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How can telehealth help in the provision of integrated care?

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How can telehealth help in the provision of integrated care?

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Key messages

- Demographic change, rising incidence of chronic disease and unmet needs for more personalised care are trends that demand a new, integrated approach to health and social care. Professionals must work across sectors as a team with common goals and resources to deliver a coordinated response to each individual's care requirements. Advanced information and communications technology (ICT) provides a major new opportunity to realise care integration, superseding today's chain of disjoint responses to discrete threats to health.
- Telehealth, the provision of care at a distance, is a key component in future integrated care. Today's segregated telehealth applications still require linking into more comprehensive eHealth strategies, in which clinical pathways and service delivery processes are fully coordinated and patient data safely shared. An increasingly solid evidence base is emerging indicating that telehealth can be used effectively to respond to the growing call for improved care, in particular for those with chronic conditions. Mainstreaming remains a challenge; market forces alone are likely to remain insufficient.
- Making the case for investment in telehealth applications requires better marshalling of existing evidence, not only to show that telehealth works, but also to show where – in what organisational context – it will work. Evidence from large-scale pilots and the few mainstream implementations requires careful synthesis, taking particular account not only of clinical dimensions but also of indicators relating to successful deployment in normal care: change management, human resources, organisational interfaces, financing requirements, technology integration and ethics for everyday practice.
- Financial flows in health systems must be critically assessed for their ability to act as incentives or disincentives for telehealth provision, acknowledging that the "business case" for telehealth is often very different for different players. Medico-legal and regulatory regimes can also pose critical barriers to the exploitation of telehealth. The various regimes should be compared to identify best practice and opportunities for regulatory and legislative reform, so as to facilitate better integrated care through the use of telehealth.
- The use of telehealth, as a tool to help support better integrated care, can be helped through initiatives that bring policy responsibilities together. This could include setting up financial and organisational vehicles (joint budgets, joint ventures) to support partnership across sectors.

- To bring about change, mechanisms should be put in place to foster dialogue, thereby instilling a sense of partnership in reform and reducing resistance to change. Process innovation driven by clear health policy priorities should precede telehealth design – technology on its own cannot be expected to deliver. Change management must fully engage all involved participants. Full attention to ethical issues should be mandatory and the usability and interoperability of today's ICT systems can, and should be, much improved.

Executive summary

The quest for more integrated care is not itself new, but new opportunities for effective realisation have emerged quite recently. In particular, the appropriate application of advanced ICT can make a major contribution towards achieving this goal.

Telehealth, the provision of care at a distance, is certain to be a key component in future ICT infrastructure for integrated care. It has already raised high hopes among policy makers with reagrd to its potential for delivering solutions for growing capacity problems. For integrated care, today's segregated telehealth applications still require linking into more comprehensive eHealth strategies, in which clinical pathways and service delivery processes are fully coordinated and patient data safely shared.

Although few instances of routine application have yet emerged in Europe or elsewhere – in contrast with an enormous breadth of research activities – an increasingly solid evidence base is emerging indicating that telehealth can be used effectively to help support better integrated care, in particular for those with long-term chronic conditions.

Policy options

Generating and using evidence of the benefits and cost–effectiveness of telehealth

Making the case for investment in telehealth applications, as one aspect of the ICT infrastructure, requires better marshalling of existing evidence, not only to show that telehealth works, but also to show where – in what organisational context – it will work. Evidence from large-scale pilots – and from such mainstream implementations as there are – requires careful synthesis, taking particular account not only of clinical dimensions but also of indicators relating to successful deployment in normal care: change management, human resources, organisational interfaces, financing requirements, technology integration and ethics for everyday practice.

A comprehensive approach to its socioeconomic impact is of particular importance in further telehealth evaluation; the human and infrastructure costs accruing to health, as well as to social care systems and other services, should be taken into account. Modelling can be used to assess the long-term benefits and costs, and help identify the level of effectiveness a telehealth investment has to achieve to be considered worthwhile.

Analysing governance frameworks and institutional arrangements to facilitate the implementation of efficient telehealth solutions

Financial flows in health and welfare systems must be critically assessed as to whether they act as an incentive or disincentive for telehealth provision: the "business case" for telehealth is often very different for different players in the health care system and beyond.

Medico-legal and regulatory regimes can pose critical barriers to exploitation of telehealth. In many jurisdictions, the regulatory framework is not well adapted to the specific characteristics of these new services. The various regimes should be compared to identify best practice and opportunities for regulatory and legislative reform, widening achievement in optimal societal outcomes with the support of telehealth.

Establishing mechanisms to support better collaboration across sectors

The majority of mainstreamed services are still firmly located in either the health or social care sectors. One policy imperative to support the use of telehealth as a tool to help facilitate better integrated care is to bring these policy responsibilities closer together. This could include setting up financial and organisational vehicles (joint budgets, joint ventures) to support partnership across sectors.

Identifying alternative ways of bringing about change

Establish mechanisms for awareness raising, dialogue and exchange of information between stakeholders

Professional cultures and resistance to change, as well as lack of organisational capacity and willingness to innovate, are key barriers that need to be addressed. One approach that can help reduce resistance to change and break down barriers between different stakeholder groups is to set up mechanisms that allow for genuine iterative dialogue on potential innovation and reform. If stakeholders are involved in discussion on reform, they are more likely to have a sense of ownership over the outcomes of this process, which in turn can help to facilitate the adoption and acceptance of new structures, including telehealth solutions.

Pursue process-led innovation

Policy development and its transformation into strategy must, in order to succeed, start with a strong focus on improving, streamlining and integrating service delivery processes. Many existing processes are inconsistent, convoluted and not coordinated sufficiently to continue to deliver when a telehealth

solution is introduced in an attempt to support a process. Delivery processes need to be examined, particularly where they cross different organisational and management boundaries. This will require redesign and clear specification of these interfaces. Health technology innovations like telehealth approaches must follow, support, and offer opportunities for, such process innovations – but not be seen as the driving force.

Pursue a multidimensional approach towards change management

The systemic nature of ICT-enabled support for integrated care – being both a technology and a process innovation – puts considerable demands on the capacity of organisations and professionals to adapt to new requirements. Changing organisational structures and culture, work processes or behaviour are among the most difficult tasks to accomplish in making any improvement to health and social care service delivery. Measures to help promote and enable active change management at all system levels can help facilitate better implementation of telehealth solutions. This approach requires the highest level of leadership support, and should be guided and promoted by health-care and social-care professionals. It also requires sufficient financial resources over an extended period of time. Investments that have to be made in technology, staff and support costs to achieve change and render it sustainable may outweigh narrow cash savings achievable from reduced hospital long-term admissions or more-efficient work flows, particularly in the shorter term. Substantial additional investments may be required up front before ICT-enabled service innovation can actually "pay off".

