

# Workshop on Implementation of Solutions in European Health Systems 9 December 2014



## Workshop on Implementation of Solutions in European Health Systems

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## Introduction

This report follows up on the Workshop on Implementation of Solutions in European Health Systems that took place in Brussels on 9 December 2014. The workshop brought together around 45 researchers, clinicians and other stakeholders from 15 different EU countries, the European Commission and the World Health Organization (WHO). The purpose was to address questions relating to why large-scale implementation of new evidence is difficult in European health systems, how implementation research can address knowledge gaps on the implementation of evidence and whether piloting and scaling up research projects at the EU level could be a solution and, if so, how such projects should be designed.

European health systems face significant challenges due to the combination of an ageing European population and economic stagnation. The healthcare sector accounts for nearly 10% of Europe's gross domestic product (GDP) and is expected to increase by one third by 2060. Changing demographics combined with increased pressure on public budgets forces health systems to enhance efficiency, cost-effectiveness and to ensure long-term sustainability.<sup>1</sup> Research and development projects have created promising evidence for numerous new solutions with the potential to transform European health systems. However, there is a need for new insights to improve large-scale implementation of available solutions that have proven successful in small-scale trials. Implementation research, defined as follows, can contribute to this: "The study of methods to promote the integration of research findings and evidence into healthcare policy and practice. It seeks to understand the behavior of healthcare professionals and other stakeholders as a key variable in the sustainable uptake, adoption, and implementation of evidence-based interventions".<sup>2</sup>

Europe faces the need for new knowledge about how large-scale implementation of evidence-based concepts embracing a whole system including health services, treatment, care, rehabilitation and prevention can be realised. With Horizon 2020, Europe has launched a new research and innovation programme that addresses societal challenges by generating and implementing new knowledge. This workshop intends to address knowledge gaps and research needs that can advance the implementation of new evidence in European health systems.

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<sup>1</sup> European Commission (2013). "Investing in Health" Commission Staff Working Document, Social Investment Package

<sup>2</sup> Fogarty International Center, <http://www.fic.nih.gov/News/Events/implementation-science/Pages/fags.aspx>



## Key workshop points

The following key points derive from presentations, case studies and discussions structured around four key areas covering health systems of Europe. It is important to note that the starting point of the workshop was not about building more evidence or new medical knowledge, but rather about concentrating on situations where evidence is available and ready to be implemented in the health systems of Europe or integrated into health and social care policies. Workshop participants agreed that support for scaling up and implementation is important, and the participants identified various barriers and facilitators for implementation, which will be described and discussed in the following.

### **The local context plays a significant role for the approach to implementation and rollout of new evidence.**

Context includes socio-technical infrastructures, culture as well as payment and compensation schemes. Culture is not only national culture but also organisational culture, and is bound up with the socio-technical relations among local stakeholders, their needs and constraints, hence also the articulation and adaptation of these. Local socio-technical infrastructures may vary significantly from one setting to another in terms of, for instance, IT systems and relations between hospitals, general practitioners (GPs) and clinics. Citizens may not have the same types of access to essential healthcare infrastructures across different European countries. As a result transferring a successful solution from one context to another is only rarely just a matter of “scaling up”. Knowledge translation across contexts also requires a thorough context and stakeholder analysis (at local and sometimes even micro level) to ensure a level of adequacy that suits their real needs and priorities. Similarly, user acceptance may vary across different user groups (e.g. young and old, poor or well-off), as well as within particular user groups (e.g. doctors, patients). Consequently carefully studying and identifying concrete needs in a given setting are an important part of tailoring the adaptation of a new solution to accommodate the particular needs of patients, their families and professional users.

**The personality and openness of implementers seem to be crucial factors in this relationship as they play a key role in promoting new solutions and health literacy.** One key issue is the general resistance to change, which is why European health education systems should stimulate positive attitudes toward innovation and openness among students to ensure the capacity to uptake new evidence in healthcare. Lifelong learning should also be encouraged across European health systems to sustain people’s curiosity and the ability to uptake new knowledge. Another way of tackling resistance to change is by improving the consistency and quality of the evidence on disease prevention.

**Political support and access to funding dedicated to implementation and knowledge translation are essential aspects of efficiently and effectively implementing new solutions.** In many cases gaining access to funding to carry out analyses necessary for facilitating knowledge translation and implementation is quite difficult. Funding is also necessary to install new innovations, to educate and support users of the solution, and to encourage the policy uptake and implementation of interventions across countries. For these reasons more European funding for implementation research is needed.

**The lack of sustained networks across stakeholder groups and a lack of multidisciplinary approaches** are particularly important barriers to quick knowledge translation and uptake in policy making. Researchers usually work with other researchers, policy makers network with other policy makers and healthcare professionals are linked to other healthcare professionals. Increasingly researchers are encouraged to develop multidisciplinary research projects, which requires new kinds of networking across scientific disciplines, e.g. medical researchers can collaborate with anthropologists and social scientists to better understand non-compliance to treatment or why a sustained lifestyle change is difficult to achieve. To speed up the implementation and policy uptake of new research-based evidence, new types of multi-stakeholder networks are needed to foster mutual understanding and long-term collaboration between those who create knowledge and the users of this knowledge.

