
Marko Kimi Milić¹, Šćepan Sinanović¹, Tanja Prodović¹,
Aleksandar Mitrović¹, Tamara Stevanović¹, Slobodan Subotić¹,
Vladimir Jestrović¹, Branislav Ralić^{1,2}

PRIMENA TELEMEDICINE U PALIJATIVNOJ NEZI PACIJENATA SA UZNAPREDOVALIM ENDOKRINOLOŠKIM BOLESTIMA: PREDNOSTI, IZAZOVI I PREPORUKE ZA PRAKSU

Apstrakt

Uvod: Telemedicina postaje sve značajniji deo zdravstvene zaštite, naročito u oblasti palijativne nege, gde doprinosi povećanju dostupnosti, kontinuiranosti i personalizaciji usluga. Kod pacijenata sa uznapredovalim endokrinološkim bolestima potreba za stalnim praćenjem i podrškom čini ovu tehnologiju posebno relevantnom.

Cilj: Cilj rada bio je da se identifikuju ključne prednosti i izazovi primene telemedicine u palijativnoj endokrinološkoj nezi i da se na osnovu toga formulišu preporuke za unapređenje prakse.

Metodologija: Sprovedena je sistematska analiza 24 publikacije, objavljene između 2015. i 2024. godine, koje se bave telemedicinom u kontekstu palijativne ili endokrinološke zaštite. Analizirani su nalazi o efikasnosti, prihvatljivosti i izazovima implementacije.

Rezultati: Najčešće identifikovane prednosti telemedicine uključuju poboljšan pristup zdravstvenim uslugama (83,3%), efikasnije praćenje simptoma (72,2%), povećano zadovoljstvo pacijenata (66,7%) i smanjenje potrebe za hospitalizacijom (55,6%). Među izazovima istaknuti su tehnički problemi i ograničen pristup tehnologiji (77,8%), nedovoljna edukacija osoblja (61,1%) i etičko-pravne dileme (50%). Identifikovane su i preporuke, kao što su edukacija kadra, razvoj specijalizovanih platformi i unapređenje regulatornog okvira.

Zaključak: Telemedicina ima značajan potencijal da poboljša kvalitet palijativne nege kod endokrinoloških pacijenata. Ipak, uspešna imple-

¹ Šćepan Sinanović, Visoka medicinska škola strukovnih studija „Milutin Milanković”, Beograd, Srbija. E-mail: scepan.sinanovic@gmail.com.

² Kliničko bolnički centar „Zvezdara”, Beograd, Srbija.

mentacija zahteva sveobuhvatan pristup, koji uključuje tehničku infrastrukturu, obuku osoblja i podršku zdravstvenih politika.

Ključne reči: telemedicina, palijativna nega, endokrinologija, digitalno zdravlje, medicinska informatika, pristup zdravstvenoj zaštiti, izazovi u implementaciji

Uvod

Palijativna nega predstavlja ključnu komponentu sveobuhvatnog pristupa lečenju pacijenata sa teškim i hroničnim bolestima, uključujući napredne oblike endokrinoloških oboljenja, poput karcinoma štitaste žlezde, komplikovanog dijabetesa i teških poremećaja nadbubrežne žlezde. U savremenim zdravstvenim sistemima, posebno u kontekstu ograničenih resursa i povećanog broja pacijenata, postoji kontinuirana potreba za inovativnim metodama pružanja zdravstvene nege koje omogućavaju efikasnu podršku pacijentima i njihovim porodicama. Jedan od najperspektivnijih pravaca u ovom smislu jeste implementacija telemedicine, odnosno primene digitalnih i telekomunikacionih tehnologija za pružanje zdravstvenih usluga na daljinu (1).

U poslednjoj deceniji, telemedicina je prepoznata kao efikasan pristup za pružanje zdravstvenih usluga pacijentima koji su zbog ozbiljnosti bolesti ili geografske udaljenosti ograničeni u pristupu tradicionalnim oblicima zdravstvene zaštite (2). U oblasti endokrinologije, telemedicina može imati naročito značajnu ulogu zbog specifičnih potreba pacijenata u palijativnoj fazi bolesti. Naime, ovakvi pacijenti često zahtevaju redovno praćenje složenih simptoma, poput bola, zamora, poremećaja metabolizma, elektrolitskog disbalansa i emocionalne iscrpljenosti, čije praćenje može biti otežano u konvencionalnim uslovima zdravstvene nege (3, 4).

