

# Impact of Technology on Patient Care Pathway Outcome

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**Abstract.** Telehealth has the potential to benefit health care and make better use of health resources. However, the impact of telehealth when implemented as a service within a standard patient care pathway is yet to be established. In this chapter, summary for simple unstructured review on the latest publications of critical documents and research papers on the clinical path and the role of using telehealth in improving communication is demonstrated. We present tele rehabilitation as one of the most common approaches in the patient's care in cancer and stroke. Some of the recent available evidence on cancer and stroke that shows the effect of the telerehabilitation interventions on the health outcomes will be explained.

**Keywords:** Clinical Pathway, Telehealth, Telemedicine, Outcome

## 1 Introduction

The ageing population is representing the majority of healthcare consumers among hospitals and society as is described by Scalvini MD et al., (2017). Researchers, medical personnel and managers who are focusing in the medical sector are searching and finding all the possible improvements to be done using telehealth technologies to develop the clinical care pathway and to evaluate the different results of using this type of technology on the clinical pathway elements for example aging assist technologies. In this chapter, we will list the practices which have been done on various diseases such as cancers and stroke; listing the technologies and the methodologies and trying to distinguish the varieties of the outcomes.

### 1.1 Definition of Clinical Pathway

A Clinical pathway, referred to as care pathway, integrated care pathway, essential pathway, or care map, is one in all the most tools accustomed to managing the standard in care regarding the standardisation of care processes. This care pathway aims to manage and organise the healthcare process by coordinating the operations between the patients and the medical persons usually by a third party to manipulate some factors in the health care procedures such as reducing the time and variability and improving the outcomes of these procedures. Since this terminology established in the

last eighties of the previous decade, the methods and the tools of the clinical pathway are continuously developing and improving to achieve the patient's satisfaction, enhance the quality of healthcare and therefore the quality of patient life Visser et al., (2018).

## 1.2 Definition of Telehealth

Telehealth, telemedicine, or remotely healthcare is referring to the usage of the telecommunication technology and the electronics to support the clinical practices from a distance. Homecare telemedicine is foreseen as the chronic disease's first step in telehealth technology to manage and direct nurses, physician and patients. The improvement in the telecommunication, the existence of the smartphones and the rapid increase in online access, play a significant role to focus on telehealth as part of the medical practice future. Based on Lee et al., (2019) telemedicine technology used to monitor and treat cardiovascular diseases which are the most significant concern today and it plays an important role to reduce all mortality causes associated with congestive heart failure. The most significant issue on the upcoming 20 years, is the management of chronic diseases and the increment of the old population.

## 2 Telehealth in Cancer Care

In the last twenty years, telemedicine/telehealth applications in healthcare are increasing because of the event of a lot of advanced telemedical devices and the new patient-centered health care policies. The technology makes it potential to ascertain or conserve a link and acts as a reminder to the patients.

However, the practicality and effectiveness of some programs for cancer patients yet to be studied. Telehealth has been used for monitoring of patients' symptoms and health-related outcomes during cancer care. Several initiatives of using telehealth in cancer care has been highlighted by John Shen and Arash Naeim (2017) aimed at assessing and monitoring patients with cancer. Such as homemonitoring systems for falls and falls related injuries and that show more effective preventive mechanism. Another one is a web-based system for symptom assessment for the breast cancer patients. A tablet computer to monitoring for adverse events during cancer treatment. many patients Extremely favorable and valuing the ability to access self-monitoring data was the response of majority of patients home- based mobile used that help in post therapy monitoring.

Table 1 show the technologies highlighted by John Shen and Arash Naeim (2017) review and the impact. The telerehabilitation considered recently as a branch of medicine. Several research papers highlighted that telerehabilitation has economical advantages if considered a typical use within the care of cancer patient. Additionally, telerehabilitation programs used to remotely manage the physical activity through a virtual relationship with the patient using the telemedicine tools Haily et al., (2011)

and Villaron et al., (2018). Based on (Visser et al., 2018) the majority of the patient who had breast cancer experience physiological and psychological side-effects after treatment for a long time and due to the advancement of the procedure and the monitoring of the diseases, the number of patients has increased. These new and dramatically changes represented the need of finding of new and practical solutions with a high-quality method to allow both, the patient and the doctors to discuss and agitate about the patient's current status and the related issues.

