REVIEW

Examining perspectives on telecare: factors influencing adoption, implementation, and usage

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Abstract: Telecare, or the use of remote care technologies to support safe and independent living, offers great potential to mitigate the challenges faced in a time of changing demographics. By supporting people to live for longer in their own home, telecare can enhance quality of life, reduce reliance on institutional care settings, and reduce costs. Despite these potential opportunities, the adoption of telecare has not been as fast or widespread as it might have been. This article discusses some of the factors acting as drivers or barriers, which have influenced adoption and impacted on implementation. The implications of the availability of such a wide range of telecare applications is explored; this diversity of choice allows for services to be tailored to the specific needs of users, but also causes a tangled web of terminology that can lead to confusion and lack of clarity. In terms of the evidence base, although evaluations of telecare services often demonstrate a high level of cost benefit and user satisfaction, primary research findings are not as positive. This paper focuses particularly on the Whole System Demonstrator, a large-scale, randomized controlled trial that raised questions about the value and cost-effectiveness of telecare. The paper also discusses the ethical, governance, and resource issues associated with telecare implementation and the organizational complexities inherent in such exciting but challenging changes to services. The policy perspective is also summarized, highlighting how much of the adoption of telecare to date has been influenced by top-down initiatives. Telecare will continue to evolve as our understanding and the technology continue to develop. This paper provides information and advice for commissioners, providers, and practitioners regarding the factors that will shape the future of telecare.

Keywords: telecare, barriers and facilitators, perspectives, assisted living, independent living

Introduction

An aging population, increased prevalence of long-term conditions, and a long period of public spending austerity all continue to put pressure on the commissioners and providers of care services. In response, there has been great interest in trying to increase efficiency and effectiveness of care delivery through enhancing self-management, supporting independent living, and integrating health and social care services.[1]

For many providers, technology provides a vehicle for supporting these developments. This article explores perspectives on one specific set of technological applications, known collectively as telecare, with a particular emphasis on the factors that drive or hinder the adoption of telecare services in the UK.

Current context

Telecare interventions provide individuals with technology-enabled mechanisms for enhancing personal safety, maximizing independence, and supporting residence in their place of choice. Many different definitions of telecare exist, although one of

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the most commonly cited is that provided by Brownsell and Bradley in 2003:

> […] the continuous, automatic and remote monitoring of real time emergencies and lifestyle changes over time in order to manage the risks associated with independent living.[2]

Telecare has also been differentiated into different generations: the first generation relating to simple, user-activated emergency response systems, the second generation encompassing automatic environmental (eg, smoke, flood) or personal (eg, falls) detectors, and the third generation providing functionality, such as lifestyle monitoring or remote support.[3] On one level, telecare appears to be well established as a mainstream element of social care. In England alone, telecare deployments have been estimated at approximately 1.6 million, predominantly in the form of first-generation personal alarms.[4] While most deployments are within individuals' own homes, the use of telecare applications has also been reported within residential homes and other communal settings.[5]

However, this level of use needs to be considered in the context of potential need within the population. Although a generalization, the groups who could be considered most likely to benefit from telecare services are adults with learning disabilities and older people. There are thought to be approximately 905,000 adults with learning disabilities in England,[6] and there are almost 11 million people in the UK aged over 65 years, of whom approximately 4 million have a longstanding, limiting illness.[7] The oldest section of the population is the most rapidly growing, with the number of people in the UK aged over 85 years expected to reach 3.5 million in the next 20 years.[8] Even though not all people would benefit from telecare, it is clear that the current 1.6 million users is still likely a long way from providing full coverage of those vulnerable members of society who might require such support.

Factors influencing adoption and implementation

The wider adoption and implementation of telecare services is subject to a range of complex interrelated influencing factors. While commissioners and providers may recognize the need to support wider adoption of telecare, to do so requires an understanding of the financial, organizational, ethical, and clinical issues inherent in this area of care.

To complicate matters further, many of the influencing factors can act as both drivers of, and barriers to, wider adoption. For example, the range of available telecare applications offers opportunities for bespoke, needs-led services, but leads to a muddle of terminology and difficulties in linking benefits to interventions; the opportunities of telecare to support integrated care also provide additional complexity in change management and reimbursement models, and the evidence base can both encourage and hinder wider adoption.

The following discussion addresses each of these influencing factors, exploring their impact on the adoption and implementation of telecare and offering solutions to overcome outstanding issues.

