Telehealth in COPD: Compiling a Tele-Monitoring Package

Ghassan A Hamad* and Alyn H Morice

Centre for Cardiovascular and Metabolic Research (CCMR), University of Hull, Castle Hill Hospital, Castle Road, Cottingham, East Yorkshire, HU16 5JQ, UK

*Corresponding author: Hamad GA, General Practitioner and a Clinical Senior Fellow, Centre for Cardiovascular and Metabolic Research (CCMR), University of Hull, Castle Hill Hospital, Castle Road, Cottingham, East Yorkshire, HU16 5JQ, UK, Fax: +44 (0) 1482 624068; Tel: +44 (0) 1482 624066; E-mail: g.hamad@hull.ac.uk

Rec date: February 10, 2016; Acc date: February 22, 2016; Pub date: February 29, 2016

Abstract

Chronic Obstructive Pulmonary Disease (COPD) is a significant illness that lends itself well to telehealth – the remote monitoring of patients at home. The technology for COPD telemonitoring is usually supplied as a full package by multinational corporate suppliers. We present our experience of compiling a “home grown” telemonitoring kit using separate components from different technology providers. We used our solution in a real life telehealth service alongside telehealth solutions from market leaders. We demonstrated that it is feasible to gather separate elements of the COPD telehealth system, largely off-the-shelf, to produce a package capable of delivering the technical aspect of COPD telemonitoring with a performance acceptable to telehealth service providers.

Keywords: COPD; Telemonitoring; Telehealth

Introduction

Recent years have witnessed a growing interest in the use of technology to support patients with chronic illnesses to manage their conditions with a real potential to shift healthcare delivery from traditional settings to home settings [1]. Telehealth, defined as the remote monitoring and care of patients at home, has been seen as a system of health service providers. We present our experience of compiling a “home grown” telemonitoring kit using separate components from different technology providers. We used our solution in a real life telehealth service alongside telehealth solutions from market leaders. We demonstrated that it is feasible to gather separate elements of the COPD telehealth system, largely off-the-shelf, to produce a package capable of delivering the technical aspect of COPD telemonitoring with a performance acceptable to telehealth service providers.

Chronic Obstructive Pulmonary Disease (COPD) is a chronic illness that lends itself well to telemonitoring [2]. It is a chronic respiratory condition that manifests as progressive breathlessness, cough and excessive sputum production with periodic exacerbations mainly in winter months. In England, around one million patients are diagnosed with this condition [3]. The direct cost to the National Health Service (NHS) of providing care to COPD patients is approaching a billion Pound Sterling a year, largely related to the cost of hospital admissions [4,5].

COPD telehealth involves remote daily collection of vital signs and respiratory symptoms from patients using electronic means. A typical COPD telehealth kit consists of “peripheral devices” to collect the vital signs, such as blood oxygen saturation, connected to an electronic platform, for example a tablet computer or a smart phone. The information is collected and transmitted on daily basis to a team of telehealth practitioners via the internet. An alert-generating software is needed to computerize the process of flagging up patients with impending exacerbations e.g. by using a traffic light system. By examining the transmitted data, patients deemed at high risk will have their care escalated in line with agreed local protocols.

There is evidence that telehealth helps in reducing admissions in chronic diseases, including COPD [6]. Research evidence also suggests that the cost of providing telehealth remains prohibitively high for the technology to be considered on a larger scale even when considering different contracting arrangements and project management structures [7]. It was originally hoped that the telehealth cost will be offset by reduction in healthcare utilisation and improved patient outcomes. Telehealth interventions are complex and economic evaluations have to consider a number of evolving variables.

In this report we examine the current UK COPD telehealth technology market and share our local experience in compiling a COPD telehealth package capable of delivering the technical aspect of tele-monitoring with cost and performance acceptable to community telehealth providers who have experienced working with corporate telehealth technology suppliers. We will focus only on telehealth equipment and examine the options of acquiring a good value for money technical solutions by procuring separate components from a range of suppliers. We believe that this report provides a useful insight of how telehealth service providers can be more involved in the technology aspect of telehealth.

The Rationale

With the advance of technology and the declining need for bespoke devices, an argument was made to compile a COPD
package by purchasing the separate components of the COPD telehealth from multiple technology suppliers. In 2013, a team of clinicians with interest in COPD telehealth from the University of Hull (UK) examined the potential for replacing the COPD bespoke telehealth packages available from corporate telehealth suppliers with a telehealth kit using “off-the-shelf” components whenever possible. Driven by the demand to reduce expenses and enable the technology to be more sustainable and available to a wider section of patients with chronic diseases we surveyed the market of telehealth technology to establish the business rules and prices.

The Market for COPD Telehealth

Internet search carried out in 2014 revealed a number of telehealth equipment suppliers from very well-known names, such as Philips, Tunstall and Docobo, to less well known small technology firms. When directly contacted, the majority of the commercial equipment suppliers declined to permit a “mix and match” approach that allows one to shop around and procure certain components of the telehealth package. They only agreed to lease an “end to end” full package of telehealth in return for a flat rate monthly fee. They also objected to hardware upfront purchasing and only allowed equipment and software lease with a minimum contract period of six months. In addition to the equipment lease, they added other expenses related to equipment installation and penalties for early de-installations that could amount to hundreds of pounds.

Our Experience

During our search we found a telehealth company (Whzan Telehealth; www.whzantelehealth.com/) that agreed to consider supplying individual components of its telehealth solution. This company was contracted to lease its software for COPD telehealth for 6 months. We opted to purchase the hardware upfront: Android 7 inch computer tablets and bluetooth TD-8201 pulse oximeters. We also opted to use a local telecommunication company (Connexion; http://hull.connexin.co.uk/) to provide the 3G connectivity and provide the technical support as needed. Given the non-bespoke nature of this telehealth solution and the wireless connectivity, there was no need for engineer visits to install or de-install equipment, further reducing the overall cost of the package. The equipment were simply delivered to the patients at home with a simple instruction leaflet of how to use, endorsed by a quick demonstration by the telehealth nurses.