**Economic incentive structures** are considered an important barrier to the implementation of innovations in healthcare systems. There is a discrepancy between the purchase of innovations by healthcare management and other stakeholders in the ecosystem around the patient. The business of health systems does not encourage the implementation of innovative care solutions that work across stakeholders. New incentive structures and models of reimbursement that enable various stakeholders to share care solutions with other caretakers are needed.

## What do implementation and knowledge translation involve?

Implementation is the use of strategies to adopt and integrate evidence-based health interventions and change practice patterns within specific settings. Often implementation of new interventions also implies revision of existing healthcare policies. A broader definition that includes policy making is thus that implementation is the study of methods to promote the integration of research findings and evidence into healthcare policy and practice. Implementation research seeks to understand the behaviour of healthcare professionals and other stakeholders as a key variable in the sustainable uptake, adoption and implementation of evidence-based interventions. Research on implementation addresses the level to which health interventions can fit into real-world public health and clinical service systems. The intention of this emerging research field is to investigate and address major bottlenecks (e.g. social, behavioural, financial, managerial) that impede effective implementation, to test new approaches to improve healthcare programmes and to determine a causal relationship between the intervention and its impact.<sup>3</sup>

Knowledge translation from health-related research to policy making is closely related to implementation. This is as a result of the crucial importance political support plays in the large-scale implementation of new interventions, which may imply changes to health policy, practice and regulatory frameworks. Knowledge translation is a process leading to a) a cycle of **policy-informed evidence** in which policy priorities are taken into consideration; and to b) **evidence-informed policy** in which the best available evidence is incorporated into policy making, which is in turn evaluated for further policy refinements and possible contributions to the research agenda.<sup>4</sup> Possible major barriers to this process are that research is not valued as an information input and research is not perceived as relevant, which then makes it difficult for policy makers to use research. The reasons are, for instance a) that research may not be communicated effectively to policy makers as a target group; b) research is not always available to policy makers when they need it; c) there is a lack of mechanisms to prompt policy makers to use research in policymaking; and d) there is a lack of fora where policy makers and key stakeholders can discuss policy challenges.

## Summary of presentations

**Professor Henning Boje Andersen, Technical University of Denmark, Denmark** welcomed participants to the workshop and briefly introduced the concept of implementation of new evidence or solutions into health systems. Implementation requires the use of qualitative methods to ensure organisational adaptation rather than the development of new technologies. The definitions of a number of concepts were presented. The concepts suggested that the challenge of implementation concerns the transfer of a solution from one context to another, i.e. to make a solution work in different contexts it needs to be embedded in the particular organisation, the economic and socio-technical context, and its particular culture. This is as opposed to the mere upscaling of a given solution which, though by no means trivial or easy, is a quantitative term referring to an increased number of users of a solution and the technical capacity to meet increasing demand.

<sup>3</sup> Fogarty International Center, <http://www.fic.nih.gov/News/Events/implementation-science/Pages/faqs.aspx>

<sup>4</sup> Kasonde, J., Campbell, S. (2012). Creating a Knowledge Translation Platform: Nine Lessons from the Zambia Forum for Health Research. Health Research Policy and Systems. 10:31. (Presentation by Tanja Kuchenmüller, WHO Europe)

**Line Matthiessen, Head of Unit, fighting infectious diseases and global epidemics, DG Research and Innovation** gave a short introduction to the rationale of the workshop. The Horizon 2020 “Health, demographic change and wellbeing” societal challenge aims to translate science for the benefit of citizens, for example by testing and demonstrating new healthcare models, approaches and tools, by promoting healthy and active ageing, and by improving health outcomes, including a reduction in health inequalities. Due to the increasing burden of chronic and degenerative diseases that lead to rapidly increasing health expenditure, there is a strong need for more innovation and a greater transformation of health systems to make them more responsive to people’s needs and to make them more sustainable. Chronic and degenerative diseases remain a major challenge but recent events show that infectious diseases are not a problem of the past. Evidence from research represents significant innovation potential for European health systems. In Europe, however, a clear gap exists between the creation of research evidence and the uptake of the evidence in policy making. Dr. Matthiessen thus kicked off the discussion by asking why Europe has such difficulty uptaking new evidence. What are the needs of the users of evidence? How can the translation of evidence be supported through implementation research?

**Tanja Kuchenmüller, Technical Officer, WHO Europe**, presented the concept of evidence, the concept of knowledge translation and some of the challenges related to the use of evidence in policy making. Kuchenmüller began by defining the two terms “research evidence” and “policy making”. Research evidence can be described as “the results of a systematic study of materials and sources in order to establish facts and reach new conclusions”.<sup>5</sup> She also described four concepts of evidence:

- Context-free scientific evidence, such as fundamental research and clinical studies
- Context sensitive scientific evidence, such as applied, social science-oriented research evidence
- Tacit evidence, such as the expertise, views and realities of stakeholders
- Knowledge derived from data analysis

Policy is defined as a “purposive course of action followed by an actor or set of actors”.<sup>6</sup> The main challenge of policy making is the complexity of the process, which is multi-factorial, multi-level and involves multiple actors. Traditionally the link between research and policy has been considered a linear process by which research evidence is transferred from the research to the policy sphere. Simply presenting information to policy makers and having them act on it, however, is seldom the case. Evidence is but one of the factors that influence policy making. The political context, culture, traditions, values and the influence of pressure groups are among the other factors with a strong impact on policy-making processes and outcomes. Moreover, there is a general challenge that evidence is not valued by policy makers, is contested by other stakeholders, or fits poorly with the local context.

