Assistive Technologies, Telecare and Telehealth – Do They Make Healthcare Services More Efficient? Can They Transform How We Manage Our Own Health and Well-being?

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The High Street and shopping centres of every town and city in the developed world are very different today than they were 20 years ago. It's not only the disappearance of some popular names, and the emergence of some new ones (between the charity shops and the bookmakers!), but the insides are different too, including the number and the roles of the staff. For the sake of brevity, I will consider only five examples:

1. Banks
2. Travel agents
3. Insurance agencies
4. Food supermarkets, and
5. Gents clothing shops.

In all cases, the trend has been away from labour-intensive personal support and attention by staff, towards a culture of self-service. Indeed, in many cases, it means that customers no longer need to visit the High Street because they can do their business (including shopping) from the comfort of their own homes, or on a train or while they are at work or walking down the street, or enjoying the fresh air in a park or at the beach. Shops and agencies that didn't adapt or change simply died; those that did embrace the changes found that they needed fewer members of staff, and those that remained needed different skills to enable them to perform new tasks. They became more efficient.

Technology has been the facilitator of change in each case. It's easy to find examples of specific inventions that some would "blame". For banks, it could be Automated Cash or Teller machines, or cash cards with PINs that make cash withdrawals or paying for goods so simple. For supermarkets, it could be barcodes that are printed on labels, and the scanners that can read them - avoiding the need for every item to be provided in store with a price tag that an assistant then needs to read at a check-out. It's not surprising that self-service checkouts (with additional weighing facilities and image recognition) are now used routinely. In all these cases and more, the development of Information and Communication Technology (ICT) has been at the core of all the changes.

ICT includes access to the Internet and all the remote interaction and sources of information that this entails, but also impacts on the role of call centres as components in the loop. The exponential growth in Internet use is due to a combination of factors which include:

- Low-cost computer handsets - especially touchscreen portable devices such as smart phones and tablets;
- Fast connection and communication – this includes more ubiquitous wifi in the home and in public places, and mobile services (3G and 4G) that cover increasing geographies;
- Attractive, colourful websites – these are easy to navigate and provide images and decision support software which enhances the user experience; and
- Improved security – payment collection is performed with support from standards that are robust and give confidence to the consumer.

Accessing a call centre to speak to an operator to seek more information or to complete a purchase was the standard way of dealing with utility companies, insurance companies and many other service providers during the 1990s and during the early years of this century. This has given way to

more Internet-enabled self-service opportunities that can democratise consumer services further by giving people access to far more information and choices that agile service providers can offer.

It's clear that ICT has made services more efficient, but has it (and can it) transform those services? If banking had been truly transformed by telebanking then we would no longer need cash nor cheque books. We already have the technologies to replace them, but the elimination of the old has been delayed by public opinion, associated in part by:

(a) Fears about poor cyber security,
(b) Potential exclusion of those who are not digitally literate, and
(c) Continuing challenges facing many older people with sight problems who struggle to interact with digital interfaces.

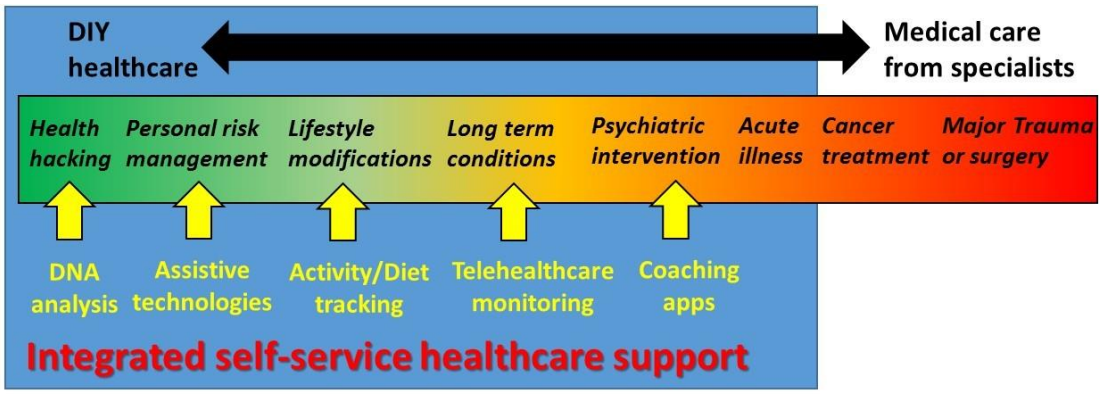
Changes will, almost inevitably occur in the future. We will have to wait and see if it is simpler technology, changes in attitude of the population, or improved awareness and education will facilitate the biggest changes in the level of acceptance.

