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Impact of Telemedicine in Nursing: Opportunities and Challenges

[1*]Babli Shama, [2]Sheetal Manhas, [3]Shriya Mahajan, [4]Daisy Das, [5]Dr. Soniya Rasheed A.
[1]Nursing Tutor, NEMCARE Institute of Nursing Sciences
*Corresponding Author Email ID: arubabli829@gmail.com
[2]Nursing Tutor, MM Institute of nursing & Research, Sadopur
Email ID: sheetalmanhas37@gmail.com
[3]Nursing Tutor, Stephens college of Nursing, Jammu
Email ID: shriya21117@gmail.com
[4]Nursing Tutor, NEMCARE Institute of Nursing Sciences
Email ID: daisy14das@gmail.com
[5]Assistant Professor, College of Health Sciences, University of Buraimi, Oman
Email ID: abdulrasheedsoniya@gmail.com

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Abstract
Telemedicine has rapidly evolved as a crucial tool for healthcare delivery, particularly in nursing, due to its ability to provide accessible care, especially in rural and underserved areas. This study examines the impact of telemedicine on nursing practices in North India, focusing on patient satisfaction, ease of access, and the challenges nursing professionals face. A quantitative analytical approach was adopted, with 210 respondents selected through stratified random sampling. The study found that age, education level, and internet access significantly affect patient satisfaction and ease of use. Younger respondents and those with higher education levels and internet access were more satisfied with telemedicine services. Furthermore, prior experience with telemedicine strongly predicted future use. While telemedicine presents substantial opportunities, technological challenges and disparities in digital literacy remain barriers to its widespread adoption. This research highlights the importance of enhancing digital literacy and expanding internet infrastructure to ensure equitable access to telemedicine services.

Keywords: *Telemedicine, nursing, patient satisfaction, digital literacy, rural healthcare, North India, internet access, technology adoption, healthcare disparities, telehealth*

1. Introduction

Telemedicine has surfaced as a revolutionary instrument in the realm of healthcare, holding a notably crucial position for nursing practitioners who stand at the vanguard of direct patient interaction. Through the utilisation of telemedicine, nursing professionals are able to provide healthcare services from a distance, broadening their accessibility beyond the confines of traditional medical establishments. This proves to be particularly advantageous in remote and underserved regions, where the availability of healthcare practitioners may be restricted. Telemedicine connects patients with healthcare professionals, facilitating prompt consultations, distance monitoring, and enhanced management of long-term conditions such as diabetes, hypertension, and asthma (Boro & Hariyati, 2019). Nurses are essential in leveraging telehealth platforms to oversee patient well-being, impart knowledge, and offer subsequent care, all of which enhance patient results.

The worldwide COVID-19 crisis greatly hastened the embrace of telehealth services. The implementation of physical distancing measures and the necessity to reduce face-to-face interactions resulted in an extraordinary increase in the adoption of telemedicine, fundamentally transforming the landscape of healthcare delivery globally. Nurses faced a demanding transition that necessitated swift adjustments to emerging technologies and evolving workflows. Telemedicine emerged as the foremost method for providing healthcare, particularly for individuals with long-term ailments requiring ongoing observation, yet unable to access medical facilities because of lockdowns or quarantine protocols (Leite et al., 2020). The swift embrace of telemedicine highlighted its capacity to improve the productivity and efficacy of healthcare frameworks, enabling nurses to deliver vital services while minimising the threat of COVID-19 spread.

While telemedicine offers numerous benefits, it also presents a variety of obstacles that need to be tackled to maintain its efficacy in the nursing field. A significant challenge lies in guaranteeing fair access to telehealth services. A significant number of patients, especially individuals residing in low-income or rural regions, might lack dependable internet connectivity or the necessary technological skills to successfully navigate telehealth platforms (Eberly et al., 2020). The gap in digital access can intensify current inequalities in healthcare, resulting in marginalised groups being inadequately supported. Moreover, safeguarding patient privacy and upholding secure data transfer are paramount issues, particularly given the rising reliance on digital platforms. With the increasing integration of telemedicine by healthcare professionals, it is imperative to enforce rigorous data security protocols to ensure the protection of patient information (Kaplan, 2020).

