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TELEMEDICINE IN PREOPERATIVE ANAESTHESIA ASSESSMENT AT A TERTIARY CARE HOSPITAL IN ODISHA

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ABSTRACT

Background: Telemedicine has increasingly become a critical component in enhancing healthcare delivery, particularly in specialized fields like anesthesia. This study aimed to evaluate the feasibility, effectiveness, and patient satisfaction of using telemedicine for preoperative anesthesia assessments at a tertiary care hospital in Odisha, a region with diverse geographic and healthcare infrastructure challenges.

Materials and Methods: In this observational study, 200 elective surgery patients were randomized into telemedicine and control groups for preoperative anesthesia assessment. Data on assessment completion, patient satisfaction, identification of anesthesia-related issues, consultation times, and follow-up requirements were collected and analyzed using descriptive and inferential statistics.

Results: The telemedicine group demonstrated a 98% completion rate for preoperative assessments, significantly higher patient satisfaction scores in overall satisfaction ($p=0.03$), and more efficient consultation times compared to the control group ($p<0.001$). There were no significant differences in the identification of anesthesia-related issues between groups, indicating that telemedicine is as effective as in-person assessments in clinical efficacy.

Conclusion: Telemedicine offers a viable and beneficial alternative for preoperative anesthesia assessments, enhancing patient satisfaction and efficiency without compromising the quality of care. These findings support the broader adoption of telemedicine in preoperative care, especially in regions facing healthcare accessibility challenges.

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Keywords: Telemedicine, Preoperative Anesthesia Assessment, Patient Satisfaction, Healthcare Efficiency, Tertiary Care Hospital, Odisha.

Introduction

In recent years, telemedicine has emerged as a transformative tool in healthcare, offering a bridge to overcome geographical barriers, enhance accessibility, and improve the efficiency of healthcare delivery. This innovation holds particular promise for specialized fields such as anesthesia, where preoperative assessments play a critical role in patient care and surgical outcomes. In the context of Odisha, a state marked by its diverse geography and varying levels of healthcare infrastructure, the adoption of telemedicine in preoperative anesthesia assessment represents a significant stride towards optimizing pre-surgical care and maximizing patient safety.[1,2]

The preoperative period is a critical phase where anesthesiologists evaluate patients to identify any potential anesthetic risks and plan the anesthesia care tailored to each individual's needs. Traditionally, this assessment has been conducted in-person, necessitating patients' travel to tertiary care centers, which can be especially challenging in regions with limited access to specialized healthcare services. The integration of telemedicine into this process presents an innovative solution, potentially reducing the need for physical travel, decreasing preoperative anxiety, and facilitating a more efficient use of healthcare resources.[2,3]

Despite its potential, the adoption of telemedicine in preoperative anesthesia assessment is still in its nascent stages in Odisha, with various challenges and opportunities yet to be fully explored. This study aims to fill the gap in literature by evaluating the implementation, effectiveness, and patient satisfaction associated with telemedicine in preoperative anesthesia assessments at a tertiary care hospital in Odisha. By doing so, it seeks to provide insights into the feasibility, barriers, and facilitators of telemedicine in a resource-limited setting, contributing valuable knowledge to the field of anesthesiology and telemedicine.[3,4]

The significance of this research lies not only in its potential to enhance patient care but also in its contribution to the broader discourse on telemedicine in perioperative medicine. As healthcare systems worldwide continue to evolve and integrate digital health technologies, understanding the specific impacts and mechanisms of telemedicine in preoperative anesthesia assessment is crucial. This study aims to provide evidence-based recommendations for policymakers, healthcare providers, and institutions considering telemedicine as a tool to improve the quality and accessibility of preoperative anesthesia services.

Materials and Methods

Study Design and Setting

This observational study was conducted at M.K.C.G Medical College & Hospital, Berhampur Odisha, India, over a period of 12 months from July 2022 to June 2023. The hospital was chosen due to its innovative integration of telemedicine services within its anesthesia department. The

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study aimed to assess the feasibility, effectiveness, and patient satisfaction of telemedicine in preoperative anesthesia assessments, with a comparison to traditional in-person assessments.

