consistency and quality of care.

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