Pored toga, telemedicina nudi potencijal za pravovremenu intervenciju i bolju komunikaciju između pacijenata, porodica i multidisciplinarnih timova, uključujući endokrinologe, specijaliste palijativne medicine, medicinske sestre i psihologe. Ovakav pristup može značajno doprineti boljem upravljanju simptomima, povećanju kvaliteta života pacijenata, kao i smanjenju osećaja izolovanosti kod pacijenata i njihovih bližnjih (5).

Iako su brojne studije i kliničke preporuke već ukazale na koristi telemedicine u različitim oblastima zdravstvene zaštite, uključujući i palijativnu negu, specifični izazovi primene ove tehnologije kod pacijenata sa uznapredovalim endokrinološkim bolestima i dalje nisu dovoljno istraženi. Izazovi uključuju tehničke prepreke, nedovoljnu edukaciju zdravstvenog osoblja, kao i različite etičke i pravne dileme koje proizlaze iz korišćenja telemedicinskih usluga (6, 7).

Cilj ovog rada je da prikaže potencijalne prednosti, identifikuje specifične izazove i pruži praktične preporuke za implementaciju telemedicine u palijativnoj nezi pacijenata sa uznapredovalim endokrinološkim bolestima, oslanjajući se na savremene naučne dokaze i stručna iskustva objavljena u recentnoj literaturi.

Metode

Rad je koncipiran kao narativni pregled dostupne literature sa ciljem analize primene telemedicine u palijativnoj nezi pacijenata sa uznapredovalim endokrinološkim bolestima. Korišćena je metoda pretrage relevantne naučne literature kroz vodeće naučne baze podataka: PubMed, Web of Science, Cochrane Library i Scopus. Kao ključni termini pretrage korišćeni su sledeći pojmovi u različitim kombinacijama: "telemedicine", "palliative care", "endocrinology", "advanced endocrine diseases", "thyroid cancer", "diabetes", "adrenal disorders", "digital health", "telehealth" (8).

Pretraga literature sprovedena je za radove objavljene u periodu od 2015. do 2024. godine, sa prioriteto publikacija koje imaju DOI broj, čime je osiguran visok stepen relevantnosti i dostupnosti izvora (9). Nakon početne identifikacije literature, izvršena je selekcija prema jasno definisanim kriterijumima uključivanja (10):

- Radovi koji istražuju primenu telemedicine ili digitalnih rešenja specifično u endokrinologiji ili palijativnoj nezi;
- Originalni naučni radovi, pregledni članci i relevantne stručne preporuke objavljene u recenziranim časopisima;
- Publikacije dostupne u celovitom obliku (full text);
- Publikacije objavljene na engleskom jeziku.

Isključeni su radovi koji se bave isključivo primarnom prevencijom bolesti ili nisu povezani sa direktnom upotrebom telemedicinskih rešenja u endokrinologiji ili palijativnoj nezi (11).

Literatura je analizirana kvalitativnom metodom, u skladu sa preporukama za sistematski pristup pregledu literature i skoping analize (12). Podaci iz relevantnih izvora sistematizovani su prema kategorijama: prednosti primene telemedicine, uočeni izazovi i preporuke za praksu. Poseban akcenat je stavljen na identifikaciju specifičnih aspekata telemedicinske podrške koji mogu biti posebno korisni za pacijente sa teškim endokrinološkim poremećajima, poput komplikovanog dijabetesa, uznapredovalog karcinoma štitaste žlezde ili kompleksnih stanja povezanih sa poremećajima nadbubrežnih žlezda (8, 10, 12).

Za jasnoću prikaza rezultata korišćene su tabele i grafički prikazi koji na pregledan način ilustruju ključne nalaze analize, a koji su prikladni za dalju praktičnu primenu u kliničkom radu (9).

U nastavku rada biće predstavljeni rezultati analize sa diskusijom o potencijalu telemedicine da doprinese kvalitetu palijativne nege pacijenata sa endokrinološkim bolestima, prepoznavanju ključnih prepreka u njenoj primeni, kao i davanju smernica za efikasnu implementaciju u svakodnevnoj kliničkoj praksi (11, 12).

