MOBILE SUPPORT FOR COMMUNITY HEALTHCARE:
A JANUS VIEW

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Abstract: Mobile support, through powerful multimedia and communication devices, offers much promise to enhance the working environment. One area where substantial enhancements are possible, including considerable 'social good', is healthcare. The full infrastructure of the health systems can be brought to support the patient, irrespective of location. The role of community healthcare professionals could be considerably enhanced, enabling a fuller range of patient care to be provided in the community. However, applying such technologies are likely to have unforeseen consequences. This paper explores a 'Janus-faced' view of such technological changes to identify some of these unanticipated consequences. A case of district nurses in the UK is discussed, where technologies such as mobile phones are already being used. For the case, mobile technologies offer much potential, but this will require structural changes, not just in technology.

Key words: Mobile Applications; Mobile Services; Janus-faced; Community Healthcare.

1.   INTRODUCTION

Information systems using sophisticated mobile technologies offer much potential to enhance the working environment, particularly for groups working in remote contexts. Support for such professionals includes corporate information systems, network and communication infrastructure, and corporate databases. One area that seems ideal for such support is community healthcare. Community healthcare professionals visit patients in their own homes or health centres and collaborate with other support

services to address pre- and post- primary healthcare, providing a key link between the patient/client and other health and/or social care services, such as housing, general practitioners, social workers and local hospitals. Community healthcare provides key support for vulnerable groups, such as the elderly, less mobile and newly born infants and assist often overstretched primary healthcare systems. For countries where the healthcare infrastructure is less well developed, community healthcare may be the only access to healthcare for much of the population.

Health and social care is a very lucrative market for developers of mobile systems, since significant proportions of GDP are spent on healthcare by national governments, and an increasing proportion of this is targeted at community healthcare (EOHCS 2002).

An examination of community healthcare in the South of England shows that mobile technology use is mainly limited to mobile phones and standalone equipment, however, trends point towards an almost inevitable increase in using more sophisticated mobile support. Governments want increases in efficiency, better communication, reduced bureaucracy and better patient care. Mobile technologies are identified as one way to achieve these by providing better support at point of patient care, providing better recording and monitoring capabilities and integrated communication facilities. However, we argue that before such move takes place we have to be aware of the implications which may be unforeseen and contrary to intended use. In this paper we explore such implications by developing a generic community healthcare case, based on existing practice, and applying a 'Janus-faced' analysis. Each area offering benefits may also yield malefic results. For instance, the aim to use mobile support to reduce bureaucracy may actually result in an increase in bureaucracy.

The paper is structured as follows: first a brief examination of current trends is provided, followed by the development of a generic case based on community healthcare in the South of England. The metaphor of 'Janus-faced' phenomenon is then examined and applied to the community healthcare case. The paper concludes with a discussion of some of the likely challenges of applying sophisticated mobile support in such environments.

2.   COMMUNITY HEALTHCARE, A GENERIC CASE

In the UK, healthcare is mainly provided by the National Health Service (NHS), a huge and complicated institution employing over one million people with an annual budget of around £42 billion (NHS, 2004). The NHS has seen major structural changes over previous years, often politically led, a

process that is still continuing (DoH 1997, 1998, 2000, 2002, 2003; Wanless 2002).

District Nurses (DNs) and Health Visitors (HVs) work in patients' own homes after initial contact with general practitioners or after discharge from hospital, with the former assessing healthcare needs and developing appropriate packages of care for their patients, the latter helping people to achieve their potential for health and well-being.

The example developed is based on a pilot study of eight in-depth interviews with DNs, HVs and organizational support staff in fairly urban, including socially deprived, areas. The interviews lasted between 1 ½ and 2 hours and were conducted in the community over a period of two months; a larger study is planned in the near future. A set of open questions based around 5 categories including respondents' experiences of mobile computing/support technologies in general and in existing working practice. Questions also addressed the wider context, any negative experience of use and possible future uses. Responses were recorded and analysed within the context of the respondents' local working environments, thus enabling common themes to be identified.

The existing level of technology is likely to be based on mobile telephones. Existing management dilemmas include ensuring sufficient mobiles for each staff member on duty and having in place procedures to allow people to use their own mobiles when a staff phone is not available. Smaller weekend cover team staff may have a mobile phone each, yet busy main week schedules mean limited availability of mobile phones so staff may have to use their own. Typically there will be discussion on appropriate use of the mobile phone for work activities and bureaucratic processes for recording call activity and reimbursement of personal expenditure.

Although use of the mobile phone is not essential, it does contribute directly to efficiency targets. For instance, response targets are set for dealing with alerted and urgent calls. Without mobile phones HVs and DNs are not able to respond within the maximum time set out in the care protocols. Reduced travel time is yet another benefit, care staff returned to base to pick up referrals, whereas now they travel direct from one visit to the next after receiving the details via their mobile phones. In addition, community workers can telephone base to receive specific information on patient notes, if these are available.

