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Multiple sclerosis on behalf SFSEP

Connected health and multiple sclerosis

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INFO ARTICLE

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ABSTRACT

There is as yet no consensual definition of "connected health". In general, the term refers to the growing use of technology and, in particular, mobile technology in medicine. Over the past 10 years, there have been an increasing number of published reports on the wide-ranging and heterogeneous fields involving the application of technology in medicine, ranging from telemedicine to tools to improve patients' evaluation and monitoring by physicians, as well as a multitude of patient-centered applications. They also represent promising tools in the field of clinical research. This report is a review of the importance of using this technology in the management of multiple sclerosis patients.

1. Introduction

There is as yet no consensus definition of "connected health". The expression only appeared within the last few years and usually refers to the growing use of technology, especially mobile technology (MT), in the medical field. Various applications can be included under the term, such as telemedicine, and digital tools that can help physicians evaluate and follow patients with a specific disease or symptom. It also includes patient-centered tools that can be used for patient education, symptom and treatment monitoring, and rehabilitation. As there have been an increasing number of published reports on connected health over the past 10 years, regulatory authorities are now progressively taking more and more consideration of this novel field of medical practice in their guidelines and recommendations. Thus, the aim of the present report is to review the main applications of connected health in the management of patients with multiple sclerosis (MS).

2. General considerations

2.1. *Are patients and physicians likely to use MT for medical purposes?*

Several studies have assessed the use and acceptance of MT, especially smartphones, by MS patients in their healthcare [1–3]. The results have revealed that > 85% of patients own a smartphone, and most of them have declared using it to improve their disease management. The main smartphone

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use was for Internet access. A study by Winberg et al. [3] showed that MS patients use mobile apps the same way as the general population does. When Griffin et al. [1] enquired about patients' concerns about using MT for healthcare, the most reported issues were reduced contact with healthcare professionals, data security and visual impairment.

As for healthcare professionals, another report found that > 90% of them owned a smartphone, and most of them used their smartphones in clinical settings [4].

2.2. Mobile apps and device regulations

The number of so-called ''medical'' applications (apps) are growing exponentially in mobile stores such as the Apple App Store and Google Play Store. However, there is wide heterogeneity regarding the quality, reliability, relevance and cost of these apps. This is mainly due to the lack of regulation of the medical content provided by these apps at this time. The use of mobile apps in healthcare also raises unresolved questions about data privacy and security, as well as legal concerns in cases where, for example, inaccurate app content has led to incorrect diagnosis or disease management.

Thus, the regulation of mobile apps and devices appears to be mandatory if their use in future is to be integrated into daily clinical practice. In 2013, the US Food and Drug Administration (FDA) released recommendations stating that only the tools considered ''medical devices'' would be regulated [5]. The FDA defined a ''device'' as an app or tool intended to help diagnose, treat or prevent disease. Only ''those mobile apps that are medical devices and whose functionality could pose a risk to patient safety if the mobile app were to not function as intended'' should be regulated.

In Europe, the health and regulatory authorities adopted a similar position on medical apps. In addition, labeling mobile apps as ''mHealth Quality'' was recently proposed by a French team [6]. This is a two-step process: first, it requires the app developer to fill out a questionnaire to ensure that the app meets the required quality criteria; and second, the app is then tested by a panel composed of the healthcare professionals and potential users for whom the app was designed. At present, this process is at the beta-test stage, and around 30 apps have been labeled thus far.

3. Role of the Internet in MS management

The development of websites dealing with medical information was most likely the initial step in the growth of connected health. As patients have increasingly searched the Internet for more information about their diseases, symptoms and available treatments, the available resources have become massively diversified over the past few years, and now includes websites, social networks and discussion groups. A US publication based on social media analysis revealed that patients are highly likely to share their own experiences with disease-modifying therapies (DMTs) and treatment-switching on social media [7]. In the field of patient education, the present authors showed that the use of Internet sites could provide relevant and personalized information to patients [8]. However, in another, more recent study, French websites delivering MS information were blindly rated by two MS experts and one naïve evaluator [9]. The results highlighted poor-quality content overall, and a lack of scientific references to support the delivered content, although institutional websites appeared to deliver the most reliable information.

Several certification processes for websites have been proposed over the last 20 years [10]. The first version of the certification called ''Health on the Net Foundation Code of Conduct'' (HONcode) came out in 1996, and now appears to be the most robust and reliable labeling process at this time.

4. Mobile apps and devices for healthcare professionals

Regarding routine clinical practices, the follow-up of MS patients mainly relies on anamnestic data and ratings based on Expanded Disability Status Scale (EDSS) scores. These tools, combined with regular magnetic resonance imaging (MRI) monitoring, should allow physicians to evaluate disease activity and disability progression. However, several limitations persist that could be solved by MT. For example, evaluation of walking distance, which mostly relies on patients' subjective estimations, can be objectively and regularly measured to obtain better and more reliable information on disability progression. In fact, several parameters, such as visual and cognitive function, are underestimated by both EDSS scores and our current routine clinical practices, yet can be more easily and more accurately evaluated with the use of MT.

Currently, several mobile apps dedicated to MS are available on iOS and Android devices (Table 1). Most of them provide clinical and/or educational content dedicated to medical residents and medical students. However, only a few have been validated and reported in the literature. In the poster session of the 2015 European Committee for Treatment and Research in Multiple Sclerosis (ECTRIMS) Congress, it was reported that an iOS mobile app could improve the reliability of EDSS score ratings [11]. Further study is now ongoing to assess its potential to reduce inter-rater variability.

In fact, numerous other tools, based on new technologies that are not yet available for public access, have been evaluated and reported in the literature. Several studies showed that smartphones and tablets could be used for cognitive assessment using either self-administered tests [12,13] or the classic tests administered by a health professional [14]. Digital cognitive assessment of older patients has also proved feasible [15]. A recent paper by a French team reported that a mobile app could be used to replace the classic Multiple Sclerosis Functional Composite (MSFC) instrument [16], and a prospective study is currently ongoing to correlate the results obtained by this app with various forms of MS involving various degrees of disability.

Visual function assessment, which is not always easy to do during neurological consultations, can be performed with the use of tablets for either classic or low-contrast visual acuity tests [17–19]. The various sensors integrated into most smartphones for, say, the global positioning system (GPS) and pedometer gyroscope, may also be used to measure and quantify the neurological parameters usually considered

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