Hence, there has been a gap between what we know and what we do. Kuchenmüller presented the example that 264 years passed between the discovery of lemon juice as a way to prevent scurvy to the British Navy’s decision to ensure an adequate supply of citrus fruits on navy ships.<sup>7</sup> A more recent example is that 30 to 40% of patients in the United States and Europe do not receive cost-effective interventions that are justified by the best available scientific evidence.<sup>8</sup> This example shows that despite greater international and regional efforts, policy is often only poorly informed by research evidence.

The uptake of scientific evidence is contested by well known obstacles, e.g. research is not valued by policy makers, it is not relevant to decision-making processes, it is difficult to use because of technical jargon, there are

<sup>5</sup> Lavis, J.N., Permanand, G., Catallo, C., BRIDGE Study Team (2013). Policy Brief 17 (BRIDGE SERIES): How can knowledge brokering be advanced in a country’s health system? WHO Regional Office for Europe, Copenhagen.

<sup>6</sup> Anderson, J.M. (1975). Public Policy-making. Praeger, New York.

<sup>7</sup> WHO (2004). World Report on Knowledge for Better Health. World Health Organisation, Geneva.

<sup>8</sup> Schuster, M.A., McGlynn, E.A., & Brook, R.H. (1998). How Good Is the Quality of Health Care in the United States? *Milbank Quarterly*, 76 (4), 517-563.

ineffective communication and dissemination strategies, there is a lack of capacity and mechanisms for policy makers to use research, and there is a lack of fora where key stakeholders can discuss policy challenges.

Based on a review of 24 studies assessing the driving and hindering factors of evidence-informed policy making, the number one barrier to using research evidence in policy making, however, is the absence of personal contact between researchers and policy makers. At the same time, personal contact between researchers and policy makers is the number one facilitator of research utilisation.<sup>9</sup>

Kuchenmüller's presentation moved on to suggest various approaches for supporting more effective use of research evidence, for example: by encouraging greater interaction between policy makers, stakeholders and researchers, by making relevant and good quality research available in a timely manner, by having research communities provide summaries of research results, by showing how evidence can enable considerations concerning how research aligns with the beliefs, values, interests and political goals and by ensuring that research is aligned with policy priorities.<sup>10</sup>

Finally, the presentation touched upon the recently established Evidence-Informed Policy Network (EVIPNet) Europe,<sup>11</sup> which is the European arm of EVIPNet, launched globally by WHO in 2005. The aim of EVIPNet is to support knowledge translation worldwide. WHO defines knowledge translation as "... the exchange, synthesis, and effective communication of reliable and relevant research results. The focus is on promoting interaction among the producers and users of research, removing the barriers to research use, and tailoring information to different target audiences so that effective interventions are used more widely".<sup>12</sup>

EVIPNet Europe strives to achieve the following three strategic objectives:

- To increase country capacity in knowledge translation and to put countries in the driver's seat of evidence-to-policy efforts.
- To institutionalise knowledge translation activities through the establishment of national advisory bodies (so-called Knowledge Translation Platforms) and to inter-link these platforms to foster exchange and synergetic effects.
- To support the production and implementation of knowledge translation innovations to improve policy-makers' access to and use of research evidence that is relevant, reliable, accessible and timely.

EVIPNet Europe operates in 13 countries in Eastern Europe and Central Asia, but countries in the western part of the EU have increasingly shown interest in joining the network. EVIPNet has powerfully demonstrated the success and benefits of South-North knowledge transfer in other parts of the world. Uganda, for instance mentored peers in Canada on launching and operationalising a rapid response mechanism, a knowledge translation strategy designed to meet the urgent need of policy makers for evidence about health systems. This strategy was developed during the Supporting the Use of Research Evidence (SURE) project,<sup>13</sup> a Seventh Framework Programme project covering seven African countries.

Kuchenmüller stressed that understanding the potential of reciprocal learning and reverse innovation between Western EU countries and EVIPNet Europe member countries is key to scaling up the use of knowledge translation innovations throughout the region and, hence, represents an important research niche.

<sup>9</sup> Innvaer et al. (2002). Health policy-makers' perceptions of their use of evidence: a systematic review. *Journal of Health Services Research & Policy* Vol 7, No 4

<sup>10</sup> Innvaer et al. (2002). Health policy-makers' perceptions of their use of evidence: a systematic review. *Journal of Health Services Research & Policy* Vol 7, No 4,

<sup>11</sup> <http://www.euro.who.int/en/data-and-evidence/evidence-informed-policy-making/evidence-informed-policy-network-evipnet>

<sup>12</sup> WHO (2004). *World Report on Knowledge for Better Health*. World Health Organisation, Geneva.