Has ICT changed how we consider as well as organise and arrange our travel plans, or is it the emergence of low cost airlines such as Easyjet and Ryanair that have relegated the old package holiday to something from the 20th Century and therefore transformed the travel industry? Perhaps it is a change of behaviour or confidence that has been the main driver? Many of today's air travellers have probably grown up with flying and has experience of Mediterranean holidays going back 40 years or more. They don't need to have the details worked out for them, especially if they have personal experience of a resort and, therefore, don't need the input from an agent who may well know less about the local attractions than they do. Armed with on-line reviews and a web-presence of each hotel, they can now choose from an extended list of options. But they might also want to fly further afield – why not visit relatives in North America or in Australia and stay for a month? People are more confident to do this, and often have the financial resources to plan to a budget. So it is a behavioural change that has facilitated the transformation, as much as the technology.

Healthcare provision (including social care) for rapidly increasing numbers of older and disabled people is facing a crisis in the UK, Europe, North America, and all developed countries. It is, in part, the successful consequences of improved life expectancy, but is mainly a result of greatly increased expectations of informed populations. Simply paying more into the system is not going to be enough – the systems will need to be made more efficient but also transformed so that the demand is reduced. Efficiencies will happen as ICT makes its way into every area of the healthcare system, and as it allows an integration of personal services and a fuller appreciation of the important roles played by housing, equipment, family carers and smart assistive technologies in addressing the issues that prevent people enjoying a full and active life. E-healthcare, including shared electronic health records, ordering of prescriptions and booking of appointments will make processes slicker, reducing waste, duplication of effort and many costs. Traditional alarm-based telecare services and the remote collection and analysis of vital signs (1st generation telehealth) will also reduce travel for both clinical staff and for patients, and they will help services to react quickly to the needs of patients, often reducing hospital admissions and the length of stay - but they won't significantly reduce overall demand.

The only realistic way of reducing demand is by supporting people, both before they become patients, and then continuously when they enter the system, to adopt a greater self-service role towards their health and well-being. The diagram below shows a spectrum of care needs with

opportunities for self-care in the box on the left (including "health hacking" – an often informal collaboration between inventors, professional and enthusiasts to co-create new health solutions). More conventional and formal, physician-led and hospital-based treatments and investigation services are on the right of the box in this diagram. The challenge is to find the ways in which technology can underpin self-service and then to offer support through new service propositions. Some of the interventions, or support tools, on which these tele-services will be based are shown in the diagram, but they will change as new specialist medical devices and technologies are developed and the structures needed to operate them securely and safely in the community improve. Many of these technologies will be wearable devices that can provide continuous and ambulatory monitoring of vital signs and other indicators of status or well-being. Others will be therapeutic systems that promote rehabilitation or relief from pain. They will be the specialist DIY tools of the self-carer which accompany the more general tools such as the computer and smart-phone.



It must be apparent that a transformed healthcare system will have self-service and self-care at its centre, giving individuals the levels of choice and control that they want and with clear financial benefits to the system. This will offer opportunities for reinvesting some of these savings in the medical treatments by doctors and nurses for which there will always be a demand. The challenge is to make technology-supported self-care the norm and, thus, the conventional expensive and unsustainable approach based on an army of care professionals the exception.

The reality is that there are probably 3 groups to consider:

The Digitally Engaged Healthcare Enthusiast – this includes many people reading this article. They will typically be younger, love technology and spend most of their lives on a computer device or on-line. Significantly, they understand what technology can do and will trust it to deliver them improved outcomes. They may be advocates as well as potential users of health technologies

The Reluctant Traditionalist – they will probably understand most of the technology but believe that care is a hands-on experience and should be left to specialists. They may well appreciate the arguments but remain in denial about how our healthcare services can be funded in the future. They might also be reluctant to support transformation because they are concerned about the impact of change on the most vulnerable people.

The Digitally Excluded and Rebels – they are likely to consist of some older people who feel that they are beyond the age where they can readily accept change, but might also include many people who are currently the greatest users of healthcare services due to them having long term conditions, some of which may be the result of past or current lifestyle choices.

