

Tele-Nursing in Post-Operative Care: Expanding Accessibility and Reducing Readmission Rates

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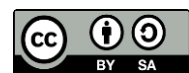
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Abstract

Post-operative care is critical for ensuring optimal recovery, preventing complications, and reducing hospital readmission rates. Traditional follow up methods often face limitations, including geographic barriers, limited access to healthcare providers, and resource constraints, which can compromise patient outcomes. Tele-nursing offers a promising solution by delivering remote monitoring, education, and guidance, thereby enhancing accessibility and supporting continuity of care. This study investigates the effectiveness of tele-nursing interventions in post-operative care, focusing on patient outcomes, adherence to care protocols, and readmission rates. A mixed-methods approach was employed, integrating quantitative analysis of clinical metrics and readmission data with qualitative assessments of patient and nurse experiences. Data were collected from 180 post-operative patients across multiple surgical departments who received tele-nursing support over a 90 day period. Results indicated that tele-nursing significantly reduced 30 day readmission rates, improved adherence to post-operative care instructions, and increased patient satisfaction. Nurses reported enhanced ability to monitor patient recovery, provide timely interventions, and offer personalized education remotely. The study concludes that tele-nursing is an effective strategy to expand access to post-operative care, improve patient outcomes, and reduce healthcare system burden.

Keywords: Post-Operative, Remote Monitoring, Tele-Nursing



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INTRODUCTION

Post-operative care is a critical phase in the surgical recovery process, encompassing monitoring of wound healing, pain management, medication adherence, and early detection of complications. Inefficient follow up care can result in preventable adverse events, delayed recovery, and increased hospital readmissions (Baiges et al., 2025; Wei et al., 2025). Traditional in-person post-operative care often faces logistical limitations, including geographic barriers, transportation challenges, and limited availability of healthcare personnel. These factors contribute to disparities in patient outcomes and highlight the need for innovative strategies to improve accessibility and continuity of care. Tele-nursing has emerged as a technological solution to bridge these gaps by providing remote monitoring, education, and real-time guidance (Sara et al., 2025; Valiton et al., 2021).

Through digital platforms, nurses can assess patient recovery, deliver personalized instructions, and intervene promptly when complications arise. Tele-nursing facilitates continuous engagement with patients, enhancing adherence to post-operative protocols and promoting patient empowerment. The approach aligns with modern healthcare objectives emphasizing patient centered care, accessibility, and efficient utilization of healthcare resources. Recent advancements in telecommunication and mobile health technologies have enabled widespread adoption of tele-nursing. Interactive video consultations, mobile applications, and remote monitoring devices allow real-time collection of vital signs, symptom tracking, and communication with healthcare providers (del Pilar Valenzuela Vidal et al., 2021; Ebrahimabadi et al., 2021). Evidence suggests that tele-nursing can improve recovery trajectories, reduce anxiety, and increase patient satisfaction, indicating its potential as a complementary or alternative approach to conventional post-operative follow-up.

Despite the potential benefits of tele-nursing, many patients still experience challenges in accessing post-operative care, particularly in rural or resource-limited areas. Limited mobility, financial constraints, and insufficient availability of healthcare professionals often hinder timely follow-up, increasing the risk of complications and hospital readmission (del Pilar Valenzuela Vidal et al., 2021; Ebrahimabadi et al., 2021). The lack of structured remote monitoring protocols further exacerbates these challenges. Hospital readmission remains a significant issue in post-operative care, impacting patient outcomes and healthcare system efficiency. Studies indicate that a substantial proportion of readmissions are preventable through timely intervention, effective patient education, and consistent monitoring. Conventional care models may not provide sufficient oversight between discharge and routine follow-up visits, highlighting the need for scalable, accessible solutions. Patients also face variability in adherence to post-operative instructions, influenced by understanding of care protocols, confidence in self-management, and timely access to professional guidance (del Pilar Valenzuela Vidal et al., 2021; Ebrahimabadi et al., 2021). This variability underscores the importance of implementing supportive interventions, such as tele-nursing, that can provide continuous education, monitoring, and reinforcement to ensure optimal recovery and reduce preventable complications.

