

## Digital Physiotherapy Intervention in Health Care Delivery– A Narrative Review

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### Abstract

**Background and Objective:** Delivering health care with information and communication technology has become an innovative form to address various health needs. Poor demand for services, adherence or follow up plans, inaccessibility of facilities, and high cost of treatment are the major challenges faced by the health care system that need to be overcome. So the objective of this narrative review is to explore how digital physiotherapy intervention is supportive and improve the quality of healthcare in the current clinical setup.

**Methods and Results:** Electronic papers up to May 2019 were searched in Medline/PubMed rigorously. Total of 10 potential relevant titles was identified and reviewed. We summarized these studies emphasizing how digital intervention could support or enhance the current rehabilitation or physiotherapy practice.

**Conclusion:** Digital intervention is believed to have an impact on the client's performance, self-management and adherence of exercise program at the home in the absence of health care providers to a certain extent. The digital intervention act as the driver or facilitator in improving the client's health status.

### Keywords

Digital, Intervention, Physiotherapy

### Introduction

Delivering health care with information and communication technology has become an innovative form to address various health needs. Digital health intervention (DHI) is a method of delivering interventions through technologies such as the mobile devices/apps, information sharing through websites, telemedicine and text messaging to support the achievements of health objectives (World Health Organization - WHO 2016). This method of intervention demonstrated a potential to provide cost-effective, safe and also as a measurable tool to boost health care system (Murray et al. 2016) which is supported by WHO, defines digital health as a potential tools to overcome health system challenges like poor demand of services, adherence or follow up plans, inaccessibility of

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facilities, and cost-effective for health and health-related fields (WHO 2018). DHI has been projected as a promising mode of intervention delivery for self-management support programs and has shown significant improvement in patients' symptom (Toelle et al. 2019). Moreover, DHI involving a group of patients created a more positive experience and increased the level of motivation through the exchange of information between one and another (Dunphy et al. 2017).

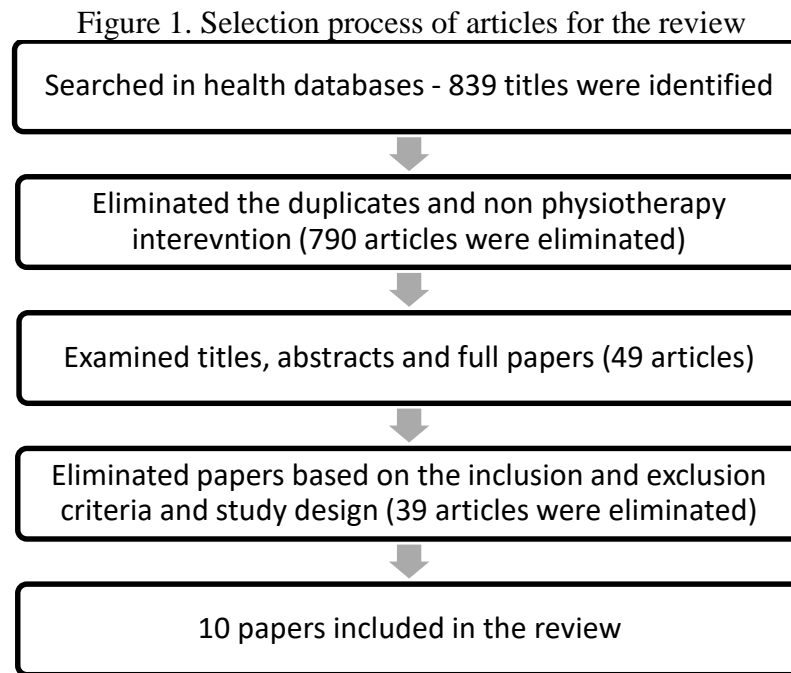
Countries with the developed healthcare system are generally facing pressure in meeting the increased demands of quality healthcare services while reducing expenditure. For instance, the physiotherapy department based in South Australia provides consultation to all post-natal women which allow early screening of pain, wound care, mobility and other related dysfunctions (Goode et al. 2018). Following the consultation, comprehensive handouts were provided and ward-based class for approximately 30 minutes was held. However, due to the need for reducing the length of hospital stay, hospitals encouraged early discharge which hindered the ward-based class. Continuity of the exercises upon discharge is not guaranteed but, since comprehensive consultation has been done, follow up with exercises via the internet was developed. As a result, post-natal women who followed up via the digital intervention system expressed satisfaction and reported positive outcome (Goode et al. 2018). Besides these, the online exercise logs to monitor the progress instilled persistence in patients to perform the exercises on a regular basis purposefully to ensure that the logs don't look empty (Dunphy et al. 2017).