Pay full attention to ethics

It is also important to be very mindful of ethical issues that can arise out of the use of telehealth. If ethical issues are not dealt with satisfactorily then the willingness of the public and professionals to make use of these technologies will be curtailed. At the "macro ethical level", overall policy has to address how ICT-based services may impact on equality of access and the quality of care, or how adjusted incentive systems impact on the availability of beneficial services. Related ethical issues concern patient selection, like the possible emergence of "creaming and dumping", privacy as regards access to medical records by non-medical personnel, e.g. in call centres, or quality and safety issues, especially in transitional phases where patients move from an institutional setting to home. There are also ethical issues concerning transparency and informed consent, proportionality and purposefulness, privacy and dignity, as well as open information and surveillance of data management.

Improve the usability and interoperability of technology

Effective implementation will be aided by consideration of the interoperability of ICT systems and devices across the care continuum. Only if the technical, as well as semantic, interoperability of all disparate ICT solutions that may be involved in supporting continuity of care is assured, can the full benefits of integrated care information systems in general, and telehealth in particular, come within reach.

Policy brief

Health policy context and current use of telehealth

Telehealth – the use of ICT applications to provide health and long-term care services over a distance – is often proposed as solution to mitigate the considerable strain facing European health care systems. Policy-makers are challenged by insufficient human and capital capacities to meet demand for services, and by the need to prioritise within finite budgets.

Health policy context

Before looking specifically at the role of telehealth, it is important to assess core drivers of demand for health and social care services and to situate this particular ICT application domain within the wider concept of eHealth, because this will have a critical impact on the ways in which telehealth may be prioritised and implemented across Europe.

Core drivers for health service demand

Demographic change is one key driver of change within the health system. Progress in medicine and health care technologies, an improved living environment (better hygiene, access to nutrition, housing, workplace), and a falling birth rate in many European countries have meant that the average age of populations is increasing and the proportion of older people growing. In the EU25 alone, the proportion of the population aged 65+ is projected to increase from 17% in 2007 to 21% by 2020 and 28% by 2040 *(1)*. Current projections also suggest that, across the Organisation for Economic Co-operation and Development (OECD), expenditures for long-term care alone are likely to increase from their current level at just over 1% of gross domestic product (GDP) to between 2% and 4% of GDP by 2050 *(2)*. Changes in family structures also may mean that in future the supply of informal care may become more limited. In Italy, for instance, the proportion of women living alone doubled to 40% between 1970 and 2000. These changes are not confined to southern Europe: similar rises have been observed in the United Kingdom (from 34% to 48%) and in the Netherlands (from 28% to 41%) *(3)*.

Coupled with an ageing of the population, there has also been a change in the burden of disease in high-income countries, with a shift away from communicable disease and acute life-threatening conditions to a situation where health care systems must contend with the management of a range of chronic diseases. Some of these diseases may be linked to the ageing of the population, most notably dementia and some cancers, whilst other conditions reflect our changing lifestyles (like increased levels of obesity and sedentary behaviours), e.g. diabetes and cardiovascular disease and are also increasing in younger age groups *(4)*.

Despite perceptions to the contrary, neither the ageing of the population, nor the rise in the incidence of some chronic diseases, is a principal driver of cost *(5,6)*. While long-term social care costs are undoubtedly increasing as populations age, it remains the case that the bulk of health care expenditure for any one individual is incurred during the last year of life, irrespective of the age of the person *(7–9)*. The bulk of the rapid cost growth has been driven by rising per capita incomes, the availability of promising but costly new medical technologies, workforce shortages that can drive up the unit costs of health care, and the asymmetric distribution of market power in health care (which greatly favours the supply side of the sector rather than the demand side).

We also have higher expectations for the health and social care services that we receive. More-educated and media-informed parts of the population are no longer individual passive recipients of health care services. Increasingly they act as consumers, demanding rapid and high-quality services tailored to their specific needs.

All of these factors, acting in concert, are rapidly increasing the pressure to change the way in which health care is delivered. There is a need to innovate and introduce a new model of service delivery to:

- implement increasingly complex health care processes and service the resulting need to standardise clinical pathways and radically improve productivity in order to contain rising costs
- provide an opportunity to both activate patients (because patient action is an unused resource) and empower them to have a greater say in health and social care.

This suggests an urgent need for care provided at the prime point of need, favouring services in the home or in the community whenever possible. It also points to a need for improved coordination, partnership working and integration in the delivery of health promotion, public health and social care services.

Much of this analysis is not a new insight *(10)*. However, the context has changed fundamentally. For the first time, the facilitating and enabling capacities of advanced ICT indeed allow us to respond to these requirements favourably. ICT applications, or eHealth, can enable patient data to be safely *shared*, clinical pathways and service delivery processes to be coordinated, knowledge to be generated from structured data, and results to be merged into an evolving standard of care provided jointly by our health and social care services.

Telehealth within the wider context of eHealth and integrated care

Telehealth can be understood as a specific domain of the more comprehensive concept of eHealth. eHealth encompasses all applications of ICT towards supporting and interconnecting health service processes and health system actors, both at the local level and remotely. Such applications range from infrastructural arrangements like regional health networks, electronic patient record systems and electronic prescribing to specialist applications such as teleradiology. Overarching health system priorities and respective eHealth strategies have a critical impact on ways in which telehealth applications may be prioritised and implemented in a given national/regional context. In this section, the supportive role of eHealth in developing integrated models of care is briefly discussed.

The World Health Organization (WHO) has defined health not as the mere absence of disease or infirmity but as a state of physical, mental, and social wellbeing *(11)*. Health care must be understood not as occasional care in acute situations where disease or trauma is clearly present, but as a more continuous and holistic service provided both in response to evident need and to avoid unanticipated acute responses and phases of costly treatment. Particularly when concerned with chronic disease management and long-term care needs, today's landscape, which often has discrete management and budgetary "silos" for health promotion and public health, acute health care, care for long-term conditions and social care services, must be tackled and the structures, processes and the systems which support them linked together.