Another "mobile" technology is digital cameras in wound care, where digital photos are attached to the patient's medical record, documenting their progress and condition. Data-pens are a further example and are used to record activity. Staff, patients and the care provided all have a unique barcode; these are swiped at the end of the visit, recording the interventions that have taken place. However, currently community staff can download

information contained in the data-pens at base but retrieval in the field is not possible. Issues of current use include 'use protocols' such as what data can be stored on the mobile devices, what to do to reduce risk of theft and what to do in case of theft, practical issues such as recharging batteries practices and handing over the phones and other equipment in 'good condition' for the next set of users.

3.   A JANUS-FACED ANALYSIS

Technology is not always applied and used as expected. As Arnold (2003) notes: "Technologies of many kinds perform in ways that are ironic, perverse and paradoxical. That is to say, a certain technology applied in a certain way in a certain context may have consequences or implications of one kind, and may necessarily and at once be implicated in a contrary set of consequences." (Arnold 2003, p232)

Arnold, examining the effect of mobile phones on society uses the metaphor 'Janus-faced', based on the Roman deity Janus who was blessed and cursed with two faces pointing in opposite directions. Some examples given of technology performing in such a paradoxical manner include car brakes which are designed to slow cars down, and yet the more effectively brakes perform, the faster people drive their cars; antibiotics used to kill pathogens and reduce disease actually result in pathogens evolving into stronger stains resistant to antibiotics; heroin was recommended as a cure for morphine addiction but turned out to generate an even bigger addiction problem. (Arnold 2003, p234)

The concept of a technology paradox within the health service has been previously identified by Hebert (1998) while investigating healthcare provision in 5 community hospitals. As Hebert noted "results suggest that, for specific tasks, IT increased efficiency and productivity – a single employee was able to complete more tasks. However, this produced other consequences not predicted. Participants noted this change did not 'free up time' to spend with patients, but meant there were potentially more opportunities to provide services and more tasks to complete". Indeed, technology that was meant to increase quality of service to patients often resulted in less frequent and shorter contact between staff and patients, as staff time was increasingly taken up with computer-orientated tasks. Other unforeseen consequences were noted, including more 'visible' accountability, changes in roles and responsibilities and delineation between these, and a reduction in job satisfaction.

Arnold (2003) identifies conditions where the Janus-faced metaphor, incorporating notions of irony and paradox, are applicable:

"The performance of the socio-technical system gives rise to multiple implications or sets of implications, at least some of which pull in opposite directions towards contrasting conclusions.

These contrasting conclusions, implications, or binaries, are observed on the same axis of analysis, within the same conceptual frame, as it were.

And, these contrasting implications are not a result of error, to be resolved by better methods, but are co-dependent and co-productive, and are intrinsic to a full apprehension of the operation of the system." (p234)

Some of the challenges of more sophisticated mobile developments have already been discussed above. We analyse this further by applying the Janus-faced metaphor to the generic case, using the goals of parity, standards, increased collaboration and efficiency, reduced bureaucracy, meeting the growing expectations and demands, all of which affect the general quality of service for patients.

3.1 Parity of service: national versus local tensions

The potential of sophisticated mobile support enabling access to the full information infrastructure and support of the NHS would mean a consistent and comparable service across the UK. This would address the so called 'postcode lottery' phenomenon where people living in adjoining postcodes have access to different service levels. However, DNs operate within considerably different set of local resources and priorities. Current mobile use highlights some of the challenges of parity. Different centres use different mixes of technology, some using a pool of mobile phones and others relying more on DNs' own phones. There are differences even within the same Care Trust for alternative shifts. More sophisticated mobile support will add more complexity in the form of increased number of mobile devices and accompanying support mechanisms that have to be rolled out across the UK, which itself is likely to take considerable time to complete, possibly years. There is clearly potential for further inconsistent access to services throughout this transition period as well as local differences once it has been completed.

3.2 Standards: homogeneity versus heterogeneity

Standards are important in terms of integration of patient records and technology and this is accompanied by political and organizational challenges. Community healthcare is often at the forefront of the pull between the 'national' standards and aims driven by the centre and 'local' needs for partnerships, initiatives and collaboration. De jure standards may be imposed, forcing equipment and protocols down a particular route; at the

same time, local de facto standards will develop through use, helped by the freedom of mobile devices, which are supposed to remove the shackles of geographic location and environmental limitations. National standards are likely to take considerable time to implement requiring developing a consensus from several different health authorities and different services with different aims and priorities. The array of local de facto standards will emerge more rapidly as the imperative of local needs and working practices evolve.

3.3   Increase in collaboration: interruption versus engagement

The need for better coordination and communication between different health and social care services is a powerful driving force for change, not least to address the needs of vulnerable groups. Sophisticated mobile support offers the potential of real-time communication and better coordination of schedules: social workers, doctors and health visitors can more quickly coordinate activity to address possible concerns with a vulnerable child-at-risk or an elderly person, even in real-time. Such real-time interaction increases interruption for the various service professionals. In addition, semi-automated activity (e.g. automatic synchronising of meeting diaries), could result in less individual control and engagement in the collaboration. Working practices are likely to change to accommodate more interruption, and the interruption is likely to be more insistent. Overall, the nature of collaboration is likely to change, possibly becoming shorter, more insistent and intrusive, less personal and possibly lacking the depth of existing collaboration.

