

# The influence of telehealth-based interventions in patients with cancer in the digital era of society 5.0: A literature review

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## ARTICLE INFORMATION

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## The influence of telehealth-based interventions in patients with cancer in the digital era of society 5.0: A literature review

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### Abstract

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**Background:** Cancer is a group of diseases characterized by the uncontrolled growth and spread of abnormal cells, which can result in death if not managed. It is important for cancer patients to be able to participate in long-term treatment programs. Therefore, a good support system, healthcare professionals' support, and the utilization of information technology in healthcare services are needed. The management of cancer is also expected to adapt to the era of Society 5.0. The use of Telehealth has been recommended by the World Health Organization (WHO) to support current healthcare services. The implementation of the combination of telehealth is expected to be a solution for holistic cancer care in the digital era.

**Purpose:** To explore the effectiveness of telehealth-based interventions on cancer patients in the digital era of society 5.0.

**Method:** Literature review using online databases such as Sage Journals, Science Direct, Clinical Key Nursing, and PubMed. Inclusion criteria: articles on the application of telehealth for cancer patients, available in full text in English, published between 2020-2023. Exclusion criteria: articles published before 2020, articles that do not discuss telehealth in cancer patients, and literature review studies.

**Results:** Analysis of the 13 articles used shows the important role of combining telehealth (telenursing, telepalliative, telerehabilitation, teleoncology), which is beneficial not only for cancer patients but also for nurses and other healthcare professionals in providing good quality, safe, effective, and efficient healthcare services in the digital era of society 5.0.

**Conclusion:** Telehealth-based cancer rehabilitation demonstrates a positive impact that warrants further evaluation and study.

**Keywords:** Cancer; Digital; Remote; Telehealth.

### INTRODUCTION

Cancer is a complex biological phenomenon with more than 100 types, depending on the site of proliferation and cell type (Majérus, 2022). In 2020, it was estimated that there were 18.1 million new cancer cases and 9.9 million cancer-related deaths worldwide (Sung, Ferlay, Siegel, Soerjomataram, Jemal, & Bray, 2021). By 2040, the global burden is projected to reach 28.0 million new cancer cases and 16.2 million cancer-related deaths, solely due to population growth and aging. In low- and middle-income countries with limited medical

resources and healthcare systems, this trend is projected to increase by 95% and 64%, respectively (Wolf, Oeffinger, Shih, Walter, Church, Fontham, & Smith, 2024). The development of information and communication technology (ICT) has enabled the global expansion of nursing care services and is considered an innovative method (Kamei, 2022). Over 4.57 billion people worldwide now use the internet, representing nearly 60% of the global population, with the majority (91%) using mobile devices for online activities (Kaye, Rosen, & Ron, 2020). The World

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Health Organization (WHO) has recommended the use of ICT to support healthcare services, including telehealth, telemedicine, mobile health (mHealth), electronic medical records, big data, wearable devices, and artificial intelligence (AI) (Kamei, 2022). In recent years, society has shifted to a digital era, and patients expect more than conventional healthcare systems. Patients are increasingly interested in digital health technology while ensuring their privacy is maintained (Kaye et al., 2020). Telehealth addresses the healthcare needs in the digital era by providing healthcare services from a distant location using technology. This includes curative, preventive, rehabilitative, and palliative care (Mishra & Sharma, 2022). Additionally, telehealth promotes high patient satisfaction and high acceptability among healthcare professionals (Li, Liu, Jiang, Peng, & Hu, 2021). The term "telehealth" is not new but has been extensively discussed, particularly due to the COVID-19 pandemic, which has increased pressure to reduce healthcare system costs, making telehealth more popular. Healthcare providers have employed various forms of telehealth to provide care to their patients (Mishra & Sharma, 2022). The most frequently mentioned benefits of telehealth include its ability to reach patients in remote or rural areas, directly addressing the shortage of doctors and nurses in these areas and providing efficient and high-quality services to improve patients' quality of life (Li et al., 2021). Furthermore, due to the high financial burden

associated with a low quality of life among cancer survivors, telehealth interventions can reduce treatment costs to some extent and subsequently improve the quality of life of cancer survivors (Li et al., 2021).

This literature review aims to explore studies and research related to the application of combined telehealth in cancer patients. It analyzes the benefits, challenges, and outcomes associated with the use of telehealth in cancer care. It is hoped that this review will provide insights for healthcare practitioners, researchers, and policymakers in understanding the effectiveness of combined telehealth-based interventions in improving cancer patient care in the digital era of society 5.0.