<sup>13</sup> <http://www.who.int/evidence/sure/en/>



**Professor Mical Paul, head of division for infectious diseases, Ramban Health Campus, Israel** presented her experiences with the development and implementation of the new decision support system, TREAT, to improve and speed up correct treatment of bacterial infections. Professor Paul introduced the existing challenge related to antibacterial treatment where inappropriate empirical treatment increases mortality. The TREAT solution involves modelling the infection domain to ensure early introduction of the proper treatment of patients. Clinical evidence from the system was created by testing its performance on 7.500 patients in many different clinical setups and regions. Despite solid clinical evidence and a clear health economic case, large-scale implementation of TREAT faced obstacles. A number of obstacles and solutions on how to overcome the barriers were identified, however.

The most significant obstacle was establishing acknowledgement and acceptance of the system among clinicians, i.e. the main users of the system. Clinicians showed resistance to decision support for clinical practice, and acceptance of the system was especially sensitive if it was presented as a tool to improve performance. To gain acceptance it proved very important to carry out a proper identification of local gaps and needs in order to adapt the presentation of TREAT to the particular context. Clinicians were key stakeholders in this process as bypassing them was tantamount to failure. A second barrier concerns the fact that infection epidemiology changes from place to place, e.g. the bacteria causing the infections and resistance characteristics. Often data on a particular local epidemiological situation are missing and calibrating the system to a particular situation is very time consuming. Implementation was facilitated, however, by building calibration mechanisms into TREAT, by collaborating with hospital pharmacies to understand the epidemiological situation and by stressing the educational aspects of data management.

Other barriers included access to funding for installing the system, technological issues such as electronic systems and a lack of or incomplete electronic patient files, integration of the system in the clinical workflow, adherence to evidence-based medicine and sepsis-related practices when evidence does not necessarily originate from the particular local context. Surprisingly, no regulatory or insurance related obstacles were identified.

**Professor Merete Nordentoft, Mental Health Services, Capital Region of Denmark, Denmark** presented recently introduced early intervention services to treat psychotic illness. The state-of-the-art approach to treat and prevent psychotic illness only involved intervening when disease symptoms were relatively advanced and the situation had become acute. During the 1990s a number of studies were published suggesting that early interventions on high-risk groups could sometimes prevent severe cases of psychosis. Similarly, publications suggested new approaches to treatment and prevention, including an assertive approach, the importance of family and relatives' involvement and the development of social skills among patients. Based on this the OPUS concept was developed and evidence was created during a two-site randomised clinical trial in Denmark. New multidisciplinary team compositions were established, a new mindset concerning the patient was introduced to acknowledge the patient, and flexibility in relation to patient contact and home visits became a principle. In addition a targeted family programme was developed to closely involve family and relatives in the treatment. The clinical evidence clearly showed that the OPUS concept outperformed standard treatment on almost all measured parameters. The impact of the treatment compared to the state of the art grew from the first to the second year of treatment. In addition the economic case for reduced health expenditures was unmistakable. These clear findings created the basis for permanent implementation of the OPUS programme, initially in the two regions where the trial took place and later in all Danish regions. The presentation identified various success factors that facilitated Danish efforts concerning the implementation of OPUS, for example the development of an implementation kit to facilitate knowledge transfer to new settings, significant political support for its implementation and access to national and regional funding. The OPUS case indicates that it takes about a decade to move from initiating a project to the creation of clinical evidence to full implementation.

**Line Linstad, Head of Department, Norwegian Centre for Integrated Care and Telemedicine, Norway** presented the EU-funded project RENEWING HEALTH, which seeks to create scientific evidence for the use of telemedicine in healthcare services and as a tool to empower patients. In recent years the use of information and communication technologies (ICT) in Europe has rapidly increased, e.g. access to broadband coverage and the use of smartphones and tablets has grown. This growth has no generational boundaries. ICT-based, self-monitoring of chronic diseases such as diabetes recognises the patients' own knowledge about their condition. Such treatment and monitoring systems put the patient at the centre of an ecosystem. All other actors, e.g. GPs, hospitals, nursing homes, relatives and insurance companies collaborate around the patient in a virtual team. To date the project shows that the doctors involved in the RENEWING HEALTH project embrace the concept because they can see that technology can help the patients. The need remains, however, to develop a concrete business case on telemedicine for self-management. One barrier is that doing randomised control trials to create clinical evidence are especially time consuming. Moreover, trial results must often wait to be published until every aspect of the trial is complete. Clear gender differences in the uptake and use of telemedicine models have also been observed, suggesting that future solutions should take gender into account.

## Workshop outcomes and recommendations

Following the presentations summarised above the workshop addressed knowledge gaps and research needs that can advance the implementation of new evidence in European health systems. The discussion part was structured around four promising areas for European health systems and addressed the question of how to establish large-scale implementations of evidence-based concepts embracing a whole system for:

- **Upscaling and rollout of health promotion policies and disease prevention**  
Chair: Professor Bente Stallknecht, University of Copenhagen
- **Towards independent ageing**  
Chair: Associate Professor Susanne Boch Waldorff, Copenhagen Business School
- **The use of eHealth and assisted living technologies in integrated care models**  
Chair: Associate Professor Lars Kayser, University of Copenhagen
- **Innovative hospitals and medicine**  
Chair: Professor Jørgen Arendt Jensen, Technical University of Denmark

The discussions took place in breakout sessions, where all participants had the opportunity to discuss and contribute to three out of four areas of their own choice. The following pages provide a one-page description of the individual areas that formed the basis for the discussions and a one-page table summarising the main suggestions derived from the discussions.