Understanding of telecare among providers of care

Although definitions of telecare exist, there remains a lack of consensus regarding the precise scope and range of telecare interventions. Part of the confusion emanates from the different terminology used in this space with terms such as telecare, assisted-living technologies, assistive technologies, telehealthcare and connected care often used synonymously. Additional complexity is added by the use of terms related to remote health care technologies, such as telehealth, telemedicine, and eHealth. Even where telecare is the term of choice, there is not always agreement on how wide the scope of interventions should be, with some authors still arguing that telecare encompasses both social and health care support.[9,10]

At a micro level, where applications are described individually, the lack of an agreed taxonomy is unimportant, ie, any technology deployed as, for example, a falls detector, is still a falls detector, regardless of how it is categorized. However, the muddled nomenclature provides broader problems with adoption and uptake. Developing business cases, funding proposals, publicity materials, educational curricula, and research methodologies all require a clear understanding of what interventions are in scope.

Moving forward, there are two solutions. The first, by far the most ambitious and long-term, is to move toward greater agreement between academics, clinicians, and commissioners on the use of terminology. This may even require development of a taxonomy of remote care technologies, providing clear categorization of different applications based on service delivery type and/or user need.

In the short term, we can overcome problems by focusing discussions on the exact applications of remote care technologies, rather than trying to apply poorly understood labels. For example, if we wish to publicize, commission, or study the use of global positioning system motion trackers for people

living with dementia, then that is exactly what we should do, without becoming tied in taxonomical knots about whether we are discussing telecare, telehealth, or assisted-living technologies.

The lack of agreement on terminology is symptomatic of the fact that this remains an approach to care that could still be considered relatively new and which is evolving rapidly. The speed of change and relative immaturity also manifests as a general lack of awareness among health and social care staff. This, in turn, degrades the ability of staff or service providers to capture relevant metrics of sufficient quality to establish effectiveness. Although there are pockets of good practice where telecare and other technology applications are included in curricula,[1] there needs to be greater emphasis on embedding telecare training into health and social care practitioner education.[11]

Policy initiatives

Within the UK, a number of policy initiatives have sought to enhance the adoption and uptake of telecare services. In some instances, these initiatives have been designed to inspire and encourage greater adoption of telecare, a recent example being "3 Million Lives" in England. This policy push by the National Health Service in England sought to enhance the lives of the population by encouraging and supporting (but not directly funding) the use of telecare and telehealth applications as a vehicle for providing more person-centered and integrated care.[12] Elsewhere, policy initiatives and strategic plans for country-wide adoption of telecare have been accompanied by the availability of funding.[13–15]

These policy drivers, particularly when associated with funding, have been the fundamental reason behind the growth of adoption of telecare across the UK during the past two decades. The future is less clear. There is recognition that technology-enhanced care services are an important part of future planning. However, there should also be recognition that a strong policy push from central government may sometimes act a paradoxical barrier to adoption. Rightly or wrongly, when the rationale for policy is seen as being to increase cost efficiency, practitioners, users, and carers may feel that they are being coerced into using a cheaper and less personal form of care.[16] This feeling might be exacerbated further if the telecare agenda is perceived to be set by the capabilities and priorities of technology developers and vendors, rather than the needs of users. Moving forward, advocates of telecare need to be cognizant of this, ensuring that a top-down

policy push is implemented with the input, support, and involvement of key stakeholders.

The evidence base

The promise of telecare (however defined) is great. In addition to the potential benefits for individuals, providers of social care may also seek to cut costs through a reduced need for state-funded domiciliary or residential care.[17] However, a lack of empirical evidence related to outcomes and effectiveness is certainly a barrier to the wider adoption of telecare.[3] Even where evidence has been published, it is frequently highly specific or undefined (for the reasons described earlier) and unsuitable for collation as part of a broader evidence base. This leads to complexity and confusion, as the evidence frequently cannot provide a valid comparison between the options applicable to any specific locale, other than where each individual piece of research took place. As a result, when we explore the arguments related to evidence for or against using telecare, we should instead address two key questions. Firstly, is there any evidence of benefit in the specific application under consideration (whether related to quality of life, cost, or other outcomes)? Secondly, do we need evidence to justify the use of a certain telecare application? If so, what level of evidence should we seek?