#### RESEARCH METHOD

The research methodology used in this research is a literature review. The authors used electronic databases, including Sage Journals (n=25), ScienceDirect (n=29), ClinicalKey Nursing (n=1988), and PubMed (n=96), the total number of journals obtained was 2.138. The article search was carried out until 22 October 2023. The search method used English keywords. Inclusion criteria consisted of articles discussing the application of telehealth in cancer patients, available in full text in English, and published between 2020 and 2023. The authors used keywords such as Telehealth, Teleoncology, and Cancer.

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## RESEARCH RESULTS

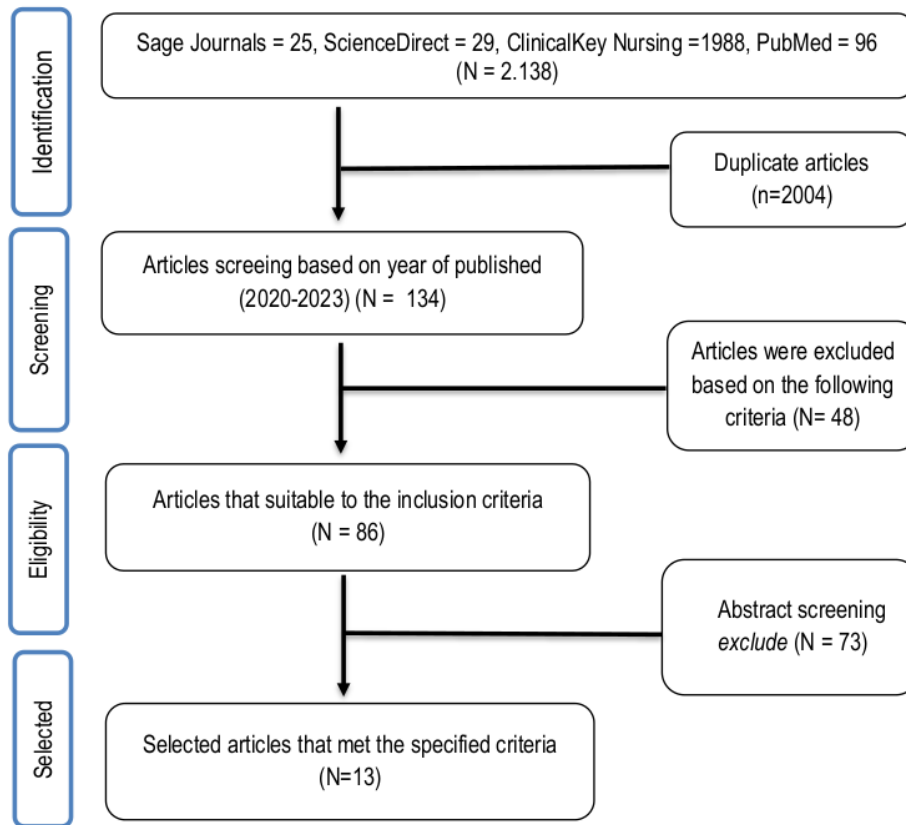


Figure: PRISMA Flow Diagram

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Table 1. Summary of The Articles' Review

