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Telehealth, Mobile Applications, and Wearable Devices are Expanding Cancer Care Beyond Walls

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Objectives: *To review telehealth solutions, mobile applications, and wearable devices that are currently impacting patients, caregivers, and providers who work in the oncology setting.*

Data Sources: *A literature search was conducted using the terms (Telehealth, Mobile Health, mHealth, Wearable Devices) + (Oncology, Cancer Care).*

Conclusion: *There are many current applications of telehealth and mobile health in the oncology setting.*

Implications for Nursing Practice: *Nurses who care for patients with cancer should be aware of the pervasiveness and impact of telehealth and mobile health to this unique population.*

Key Words: *telehealth, mobile health, mHealth, healthcare applications, wearable devices, oncology.*

In the last decade, telehealth, mobile applications, and wearable devices are dramatically changing access to health resources for patients, caregivers, and health care providers.[1] The World Health Organization (WHO) defines telehealth as "the delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment, and prevention of disease and injuries, research and evaluation."[2] MHealth is defined as the use of mobile and wireless technologies to contribute to the achievement of health

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objectives.[2] WHO attributes the transformation of health care delivery to the rapid advancements in mobile technologies and applications and the continued growth in mobile cellular networks. The International Telecommunications Union (ITU) estimates that more than 95% of the global population is now covered by mobile-cellular networks.[3]

Telehealth

Limited or lack of access to specialized cancer services is a well-documented societal problem faced by patients who live in rural and remote areas.[4]

Telehealth is one solution to help reduce disparities for these populations and is becoming increasingly utilized as increased mobile broadband networks help overcome mobility and access limitations of people in these areas.[3] Only a small amount of data is required for a significant impact. For example, with 500 megabytes (MB) per month, a doctor could carry out 70 minutes of remote visits (involving a video conversation via Skype) per month, and send or receive five medical images to/from medical specialists located in another town.[3]

Impact of Telehealth in Oncology

Telehealth is a vast topic, and there is limited literature on telehealth services. Patients utilizing oncology or oncology sub-specialty services have been found to benefit from these services, just as those in other fields of medicine. A recent study by Denis et al[5] demonstrated that the use of a mobile Web-application-guided follow-up increased overall survival in lung cancer patients because its use was shown to increase disease detection, lead to pursuit of earlier medical care, and increase medication and treatment compliance, and even earlier detection of relapse. Table 1 offers examples of services to patients in the oncology setting.[6]

Current research has documented positive outcomes of telehealth and teleoncology, which are summarized in Table 2.[6,7]

Mobile Health

Mobile health (or mHealth) is the utilization of mobile phones such as text messaging or mobile phone reminders to assist patients and families in keeping follow-up appointments, adhering to treatments, initiating consultation themselves, and to promoting health in the community. They are also used to support the role of the health care provider by functioning as decision support systems, hubs to Web-based medical information, or as learning tools for continuing education.[2]

The role of mobile health is studied and cited more extensively in developed countries, including the US. According to US Census Bureau data for 2013, 84% of US households reported owning a computer, and 64% owning a handheld computer (tablet) or smartphone.[8] Americans routinely utilize technology to access general medical information online, with a much smaller group utilizing technology to access their own personal health records.[9] Mobile health has also been documented and studied in developing countries, where they are

TABLE 1.
Examples of telehealth services provided by oncology sub-specialities

Radiation oncology	Radiotherapy treatment planning
	Patient consultations
Medical oncology	Patient consultations
	Remote supervision of chemotherapy
	Acute care management
Palliative care	Patient consultation
	Home management
Hematology/bone marrow transplantation nursing	Patient consultation
	Patient education
	Supervision of oral and intravenous administration of chemotherapy
Adjunct patient care services	Swallow assessment
	Lymphedema management
	Psychosocial counseling

Data from Sabesan.[6]