When addressing these questions, it is vital that the range of different telecare applications is considered. The question "Does telecare work?" is as vague and unhelpful as asking "Do drugs work?" or "Does surgery work?" Any review of the evidence for drugs or surgery relies on clear parameters and definitions in relation to the specific intervention, the target population, and the indicators of success. A review of telecare evidence must do the same.

For many, the gold standard of empirical evidence is the systematic review. To better understand the evidence for telecare and associated applications, a Cochrane review of smart home technologies was published in 2009.[18] This review looked for quantitative studies that explored the impact of interventions such as environmental sensors, personal telecare alarms, and automated home environments. However, despite a robust and comprehensive search strategy, no studies were found that met the inclusion criteria. The review was therefore unable to support or refute the use of telecare-type technologies, but did advocate further research.

The Cochrane review only encompassed research published up to 2007, and 7 years is a long time in telecare. Indeed, there have been some useful additions to the evidence base in subsequent years. One of the best-known, large-scale explorations of the effectiveness of telecare applications

was the Whole System Demonstrator (WSD) project, which recruited almost 6,000 participants into a cluster randomized controlled trial across three regions in England. Whereas over 3,230 were recruited into the study of the effectiveness of telemonitoring (the remote monitoring and triage of vital signs and symptoms),[19] 2,600 took part in the telecare element, with participants in the intervention group receiving a range of telecare devices (including emergency response and falls detection pendant alarms and environmental detectors) depending on assessed need.[20]

There was some suggestion that telecare could limit the decline in mental quality of life and depressive symptoms over time.[21] However, there was no impact of telecare applications on the use of health or social care services by participants over the period of the trial.[20] In addition, an examination of the cost-effectiveness within the WSD generated a cost per additional quality-adjusted life year of £297,000, thus concluding that telecare could not be considered a cost-effective intervention.[22]

There have also been studies focusing on the use of telecare within communal settings. Brownsell et al carried out a small (n=52) randomized controlled trial of second-generation and third-generation telecare applications (eg, falls detectors, epilepsy bed monitors, movement detectors) in a sheltered housing environment. The findings were mixed: the telecare systems did detect some potentially dangerous incidents, but generated four times as many inappropriate alerts. Users of telecare did not report any reduction in their fear of falling, but there was a positive impact in relation to aspects of social functioning and on feelings of safety and security.[3] Both studies described above were methodologically robust, but suffered from the same flaw of treating a diverse range of telecare applications as a single intervention. The studies therefore try to apply an empirical approach, without the fundamental principle of testing a specific intervention in a specific target population.

This brief foray into the evidence base for telecare gives us little definitive proof of benefit, a conclusion reached by others before us.[23] Our second question related to the evidence, was whether we even need proof that telecare applications are clinically, financially, or organizationally beneficial. We would argue that the clinical risk of telecare interventions are not of the same magnitude, and therefore do not require the same evidence base, as clinical interventions such as new drugs or surgical techniques. Equally, in comparison with many new medical innovations and developments, the financial risks are much lower, with the potential benefits (in terms of reduced reliance

on care institutions) high in comparison. In addition, the non-telecare services which they may replace are typically poorly defined and understood, and so analysis of the telecare service cannot answer questions regarding whether it is superior to the non-telecare service. With the risks low, the potential benefits high, and comparison problematic, we would argue that there is no necessity for high-level primary research into telecare interventions. Rather than randomized controlled trials, we would advocate pragmatic, prospective evaluations of specific aspects of a service, with a primary focus on user experience, coupled with improved routine collection and dissemination of quantitative data of service performance. These will not prove that telecare interventions reduce costs, but will identify whether or not new services seem to be doing what they are supposed to do, and whether the existing service (telecare or not) would benefit from improvement.

Research into telecare applications will not stop, and questions about effectiveness will not go away. However, we would argue that it is important to stop attempting to apply the traditional medical research model to a fast developing, complex, social care intervention.