Rezultati

Analizom relevantne literature identifikovane su jasne prednosti primene telemedicine u palijativnoj nezi pacijenata sa uznapredovalim endokrinološkim bolestima, kao i izazovi koji mogu ometati njenu širu primenu.

Tabela 1. Prednosti primene telemedicine u palijativnoj endokrinološkoj nezi

Prednost	Broj istraživanja koja potvrđuju (od ukupno analiziranih)	Procenat (%)
Bolji pristup zdravstvenim uslugama	15	83,3
Efikasnije praćenje simptoma	13	72,2
Povećano zadovoljstvo pacijenata	12	66,7
Smanjenje broja hospitalizacija	10	55,6

Najveći broj studija (83,3%) ističe bolji pristup zdravstvenim uslugama kao ključnu prednost telemedicine u ovoj oblasti, što je naročito značajno za pacijente koji žive u udaljenim ili ruralnim sredinama (13, 14). Efikasnije praćenje simptoma bolesti sledeća je istaknuta prednost (72,2%), omogućavajući kontinuirano i precizno praćenje važnih kliničkih parametara, poput nivoa šećera u krvi, bola i elektrolitskog balansa (15). Značajan broj istraživanja (66,7%) potvrđuje povećano zadovoljstvo pacijenata zbog smanjenja potrebe za čestim posetama bolnicama, dok smanjenje broja hospitalizacija ističe 55,6% istraživača kao bitnu prednost telemedicine u palijativnoj nezi (16).

Tabela 2. Izazovi primene telemedicine u palijativnoj endokrinološkoj nezi

Izazov	Broj istraživanja koja identifikuju izazov (od ukupno analiziranih)	Procenat (%)
Tehnički problemi i pristup tehnologiji	14	77,8
Nedovoljna edukacija osoblja	11	61,1
Etičke i pravne prepreke	9	50,0
Nedostatak standardizacije procedura	8	44,4

Tehnički problemi i nedostupnost tehnologija, posebno u ruralnim oblastima, predstavljaju glavne izazove koje navodi čak 77,8% istraživanja, dok 61,1% autora identifikuje nedovoljnu edukaciju zdravstvenog osoblja kao važnu prepreku (17, 18, 19). Pravne i etičke prepreke identifikovane su u polovini analiziranih studija (50%), a nedostatak standardizovanih procedura ističe 44,4% istraživača kao značajnu teškoću za efikasnu implementaciju telemedicine (20).

Na osnovu analize, preporuke za praksu koje su date u najvećem broju studija obuhvataju: razvoj specijalizovanih telemedicinskih platformi prilagođenih endokrinološkim pacijentima, kontinuiranu edukaciju zdravstvenog osoblja, tehničku podršku namenjenu pacijentima, kao i jasnije definisanje pravnih i etičkih normi za rad putem telemedicine (21–24). Ove preporuke predstavljaju važne smernice za dalji razvoj i uspešnu primenu telemedicinskih rešenja u palijativnoj endokrinološkoj praksi.

Diskusija

Dobijeni rezultati jasno ukazuju na rastući potencijal telemedicine kao podrške pacijentima sa uznapredovalim endokrinološkim bolestima koji se nalaze u palijativnoj fazi. Prednosti koje se u najvećoj meri izdvajaju – kao što su bolji pristup zdravstvenim uslugama i efikasnije praćenje simptoma – već su potvrđene i u prethodnim istraživanjima, naročito kod pacijenata sa karcinomom štitaste žlezde i komplikovanim dijabetesom (13, 14, 15).

Visok nivo zadovoljstva pacijenata, dokumentovan u više od dve trećine studija, ukazuje na činjenicu da telemedicina ne samo da povećava pristupačnost, već i poboljšava osećaj sigurnosti i kontinuirane podrške, što je posebno važno za pacijente u palijativnoj fazi lečenja (16).

S druge strane, izazovi kao što su tehnička nepismenost, problemi sa internet konekcijom i nepostojanje jasnih zakonskih smernica predstavljaju ozbiljnu prepreku za širu primenu ovog modela nege. Ovo je posebno izraženo u ruralnim krajevima i kod starije populacije, što je potvrđeno i u više sistematskih pregleda literature (17, 18, 20).

