"Citizen Centred Health and Lifestyle Management via Interactive TV in patients with Severe Chronic Cardiovascular Diseases: Patient views on the PANACEIA-iTV Health System"

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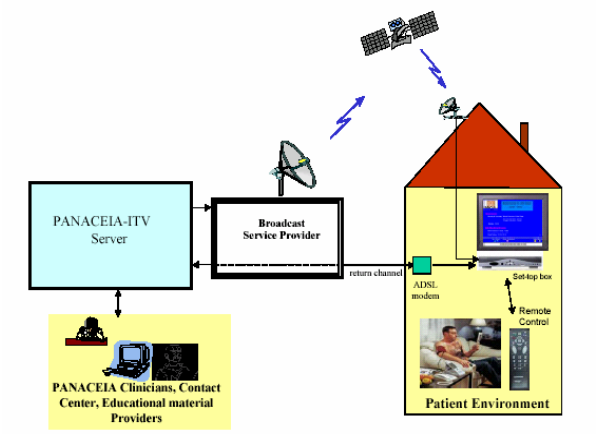
Summary
In this paper we present the findings of a pervasive healthcare evaluation study conducted at the Royal Brompton and Harefiled NHS Trust during the Panaceia-iTV pilot. We report that patients with congenital heart disease regard favourably the use of the system and provide some detail of their responses. Critically, we find that such a system does not affect significantly the patient-doctor relationship and is seen as supplementary to current treatment processes.

Introduction
Previous epidemiological studies show that patients with severe chronic heart disease, including adult congenital heart disease, exhibit high frequency of hospitalisation. This is in part due to lack of resources for sustainable clinical support of these patients within their community. Moreover, regular remote monitoring of such patients may significantly reduce rates of hospitalisation.
Panaceia-iTV is designed to facilitate remote monitoring; effect essential lifestyle changes and promote compliance with clinically robust self-care recommendations. This system utilizes an interactive digital television-based interface with a view to provide information and case management services to the patient[2].
The Panaceia-iTV technology has been developed as a Service Oriented Architecture (SOA) [3]. Figure 1 shows the three main elements of the Panaceia-iTV system.

Figure 1



Users at home are able to carry out a variety of simple measurements with the use of appropriate medical devices or body area networks and then transmit these measurements for further processing and review by clinicians. Moreover, users at home are able to receive educational material in the form of tips or digital interactive videos. The transmission of measurements as well as the involvement in educational sessions is developed in personalized schedules, which provides guidance to

individual users. Clinicians are primarily responsible for monitoring their patients' condition by checking the transmitted measurements, scheduling the patient's activities and communication protocol.

Methods

The Panaceia-iTV pilot trial took place in the Royal Brompton hospital in June and August 2004. The sample was recruited from both hospitalised and non-hospitalised patients with adult congenital heart disease. Hospitalised patients were under treatment on the Paul Wood Ward. Non-hospitalised patients had a scheduled appointment in the hospital outpatient clinic with a consultant cardiologist on the day of the trial.

On the days of the pilot sessions, a Senior Clinical Nurse approached patients explaining the nature of the Panaceia-iTV project. Patients who agreed to participate in the trial then had to complete a consent form. Patients were also given two information brochures: one brochure with information on how the Panaceia-iTV system is designed and the second one with information on how to use the system.

Following a system demonstration by the clinical and technical team of the hospital, patients had to take their measurements (blood pressure, ECG measurement, oxygen saturation, body weight) and submit their data through the Panaceia-iTV system which was received in a nearby Consultant Cardiologist office. At the end of each session patients completed a user satisfaction questionnaire.

The aim of the study was to evaluate the patient views on the Panaceia-iTV system addressing primarily their cognitive, emotional and behavioural response. The study required that qualitative data were collected from patients using a questionnaire containing eighteen targeted five-point Likert questions ranging from 1 to 5. To avoid question bias, both positive and negative statements were used. An open-ended question was included at the end of the session to offer the opportunity to patients to make any other relevant comments.

Table 1 presents the distribution of hospitalised and non-hospitalised patients by sex. The inclusion criteria were: any patient of chronic medical therapy capable of handling the equipment following patient consent. Exclusion criteria applied for the non-literate patients. The hospital's Ethics Committee approved the trial execution on hospital premises as well as the use of the Questionnaire.

