



THE POTENTIAL OF TELECOMMUNICATIONS IN CANCER CLINICAL TRIALS: AN OVERVIEW

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ABSTRACT

This review article explores the potential benefits and challenges of using telecommunications technology, including telemedicine and mobile health apps, in cancer clinical trials. The author conducted a search of four electronic databases for studies published in English between 2010 and 2021 that evaluated the use of telecommunications technology in adult cancer patients and reported patient outcomes. The studies were grouped based on the type of telecommunications technology used, and the outcomes were synthesized to provide an overview of the potential impact of telecommunications technology on cancer clinical trials. Telecommunications technologies were found to improve patient access and recruitment, data collection, management, and analysis, and enable real-time monitoring of patients' health and adherence to treatment. Telecommunications technologies can also reduce trial costs by minimizing the need for in-person visits and other expenses. However, the implementation of telecommunications technologies in clinical trials is not without challenges, including technical issues, patient acceptance and adherence, regulatory and legal approvals, and variability in healthcare systems. The author suggests that addressing these challenges could lead to improved patient outcomes and better overall health outcomes for cancer patients.

**KEYWORDS :** Telecommunications, Cancer Clinical Trials, mHealth, Digital Health, Patient Engagement.

INTRODUCTION

Cancer remains a significant public health concern worldwide, with millions of new cases and deaths reported each year. Clinical trials are critical in advancing cancer treatment options and improving patient outcomes. However, these trials often face challenges such as recruitment, retention, and data collection.

Telecommunications technologies, such as telemedicine and mobile health apps, have the potential to improve the efficiency and effectiveness of clinical trials. In recent years, there has been increasing interest in exploring the use of telecommunications in cancer clinical trials. This article provides an overview of the potential benefits and challenges of using telecommunications in cancer clinical trials, as well as their impact on trial recruitment, data quality, and patient outcomes (1).

METHODS

A systematic review was conducted to identify and evaluate the current literature on the potential of telecommunications technology in cancer clinical trials. The search was performed in four electronic databases, including PubMed, Embase, Cochrane Library, and Web of Science, using a predefined search strategy. The search strategy consisted of a combination of keywords related to telecommunication technology, cancer clinical trials, and patient outcomes.

The search was limited to studies published in English and conducted between January 2010 and September 2021. Full-text articles were retrieved and assessed for eligibility based on the inclusion criteria.

Studies were included if they met the following criteria: (1) evaluated the use of telecommunications technology in cancer clinical trials, (2) included adult cancer patients, (3) reported patient outcomes, and (4) were published in peer-reviewed journals. Studies were excluded if they were not original research articles, did not evaluate the use of telecommunications technology, or included pediatric or non-cancer patients (Figure 1).

A narrative synthesis approach was used to summarize the findings of the included studies. The studies were grouped based on the type of telecommunications technology used, and the outcomes were synthesized to provide an overview of the potential impact of telecommunications technology on cancer clinical trials.

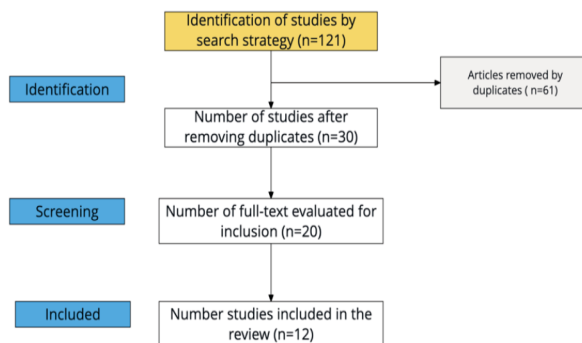


Figure 1. PRISMA.

Benefits of Telecommunications in Cancer Clinical Trials

Telecommunications technologies offer several potential benefits for cancer clinical trials, including improved patient access and recruitment: Telecommunications technologies can enable patients to participate in clinical trials from remote locations, improving access and increasing recruitment rates.

For instance, a study by Antonarakis et al. found that a smartphone app-based remote monitoring system improved patient participation and reduced the burden of in-person visits.

Telecommunications technologies can improve data collection, management, and analysis, leading to more accurate and representative trial results. Electronic data capture and remote monitoring systems can reduce errors and improve data completeness, as demonstrated by a systematic review by Brouwers et al. on the use of telehealth and mobile health in clinical oncology (1,2).