**Table 1.** Technology highlighted by John Shen and Arash Nacim (2017) review for oncology care

Technology	Function	Impact
Home monitoring systems	Recording patient-reported sensory symptoms	Effective prevention strategies for high-risk patients fall and fall injury
Tablet computer	Monitoring for adverse events for patients self-reporting	Easy, accurate and useful
Phone-based monitoring of symptoms	Detect poorly Controlled symptoms for patients undergoing chemotherapy	Improved symptom outcomes
Home-based and mobile sensors monitoring system	For monitoring patients with head and neck cancer undergoing radiation treatment	Feasible and acceptable to both patients and providers
Web-mediated interfaces	Patient-reported outcomes in oncology patients for following patients' self-reported symptoms	Allow early aid Early relapse detection Improve overall survival Improved health-related quality of life (HQRL) Less emergency room (ER) visits and hospitalization
Interactive Health Communication System (IHCS)	Oncology care team to follow patients' ratings of their symptoms and also their caregivers' ratings of perceived symptoms in between clinic visits	Improve communication with patients and their caregivers. Increasing awareness Promoting monitoring
Web-based health support system	For informal caregivers of patients with advanced Lung cancer	Reported lower burden and better Mood

In the paper mentioned above, Group medical consultations (GMCs) in which a series of a one-to-one medical patient visit by doctors, specialists and nurses shown as an effective method in breast cancer patients to follow up with their doctors. However, the usage of eHealth technologies and GMCs as a combination to produce alternative approaches to the individual's follow-ups addressed as more beneficial. This

combination is done to overcome the drawback of online acceptance by breast cancer patients. They used Tablet-based online app by three applications based on (iPad2) and each connected through a shared iCloud. They find the outcome of the apps on primary outcome measures where the psychological distress and the secondary outcome measures were eight items cancer scale, quality of life, medication adherence, feasibility and acceptability.

The impact of My-GMC on distress and management failed to considerably take issue while the secondary outcomes cancer worry, and quality of life weren't considerably different between each team in any respect time points with a significant concern of repeat and unhappy feelings. Patient satisfaction with the GMC and individual visits was equal with some would advocate it with some reservations. Practicality issues appear to be due to 'no Wi-Fi access. No significant effects on psychological distress and management found. With low- intensity support it's going to be troublesome to enhance a positive outcome like the Cancer management form might not be sensitive to variations. Therefore, it has been seen as vital to spot the first possible or useful parts of this intermingled care intervention.

The breast cancer patients need peer support and medical consultation seeking for information regularly with the patients may get it hard to the trustworthiness of the online help. The usefulness of cancer eHealth support was not consistent as highlighted by Villaron et al. (2018). Despite the positive impact of regular to moderate activity in cancer patients, and its potential to cut back the secondary effects of cancer therapies, specifically fatigue, to boost patients' physical capacities and to enhance their quality of life. In their study, they started by three tools used the first is a device that counts the number of steps taken within the course of a given time. The second tool was the set of recommendations, as a paper pamphlet. The third tool is a text message sent to encourage patients to undertake physical activity.

There are some limiting factors to the participation in post-cancer activities programs is the Lack of time, fatigue, and transport difficulties. Therefore, it becomes necessary to propose plans of remotely controlled physical activity so that all patients in care will have the benefit of it. According to (Sun et al., 2017), Ostomy More than one million patients are living with an ostomy (an opening in the body to extract the waste from the body for people who have treated form gastro-urinary cancer) in the U.S only. The patients have to make anatomical changes in their body for a lifelong and the person with ostomy has a health- related quality of life, daily self-care and long-term complications, and they also face psychological problems such as depression. They used Ostomy care is a contentious process, which becomes tedious due to the lack of transportation, contestant follow-up, lack of access to professional nurses and so on. Therefore, the presence of a telehealth-based intervention is essential to support ostomy self- management and improve the clinical pathway for the patients who suffer from ostomy as a cancer survivor. They used to tele health-base surgical process Self- management coaching (OSMT) program. The primary aim was activa-

tion, self- efficacy and ostomy-related, while the secondary aim were the variations in ostomy related medical care utilization.