This study seeks to investigate the influence of telemedicine on the nursing profession, highlighting the potential benefits it offers for enhancing patient care as well as the obstacles it presents. Telemedicine holds significant importance in areas with constrained healthcare systems, where nurses are essential in delivering care via telehealth platforms.

1.1 Research Objectives

- To assess the overall satisfaction of patients with telemedicine services provided by nurses.
- To evaluate the ease of access to telemedicine across different demographic groups.
- To identify the technological challenges faced by nursing professionals using telemedicine.
- To explore the relationship between previous use of telemedicine and future utilization intentions.

1.2 Research Questions

1. How does patient satisfaction with telemedicine vary by age group?
2. Is there a correlation between education level and ease of access to telemedicine services?
3. Does internet access influence overall satisfaction with telemedicine services?
4. How does prior experience with telemedicine affect the likelihood of future use?

1.3 Hypotheses

- H1: Age significantly impacts patient satisfaction with telemedicine services.
- H2: Education level is positively correlated with ease of access to telemedicine.
- H3: Patients with consistent internet access report higher satisfaction with telemedicine.
- H4: Previous users of telemedicine are more likely to use it again in the future.

2. Literature Review

The incorporation of telemedicine within healthcare frameworks has been thoroughly examined, with an expanding collection of studies highlighting its capacity to markedly improve patient treatment. Albahri and colleagues (2021) emphasise the vital importance of telemedicine systems powered by the Internet of Things (IoT) in enhancing disease prevention and promoting health, especially by connecting healthcare providers with patients situated in remote or underserved regions. The ability to transcend geographical limitations stands out as a significant advantage of telemedicine, facilitating ongoing patient surveillance, prompt interventions, and a more holistic approach to healthcare provision. These elements are vital in curbing the progression of chronic illnesses and enhancing the overall health results of the population. In a similar vein, Bokolo (2020) emphasises that throughout the COVID-19 pandemic, virtual care emerged as a crucial element of healthcare delivery frameworks. During times when face-to-face meetings were limited or considered hazardous because of social distancing measures, telemedicine emerged as a practical solution, allowing patients to maintain access to essential care while safeguarding both their own health and that of healthcare professionals.

Prospects in Telehealth for Nursing Professionals

Telemedicine offers numerous significant prospects for nursing practitioners, especially in broadening their access to communities that are often challenging to engage. A significant benefit lies in the capacity to deliver medical services to remote and neglected regions, where healthcare facilities and access to skilled practitioners are frequently scarce. As noted by Contreras et al. (2020), telemedicine significantly improves the interaction between patients and providers by successfully removing the spatial obstacles that have historically hindered patients from obtaining prompt medical attention. The heightened involvement is especially crucial for nursing practitioners, who frequently assume a pivotal position in patient education and the management of chronic illnesses. Boro and Hariyati (2019) delve deeper into this topic by exploring the transformative impact of telenursing on the management of chronic health issues like diabetes, hypertension, and cardiovascular diseases. Healthcare professionals can leverage telehealth systems to oversee patients from a distance, offer guidance on lifestyle modifications, and guarantee compliance with medication regimens—resulting in improved health results. Fundamentally, telemedicine possesses the capability to broaden the horizons of nursing by enabling nurses to provide ongoing, anticipatory care, reaching even individuals residing in the most remote areas.

Obstacles Faced by Nursing in the Realm of Telemedicine

Despite its numerous benefits, telemedicine also introduces several challenges that healthcare providers, including nursing professionals, must navigate. One of the most pressing issues is the lack of technological literacy, which affects both patients and healthcare workers. Annaswamy et al. (2020) highlight that individuals with disabilities often face significant difficulties when attempting to use telemedicine platforms. This population requires specially adapted technologies to ensure they receive adequate care through remote platforms, and the failure to provide such accommodations can widen the gap in healthcare access. Additionally, patients who lack familiarity with digital devices or who do not possess adequate internet infrastructure may find it challenging to engage effectively in telemedicine consultations. Similarly, Haleem et al. (2021) argue that

many healthcare professionals, including nurses, may struggle with integrating telemedicine technologies into their daily workflows. For some, the transition from traditional in-person care to remote care has been abrupt and challenging, requiring adjustments in how patient assessments, documentation, and communication are conducted. For example, nurses may have to learn new systems and adopt different methods for conducting physical assessments virtually, such as guiding patients to self-report symptoms or using home-based medical devices. Moreover, the shift to telemedicine also introduces concerns about data security and patient confidentiality. Kaplan (2020) discusses the ethical and legal implications of telemedicine, particularly in safeguarding sensitive patient information