Integrated care aims to realise such a new model of service delivery. It is an organisational principle encompassing continuity of care, shared care and seamless care. In integrated care, professionals from different organisations work together in a team-oriented way towards a shared goal, with shared resources to deliver, via an integrated service delivery process, all of a person's care requirements. This requires high-quality collaborative working relationships, clarity and commonality of objectives and care plans, frequent communication among team members, a clear understanding of, and respect for, individual roles and skills within the team, a transparent incentive structure and the general flexibility of practitioners *(12)*. By breaking down unnecessary boundaries between organisations' missions and resources, integrated care can:

- offer services responding to needs in a person-centred manner
- capitalise on the interdependence of health and social care outcomes
- facilitate the continuity of care for a wide range of vulnerable groups
- offer overall efficiency through better coordination of care *(13)*.

This, in turn, needs supportive infrastructural arrangements such as shared electronic patient records. It is indeed increasingly hard to imagine integrative initiatives without a strong care information management and ICT solution component *(13)*.

Box 1. ICT support for better integration of hospitals, primary care and social care services in Denmark: a bottom-up approach

The admission of any patient into a hospital automatically triggers a notification message to their respective local authority and relevant home care service. When the patient is discharged, again a message is automatically sent to the home care organisation so that all necessary services can resume following discharge. The individual's primary care doctor is informed by an electronic discharge letter, allowing him/her to coordinate health and social care services and develop an updated medication or rehabilitation plan. This has had a beneficial impact on productivity in the system, approximately equivalent to one person-day for each patient discharged from hospital *(14)*.

In practice, mechanisms for eHealth-supported service integration have been driven through patient-oriented events or top-down initiatives from a service funder or commissioner, such as central or local government. An example of the former can be seen in Denmark, where MedCom, a cooperative venture between the national government, local authorities and private firms linked to the Danish health care sector, set out to overcome communication problems between hospitals, primary care doctors, social care services and other health service providers through the use of a messaging system *(14)* (Box 1). An example of the latter is the Andalucian Autonomous Community in Spain, where Diraya, an electronic health record and ePrescribing system, is in operation (Box 2) *(15)*.

As illustrated by these examples, there is already some progress towards a new generation of integrated care information systems which have the potential to revolutionise the application of ICT to health and social care delivery in the longer term. At the same time, there have been numerous experiments using telehealth solutions. This suggests a need for a better integration of such solutions within a wider health policy perspective and comprehensive eHealth strategy. It seems plausible that only then will telehealth unfold its full potential.

How can telehealth services support the provision of integrated care?

Telehealth services could potentially help health systems cope better with the growing demands arising from ageing populations, the need for chronic disease management, and ever-increasing consumer expectations. Its potential is increasingly recognised in health policy in Europe *(16–18)*.

Box 2. ICT support for better integration of health care services: a single electronic health record system (Diraya) in Andalucia illustrates a top-down approach

Diraya supports continuity of care in a region of over eight million inhabitants. It involves a single regional electronic health record system shared by all health care providers, including pharmacies and hospitals. This critical initiative, which began in 1999, has been centralising more than 1000 databases, specifying homogeneous data and organising their structures. Each individual's health information from primary health care, pharmacies, specialised outpatient health care and hospital emergency care is integrated within this health record system. It can be accessed by authorised health professionals, as appropriate, at any time and in any location in Andalucia where the individual in question needs health care. It is used by 94% of all primary health care professionals, while 75% of accident and emergency episodes rely on it. The initiative has been associated with a 15% reduction in visits to primary care practitioners by those patients receiving an electronic prescription for an episode of care or chronic condition that can be filled out several times within a twelve-month period. Non-attendance at outpatient appointments was also decreased by 10% with a similar reduction in costs resulting from the use of a single centralised database replacing a range of local databases *(15)*.

However, to date, telehealth services have tended to be used for discrete purposes rather than being seen as part of the solution for better integrated care *(19)*. They have been used to support relationships and enhance dialogue between different health or social care providers and more recently between this group and members of the general public. Most often, however, such interventions have been used to support the relationship between health or social care providers and specific clients (see Box 3). Interventions include personal health systems, which provide support for the provision of continuous, quality controlled and personalised health services to individuals regardless of their location *(20)*. Common applications include telephonic services, use of home telemonitoring devices, tele-consultations and mobile services, including text messaging for appointment reminders and medication alerts. It also includes telecare systems, supporting urgent information flows from the home, which autonomously detect the need for further intervention.

Given this functionality of telehealth, in particular its facilitation of the extension of health and long-term care provision outside hospitals and in individuals' homes (home telehealth and telecare), it may become an essential component within future integrated care information systems. We now examine the current evidence base on the benefits and effectiveness of

Box 3. Example of a telehealth network connecting patients and providers in Lombardy, Italy

The Health Telematic Network in Lombardy, Italy, provides high-quality specialised telecardiology services to patients with complex conditions: chronic heart disease, those waiting for heart transplants or other types of cardiac surgery, and those who need multidisciplinary care management at home. Patients' electrocardiogram data are transferred to a call centre and monitored by nurses who may pass on the data to a team of cardiologists throughout Lombardy. The network has improved cardiology services and facilitated better use of resources, through the more rapid integration of second opinions for primary care doctors, the use of home telenursing and call-centre services for hospitals. Benefits for patients and carers include: a 35% reduction in hospital inpatient admissions, 12% fewer outpatient visits for hospital care that is no longer needed, a reduction of 15 days in waiting times for the beginning or modification of therapy for 14% of patients and reduced travel time and out-of-pocket costs for patients and their family carers *(21)*.

telehealth, highlight some practical experiences and later put forward different policy options that might be used to help facilitate its greater use to support integrated care across Europe.

Current use of telehealth

What do we know about the use of telehealth in routine care?

We have noted that there is an expectation that ICT-enabled solutions can help effectively support integrated care for all people, old and young, particularly those with long-term chronic conditions. But is there sufficient evidence to support such claims and to guide policy development? To better understand policy options and develop appropriate recommendations, this section briefly summarises the available evidence on the current levels of adoption and impacts observed.

In general, while we can point to a growing body of evidence indicating the beneficial impact of telehealth on care provision in specific contexts *(22)*, this evidence base is almost exclusively reliant on isolated experimental pilot implementations. To date, "implementation has often been characterised by a failure of pilot projects to develop into sustainable services" *(23)*. Ideally, for evidence-informed policy we require information on the impact of telehealth within the context of regular care provision, i.e. in day-to-day mainstream or routine care.

How widely has it been adopted to date?