User perspectives on telecare

Technology offers great things to individuals and providers of care services. Greater independence, enhanced safety, and reduced reliance on institutional care settings are all potential benefits of telecare applications. Users of telecare have reported feelings of empowerment and connectedness to professional caregivers.[24,25] However, the use of technology to support independence and enhance quality of life can be an uncomfortable concept for some. Social care, for some people, is predicated on face-to-face provision of personal support, so a move toward technology-mediated care may cause anxiety.[26]

A study of barriers to participation in the WSD trial identified that some users were concerned about their ability to operate technology, the association of technology with being "dependent", and concerns regarding replacement of face-to-face care with telecare.[27] Feelings of discomfort can be exacerbated when the adoption of telecare applications is perceived as being forced upon reluctant, vulnerable people. Mort et al suggested that telecare could potentially become coercive, closing options for older people, enhancing isolation, and increasing dependence.[16] Users (or potential nonusers) of telecare also cite concerns regarding the perception of surveillance, or the role that telecare may play in disrupting their lives or the lives of those around them.[25]

For some, this discomfort is exacerbated by a perception that the wider adoption of telecare services is being influenced to too great an extent by technology suppliers. Whereas the use of technological devices in health care (eg, pacemakers, implantable defibrillators) is usually led by clinical evidence and best practice guidelines, telecare uptake seems sometimes more dependent on cost of service than proof of benefit, an issue that is probably symptomatic of the challenges associated with developing a clearer evidence base.

The wide range of specific telecare applications discussed earlier also impacts on user experience. Although it may increase complexity, the range of devices and services available means that a bespoke set of applications can be put in place to match the precise needs of users. By doing so, the experience of users can be enhanced, benefits can be optimized, and uptake can be increased.

Wider adoption of telecare relies on positive user experience. The challenge for commissioners, providers, and technology suppliers is therefore to ensure that the design and deployment of telecare services is based upon the needs of individuals.

Ethical issues

Of all the issues associated with telecare, ethics are the most complex. Concerns regarding the ethics of telecare may provide a powerful barrier to adoption at a national, organizational, and individual level. Again, care must be taken not to treat telecare as a single intervention when considering ethics: the issues associated with a smoke alarm are very different to those related to location tracking. However, regardless of the type of application, the ethical issues associated must be understood, both in terms of supporting and suppressing wider use.

An approach to ethics commonly used in health and social care is that of Beauchamp and Childress,[28] which has four principles

- respect for autonomy, allowing people to make independent choices;
- beneficence, acting in a way that benefits others;
- nonmaleficence, the principle of doing no harm;
- justice, ensuring fairness in care (eg, making sure that people have the same access to services).

The links between these ethical principles and telecare applications are complex. Even taking a single, clearly defined telecare intervention will open up a wide-ranging and often emotive ethical debate. For example, telecare could raise a number of issues related to competing liberties and autonomy.[29] If a person is given a location device,

does it impinge on their autonomy to increase surveillance and intervene if they walk to an area that they should not? Does it increase their autonomy by giving them more freedom to walk, now that it can be done safely and with oversight? Again, these questions should not be addressed in isolation and instead considered alongside the other viable options. Location devices may be considered excessive to some, but others may consider it a far more attractive option than restricting the person's movement to within a secure facility.

Some specific issues associated with the ethics of telecare adoption and implementation are more straightforward, but equally challenging. Harm may come to users, not just through restriction of autonomy or removal of other services, but also through invasion of privacy. Providers of telecare services need to ensure that data protection is upheld, security and governance processes are in place, and user details cannot be accessed by unauthorized parties.

User involvement in the decision-making process can be of tremendous benefit, and ethical questions are made far more complex if telecare users are deemed to lack the capacity to make informed decisions regarding their own care.[29] In these cases, it is crucial that providers of telecare are aware of the Mental Capacity Act and how it impacts on all elements of telecare provision.[30] The nature of ethics means that there are few straightforward answers. However, providers of telecare must be aware of the ethical issues associated with different applications and understand how to address these. Where guidance exists, such as that provided by the Social Care Institute for Excellence,[31] it should be incorporated into service development.

Organizational issues and costs

For a provider of social care services, telecare offers a wealth of opportunities, and in a period of austerity, with an aging population and increasing demand on social care services, the potential financial benefits of telecare are understandably attractive. However, it is important in the light of recent findings from the WSD that telecare not be seen as a panacea for addressing health and social care cost pressures.[22]

We have already addressed the capability of remote care services to support individuals in their own homes. This capability, in turn, creates the potential to reduce pressures on residential home capacity and so provide substantial return on investment. As an example, an evaluation of the National Telecare Development Programme, the large-scale implementation of telecare in Scotland, suggested that, in 2007–2008, the program was associated with a reduction of

over 500 care home admissions and almost 62,000 residential and nursing home bed days.[32]

Results such as this are impressive and provide a clear driver for further telecare deployment. However, they also raise substantial organizational issues in terms of how to exploit the benefits. Although reducing admissions may relieve pressure on oversubscribed care home services, it may not actually result in the release of "real" cash savings. The only mechanism by which the investment in telecare can truly be offset (and more) by the benefits is reducing the care home bed base. Although this may deliver cash savings, it reintroduces capacity pressures and carries with it the organizational challenges associated with decommissioning direct care services.