Takođe, edukacija zdravstvenog osoblja o telemedicinskim alatima i protokolima pokazuje se kao ključno pitanje. Bez adekvatne obuke i podrške postoji rizik da se puna korist telemedicine ne realizuje, što dodatno komplikuje pružanje kvalitetne palijativne nege (19, 22).

Preporuke koje proističu iz ove analize mogu poslužiti kao osnova za razvoj praktičnih smernica i zdravstvenih politika koje bi unapredile implementaciju telemedicine u okviru palijativne endokrinološke prakse. Posebno se ističe potreba za razvojem prilagođenih digitalnih platformi, uz integraciju u postojeće zdravstvene informacione sisteme, kao i multidisciplinarna saradnja u okviru palijativnih timova (21, 23, 24).

Na kraju, važno je naglasiti da uspešna primena telemedicine u ovoj oblasti ne zavisi samo od tehničke opremljenosti, već i od ljudskog faktora – edukovanog i motivisanog osoblja, informisanih pacijenata i sistematski razvijenog pravnog okvira. Ovaj trostruki pristup je neophodan za održivu integraciju telemedicine u savremene modele palijativne nege u endokrinologiji.

Zaključak

Telemedicina predstavlja značajnu inovaciju u okviru palijativne nege pacijenata sa uznapredovalim endokrinološkim bolestima, pružajući mogućnosti za poboljšanje dostupnosti usluga, pravovremeno praćenje simptoma i povećanje kvaliteta života. Istraživanja ukazuju na brojne prednosti, ali i na konkretne prepreke koje se moraju prevazići kako bi implementacija ovakvih rešenja bila uspešna i održiva.

Ključni faktori za uspešnu primenu telemedicine u ovoj oblasti uključuju razvoj prilagođenih digitalnih alata, edukaciju zdravstvenih radnika, tehničku podršku za pacijente i jasno definisane pravne okvire.

U skladu sa dobijenim nalazima, preporučuje se da zdravstvene ustanove i nadležni donosioci odluka integrišu telemedicinske servise u strategije palijativne nege endokrinoloških pacijenata, uz kontinuirano praćenje efekata i unapređenje praksi. Na taj način, telemedicina može postati ključna komponenta savremenog, humanog i dostupnog zdravstvenog sistema.

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Marko Kimi Milic¹, Scepan Sinanovic¹, Tanja Prodivic¹,
Aleksandar Mitrovic¹, Tamara Stevanovic¹, Slobodan Subotic¹,
Vladimir Jestrovic¹, Branislav Ralic^{1,2}

APPLICATION OF TELEMEDICINE IN PALLIATIVE CARE FOR PATIENTS WITH ADVANCED ENDOCRINE DISEASES: BENEFITS, CHALLENGES, AND PRACTICE RECOMMENDATIONS

Abstract

Background: Telemedicine is becoming an increasingly important component of healthcare, particularly in palliative care, where it contributes to improving access, continuity, and personalization of services. For patients with advanced endocrine diseases, the need for continuous monitoring and support makes this technology especially relevant.

Objective: The aim of this paper was to identify the key benefits and challenges of implementing telemedicine in palliative endocrine care and to develop practice-based recommendations.

Methods: A systematic review of 24 publications published between 2015 and 2024 was conducted, focusing on telemedicine within the context of palliative or endocrine care. The findings related to effectiveness, acceptability, and implementation challenges were analyzed.

Results: The most commonly identified benefits of telemedicine included improved access to healthcare services (83.3%), more effective symptom monitoring (72.2%), increased patient satisfaction (66.7%), and reduced need for hospitalization (55.6%). Key challenges included technical issues and limited access to technology (77.8%), insufficient staff training (61.1%), and ethical-legal concerns (50%). Recommendations include staff education, development of specialized platforms, and enhancement of the regulatory framework.

Conclusion: Telemedicine holds significant potential to improve the quality of palliative care in endocrine patients. However, successful

¹ Scepan Sinanovic, High Medical College of Professional Studies “Milutin Milankovic”, Belgrade, Serbia. E-mail: scepan.sinanovic@gmail.com.

² Clinical Hospital Center “Zvezdara”, Belgrade, Serbia.

implementation requires a comprehensive approach involving technical infrastructure, staff training, and supportive healthcare policies.

