The Elderly Demographic Time Bomb - Sharing the Load with the Active Ageing: Can eHealth Technologies Help Defuse it?

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Abstract. This paper examines strategic health management and practical health service delivery issues inherent in the potential doubling in the number of over 65s over the next two decades. It considers the use of scarce and overloaded resources in providing care and support to this age group across the spectrum of community environments, and advocates the use of shared information services coupled with the deployment of 'smart' technologies to supplement available yet scarce professional resources as well as enabling elderly people to maintain a safe, active and independent lifestyle. An innovative approach to provide support both to an active ageing population, as well as the more frail or vulnerable members of society, is outlined. Based on an ongoing research programme, this centres on the extension of the Smart Home concept to create an overarching smart environment. This combines advanced information, communications and textile technologies with physiological monitoring and location based processes and services, to protect and support users by maintaining the range of services they need. Discussion of the behavioural dynamics inherent in organizational change concludes the paper.

Keywords. Demographics, ageing, telecare, telemonitoring, information, lifestyle, patient empowerment, smart environment, behavioural dynamics

The Demographic Time Bomb

The Statistical Picture

The European Union (EU) currently has to cope with demographic decline, low natural growth and ageing of part of its population. The EU's arithmetic sums it thus: the average number of children per woman in the EU = 1.5; the required population replacement level = 2.1; the projected population replacement rate for 2030 = 1.6; the decline in fertility ("baby crash") which followed the baby boom is the cause of the large proportion of 45-65 year-olds in Europe's population; life expectancy has risen by eight years since 1960 and could continue to increase by another 5 years by 2050, resulting in a larger proportion of people surviving to the ages of 80 and 90; the working age population (ages 15 to 64) is expected to have fallen by 48 million between 2006 and 2050 and the dependency ratio is set to double, reaching 53% by 2050. According to demographic estimates, 40% of the EU population will be aged more than 65 years, and 11% more than 80 years by 2050. The cost of providing pensions, and long term health and social care will increase and is estimated to rise by 4%-8% of GDP by 2050.[1]-[4]

These trends will lower the total EU population, which will also become much older, and the widening gap between the ageing population, plus the decline in birth rates, is leading to reduced numbers in education and the workforce, which mean that there will be severe pressures on all countries in terms of the sustained ability to fund and maintain a viable economic and social infrastructure.

The Premature Ageing Factor

In parallel with the general problem of how to provide services for a "normally" ageing population, health and social care policy makers and managers will need to give specific consideration to the needs of those people with chronic health conditions, rare diseases and those whose conditions may generate acute premature ageing, by as much as 20-30 years. This is particularly true of people with central nervous system damage.[5]-[6]

Since such people often require much higher dependencies on family and professional support and care, the cost per case of treatment, care and support is much higher than the "norm" placing a greater demand on scarce resources. They are also often the least advantaged in terms of being able to access services. It is anticipated that this factor will continue to increase in significance.

Evidence in Sweden and the UK, from current work with patients suffering from damage to their central nervous system, suggests that if aged, frail, infirm, people or those who are disabled or suffering from chronic or rare diseases, have proper physical support and access to credible information about managing their condition – better social care intervention - the rate of deterioration can be slowed significantly,[6] thus the cost of service provision can be reduced and resources better deployed.

Can Technology Help?

A natural corollary to the demographics: there will be ever larger numbers of people (patients) requiring more professional health and/or social care interventions. Equally, there will also be fewer health and social care professionals available to provide the required levels of service.

However, many older people will be more articulate and more familiar with e.g. information and communications technologies (ICTs) than in previous generations. Therefore, it is logical to look to technology based assistance to mitigate the shortfall in other resources.[7]-[10]

The concepts of telemonitoring [11] and telecare [12] are well established and may be regarded as routine for service delivery, but recent work has highlighted the issues of user acceptance in a "smart home environment" where the intention of empowering a person can result in increased dependency through well meaning but often unnecessary interventions by e.g. carers or community nurses.[13]

In the EU, e-health research programmes have been in existence for almost 20 years, producing an ever growing range of remote physiological monitoring devices and clinical support, together with personal care support systems.[11] Once assembled to meet the individual care cover needs of patients or the vulnerable elderly, these "smart homes" enable them continue to maintain an independent lifestyle far longer than would otherwise be the case.

