

eHealth and mHealth: Adherence to treatment in chronic diseases

Cibersalud y salud móvil: adherencia al tratamiento en enfermedades crónicas

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Abstract

Poor adherence to treatment is a common problem in patients with chronic diseases since, given their nature, they involve long-term therapeutic regimens, hence the importance of permanent follow-up. In general, it is known that adherence to treatment is necessary to achieve better health outcomes, improve quality of life, and reduce health care-related costs. The growth of eHealth, particularly telemedicine and mobile health (mHealth), has resulted in a real benefit of technological platforms in the therapeutic adherence of these patients. With this in mind, the aim of this reflection paper is to briefly describe the current state of eHealth strategies and the impact they may have on adherence to treatment in patients with chronic diseases.

Keywords: Telemedicine; mHealth; eHealth; Chronic Disease; Therapeutic Adherence (MeSH).

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Resumen

La poca adherencia a los tratamientos es un problema frecuente en pacientes con enfermedades crónicas, ya que, dada su naturaleza, implican esquemas terapéuticos que se perpetúan a largo plazo, de ahí la importancia de un seguimiento continuo. En general, se sabe que una mejor adherencia al tratamiento es de gran importancia para lograr mejores resultados en salud, mejorar la calidad de vida y reducir los costos asociados con la atención en salud. Actualmente, con el crecimiento de la cibersalud (ehealth), en particular la telemedicina y la salud móvil (mhealth), se ha comenzado a describir un beneficio real de las plataformas tecnológicas en la adherencia terapéutica de estos pacientes. Teniendo en cuenta lo anterior, el objetivo de esta reflexión es describir brevemente el estado actual de las estrategias de cibersalud y el impacto que podrían generar en la adherencia al tratamiento en pacientes con enfermedades crónicas.

Palabras clave: Telemedicina; Enfermedad crónica; Cumplimiento y adherencia al tratamiento (DeCS).

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Introduction

Poor adherence to treatment is a common problem in patients with chronic diseases since, given their nature, they involve long-term therapeutic regimens, hence the importance of permanent and effective follow-up. In this sense, new technological strategies have been implemented with the aim of improving the management of these diseases and, thus, preventing complications associated with poor therapeutic adherence in these patients.^{1,2}

Different electronic Health (eHealth) methodologies, in particular mobile health (mHealth, which includes mobile device applications), are strategies that can positively impact adherence to treatment in patients with chronic diseases.² In this regard, the objective of this reflection is to briefly describe the current state of eHealth strategies and the impact they may have on adherence to treatment in patients with chronic diseases, including those covered by the Colombian health system.

Adherence and eHealth

According to data from the World Health Organization (WHO),³ noncommunicable diseases account for 41 million deaths worldwide each year. These deaths occur mainly in low-income countries and are mostly related to cardiovascular disease, diabetes mellitus (DM), cancer and respiratory diseases,⁴ conditions that often require a long-term therapeutic plan and in which non-adherence has been linked to poor control and management. Therefore, it is clear that good therapeutic adherence in patients with chronic conditions is essential not only to improve health and quality of life outcomes, but also to reduce health care costs.⁵

In Colombia, the Ten-Year Public Health Plan⁶ establishes that non-communicable diseases include cardiovascular diseases, cancers, DM, high blood pressure, lower-airway respiratory diseases and chronic kidney disease, which, in addition, are considered diseases of interest to public health because they require adequate control and, especially, prevention.⁷ According to the literature, adherence to the treatments of these diseases is not the best; for example, regarding DM, adherence is 66% according to a study by Alayón & Mosquera-Vásquez⁸ carried out in 131 diabetic patients users of a health promotion company in Cartagena, and 31.4% for high blood pressure according to a study carried out by Guarín-Loaiza & Pinilla-Roa⁹ in 242 patients with hypertension treated in two health care centers in Bogotá.

Adherence to therapy is generally defined as the extent to which a patient takes medications following the prescription and recommendations made by a physician. Patients' adherence rates are usually reported as the percentage of drug doses taken by the patient at a given time.¹⁰

Poor adherence to treatments is not only related to complications and deterioration of the underlying chronic disease, but is also associated with disability, death, and increased costs of care.^{10,11} Furthermore, it is critical to keep in mind that adherence to therapy can be related to the patients' understanding of their condition.¹² Some of the factors that influence adherence are the formulation of complex regimens, lack of explanation of the benefits and possible adverse effects, high drug costs, poor physician-patient relationship, and frequency of drug use; concerning the latter, it is worth noting that the highest adherence to medications occurs when they are formulated once a day.¹⁰

Technological advances have led to the emergence of eHealth, which consists of the use of information and communication technologies (ICTs) as a helpful tool in the field of health, including telemedicine, health-related websites, electronic medical records, applications for electronic devices, etc.¹³⁻¹⁵ The perception of the term eHealth changes as technologies evolve and new care methodologies are implemented. For example, the term digital health is now used to refer to the general use of digital health technologies for health, and although its origin is framed in eHealth, it encompasses new computational advances, such as big data and aspects of artificial intelligence.¹⁶

Since the end of the twentieth century, ICTs have been implemented in health care to improve patient participation and continuity in their medical treatments.¹⁷ Telemedicine is a type of care that uses these technologies and, according to the American Telemedicine

Association (cited by De La Torre-Díez *et al.*¹⁸), it consists of the exchange of medical information from one site to another via electronic communications between health professionals and has grown in importance for optimizing patient care and health status.