The same three groups might be equally relevant as changes in the High Street occurred. The latter two will have seen the changes as a bad thing, suggesting that they are conservative (little c!) in their outlook and fearful of having to learn and accept new ways of living. They may well use cheques, book holidays through a travel agent, visit a men's clothing shop to buy a new jacket, queue up behind 5 other people at the manned check-out in Morrisons (when they have only 3 items in their basket and there are three self check-outs free) and visit an insurance broker to renew their car or home insurance. It could indicate that they have too much time on their hands; they could be lonely and need to engage with anyone for a conversation – all important issues that society should be addressing. But these issues might easily lead to an unnecessary visit to the GP, consuming valuable resources and potentially denying an appointment for someone with more pressing medical issues. Solutions are difficult to find but might involve more social prescribing opportunities to deal with a wider range of issues than those traditionally addressed by primary care where the temptation to offer (often free) pharmaceutical interventions has been so easy.

So how have my 5 examples overcome the obstacles posed by people who are opposed to innovation and self service? How have they tried to change behaviour and usage patterns? I suggest that they have used the only 2 weapons available to them – the carrot and the stick. The carrot could be more choice, lower cost or faster access – all of which are routinely used in marketing campaigns to attract customers. For example, Irish Ferries advertise that the best fares to cross the Irish Sea are ONLY available through their website. The stick is that you have to pay more and wait longer for a personal service involving a face-to-face meeting with a representative who can take and count your cash and offer a printed paper ticket in return. People who are financially well-off can afford to buy their preferred service option. Taking this to its extreme, a wealthy man can pay a personal assistant and trainer to select and buy his new clothes for him from a High Street retailer or arrange for a private fitting when there are no other customers present. People are free to spend their wealth as they wish, and many private medical insurance schemes exist to enable people to choose both their surgeon and their hospital admission date for routine surgery. But the financial incentives for promoting self-service health don't exist in countries, such as the UK, where healthcare (including medication) is free for all older people and for many other groups.

The opportunities for preferential and more rapid access to services are, however, significant. These could include simpler ordering of repeat prescriptions, booking of appointments on-line (with more favourable slots reserved for self-service patients) and opportunities for on-line "chats" with a GP, a nurse specialist, allied professional or community pharmacist for advice. Such consultations would be enhanced further if they could be extended to include video and the sharing of continuous health or fitness data being collected by the patient. They could be in the waiting room of the GP practice (or in a supermarket or railway station) but many people might prefer their service to be offered to them in the comfort of their own lounge, in front of the TV while they have a relaxing drink. Suddenly, self-service becomes enhanced service and tele-services become better than face-to-face consultations. I suspect that many of the Reluctant Traditionalists might be tempted to try these services, as long as they were offered the appropriate sensing devices and didn't have to accept intrusive and stigmatising boxes in their own homes that reminded them of their illness.

Fortunately, today's sensors can connect to smartphones, tablet devices and laptops as well as to specialist equipment, enabling a much simpler form of telehealth service to be offered. Progressive Clinical Commissioning Groups, such as the Liverpool CCG, are already planning to offer services that aim to give some people with long term conditions the sensor tools that empower them to become self-service users - but with a safety net of support from their community health provider. This overcomes potential concerns about potentially vulnerable people becoming second class patients

as it provides tangible benefits and gives them a great sense of self-esteem as they both share a better understanding of their condition and an understanding of how they can influence its progression and can become partners in the treatment plan. This progressive approach should convert patients into self-care specialists, rewarding them and the NHS with improved outcomes, and making technologies, especially telehealth and telecare more acceptable.

With connected healthcare initiatives, they can continue to be supported by 24/7 monitoring, increasingly using sophisticated algorithms and Artificial Intelligence to detect trends and to interpret cues in speech and actions. Provided that the self-service approach has relevant safeguards in place, and is operated by, and supported by, an appropriate service organisation, which can integrate a range of applications including assistive technologies, the outcomes will be better and a big step taken in the direction of health service transformation.

The final piece in the jigsaw is the quality assurance of the self-service offering – which will cover all aspect of support including assistive technology provision, telecare, telehealth, and the provision of apps. The types of service will include alerts and alarms, and how they are responded to, continuous monitoring using body-worn devices, on-demand services that are available through call centres and through websites, and regular remote consultations and remote visits that are enabled by handheld computing devices or through smart TVs. The diversity of applications will require different operational good practice principles to be developed, and it would be foolish to try to predict what they might be. Fortunately, the new International Code of Practice for Telehealth provides a strategic framework which is both generic and agile, enabling it to be as applicable for alarm services as for apps designed to change behaviour. It will grow in scope over time, but will retain an approach which requires service providers to provide current performance data on their websites in a timely manner. This gives individual consumers sufficient information for them to make informed choices based on what matters to them rather than accepting an approach based wholly on occasional inspections. It may be apparent that inspection is a tool that has failed to deliver quality improvement in hospitals, care homes and domiciliary care services over a number of years.