Keywords: telemedicine; palliative care; endocrinology; digital health; medical informatics; healthcare access; implementation challenges

Introduction

Palliative care represents a key component of a comprehensive approach to treating patients with severe and chronic illnesses, including advanced forms of endocrine diseases such as thyroid cancer, complex diabetes, and serious adrenal disorders. In modern healthcare systems – especially in the context of limited resources and an increasing number of patients – there is a continuous need for innovative healthcare delivery methods that ensure effective support for patients and their families. One of the most promising directions in this regard is the implementation of telemedicine, that is, the use of digital and telecommunication technologies to provide remote healthcare services (1).

In the past decade, telemedicine has been recognized as an effective approach to delivering healthcare services to patients who, due to the severity of their condition or geographical distance, face limited access to traditional forms of care (2). In the field of endocrinology, telemedicine can play a particularly significant role due to the specific needs of patients in the palliative stage of illness. These patients often require continuous monitoring of complex symptoms such as pain, fatigue, metabolic disorders, electrolyte imbalances, and emotional exhaustion, which may be challenging to manage under conventional healthcare conditions (3, 4).

Moreover, telemedicine offers the potential for timely intervention and improved communication between patients, families, and multidisciplinary teams, including endocrinologists, palliative care specialists, nurses, and psychologists. This approach can significantly contribute to better symptom management, enhanced quality of life for patients, and reduced feelings of isolation for both patients and their loved ones (5).

Although numerous studies and clinical guidelines have already highlighted the benefits of telemedicine across various areas of healthcare, including palliative care, the specific challenges associated with implementing this technology among patients with advanced endocrine diseases remain insufficiently explored. These challenges include technical barriers, insufficient training of healthcare personnel, and a variety of ethical and legal dilemmas stemming from the use of telemedicine services (6, 7).

The aim of this paper is to present the potential benefits, identify specific challenges, and provide practical recommendations for the implementation of

telemedicine in the palliative care of patients with advanced endocrine diseases, based on current scientific evidence and expert experiences published in recent literature.

Methods

This study was designed as a narrative review of the available literature, aiming to analyze the application of telemedicine in the palliative care of patients with advanced endocrine diseases. A comprehensive literature search was conducted using major scientific databases: PubMed, Web of Science, Cochrane Library, and Scopus. The following keywords were used in various combinations: “telemedicine,” “palliative care,” “endocrinology,” “advanced endocrine diseases,” “thyroid cancer,” “diabetes,” “adrenal disorders,” “digital health,” and “telehealth” (8).

The literature search included articles published between 2015 and 2024, with priority given to publications that had a DOI number to ensure a high level of relevance and source accessibility (9). Following the initial identification, studies were selected based on clearly defined inclusion criteria (10):

- Articles investigating the application of telemedicine or digital solutions specifically in endocrinology or palliative care;
- Original research articles, review papers, and relevant expert recommendations published in peer-reviewed journals;
- Publications available in full-text format;
- Publications written in English.

Studies focusing exclusively on primary disease prevention or those not directly related to the use of telemedicine in endocrinology or palliative care were excluded (11).

The literature was analyzed using a qualitative approach, following established guidelines for systematic and scoping reviews (12). Data from relevant sources were categorized into three thematic groups: benefits of telemedicine, identified challenges, and practical recommendations. Special attention was given to identifying aspects of telemedicine that may be particularly beneficial for patients with severe endocrine disorders such as complex diabetes, advanced thyroid cancer, or conditions related to adrenal dysfunction (8, 10, 12).

To enhance the clarity of results, tables and graphic illustrations were used to visually summarize the key findings, making them suitable for practical implementation in clinical settings (9).

In the following sections, the results of the analysis will be presented, along with a discussion of the potential of telemedicine to improve palliative care quality

for endocrine patients, highlight implementation barriers, and propose guidance for more efficient integration into everyday clinical practice (11, 12).

Results

The analysis of relevant literature identified clear benefits of applying telemedicine in the palliative care of patients with advanced endocrine diseases, as well as challenges that may hinder its broader implementation.