The level of mainstreaming of telehealth, i.e. its inclusion within the standard repertoire of health and social care services, remains generally low across Europe *(24)*. Relatively few examples of mainstream implementation can be found today. Moreover, what is available varies widely in scale and scope. In many cases these are quite localised initiatives involving just one provider or cluster of local providers. The majority of telehealth applications in Europe that are embedded in mainstream services today focus on support for chronic disease management (Box 4). There is also some activity in relation to early discharge from hospital (hospital-at-home).

In the United States, home telehealth or at least telemonitoring has established something of a beachhead in the domestic home care industry. About 17% of home care agencies, responding to the 2007 survey of the National Association of Home Care and Hospices, reported using some form of telehealth *(25)*. The average number of telemonitoring sets used per home care organisation has remained low, with ten to twenty-five units being the most common response even among the largest home care organisations.

Box 4. Telehealth as an aid to chronic disease management in Germany

In Germany, after successful piloting, a health insurance fund (TAUNUS BKK) mainstreamed home telehealth within dedicated disease management programmes from 2007. One initiative uses telehealth alongside a diabetes management and decision support system. Another targets patients at risk of heart failure. Depending on the respective medical indication, vital parameters such as blood sugar, body weight, blood pressure and an electrocardiogram may be monitored with the help of a home care unit. All data captured are automatically fed into a personal health record. Specialist staff are automatically alerted when predefined threshold values are exceeded. Moreover, patients receive advice in relation to nutrition, exercise and pharmacotherapy *(26)*.

Though telehealth is not in widespread use in a clinical context across Europe, push-button alarms, to aid in the risk management of long-term chronic conditions – "first generation" telecare – are more widely available in many countries *(24)*. In England, "second generation" telecare is now also being more widely implemented. This involves the provision of additional sensors in the home to enhance safety and enable timely intervention, not only when triggered by a pressed alarm button, but upon automatic detection of a number of types of threat to personal health.

Other developments include the use of new media, particularly videotelephony, in countries including Germany, the Netherlands and Sweden, to facilitate higher quality person-to-person communication between individuals at home and professional care staff. In some instances, telecare solutions have also been used to support family carers as part of mainstream service provision, as in the case of a service operating in two cities and four municipalities in Sweden (Box 5).

Box 5. The ACTION service for frail older people and their carers in Sweden

The ACTION telecare service includes the remote provision of dedicated information and training programmes in order to strengthen the self-management capabilities of older people and their families, thus enabling them to better cope with their situation. Family carers can receive on-demand support from local service centres. ICT-enabled networking and mutual exchange between service users is also facilitated. Qualitative research suggests that family carers feel safer and more competent in their role of caring, while older people and their relatives have found it easier to develop informal support networks.

What do we know about the benefits and effectiveness of telehealth?

The evidence base

The quality of the evidence base remains limited, despite the fact that one review reported that almost 9000 studies on telecare trials and pilot studies have been published *(22)*. This review, looking at the use of telecare by older people and individuals with long-term conditions, was able to identify 68 randomised controlled trials and a further 30 observational studies with 80 or more participants. Almost two-thirds of these studies took place in the United States. The authors concluded that the most effective telecare interventions, including those targeted at individuals with diabetes or heart disease, appeared to be automated vital signs monitoring (for reducing health service use) and telephone follow-up by nurses (for improving clinical indicators and reducing health service use). Very little information was available to assess the cost–effectiveness of interventions *(22)*.

Several other systematic reviews of rigorous randomised controlled trials and other well-designed observational studies on the effectiveness of these interventions have reached similar conclusions. One systematic review of telehealth, telecare and home monitoring was able to identify 138 papers covering 130 projects, of which 80% were randomised controlled trials. Evidence for effective interventions was found in the areas of diabetes, mental

health, high-risk pregnancy monitoring, heart failure and cardiac disease. Fewer than 20% of these studies, however, reported cost data *(27)*.

Another systematic review looked at the extent to which telemedicine could substitute for face-to-face medical diagnosis and treatment. Of the 106 studies included in the review, evidence of effect was mixed, with "several limited studies showing the benefits of home-based telemedicine interventions in chronic diseases". It also noted that telemedicine applications may be well suited for verbal communication and interactions in areas such as psychiatry *(28)*. However the authors concluded that there remained a need for more well-designed studies to clarify how best to use telecare services.

With reference to five studies involving physiological home monitoring, telephone visits, video visits and remote messaging, reductions in emergency admissions were reported by Litan for patients with heart diseases, lung diseases, diabetes and chronic wounds *(25)*. Depending on the patient's condition and the particular programme, the same review found that telehealth can increase or decrease physician visits. Such visits can be reactive as well as proactive, and early warnings initiated by home health monitoring may well increase the number of proactive visits.

In respect of a review of the application of telehealth to individuals with congestive heart failure, six of nine controlled studies reported a reduction of between 27% and 40% in overall hospital admissions. Three studies also indicated a significant reduction in the length of stay for those patients that were admitted *(29)*. Similar conclusions were drawn regarding the potential for reduction in hospitalisation and use of health care services in another recent review of 21 studies of home telemonitoring *(30)*.

Whitten and colleagues undertook a review specifically of economic evaluations of telemedicine interventions almost a decade ago *(31)*. The review identified 55 studies of telemedicine that captured cost data. Over 50% concluded that telemedicine saves money or time and money, whilst only 7% concluded that telemedicine does not save money. The authors noted, however, that the economic evidence tended to be derived from small-scale, short-term studies that were often characterised by poor design and inadequate technical quality. A later review of home telemonitoring interventions for four chronic conditions – diabetes, cardiovascular disease, pulmonary disease and hypertension – identified 65 suitable studies. While the interventions were broadly found to be effective and acceptable to patients, only 26% included any form of rudimentary cost analysis *(32)*.

In summary, while the evidence base remains mixed, a growing number of studies pointing to the effectiveness of different telehealth interventions in specific contexts and settings can be identified. Potentially, there may be

Box 6. Illustrative examples of the economic impact of telecare

The Scottish Telecare Development Programme

In Scotland, a country-wide Telecare Development Programme was put in place in 2006. Just over 7900 people were in receipt of telecare packages funded through the programme by March 2008. It was estimated in 2007/08 that costs avoided amounted to more than £11 million. These costs were averted for a number of reasons, including increased speed of discharge from hospital once clinical need was met, as well as reductions in unplanned hospital and care home admissions, nights of sleepover care purchased, home-check visits and waking night cover *(33)*.