Participants

A total of 200 patients scheduled for elective surgery requiring anesthesia were enrolled in the study. The sample size was determined based on a power analysis to detect a significant difference in patient satisfaction scores between the telemedicine and traditional in-person assessment groups, with a power of 80% and an alpha of 0.05. Inclusion criteria were adults aged 18 years and above, able to provide informed consent, and with access to the necessary telemedicine technology (e.g., smartphone, tablet, or computer with internet connectivity). Exclusion criteria included patients scheduled for emergency surgery, those without access to the required technology, and patients with cognitive impairments that could affect their ability to participate in telemedicine consultations.

Telemedicine Platform

The telemedicine consultations were facilitated through a secure, hospital-approved digital platform, adhering to healthcare privacy and data protection standards. This platform enabled video consultations, secure messaging, and the exchange of medical documents between patients and anesthesiologists.

Data Collection

Data collection methods encompassed electronic health records, telemedicine consultation logs, and pre- and post-consultation surveys. Primary outcomes included the completion rate of telemedicine consultations, patient satisfaction (measured using a standardized questionnaire), and the identification of any anesthesia-related issues potentially impacting surgical outcomes. Secondary outcomes involved the comparison of consultation times and the necessity of in-person follow-ups after the telemedicine consultation.

Procedure

Participants were randomly assigned to one of two groups: the telemedicine group (n=100) or the control group (n=100), which received the standard in-person preoperative assessment. The telemedicine group underwent a preoperative anesthesia assessment via the designated telemedicine platform, while the control group received their assessment in person. All participants proceeded to their scheduled surgeries as planned.

Statistical Analysis

Statistical analysis was conducted using SPSS software version 25. Descriptive statistics summarized demographic characteristics, consultation times, and patient satisfaction scores. Comparative analyses between the telemedicine and control groups utilized chi-square tests for categorical variables and independent t-tests for continuous variables, with a significance level set at $p<0.05$.

Ethical Considerations

The study's protocol received approval from the Institutional Review Board (IRB) of the tertiary care hospital. Informed consent was secured from all study participants prior to their inclusion.

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The study adhered to the ethical standards of the responsible committee on human experimentation and the Helsinki Declaration of 1975, as revised in 2000.

Results

Table 1 presents the demographic characteristics of participants enrolled in a study evaluating telemedicine in preoperative anesthesia assessment at a tertiary care hospital in Odisha. The study involved two groups: the Telemedicine Group and the Control Group, each comprising 100 participants.

The average age of participants in the Telemedicine Group was 45 years (with a standard deviation of 15 years), closely matching the Control Group's average age of 46 years (standard deviation of 14 years). The similarity in ages between groups, indicated by a p-value of 0.75, suggests that age distribution was well balanced, minimizing age as a confounding factor in the study's outcomes.

Gender distribution across both groups was also comparable, with the Telemedicine Group comprising 60% males and 40% females, and the Control Group comprising 55% males and 45% females. The p-values for gender distribution (0.45 for both male and female comparisons) indicate no significant difference between the groups, ensuring that gender was not likely to bias the study's results.

Regarding socioeconomic status, participants were categorized into three groups: Low, Medium, and High. In the Telemedicine Group, 20% were categorized as Low, 50% as Medium, and 30% as High. This distribution was similar to the Control Group, where 25% were Low, 50% were Medium, and 25% were High. The p-values for socioeconomic status categories (0.50 for Low and High, and 1.00 for Medium) reflect no significant differences between the two groups, suggesting that socioeconomic status was evenly distributed and unlikely to influence the study's findings significantly.

Table 1: Demographic Characteristics of Participants

Variable	**Telemedicine Group (n=100)**	**Control Group (n=100)**	**p-value**
Age (years), mean ± SD	45 ± 15	46 ± 14	0.75
Gender, n (%)			
- Male	60 (60%)	55 (55%)	0.45
- Female	40 (40%)	45 (45%)	0.45
Socioeconomic Status*			
- Low	20 (20%)	25 (25%)	0.50
- Medium	50 (50%)	50 (50%)	1.00

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Variable	Telemedicine Group (n=100)	Control Group (n=100)	p-value
- High	30 (30%)	25 (25%)	0.50

*Socioeconomic status is categorized based on local economic standards.

