

# A POST CARD FROM UK



## Telehealth: Lessons for its development and implementation



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### 1. INTRODUCTION

In the current stage of our global village that we live in, it is hard for any country to claim immunity from the influences of technological advances that are taking place around the world; and Sudan is not an exception. Modern technologies, such as mobile phones, internet, email, etc. are transforming the lives of individuals and society we live in, in a way we had never imagined before. Harnessing these technological developments to improve the health of our population is the challenge that is being pursued in telehealth. Experiences elsewhere from around the world show that there is potential for telehealth to enhance the delivery of healthcare at a distance or remotely<sup>[1]</sup>. However, internationally, the search for evidence of cost-effectiveness of telehealth still continues in the various areas of application<sup>[1],[2]</sup>. Several studies, including systematic reviews, showed that establishing systems for patient care using telecommunications technologies was feasible, and that they improved treatment compliance, reduced unnecessary resource use; however, there were limited evidence of cost-effectiveness<sup>[2-7]</sup>. Emerging evidence among patients with chronic conditions showed that Home Telehealth can be cost-effective and it enhanced self-management and enabled patients to live independently in their own homes<sup>[8]</sup>.

In this post card, the author shares the definitions of telehealth, gives its brief history, some examples of telehealth technologies in current use, and finally presents a checklist (toolkit) for development and implementation of telehealth, based on his experience in the UK. It is hoped that this checklist can be a useful tool to consider for practitioners who are involved in or are thinking of starting telehealth development and implementation.

#### 1.1 Definitions: *Telehealth / telemedicine*

The word tele- is derived from Greek, meaning distance, and when it is combined with Health or Medicine, the word telehealth or telemedicine is formed. The short definition of Telehealth is "healthcare carried out at a distance." <sup>[1]</sup>. There are, however, numerous definitions of Telehealth or Telemedicine in the published literature and many authors prefer not to imposed a uniform terminology, in light of the changing nature of technologies <sup>[9]</sup>. Some few observations need to be made around the definitions of telehealth / telemedicine in current usage. Telehealth / Telemedicine are terminologies that are sometimes used interchangeably to mean the same thing in the published literature; while others have sought to make distinctions between telehealth and telemedicine. The UK Department of Health, for example, offered these definitions for Telehealth and Telemedicine:<sup>[10]</sup>

Telehealth: “The delivery of healthcare at a distance using electronic means of communication – usually from service user to clinician e.g. a service user measuring their vital signs at home and this data being transmitted via a Telehealth monitor to a clinician.”

Telemedicine: “The delivery of healthcare at a distance using electronic means of communication – usually from one clinician to another e.g. a non-specialist GP undertaking an ECG on a patient suspected of heart disease and the transfer of that data electronically to another specialist clinician for discussion / comment.”

However, there is a consensus view that the term telehealth is much more encompassing than telemedicine, a view supported by the World Health Organisation<sup>[1]</sup>:

“the term Telehealth corresponded more closely with its [WHO] international activities in the field of public health as it covers education for health, public and community health, health systems development and epidemiology, whereas telemedicine was oriented more towards the clinical aspects.”

Consistent with the broader definition of telehealth, which encompasses public health principles, a long definition of telehealth, adopted in this article is <sup>[11]</sup>: “The delivery of healthcare service, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of healthcare providers, all in the interest of advancing the health of individuals and their communities.”

### 1.2 Examples of telehealth

Examples of Telehealth range from telephone alone or in combination with other devices, videophone, computer, mobile phone, still image video phones, radio, fax, internet <sup>[12], [13]</sup>. Wootton and colleagues <sup>[14]</sup> showed that the main areas of application of Telehealth were around diabetes, heart failure, cardiac disease, mental health, smoking cessation, and chronic lung disease, among others. Medical specialties where telehealth consultation had been successfully reported included radiology, pathology, dermatology, psychiatry, cardiology, surgery and ororhinolaryngology, among others.<sup>[1]</sup>

Telehealth is considered to be in an early stage of development in all countries <sup>[15]</sup>. Most of Telehealth activities accelerated from early 1990s to the present time <sup>[16]</sup>, with concentration of Telehealth projects found mainly in countries of North America, Europe, and Oceania <sup>[17]</sup>. It has been shown that most of the world’s Telehealth activities, derived from publication in Telehealth journal, occurred in the Americas (44%), and Europe (40%); with the UK accounting for 34% of the activities in Europe <sup>[14]</sup>. This figure, however, may not represent the true picture of Telehealth activities as the majority of Telehealth projects remain unpublished. A number of developing countries are also taking up the challenge of implementing telehealth, including countries in South East Asia; Sub-Saharan Africa, and countries in Latin America <sup>[18] [19] [20]</sup>.

