



The Role of Nursing in Leveraging Mobile Health Technologies to Improve Healthcare Access and Outcomes in Rural Communities

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Abstract

Background: Palliative care has evolved to support individuals with chronic illnesses at any stage, yet access remains limited, especially in rural areas. Nurses play a crucial role in utilizing mobile health technologies to enhance healthcare access and outcomes for patients in these remote communities. The integration of telehealth services has emerged as a viable solution to address these challenges.

Methods: This review evaluated peer-reviewed publications from 2019 to 2023, focusing on the use of telehealth in palliative care for rural populations. Databases such as MedLine, Google Scholar, and EBSCO were searched using keywords related to palliative care and telemedicine. The analysis included studies that assessed various telehealth modalities, including clinician-to-patient and patient-to-health technology interactions.

Results: Findings revealed that telehealth significantly improves access to palliative care, with positive impacts on symptom management, quality of life, and patient satisfaction. Approximately 50% of studies highlighted the effectiveness of interprofessional teams in delivering care via videoconferencing and other remote methods. Despite challenges such as technological barriers and patient privacy concerns, the overall satisfaction levels among patients, caregivers, and providers were high, indicating a strong acceptance of telehealth services.

Conclusion: Telehealth is a promising approach to delivering palliative care to patients in rural areas, overcoming geographical barriers, and enabling continuous access to essential services. Future research should focus on developing best practices for telehealth applications in palliative care, addressing the

unique needs of diverse populations, and evaluating long-term outcomes to enhance the quality of care provided.

Keywords: Palliative Care, Telehealth, Rural Healthcare, Nursing, Mobile Health Technologies.

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1. Introduction

Palliative care originated from the hospice movement in Europe during the 1960s and has seen substantial evolution over the subsequent five decades. Palliative care, initially focused on the requirements of terminal cancer patients, now extends to offering supportive healthcare for individuals with any chronic illness at any stage, to alleviate symptoms, manage pain, reducing stress, providing respite for caregivers, and enhancing quality of life (1, 2). Palliative care is frequently regarded as a specialized field within healthcare, with certifications available to affirm advanced knowledge and expertise. Moreover, there is an increasing number of individuals requiring palliative care in distant and/or rural areas (3).

Nearly half (45%) of the world's population live in geographically remote and/or rural areas, defined as communities that consist primarily of less than 300 inhabitants per square kilometer of landmass (4, 5). Limited access to health care is a common issue for individuals living in these rural/remote communities (6). Unfortunately, there is a paucity of palliative care specialists in these areas, and the dearth of palliative care services and support can translate to poorer quality of life (3, 7). For example, the need to travel to various health care specialist appointments can result in physical, psychological, and financial stress (3). Telehealth services are becoming more commonplace for the provision of palliative care in these geographically isolated communities (7). Also of note, offering a strategy for continuity of care while reducing transmission risk of the novel coronavirus, telehealth solutions were recently rapidly implemented across the world (8). Thereby, the unexpected onset of the COVID-19 pandemic dramatically increased the utilization of telehealth for all patients, including those receiving palliative care services (9).

While various evaluations have examined the use of telemedicine in palliative care, they do not provide insights into the unique issues for patients in distant or rural settings. Rogante et al. (10) reviewed systematic reviews, incorporating fourteen studies for comprehensive analysis and six in the final publication. The reviews concluded that telehealth was viable for the provision of palliative care; however, various limitations undermined the quality of the study outcomes. A systematic evaluation of 30 papers determined that there is an increasing interest and use of telehealth services; nevertheless, the research is mostly descriptive rather than evaluative (11-13). A deficiency of adequate evidence persists. Jess et al. performed a review of video technology in palliative care, emphasizing the necessity for additional research on the optimal utilization of video compared to in-person consultations. A review of telehealth and palliative care in the UK indicated that while both providers and patients deemed the technology acceptable, the incorporation of telehealth into standard practice poses challenges. Zheng et al. (14), in their review of nine studies on palliative telehealth interventions, reported high satisfaction levels among caregivers. However, the authors acknowledge that methodological deficiencies and limited sample sizes undermine the robustness of the evidence supporting this conclusion.

