

# THE OPPORTUNITY AND CHALLENGES FOR DELIVERING GROUP-BASED REHABILITATION SERVICES TO THE HOME VIA DIGITAL TELEVISION

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## ABSTRACT

Rehabilitation programs improve wellbeing and quality of life in a number of conditions, but travel demands or poor health mean that many patients cannot participate in hospital or clinic-based programs. Previously, we reported a successful feasibility study to deliver pulmonary rehabilitation to a group of patients with chronic lung disease in their own homes, involving videoconferencing on a mini computer connected to the Internet with the television as the video display. This paper reflects on the opportunity and challenges for delivering group-based rehabilitation services to the home via digital television. The popularity of television and the digital switchover, the drive for universal access to superfast broadband and the shift in health care policy to delivering services closer to home, all point to the emergence of digital television as an important platform for widening access to care and rehabilitation services.

## KEYWORDS

Digital television, health care, rehabilitation, videoconferencing.

## 1. INTRODUCTION

The delivery of health and social care is changing in response to an ageing population, the growth in long-term conditions, and the rising trend in emergency admissions to hospital among older people. Health care has been hospital centered and reactive. The evolving model of care emphasizes care in the community and preventive care [1] and policymakers see Information and Communication Technology (ICT) as a potential solution. In particular, there is significant interest in the opportunity offered by digital television to provide new ways for the public to access health and social care services.

Rehabilitation has become increasingly important as a strategy to improve wellbeing and quality of life in a number of conditions, such as Chronic Obstructive Pulmonary Disease (COPD), Ischemic Heart Disease, Stroke, and following trauma. In some cases, rehabilitation will be tailored for an individual patient and will be delivered on a one to one basis. However, for other conditions, such as COPD and Ischemic Heart Disease, rehabilitation programs are delivered in a group setting and there is evidence that participation in the group is an important determinant of the outcome of the program [2]. Conventionally, COPD rehabilitation groups will meet on a regular basis at a defined location, usually a hospital, or other clinical facility, and will be directly supervised by a physiotherapist. At each class, in addition to a supervised exercise program, the patients will be offered a series of educational talks about issues such as smoking cessation or inhaler technique [3], and in many cases there will also be a social element to the class, sharing refreshments and informal chat at the end of the session. The effectiveness of conventional pulmonary rehabilitation is established [4]. However, patients who are unable to attend a central hospital or clinic facility by virtue of geography, lack of transport or poor health are denied both the clinical and social benefits of participation.

In two previous papers [5, 6], we reported a feasibility study to deliver pulmonary rehabilitation to a group of patients in their own homes, which involved videoconferencing on a mini computer connected to the Internet with the television as the video display (figure 1). The findings demonstrated the feasibility of delivering such a program, with clinical outcomes comparable to a conventional program. Reference [5] described the design of our videoconferencing system and reported findings from the first trial. Reference [6]

contributed findings from the second trial with a discussion of the main challenges encountered and opportunities for future development of such systems. Across both papers, we presented related work on the remote management of COPD at or close to home, using ICT. This paper contributes a discussion of the opportunity and challenges for delivering group-based rehabilitation services to the home directly via digital television; that is without the need for a separate, dedicated computer.



Figure 1. Group pulmonary rehabilitation delivered to the home via videoconferencing on a mini computer connected to the Internet with the television as the video display.

## 1.1 Related Work Overview

Over the past decade, there have been a number of digital television initiatives involving a range of public service providers. In 2001, the UK Department of Health took first steps in exploring the feasibility and effectiveness of the medium for delivering health information and advice to the public [7]. The results demonstrated that a market for digital health existed and that digital television could prove effective at reaching groups that may be reluctant or unable to access services via personal computers, such as older people. The research culminated in the launch of “NHS Direct Interactive” in 2004, available to digital satellite viewers; despite the use of the word “interactive” the channel was launched as an information only service. NHS 24, who provide health information and self care advice for people in Scotland, recently launched a comparable digital television service called “NHS Scotland” to digital satellite and cable viewers.

However, the market may still be in its infancy. A recent systematic review of digital television systems that communicated information to or from an individual’s home with either a health or social care application, concluded that digital television has the potential to deliver health and social care to people in their own homes [8]. However, only seven of the 25 systems identified were commercially available. Eleven of the systems (44%) facilitated some form of direct consultation with health and social care professionals via voice, text and/or video. Seven of the systems (28%) facilitated social interaction in some form, mainly through video communication with other users.