The issue of decommissioning to deliver savings also illustrates further the challenges of trying to evaluate the benefits of telecare. A research-driven approach would not risk the simultaneous decommissioning of aspects of existing services alongside the commissioning of new telecare-enabled services, raising the potential to increase rather than reduce costs (as there will be an extended period during which both services require support). Further, the service change approach of aligning decommissioning of the old against commissioning of the new raises the criticism that reductions in apparent costs or other desirable outcomes may stem from reduction in capacity of the original service, not from successful implementation of the new telecare-enabled service.

Longer term, the organizational benefits of telecare go beyond finance and capacity. When used thoughtfully, and in partnership with telehealth applications, telecare offers the opportunity to integrate care for people with health and social care needs.[26] Technology can provide the vehicle for joined-up delivery of care, seamless care pathways, and organizational collaboration, even in a UK context of complex reimbursement models and fragmentation of care provision. While this goal remains a desirable and achievable one, the comparatively slow pace at which it is occurring within the UK suggests that it may be challenging. Even in the controlled, managed environment of a research study, those localities that expanded telecare and telehealth as part of the WSD did so without seeing any great progress in the integration of care services.[33]

This gap between the anticipated organizational impact of telecare adoption and the actual benefits for care providers acts as a powerful brake on increased uptake and mainstreaming of services. It is therefore important that commissioners of remote care technologies in social care avoid overoptimistic,

short-term business planning and recognize that the benefits of telecare may only become apparent in the longer term.[23]

The cost of telecare application provide an exemplar of an issue that both drives and hinders wider adoption. In relative terms, compared, for example, with institutional care, some applications of telecare (such as emergency response systems) can be considered relatively low cost. As such, even a small benefit in terms of postponing or averting admission to residential care can provide a return on investment.

This potentially large yield from a relatively small outlay is a source of great attraction to some care providers and has underpinned the relatively widespread adoption of telecare. However, beyond simple, first-generation telecare applications, the picture becomes more complex. More sophisticated systems come at a higher price, so the potential return on investment is less and the overall risk greater. The separate reimbursement models for social care and health care also mean that the responsibilities for paying for those applications that sit in the "gray area" between telecare and telehealth are unclear. For example, if a telecare application is designed to provide early detection of falls, which may shorten stay in hospital and improve clinical outcomes, then should this be paid for by social care or health care? The wider adoption of telecare is potentially hindered by this mismatch between who makes the outlay and who reaps the benefits.

The relatively low cost of the technology, and the established use of means testing within the UK for social care (but not for health care) also means that telecare, unlike telehealth, is often paid for, at least in part, by users of the service. Often, the service is paid for by users via a statutory body provider, thereby offering a quasi-consumer model. This can act as both a driver of adoption (through allowing care providers to expand telecare deployments at lower cost to the public purse) and a limiting factor (with users potentially reluctant to pay for services themselves).

Interestingly, one recent attempt to introduce a pure business-to-consumer model of telecare provision in the UK was abandoned after only a few months, suggesting that the consumer population may not yet be ready for such a development.[34] However, a "middle ground" between direct business-to-consumer models and current models might be the growth of personal care and health budgets. These offer consumers of care services the opportunity and means to procure a bespoke range of services best suited to their particular needs.[35]

The opportunities for telecare to feature as part of the service procured by users of social care are obvious (as are the potential links to personal health budgets).

However, moving the emphasis for procurement from the statutory bodies to the user requires consideration of key issues through a new lens, ie, users will need to understand the scope and range of telecare applications, the evidence of benefit, and the challenges of implementation. The role of providers in a new world of consumer-led telecare procurement becomes one of information giving, advocacy, and brokerage.

Conclusion

Telecare offers providers and consumers of social care a wealth of opportunity. Different applications may support independent living, enhance safety, reduce reliance on statutory care settings, improve quality of life, and reduce costs. This promise, coupled with ring-fenced funding initiatives, has led to telecare services gaining a substantial foothold in the social care environment within the UK.