Analysis of these reviews and additional studies indicated the existence of diverse telehealth methodologies, encompassing (1) clinician-to-clinician, (2) clinician-to-patient, and (3) patient-to-health technology interactions. Examples of clinician-to-clinician applications include peer mentoring or specialty consultations conducted through email, telephone, or videoconferencing. Clinician-patient interactions use video, phone, email, remote wireless monitoring, and web-based apps. Telehealth in various modalities has been used to provide treatment for chronic illnesses, manage pharmacotherapy, advise and educate patients and caregivers, and facilitate post-discharge follow-up (12-16). Finally, patients may utilize mobile technologies to monitor vital signs, caloric intake, and activity levels, evaluate medication adherence, and assess communication abilities, cognitive functioning, and swallowing function. The US Veterans Administration (VA) has established itself as a leader in telehealth. In 2013, the VA delivered health care across 44 clinical specialties to over 600,000 veterans through clinic-based video telehealth, real-time video consultations, and medical appointments. The veterans reported an average satisfaction score of 86%. In another chart review study, the authors determined that 65% of home visits conducted by hospice nurses could have been executed using telehealth methods (17).

A fast assessment of peer-reviewed publications was done to investigate options for enhancing access to palliative care for persons residing in distant or rural locations via the use of telehealth apps.

2. Methods

This evaluation was undertaken from 2019 to 2023. The databases MedLine, Google Scholar, and EBSCO were queried with the phrases palliative care, remote, and telemedicine/telehealth/telecare. The supplemental material includes specifics of the MedLine search. Filters were used to get only peer-reviewed, primary research publications published in English (both in print and online ahead of print). The date parameter was not established. All medical conditions necessitating palliative care were included. Supplementary studies were sourced from the bibliographies of chosen papers. Review papers, clinical recommendations, case studies, and comments were omitted.

3. Emerging Themes

The findings included three primary domains: care delivery, symptom management and quality of life, and satisfaction levels among patients, caregivers, and providers. Findings from the delivery of care included feasibility insights and implementation concerns. Quality of life issues included symptom alleviation and advancements in patient care, resulting in improved living experiences for both patients and caregivers. Finally, several research assessed the satisfaction levels of different stakeholders about telehealth services (18-20).

3.1. Provision of Care

Videoconferencing demonstrated efficacy for remote patient monitoring (n = 101, terminally ill), the provision of specialized cancer care (n = 101, 72% metastatic disease), web-based patient consultations (n = 10; 80% cancer), and palliative care consultations with cancer patients (n = 12; n = 158; n = 60; n = 100) (21-24). Pain management education and case reviews were conducted via videoconferencing for 93 healthcare providers at 16 remote tribal clinics. Telephone-based interventions were deemed feasible for symptom monitoring and management, as well as for enhancing the outreach of palliative care nurses. In Africa, a web-based platform was identified as an effective tool for the remote management of medications among terminally ill patients (n = 74) (25).

Approximately fifty percent of the studies (8 out of 18) incorporated an interprofessional team. The team members varied and included advanced practice providers, counselors, geriatric specialists, nurse practitioners, pharmacists, physician assistants, physicians, registered nurses, and other allied health professionals. Watanabe et al. observed that the composition of the interprofessional team was contingent upon the patient's diagnosis and familial requirements. (26-30). By leveraging the expertise of various disciplines, interprofessional strategies provided a comprehensive framework for fulfilling client-centered care needs (30). Bonsignor (22) indicated that remote patient monitoring and management of terminal cancer patients in rural North Carolina resulted in enhanced access to clinicians. Two studies documented improved access to specialty care (17, 28); one facilitated communication between home care nurses and palliative care nurses through video phones during patient visits, and another connected university oncologists with remote providers (17, 31,32)

Telehealth applications provide significant operational advantages. A small Canadian study (n = 10; 80% cancer patients) evaluated videoconferencing against traditional care, revealing a reduction of 1.5 hours in clinician time. Four studies indicated reduced wait times for appointments; videoconferencing resulted in wait times of 0 to 7 days, whereas traditional care ranged from 0 to 30 days, $p < 0.001$. A Nigerian mobile phone intervention led to lower no-show rates for follow-up appointments, with 97.6% of 733 remote patients attending compared to 19.2% of controls. Hospital transfers decreased from 13% to 6% in the Donnem et al. (23) study; however, Bakitas et al. (21)'s randomized controlled trial found no change in hospitalizations, intensive care unit admissions, or emergency room visits. Donnem et al. (23) did not report statistical significance, while Bakitas et al. (21) indicated the finding was not significant.