## Upscaling and rollout of health promotion policies and disease prevention

Evidence shows that the successful rollout of health promotion to prevent diseases could lead to lower mortality caused by lifestyle-related diseases. Health promotion policies have a broad scope. Preventive health policies can be defined as policies relating to tobacco, alcohol, food and nutrition, fertility, pregnancy and childbirth, child health, infectious diseases, hypertension, cancer screening, road safety and air pollution.<sup>14</sup> In addition, research suggests that physical activity can promote public health and prevent health problems related to overweight and obesity.<sup>15</sup>

In many cases the evidence that an intervention would have a positive impact on population health is well documented. However, the translation of evidence into policy making and implementation of interventions as standard solutions is slow. Health promoting interventions typically imply a complex process of embedding evidence, or a new intervention, in the institutional structure of a given health system.<sup>16</sup> It includes e.g. new legislation to restrict access to alcohol or tobacco, changing city planning to promote bicycle paths, or new tax regimes to direct consumers' food choices in a particular direction. Uptake is more a political process than a technical issue. It also means that competing interests in population health may be at stake, which inhibits policy uptake of clear scientific evidence. In addition, health promotion interventions often depend on a wide range of stakeholders who are traditionally not part of the healthcare system. It makes the issue of upscaling – at any level – a complicated process where support from particular stakeholders is crucial to success. It requires close networks and a high level of trust between research teams and stakeholders, as well as within the group of stakeholders. Such trust relationships are built over time and involve individual relationships and linkages at the organisational level<sup>17</sup>.

In Europe the institutional set-up is different from one country to another, which means that when an intervention has successfully been rolled out at the national level unforeseen challenges may occur when trying to transfer the same evidence to another country. The issue of large-scale implementation and knowledge transfer from one setting to another is often challenging due to different contextual factors. Responding to different audiences therefore has important implications for the basic design of research, and for budgets and scheduling.<sup>18</sup>

<sup>14</sup> Mackenbach, Johan P. & McKee, Martin (2013). A Comparative analysis of health policy performance in 43 European countries, The European Journal of Public Health Vol 23, No 2, Oxford University Press

<sup>15</sup> Copenhagen Research Forum (2012). Copenhagen Research Forum – Visions for Horizon 2020

<sup>16</sup> Peters, David H., Tran, Nhan T. & Taghreed, Adam (2013). Implementation Research in Health – A Practical Guide, World Health Organisation, Geneva

<sup>17</sup> Sorensen, T. et al. (2013). Report of the Independent Expert Group on the Future of European Public Health Research, Subgroup 2, European Commission

<sup>18</sup> Peters, David H., Tran, Nhan T. & Taghreed, Adam (2013). Implementation Research in Health – A Practical Guide, World Health Organisation, Geneva

Table 1 – Upscaling and rollout of health promotion policies and disease prevention	
Overall conclusions	<p>Healthcare workers are hard to convince about new evidence, and there is need for consistency in the evidence and knowledge base on disease prevention. Little evidence exists on the long-term effects and potential side effects of health promotion. Furthermore, translating research into real life and maintaining lifestyle changes is challenging. How much more evidence is needed in this area before knowledge transfer and policy uptake occur?</p> <p>Research on disease prevention should be supported at national and European level. It is important to encourage policy uptake and implementation of interventions across countries.</p> <p>Stakeholders should be brought into the research projects. The long-term goal is improved lifestyle for all social groups across Europe, and new methodologies are needed to monitor the long-term impact of health promotion.</p>
Barriers to implementation	<ul style="list-style-type: none"> <li>• Low clinical/biological significance of interventions and/or poor quality of projects</li> <li>• Little evidence on the long-term effects of interventions</li> <li>• Inconsistent research messages; information overload makes public information confusing, which may have to do with the lack of strong evidence</li> <li>• Lack of continuity in interventions funded as research projects</li> <li>• Tailoring of interventions and messages; people have picked up general health messages but are unable to transfer them to their everyday lives and lifestyle</li> <li>• Different populations need different approaches; a life course approach is necessary as health promotion should target all generations</li> <li>• Lack of attention to special groups and social context; the environment is complex and structural changes are needed</li> <li>• Evidence and policy making are not sufficiently linked; research-based evidence is not always easy to use</li> <li>• Active resistance to change in healthcare systems; healthcare workers are hard to convince about new evidence, and there is a need to integrate new evidence in education/curricula; some doctors believe the task of GPs is to treat the ill and not to ensure primary prevention</li> </ul>
Knowledge gaps on implementation	<ul style="list-style-type: none"> <li>• Theory of prevention needed; identification of preventable diseases</li> <li>• Little is known at the individual level about how to maintain a new lifestyle and translate “good” behaviour into everyday practices</li> <li>• Translating research into real life and maintaining lifestyle changes</li> <li>• Integrating messages; very few interventions integrate evidence on e.g. alcohol, smoking and physical activity</li> <li>• Negative consequences and side effects of health promotion; risk evaluation needed</li> <li>• More systematic reviews of evidence needed</li> <li>• Involving stakeholders and bringing them into research projects</li> <li>• Stakeholders, actors and their roles; identifying who should be responsible for health promotion in healthcare systems; qualitative studies needed to address this issue</li> <li>• New educational programmes on health coaching to advance knowledge translation and implementation of health promotion research</li> <li>• More research on facilitators and barriers to implementation, identification of knowledge brokers and how to institutionalise the uptake of evidence in policy making</li> <li>• Timing changes in existing policy and making policy changes visible</li> </ul>