Table 1

Group	Frequency	Percent
n=	21	100
Male	9	42.86%
Hospitalised Patients	4	44.44%
Non Hospitalised Patients	5	55.56%
Female	12	57.14%
Hospitalised Patients	5	41.67%
Non Hospitalised Patients	7	58.33%

Results

Table 2 The responses of patients (n=21)

		Not at all true	*A little bit true*	*Somewhat true*	*Moderately true*	*Extremely true*	*No response*
		1	2	3	4	5	6
Q1 *	I would like to go on using this system in the future	0	0	1	4	15	1
Q2 *	I would recommend the use of this system to my family members, to my friends or to other patients	0	1	0	4	15	1
Q3 **	It took me a lot of time to learn how to use this system	16	0	3	1	1	0
Q4 **	I am satisfied with the training I received, before I started using this system	0	0	2	6	12	1
Q5 *	It was easy to use this system, once I learnt how	0	0	2	4	15	0
Q6 *	I find this system to be a useful and efficient adjunct to my care	0	0	1	6	14	0
Q7 **	I felt uncomfortable disclosing intimate information to this system	16	3	0	1	1	0
Q8 **	Using this system was bothersome or boring for me	16	1	2	0	1	1
Q9 **	I have concerns regarding the confidentiality of this system	8	5	4	2	1	1
Q10 *	It was easy accessing this system, whenever I tried	1	0	4	8	7	1
Q11 **	I have had technical problems while I used the system	11	3	0	6	0	1
Q12 **	I found the session time consuming.	15	2	1	1	0	2
Q13 *	The information provided by this system was clear and easy to understand	1	0	3	5	12	0
Q14 *	The error messages that this system gave me, when I made mistakes, helped me fix them easily and quickly	1	0	3	5	12	0
Q15 *	I liked using this system	0	0	3	4	13	1
Q16 **	There are many things about this system that could be improved	3	7	6	1	1	3
Q17 *	Overall, I am satisfied with this system	0	0	0	7	13	1
		(1) Very Positively	*(2) A Little Bit Positively*	*(3) Not At All*	*(4) A Little Bit Negatively*	*(5) Very Negatively*	*No Response*
Q18	The use of the system has affected my relationship with my doctor and the medical team	6	0	6	0	3	6

* Questions indicating positive attitude

* * Questions indicating negative attitude

Most patients found extremely true statements related to the intention to use the system in the future (71.4%) and recommend it to other patients (71.4%). The

majority of them perceived the system as useful, efficient and appropriate for use for their condition (66.7%) and they were satisfied with the usability of the system (71.4%). The considered the information provided by the system as easy to understand and they liked using this system (61.9%). Most patients (20) were overall satisfied with the system.

Our survey shows that some patients revealed concerns regarding privacy protection and the confidential use of the system, correct and uninterrupted operation of the technology and some suggested further system improvements.

A particularly significant finding was also the fact that the majority of the participants did not feel that the system affected their relationship with their doctor. They rather considered it as a useful complementary tool in the care they receive from the hospital and were interested to participate in future trials.

Discussion

Panaceia-iTV is a pervasive healthcare system that can facilitate remote monitoring of patients with congenital heart disease. Our analysis of patient responses provided a number of very encouraging results. This is the case in most of the questions indicating either a positive or a negative attitude towards the use of the system. The system can easily include sessions that facilitate patient's education and training, leading to modification of lifestyle that may ultimately improve quality of life and survival. It can also be used to monitor and review data from other patients involved in different research protocols.

Conclusion

Telemedicine will undoubtedly come to the front as a way of providing services in the future. However, its development needs to be managed in a way that ensures that its benefits are properly identified and utilised, resources are not wasted and the appropriate legal and regulatory framework is in place before its operational application. Our results indicate that adult congenital heart disease patients perceived positively the use of the system. Further trials are required on a longer time scale, larger patient samples, and predefined sessions of communications between the two ends of the system. This will provide evidence that the system can have an impact on lifestyle changes, educational benefits and clinical monitoring of patients with adult congenital heart or suffering from other diseases. The ability of the system to reduce length of hospital stay, the number of hospital admissions and the number of outpatient visits should be also subject to further investigation.

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