Nine studies identified implementation challenges, including the necessity of securing stakeholder buy-in prior to initiating a telehealth initiative, the significance of thorough preparation and technical proficiency, and the requirement for an augmented budget to facilitate training. Watanabe et al. (29) noted that the task of scheduling appointments for videoconferencing was labor-intensive. From a patient care standpoint, additional operational challenges included safeguarding patient privacy for individuals not

residing alone, providing specialized headphones for patients with hearing impairments, and ensuring the availability of a caregiver for those requiring assistance due to health issues. Technical difficulties such as software malfunctions, connectivity issues, and usability problems also emerged as prevalent obstacles.

3.2. Symptom Management and Quality of Life

Three studies noted improved quality of life scores and positive mood changes among patients receiving telehealth services (22-23,30). A randomized controlled trial (n = 161 enrollees and n = 161 nonenrolment controls, advanced cancer), evaluated the effect of a nursing-led, patient empowerment intervention on quality of life, symptom intensity, mood, and resource usage (22). Increased quality of life (p = .02) and lower depressed mood (p = .02) scores were reported among participants; there were no significant differences in other outcomes symptom intensity, and resource usage. A mixed methods study (n = 101 patients, n = 51 providers) reported improved symptom management with a web-based videoconference platform used to deliver palliative care services to the terminally ill in remote North Carolina; the authors did not report statistical significance for this finding (23). Palliative care patient visits (n = 44 initial consultations; 28 follow-up visits) with a multidisciplinary team were conducted at a Canadian telehealth facility; a nurse joined each patient. Both patient anxiety levels and appetite exhibited significant improvement among participants (p < 0.01 and p = 0.03, respectively) (33-35). An evaluation of a 24/7 phone service in Bangladesh (n = 1,164 participants) concluded that both patients (20% of participants) and their caregivers (80% of participants) valued access to healthcare providers and felt reassured by the availability of the service. In an Australian study, remote indigenous cancer patients (n = 18) engaged in a teleoncology program utilizing videoconferencing. This approach allowed caregivers and other support individuals to engage in the online consultation; 66.7% included four or more family members, and 5.9% included a traditional healer (36).

Eight studies indicated beneficial effects on the quality of care, resulting in enhanced quality of life for palliative care patients. These benefits included improved symptom management (pain, nutrition, and nausea), dissemination of advice and health information, and psychological support (3,14,17,22,30,34-36). Paul et al. (3) discovered that videoconferencing reduced travel time for patients and family members by 0.1 to 1.3 hours; similar results were reported by Weinerman et al. Patients expressed appreciation for a 24/7 phone consultation service, with 97.6% preferring phone visits to avoid traveling to a hospital or clinic.

3.3. Satisfaction Levels of Patients, Caregivers, and Providers

Two-thirds of the studies offer insights into the telehealth user experience (3,17,23,25-27,29-31,35,36,32). A web-based videoconference platform found positive patient and caregiver experiences; the statistical significance of these findings was not reported.23 Patients reported being “very comfortable” or “comfortable” with the telehealth intervention employed in a Scottish mobile phone study (n = 21 patients; n = 9 providers) (26). In a mobile phone intervention conducted in Africa, 86.2% of the patients described the care as excellent (27). Two videoconferencing cohorts of Canadian cancer patients (n = 60, n = 10) reported the same level of satisfaction with video patient visits and in-person visits (3,31). Olver et al. (17) reported higher patient satisfaction rates with video calls than audio-only calls. Of note, some patients raised concerns about the risk of computer hacking or information mistakenly getting posted publically online (4). Patients reported receiving valuable support from a 24/7 phone consult service; in another study, 97.6% preferred the phone visits because of not having to travel to a hospital or clinic (27,29).

Three studies indicated favorable provider satisfaction with telehealth interventions. Weinerman et al. (30) observed significantly elevated (p < 0.05) provider satisfaction with video consultations; nonetheless, one oncologist expressed that video consultations were less effective than in-person meetings. Providers engaged in remote patient monitoring and videoconferencing with palliative care patients in rural North Carolina reported a positive experience. Haozous et al. identified high satisfaction levels among healthcare providers involved in virtual consultations and educational sessions with specialists.