	<ul style="list-style-type: none"> <li>• Health economics and research on tax policies</li> </ul>
Impact	<ul style="list-style-type: none"> <li>• More projects successfully implemented; however, impact of new evidence/interventions is often not measurable for 10-15 years; funding needed for research on implementation, but is rarely available at international level</li> <li>• Results only show after a long time</li> <li>• Improved lifestyle but this impact is a long-term goal; takes about two generations to implement real changes; new methodologies needed to monitor the long-term impact</li> <li>• Improved knowledge and acceptance</li> </ul>
Scientific disciplines and stakeholders	<ul style="list-style-type: none"> <li>• Disciplines: Anthropology, architects, economists, environmental scientists, ergonomics, health economy, information technology, medical doctors, nutrition, political science, psychology, public health, sociology, toxicology</li> <li>• Stakeholders: Administrators, citizens, cultural institutions, educators, families, health workers, hospitals, industry, insurance companies, media, non-governmental organisations, opinion leaders, patient organisations, politicians, primary care, schools, tax payers, teachers</li> </ul>
Social determinants and inequalities	<ul style="list-style-type: none"> <li>• Evidence is scarce on equality of access to healthcare and access may depend on the particular part of a health system, e.g. easy access to primary care and hampered access to secondary care; access to health promotion also includes access to sports facilities, education and knowledge</li> <li>• Important to tailor interventions to social groups; study designs should address social inequality issues</li> <li>• Understanding the situation for people in different social contexts</li> <li>• Focus on accessible options for improved lifestyle</li> </ul>

## Towards independent ageing

The region in the world with the oldest population, Europe will experience a continuing rise in life expectancy over the next 50 years. The reasons for this longevity revolution are well known as are its widespread consequences for all levels of society. Development and implementation of new solutions to support independent living for the elderly is therefore necessary to delay institutionalisation and to increase quality of life.<sup>19</sup> Independent ageing concerns the development and deployment of innovative products, devices and services that promote independent, active lives.

A successful European response to this challenge requires age-friendly environments focusing primarily on the physical environment, such as housing, the role of neighbourhoods, infrastructure, old and new technology including assistive devices, transport and the design of age-friendly community environments at large.

Social innovation could also be an effective tool to empower older people to remain active at work and in society. In addition to supporting formal and informal (e.g. family) care providers, innovation can help people continue to take part in social networks and activities.<sup>20</sup> Some European countries are focusing on ensuring independent living for their elderly citizens, e.g. with targeted employment policies, access to suitable housing facilities and assistive technologies outside medical homes or social institutions, and access to transport facilities and thereby mobility. Large-scale implementation of access to independent living solutions, facilities and technology for the elderly depends on a range of stakeholders, including providers (public or private organisations), citizens and the communities and institutions surrounding the recipients of services.

In order to ensure implementation and thus access to novel assistive technologies and services, close interaction is necessary between stakeholders, such as researchers, policy makers, private companies, care and social assistance providers, citizens, their families and relatives, to develop and market new products and services. It is suggested that such networks are crucial to speed up knowledge transfer from research and technological innovation to policy uptake and implementation.<sup>21</sup>

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<sup>19</sup> The European Innovation Partnership for Active and Healthy Ageing (2011). Strategic Implementation Plan for EIP AHA

<sup>20</sup> The European Innovation Partnership for Active and Healthy Ageing (2011). Strategic Implementation Plan for EIP AHA

<sup>21</sup> Sorensen, T. et al. (2013). Report of the Independent Expert Group on the Future of European Public Health Research, Subgroup 2, European Commission