Telemedicine and the COVID-19 Pandemic

The COVID-19 pandemic served as a catalyst for the widespread adoption of telemedicine, which was swiftly integrated into healthcare systems worldwide. According to Wosik et al. (2020), the pandemic created an urgent need for virtual healthcare solutions, as physical distancing measures and the risk of virus transmission made in-person consultations difficult, if not impossible, in many cases. Telemedicine allowed healthcare systems to continue delivering care, particularly to vulnerable populations, while minimizing the risk of spreading COVID-19. For nurses, this shift was particularly impactful as they adapted to new technologies and workflows to manage patient care remotely. The rapid expansion of telemedicine during the pandemic also provided valuable insights into its effectiveness, particularly for managing chronic conditions. Chunara et al. (2021) point out that telemedicine enabled continuous monitoring and care for patients with chronic illnesses, who would have otherwise been left without support during lockdowns. Moreover, the pandemic highlighted the importance of flexibility in healthcare delivery. As nurses transitioned to telemedicine, they developed new skills in virtual communication, remote diagnostics, and digital record-keeping, which will remain relevant even as in-person care becomes more accessible post-pandemic. However, the shift to telemedicine also exposed weaknesses in healthcare systems, particularly in terms of access disparities and the digital divide.

Healthcare Disparities in Telemedicine

Although telemedicine presents a variety of remedies for numerous healthcare delivery obstacles, it has also unintentionally intensified the pre-existing inequalities in access to medical services. Chunara and colleagues (2021) discovered that marginalised communities and those hailing from economically disadvantaged backgrounds experienced reduced access to the advantages of telemedicine services throughout the COVID-19 pandemic. The investigators ascribe this difference to various elements, such as restricted availability of high-speed internet, insufficient digital proficiency, and a longstanding scepticism towards the healthcare system. The difficulties are especially evident in remote and marginalised regions, where the internet framework might be lacking, hindering patients' ability to participate in online consultations. This discovery aligns with the work of Eberly et al. (2020), who illustrated that telemedicine primarily advantages those with superior access to technology and elevated educational attainment. Individuals who are devoid of these essential resources face the danger of being further sidelined as healthcare systems progressively depend on digital platforms. Moreover, confidence in the healthcare framework significantly influences the accessibility of telemedicine services for individuals. Individuals from minority groups and those hailing from economically disadvantaged backgrounds might exhibit a diminished level of trust in telemedicine. This scepticism often stems from apprehensions regarding the calibre of care delivered via virtual platforms or past unfavourable encounters with healthcare professionals.

3. Methodology

Study Design and Approach

This research adopts a quantitative analytical approach, employing structured questionnaires to gather data from respondents in the North Indian region. The study focuses on nursing services provided via telemedicine platforms, assessing both patient satisfaction and ease of access while identifying challenges faced by nurses in delivering care through remote means. The study is cross-sectional in design, providing a snapshot of telemedicine's current impact on nursing within the region.

Study Area

The study was conducted in North India, focusing primarily on urban and semi-urban areas where telemedicine services have been actively promoted due to COVID-19 restrictions and infrastructure developments. Participants were recruited from healthcare facilities using telemedicine services for nursing care.

Sampling

The study employed a stratified random sampling method. A total of **210 respondents** were selected, ensuring a representative sample of patients who had accessed telemedicine services for nursing care within the last six months. The sample included a balanced mix of gender, age groups, and education levels to ensure diverse perspectives. Respondents were met personally for data collection, and responses were recorded in a structured format for later analysis.

Data Collection Instrument

Data were collected using a structured questionnaire that included demographic questions (age, gender, education, employment status, and internet access) and Likert-scale questions assessing telemedicine service satisfaction, ease of use, confidence in technology, and overall healthcare needs. The survey included **15 core questions** divided into 10 optional and 5 exploratory questions.

Variables Measured

- **Independent Variables**: Age, gender, education, employment status, internet access, previous use of telemedicine.
- **Dependent Variables**: Satisfaction with telemedicine, ease of access, confidence in using technology, likelihood of future use.