Awareness of telecare services needs to improve. At a high level, there needs to be an evolution of the taxonomy of remote care services, to provide clarity on scope and range. There needs to be an active and ongoing approach to stakeholder engagement, including users and carers. There also needs to be a strategic approach to workforce development, ensuring that the practitioners of today and tomorrow are aware of the toolkit of services available to them. Finally, overall public awareness needs to increase so that bottom-up user demand complements top-down policy push.

We need a re-evaluation of the evidence base to understand which applications work, in which specific contexts, and for which target populations.[17] We also require a discussion of what level of evidence is feasible and necessary for different interventions.

While innovations in telecare continue to evolve to provide new and potentially more cost-effective ways of service delivery, telecare itself will not be the "disruptive innovation" that will ultimately stimulate fundamental changes to the way care is delivered unless strategies for more fundamental root and branch reforms to care systems are undertaken. For example, following an examination of 31 telehealth and telecare initiatives across eight European countries, researchers concluded that strategies to stimulate adoption (typically financial reimbursements and incentives) have proven to be questionable investments because roll-out of telecare could not be achieved without the more fundamental alignment of health and social care delivery and funding.[36] Advances in technological developments significantly outpace the ability of care systems to reform themselves in a way that can provide the enabling platform necessary for wider deployment of telecare. So while in the UK and Europe the advancement of ICT-based solutions to better care management are a strategic priority, the legacy of complex care systems provide more fundamental legal, governance, funding, and organizational barriers to progress.

Commissioners and providers of telecare services need to understand the challenges of implementation and how these can be addressed. They need to understand the importance of addressing user concerns and ethical issues associated with telecare, and need to explore different funding and reimbursement models to expand the development of user-led services.

The first 14 years of the 21st century have seen a technological revolution of staggering pace and breadth. Telecare has struggled to keep up in terms of uptake and development, and it is time to press the accelerator.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Barrett D. Effectiveness of a telehealth and telecare learning resource within an undergraduate nursing curriculum. *Journal of the International Society of Telemedicine and eHealth*. 2013;1(1):12–18.
2. Brownsell S, Bradley D. *Assistive Technology and Telecare: Forging Solutions for Independent Living*. Cambridge, UK: Policy Press; 2003.
3. Brownsell S, Blackburn S, Hawley MS. An evaluation of second and third generation telecare services in older people's housing. *J Telemed Telecare*. 2008;14(1):8–12.
4. Clark M, Goodwin N. *Sustaining Innovation in Telehealth and Telecare*. London, UK: The King's Fund; 2010.
5. Barrett D. Applying Telecare and Telehealth in Communal Settings (ATTICS): Summary report. 2012. Available from: http://www2.hull.ac.uk/administration/business/centrefortelehealth/evaluations.aspx. Accessed July 8, 2014.
6. Emerson E, Hatton C, Robertson J, et al. *People with Learning Disabilities in England 2011*. Learning Disabilities Observatory. 2012. Available from: http://www.improvinghealthandlives.org.uk/publications/1063/People_with_Learning_Disabilities_in_England_2011. Accessed July 10, 2014
7. AgeUK.org.uk. Later life in the United Kingdom: June 2014. Available from: http://www.ageuk.org.uk/Documents/EN-GB/Factsheets/Later_Life_UK_factsheet.pdf?dtrk=true. Accessed July 8, 2014.
8. Office of National Statistics. UK population projected to hit 70m by 2027. 2011. Available from: http://www.ons.gov.uk/ons/dcp29904_240697.pdf. Accessed July 8, 2014.
9. Rogers A, Kirk S, Gately C, May CR, Finch T. Established users and the making of telecare work in long term condition management: implications for health policy. *Soc Sci Med*. 2011;72(7):1077–1084.
10. Barlow J, Bayer S, Curry R. Implementing complex innovations in fluid multi-stakeholder environments: experiences of 'telecare'. *Technovation*. 2006;26(3):396–406.
11. Turner KJ, McGee-Lennon MR. Advances in telecare over the past 10 years. *Smart Homecare Technology and Telehealth*. 2013;13(1): 21–24.
12. Department of Health. A concordat between the Department of Health and the Telehealth and Telecare industry. 2012. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/216757/Concordat-3-million-lives.pdf. Accessed July 8, 2014.

13. Joint Improvement Team. *Seizing the Opportunity: Telecare Strategy 2008–2010*. Edinburgh, UK: Scottish Government; 2008.

14. Barlow J, Bayer S, Curry R, Hendy J, Wheelock A. Telecare Capital Grant in Wales: Evaluation of TCG implementation. 2010. Available from: http://www.ssiacymru.org.uk/home.php?page_id=2038. Accessed July 8, 2014.

