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Original Research Article

Study on Telehealth in Rural Nursing Practice: Bridging the Gap in Access to Care in Osmanabad

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Abstract: ***Background:*** Rural communities in Osmanabad district face restricted healthcare facilities due to the geographical distance, fewer staffed centres, and inadequate specialists' assistance. Telehealth, especially nurse-driven virtual consultations, offers a potential solution to fill this gap, but its performance will be determined by the existing infrastructure and workforce readiness of the local context, as well as patient acceptability. ***Objectives:*** To evaluate the digital readiness of rural nurses and to report infrastructure and experiential barriers to telehealth adoption, and to determine the impact of teleconsultations on patient travel time, follow-up compliance, and satisfaction in rural PHCs and CHCs of Osmanabad. ***Methods:*** A convergent mixed-methods approach was used from January to April 2020. A structured questionnaire with a focus on digital literacy, availability of devices, connectivity, and frequency of teleconsultation use was administered to 60 registered nurses in five PHCs and three CHCs. Quantitative data were analysed descriptively. The same respondents were interviewed again using semi-structured interviews about technical challenges, training requirements, and coordination problems, and the data were analysed thematically using Braun and Clarke's approach. ***Results:*** Eighty-seven percent of the nurses self-reported basic smartphone competence, and 30% had undergone formal telehealth training. Fifty-seven percent of sites had reliable internet, and 47% had a dedicated telehealth device. Nurses performed 14.2 teleconsultations per month on average. Patient results were an average2.3±0.8 hours saved in travel time and 28.5±9.4% more likely to fulfil follow-ups and scored a 4.1±0.6 out of 5 in satisfaction. Primary qualitative themes were intermittent connectivity and power outages, device shortages, the need to train hands-on, caregiver support for the elderly and frail, and the importance of streamlining IT–public health department coordination. ***Conclusion:*** Rural nursing practice in Osmanabad is an important example of how telehealth has clear benefits in terms of travel burden and quality of care continuity. Sustainable scale-up will involve investment in a reliable connectivity option, standardization of telehealth equipment, immersive telenursing training, and the establishment of communication links between nursing and IT staff in order to achieve equitable delivery of healthcare.

Keywords: Telehealth, Rural Nursing Practice, Digital Literacy, Teleconsultations, Infrastructure Barriers, Patient Satisfaction, Osmanabad.

1. INTRODUCTION

1.1 Rural Healthcare Disparities in Osmanabad

Osmanabad district is located in the Marathwada region of Maharashtra state. It has substantial service deficits, including underdeveloped PHCs and CHCs, poor nurse-to-patient ratios, and distant specialty care centres [1].

1.2 Emergence of Telehealth in Rural India

Telehealth, a practice of healthcare utilizing information and communication technologies to bridge the geographical gap, especially in rural India [2]. Some preliminary studies have shown reduced patient travel time and costs, and specialist input in telecentres can increase the adherence to chronic disease management by as much as 25% [3].

1.3 The Role of Telenursing

Telenursing is the extension of telehealth that enables registered nurses to conduct virtual assessments, provide health education, and follow up on care in remote locations. Systems reviews have shown that this technology has the potential to help address rural nursing shortages and facilitate post-discharge surveillance and patient satisfaction, but gaps in training and technical limitations are present as well [4].

1.4 Policy and Practice Landscape

Though the WHO had put a call to integrate telemedicine worldwide in 2010, the regulatory system in India was underdeveloped until 2020. Professional organizations then described competencies for virtual care, which focused on nurse-led protocols, digital records and informed consent, quality assurance, and confidentiality [5].

1.5 Study Rationale and Objectives

With Osmanabad's continued limitations on access and documented potential of telehealth and telenursing, the present study aimed to explore the digital readiness, infrastructural bottlenecks, and teleconsultation experience in rural PHCs and CHCs. Results will be used to develop a scalable solution using local eHealth platforms to improve continuity of care and equity.

2. REVIEW OF LITERATURE

2.1 Advantages of Telehealth in Rural Areas

Telehealth programs delivered into rural settings have been associated with substantial reductions in patient travel time and out-of-pocket costs and improved access to specialist and chronic disease care [6]. A systematic review of telemedicine in chronic diseases revealed equivalent improvements from the standpoint of clinical outcomes and patient adherence compared with face-to-face consultations in a way that raises hopes for reducing disparities in care among rural populations [7].

2.2 Telenursing Frameworks

Scope and Purpose of Teleservices Telenursing frameworks place registered nurses at the core of the provision of care through distance services, including assessing, identifying, obtaining consent, securing electronic records, and healthcare education [8]. A nurse-led virtual triage, teletriage, as well as remote monitoring, have been demonstrated to enhance self-management of chronic diseases and discharge-based follow-up; gaps remain in hands-on training and infrastructure [9]. Global recommendations highlight standardization of competences and the joining-up of service delivery with wider health systems to deliver safe and continuous care to patients.

