

COMMENT

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Digital solutions in musculoskeletal health

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Abstract

Musculoskeletal disorders (MSDs) are a common cause of disability and reduced quality of life, and the burden of MSDs is a global concern. To tackle the projected increase in the burden of MSDs digital technologies are perceived as critical in the context of complementing traditional healthcare services.

Background

Worldwide, the burden of managing chronic diseases, including musculoskeletal disorders (MSDs), is increasing at a rapid pace. MSDs affect the human body's movement or musculoskeletal system and are characterized by pain, fatigue, and stiffness, and typically impacts movement, sleep and quality of life. Musculoskeletal disorders impact approximately 1.7 billion people globally and the burden of MSDs is well established in terms of morbidity, reduced quality of life and work absenteeism [1].

In the context of budget restraints, the need for early access to care, and scarcity of healthcare professionals, healthcare systems are increasingly challenged by the necessity and demand for management of MSDs. In addition, a look into the future reveals a projected rise in incidence and prevalence of MSDs due to factors such as aging, population growth, overweight, and sedentary lifestyle [2]. Taken together, these factors are likely to lead to a significant and growing burden of MSDs globally, which highlights the importance of initiatives to improve musculoskeletal health and reduce the impact of MSDs on healthcare systems and economies.

Time for a change

The majority of people with an MSD are impacted by back and neck pain, hip or knee osteoarthritis, gout, or rheumatoid arthritis [1]. Traditionally, diagnosis, monitoring and disease-management of MSDs has been provided through face-to-face consultations requiring the patient to physically visit numerous departments and clinics. Moreover, the increasing therapeutic options and demanding treatment goals of contemporary management of patients with MSDs calls for further development of the traditional healthcare systems approach, which involves time consuming and resource demanding visits.

To tackle the projected increase in the burden of managing people impacted by chronic conditions, such as MSDs, digital health solutions are recommended by the World Health Organization (WHO) and the European Union (EU) to complement traditional healthcare services [3, 4]. A transition towards digital health was pushed further by the recent pandemic, which gave an incentive to speed up digitalisation in the healthcare system. The potential for digital health solutions to have an increasing bearing on global health is supported by the fact that the majority of the global population now has internet access, altering how people approach health and wellbeing, communicate with healthcare professionals, as well as access and receive healthcare services [5]. Moreover, a move towards a more patient-driven and home-based healthcare delivery model, i.e., through

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digital health solutions, is considered to be both relevant, preferable, and feasible by patients and healthcare professionals [6–8].

Digital health solutions

Digital health covers the employment of routine and innovative forms of information and communications technology (ICT) to address health needs [5, 9]. Digital health solutions facilitate remote consultations and access to care, which may be particularly important for patients who live in remote areas, are quarantined, or have mobility issues, and they have been applied in the management of a series of different contexts, ranging from disease prevention, rehabilitation, disease management and disease monitoring [10–14].

The technology applied in research and clinical practice range from phone calls to virtual reality solutions, from text-based guidance to digital humans, and from the use of web technology to biofeedback equipment [10–14]. Machine learning (ML) and artificial intelligence (AI) is already being applied in the analysis of radiographs and in personalizing digital health interventions that engage and motivate patients to take an active role in managing their musculoskeletal disorder(s). In the years to come we are likely to see an increase in the number digital health solutions embedding ML and AI in order to further advance the diagnostic process, disease management, and patient outcomes [15].

In the context of digital health, the vast majority of current solutions focus on a vertical strategy. This implicates developing digital health solutions that are tailored to a particular clinical specialty (rheumatology), domain (rehabilitation) or patient population (knee osteoarthritis), rather than a general approach that covers a broad range of conditions, treatments, or interventions [16, 17]. In example, an organization pursuing a vertical strategy could focus on rheumatoid arthritis, and develop tools for remote monitoring and online consultations, as well as a platform for patient education [6]. Applying a vertical strategy can have several advantages within the space of digital health, including the ability to develop more targeted and effective solutions for specific patient populations, and the potential to establish a leadership position in a specific domain. Conversely, it can also have limitations, such as too narrow of a focus and the risk of missing out on opportunities and needs in adjacent or complementary areas of healthcare.

The development of digital health solutions has advanced from focusing on research and local/regional implementation cases to being systematically accredited, deployed and embedded into national clinical services and pathways [15, 16]. An update on regulatory requirements in many regions of the world has increased

the demand for documentation of safety, performance, and clinical effectiveness of digital health solutions [18]. Driven by requirements and global demands an ever-increasing number of digital health solutions are now approved as medical devices and evaluated based on their ability to deliver evidence-based therapeutic interventions [17].

These latest stages of development have created a framework for the development and deployment of evidence-based and clinically validated digital health solutions referred to as digital therapeutics (DTx). These solutions are typically regulated and/or ensured reimbursement by healthcare authorities, and once developed and certified, DTx solutions are prescribed by healthcare professionals, similarly to the prescription of medicine and medical devices.

Conclusion

Healthcare systems across the globe have traditionally focused on preventing mortality rather than the long-term healthcare for people impacted by chronic disabling conditions. The current healthcare system is systematically failing to recognise, and is negatively impacted by, the influence MSDs have on i.e., the ability to adhere to a healthy lifestyle or rehabilitation initiatives [2]. Consequently, there is an enormous need for an accelerated and globally elevated awareness on implementing changes related to the management of MSDs.

Despite numerous initiatives and practices at national, regional, and local level, a full digital health transformation is still hampered by unequal access, lack of interoperability as well as missing/outdated infrastructures, incentives and payment-models. It is critical that researchers and clinicians continue to explore and leverage the potential of digital health tools in the management of MSDs. Besides continuing research on safety and clinical effectiveness of digital health solutions, future investigations should focus on developing and evaluating personalized, effective, and integrated digital health solutions that improve long-term patient outcomes while also being widely applicable, accessible, and cost-effective. In particular, there is a need to apply rigorous methods to evaluate the impact of digital health solutions on patient outcomes, to explore factors important for implementation, and to investigate how digital interventions may be adapted to patient preferences, characteristics, and clinical presentation.

The growing use of digital technologies in healthcare has opened up new opportunities for the prevention, diagnosis, and management of MSDs, but as highlighted there are still critical challenges that must be managed in order for digital health solutions to reach as many patients in need of treatment as possible [14].

Authors' contributions

HG conceptualized, wrote and revised the manuscript. The author(s) read and approved the final manuscript.

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