Table 2 showcases the completion rates for preoperative assessments in both the Telemedicine and Control Groups, providing insight into the feasibility and acceptability of telemedicine as a medium for conducting preoperative evaluations. A high completion rate of 98% was observed in the Telemedicine Group, with only 2% of the assessments not completed. This compares favorably to the Control Group, which had a slightly lower completion rate of 95% and a 5% non-completion rate. Despite the numerical difference, the p-value of 0.45 indicates that the difference in completion rates between the two groups is not statistically significant. This suggests that telemedicine is nearly as effective as traditional in-person methods in ensuring the completion of preoperative assessments, highlighting its potential as a viable alternative for patient evaluation before surgery.

Table 2: Preoperative Assessment Completion Rates

Assessment Completion	Telemedicine Group (n=100)	Control Group (n=100)	p-value
Completed, n (%)	98 (98%)	95 (95%)	0.45
Not Completed, n (%)	2 (2%)	5 (5%)	0.45

Table 3 delves into the patient satisfaction scores across various metrics, measured on a scale of 1 to 5, where 1 indicates low satisfaction and 5 indicates high satisfaction. The Telemedicine Group reported a mean overall satisfaction score of 4.5 (with a standard deviation of 0.6), which was significantly higher than the Control Group's mean score of 4.2 (standard deviation of 0.8), as indicated by a p-value of 0.03. This statistically significant difference underscores the positive reception of telemedicine by patients, reflecting higher satisfaction levels with the telemedicine approach compared to traditional methods.

Notably, the Telemedicine Group rated 'Ease of Use' at 4.6 (standard deviation of 0.5) and 'Privacy and Security' at 4.7 (standard deviation of 0.5), indicating high satisfaction with these aspects of the telemedicine experience. These metrics were not applicable (N/A) to the Control Group as they relate specifically to the telemedicine interface and process. The 'Quality of Interaction' received a mean score of 4.3 (standard deviation of 0.7) in both groups, with a p-value of 0.98, suggesting that the mode of delivery (telemedicine vs. in-person) did not significantly affect patients' perceptions of the quality of interaction with healthcare providers.

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Table 3: Patient Satisfaction Scores (Scale 1-5)

Satisfaction Metric	**Telemedicine Group (n=100), mean ± SD**	**Control Group (n=100), mean ± SD**	**p-value**
Overall Satisfaction	4.5 ± 0.6	4.2 ± 0.8	0.03
Ease of Use	4.6 ± 0.5	N/A	N/A
Quality of Interaction	4.3 ± 0.7	4.3 ± 0.7	0.98
Privacy and Security	4.7 ± 0.5	N/A	N/A

This table compares the effectiveness of telemedicine and traditional in-person consultations in identifying anesthesia-related issues before surgery. In the Telemedicine Group, 30% of cases had anesthesia-related issues identified, closely mirroring the 28% in the Control Group. The near-identical percentages, along with a p-value of 0.78, suggest that there is no statistically significant difference between the two modalities in their ability to detect potential anesthesia complications. This finding is significant as it indicates that telemedicine does not compromise the quality of preoperative anesthesia assessments in identifying clinical issues that could impact surgical outcomes.

Table 4: Identification of Anesthesia-related Issues

Anesthesia Issues	**Telemedicine Group (n=100)**	**Control Group (n=100)**	**p-value**
Identified, n (%)	30 (30%)	28 (28%)	0.78
Not Identified, n (%)	70 (70%)	72 (72%)	0.78

The efficiency of preoperative consultations is highlighted in this table, showing a mean consultation time of 20 minutes (± 5 SD) for the Telemedicine Group, which is notably shorter than the 30 minutes (± 10 SD) observed in the Control Group. The statistical significance of this difference, with a p-value of less than 0.001, underscores the efficiency benefits of telemedicine, suggesting that digital consultations can save time for both patients and healthcare providers without sacrificing the thoroughness of the preoperative evaluation.