(Author, Year) (Country)	Purpose	Method	Result
(Andriani et al., 2023) (South Korea)	To evaluate the Safety and Feasibility of Telehealth and Remote Clinical Trials in Gynecologic Oncology During the COVID-19 Pandemic	Patients with at least 1 provider or research coordinator telehealth visit were included. Patient demographics, health system encounters, adverse events, and protocol deviations were collected.	The results of the research indicate that the use of telehealth and remote clinical trials was safe and did not compromise clinical protocols. There was an increase in the use of virtual providers and laboratory testing outside of the location during the telehealth period.
(Bektas et al., 2022) (Turkey)	To develop a web-based educational program for cancer patients undergoing systemic chemotherapy and to evaluate its effectiveness in controlling symptoms, improving Quality of Life (QoL), enhancing self-efficacy, and reducing depression.	Pretests were applied to 60 cancer patients undergoing treatment with systemic chemotherapy, and the patients (intervention: 30, control: 30) were randomized. The efficacy of a web-based education program at baseline and after 12 weeks was evaluated.	The results of the study indicate that patients who received web-based education reported fewer symptoms and a significantly better quality of life. However, there were no significant differences in self-efficacy and depression levels during the three-month monitoring period.
(Ebrahimbadi et al., 2021) (Turkey)	To evaluate the effects of tele-nursing on the supportive care needs (SCNs) of cancer patients undergoing chemotherapy.	Patients' SCNs were assessed in the baseline, and 1 and 2 months after commencement of the intervention using the SCNs Survey -Short Form 34. The data were analyzed through descriptive statistics, t-test, and repeated measure test, by SPSS version 16.	There were no significant statistical differences in the mean score of dimensions and total SCNs between the two groups in baseline ( $p > 0.05$ ). However, the results showed that the mean score of dimensions and total SCNs in the intervention group were significantly less than the control group, after the intervention ( $p < 0.05$ ).
(Sato, 2020) (India)	To evaluate the effectiveness of telenursing in reducing postoperative complications and improving the quality of life of prostate cancer patients.	Using a tablet computer, the participants were asked to provide information on various items, including urinary frequency, number of incontinence pads used, and presence of sexual desire and erections.	The Amount of Urine Retained in the Bladder After Stress Testing Increased, Indicating Improvement in Urinary Incontinence. The Relationship Between Postoperative Complications in Prostate Cancer Patients and Quality of Life Suggests That Their Physical Well-being Improved as They Experienced Relief from Symptoms.

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<b>(Author, Year) (Country)</b>	<b>Purpose</b>	<b>Method</b>	<b>Result</b>
(Calvetti et al., 2022) (USA)	To evaluate the impact of nurse-led telephone triage (Nurse-Led Telephone Triage/NTT) on reducing hospitalization rates among cancer patients.	Assessment of TRAEs was performed by trained oncology nurses according to the Common Terminology Criteria for Adverse Events grading scales and subsequent actions were taken according to the severity of the events.	It was found that 27.4% of cancer patients receiving medical treatment were referred to NTT. There was a significant reduction in normalized hospitalization rates by 4.6% compared to the previous year. Additionally, an estimated cost savings of €345,246 was reported.
(Kizikaya et al., 2023) (England)	To estimate the level of breast cancer awareness among Afghan refugee women and to evaluate the feasibility of breast cancer education through telehealth in enhancing this awareness.	Participant awareness of breast cancer (BC) was assessed using the validated BC awareness tool, Breast Cancer Awareness Measure (BCAM), during a telehealth encounter. After this baseline assessment, a BC educational intervention was administered to each participant during the telehealth encounter.	This study demonstrates that breast cancer education through telehealth significantly increased awareness among Afghan refugee women. This increased awareness was also associated with a significant increase in breast cancer screening.
(Abdigaravand et al., 2023) (USA)	To determine the effects of education and follow-up via telephone on the burden experienced by family caregivers (family caregiver burden) of cancer patients.	They were randomly assigned to intervention (n = 33) and control (n = 36) groups. For the intervention group, two face-to-face training sessions and six telephone counseling sessions were held related to the care of the patients and self-care. The control group received only routine care.	The caregiver burden scores in the intervention group were $77.33 \pm 8.49$ before the study, $58.93 \pm 8.03$ immediately after the study, and $52.78 \pm 6.86$ after six weeks. There were no significant changes in the control group. The findings of this study suggest that education and counseling via telephone can reduce caregiver burden. Such support is beneficial for providing holistic care and maintaining caregiver health.
(Rosa et al., 2023) (USA)	To explore the experiences of multidisciplinary palliative care teams in providing telepalliative care to oncology patients during the COVID-19 surge in New York City, and to provide recommendations for improving the delivery of telepalliative care in the future.	An interdisciplinary coding team iteratively coded data using a mix of a priori and inductive codes. Team members first independently reviewed each category, then met to reach consensus on recurring themes. The sample (n=11) included a chaplain (n=1) social worker (n=1), pharmacist (n=1), physicians (n=3), physician assistant (n=1) and nurse practitioners (n=4).	In this study, participants described experiencing multidimensional clinical stress as the primary challenge in providing telepalliative care during the COVID-19 surge. This stress was characterized by conflicts of loyalty and feelings of powerlessness. Participants provided explicit recommendations for enhancing the delivery of telepalliative care to acute oncology patients in the future.