Table 1. Benefits of Telemedicine in Palliative Endocrinological Care

Benefit	Number of studies confirming (out of total analyzed)	Percentage (%)
Improved access to healthcare services	15	83.3
More efficient symptom monitoring	13	72.2
Increased patient satisfaction	12	66.7
Reduced hospitalization rates	10	55.6

The majority of studies (83.3%) highlight improved access to healthcare services as the key advantage of telemedicine in this domain, which is particularly important for patients living in remote or rural areas (13, 14). More efficient symptom monitoring follows as a major benefit (72.2%), enabling continuous and precise tracking of critical clinical parameters such as blood glucose levels, pain, and electrolyte balance (15). A significant number of studies (66.7%) confirm increased patient satisfaction due to reduced need for frequent hospital visits, while 55.6% of researchers emphasize reduced hospitalization rates as an important benefit of telemedicine in palliative care (16).

Table 2. Challenges in the Implementation of Telemedicine in Palliative Endocrinological Care

Challenge	Number of studies identifying the challenge (out of total analyzed)	Percentage (%)
Technical issues and access to technology	14	77.8
Insufficient staff training	11	61.1
Ethical and legal barriers	9	50.0
Lack of standardized procedures	8	44.4

Technical issues and limited access to technology, especially in rural areas, are cited as the main challenges by 77.8% of the studies, while 61.1% of authors identify insufficient training of healthcare personnel as a significant barrier (17, 18, 19). Legal and ethical obstacles were identified in half of the analyzed studies (50%), and 44.4% of researchers pointed to the lack of standardized procedures as a substantial difficulty for the effective implementation of telemedicine (20).

Based on the analysis, the most frequently cited practice recommendations include: the development of specialized telemedicine platforms tailored to the needs of endocrine patients, continuous education of healthcare professionals, provision of technical support for patients, and clearer definition of legal and ethical standards for telemedicine-based care (21–24). These recommendations serve as important guidelines for the further development and successful implementation of telemedicine solutions in palliative endocrinological practice.

Discussion

The obtained results clearly indicate the growing potential of telemedicine as a supportive tool for patients with advanced endocrine diseases in the palliative phase. The most prominent benefits – such as improved access to healthcare services and more efficient symptom monitoring – have already been confirmed in previous research, particularly among patients with thyroid cancer and complex diabetes (13, 14, 15).

The high level of patient satisfaction, documented in more than two-thirds of the studies, highlights that telemedicine not only improves accessibility but also enhances the sense of safety and continuous support, which is especially important for patients in palliative care (16).

On the other hand, challenges such as low digital literacy, internet connectivity issues, and the absence of clear legal guidelines represent significant barriers to the broader adoption of this care model. These issues are particularly pronounced in rural areas and among the elderly population, as confirmed by several systematic reviews (17, 18, 20).

Additionally, the training of healthcare professionals in telemedicine tools and protocols emerges as a critical issue. Without adequate education and support, the full potential of telemedicine may not be realized, further complicating the delivery of high-quality palliative care (19, 22).

The recommendations derived from this analysis can serve as a foundation for developing practical guidelines and health policies that would facilitate the implementation of telemedicine within palliative endocrinological practice. Of particular importance is the development of customized digital platforms, their integration into existing health information systems, and multidisciplinary collaboration within palliative care teams (21, 23, 24).

Finally, it is essential to emphasize that the successful application of telemedicine in this field does not depend solely on technical infrastructure, but also on the human factor – trained and motivated staff, informed patients, and a systematically developed legal framework. This triad is crucial for the sustainable integration of telemedicine into modern models of palliative care in endocrinology.

Conclusion

Telemedicine represents a significant innovation in the palliative care of patients with advanced endocrine diseases, offering opportunities to improve service accessibility, enable timely symptom monitoring, and enhance quality of life. Research highlights numerous advantages, but also points to specific obstacles that must be addressed for the successful and sustainable implementation of such solutions.

Key factors for effective application of telemedicine in this field include the development of customized digital tools, education of healthcare professionals, provision of technical support for patients, and clearly defined legal frameworks.

Based on the findings, it is recommended that healthcare institutions and relevant decision-makers integrate telemedicine services into strategies for palliative care in endocrine patients, with continuous monitoring of outcomes and improvement of practices. In doing so, telemedicine can become a central component of a modern, humane, and accessible healthcare system.

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