### 1.3 Brief History of Telehealth

The ability of mankind to communicate health messages at a distant (Telehealth) had been recognised well before the discovery of telephone by Alexander Graham Bell in 1876 <sup>[1, 21]</sup>. In the ancient times, health messages were communicated by some form of primitive communication technologies, for examples: flags were flown by quarantined ship with cases of bubonic plague to warn other ships to keep away; lepers were made to ring bells to warn other people to keep away; or people used signs to communicate health messages to outsiders from a village infected with plague <sup>[1]</sup>.

In 1897, the telephone was first reported in diagnosing a child with croup [1]. This followed the formation of International Telecommunication Union (ITU) in 1965 [22]. Early advances in Telehealth were reported in the field of distant education, telesurgery, and mental health hospital in the United States in the 1960s <sup>[1]</sup>. The 1970s to 1990s saw the expansion of Telehealth in space usage (NASA), Antarctic survey stations, Offshore oil exploration rigs, and the military <sup>[1]</sup>. The 21st Century has seen the growth of Telehealth, especially in the US as the lead nation <sup>[16, 17]</sup>.

## 2. THE RANGE OF TECHNOLOGIES CURRENTLY AVAILABLE

Telehealth technologies currently available do range in sophistication and user friendliness, and hence in level of adoption. Taking the UK example, the range includes:

**2.1 Examples from UK:**

- Social or community alarm infrastructure, e.g. premises exit sensors, flood detectors, smoke & CO2 detectors
- Adaptive equipment e.g. for long term neurological conditions
- Call centres: offer immediate opinion on urgency of medical treatment or offer advice e.g. NHS Direct, specialist contact centres
- E-visits: structured secure non-real-time messaging patients and healthcare professionals, e.g. offering Asthma follow ups remotely
- Video visits: use of video-conferencing for remote consultations e.g. from nursing homes
- Remote ECG monitoring: transfer of ECG reading from a wearable device to an analysis centre. This can be via a download or real-time via wireless – a specialist version of home health monitoring
- Home Health Monitoring: vital signs monitoring in the home, e.g. COPD monitoring
- Mobile Health Monitoring: as above but wireless, e.g. Emergency Care Practitioner ‘box of tricks’
- Clinical kiosks: a combination of vital signs monitoring and video-conferencing, e.g. CISCO Health Presence
- Teleradiology: includes outsourcing where competent radiologists remotely diagnose digital radiology images e.g. using ePACS digital imaging,
- Teleretinal imaging: use of store-and-forward imaging in particular diabetic retinopathy – image sent to eye care specialist elsewhere
- Teledermatology: remote diagnosis of skin conditions
- Telepathology: use of pathologists to view lab specimens located elsewhere
- Telesurgery: use of telecommunications and IT to perform surgical procedures remotely e.g. robotics
- Remote ICU: combines audio, video, patient records and image access with decision support e.g. remotely monitoring multiple ICUs

**2.2 Innovation in Telehealth**

There are technologies that we have come to take for granted in our lives like the mobile phone and the internet. Telehealth that is based on these technologies is no longer viewed as innovative. New products and technologies either build upon existing technologies or they represent a breakthrough, a creative or unusual application in healthcare. Of the new technological advances, only a couple

have reached ‘maturity’. Most are in the difficult and uncertain process of crossing the chasm between pioneer sites and widespread adoption. A report by the leading innovators Gartner 2008<sup>[23]</sup>, highlights the maturity of new technologies and Gartner researchers have used this framework to prioritise those technologies that health care providers and commissioners should consider and the transformational benefit of these new technologies. This is demonstrated in the table below.

Priority Matrix

		Years to mainstream adoption			
		Benefits	Less than 2 years	2 to 5 years	5 to 10 years
Transformational	High	Teleradiology	E-visits Remote ECG monitoring	Home health monitoring Teleretinal imaging Video visits	Remote ICU
	Moderate	Call centres Teleradiology outsourcing		Mobile health monitoring Teledermatology	
	Low			Clinical kiosks	Telepathology Telesurgery

Source: Extracted from Gartner, June 2008

2.3 Summary of Innovative Technologies, their maturity, and how they can be applied in the care of long term conditions

Target	Enabling access	Examples of technologies, Ref Gartner 2008	Availability, Ref Gartner 2008	Benefits
Maintaining Health	Access to advice via the Internet, Digital TV and Radio, mobile phones  Assessment of health risk	Internet TV radio, mobile phones  Call centres  Clinical kiosks	Available and being used – no longer viewed as innovative.  Available and being used – can be expanded  Still to prove potential to embed	Extends access to information widely  Extends access to information widely  Extends access to assessment of risk and supports lifestyle change to reduce risk
Managing a condition	Access to self help groups and support  Access to self monitoring equipment  Access to decision support	Call centres  Home health monitoring  Telerectal imaging  E-visits, Video visits  Clinical kiosks Mobile health monitoring	Available and being used  Technology available, not yet mature  Still to prove potential to embed	Empowers the patient  Supports self care for as long as is practicable  Reduces stress for family carers  Reduces need for hospital admission
Receiving care	Access to specialists across time e.g. real time, and remote	Map of Medicine Telerradiology outsourcing  Remote ECG monitoring Teledermatology  Telepathology, Telesurgery Remote ICU	Available  Technology available, not yet mature  Still to prove potential to embed	Reduces need to travel for patients and staff  Enables highly specialist care closer to home