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(Author, Year) (Country)	Purpose	Method	Result
(Ester et al., 2021) (USA)	To evaluate the technological literacy, technology usage, and perceived utility in supporting physical activity behavior among cancer survivors with a history of physical activity.	2 Alberta Cancer Exercise participants were invited to complete a survey on technology literacy, usage, and perceived usefulness. Summary statistics were calculated for all variables. Multiple regression examined demographic prediction of technology usage and literacy.	The results indicate that the participants' electronic health technology literacy was low, but the use of computers and smartphones was common. The majority of smartphone users employed these devices daily. Half of the respondents utilized mobile applications or wearable trackers for physical activity, and most considered them beneficial. Age and income were significantly related to technology usage and literacy.
(Blanco et al., 2022) (USA)	To analyze patient satisfaction with teleconsultations provided in the Colorectal Surgery Unit and to assess patient interest in developing and enhancing this type of support in the future.	2 A telephonic survey was conducted with the validated in the Spanish tool Telehealth Usability Questionnaire (Telehealth Usability Questionnaire; rating from 1-7) of all candidate patients assisted consecutively in the Coloproctology Unit. We included demographic variables, education level, job status, diagnosis and consultation type. A descriptive study was done.	The results indicate that the majority of patients provided positive responses to almost all questions in the survey. However, only 26.1% of them would choose a tele-health model without limitations.
(Elk et al., 2020) (USA)	To develop and determine the feasibility of a culturally-based palliative care consultation program through telephone, grounded in the cultural values and preferences of African-American and white communities in rural areas. This research also aims to evaluate the acceptance of this program by patients, their family members, and healthcare providers.	1 Phase 1: Cultural values and preferences were determined through ethnic-based focus groups comprising family members (15 W and 16 AA) who had cared for a loved one who died within the past year. Phase 2: Protocol Development: We created a protocol team of eight CAG members, two researchers, two hospital staff members, and a PC physician. Phase 3: The culturally based PC protocol was implemented by the PC physician via telehealth in the local	Phase 1: The study observed instances of disrespect towards patients and their families by hospital doctors. They believed that hope and miracles always exist and that God is the determiner. Phase 2: Specific ethnic group recommendations for culturally-based PC consultations were integrated into standard PC consultations. Phase 3: The study tested the feasibility and acceptance of ethnic-specific PC consultations among eligible patients. The telehealth system functioned well. The implementation success rate for PC MD was 98%. Most patients were non-verbal and unable to assess satisfaction with

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(Author, Year) (Country)	Purpose	Method	Result
(Algami et al., 2022) (USA)	To elucidate patients' perceptions of tele-rehabilitation (TR) and investigate the relationship between relevant factors and patient age, as well as the type of rehabilitation service.	A cross-sectional survey was conducted to obtain data about patients' demographic and medical information, technological familiarity as well as patients' experience and opinions about TR. The 227 patients completing the survey reported a mean $\pm$ SD age of $40.7 \pm 13.9$ years and musculoskeletal disorders as the most common condition treated by TR.	1 consultations; however, caregivers felt satisfied or very satisfied. Hospital administrators supported the program implementation, but hospital doctors only referred 18 out of 28 eligible patients.
(Banerjee et al., 2021) (USA)	To provide a concise guide on communication in tele-oncology that can help enhance the quality of cancer patient care through effective communication via video conferencing.	This model of patient care is being utilized at major cancer centers around the USA—and tele-oncology (telemedicine in oncology) has rapidly become the primary method of providing cancer care. However, most clinicians have little experience and inadequate training in this new form of care delivery.	This article presents the TeleOnc Comskill guidelines, compiled by a team of communication experts and oncologists, and refined through collaboration with professionals in tele-oncology services. The purpose is to provide guidance to doctors on more effective communication with their patients in post-pandemic healthcare systems. Additionally, the article aims to develop the Comskill TeleOnc virtual training intervention to improve communication-related quality care and patient satisfaction in tele-oncology.