The United States Veteran Health Administration Care Coordination Home Telehealth Programme

The Care Coordination Home Telehealth (CCHT) Programme of the Veteran Health Association (VHA) has been able to realise the potential for cost-savings/ cost-avoidance initially shown in pilot programmes that put the emphasis on patient self-management and the sharing of responsibility for care between the patient and formal caregiver. The VHA's financial decision support system captures CCHT workload and provides cost data, as well as routine clinical outcome reports. Reductions in hospital admissions (20%) and bed day occupancy (25%) have been recorded. The cost of CCHT averages $1600 per annum per person, and this has been compared with the $13 000 per annum for the VHA home-based primary care service and $77 000 per annum for private nursing-home care. Information on patient satisfaction with CCHT-based care is collected from patients every three months. Surveys in 2006 and 2007 reported a mean satisfaction score of 86% *(34)*.

considerable long-term health and economic benefits from greater investment in telehealth, although few examples of implementations covering larger numbers of clients under routine conditions have emerged to date (cf. Box 6). Therefore, pilot projects should be designed with evaluation in mind, and consideration given to the integration of telehealth applications within the care system *(35)*. As we have noted, much less information is available on the economic case for investing in such applications. Quantitative estimates of costs and realisable benefits relying upon extrapolations of outcomes of projects and trials need to be treated with great caution. One key issue, therefore, is to further strengthen the evidence base, both in terms of benefits and effectiveness within routine settings.

What are the key gaps in the evidence base?

As noted, current studies differ considerably in design, complexity of interventions, populations enrolled and allocation of responsibility for initiating management change and service integration. Many are of a limited length, often below one year, and typically only look at the experiences of a very small number of people. The innovative environments with motivated patients, in which many interventions are to be found, means that no attempt has been made to blind which individuals are making use of such interventions or account for other confounding factors. Only a comparatively small number of well-designed randomised controlled trials have been identified in literature reviews.

This limitation in the evidence base makes it a challenging task to judge which implementations may be successful under routine conditions in different contexts and settings across Europe. Many factors influence the outcomes of mainstream telehealth implementations, and there are likely to be substantial variations across countries. To better understand these factors, there is a need to undertake careful evaluation of telehealth solutions under routine conditions; this would be akin to so-called naturalistic evaluations of drugs and health care technologies that are now being conducted in a number of countries *(36)*. Such evaluations need to look at the impact of additional investment in telehealth services on health and social care systems in the round, and they cannot rely on quantitative study designs such as randomised controlled trials alone. Qualitative information, e.g. on the impacts on patient/carer experience, will need to be collated as well. They should also be strengthened by being tailored to identify evidence "that convinces different stakeholders across professional boundaries and different familial and organisational contexts" *(23)*.

It is also important in economic analysis, going forward, that a broad public sector approach is taken. In many European countries separate funding and budgetary arrangements for health and social care services prevail. It may be the case that one sector, e.g. health, is responsible for investing resources in establishing telehealth sources to support continuity of care across the health and social care system, but the majority of benefits and costs avoided may perhaps accrue to the social care sector. It is important to estimate both the global costs and benefits of telehealth solutions and their impacts on different budget holders over the short, medium and long term *(22)*.

Beyond this, studies using an approach known as dynamic impact modelling may be able to help strengthen this evidence base going forward; failing to take a longer term perspective may mean that important systemic factors which potentially act as barriers towards the full realisation of desired impacts remain unconsidered. A good example of this can be seen in England, where the

benefits of telehealth in terms of helping to reduce the need for institutional care are more difficult to see in the short term because of delays in reform elsewhere in the system *(37)*.

Policy options to help foster use of telehealth as a support to integrated care systems

Generating and using evidence on the benefits and cost–effectiveness of telehealth applications

Although instances of routine application have emerged in Europe and elsewhere, the mainstreaming of telehealth applications as a constituent element of integrated care remains a challenge. In spite of evidence of potential benefits, market forces alone are likely to fail to ensure full realisation of these socioeconomic benefits. Here we highlight some potential policy options to help foster the wider use of telehealth.

Synthesising evidence from large-scale pilots and mainstream implementations

Making the case for investment in telehealth applications requires a better marshalling of the existing evidence on what works, in what context and at what cost *(19)*. Analysis of context should document information on infrastructure, legal/ethical dimensions and business opportunities. Qualitative data on satisfaction of both service users and health/social care professionals is also important. Systematic reviewing techniques, which seek to systematically identify and appraise the medical, organisational and economic effectiveness (and other evidence) of the use of telehealth, may be a particularly useful way of gathering such data on the appropriateness of specific applications. Collating and, where feasible as the evidence base grows, statistically pooling information from several studies reduces the probability that one unrepresentative study would bias the results of any impact analysis. Information from existing high-quality reviews can provide policy-makers with a rapid source of evidence (and evidence gaps) on any particular application of telehealth, e.g. to provide remote support to people with psychiatric disorders.

In order to better inform decisions of relevant stakeholders, such consolidated data can then be critically assessed against a spectrum of deployment-related requirements, e.g. change management, human resources, organisational interfaces, financing requirements, technology integration and ethics for everyday practice. This would close an important gap in the current knowledge base. Impacts can be tailored to take account of differing health and social care contexts and consider how applications might have to be adapted to take account of these differences.

Strengthen what is known about the economic case for investing in telehealth

We have noted that the prevailing uncertainty and ambiguity about the role, added value and benefits of telehealth have limited the engagement of key stakeholders to date, especially service providers and funding organisations. A more convincing evidence base than has been hitherto available is urgently needed to inform decisions and activities of key stakeholders. Economic evaluation can help strengthen the case.

Widely used in the health and social care sectors, and the public sector in general, socioeconomic impact evaluation can be considered "the comparative analysis of alternative courses of action in terms of both their costs and consequences" *(38)*. It acknowledges that scarcity is an endemic feature of all societies and implies that investment in one specific public project will mean a lost opportunity to use these resources for another purpose. Even in the absence of long-term economic efficiency data, economic evaluation can use modelling techniques to assess the long-term costs and effects or benefits, and/or identify the level of effectiveness a strategy would have to achieve to be considered cost-effective.

If a new intervention is both less costly and more effective than the existing situation, then the decision is usually straightforward – invest in the new intervention. If an intervention is both more effective and more costly, then policy-makers must seek a socioeconomic cost–benefit assessment or make a value judgement as to whether it is worthwhile. The resources and infrastructure available influence this: telehealth solutions that may be deemed cost-effective or have cumulative net benefits in one country or in the context of one (regional) health system may not be thought so in another country with a different infrastructure and resources.