In collaboration with our local COPD telehealth service provider we piloted ten patients in the first six months of 2015 on the new telehealth solution. A formal contractual arrangement was made with our telehealth service provider and a set of performance criteria were agreed upon in line with the performance standards for the existing technology supplier (Docobo; www.docobo.co.uk/). Our team at the University of Hull coordinated the pilot and overseen its day to day running. The pilot continued for the intended six months and collected data on technical issues and response time to fix technical faults and adherence to the contractual performance criteria. A number of technical issues have arisen in the course of the pilot, mainly around the 3G connectivity and delayed data transmission, but none of the issues represented a serious performance concern or caused patient’s harm. Furthermore, the community telehealth service provider confirmed that the volume and nature of these technical glitches were not dissimilar to the existing supplier or previous suppliers of telehealth technology.

Discussion

The cost of telehealth is related to its two main components: the equipments and the service delivery aspect. Telehealth service delivery cost includes telehealth staff, premises, and other overheads. On the other hand, telehealth equipment is usually limited to base units, peripherals, software licences and activities related to installation, de-installation, and maintenance of equipments and data handling. In the UK, some local health authorities commission telehealth services for chronic diseases including COPD, heart failure and diabetes. The local arrangements vary between local authorities but it usually involves the local healthcare commissioners contracting a primary care service provider to undertake all aspects of the service. The service provider will in turn subcontract a telehealth equipment supplier to provide the technical aspect of telehealth.

In the UK, patients enrolled on telehealth are usually provided with everything free of charge and only expected to pay for the electricity operating the telehealth base unit and sometimes the internet fees. This means that the cost of telehealth has to be fully provided by the NHS.

Earlier generations of telehealth equipment consisted of bespoke base units that are manufactured specifically to collect telemonitoring information from wired bespoke peripherals. These devises usually need a landline internet connection and engineers to install and de-installations equipment. This adds considerably to the cost of telehealth equipment.

Commercial telehealth technology companies will normally lease equipment and ensure the smooth operation and maintenance of the telehealth paraphernalia including fault finding and repair, replacement of batteries, software updates and technical support. The cost of leasing equipment and providing the support vary depending on the provider, the number of peripherals, the level of technical support and the total number of units. Telehealth providers do not publish their fees in the public domain; however, our enquiries in 2014 confirmed that the monthly fee is around a £100 per patient per month for the bespoke units with extra fees for the initial set up (installation) of equipment and penalties for early equipment removal (de-installation). This is still lower than the cost of providing telehealth using the earlier models of telehealth equipment available in 2009 which was around £1800 per patient per year. 7 In the past two years some corporate telehealth companies such as Philips started to offer non-bespoke hardware telehealth solutions with some reduction in the monthly lease fees. However, most telehealth
equipment commercial suppliers demand a minimum contractual period to guarantee the return on their initial investment. In our own compiled telehealth package we were able to recoup the initial investment in six months with a £75 per month per patient inclusive of VAT. This level of monthly reimbursement was exactly what the existing technology supplier (Docobo) was charging our local service provider at the time of the pilot on an ongoing basis for a longer term contract.

The use of innovative technology combined with increased competition has the potential to further reduce the cost of providing telehealth. In this work we have not intended to produce detailed account of our performance in comparison with the corporate telehealth technology suppliers or to provide economical evaluation of our pilot. We purely wanted to share our experience in compiling a telehealth solution that was economically, clinically and technologically acceptable to community telehealth service providers. We argue that it is possible to move away from the traditional model of subcontracting big companies to building “in-house” telehealth solution with the potential of further cost reduction and better flexibility. Further work is needed to evaluate all aspects of this approach including the full economic impact.

Conclusion

In this work we were able to demonstrate that it was feasible to build a COPD telemonitoring package using components purchased or leased separately with performance standards and cost acceptable to a telehealth provider that experienced working with corporate telehealth suppliers. With the latest advances in technology and increased competition, telehealth service providers may wish to consider the option of building their own telehealth solution and customise it to achieve the best value for money which may improve the sustainability and scalability of providing telehealth to patients with chronic diseases in general.

References

1. Sibbald B, McDonald R, Roland M (2007) Shifting care from hospitals to the community: a review of the evidence on quality and efficiency. J Health Serv Res Policy 12:110-117.
2. Steventon A, Bardsley M, Billings J, Dixon J, Doll H, et al. (2012) Effect of telehealth on use of secondary care and mortality: findings from the Whole System Demonstrator cluster randomised trial. BMJ 344: e3874.
3. Health and Social Care Information Centre (2012-13) Quality and Outcomes Framework Achievement, Prevalence and Exceptions Data.
4. British Thoracic Society (2006) Burden of lung disease – a statistics report from the British Thoracic Society.
5. British Lung Foundation (2007) Invisible lives: Chronic Obstructive Pulmonary Disease (COPD) finding the missing millions.
6. Segrelles G, Gómez-Suárez C, Soriano JB, Zamora E, Gónzalez-Gamarra A, et al. (2014) A home telehealth program for patients with severe COPD: the PROMETE study. Respir Med 108: 453-462.
7. Henderson C, Knapp M, Fernández JL, Beecham J, Hirani SP, et al. (2013) Cost effectiveness of telehealth for patients with long term conditions (Whole Systems Demonstrator telehealth questionnaire study): nested economic evaluation in a pragmatic, cluster randomised controlled trial. BMJ 346: f2065.