Telecommunications technologies can enable real-time monitoring of patients' health and adherence to treatment, allowing for timely interventions and improved outcomes. For instance, telemedicine consultations can provide timely medical advice and support to patients, as discussed in a review by Denzinger et al. on telemedicine in uro-oncology (3).

Telecommunications technologies can reduce trial costs by minimizing the need for in-person visits, travel, and other expenses. This can lead to cost savings for both patients and healthcare systems (4).

### Challenges of Telecommunications in Cancer Clinical Trials

Telecommunications technologies have the potential to revolutionize cancer clinical trials, but their implementation is not without challenges. Here we discuss some of the major challenges faced using telecommunications in cancer clinical trials. One of the major challenges is the technical issues associated with the use of telecommunications technologies. These challenges may include issues with connectivity, data privacy and security, and interoperability challenges. Technical challenges can significantly impact the reliability and accuracy of data collected through these technologies and may require significant investments in infrastructure and resources (5).

Another challenge in the implementation of telecommunications technologies is patient acceptance and adherence. Patients may be reluctant to use these technologies or may face challenges in accessing or using them. This may limit the patient population that can be recruited for the clinical trial and impact the accuracy of data collected. The use of telecommunications technologies in clinical trials may require regulatory and legal approvals. This can be a time-consuming and complex process that may delay the implementation of the clinical trial. Furthermore, the use of these technologies raises ethical concerns regarding patient privacy, informed consent, and patient autonomy (6).

The implementation of telecommunications technologies in clinical trials may face variability in healthcare systems. Different healthcare systems may have different capacities to support and implement these technologies, which can impact the feasibility and success of telemedicine-based clinical trials. The implementation of telecommunications technologies in clinical trials may require significant investments in infrastructure, equipment, and training. This may limit the number of clinical trials that can be conducted using these technologies, particularly in resource-constrained settings (7).

Telecommunications technology can improve patient outcomes in cancer clinical trials by enhancing patient engagement, treatment adherence, and symptom management. For example, telehealth interventions can provide patients with remote access to education and support resources, which may improve patient knowledge, self-efficacy, and satisfaction with care. In addition, telecommunication technology can facilitate remote monitoring of patient symptoms and adverse events, enabling clinicians to intervene more quickly and effectively in response to treatment-related side effects. These benefits can ultimately lead to improved patient outcomes and better overall health outcomes for cancer patients (8).

### Impact on data collection

Telecommunications technology can significantly impact the quality and efficiency of data collection in cancer clinical trials. For example, mobile health (mHealth) tools can be used to collect patient-reported outcomes (PROs) remotely, providing real-time data on patient symptoms, quality of life, and treatment adherence. Additionally, videoconferencing can be used to conduct virtual tumor boards, allowing for multidisciplinary input on treatment plans and enhancing clinical decision-making. By improving data collection, telecommunications technology has the potential to enhance the accuracy and relevance of clinical trial results, ultimately leading to better patient outcomes (9).

### Challenges and limitations

Despite the potential benefits of telecommunications technology in cancer clinical trials, there are several challenges and limitations that must be addressed. For example, the use of telecommunication technology may

increase the risk of data breaches and other security issues, potentially compromising patient privacy and confidentiality. Additionally, there may be technical and infrastructure challenges associated with the use of telecommunications technology, particularly in resource-limited settings. Finally, there may be concerns about the accessibility and equity of telecommunication technology, particularly among underserved populations. Addressing these challenges will be critical to realizing the full potential of telecommunications technology in cancer clinical trials (10).

### Future directions

Telecommunications technology is a rapidly evolving field, and there are many new and emerging technologies that may have applications in cancer clinical trials. For example, wearable devices and sensors can be used to collect physiological data in real-time, providing a more comprehensive understanding of patient health and treatment response. Artificial intelligence and machine learning algorithms can be used to analyze large datasets and identify patterns and predictors of treatment response. These technologies have the potential to transform cancer clinical trials and improve patient outcomes in new and exciting ways (11).

Telecommunications technology has the potential to revolutionize cancer clinical trials by improving patient outcomes and data collection. However, there are also significant challenges and limitations that must be addressed in order to realize the full potential of these technologies. By addressing these challenges and leveraging new and emerging technologies, we can improve the quality and effectiveness of cancer clinical trials, ultimately leading to better outcomes for cancer patients (12).

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