Implementation of DHI should be considered as quickly as possible because the process of designing an implementation strategy based on the best evidence available requires much dedication. It is crucial to identify the category of people who will be undergoing the interventions and understand their needs based on assessments to ensure both interventions and the implementations strategies fit the purpose (Ross et al. 2018).

Self-care management, home-based exercise and maintaining an active lifestyle are the vital element of the complete rehabilitation program and also exercise adherence will influence the recovery. In current days the appointments are delayed, follow up of prescribed exercise frequency and methods have not adhered. So the objective of this current review is to address the potential role of digital physiotherapy interventions in health care delivery and with that how far the patients will feel empowered to take care of themselves using various digital tools. In the future, information from this narrative review will shed insight and create awareness of digital technologies in physiotherapy practice.

## **Methods**

Electronic papers published up to May 2019 were searched in MEDLINE/PubMed rigorously for digital physiotherapy intervention. Randomized controlled and convenience trial was considered for evaluation that is focusing on physiotherapy practice using digital interventions which include mobile phones & applications, internet-delivered programs, recorded videos, and telerehabilitation programs. No restrictions on the conditions and intervention protocols. Total 839 articles were identified, out of which only 10 manuscripts that met the inclusion criteria were retrieved, analyzed and interpreted and those did not meet the above-stated criteria were excluded. The flowchart of the selection process is shown in Figure 1.



## Discussion

The studies categorized and included in this comprehensive narrative review supported the digital physiotherapy intervention rather than selecting a specific type of conditions and its intervention. In this review, we considered the digital intervention which supports care and educating patients through mobile phones & apps, internet-based information sharing and other remote technological tools for monitoring/implementing the various exercise programs. Therefore, we detailed intervention and participant characteristics to outline areas for future research to improve this method of treatment delivery well.

The use of the digital intervention in healthcare practice provides an excellent means of self-monitoring and self-management. Several studies have highlighted that digital intervention is effective in reducing pain (Toelle et al. 2019; Irvine et al. 2015). A Study by Toelle et al. (2019) was conducted among 101 lower back patients on comparing the treatment effects of the digital app (Kaia App) against a control group which received conventional physiotherapy and education. The study result demonstrated significant improvement of pain ( $p < 0.05$ ) in the group with digital app intervention for treating back pain and further supported by Irvine et al. (2015), which compare the efficacy of online intervention (Fitback), providing education, behavioral strategies and instructional videos on specific exercise while control group did not receive any intervention. Interestingly, after 16 weeks, Fitback group reported lower pain level to compare to control group. This highlights that treatment with digital intervention is effective and superior compare to face-to-face exercise therapy program alone.

Another randomized control trial by Broekhuizen et al. (2016), aiming at improving physical activity in inactive older adults has demonstrated significant improvement in the quality of life (QOL) in intervention group which utilized “direct life” internet-based physical activity

program compare to control group. The internet-based intervention program that was designed includes a general recommendation on physical activity and participants were given a target for daily activity. This suggests that designing of intervention is important in improving the QOL.

Even though some studies are favoring to home or institution based face to face therapy session, Redzuan et al (2012) concluded in his study that providing a video-based home therapy for acute stroke patients has improved better independence level in the modified Barthel index score and also reduced the stress level of the caregivers due to self-paced treatment session to the beloved or the patients, spared the hassle of travelling and also it is cost-effective. The above facts are consistent with another study by Dias Correia et al (2019) stated that home-based digital physiotherapy is feasible and reduces the dependency of manpower (Time Up Go test 3 and 6 months  $P=0.01$  &  $P=.005$  respectively) while ensuring the outcomes compared to conventional in-person rehabilitation for total hip arthroplasty.

Several important factors which would determine the acceptability of the digital intervention, this includes the cost estimation and accessibility of the treatment . Therefore, a literature searches support the acceptability, accessibility, and feasibility of the digital intervention in managing older adults discharge from an acute rehabilitation unit with the various disorder (Tousignant et al. 2006). In this manuscript, telerehabilitation was built and controlled remotely to improve the functional autonomy in the elderly population. Sessions are scheduled three times a week for 4 weeks and cost-effectiveness are measured based on market prices. Accessibility of the session was challenging, where onsite presence of a person is need for safe delivery in the older adults although the development of digital and remote communication is well established, their true value can be obtained if the therapist and patient jointly engage with them but visiting the clinic and poor accessibility of home therapist made a good compromise for delivering telerehabilitation. The cost estimation of the telerehabilitation showed comparatively less than the therapist home visit of the patient (Tousignant et al. 2006).