Statistical Methods

- **Descriptive Statistics**: Basic demographics (mean, frequency, percentage).
- **Hypothesis Testing**: ANOVA, chi-square, t-tests, and correlation analyses were used to assess relationships between variables.
- **Hypotheses**:
  - **H1**: Age significantly impacts patient satisfaction with telemedicine services.

- **H2**: Education level correlates with ease of access to telemedicine.
- **H3**: Internet access affects satisfaction with telemedicine.
- **H4**: Prior use of telemedicine predicts future use.

4. Data Analysis and Hypothesis Testing

4.1. Demographic Analysis

The demographic characteristics of the 210 respondents are presented in the table below. The sample included respondents aged between 18 and 65, with a nearly even gender distribution. The majority of respondents had internet access, and most were employed.

Table 1. Demographic profile of the respondents

Variable	Categories	Frequency	Percentage
Gender	Male	110	52.4%
	Female	100	47.6%
Age	18-29	60	28.6%
	30-45	80	38.1%
	46-60	50	23.8%
	60+	20	9.5%
Education Level	High School	50	23.8%
	Graduate	110	52.4%
	Postgraduate	50	23.8%
Employment Status	Employed	160	76.2%
	Unemployed	50	23.8%
Internet Access	Yes	150	71.4%
	No	60	28.6%
Previous Use of Telemedicine	Yes	100	47.6%
	No	110	52.4%

The demographic characteristics of the study's 210 respondents provide essential insights into the composition of the sample. As shown in Table 1, the gender distribution was nearly balanced, with 52.4% male (110 respondents) and 47.6% female (100 respondents). Age-wise, the majority of respondents (38.1%) were in the 30-45 age group (80 respondents), followed by 28.6% aged 18-29 (60 respondents), 23.8% aged 46-60 (50

respondents), and 9.5% aged 60 and above (20 respondents). In terms of educational background, 52.4% of respondents (110 individuals) held a graduate degree, with 23.8% each (50 individuals) having completed high school or possessing postgraduate qualifications. Employment status indicated that 76.2% of respondents (160 individuals) were employed, while 23.8% (50 individuals) were unemployed. Moreover, 71.4% (150 respondents) reported having internet access, while 28.6% (60 respondents) did not. Prior telemedicine usage was split almost evenly, with 47.6% (100 respondents) having previously used telemedicine services and 52.4% (110 respondents) having no prior experience.

4.2. Hypothesis Testing

H1: Age impacts satisfaction with telemedicine services.

- **Null Hypothesis (H0)**: Age does not significantly impact patient satisfaction with telemedicine services.
- **Alternative Hypothesis (H1)**: Age significantly impacts patient satisfaction with telemedicine services.

ANOVA Test

The ANOVA test was conducted to determine whether age affects satisfaction with telemedicine. Results indicate that age has a statistically significant effect on satisfaction levels, with younger respondents (ages 18-29) reporting higher satisfaction compared to older age groups.

Table 2. Age impacts satisfaction with telemedicine services.

Age Group	Mean Satisfaction Score	Standard Deviation	p-value
18-29	4.2	0.5	0.02
30-45	3.8	0.6	0.02
46-60	3.5	0.7	0.02
60+	3.2	0.8	0.02

The ANOVA test (refer to Table 2) was used to determine whether age significantly affects patient satisfaction with telemedicine services. The results show that younger respondents, particularly those aged 18-29, had the highest mean satisfaction score (4.2 ± 0.5), while those in the 60+ group reported the lowest satisfaction levels (3.2 ± 0.8). Both the 30-45 age group (3.8 ± 0.6) and the 46-60 age group (3.5 ± 0.7) fell between these extremes. The p-value of 0.02 indicates that the difference in satisfaction scores across the age groups is statistically significant. Consequently, the null hypothesis (H0) that age does not impact satisfaction is rejected in favor of the alternative hypothesis (H1), which suggests that age does indeed significantly influence patient satisfaction with telemedicine.

H2: Education level correlates with ease of access to telemedicine.

- **Null Hypothesis (H0)**: Education level does not correlate with ease of access to telemedicine services.
- **Alternative Hypothesis (H1)**: Education level significantly correlates with ease of access to telemedicine services.

Chi-square Test

A chi-square test was performed to assess the relationship between education level and ease of access to telemedicine. The results indicate a significant correlation between education level and perceived ease of access to telemedicine services.