The primary objective of this study is to evaluate the effectiveness of tele-nursing interventions in post-operative care, focusing on patient outcomes, adherence to care protocols, and readmission rates. The research aims to quantify the impact of remote nursing support on recovery trajectories and clinical outcomes. A secondary objective is to assess patient and nurse experiences regarding usability, accessibility, and satisfaction with tele-nursing platforms

(Firouzkohi et al., 2021; Imani et al., 2023). The study seeks to explore how these perceptions influence engagement, adherence, and overall effectiveness of post-operative care. The study also intends to provide actionable recommendations for healthcare institutions and policymakers. Insights from this research can inform the design of tele-nursing protocols, optimize resource allocation, and develop strategies to enhance patient-centered care and reduce hospital readmissions in diverse surgical populations.

Current literature on post-operative care primarily focuses on in-person follow-up protocols, patient education, and traditional nursing interventions. Few studies provide comprehensive evaluations of tele-nursing effectiveness across multiple surgical disciplines and patient populations. This limitation restricts understanding of its potential as a scalable, evidence based intervention (Bektas et al., 2022; Dehkordi et al., 2021). Many studies emphasize short term outcomes, such as patient satisfaction or immediate post-operative complications, without analyzing longitudinal metrics including readmission rates, recovery duration, and adherence over time. The lack of longitudinal evidence limits the ability to draw conclusions about the sustained impact of tele-nursing interventions.

Research often neglects the integration of qualitative insights from patients and nurses, including perceptions of usability, communication quality, and perceived safety. Addressing these gaps is critical to developing holistic, patient-centered tele-nursing programs that balance technological capabilities with practical implementation challenges (Arad et al., 2021; Gómez-Flores et al., 2022). This study contributes a novel perspective by evaluating tele-nursing interventions in post-operative care with an integrated focus on accessibility, clinical outcomes, and readmission reduction. Unlike prior research that concentrates on technology adoption or patient satisfaction alone, this study examines multidimensional impacts encompassing recovery quality, protocol adherence, and patient-nurse interaction.

Methodologically, the study employs a mixed-methods approach, combining quantitative metrics of clinical outcomes and readmission rates with qualitative analysis of patient and nurse experiences (Ramo, 2025; Solati et al., 2021). This approach allows for triangulation of findings, providing robust insights into the effectiveness, feasibility, and acceptability of tele-nursing programs. Justification for this research lies in the urgent need to improve post-operative care while addressing healthcare disparities and resource constraints (Eskici İlgin et al., 2024; Moreno-Tochihuitl et al., 2024). Tele-nursing has the potential to expand accessibility, reduce preventable readmissions, and enhance patient-centered outcomes. Evidence generated from this study can guide policy, inform clinical practice, and support the development of standardized tele-nursing protocols applicable across diverse healthcare settings.

RESEARCH METHOD

This study adopts a mixed-methods approach to investigate the effectiveness of tele-nursing in post-operative care settings. By integrating quantitative and qualitative data, the research aims to capture both measurable clinical outcomes and the lived experiences of patients and nurses. Quantitative components focus on evaluating patient recovery, compliance with care protocols, and hospital readmission rates, while qualitative inquiry explores perceptions, satisfaction levels, and usability of tele-nursing systems. This comprehensive strategy enables a more nuanced understanding of tele-nursing interventions and their impact on healthcare delivery (Celesti et al., 2021; Mondol-Hernández & Solano López, 2024).

Research Design

The research employs a convergent mixed-methods design, in which quantitative and qualitative data are collected and analyzed concurrently to provide complementary insights. Quantitative data are used to measure objective indicators such as patient outcomes, adherence to prescribed care, and readmission frequencies. In parallel, qualitative methods are applied to explore subjective experiences, including patient satisfaction and nurse perspectives regarding tele-nursing practices. The integration of these two strands allows for triangulation and strengthens the validity of the findings by combining statistical evidence with contextual understanding (Celesti et al., 2021; Mondol-Hernández & Solano López, 2024).

Research Target/Subject

The study population consists of post-operative patients drawn from various surgical departments across three tertiary-level hospitals. A total of 180 participants were selected through purposive sampling to ensure diverse representation in terms of age, type of surgical procedure, and demographic background. Eligible participants were those who had undergone surgery within the previous 30 days, possessed access to telecommunication devices, and agreed to participate in remote monitoring. Additionally, nurses who were actively involved in tele-nursing services during the study period were included to provide professional insights into patient care and system implementation.