<b>Table 2 – Towards independent ageing</b>	
Overall conclusions	<p>The definition of independent ageing was discussed, i.e. who and what should the elderly be independent from? The narrow definition of ageing/elderly as those 65 and older was also discussed. Using the term independent living was discussed. The discussion also focused on what kind of assistance people need and when. Countries and contexts vary greatly within Europe, particularly family structures and traditions play a role, as well as the structure of society (e.g. welfare state). Drivers are social structure, welfare system and technological developments.</p> <p>There is a need for knowledge about the impact of local context, how quality of life can be measured, when developing new standards is important and beneficial, and identifying the stakeholders who benefit from these standards. How to create more local, sustainable communities is also an issue.</p>
Barriers to implementation	<ul style="list-style-type: none"> <li>• Definition of independence – independent from state support, independent from family and relatives? The context differs tremendously between and within countries, e.g. the balance between support from a welfare state and family/relatives differs strongly within Europe</li> <li>• Social innovation to create social networks</li> <li>• Recreating the use of social technologies; future ageing generations will have grown up with technologies, but the current elderly generation is not always familiar with technological solutions and does not embrace them easily; this will change over time and differ from one country to another</li> <li>• Changing technology barriers over time; technological solutions cannot solve all social problems</li> <li>• Common standards/terminology in medical records, e.g. eHealth</li> <li>• Identifying joint aims and target groups; approaching people about ageing; the cost of providing assistance to a large and growing population group</li> </ul>
Knowledge gaps on implementation	<ul style="list-style-type: none"> <li>• How to account for context specific needs and how to adapt innovation to particular contexts</li> <li>• How to marry global evidence with local evidence and to define what would be contextually appropriate; more knowledge on contexts needed, e.g. what context requires what kind of intervention</li> <li>• Identification of actors in health and social care systems who should be responsible for services, for defining needs and for coordinating responsibilities</li> <li>• Identification of when standards are needed, what standards are needed and who benefits from them</li> <li>• Identification of the drivers of new technologies as the solution; collaboration among actors; content of technological solutions?</li> <li>• Critical evaluations of the push for new technology</li> <li>• Comparable studies and evaluation research</li> </ul>
Scientific disciplines and stakeholders	<p>Disciplines: Anthropology, business studies, geriatrics, health and social care, psychology, public health, social science</p> <p>Stakeholders: Associations for the elderly, elderly people, families, friends, governments (local), health and social care professionals industry, neighbours, patients, politicians, unions, universities.</p>

## The use of eHealth and assisted living technologies in integrated care models

The potential of large-scale use of integrated care models and assisted living technologies is increasingly recognised as a means for addressing the challenges of an ageing population. Integrated care models using ICT-based tools and technologies, such as eHealth, mobile devices and assisted living technologies, provide an immense potential for enhancing the use and the quality of medical homecare, especially in the light of the increased importance of early detection and preventive care. Remote patient monitoring enables effective therapy support and the detection of abnormal conditions at an early phase. There is also evidence that such technologies can contribute to a significant reduction in hospitalisation and increased success in long-term therapies.

Integrated care is the management and delivery of health services so that clients receive a continuum of preventive and curative services, according to their needs over time and across different levels of the health system.<sup>22</sup> Evidence shows that eHealth and ICT applied to health and healthcare systems can increase efficiency, improve quality of life and patient empowerment and unlock innovation in health markets.

New approaches to the delivery of ICT-based integrated care and assisted living have been initiated across Europe. However, large-scale implementation of evidence in this area has proved difficult to achieve. In addition, integrated care solutions which have proved successful in a particular local or national context might fail when upscaled in national strategies or in a different national context.<sup>23</sup> As health systems across Europe face similar challenges in terms of an ageing population and increased prevalence of chronic diseases there is a need for developing a better understanding of successful implementation and knowledge transfer across different national, regional and local contexts.

Successful implementation of long-term condition management will typically involve the whole care system. Hence, the incorporation of wider elements of healthcare systems is necessary for effective solutions.<sup>24</sup> Implementing integrated care models is a complex task that goes well beyond developing or selecting the appropriate technologies. It requires a concerted effort and depends on a complex interaction between hospitals, municipalities, GPs, public bodies and private healthcare suppliers. Successful implementation of integrated assistive technologies has to meet the demands of users as well as care providers. It depends on all stakeholders having a sound grasp of the whole value chain and often the services need to be adapted to a local or regional context. Adaptation and large-scale implementation of integrated care and assisted living technologies on a European scale therefore represents a real challenge to the supply chain.

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<sup>22</sup> Waddington, Catriona and Egger, Dominique WHO Department of Health Policy, Development and Services (2008). Integrated health services – What and Why?, World Health Organisation, Geneva

<sup>23</sup> Peters, David H., Tran, Nhan T. & Taghreed, Adam (2013). Implementation Research in Health – A Practical Guide, World Health Organisation, Geneva

<sup>24</sup> Kennedy, Anne (2014). Implementation of a self-management support approach (WISE) across a health system: a process evaluation explaining what did and did not work for organisations, clinicians and patients. Implementation Science 2014, 9:129