The first domain, Structure, and Processes of Care, emphasizes the distinctive provision of palliative care, including the components of evaluation, care planning, and the training of the multidisciplinary team. This area emphasizes telemedicine as a method for offering patients and families continuous access to treatment delivered by an interprofessional team. The research indicated that videoconferencing and

related technologies were successful for clinician-to-clinician contact and interprofessional sessions including patients and families.

Shabnam et al. (28) established the feasibility of a 24/7 telephone service for advising geographically isolated palliative care patients and their families; Wilkes et al. corroborated these findings regarding an after-hours phone service. Additional studies highlighted the efficacy of home-monitoring telehealth systems that similarly provide 24/7 access to care for rural and remote palliative care patients.

4. Discussion

This evaluation provides insights into the delivery of telehealth treatments for palliative care to patients living in regions classified by the authors as rural and/or distant. While the scope of palliative care extends beyond oncology, the research mostly focused on the delivery of palliative care to cancer patients. The identified topics provide solutions to enhance access to palliative care for persons living in distant or rural areas. Numerous implementation issues that arose were similar to those examined by Kidd et al. in their evaluation of virtual palliative care.

Examining the Clinical Practice Guidelines for Quality Palliative treatment, the research mostly focused on operational and logistical concerns—the structural/processual and physical dimensions of treatment. Despite the insufficient level of evidence, this review's findings indicate that telehealth is a viable method for providing palliative care in distant regions and is deemed acceptable by numerous stakeholders. Telehealth enabled interprofessional teams to proficiently meet the comprehensive care requirements of patients and caregivers; however, the roles of numerous critical interprofessional providers (such as counselors, registered dietitians, and speech-language pathologists) were significantly underrepresented or not examined in the reviewed articles. Telehealth supports patients, families, and caregivers aiming to enhance the palliative care experience at home by prioritizing the family's most significant needs.

This research indicates that telemedicine may enhance social and cultural quality standards while providing essential psychological support to patients, family members, and caregivers. The endorsement by indigenous tribes in Australia and American Indian/Alaskan Native tribal clinics in the US underscores the readiness of underserved communities to engage with virtual care, indicating that some of these communities may possess the necessary bandwidth to facilitate telehealth technologies. Although included in just one study, the use of web-based action alerts to assist patients, family members, and caregivers in completing advanced directives and related documentation presents a discreet method. A further comprehensive study is required to assess the operational and logistical dimensions of excellent palliative care for this particular group.

These findings correspond with those presented by Hancock et al.; palliative care telehealth studies are predominantly descriptive, thereby constraining the quality of evidence substantiating the effectiveness of this approach for palliative patient care. Numerous factors likely contribute to the deficiency of rigorous research. Recipients of palliative care may exhibit hesitance in consenting to studies using more stringent procedures; there is a lack of research concerning this possible aspect. Operational factors may be another explanation for the disparity. Inadequate funding for telehealth services prior to COVID may have deterred a more comprehensive exploration of telemedicine for delivering health services to distant or rural palliative care patients. Some assert that the pre-pandemic payment model favored payors above the healthcare system in the delivery of telemedicine services. The provision of telehealth services may result in diminished revenues for hospitals and other healthcare facilities (36). Therefore, to promote the establishment of evidence-based methodologies for delivering virtual palliative care to remote and rural populations, the reimbursement model must adequately compensate providers and facilities for patient-centered care. The lessons gained during the pandemic, including modified care delivery methods and increased payment rates for all providers, give essential guidance for overcoming these obstacles.

This is the first quick evaluation that examined the evidentiary foundation for using telemedicine in the provision of palliative care within rural areas. A notable strength is the variety of telehealth modalities examined, including mobile phones and advanced web-based systems with videoconferencing capabilities. Moreover, the studies using a mixed methods approach provided significant insights into the experiences of patients, caregivers, and providers with telehealth. The conclusions of this review are constrained by its expedited methodology. The evaluation was performed over a brief duration of three months and included

just English-language literature. The main author chose the abstracts and papers for inclusion and conducted the data extraction process. Consequently, although the other authors examined and analyzed the choices and interpretations, a systematic review methodology was not rigorously adhered to. Additionally, it is important to acknowledge that due to the inequalities present in rural and distant communities (such as socioeconomic status, cultural differences, access to technology, and communication networks), the generalizability of the results may be constrained. The significant risk of bias in the included research is an additional restriction; particularly, risks of selection, performance, detection, and reporting biases were identified in all investigations.