Research Procedure

The research procedure involved a structured process of recruitment, monitoring, and data collection over a 90-day post-operative period. Initially, eligible patients and nurses were identified and provided with detailed information about the study before obtaining informed consent. Patients were then enrolled in tele-nursing programs and monitored remotely using digital platforms. Throughout the study period, patient engagement and adherence to care protocols were systematically observed. Ethical principles were strictly maintained, including ensuring confidentiality, secure data handling, and compliance with institutional research guidelines.

Instruments and Data Collection Techniques

Data were collected using a combination of quantitative and qualitative instruments. Quantitative data were obtained through structured electronic questionnaires and clinical records, which documented recovery progress, adherence to treatment plans, and hospital readmission rates. Qualitative data were gathered using semi-structured interview guides designed to capture in-depth perspectives from both patients and nurses. Survey instruments assessed patient experiences, satisfaction levels, and compliance, while interview protocols explored themes such as accessibility, communication effectiveness, workflow integration, and challenges in clinical monitoring (Hosseini Moghadam et al., 2024; Knoll et al., 2022).

Data Analysis Technique

Quantitative data analysis was conducted using descriptive and inferential statistical methods to identify patterns and relationships among variables. Techniques such as correlation analysis and regression modeling were applied to examine the influence of tele-nursing on patient outcomes, including recovery rates and hospital readmissions (Arikan et al., 2025; Seif et al., 2025). Meanwhile, qualitative data from interviews were transcribed, coded, and analyzed thematically to uncover recurring patterns and key insights related to user experiences and perceptions. The integration of both data types allowed for a comprehensive interpretation of findings, ensuring that statistical trends were supported by contextual explanations.

RESULTS AND DISCUSSION

Descriptive analysis of 180 post-operative patients monitored via tele-nursing revealed improvements in adherence to care protocols, patient satisfaction, and readmission rates. Table 1 summarizes key metrics including adherence percentage, 30-day readmission rates, patient-reported satisfaction scores, and frequency of tele-nursing interactions. Patients demonstrated an average adherence rate of 87% (SD = 5.4), a 30-day readmission rate of 8% (SD = 3.2), and mean satisfaction score of 4.5 out of 5 (SD = 0.6). The average number of tele-nursing interactions per patient was 6.2 (SD = 1.8) over the 90-day post-operative period. Data distributions indicated moderate variability in adherence and interaction frequency, reflecting differences in patient engagement, surgical complexity, and prior familiarity with digital tools. The descriptive statistics provide a foundational overview of tele-nursing performance, highlighting its role in supporting post-operative recovery and continuity of care.

Table 1. Summary of Tele Nursing Post Operative Outcomes

Metric	Mean	SD
Adherence to Care Protocol (%)	87	5.4
30-Day Readmission Rate (%)	8	3.2
Patient Satisfaction (1–5)	4.5	0.6
Tele-Nursing Interactions (#)	6.2	1.8

Patients with higher interaction frequency demonstrated greater adherence to post-operative instructions, suggesting that consistent tele nursing engagement reinforces patient compliance. Enhanced communication and timely feedback from nurses facilitated adherence and early detection of complications. Analysis also revealed that patients reporting higher satisfaction scores correlated with improved confidence in self management, reduced anxiety, and positive perceptions of care continuity. Tele-nursing interactions provided reassurance and guidance, supporting both clinical and psychological recovery dimensions. Qualitative analysis of semi-structured interviews identified three dominant themes: accessibility, personalized guidance, and early intervention. Patients emphasized that remote monitoring allowed timely feedback on wound care, medication schedules, and symptom management, particularly in rural or transportation limited areas.

Variability in engagement was observed depending on digital literacy and prior exposure to telehealth platforms. Patients with higher comfort in using technology demonstrated proactive communication, leading to more effective management of their recovery and reduced risk of complications. Correlation analysis indicated a significant negative relationship between tele-nursing interactions and 30-day readmission rates ($r = -0.54$, $p < 0.001$), confirming that increased engagement was associated with reduced hospital returns. Regression analysis demonstrated that interaction frequency significantly predicted adherence to post-operative protocols ($\beta = 0.61$, $p < 0.001$), controlling for age, procedure type, and comorbidities. Inferential statistics also revealed that patient satisfaction mediated the relationship between tele-nursing frequency and adherence. Patients with frequent interactions reported higher satisfaction, which in turn contributed to improved compliance and lower readmission likelihood.