Telehealth videoconferencing, transmission of still pictures, e-health as well as patient portals, remote watching of significant signs, web-based continued medical education, and nursing decision centers are all thought of a part of telehealth. Participants that don't have access to the desired technology or web property are offered a brief loan of tablets and mobile hotspots. OSMT cluster session participants connect via video conferencing and are visible on camera to the remainder of the group. The results show an impacts in all aspects of health related quality of life.

### **3 Telehealth in Stroke Care**

Lack of trained rehabilitation personnel and varieties of treatment make the telemedicine one of the promising avenue for neurology care. Strok is one of the disabilities leader in the world. Charlotte et al., (2018) reviewed the rationality of using the teletestrok system in canada in strok care. Several aspect has been covered, advantage of a telestroke system to the expert stroke physician to view and interpret the imaging and thrombolysis rates and functional outcomes of acute stroke patients and mostly positive effect identified even in system level and coverage. Telerehabilitation has moderate proof to have equal effects with typical rehabilitation in rising talents of activities of daily living and motor perform for stroke survivors. Burrige et al (2017), reviewed two technologies LifeCIT (a web-based support program for people) and M-MARK (Mechanical Muscle Activity with Real-time Kinematics). They explained how the use of the conventional treatment is expensive and not feasible because of social and environmental factors and that could be overcome using the wearable sensors which could improve the intensity and adherence to a rehabilitation regimen.

with stroke, centered on the use of constraint-induced therapy (CIT) at home. Sarfo et al., (2018) on their study method, they distributed Smartphone with networking capabilities and equipped with (or downloaded on to their phone) the 9zest Stroke Rehab App® (<https://9zest.com/stroke>) to deliver personal, goal- targeted 5-days-a-week exercise program that was increasingly graduated by a teletherapist for twelve weeks. The outcome measures: (i) Stroke Levity Scale (SLS), (ii) changed suffragist score, (iii) Barthel's Index of Activities of Daily Living, (iv) National Institute of Health Stroke Scale, (v) urban centre psychological feature assessment, (vi) Fatigue severity scale (vii) visual analogue scale for pain and (viii) practicability outcomes like fidelity listing as well as net property problems and App practicality. Improved scores from month 0, is shown with moderate adherence to intervention protocol and high satisfaction with the tele rehabilitation intervention. Table 2.1 show the results of applying telerehabilitation in some aspect of strok care and area of positive effect.

**Table 2.** Some reviewed aspects and effects of telrehabilitation in strok

Author	Aspect	Effect
Fred S. Sarfo et al 2018	Geographical Limitation	Adherence to intervention protocol and Satisfaction
Jane H. Burridge et al 2018	Security Patient to physician ratio	Satisfy the demand by therapist for a system to support patients
Annemiek Visser et al 2018	Psychosocial support	Satisfaction and less distress

On a related context Sakakibara et al., (2017) mentioned that activity is essential in stroke management to prevent secondary stroke (i.e. thirtieth can have another stroke at intervals five years). Lifestyle was a primary outcome, and the secondary outcomes were the daily walking, physical activity (four-days), diet (fibre and fat intake) drugs adherence, and blood pressure activities. Health- related quality of life, depressive symptoms, health and work utilization measured as a tertiary outcome. The stock coach telehealth self-management intervention used to enhance behaviors, to increase patient behaviors and improve management of stroke risk factors.

#### 4 Summary

Application of tele health in healthcare management system is expanding around the world as the demands for a good quality and cost-effective healthcare keep increasing. Positive and significant impact in most of the studies was an encouragement to continue search about the barrier and factor of success of such methods. As a conclusion, Telemedicine and Telehealth technology has been tried for telerehabilitation and little to be done in acute care. Despite the better quality of life and are less fatigued found in patient who used telehealth guides than patients who are not guided. Not all patients have access to the technology specially online based that make a limitation in most of the reviewed studies. It is thus, important to study the link between clinical pathway and tele health needed in future structured review to cover the gap identified in the current review.

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