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Table 5: Comparison of Consultation Times

Consultation Time (minutes)	**Telemedicine Group (n=100), mean ± SD**	**Control Group (n=100), mean ± SD**	**p-value**
Mean ± SD	20 ± 5	30 ± 10	<0.001

Follow-up requirements post-consultation are an essential aspect of patient care, indicating the need for additional information or clarification after the initial assessment. In the Telemedicine Group, only 10% of patients required follow-up, compared to 15% in the Control Group. Although there is a lower percentage of follow-ups in the telemedicine cohort, the difference is not statistically significant (p-value of 0.25), indicating that telemedicine consultations do not lead to an increased need for additional follow-up visits. This outcome suggests that telemedicine can effectively convey necessary preoperative information and instructions, aligning with the traditional in-person approach's effectiveness.

Table 6: Follow-up Requirements Post-Consultation

Follow-up Requirement	**Telemedicine Group (n=100)**	**Control Group (n=100)**	**p-value**
Required, n (%)	10 (10%)	15 (15%)	0.25
Not Required, n (%)	90 (90%)	85 (85%)	0.25

Discussion

This study evaluated the implementation of telemedicine in preoperative anesthesia assessments at a tertiary care hospital in Odisha, focusing on feasibility, effectiveness, patient satisfaction, and the identification of anesthesia-related issues. Our findings suggest that telemedicine is a viable alternative to traditional in-person assessments, offering comparable effectiveness in identifying anesthesia-related issues, significantly higher patient satisfaction, and more efficient use of time.

The high completion rate (98%) of telemedicine assessments in our study demonstrates its feasibility in a tertiary care setting. This finding aligns with previous research indicating that telemedicine can effectively deliver healthcare services in various medical specialties, including anesthesia. The absence of a significant difference in the identification of anesthesia-related issues between telemedicine and in-person groups underscores telemedicine's capability to

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maintain the quality of preoperative assessments, echoing the results of studies conducted in other regions.[5-9]

Our study revealed significantly higher overall satisfaction scores in the telemedicine group compared to the control group. The convenience, reduced travel time, and flexibility of telemedicine consultations likely contributed to this increased satisfaction, which is consistent with findings from the broader telemedicine literature . Notably, the aspects of ease of use and privacy/security were particularly appreciated, underscoring the importance of user-friendly platforms and stringent data protection measures in telemedicine's success.[10-12]

The significantly shorter consultation times observed in the telemedicine group without compromising the quality of assessments or the identification of issues highlight telemedicine's efficiency. This efficiency can be attributed to the streamlined communication and documentation processes enabled by digital platforms, which can reduce the overall healthcare system burden and improve patient throughput.[13-16]

The results of this study have significant implications for healthcare practice and policy, especially in regions with limited access to specialized healthcare services. The adoption of telemedicine for preoperative anesthesia assessments can expand access to quality care, reduce patient wait times, and decrease the need for physical infrastructure. Policymakers and healthcare administrators should consider integrating telemedicine into standard practice, supported by training for healthcare professionals and investment in secure, reliable technology.[17-19]

Limitations and Future Research

While our study provides valuable insights, it has limitations, including its single-center design and the potential for selection bias given the voluntary nature of telemedicine participation. Future research should explore long-term outcomes of telemedicine in preoperative anesthesia assessments, its cost-effectiveness, and its applicability in diverse surgical contexts and settings.

Conclusion

In conclusion, this study underscores the viability and benefits of telemedicine in preoperative anesthesia assessments within a tertiary care setting in Odisha, demonstrating high completion rates, significantly greater patient satisfaction, and enhanced efficiency compared to traditional in-person consultations. Despite its limitations, the evidence suggests that telemedicine can serve as an effective, satisfying, and time-efficient alternative for preoperative anesthesia evaluations, without compromising the identification of anesthesia-related issues. These findings advocate for the broader adoption and integration of telemedicine into preoperative care protocols, offering a compelling case for its role in improving healthcare accessibility, patient experiences, and operational efficiencies. Moving forward, it is imperative for healthcare systems, particularly those in resource-limited settings, to embrace telemedicine as a key component of patient care strategies, supported by adequate training, infrastructure, and policy frameworks to maximize its potential benefits.

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