3.4   Increased efficiency versus increased workload

Potential efficiency gains are usually argued along the lines that mobile support will offer benefits in automatic data entry and non-duplication of data/tasks, reduction in time (particularly in reducing the number of visits to hospitals for patients), and more efficient use of DN and other professional resources. However, examining what is likely to take place gives a different picture. Data entry is currently based on hand written elements and standalone bar code recording. More sophisticated automatic recording will require extra devices and their connection to a mobile communication device. This results in increased system complexity, such as work protocols to set up, connect, test and use of such devices, as well as general maintenance and care of such devices (eg cleaning pacing away in a reusable

condition). Even before the DNs visit there are likely to be extra activities to ensure the equipment is in good condition for use by others, including mundane things like ensuring batteries are charged (as is the existing case with the mobile phone use). All these activities are likely to take extra time before and after visits as well as during a visit. As already identified, more sophisticated mobile applications requiring GP and other clinician input via mobile devices will involve substantial reengineering of processes for DNs, GPs and the clinicians. There are also likely to be a host of extra work protocols to be developed and adopted by the GPs and clinicians, including setting up, testing and auditing tasks. There may well be some efficiency gains but there will also be considerable increase in related supporting activities.

3.5   Bureaucracy: writing pens versus data-pens.

Existing use shows some bureaucratic challenges. Some of the paperwork has been reduced by the use of data-pens, where patient, condition, treatment and DN information can be swiped quickly by an electronic data-pen using barcodes. However, the time gained through this recording mechanism is lost when trying to retrieve the data, as that is only possible at base from particular workstations. Mobile telephones help DNs in their work but as there are not enough to go around, base need to keep track of which team take out what phone. In addition, whereas before DNs only had to check their medical equipment, they now need to ensure that on returning to base their enablers are re-charged, ready for the next day, in addition there is increasingly a requirement to record each of these activities. As discussed, some DNs have to use their personal mobile telephones while others use pool phones. In both cases there are bureaucratic processes to reimburse work calls made on personal phones and personal calls made on work phones. More sophisticated use of mobile support are likely to add further bureaucratic challenges. There are likely to be similar challenges with issuing and maintaining equipment. In addition, since there will be more service items to record and more people involved (e.g. GPs, clinicians) per visit the bureaucratic burden will increase. Initially, at least, there is likely to be a need to have back up recording activity until the system has proved robust. In a further perverse sense, the bureaucratic recording and auditing activity in patient care is likely to be mainly when something goes wrong, such as when a patient dies: Effectively confirming that the DN and other healthcare professionals have done a good 'job' when the patient dies!

Satisfying expectation and demand result in increasing expectations and demands.

Arnold (2003, p236) discusses Heidegger's notion of "technological enframing", whereby the technology works in such a way as to change the question through the answer. Because mobile telephones allow speedier referral visits, a quicker service is expected by patients. More sophisticated use will also change expectations. Because digital photographs, and videos can easily be sent to experts for a second opinion, the demand for second opinions and advice are likely to increase. As with other technology, in satisfying demand, the enabling mobile technologies are likely to increase the demands.

4.   SUMMARY AND CONCLUSION

It is clear that many community healthcare professionals, from the generic example, cannot do their community activity without some mobile technology support, such as a mobile telephone. More sophisticated support offers much potential to improve patient/client care in the community as well as efficiency benefits. Community healthcare professionals are generally open to such technologies, however, practical considerations and use protocols need to be addressed before the full benefits can be achieved. However, in considering the adoption of such technologies to address the issues and challenges in healthcare, we must not forget that new solutions bring new, additional problems that in turn will need resolution.

The generic example identifies the reengineering and process changes required to reach the potential benefits that the more sophisticated mobile applications offer. Although the challenges of reengineering are not trivial, the main challenges are not technical but at system level getting the different powerful stakeholder groups 'onboard'. The complexity of the task and the operating environment is considerable and still undergoing change (DoH 2003).

In addition, technology can result in paradoxical and ironic consequences. This has been demonstrated by applying the Janus-faced metaphor to the generic case of community healthcare. Along each of the dimensions where Governments seek improvements, such as parity, standards, collaboration, efficiency, bureaucracy, expectations, demands and QoS, there are doubts whether any net gains will be achieved. This is not to say that more sophisticated mobile application will not result in gains or even an overall net gain. Indeed, by applying such technology will change the needs of the patients, professionals and health service as a whole. Things will be able to be done that were not possible before. People will be treated, more quickly, for conditions in their homes that would have taken a hospital visit. Different support services will be able to coordinate activity to more

quickly address the needs of a patient at risk. Overall there will be different demands on and for services and different ways of meeting those demands. Much of the change is going on anyway, such as development and integration of electronic patient records. However, as the Janus-faced analysis of the generic case shows, the challenges are considerable and there are doubts whether any of the expected potential benefits are achievable. A technology that is used to reduce bureaucracy may result in further bureaucratic activity. This paradoxical and ironic nature of technology needs to be considered when introducing it. Evaluating such new mobile developments calls for more understanding of the fuller unintentional and unforeseen consequences. Only then can we make an informed decision.

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