Tele-medicine: a new promised land, just to save resources?

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We need much more evidence before tele-medicine can be considered real progress in healthcare
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On that day the LORD made a covenant with Abram and said, "To your descendants I give this land....."

Genesis 15:18–21

In industrialised countries there is a 95% probability that in 2030, male life expectancy at birth will be in excess of 80 years [1]. As a consequence, there will be an increasing incidence of chronic and non-communicable diseases, as well as an increasing worldwide population of "chronically critical" patients due to respiratory diseases. These conditions, combined with high and sometimes unrealistic citizens' expectations, have already led to high burdens for healthcare systems. For example, under the current law, in the USA health expenditure is projected to grow at an average 5.6% annual rate from 2016 to 2025 and represent 19.9% of gross domestic product by 2025 [2]. Therefore it is no surprise if governments are or will be unable to sustain the past level of welfare, and are looking for new models of care with better cost/benefit ratios. Unfortunately, it seems that some of these models seek to only reduce the numerator, the costs, and not increase the denominator, the benefit.

One of these models is termed tele-medicine, the latest trend for which success is hoped for in healthcare organisations. Recent advances in information and communication technologies (ICT), especially in sensors and data transmission, have also allowed the development of such programmes for respiratory diseases [3]. Tele-medicine has been defined as "the distribution of health services in conditions where distance is a critical factor, by healthcare providers using ICT to exchange at distance informations useful for diagnosis" [4].

We do not need any further evidence that pulmonary rehabilitation (PR) improves symptoms, exercise capacity and health-related quality of life in patients with chronic obstructive pulmonary disease (COPD), independently of disease stage [5, 6]. As a consequence PR should be provided to the vast majority of COPD patients. The recent American Thoracic Society/European Respiratory Society policy statement identified key factors contributing to the present worldwide shortfall in PR and gave recommendations to improve its availability and delivery to patients: for this purpose an increase in funding and resources for PR was considered as essential [7]. Unfortunately, this last statement can be considered as wishful thinking because of the progressive weakening and criticism of the welfare systems of industrialised countries [8] and the different health priorities of the governments of low- to middle-income countries [9]. As a consequence, we must be careful when investing resources for PR, especially when aimed at personalised

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care [10]. In this issue of the *European Respiratory Journal*, VASILOPOULOU *et al.* [11] report that home-based maintenance tele-rehabilitation is equally as effective as hospital-based, outpatient, maintenance PR for reducing the risk for acute exacerbations of COPD and hospitalisations with lower risk for emergency department visits. The authors claim that tele-rehabilitation may be a potentially effective alternative strategy to hospital-based, outpatient, maintenance PR and, in addition, suggest a potential economic advantage of such an approach compared to standard PR.

The effects of tele-medicine in COPD patients are still discussed [3]. Positive results have been reported in systematic reviews and meta-analyses [12], but not confirmed in other studies [13]. There are some issues to consider when evaluating the use of this model of care, as follows.

- 1) Patients' expectations about self-management and disease control [14], as well as their age, education, experience in technology, home environment, cognitive, motor and visual abilities or deficits [15] may play an important role in their ability to use this technology. In the evaluation of patients' perception, we must consider that, like all management strategies, this tool should also be tailored to the individual patient.
- 2) The authors of the paper [11] did not directly assess the economic advantages of their tele-rehabilitation approach. On the indirect basis of cost analysis of reduced exacerbation and hospitalisation rates, they claim a positive effect on financial costs for COPD patient management. Despite some other studies suggesting an economic advantage in COPD patients [16], recent research challenges the concept that these systems are more effective and less expensive than usual care [17]. In current literature, the cost data are reported inconsistently and are often obtained from studies of poor quality. As a consequence, decision-makers may have difficulties in integrating this kind of service in health systems.
- 3) In superiority or non-inferiority studies, the definition of "standard therapy" as a term of comparison is important. Studies should compare programmes with similar characteristics in terms of type of patients, disease stage, resources spent, physiological parameters and clinical signs recorded and transmitted [18]. The superiority (if any) of this new method of care must be compared with the different homecare organisations of different countries. Accordingly, the authors of the article [11] should refer to their specific system, rather than to a general term like "tele-rehabilitation", and discuss the potential generalisability of their approach. Tele-medicine should be evaluated in the frame of other services (availability of homecare services, free or easy access to hospital, social services) including it in a "care package".
- 4) Any application of tele-medicine must be considered as a medical act with related legal risks and problems still lacking shared international and national solutions [19]. With the progressive popularity of this technology, legal cases will increase; therefore, legislation will have to face many new and unexplored issues. National governments and/or the EU (if the EU still exists, or will exist in the near future) should promote common, ethical, legal, regulatory, technical and administrative standards [20].
- 5) Although desperately seeking savings, we must not forget the appropriate quality of care. Tele-medicine should not be considered a "second-hand" model of care, useful only to save resources at the price of reduction in quality and safety. Accordingly, this model should also always follow evidence-based clinical guidelines and use specific outcome measures to assess its benefits, quality and safety to justify changes in healthcare organisations, switching resources from the existing ones. Variable models of tele-medicine exist for respiratory patients. On one hand these technologies can improve the care of patients with difficult access to services, particularly those in rural/remote areas like Indonesia, a country with more than 17 000 islands and one with a high prevalence of smoking habit. On the other hand, there is the risk that they represent an alibi to reduce standard services in more developed health systems.

In conclusion, despite the hopes in this tool, we need much more evidence before this modality can be considered as a real progress in the management of patients with COPD [3]. Tele-medicine should not be considered either as a panacea or a piggy bank only, but simply another little step in the never-ending story of medical science. Users, either patients or caregivers are entering an unexplored land without knowing if it is the "promised land". Therefore they must be cautious. The study of VASILOPOULOU *et al.* [11] may be a basis for further research aimed to allow dissemination of tele-rehabilitation as well as other health resources not only as a means to save money (an issue still to be clarified) but also in conditions and areas where health systems have difficulties in delivering care.

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