However, claims that it is worth investing in telehealth for immediate cash benefits are often misleading. The circumstances and opportunities under which this can be achieved are very context-dependent. Where they might occur, such benefits would be likely to materialise at an overall health and social care system level, and therefore may require a careful balancing of benefits and costs among all actors. It is more prudent to focus on telehealth investments as a key enabler of care quality improvements, better access to services and improvements in overall health and social care system efficiency. In some circumstances there may also be impacts on other public sector systems: e.g. telehealth might reduce the time burdens of family carers, allowing them to pursue other activities, including paid employment.

Any decision to invest in telehealth thus needs to involve consideration of the human and infrastructure costs associated with delivery, as well as the potential health and socioeconomic impacts on health, social care and other sectors as

appropriate. For instance, do the potential quality of life, equity of access or efficiency gains from reducing or delaying the need for consuming future health/social care resources and from reducing the external costs to economies, e.g. time out of normal roles, help justify investment in new telehealth applications? What additional non-health benefits, such as reduced isolation for those in ICT-enhanced networks, might be realised? Not all outcomes and impacts may be positive: careful consideration should also be given to determining whether there may also be any detrimental effects of investment in telehealth.

Analysing governance frameworks and institutional arrangements to help facilitate the implementation of efficient telehealth solutions

Successful implementation of telehealth solutions will also be influenced by governance arrangements and institutional structures. Governance refers to the rules, processes and behaviour that affect the way in which powers are exercised *(39)*. The logic and potential benefits of telehealth applications rely on integrated approaches to identifying and meeting well-defined needs; good professional governance is a key factor for success.

We have noted that budgetary and organisational barriers between health, social care and indeed other services, e.g. housing, may make it difficult to implement sustainable mainstream telehealth measures *(40,41)*. Moreover, within the health system in particular, a lack of structures and processes to support the continuity and integration of care between different stakeholders operating at different levels is an important limiting factor in the delivery of benefits from telehealth *(42)*. Public health, primary, secondary and long-term care may be governed under different administrative schemes. Achieving multidisciplinary case management for effective planning of client needs, as well as packaging and coordinating services – with support from ICT-based solutions – is difficult to achieve within day-to-day practice under such conditions. Assuring adequate governance frameworks and fostering better cooperation and collaboration must therefore be high on any policy agenda in this field.

An important step to help foster revised governance frameworks and institutional arrangements to help facilitate the implementation of efficient telehealth solutions in different national and regional settings would be to map and better understand the extent to which differences in reimbursement and incentive systems, health and social care system fragmentation and regulation may act as barriers towards wider mainstreaming of relevant solutions.

Critically assessing incentive structures

In discussions on the quality of care the importance of professional ethos, motivation, adequate staffing levels and training are often stressed. Although

these factors are important, they have a limited ability to change behaviours *(43)*. However motivated stakeholders may be to use telehealth solutions, e.g. as aids in chronic disease management, few will operate against their economic interests *(44)*. Payment and reimbursement systems may present significant barriers *(23,24)*.

Strategies must therefore critically assess how financial flows in health and welfare systems may provide incentives or disincentives for telehealth provision, taking into account that the "business case" for telehealth may be very different for various players in a given health care system. Despite the current weakness in systematic evidence, it is possible to draw some useful parallels for telehealth-related policy development from analyses that have been conducted in relation to chronic care services more generally, given that this is a key area for the use of telehealth applications.

Key aspects in reimbursement are input and process versus outcome- and quality-based approaches. Table 1 provides a provisional insight into various aspects of three common payment approaches in ambulatory care. Detailed evidence on their impact on the integration of telehealth into integrated care is largely missing, but is in need of close attention from a policy perspective.

It is to be expected that well-structured and calibrated capitation- or salary-based systems provide built-in incentives to optimise services, which would imply making use of telehealth solutions only where they help achieve this goal. On the other hand, fee-for-service approaches may lead to higher costs when telehealth applications require a specific, additional reimbursement payment that is not compensated for by a reduction in other fees. Nevertheless, during an initial diffusion phase, it may be politically justified to provide an "extra" monetary incentive to speed up innovations and reach a critical implementation mass speedily.

In respect of secondary care facilities (i.e. hospitals), the major issue concerns inpatient costs. In Europe there is often a mix of prospective and retrospective reimbursement in the hospital sector, so incentives/disincentives for telehealth can be expected to vary. Some systems might discourage the intake of patients with chronic conditions in the first place, while others might provide incentives for early discharge (with or without any major follow-up obligations). In the latter case, the extent of follow-up obligations (and associated incentives), and more generally of incentives for continuity of care between the hospital, primary and social care systems, will be central to the prospects for the facilitation of mainstream implementation of telehealth.

Again, how this works across diverse European systems is currently not well documented, neither as regards continuity of care in general, nor telehealth in particular. Unless it is a fee-for-service regime, a key aspect will be what to pay

Table 1. Incentives and disincentives for chronic care provider remuneration

Payment approach	Core characteristics	Potential incentives and disincentives for chronic care
Capitation	The professional receives a fixed sum to care for a patient overall or a specific disease over a period of time, irrespective of the actual services provided.	Agreement on short- and long-term performance indicators and quality control procedures are mandatory.
		There is a risk, depending on the type of morbidity, that providers offer as little service as possible because they bear the costs.
		If the fixed sum is too low, services may become underused.
		The schema must allow for risk adjustments, otherwise providers will not be interested in treating patients with severe chronic conditions because of the cost risk involved.
Fee-for-service	The professional is paid for each unit of service provided.	It is assumed that more services will be provided where margins are high in order to maximise income. This may lead to services being overused.
		In relation to chronic care, such over-provision may be counter-productive.
		Given sensible payments, there are no incentives for underuse.
		Poor quality may lead to more services becoming necessary and thereby causing higher costs.
Salary	The professional is compensated by a fixed amount, but may receive a performance allowance.	There is an incentive to optimise services.
		There is no specific incentive for underuse or overuse of services.
		Unless performance benchmarking of professionals and quality control procedures have been implemented, there is no specific incentive to provide good care for patients with chronic illnesses.

Source: own compilation, adapted partly from Busse et al. *(44).*

to the integrated care network for a certain severity of a chronic disease, how to share this amount among institutional, ambulatory and community service providers, and how to ensure a fair sharing of responsibility for quality assurance and performance. As our Box examples illustrate, telehealth can play a key enabling role. It might be argued that full integration, harvesting the benefits for better continuity of care for all actors, will not be possible without strong ICT support.