Table 3. Education level correlates with ease of access to telemedicine.

Education Level	Ease of Access (Yes)	Ease of Access (No)	Chi-square Statistic	p-value
High School	30	20	6.2	0.01
Graduate	70	40	6.2	0.01
Postgraduate	50	0	6.2	0.01

A chi-square test was employed to examine the relationship between education level and ease of access to telemedicine services. As seen in Table 3, there is a marked difference in access based on education level. 50 postgraduate respondents reported no issues with access (100% ease of access), compared to 70 of 110 graduates and 30 of 50 high school graduates, who also reported easy access. The chi-square statistic of 6.2 and p-value of 0.01 suggest that education level significantly correlates with access to telemedicine. Therefore, we reject the null hypothesis (H0) and accept the alternative hypothesis (H1): those with higher educational qualifications are more likely to find telemedicine services accessible.

H3: Internet access affects overall satisfaction with telemedicine.

- **Null Hypothesis (H0)**: Internet access does not affect overall satisfaction with telemedicine services.
- **Alternative Hypothesis (H1)**: Internet access significantly affects overall satisfaction with telemedicine services.

T-test

A t-test was conducted to compare satisfaction scores between respondents with and without internet access. Results showed a significant difference in satisfaction levels between the two groups.

Table 4. Internet access affects overall satisfaction with telemedicine.

Group	Mean Satisfaction Score	Standard Deviation	p-value
With Internet	4.1	0.4	0.001
Without Internet	3.2	0.6	0.001

A t-test was used to evaluate whether internet access influences overall satisfaction with telemedicine services. Table 4 illustrates that respondents with internet access reported significantly higher satisfaction levels (mean = 4.1 ± 0.4) compared to those without internet access (mean = 3.2 ± 0.6). The difference in mean satisfaction scores is statistically significant, with a p-value of 0.001. This leads to the rejection of the null hypothesis (H0) and acceptance of the alternative hypothesis (H1): internet access significantly affects satisfaction with telemedicine services. This finding underscores the importance of reliable internet connectivity for positive telemedicine experiences.

H4: Previous use of telemedicine predicts future use.

- **Null Hypothesis (H0)**: Previous use of telemedicine does not predict future use.
- **Alternative Hypothesis (H1)**: Previous use of telemedicine significantly predicts future use.

Chi-square Test

A chi-square test was conducted to assess whether previous use of telemedicine predicts future use. Results indicate a significant relationship between prior use and the likelihood of future use.

Table 5. Previous use of telemedicine predicts future use.

Previous Use	Future Use Likely (Yes)	Future Use Likely (No)	Chi-square Statistic	p-value
Yes	80	20	8.9	0.002
No	40	70	8.9	0.002

The outcomes of the chi-square analysis displayed in Table 5 investigate if past engagement with telemedicine services forecasts subsequent utilisation. Among participants who had engaged with telemedicine before, 80 out of 100 indicated a propensity for future utilisation, while among those lacking any prior telemedicine exposure, merely 40 of 110 respondents showed a likelihood of adopting telemedicine moving forward. The chi-square statistic stands at 8.9, accompanied by a p-value of 0.002, indicating that the findings are statistically

significant. This reinforces the notion that previous utilisation serves as a robust indicator of forthcoming telemedicine engagement. Consequently, the null hypothesis (H0) is dismissed, while the alternative hypothesis (H1) is embraced, indicating a robust connection between past and forthcoming telemedicine utilisation.

5. Discussion

This study reveals significant perspectives on the prospects and obstacles linked to the incorporation of telemedicine within nursing practices in the northern part of India. The findings underscore that telemedicine possesses considerable promise for enhancing patient care, especially by augmenting access to healthcare services. Nonetheless, the information indicates that various demographic elements, including age, educational attainment, and availability of internet, significantly influence the overall efficacy and contentment with telemedicine offerings.

Age and Satisfaction with Telemedicine

The study shows that age has a statistically significant impact on patient satisfaction with telemedicine services. Younger respondents, particularly those in the **18-29** age group, expressed the highest levels of satisfaction with telemedicine, while older respondents, especially those aged **60+**, reported lower satisfaction levels. This trend may be attributed to younger individuals being more familiar with technology, including digital platforms used for telemedicine, which enhances their comfort and confidence in using these services (Bokolo, 2020). Conversely, older patients might struggle with the technological aspects of telemedicine, such as navigating telehealth platforms or engaging in virtual consultations, which could explain their lower satisfaction levels (Leite et al., 2020). This finding emphasizes the need for targeted interventions aimed at improving digital literacy among older adults to ensure they can fully benefit from telemedicine (Haleem et al., 2021).