Previous studies have also highlighted a relatively low adherence level to the web-based intervention. Overall internet-based intervention plays a vital role in reinforcing exercises and also as a strong motivator to adhere to exercises for anterior cruciate ligament reconstruction patients. Personalized communication can be alongside to boost the adherence, outcome, and usage of internet-based interventions (Pazit et al. 2017). A further study conducted by Widmer et al. (2017) demonstrated that digital health-based cardiac rehabilitation program in conjunction with usual cardiac rehabilitation was positively benefitted the patients on their quality of life, a recurrent visit to hospitals and some other risk factors after percutaneous coronary intervention for the acute coronary syndrome.

Despite all the facts outlined above, our study has some certain limitations each of which points towards the directions of future study. Therefore, detailed digital intervention for the specific disorder has not been conducted. Apart from that, we have included various study design trial with various type of outcome, therefore the direct comparison between each study can be conducted which limiting us from drawing an exact conclusion. Nevertheless, we can still draw important insight on the advantage that digital technology or digital intervention that might offer in the current health care system. The key characteristics of this study is stated in table 1.

Table 1. Key characteristics of included studies

Reference	Sample	Study design	Test	Intervention	Results
Karen Broekhuizen et al 2016	119 physically inactive participants	Randomized controlled trial	Mann-Whitney nonparametric test and linear regression models.	12 week Direct Live (Physical activity program), Digital coaching.	Significant improvement in quality of life in interventional group compared to control group. Which concluded that internet based physical activity was effective.
Gabriel Mecklenburg et al 2018	162 Chronic knee pain participants	Two armed, Randomized controlled, unblinded trial	Descriptive statistics and Linear mixed effects model	12 week Digital care program using hinge health application	Digital hinge health application significantly improved the outcome of pain, physical function, stiffness level in chronic knee pain patient when compared to just education articles.
Nor Shahizan Redzuan et al 2017	90 acute stroke participants	Blocked randomization	Pearson's chi-square, independent and paired <i>t</i> test	3 months Self-instructional video on rehabilitation procedure and patient handling techniques.	Video based treatment session in acute post patients has positively impacted on the functional independence.
M.Tousignant et al 2006	4 older adults (below knee amputee, stroke knee replacement, hip replacement)	Convenience sample method	Mean difference	12 session tele rehabilitation program	This study concluded that tele rehabilitation is an alternative tool with in person rehabilitation which significantly reduced the burden and cost of rehabilitation.
Fernando Dias Correia et al 2019	66 total hip arthroplasty patients.	Single center, parallel-group pilot study	Mann-Whitney test	8 week exercise session home-based digital program	Novel digital system demonstrate significant satisfaction among patients with THA compared to conventional rehabilitation.
R Jay Widmer et al 2017	80 patients undergoing cardiac rehabilitation following acute coronary syndrome	Randomized controlled trial	Students <i>t</i> test, Pearsons chi square	12 weeks patient undergoing digital health intervention for cardiac rehabilitation	Widmer et al concluded that digital health intervention based cardiac program statistically significant alongside with cardiac rehabilitation.
Levinger Pazit et al 2017	17 patients following anterior cruciate ligament reconstruction	Pilot Randomized controlled trial	Descriptive statistics, ANCOVA	Internet based resource on information and communication	The study concluded that internet based therapy played a significant role in motivating to adhere exercise in ACL patients given the relatively low adherence..
Toelle et al. 2019	101 back pain participants	Randomized controlled trial	Two-way split-plot ANOVAs	mHealth back pain App (Kaia App)	Kaia App (program for LBP in accordance to international management guidelines)
Irvine et al. 2015	597 lower back pain participants	Randomized controlled trial	Chi-square tests and one-way analysis of variance models	Mobile web app to self-manage low back pain for 4 months	Fitback played a considerable value in this type of intervention as a potentially cost-effective tool that can reach large numbers of people
Dunphy et al. 2017	24 consented, comprising 8 females and 16 males, mean age 30 year post ACL reconstruction participants	Convenience sample method	Thematic analysis of the interview	TRAK for 16 weeks and were available for interview post ACL reconstruction participants	TRAK was found to be an acceptable method of delivering ACL rehabilitation alongside face-to-face physiotherapy. Patients reported that TRAK, specifically the videos, increased their confidence and motivation with their rehabilitation. TRAK could be developed in the future to meet technological expectations and further support rehabilitation.

## Conclusions

Digital intervention is believed to have an impact on the client's performance, self-management and adherence of exercise program at the home in the absence of health care providers to a certain extent. The digital intervention act as the driver or the facilitator in improving the client's health status.

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