Mapping and analysing legal and regulatory regimes

Medico-legal and regulatory regimes can pose another set of barriers to the exploitation of telehealth, so it is also important to map them in order to identify opportunities for regulatory and legislative reform to facilitate the optimal implementation of telehealth solutions. The regulatory situation is typically not well developed in view of the specific characteristics of such services *(24)*. In some countries, concerns about privacy/surveillance have been raised in relation to use of passive sensors and continuous monitoring in telehealth. Specific legislation is sometimes in place to regulate usage *(24)*. It can be expected that such issues will come more strongly to the fore when next-generation telehealth – involving more sophisticated lifestyle monitoring – becomes more visible in policy and practice.

There also exist considerable differences across European countries in relation to telephone and electronic consultations; some of these may also apply to telehealth. In general, however, telehealth has not yet been given sufficient attention within medico-legal regulation across Europe. Concerns about liability and risk have also been identified as potentially important barriers to the mainstreaming of telehealth technologies and services. There is also a cross-border dimension that may grow in importance, but the regulatory implications of this have not yet received much attention. The exploration of such issues in the context of the European Union epSOS (Smart Open Services for European Patients) project will, however, provide a solid base from which to progress. This project has the overarching goal of developing a practical eHealth framework and ICT infrastructure that will enable secure access to patient health information, particularly with respect to basic patient summaries and ePrescriptions, between twelve different European health care systems (see http://www.epsos.eu).

Establishing mechanisms to support better collaboration across sectors

The majority of mainstreamed services are still firmly located within either the social care or health care domain. One policy option to help support the use of telehealth as an aid for integrated care is to set up vehicles that create partnerships across sectors with a joint budget to be used for service

development. Such joint budgets between health and social care services have already been used with success in countries such as Sweden and England to promote continuity of care for those with chronic conditions such as mental and musculoskeletal disorders *(45)*.

In respect of telehealth there have been a few research, technological development and demonstration projects, validation pilots and market trials that appear to take such an integrated, holistic approach, but they remain exceptional. However, there are some signs that the traditional demarcation lines between health and social care, which are historical barriers to mainstreaming integrated care, can now be overcome and supported by telehealth solutions (cf. e.g. Boxes 5 and 6).

One major and very visible effort to implement a combined approach is the "Whole System Demonstrator" initiative in England. To date this is the largest randomised controlled trial in the United Kingdom, involving more than 6000 participants in three contrasting locations; it is providing funding to combine home telemonitoring and telecare services with the objective of promoting continuity of care within a more integrated care system. The evaluation also includes an economic assessment. However one continued limitation of this initiative is that separate – rather than a single integrated – technical systems for clinical tele- and social care based telehealth are being deployed *(46)*.

Identifying alternative ways of bringing about change

Another key issue is the implementation process. What mechanisms are available to help facilitate the actual implementation of telehealth as a component of integrated care? How can professional cultures and resistance to change and innovation be overcome? How might one prioritise different areas where telehealth solutions might be introduced? We highlight five potential areas for action.

- Mechanisms should be in place to foster opportunities for dialogue and exchange of information: such mechanisms can help instil a sense of ownership over policy reforms and help reduce resistance to change.
- Process innovations must be driven by, and respond to, clearly defined health policy priorities, and guide the supporting telehealth solutions – a technology push approach cannot be expected to deliver the hoped-for benefits.
- Professional change management must fully engage all involved actors, be guided and promoted by health care and social care leaders, and provide for comprehensive and continuing training measures.
- Paying full attention to ethical issues is mandatory.

- There is a strong need to improve the usability and interoperability of technology.

Establishing mechanisms for awareness raising, dialogue and exchange of information between stakeholders

Professional cultures and resistance to change, as well as a lack of organisational capacity and willingness to innovate, are key barriers that need to be addressed. One approach that can help reduce resistance to change and break down barriers between different stakeholder groups is to set up mechanisms that allow for genuine iterative dialogue on potential innovation and reform. If stakeholders are involved in discussion on reform, they are more likely to have a sense of ownership over the outcomes of this process, which in turn can help to facilitate the adoption and acceptance of new structures, including telehealth solutions *(47)*.

Policy-makers can play an important role in this process by supporting awareness-raising efforts among professionals and facilitating the exchange of good practice on successful approaches to organisational innovation and change management. This could also include the development of strategies and tools directed towards providing relevant organisations with hands-on advice, e.g. for local business-case planning.

When investing in telehealth solutions to support integrated care, it is also important to remember that there is no "one-size-fits-all" model for achieving success. Decisions to invest must include strategies that fit given regional/local settings, and be designed to succeed by meeting clearly identified and timely policy and business objectives. Reaching, informing and engaging relevant stakeholders in a dialogue on joint strategy building is an important prerequisite for establishing a valid "value case" for all.

It is critical to stress that this concept of engagement means going beyond consultation, in terms of listening to and meeting the concerns and requirements of all types of stakeholders. All stakeholders in each local context should be taken into account, for example, local groups and teams of health/social care professionals, professional bodies of clinicians, patient groups and their representative bodies, health/social care provider organisations, funding bodies and ICT suppliers.

Pursue process-led innovation

Another way to facilitate implementation is to use a process-led approach. Policy development and its transformation into strategy must, in order to succeed, start with a strong focus on improving, streamlining and integrating service delivery processes. Many existing processes are inconsistent, convoluted

and not coordinated sufficiently to continue to deliver when a telehealth solution is introduced in an attempt to support a process. Delivery processes need to be examined. In particular, where they cross organisational and management boundaries, they will require redesign and clear specification of these interfaces. Health technology innovations like telehealth approaches must follow, support, and offer opportunities for, such process innovations, but not be seen as the driving force.

Lessons that can be learnt from the successful mainstreaming of telehealth solutions for community care services suggest that the mere technical implementation of applications may be one of the less complicated steps in implementation. Instead, the bottleneck obstructing progress has often been the lack of a "conveyor belt of care" in terms of coordinated services facilitated by appropriate technologies *(48,49)*. In essence, the major innovation lies in the adaptation or re-engineering of organisational flows, involving many professionals, all working for different organisations but coming together to offer one integrated pathway in health and social care to support continuity of care. Strategic visions to break through existing "silos", understanding how the technology can play a part, but not being driven by it, are key factors for success *(50)*. In a similar way, telemonitoring alone achieves little in terms of better care for specific patient populations as long as the professionals involved are not adequately trained and supported, e.g. by decision support systems, to make best use of information provided by telehealth *(51)*.