However despite the undoubted benefits to the elderly and care professionals alike, the creation of a personalised remote managed care "smart home" setting that supports continued autonomy can also tend to promote an excessively high-dependency lifestyle. As a result the "smart home" could all too easily turn into a "smart prison"!

These concerns have led to the development of the concept of the "smart environment". This aims to opens the door to the outside world, where not only there is no loss of access to existing support services, but also access to support in negotiating ways around problems with public transport and shopping out in the community.

Research under the UK New Dynamics of Ageing programme is combining leading-edge clothing technologies with those of communications and computing to create a comfortable and attractive "smart wearables" that act as a mobile communication platform.

This is based on a generic "pick and mix" multi-layered multi-functional clothing design concept [9] that is heavily influenced by psychological studies into motivational, psycho-social and socio-economic factors on which choices are made by the elderly. Appropriate monitoring and support technologies are then integrated within the garment fabrics to provide a distributed systems environment to suit individual needs and preferences.

Connectivity within the garment layers and also between the support system within the home is based on Bluetooth technology. Beyond this home environment the outer layers connect via WiFi web links back to the user's home portal, and as necessary onwards to the requisite professional monitoring services.

These outer layers effectively incorporate a distributed GSP-enabled broadband mobile phone system within the garment structure. Its aim is not only to provide conventional mobile phone functionality but also to extend this to incorporate clinical monitoring and care support information traffic. One feature to be explored is the possibility of creating an emergency open-channel to replace the much maligned alarm pendant that users see a stigmatising and frequently refuse to wear.[13]

Information Sharing

Information sharing is about people having access to information to assist them in managing their conditions and being empowered to have independent, autonomous, lifestyles. The concept of the "expert patient" is recognized as an important component of managing rare and long term conditions, and its value will be enhanced by access to credible information which can be shared widely.[14]

As the migration of labour and the propensity to travel and live in other countries becomes ever more prevalent, the need to address cross border collaborations will become more common, with people and agencies in several countries able to access or provide information to or about a patient – in commonly understandable formats.

This will in turn present new challenges to ensure the quality of data, the ability for all participating entities to read and understand the information, and of course to ensure that the individuals' rights to have their information kept secure and confidential are respected and honoured.

Behavioural Dynamics

Emergent technologies and associated innovations, as applied within the multidisciplinary fields that comprise health care, are argued to be requisite for the delivery of future health care and quality of life style requirements. The overriding issues of resource and costs will clearly impact on the operational form of these systems and the extent of their availability.

However, fundamental to any system application will be the associated impact on user expectation and competence. In order to realise potential benefits designed for the system it will be necessary to elicit a profile of the behavioural change needed in order to create and sustain an effective behavioural interface between system capability and user need.

In the context of health care such a profile would prompt a redesign of core skills and professional and organisational roles in response to a re definition of the professional's role, patient-relationship and management of patient needs and expectations. Each of these elements will represent a significant pressure for change at the individual, interpersonal and organisational level. As individuals' core professional roles are re shaped by system demands, and opportunities, so to will inter professional/disciplinary requirements e.g. access and sharing of information, patient identity and the accurate charting of patients care pathways.

This 'matrix' of profession led interactions will add a further environmental, both organisational and behavioural, challenges to the system's role and use, producing an operating environment for which it may not have been designed.

Conclusion

The demographic time bomb is real and will have to be addressed locally, nationally and internationally. Knowledge from disparate clinical and other sources offers potential benefits to nursing and social care management and professional practice, and, most importantly, to enhance the autonomy of people as patients.

Three key components to any solution will be, as it is now, proper use of robust technologies; better inter agency and inter professional collaboration; with information sharing the norm rather than the exception. Cultural and ethical barriers will have to be broken down so that all professionals can feel confident about sharing information with colleagues in other disciplines, and, sometimes in other countries, where there may be cultural, political and organisational differences to take into account. And, of course will require health and social care professional practice to adapt and respond to those challenges.

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