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Review

Use of telemedicine in the management of infectious diseases

Utilisation de la télémédecine pour la prise en charge des maladies infectieuses

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Abstract

Communication technologies have invaded our daily lives. Several studies have assessed these technologies in the management of infectious diseases (mainly HIV). Weekly short text messages and real-time compliance monitoring assessed in HIV patients are both associated with higher compliance in low-income countries. Virtual consultations to monitor stable chronic HIV patients or tuberculosis treatment in high-income countries appear to be acceptable and efficient. Although assessed in small studies, virtual monitoring seems to reinforce the doctor–patient relationship and the relation between primary care settings and hospitals in various infectious diseases (endocarditis, urinary tract infection, skin and soft tissue infection, HIV, tuberculosis, hepatitis C). A better prevention of infectious diseases (mainly sexually transmitted infections) seems to be observed with telemedicine tools. As fees for teleconsultation or telemonitoring have yet to be defined, the development and evaluation (cost effectiveness) of these tools are difficult. The regulatory framework will need to be improved to encourage such developments, all the while ensuring the confidentiality of data. The development of new tools will require the collaboration of physicians, users, and healthcare systems. © 2018 Elsevier Masson SAS. All rights reserved.

Keywords: HIV; Infectious diseases; Compliance; Telemedicine

Résumé

Les nouvelles technologies de communication ont profondément modifié notre quotidien. Différentes interventions utilisant ces nouvelles technologies ont été expérimentées dans la prise en charge des maladies infectieuses notamment pour l'infection par le VIH. Dans les pays à faible revenu, deux types d'interventions évaluées sur de larges effectifs améliorent l'observance du traitement antirétroviral : l'envoi de SMS hebdomadaires et le suivi de l'observance en temps réel grâce à des objets connectés. Dans les pays à revenu élevé, une prise en charge par téléconsultation de l'infection par le VIH ou la tuberculose apparaît, avec un degré de preuve moindre, acceptée et efficace. Par ailleurs, l'impact du télésuivi semble, malgré des études avec de faibles effectifs, renforcer la relation soignant–soigné et la relation soins primaires–hôpital dans diverses maladies infectieuses (VIH, hépatite C, tuberculose pulmonaire, endocardite infectieuse, infection urinaire, infection de la peau et des tissus mous). L'impact de la télémédecine dans la prévention des maladies infectieuses (notamment les infections sexuellement transmissibles) apparaît intéressant. La persistance du bénéfice à long terme d'un télésuivi n'est actuellement pas connue. L'absence de tarification des actes de téléconsultation ou de télésuivi limite le développement et l'évaluation (rapport coût–efficacité compris) de ces outils. Le cadre réglementaire devra sans doute évoluer pour faciliter les développements tout en maintenant une vigilance légitime quant à la confidentialité des données échangées. L'élaboration de ces outils nécessitera la collaboration des soignants, des usagers et du système de soins. © 2018 Elsevier Masson SAS. Tous droits réservés.

Mots clés : Maladies infectieuses ; Observance ; Télémédecine ; VIH

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Over the past 20 years, new communication technologies have invaded our daily life. Michel Serres, a French philosopher and sciences historian, believes the switch from the printed medium to new technologies to be the third major revolution faced by Western countries following the birth of writing and the printing invention [1]. The rapid worldwide dissemination of these new tools is unprecedented. In 2015 a total of 99 and 118 mobile phones per 100 inhabitants were reported in Senegal and the United States, respectively (World Bank data).

This “revolution” has already substantially changed the daily life of healthcare professionals (treatment guidelines available on smartphones, apps for drug–drug interactions or for advice on how to apply dressings, etc.). The management of patients and the doctor–patient relationship will also soon be impacted by the use of these new technologies. Using new technologies in the management of chronic diseases has become a national health priority in France [2]. Many studies have already been conducted to assess the impact of these new technologies. Paradoxically, and because of the larger network of healthcare professionals, most of these studies have been conducted in low-income countries. Although the benefits of using these new communication technologies seem to be obvious for specific situations (isolated populations for a better dissemination of information and knowledge), grey areas continue to exist on the potential impact of such tools on the care pathway and on the doctor–patient relationship. Results obtained in situations such as smoking cessation or compliance with antiplatelet treatment when the tools were used as a support to therapeutic education are very encouraging [3,4]. Patients receiving regular automated messages had a significantly better compliance with treatment or smoking cessation.

Various tools have been evaluated for the management of infectious diseases. We aimed to assess available data on the use of telemedicine in the management of infectious diseases (Table 1).

1. Telemedicine and mobile health

Telemedicine refers to the remote practice of medicine using information and communication technologies. Telemedicine aims:

- to improve access to care;
- to maximize efficiency of time allocated to medical activities;
- to improve collaboration between healthcare professionals;
- to fine tune the care pathway for patients.

Telemedicine can be used in many fields of patient management: teleconsultation, medical response, tele-expertise, telemonitoring, and teleassistance. Telemedicine falls under Section 78 of the French decree on “Hospital, patients, health, territories” of July 21, 2009, and is now included in the Public Health Code [5].

Mobile health or connected health is a much more global term. It does not necessarily refer to a medical practice, but rather to applications, information sites, sensors, etc. Several

authors recently made the distinction between two development pathways for mobile health [6]:

- in the management of acute diseases – patients could more easily identify acute symptoms (information websites, remote consultation, applications, and sensors) and optimize their management;
- in the management of chronic diseases – a type of “e-coaching” (similar to a telemonitoring type of telemedicine) would limit unnecessary consultations for a better control of the chronic disease. Mobile health could help to strengthen the relation between patients and physicians favoring patients who really need this type of help; this would let physicians go back to their initial role of diagnosticians and health educators.

2. Texts/emails and compliance support

The World Health Organization (WHO) defined non-compliance as a major issue, which impact is even more important with the rising number of patients presenting with chronic diseases – estimated at 20 million in France. Half of these patients are believed to be non-compliant with treatment. The white paper of the Concorde Foundation published in 2014 brought to mind that the first cause of transplant rejection is suboptimal compliance with treatment [7]. Several studies reported that the mean compliance rate of asthma patients is 30%. The WHO considers that the effectiveness of measures aimed to encourage compliance may have a stronger impact than any medical discovery [8]. The main cause of suboptimal compliance is oversight, which may be due to one or several difficulties or disorders: cognitive disorders, social issues, planning or organizational difficulties, etc. [9].

The impact of new technologies on compliance has for instance been assessed in the management of HIV. A randomized study of 538 patients conducted in Kenya and published in 2010 in *The Lancet* reported the positive impact of automated weekly text messages sent to patients on compliance, but also on undetectable viral load at 48 weeks: at the end of the study 75% of patients included in the text message group had an undetectable viral load versus 66% of control patients ($P=0.047$) [10]. In this study, the absence of response within 48 hours or a response suggesting a worsening of the patient’s health status led the medical team to make a phone call to the patient. Almost 20% of patients had to be called.

Another study performed in Kenya with 431 patients focused on the frequency and content of text messages sent to patients. Patients were randomized into five groups (control group, short/long weekly/daily text messages). Compliance assessment was robust as it was performed with electronic pill containers. Sending a short and weekly text message (versus daily and/or long text messages) seemed to be associated with better acceptability and compliance. The absence of impact of daily messages (image or written text) to remind patients of the necessity of triple therapy was explained by the potentially intrusive nature of such text messages in the long-term [11]. One must, however, highlight the absence of data on HIV viral load in this study.

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