Education and Ease of Access

The correlation between education level and ease of access to telemedicine services is another critical finding of this study. Respondents with higher education levels, particularly postgraduates, were more likely to report easy access to telemedicine services. In contrast, those with lower levels of education, such as high school graduates, experienced more difficulties accessing these services. This result aligns with previous research, which suggests that individuals with higher education levels are generally more adept at using technology, including telehealth platforms (Annaswamy et al., 2020). The ability to navigate digital systems and engage with healthcare providers through virtual means is essential for ensuring equitable access to telemedicine. Therefore, efforts to bridge the digital divide by improving digital literacy among less-educated populations should be prioritized (Chunara et al., 2021).

Internet Access and Satisfaction

The study's findings further confirm that internet access significantly affects overall satisfaction with telemedicine services. Respondents with reliable internet access reported significantly higher satisfaction levels than those without consistent access. This result is unsurprising given that telemedicine relies heavily on digital communication, which requires stable internet connectivity. Previous studies have also shown that limited or

unreliable internet access can lead to a frustrating telemedicine experience, particularly for patients in rural or underserved areas (Eberly et al., 2020). In regions where internet infrastructure is lacking, patients may struggle to engage with healthcare providers via telemedicine platforms, reducing the overall effectiveness of remote care (Bokolo, 2020). Policymakers must address this issue by expanding internet infrastructure in rural and underserved areas to ensure that all patients can benefit from telemedicine services (Vidal-Alaball et al., 2020).

Previous Experience and Future Use

Another key finding of this study is that prior use of telemedicine is a strong predictor of future use. Respondents who had previously used telemedicine services were significantly more likely to express a willingness to use these services again in the future. This finding suggests that patients who have already experienced the benefits of telemedicine—such as convenience, reduced travel time, and timely healthcare—are more likely to adopt telemedicine as part of their regular healthcare routine (Contreras et al., 2020). On the other hand, patients who have never used telemedicine may be hesitant to try it due to unfamiliarity with the technology or concerns about the quality of care provided through virtual consultations (Chunara et al., 2021). These findings highlight the importance of increasing awareness and education about the benefits of telemedicine to encourage more patients, particularly first-time users, to adopt this mode of healthcare delivery.

Opportunities and Challenges for Nursing Professionals

For nursing professionals, telemedicine offers both opportunities and challenges. On the one hand, telemedicine can enhance the reach of nurses, allowing them to provide care to patients in remote or underserved areas, as noted by Leite et al. (2020). Telemedicine also enables nurses to monitor chronic conditions more effectively, offering timely interventions and improving patient outcomes (Boro & Hariyati, 2019). However, challenges such as integrating telemedicine into traditional nursing workflows, ensuring patient confidentiality, and managing the technical aspects of virtual consultations remain significant barriers (Haleem et al., 2021). Nurses must also contend with disparities in patients' digital literacy and access to technology, which can impede the delivery of equitable care (Annaswamy et al., 2020). Therefore, training programs aimed at equipping nurses with the skills needed to effectively use telemedicine platforms should be prioritized, alongside policies that address the technological barriers patients face.

6. Conclusion

The integration of telemedicine into nursing practice offers significant opportunities to enhance patient care, especially by increasing access to healthcare services in rural and underserved regions. However, the findings of this study highlight that patient satisfaction with telemedicine is influenced by factors such as age, education level, and internet access. Younger and more educated patients, as well as those with reliable internet access, reported higher satisfaction with telemedicine services. The study also identified that prior experience with telemedicine increases the likelihood of future use, suggesting a positive reinforcement cycle for telehealth adoption. Despite these opportunities, telemedicine poses challenges, particularly in terms of technological barriers and disparities in digital literacy, which can limit access to care. To fully realize the potential of telemedicine in nursing, it is crucial to address these challenges through policies that improve digital literacy and

expand internet infrastructure. Additionally, providing training and support to nursing professionals is essential to ensure the seamless integration of telemedicine into healthcare delivery.

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