Traffic-lighting:

Green = technology available Amber= Technology available, not yet mature (pioneer sites only) Red= Still to prove potential to embed

3. DEVELOPING TELEHEALTH PROJECTS

Details of work on key challenges in the development and implementation of telehealth project by the same author is published elsewhere in the Journal of Telemedicine and Telecare.<sup>[24]</sup> In this article, the author presents the model and the checklist to guide practitioners of telehealth in implementation of telehealth projects.

3.1 Telehealth model of project development

The model summaries the various steps of developing and implementing telehealth, which fits with organisational planning process (Figure 1), while the detailed checklist is shown in Table 2.

Figure 1: Model of Telehealth development and implementation



### 3.2 Checklist for successfully developing and implementing a telehealth project

No.	Challenges	Response (Y, N or N/A)
A	Identify issues (needs) and partners	
A.1	Issues (needs)	
1	Is there a clear statement of healthcare service delivery problem / issue (needs)?	
2	Is telehealth seen as a solution to political and/or medical issue?	
3	Has needs assessment been undertaken?	
4	Has relevant evidence of effectiveness been considered in relation to the condition in question and telehealth?	
5	Is this formally agreed as a priority?	
A.2	Partners	
6	Has a lead staff and agency been identified?	
7	Are all relevant partners engaged?	
8	Has a steering group been established?	
B.	Produce a strategy	
8	Is there a telehealth strategy in place for the organisation that contains a clear vision, objectives, action plan, targets and business models?	
9	Have key priorities for change been identified?	
10	Have evidence-based solutions on telehealth been considered to address the problem?	
11	Is the telehealth system a virtual one (not a single large database)?	
12	Is there a balance between horizontal (too many sites) vs vertical implementation (few highly specialised sites)?	
13	Is there a plan to market telehealth in the area?	
14	Has training of staff been considered and how to overcome potential barriers from staff?	
15	Is the organisation's Management Board engaged with the strategy on telehealth?	
16	Has the design of telehealth service delivery been considered (e.g. service evaluation vs randomised controlled trial; community vs hospital base; short-term vs long-term monitoring with telehealth; selecting the right patients; considering how long people are going to have the equipment?).	
17	Has approval been granted from the head of information governance (confidentiality and access, data sharing)?	
18	Has ethical approval been considered?	

19	Is there legislation and regulation covering telehealth service?	
20	Has the effect of telehealth service on health inequalities been considered?	
C.	Secure funding	
21	Has funding been secured?	
22	Is there a service level agreement with the service provider in place?	
23	Is the funding recurrent?	
D.	Implement changes in service delivery	
24	Has a suitable supplier been chosen?	
25	Has training of staff (to raise awareness and overcome resistance) been done?	
26	Are there dedicated staff to co-ordinate / manage the telehealth project?	
27	Do the staff involved in telehealth service delivery have access to computers from which they can monitor patients remotely?	
28	Is there adequate support for patients with telehealth equipment (e.g. education)?	
29	Are appropriate alert limits set for individual patients?	
30	Are there adequate arrangements for installation of telehealth equipment?	
31	Is telehealth integrated into standard care provision?	
32	Are there adequate storage facilities for telehealth equipment not being used by patients?	
33	Is there a clinical champion for telehealth?	
34	Are the telehealth devices to be used compatible with landline telephone providers in the area?	
35	Has consideration been given to any potential software problems in accessing patient records?	
36	Is there provision for decontamination of telehealth equipment, where appropriate?	
37	Is there a written code of practice (i.e. a manual) for telehealth, which defines how the whole system works, who is responsible and key performance indicators?	
38	Has planned implementation of telehealth been considered (starting with a small number and making sure it works, before increasing the number)?	
E.	Monitor and evaluate	
39	Is there feedback from patients and carers?	
40	Is there clear benefit / outcomes (evaluation) of telehealth measures?	
41	Is there a plan to publish / disseminate the results of telehealth project?	

### 3.3 Summary and conclusions

Telehealth improves the care of patients especially those with long term conditions. Enthusiasm for telehealth projects in the UK stems from the promise of better value for money; by improving efficiency and effectiveness of service delivery. From the patient perspective, it offers choice and flexibility, and improves quality of life. From a financial perspective, better care of patients at home will prevent hospital admissions and enables more efficient care from a distance.

In conclusion, if Sudan is to realise some of the potential benefit of Telehealth, in areas of national and local importance, the health institutions in the country, both in the North and South Sudan, need to consider how to adopt Telehealth, as more and more of the population are having access to basic communication technologies. A toolkit in the form of the above checklist offers a starting point to guide consideration of developing Telehealth.

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