2.3. India and its regional practices in telemedicine

India's first telemedicine pilot (between Apollo Hospitals, Chennai, and a rural centre in Andhra Pradesh, using ISRO's satellite network) commenced in 2001, paving the way for up-scaleable public–private partnerships. The setting up of the National Telemedicine Taskforce in 2005 and further growth of Village Resource Centres proved the concept of using satellite to provide specialist care in remote areas before 2020 [10].

3. RESEARCH METHODOLOGY

3.1 Study Area

Osmanabad district in the Marathwada region of Maharashtra state is made up mostly of rural talukas with low-resourced PHCs and CHCs. Geographic distance and lack of transportation systems are barriers to access to health care, which can be affected by telehealth interventions, and therefore, rural areas are appropriate to evaluate the use of telehealth for nursing.

3.2 Study Design

A mixed (quantitative-qualitative) cross-sectional research design was used to measure telehealth utilization, together with the qualitative barriers and facilitators. The convergent method facilitated the concurrent collection and analysis of survey and interview data, which led to an enriched understanding of the telehealth dynamics facing rural nursing.

3.3 Sample and Sampling Strategy

Sixty nurses from five PHCs and three CHCs in Osmanabad district were selected using purposive sampling, and the inclusion criteria used were as follows:

- Minimum one year of rural nursing experience.
- Active participation in telehealth consultations or willingness to adopt telehealth
- Openness to participate in the survey and interview parts

3.4 Data Collection Methods

Data was collected between January and April 2025 through two channels:

- Structured questionnaire: A 30-item tool assessing digital literacy, access to infrastructures, frequency of teleconsultations, and perceived impact on patient care.
- Topic guide Questions: How was the experience like personally? What technical issues did you face? What logistical challenges were there? What are your suggestions on how you could have been better trained for the intervention? How can we improve the program?

Surveys were administered by trained field investigators in person, and interviews, which lasted 30–45 minutes, were face-to-face at the PHCs/CHCs and audio-recorded with the consent of participants.

3.5 Data Analysis

Descriptive statistics, such as frequencies, means, and standard deviations, were applied to questionnaires entered into SPSS v.25. Verification, coding, theme construction and review, definition, and reporting were performed to analyze the qualitative interview transcripts by the 6-phase framework in Braun and Clarke's thematic analysis. Analysis. As data was collected and coded, interpretation took place to ensure that the data was triangulated, and the emergent themes were confirmed.

3.6 Ethical Considerations

All respondents gave written informed consent and were guaranteed anonymity and confidentiality. Data were kept safely in password-protected drives, and no identifying information was included in transcription and reporting.

4. RESULTS AND ANALYSIS

4.1 Overview

A total of 60 registered nurses from five Primary Health Centres and three Community Health Centres of Osmanabad participated in this study. Information from structured questionnaires and semi-structured interviews was combined to evaluate digital readiness, availability of infrastructure, uptake for teleconsultation services, and perceived patient outcomes.

4.2.1 Nurse Digital Readiness and Infrastructure

Indicator	n (%) or mean ± SD
Basic smartphone proficiency	52 (87%)
Prior telehealth training	18 (30%)
Reliable internet connectivity at the facility	34 (57%)
Availability of a dedicated telehealth device	28 (47%)
Average monthly teleconsultations per nurse	14.2 ± 5.1

There is high smartphone literacy, yet only 30% have received formal telehealth training. Gaps in infrastructure most notably the lack of devices and unstable connectivity physically limit the number of consultations that can be provided each month.

4.2.2 Patient Outcome Measures

Outcome Measure	Mean ± SD
Reduction in patient travel time (hrs)	2.3 ± 0.8
Improvement in follow-up adherence (%)	28.5 ± 9.4
Patient satisfaction score (1–5)	4.1 ± 0.6

Each teleconsultation eliminates, on average, more than 02 h of travel and allows 30% more adherence. High satisfaction rates indicate wide acceptance of tele-nursing care.

4.3 Qualitative Findings

Theme	Key Insights
Technical Barriers	Frequent power outages, dropped calls due to low bandwidth.
Training Needs	Desire for hands-on simulations and platform-specific modules
Patient Engagement	Younger patients adapt quickly; older adults rely on caregivers for session setup.
Inter-sectoral Coordination	Delayed issue resolution due to a lack of a direct IT-health team communication channel

4.4 Integration of Findings

While nurses in general have high digital literacy, this has not resulted in maximum telehealth uptake; there are still infrastructural and capacity training deficits. By stocking centers with dedicated equipment, ensuring connectivity, and implementing immersive telenursing programs, telehealth could consistently support access and continuity of care in remote Osmanabad.