The WHO¹⁹ extends the concept of telemedicine and defines it as the provision of health services using ICTs in situations where distance makes adequate medical care difficult, thus allowing for the exchange of information relevant to diagnosis, treatment, and prevention of diseases. In this way, telemedicine allows for advancements in individual and community health care, as well as research, evaluation, and continuing education for medical professionals.

In order to improve adherence to pharmacological treatments, several strategies that take advantage of technology have been proposed, such as mobile health, which refers to the use of mobile devices, sensors, smartphone applications, or wireless technologies in health care.^{16,20,21} This strategy is aimed not only at health personnel and patients, but also at people without any disease, which is why it is recognized by the WHO as highly relevant for the admission and follow-up of patients in control programs.¹⁶ It has also been proven that mobile health can be very useful in various areas of public health, for example, smoking cessation and weight loss.²²

In Colombia, telehealth is governed by Law 1419 of 2010;²³ however, at present, the goal of that Law is not fully met because, for example, health care centers often treat patients with chronic diseases through conventional follow-up programs, partly due to the lack of specific applications to make the most of ICTs, such as text messaging, websites, mobile applications, social networks, among others.^{24,25} In this regard, the implementation of technological platforms that support and integrate information and facilitate real-time patient monitoring will allow for more effective patient follow-up on the one hand, and the creation of a national database that allows for the prediction of future events based on observed patterns on the other.

Mobile applications have become of particular interest in health care, as they have gone from being simple monitoring instruments to tools that support diagnosis and interventions.²¹ On this subject, Klasnja *et al.*²⁶ identify five key intervention strategies for all types of patients using mobile phones: tracking health information, involving the health care team, leveraging social influence, increasing accessibility of health information, and using entertainment (e.g. video games). The development of these strategies takes advantage of the functions of cell phones, such as text messaging, cameras, automated sensors, and Internet browsers.²⁶

In Colombia, it was estimated that 73% of the national population aged 5 and over owned a cell phone in 2017. When these individuals were asked about the type of phone they had and how they used it, it was found that 71.2% had a smartphone and 58.9% used it to browse the Internet;²⁷ these figures showed the potential use of ICTs in health in the country.

One of the most studied aspects in the implementation of new health technologies is metabolic control in patients with DM. For instance, Demidowich *et al.*²⁸ conducted a study that selected 42 diabetes applications available on the Android mobile operating system

(free and paid) that allowed self-monitoring blood glucose and diabetes medications or calculating prandial insulin doses. The authors found that these applications had a mean usability score of 11.3 out of 30 possible points (SD: 5.9) and also highlighted the applications Glucool and OnTrack Diabetes, as they have the ability to create an alarm with any glucose input that can help improve adherence to therapy and that could be useful in cases of hypoglycemia; in addition, they obtained the highest usability scores: 28.5 and 24, respectively.²⁸ In addition, Hou *et al.*,²⁹ published a meta-analysis that included 10 studies of type 2 DM and found a 0.49% reduction in glycosylated hemoglobin levels (HbA1c) in patients using an application to track this condition.

Similarly, mobile applications have shown to be of great utility in the management of hypertension, as described by Alessa *et al.*,³⁰ who, in a systematic review that included 21 studies that used applications for the self-management of hypertension, found that 10 studies reported that the use of applications led to a significant decrease in blood pressure, being effective for the self-management of hypertension.

On the other hand, the management of HIV infection can also benefit from the use of eHealth. For example, a pilot clinical trial of young patients with poor adherence to antiretroviral therapy showed that the strategy of telephone calls with reminders and education was accepted by participants and was economically viable.³¹ Also, in a group of 28 adult HIV patients whose treatment was supported by a smartphone application that provided personalized information, it was possible to improve self-reported adherence and obtain a greater decrease in viral load at three months of follow-up compared to those who did not have this personalized approach.³² However, a study conducted in India, in which the intervention consisted of receiving reminders for taking the medication via the smartphone showed no differences in adherence to therapy compared to standard management; it should be noted, however, that such an intervention consisted only of reminders and did not include additional information about the disease, nor did it provide other type of support.³³

In Colombia, the Pharmacoepidemiology and Pharmacovigilance Research Group, which works in agreement with the Universidad Tecnológica de Pereira and Audifarma S.A., has been developing a platform for preventive health management that seeks to improve the monitoring and follow-up of patients with chronic diseases; this initiative is being carried out within the framework of the Colciencias Call 691, project code 815469153772. The platform consists of a web module and a mobile application in which users can answer questionnaires on adherence and record follow-up values for their condition (DM and high blood pressure); it also allows the health team to create specific alerts regarding, for example, taking drugs or glucometry values outside the target range.

Although the real benefit of technological platforms has been described by demonstrating that they allow for improved adherence to treatment of chronic diseases, their effectiveness in improving outcomes such as death has not yet been established.^{1,2} Therefore, this type of intervention needs to be developed and studied further, which would not only provide important information regarding adherence, but also regarding its effects

on patient outcomes. It is important to promote this at the national level, where studies on the effectiveness and usefulness of eHealth in patients with chronic diseases are scarce.

Conclusions

Although the field of telemedicine has been studied in Colombia, literature on mobile health and other areas of eHealth is scarce. In this sense and given that these tools have been demonstrating a positive impact on the control of different diseases worldwide, health care managers in the country should promote research in the area so that they can generate new strategies to improve adherence to therapy in patients with chronic diseases using these tools.

Likewise, new intervention studies are needed to scientifically demonstrate the impact of the implementation of ICTs in eHealth for the management of chronic diseases.

Conflicts of interest

JEMA, AGM and MEMD work as research physicians at Audifarma S.A.

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