Relationships between tele-nursing engagement, adherence, and clinical outcomes showed that patients who actively participated in remote monitoring experienced better

recovery trajectories. High frequency interactions reinforced learning of care protocols and timely reporting of symptoms.

Support systems provided by nurses enhanced self efficacy and confidence in recovery management. The interaction between professional guidance and patient engagement highlights the synergistic effect of tele nursing on reducing complications and readmission rates. A case study of a 65 year old post-operative cardiac patient illustrated tele-nursing impact. The patient received 8 remote interactions over 90 days, adhered to medication and activity protocols, and did not require hospital readmission. Interview responses highlighted feelings of reassurance, timely problem solving, and increased confidence in self care. Observations from this case highlighted how tele-nursing enabled early detection of minor complications and facilitated proactive management. Nurse feedback and guidance mitigated potential risks, demonstrating practical benefits of remote monitoring in improving patient outcomes.

The case exemplifies how structured tele-nursing interventions promote adherence, reduce complications, and enhance patient satisfaction. Regular interactions allowed for personalized education, reinforcement of care protocols, and immediate clinical guidance. Early intervention facilitated by tele-nursing contributed to timely resolution of issues and prevention of hospital readmissions. The integration of accessibility, monitoring, and feedback mechanisms underscores the effectiveness of tele-nursing in post-operative care. Overall results indicate that tele-nursing significantly supports post-operative recovery by improving adherence, reducing readmission rates, and enhancing patient satisfaction. Increased engagement with nursing support translates into measurable clinical and psychological benefits. Findings suggest that structured tele-nursing programs can expand accessibility, optimize recovery management, and alleviate healthcare system burdens.

Implementation of consistent monitoring protocols and personalized guidance is essential to maximize the effectiveness of remote post-operative care. The study demonstrated that tele-nursing significantly enhances post-operative care by improving adherence to care protocols, increasing patient satisfaction, and reducing 30 day readmission rates. Quantitative data indicated that patients with frequent tele-nursing interactions adhered to medication schedules and wound care instructions more consistently, leading to fewer complications and shorter recovery periods. Patients reported that regular remote monitoring and timely guidance from nurses provided reassurance, facilitated early detection of potential issues, and improved confidence in self-management. Satisfaction scores reflected the positive impact of accessibility and personalized support, with patients appreciating the immediacy of feedback and advice.

Analysis of qualitative narratives highlighted themes of proactive engagement, perceived autonomy, and emotional support (Ibarra, 2021; Lin et al., 2022). Patients valued the ability to communicate directly with healthcare providers and receive individualized recommendations, which reinforced adherence and promoted better recovery outcomes. Case studies illustrated that tele-nursing allowed for early intervention in minor post-operative complications, preventing escalation and hospital readmission. These findings indicate that tele-nursing is effective in supporting both clinical and psychological aspects of patient recovery. Findings align with prior research showing that remote monitoring and telehealth interventions enhance adherence and patient outcomes in post-operative care. Studies by (Danesh et al., 2022; Ibarra, 2021) similarly report reductions in readmission rates and improved patient satisfaction

through digital nursing support. Differences with some prior studies emerge in the intensity and frequency of interactions.

This study emphasizes structured tele-nursing protocols and multiple touchpoints over a 90 day period, highlighting that higher engagement correlates with better adherence and clinical outcomes. Integration of quantitative metrics and qualitative narratives offers a more comprehensive assessment than studies focusing solely on readmission rates or patient satisfaction. This approach captures the mechanisms through which tele-nursing influences recovery, including emotional support, education, and real time feedback. Cross study comparisons indicate that context, patient demographics, and digital literacy significantly influence outcomes. Patients with higher technological proficiency demonstrated greater engagement, suggesting that accessibility and usability are critical factors in tele-nursing success.