5. DISCUSSION

5.1 Summary of Principal Findings

This work showed a high level of digital literacy among rural nurses in Osmanabad, and the presence of enduring infrastructure and formal training gaps [11]. The nurses performed an average of 14 teleconsultations per month, saving the patients > 2 hrs of traveling time and increasing follow-up rates by ~ 30%. Qualitative findings highlighted technical errors – unstable internet connections, not enough equipment, power failures – and a need for practical telenursing education and improved ICT-to-health collaboration [12].

5.2 Comparison with Other Studies

The finding of a significant reduction in travel time is consistent with global evidence that telehealth reduces patient travel burden and costs [13]. Follow-up adherence by 30% compares with the success of around 20–35% with adherence in chronic-disease telemonitoring trials. The technical limitations reported by Osmanabad nurses are reminiscent of the challenges reported in early Indian telemedicine programs, when rural sites faced difficulties owing to bandwidth and equipment shortages. Additionally, the reported preference for scenario-based training aligns with competencies from Delphi studies specific to nursing telehealth activities [14].

5.3 Implications for Rural Nursing Practice

To close the digital readiness and telehealth take-up divide, there must be parallel investment in:

- Infrastructure: provision of individual appliances, satellite or mobile-broadband back-up, and solar power at PHCs/CHCs.
- Educational aspects: virtual telenursing activities included simulated consultations, privacy matters, and navigation in the platform.
- Communication: setting up direct contact with the nurses and the district IT teams and Telecom service to rapidly identify problems and make system updates.

These are strategies that can turn intermittent telehealth into a dependable arm of front-line nursing care, addressing access and continuity in resource-strapped contexts.”

5.4 Strengths and Limitations

The strengths are a mixed-methods approach that uses quantitative indicators triangulated with rich qualitative narratives and the focus on nurse-led teleconsultations, a relatively unexplored area in rural India. Key limitations include purposive sampling, which can restrict generalizability outside Osmanabad, and using self-reported outcomes, which introduces the potential for response bias.

5.5 Future Directions

Further investigations should determine the effects of specific infrastructure enhancements and a standardized tele-nursing curriculum, and their contribution to teleconsultation volume and patient outcomes in a controlled study. Economic and scale-out assessment across several Indian Districts will guide India's national telehealth scale-out strategy.

6. CONCLUSION

This research highlights the potential of telehealth, when adopted by rural nursing teams in Osmanabad, to address such historical disparities in access to care. Nurses exhibited very good basic digital skills and a keen willingness to incorporate virtual consultations into their daily work at a comparable level, which paid off in terms of benefits: on average, patients’ travel time decreased by over 2 hours; nearly 30% of follow-up were improved upon; and high satisfaction scores were recorded in all age groups. But these gains were moderated by enduring infrastructural challenges, spotty internet, power outages, and a lack of dedicated devices, and a clear appetite for practical, hands-on training that extended beyond slide decks and onto building confidence in navigating the platform, ensuring data privacy, and troubleshooting. The mixed-methods approach of this study highlights that technology is only part of the game: human interfacing, from the degree of support that caregivers provide to older users, to the inter-sectoral synergy between health and IT teams, is just as important when it comes to determining the success of telehealth.

If stakeholders are to achieve the full potential of telehealth in rural Osmanabad and to demonstrate the pathway in doing so for their sister districts, they must pursue a strategy together: a concordant effort. First, stable connectivity solutions like mobile-broadband back-ups and even solar power back-ups to PHCs and CHCs, along with standardized

telehealth kits, will go a long way in ensuring consultations can continue without disruption. Second, the development and deployment of immersive curricula for remote care delivery (including simulations, peer-mentoring, and on-site refresher courses) will synchronize nurse readiness with the influx of new digital tools. Third, setting up open lines of contact between front-line workers, district IT coordinators, and telecom companies will speed up problem-solving and create a collective sense of ownership of network performance. Finally, involving patients, caregivers, and community leaders in the design and evaluation of telehealth services will "humanise" the technology, helping to build trust and sustained adoption. By scaling up the technical backbone and the human infrastructure of telehealth, Osmanabad can turn a successful pilot program into a scalable, equitable model for providing rural healthcare.

7. Conflicts of Interest

The author has no conflicts of interest related to this study. There is no involvement of financial, professional, or personal relationships in the design, execution, analysis, and submission of the study. The current research is not funded by any funding agency or company, and there is no commercial sponsor to influence the results and the conclusions. Ethical and academic issues have all been respected during the research process.

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