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## DISCUSSION

From the analysis of 13 articles, four articles reported the effectiveness of telehealth-based interventions in managing cancer patients. It was reported that the use of telehealth enhances access to high-quality oncology services for patients residing in remote areas, and after investigation, it was found that web-based education in telehealth effectively improves the quality of life of patients and their coping mechanisms (Bektas, Coskun, Arikan, Ozcan, Tekeli, Kondak, & Kalav, 2022). This aligns with other studies showing a significant increase in breast cancer awareness among Afghan women following education via telehealth (Kizilkaya, Kilic, Dagistanli, Eren, Basaran, Ohri, & Sayan, 2023). Additionally, the use of telehealth has been proven to increase patient satisfaction with healthcare services (Blanco, Cerdán, García, Maqueda, Lopesino, Correa, & Martín, 2022).

Four of the 13 analyzed articles demonstrated the effectiveness of telenursing in treating cancer patients. Telenursing utilizes phone calls as a method for patient education and follow-up, employed by nurses (Sato, 2020). The telephonic nursing service is effective in providing supportive care to cancer patients, particularly those residing in remote areas, and has been shown to improve both their health and quality of life (Ebrahimabadi, Rafiei, & Nejat, 2021). Research indicates a significant improvement in the quality of life of prostate cancer patients post-surgery within three months. This improvement is attributed to sharing life goals with nurses, enhancing self-efficacy, and fostering confidence through telenursing (Abdigaravand, Goudarzi, Hasanvand, Birjandi, Galehdar, & Hojati, 2023). Furthermore, telenursing is also used as a triage method for patients reporting chemotherapy toxicity. Studies show that nurse-led phone triage is an effective method, reducing costs by €345,246 (Calveti, Tealdo, Simionato, Pagiusco, Cimenton, Gasparin, & Aprile, 2022).

Additionally, telenursing has been proven effective in reducing caregiver burden, depression, and anxiety, while enhancing communication between patients, caregivers, and healthcare professionals, making it a recommended complementary therapy (Algarni, Alshammari, Sidimohammad, Khayat, Aljabbary, & Altowajiri, 2022). The analysis revealed two articles indicating the availability of culturally sensitive palliative care models using telepalliative care methods to reach patients in remote areas.

These models are beneficial in providing equitable healthcare services (Elk, Emanuel, Hauser, Bakitas, & Levkoff, 2020). Other research emphasizes the immediate application of telepalliative care in inpatient settings and introduces it as a modality to ensure the best quality of healthcare services, strengthening this method for future use (Rosa, Lynch, Hadler, Mahoney, & Parker, 2023). One article discussed the guidelines for teleoncology as a guide for communication, understanding, reducing anxiety, and providing support via videoconferencing (Banerjee, Staley, Howell, Malling, Moreno, Kotsen, & Parker, 2021).

From the analysis of 13 articles, one study demonstrated the effectiveness of telerehabilitation using a tutor-based method at a distance. Patients accessed rehabilitation from home, with the majority expressing confidence in the facilitator's abilities. This method helped patients engage in physical activities, improving their physical condition, particularly among those aged 40-60 who were less familiar with technology (Andriani, Oh, McMinn, Gleason, Koelper, Chittams, & Ko, 2023).

Telehealth is a healthcare service provided from a distant location using digital based technology. It encompasses curative, preventive, rehabilitative, and palliative care. The forms of service include text messages, voice, images, videos, and multimedia approaches. Research has shown that telehealth care can reduce hospital stay duration, reduce emergency care needs, reduce financial burdens, improve access to healthcare services, and enhance patients' self-efficacy, ultimately leading to improved quality of life for cancer patients during treatment (Bimczok, Smythies, Waites, Grams, Stahl, Mannon, & Smith, 2013). Additionally, telehealth has been beneficial for reducing caregivers' workload and healthcare professionals' burden in caring for cancer patients. Telehealth can be combined with various interventions such as telenursing, telepalliative care, telerehabilitation, and teleoncology. From the 13 analyzed articles, there were 8 interventions using phone calls, 4 combining phone calls and videoconferences, and 1 guideline for teleoncology implementation (Ester, McNeely, McDonough, & Culos, 2021).

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## CONCLUSION

Telehealth-based cancer rehabilitation demonstrates a positive impact that warrants further evaluation and study. According to the findings of this review, telehealth-based cancer rehabilitation interventions hold promise to enhance the overall quality of life for cancer patients and considered as an essential interventions for healthcare services in the digital era of society 5.0., it also enabling the healthcare providers to deliver the services for the patient despite the distance between patients and the healthcare centre. For future intervention research to recruit and involve representative study samples related to technology literacy to learn more the linking between the effectiveness of digital-based health interventions for cancer patients.

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