## 2. OPPORTUNITY AND CHALLENGES

The popularity of television and the digital switchover, the drive for universal access to superfast broadband and the shift in health care policy to delivering services closer to home, all point to the emergence of digital television as an important platform for widening access to care and rehabilitation services.

### 2.1 Digital Television: A Popular and Social Medium

Television is one of the most pervasive technologies in the home. In the UK, an estimated 97% of households own a television [9] and watching television is the most popular media activity; in particular, older people

watch more television compared to all adults [10]. Although many older people have difficulty with the physical handling of standard television remote control devices [8], Industry is taking steps to improve product design. Over the last few years, there has been a dramatic rise in sales in the UK of televisions with screens 40inch or bigger [11]. A large screen size is well suited for displaying all the patients and the physiotherapist in a remote rehabilitation program, which is important to allow people to feel part of a group despite being geographically distant.

Socialization and companionship are important components of group-based rehabilitation programs. People usually find that taking part with others who have similar problems helps them to carry out the exercises and increases their confidence and enjoyment. Television has always been a social form of media that can also provide a source of companionship for older people [12], particularly those who are housebound or infirm. However, technological advances are changing the experience into a two-way social viewing experience and providing people with new opportunities to socialize. For example, the “Skype” video calling service is now available on a limited range of televisions; the service requires a fast broadband Internet connection and a television compatible webcam [13]. Such systems remove a major barrier to remotely delivering short-term home-based rehabilitation services, namely resource allocation and cost to install and remove audio-visual equipment.

## **2.2 The Digital Switchover**

Later this year, all television in the UK will switch to a digital signal and the existing analogue television signal will be switched off. In preparation, UK households have been switching to a digital signal, region by region, since 2008: the number of homes with digital television reached 93.1% by Q1 2011 [14]. Across Europe, the majority of countries will also have completed digital switchover by end 2012. Digital television uses less broadcast space than analogue broadcast, allowing for more channels and features than traditional analogue television. The range of features depends on the type of platform – digital terrestrial television, digital satellite, digital cable, Internet protocol television (IPTV) – but the main benefits are better quality pictures and varying levels of interactivity. The availability of more channels, and more specialist channels and programs, has potential to cater to smaller but better-defined audiences, such as rehabilitation groups.

## **2.3 Superfast Broadband**

Digital television platforms have varying levels of availability across the UK and differing levels of interactivity for the viewer, depending on the available bandwidth and whether or not the platform has a return path to allow the user’s equipment to communicate with the service provider. Delivering a home-based rehabilitation program by means of videoconferencing requires a platform with a high-speed return path, which digital cable and IPTV have but digital terrestrial and digital satellite do not. However, digital cable and IPTV are currently only available to 49% and 39% of UK homes respectively – although IPTV is gaining popularity – compared to digital terrestrial and digital satellite that have near-universal coverage [15]. Most of the systems (72%) reviewed in reference [8] were designed for use with a broadband Internet connection to enable the two-way communication, including most (67%) that incorporated videoconferencing. The authors identified the requirement for a high-bandwidth communications infrastructure as a barrier that will need to be addressed for digital television to deliver health and social care effectively on a large scale.

At end 2009, less than one in fifty households in the UK, France, Germany, Italy and Spain had a superfast broadband connection – take-up has been much higher in the US, Japan and Sweden [16]. However, there is an emerging consensus among policy makers about the importance of superfast broadband and investment in extending access is gathering pace. In the UK, Government has pledged to spend £530m of public funds to help upgrade rural areas as a step to providing superfast broadband to all by 2015. Speeds up to 40Mbps are expected, with a better balance between download and upload speeds.

## **3. CONCLUSION**

Rehabilitation services have become increasingly important as a strategy to improve wellbeing and quality of life in a number of conditions, including COPD, Ischemic Heart Disease and Stroke. However, travel

demands or poor health mean that many patients cannot participate in hospital or clinic-based programs. Television is popular, convenient and one of the most pervasive technologies in the home. By end 2012, the majority of European countries including the UK will have completed digital switchover, providing the potential for health care providers to reach virtually the whole population. Combined with continuing improvements in broadband take-up, speeds and availability, digital television offers an opportunity to deliver group-based rehabilitation services directly into patients' homes, widening access in both rural and urban areas. The preliminary results of our home-based pulmonary rehabilitation program demonstrate the feasibility and acceptability of delivering a group-based service via the Internet using the patients' home television as the video display [5, 6]. In future, rehabilitation services could potentially be delivered on digital television platforms with a high-speed return path.

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