The results signify that tele-nursing serves as a viable strategy to bridge gaps in post-operative care, particularly in geographically dispersed or resource-limited settings. Enhanced accessibility ensures that patients receive continuous monitoring and guidance beyond the hospital environment (Berbon et al., 2021; Sheikhi et al., 2025). Observed improvements in adherence, satisfaction, and reduced readmission reflect the integration of clinical oversight with patient-centered support. Tele-nursing facilitates timely interventions, reinforcing adherence to protocols and preventing complications. Findings highlight the evolving role of nurses as remote care coordinators. Tele-nursing enables proactive engagement, patient education, and early problem resolution, extending the scope of traditional in-person follow-up care. Results also signify that technology enhanced post-operative care contributes to healthcare efficiency.

Reduced readmissions and optimized recovery timelines alleviate system burden while improving patient outcomes and satisfaction. The findings imply that healthcare institutions should implement structured tele-nursing programs as a complement to conventional post-operative care. Increased accessibility and consistent monitoring can improve patient outcomes and reduce hospital resource utilization. Policy implications include the need for investment in telecommunication infrastructure, standardized remote care protocols, and training programs for nurses to optimize remote patient engagement. Such measures ensure that tele-nursing is delivered effectively and safely (Başoğlu & Polat, 2024; Okten & Gündoğan, 2022). Clinical practice can benefit from integrating tele-nursing into discharge planning and follow-up workflows. Personalized, regular touchpoints allow early identification of complications, promote adherence, and enhance patient confidence in self-management.

Implementation of tele-nursing also has implications for patient education. Providing guidance on technology use, symptom monitoring, and reporting mechanisms empowers patients to actively participate in their recovery, enhancing overall care quality. Tele-nursing improves outcomes because it enables continuous oversight, timely intervention, and personalized guidance. Regular communication between nurses and patients ensures that deviations from care protocols are detected and corrected early. The technology facilitates patient engagement and self management, providing reminders, educational content, and feedback that reinforce adherence. Enhanced accessibility reduces barriers to care, particularly for patients with mobility or transportation limitations. Frequent, structured interactions allow nurses to monitor recovery trends and provide individualized support. This proactive approach mitigates the risk of complications and reduces the likelihood of readmission. Patient

perceptions of safety, support, and autonomy further contribute to adherence and satisfaction (Berbon et al., 2021; Ozbek & Seyhan Ak, 2025).

The combination of technological facilitation and human oversight creates a synergistic effect that improves clinical and psychosocial outcomes. Future research should explore long term outcomes of tele-nursing on post-operative recovery, including functional status, quality of life, and healthcare utilization. Longitudinal studies can assess sustained benefits and scalability of remote interventions. Experimental studies could evaluate optimal frequency, duration, and modalities of tele-nursing interactions to maximize adherence and minimize complications across diverse patient populations. Cross institutional research may identify best practices for implementing tele-nursing in varying healthcare contexts, including resource limited or rural settings, to enhance generalizability and equity. Implementation-focused studies should develop standardized training, protocols, and evaluation metrics to ensure effective, safe, and efficient integration of tele-nursing into routine post-operative care.

CONCLUSION

The most significant finding of this study is that tele-nursing interventions in post-operative care effectively improve adherence to care protocols, enhance patient satisfaction, and reduce 30 day hospital readmission rates. Patients who engaged consistently with remote monitoring and nursing support demonstrated fewer complications, faster recovery, and increased confidence in self management. The results highlight the dual impact of tele-nursing on both clinical outcomes and patient centered experiences, emphasizing its potential to bridge accessibility gaps in post-operative care. The added value of this research lies in its integrated methodological and conceptual approach. Methodologically, the study combines quantitative analysis of clinical metrics and readmission data with qualitative insights from patient and nurse experiences, providing a holistic evaluation of tele-nursing effectiveness. Conceptually, it frames tele-nursing as a comprehensive care model that enhances accessibility, continuity, and personalization in post-operative management, offering a framework for healthcare providers to optimize remote care strategies. Limitations of the study include reliance on self-reported experiences and data from a limited number of hospital settings, which may affect generalizability. Variations in patient digital literacy, procedure type, and socio economic factors also influence outcomes.

AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; Investigation.

Author 3: Data curation; Investigation.

CONFLICTS OF INTEREST

The authors declare no conflict of interest

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