5. Conclusions and Implications of Principal Findings

Telehealth seems viable for providing palliative care services to patients in distant or rural areas. Despite the unique hurdles faced by these remote areas, like restricted bandwidth and limited access to technology, these technological obstacles seem to be manageable. Mobile phones may provide a superior alternative to web-based apps for technology deserts. The clinical experiences during the COVID-19 epidemic have highlighted the capacity to provide palliative treatment to patients and families in remote locations.

The advantageous results of the provision of virtual palliative care must be carefully evaluated in light of the deficiencies in the supporting data from the analyzed papers. Research is necessary to validate the feasibility of clinical care delivery and to create optimal practices for telehealth palliative care applications for patients living in distant or rural places. This study identified research deficiencies, including the need for investigations assessing telemedicine services for palliative care patients in rural regions with diagnoses beyond cancer. Research on the social, cultural, end-of-life care, and legal and ethical dimensions of treatment for distant or rural virtual palliative care patients is also necessary. Finally, research assessing profession-specific approaches to palliative care has led to creative methods for the provision of virtual rehabilitative treatment. Consequently, despite the removal of several obstacles, evidence-based strategies for enhancing the provision of palliative care to persons in distant or rural areas continue to be difficult to identify.

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دور التمريض في استخدام تقنيات الصحة المحمولة لتحسين الوصول إلى الرعاية الصحية والنتائج في المجتمعات الريفية الملخص

الخلفية: تطورت الرعاية التلطيفية لدعم الأفراد الذين يعانون من أمراض مزمنة في أي مرحلة، ومع ذلك، لا يزال الوصول إليها محدودًا، خاصة في المناطق الريفية. يلعب الممرضون دورًا حيويًا في استخدام تقنيات الصحة المحمولة لتحسين الوصول إلى الرعاية الصحية والنتائج الصحية للمرضى في هذه المجتمعات النائية. وبرزت خدمات التطبيب عن بُعد كحل عملي لمواجهة هذه التحديات.

المنهجية: قامت هذه المراجعة بتحليل المنشورات التي تمت مراجعتها من قبل النظراء بين عامي 2019 و2023، مع التركيز على استخدام التطبيب عن بُعد في الرعاية التلطيفية للسكان الريفيين. تم البحث في قواعد بيانات مثل MedLine و Google Scholar و EBSCO باستخدام كلمات مفتاحية تتعلق بالرعاية التلطيفية والتطبيب عن بُعد. شملت التحليل الدراسات التي قيمت مختلف أشكال التطبيب عن بُعد، بما في ذلك التفاعل بين الأطباء والمرضى والتفاعل بين المرضى والتكنولوجيا الصحية.

النتائج: كشفت النتائج أن التطبيب عن بُعد يحسن بشكل كبير الوصول إلى الرعاية التلطيفية، مع تأثيرات إيجابية على إدارة الأعراض، وجودة الحياة، ورضا المرضى. أظهرت حوالي 50% من الدراسات فعالية الفرق المهنية المتعددة في تقديم الرعاية عبر مؤتمرات الفيديو وغيرها من الوسائل البعيدة. وعلى الرغم من التحديات مثل الحواجز التكنولوجية ومخاوف خصوصية المرضى، كانت مستويات الرضا الإجمالية بين المرضى ومقدمي الرعاية والعاملين في المجال الصحي مرتفعة، مما يشير إلى قبول قوي لخدمات التطبيب عن بُعد.

الخلاصة: يمثل التطبيب عن بُعد نهجًا واعدًا لتقديم الرعاية التلطيفية للمرضى في المناطق الريفية، حيث يتغلب على الحواجز الجغرافية ويمكن من الوصول المستمر إلى الخدمات الأساسية. يجب أن تركز الأبحاث المستقبلية على تطوير أفضل الممارسات لاستخدام التطبيب عن بُعد في الرعاية التلطيفية، مع مراعاة الاحتياجات الفريدة للسكان المتنوعين وتقييم النتائج طويلة الأجل لتعزيز جودة الرعاية المقدمة.

الكلمات المفتاحية: الرعاية التلطيفية، التطبيب عن بُعد، الرعاية الصحية الريفية، التمريض، تقنيات الصحة المحمولة.