Pursue a multidimensional approach towards change management

Changing organisational structures and culture, work processes and behaviour are among the most difficult tasks to accomplish in making any improvement to health and social care service delivery. But without this, neither telehealth solutions, nor wider integrated health and social care information systems will be realised in a manner that best delivers all the potential socioeconomic benefits. Measures to help promote and enable active change management at all system levels can help facilitate better implementation of telehealth solutions.

We have noted that professional resistance to change as well as a lack of organisational willingness to change and innovate are key barriers. The systemic nature of ICT-enabled support for integrated care – being both a technology and a process innovation – puts considerable demands on the capacity of organisations and professionals to adapt to new requirements. For instance, clinicians have to acquire knowledge and skills to use new information systems at the same time as they are managing their current clinical loads and are faced with increasing consumer demands *(51)*. Change management is most effective when it fully engages with all actors involved, be they from the clinical, social

care, administrative or policy realms. Change requires the highest level of leadership support, and should be guided and promoted by health care and social care professionals. Everybody must become motivated and empowered, and this necessitates open and continuous communication on the change process, opportunities for interaction, and, in particular, sufficient resources for comprehensive and continuing training measures.

Change is not a cost-free exercise. It requires sufficient financial resources over an extended period of time. Investments that have to be made in technology, staff and support costs to achieve the change and render it sustainable may outweigh narrow cash savings achievable from reduced hospital, long-term admissions or more efficient work flows, particularly in the shorter term. Substantial additional investments may be required up front before ICT-enabled service innovation can actually "pay off" *(40)*.

One such initiative to help kick-start the mainstreaming of telecare into services in England has been the creation of preventive technology grants. These help local authorities offer "second generation" telecare to social care clients, building on the well-established social alarm infrastructure already in place. Their explicit aim is to "inject much needed resources to assist commissioners to mainstream the further application of technology within social care and support services" *(52)*. In Spain, the Plan Avanza is a comprehensive approach intended to help further develop the ICT infrastructure for health and other sectors across the country *(53,54)*.

Pay full attention to ethics

It is also important to be very mindful of ethical issues that can arise out of the use of telehealth. If ethical issues are not dealt with satisfactorily, then the willingness of the public and professionals to make use of these technologies will be curtailed. At the "macro ethical level", overall policy needs to address how ICT-based services may impact on equality of access and the quality of care *(55)*. In open systems, the adoption of telehealth may change the organisation of the supply side considerably, with new players joining the sector and competitors adapting to these changing market dynamics. For example, housing associations, companies specialising in particular diseases (case management) or call centres may enter the market and adopt new roles in the provision of care. Health insurance companies may also be interested in running call centres and in the information that these generate. Policies must anticipate the potential disruptions such changes may cause, and be prepared to provide interventions to cope with the resulting ethical dilemmas.

Related ethical issues concern patient selection, like the possible emergence of "creaming and dumping", privacy as regards access to medical records by non-

medical personnel, e.g. in call centres, or quality and safety issues, especially in transitional phases where patients move from an institutional setting to their homes.

Another set of issues arises at the "micro ethical" level, in relation to the functionalities of telehealth. These technologies can allow for the monitoring and surveillance of individuals. This can be implicit (through sensors and radio tags) or explicit (through cameras and microphones). Key ethical issues arising here include transparency and informed consent, proportionality and purposefulness, privacy and dignity, as well as openness of information and surveillance of data management.

Improving the usability and interoperability of technology

Although we have noted that technology itself is usually not a critical limiting factor for the wider implementation and mainstreaming of telehealth, there remains a continuing need for further technological innovation. This must also encompass advanced user interfaces for patients and carers as well as better "ease of use", i.e. users should be able to use these new technologies without the need to rely on support from information-systems specialists *(56)*.

Effective implementation will be aided by consideration of the interoperability of ICT systems and devices across the care continuum. Only if technical as well as semantic (issues around the language used by different professionals as well as in ICT systems) interoperability of all disparate ICT solutions that may be involved in supporting continuity of care is assured, can the full benefits of integrated care information systems in general, and telehealth in particular, come within reach. Such interoperable systems will not only allow all actors involved in the care of a person to communicate seamlessly in a commonly understood parlance, but also permit technical system components to exchange, aggregate and analyse all the uniquely structured and coded data generated by the care and monitoring process. This will allow for improved service delivery, management support, transparency and control, knowledge generation and decision support at the point of care – for both patients and their family carers.

Many issues related to interoperability *(57)*, such as a clear legal and regulatory framework, ethical issues, organisational changes and relevant technological aspects, have also been touched on above. Other issues include the need for technical standardisation, security policy, certification of devices and systems, as well as issues of education and training, financing and procurement. All of these elements together constitute a complex framework for enabling ICT systems and care teams to work together and deliver to their full potential.

Summary and outlook

In spite of the still limited, albeit growing, evidence base and the many challenges to be met, telehealth applications have considerable potential to effectively support the growing call for better integrated care. This is particularly the case for individuals with chronic conditions like severe cardiovascular disease, diabetes and dementia. Telehealth can be expected to become both a central element of a new health care model and an essential component of better integrated health and social care information systems in future.

To date, uncertainty and ambiguity about the role of telehealth and its added value and benefits have limited the engagement of key stakeholders. If appropriate evidence-based telehealth is to be mainstreamed into health and social care systems, market forces on their own will be insufficient: policy action will be required. Policy-makers wishing to pursue specific interventions for their jurisdictions will need to:

- establish a convincing evidence base on the benefits and cost effectiveness of investing in telehealth integrated in routine care for different population groups, in different setting and in different contexts;
- create greater awareness of its potential, provide opportunities for dialogue with stakeholders and disseminate good practice; and
- proactively explore and foster emerging opportunities.

More specifically, for any given application to be successful, policy-makers will need to invest in telehealth and integrated care information systems as a structural support for health and social care systems. Such process innovation must be driven by, and respond to, clearly defined health and social policy priorities. This must be accompanied by professional change management, which fully engages all involved actors, is guided by professional leaders, and provides for comprehensive and continuing training measures.

Furthermore, effective political intervention will need to take adequate account of local, regional and national circumstances; there is no "silver bullet" that could claim to be effective across Europe. It should, for instance, be recognised that the adoption of telehealth solutions even at a pilot level has been much lower in the east of the WHO European region, where infrastructure and available resources are more limited. Nonetheless, a number of priority action lines can be identified that are essential elements in the development of policy and strategic action irrespective of which country is involved.

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