15. Department of Health, Older People and Disability Division. *Building Telecare in England*. London, UK: Department of Health; 2005.

16. Mort M, Roberts C, Callen B. Ageing with telecare: care or coercion in austerity? *Sociol Health Illn*. 2012;35(6):799–812.

17. Parker SG, Hawley MS. Telecare for an aging population? *Age Ageing*. 2013;42(4):424–425.

18. Martin S, Kelly G, Kernohan WG, McCreight B, Nugent C. Smart home technologies for health and social care support. *Cochrane Database Syst Rev*. 2008;4:CD006412.

19. Steventon A, Bardsley M, Billings J, et al. Effect of telehealth on use of secondary care and mortality: findings from the Whole System Demonstrator cluster randomised trial. *BMJ*. 2012;344:e3874.

20. Steventon A, Bardsley M, Billings J, et al. Effect of telecare on use of health and social care services: findings from the Whole Systems Demonstrator cluster randomised trial. *Age Ageing*. 2013;42(4):501–508.

21. Hirani SP, Beynon M, Cartwright M, et al. The effect of telecare on the quality of life and psychological well-being of elderly recipients of social care over a 12-month period: the Whole System Demonstrator cluster randomised controlled trial. *Age Ageing*. 2014;43(3):334–341.

22. Henderson C, Knapp M, Fernandez JL, et al. Cost-effectiveness of telecare for people with social care needs: the Whole Systems Demonstrator cluster randomised trial. *Age Ageing*. June 20, 2014. [Epub ahead of print.]

23. Bayer S, Barlow J, Curry R. Assessing the impact of a care innovation: telecare. *System Dynamics Review*. 2007;23(1):61–80.

24. Milligan C, Roberts C, Mort M. Telecare and older people: who cares where? *Soc Sci Med*. 2011;72(3):347–354.

25. Greenhalgh T, Wherton J, Sugarhood P, Hinder S, Proctor R, Stones R. What matters to older people with assisted living needs? A phenomenological analysis of the use and non-use of telehealth and telecare. *Soc Sci Med*. 2013;93:86–94.

26. Goodwin N. The state of telehealth and telecare in the UK: prospects for integrated care. *Journal of Integrated Care*. 2010;18(6):3–10.

27. Sanders C, Rogers A, Bowen R, et al. Exploring barriers to participation and adoption of telehealth and telecare within the Whole System Demonstrator trial: a qualitative study. *BMC Health Serv Res*. 2012;12:220.

28. Beauchamp TL, Childress JF. *Principles of Biomedical Ethics*. 5th ed. Oxford, UK: Oxford University Press; 2001.

29. Sethi R, Bagga G, Carpenter D, Azzi D, Khusainov R. Telecare: legal, ethical and socioeconomic factors. 2012. Available from: http://eprints.port.ac.uk/8336/1/Sethi_et_al_Telecare-Legal_Ethical_and_Socioeconomic_Factors_IASTED_2012.pdf. Accessed July 10, 2014.

30. Department for Constitutional Affairs. Mental Capacity Act 2005 Code of Practice. London, UK: TSO (The Stationery Office); 2007. Available from: http://www3.imperial.ac.uk/pls/portallive/docs/1/51771696.PDF. Accessed September 14, 2014.

31. Francis J, Holmes P. *Report 30: Ethical Issues in the Use of Telecare*. London, UK: Social Care Institute for Excellence; 2010.

32. Beale S, Sanderson D, Kruger J. *Evaluation of the Telecare Development Programme: Final Report*. York, UK: York Health Economics Consortium; 2009.

33. Hendy J, Chrysanthaki T, Barlow J, et al. An organisational analysis of the implementation of telecare and telehealth: the whole systems demonstrator. *BMC Health Serv Res*. 2013;12:403.

34. Lowe C. O2 to stop selling telecare and telehealth in the UK. 2013. Available from: http://telecareaware.com/o2-to-stop-selling-telecare-telehealth-in-the-uk/. Accessed July 10, 2014.

35. Carr S. The Implementation of Individual Budget Schemes in Adult Social Care. London, UK: Social Care Institute for Excellence; 2009.

36. Lluch M. Incentives for telehealthcare deployment that supports integrated care: a comparative analysis across eight European countries. *Int J Integr Care*. 2013;13:e042.