<b>Table 3 – The use of eHealth and assisted living technologies in integrated care models</b>	
Overall conclusions	Cultural and social context was emphasised as an important barrier for knowledge transfer. The sustainability of a new solution is another important factor that requires close assessment. Establishing living labs to facilitate interdisciplinary research and testing of solutions was proposed. The primary health sector can be used to educate people in using technologies. Working from both the bottom up and top down on the same projects should be considered.
Barriers to implementation	<ul style="list-style-type: none"> <li>• Culture is a barrier for knowledge transfer from one place to another; a given solution does not necessarily fit or work without adaptation to local context</li> <li>• Implementation is slow; culture needs to follow/adapt to technological opportunities; taking into account the level of the health system, within society and culturally</li> <li>• Individual drivers of implementation, need for committed people to take a lead in the implementation process; historical context and conservatism of healthcare systems</li> <li>• Partial use of data and infrastructure; only some practitioners use facilities; lack of time to integrate new systems in everyday practices</li> <li>• eHealth interventions are highly complex, maintaining data systems is also time consuming and sometimes expensive</li> <li>• Difficult to transfer tacit knowledge to other places and contexts</li> <li>• Financial instruments/incentives, e.g. savings in health systems from previous implementation could fund other implementation</li> <li>• Level of access to hardware and widespread illiteracy in some countries are key barriers to ICT-based solutions</li> <li>• Complexity of eHealth systems, solutions must be kept exceedingly simple</li> </ul>
Knowledge gaps on implementation	<ul style="list-style-type: none"> <li>• The sustainability of solutions</li> <li>• Social context</li> <li>• Establishing an organisation, environment and good management around a solution; interpretations of middle managers, often physicians</li> <li>• Implementation studies</li> <li>• Identification of early adopters of new solutions</li> </ul>
Impact	<ul style="list-style-type: none"> <li>• Change in practice, especially work across sectors</li> <li>• Establishment of living labs to facilitate cooperation between industrial partners and communities and to create awareness in the general population</li> </ul>
Scientific disciplines and stakeholders	<p>Disciplines: Economics, ethics, health and medicine, information and communication technology, psychology, sociology,</p> <p>Stakeholders: Doctors, nurses, patients, relatives, social workers</p>
Social determinants and inequalities	<ul style="list-style-type: none"> <li>• Ability of technology to decrease or increase equal access</li> <li>• Design of technologies to offer disadvantaged social groups better access</li> </ul>



## Innovative hospitals and medicines

Private companies and hospitals are making big investments in various types of medical innovations. Medical innovations are understood here as the introduction and/or development of tangible or intangible technological innovations, or of medicinal innovations at the heart of a hospital's core business, for example new drugs, new chemicals or pharmaceutical substances, or the introduction of technical systems, small devices for diagnostic or therapeutic purposes, treatment protocols, and diagnostic or therapeutic strategies.<sup>25</sup>

Unfortunately, these medical innovations are not always implemented, or they are implemented slowly, thereby depriving Europeans of hospital treatments based on state-of-the-art knowledge on their disease or disability, thus decreasing the return on investment. Against this background, it has been suggested that implementation research that supports the upscaling and integration of evidence in the hospital sector is needed to ensure the transfer of knowledge and technology to hospitals.

Studies show that the implementation of medical innovations depends on many factors, like the existence of specialist teams, the degree of acceptance of the innovation within the population and within the medical profession itself, government standards and controls, and even pricing.<sup>26</sup> Medical technologies are considered one of the primary drivers of healthcare spending. Despite evidence of improvement new technologies can be expensive to acquire, difficult to operate and staff may use technologies inappropriately. As a result the introduction of new solutions requires a thorough assessment of the potential to improve efficiency and productivity.<sup>27</sup>

New methods are needed to certify maximal uptake of research-based solutions in the hospital sector, demonstration projects, scaling-up schemes and proof-of-concept activities. Moreover, a relevant question is whether or not scaling-up efforts are needed on a European level or whether such activities are better conducted elsewhere, keeping in mind that European hospitals differ not only from country to country but often also from region to region.

Barriers to "from theory to practice" in real-world hospitals systems must be identified and broken down by integrating not only hospital managers but also policy makers, practitioners, including, for example nurses, physicians, pharmacists, and civil society groups in uptake initiatives.

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<sup>25</sup> Faridah Djellal & Faïz Gallouj (2007). Innovation in hospitals: a survey of the literature, *The European Journal of Health Economics* 8: 181-193

<sup>26</sup> Faridah Djellal & Faïz Gallouj (2007). Innovation in hospitals: a survey of the literature, *The European Journal of Health Economics* 8: 181-193

<sup>27</sup> European Commission (2013). Investing in health" Commission Staff Working Document, Social investment package

<b>Table 4 - Innovative hospitals and medicines</b>	
Overall conclusions	Hospital budgets and implementation costs for individual hospital settings that adopt new innovations play a strong role in implementation. Incentive structures were discussed, especially the discrepancy between hospital management's purchase of innovations and that of other stakeholders in the ecosystem around the patient. Incentive structures that enables hospitals to share care with other caretakers are needed to reduce overall healthcare costs and need to include new reimbursement models for sharing the benefits and new ways of producing evidence. If an innovation depends on a specific infrastructure, for example IT infrastructure, then implementation becomes more difficult.
Barriers to implementation	<ul style="list-style-type: none"> <li>• Information overload, practitioners are overloaded with operational tasks and time-consuming tools</li> <li>• Tools are not thoroughly tested; presentation to practitioners happens too early for them to be used successfully</li> <li>• Stakeholder ownership of innovations is non-existent, hence no incentive to use them</li> <li>• Testing and adopting innovations in individual hospital settings is expensive; funding for implementation costs like training is absent</li> <li>• Integration of new technologies in existing IT systems is difficult due differing IT systems in hospitals; implementing innovations dependent on IT infrastructure becomes more difficult</li> <li>• Medical doctors who provide advice to policy makers about medical innovations have no experience with medical trials; conflict of interest issues prevent them from being involved with medical companies</li> <li>• Procurement decisions in hospitals are often made by managerial staff instead of staff responsible for data and training who have valuable insights on clinically oriented information systems; vendors fail to prioritise features that support continuity of care to reduce total life-cycle costs</li> <li>• The medical device industry is struggling to sell its products; determining whether GPs or patients should fund home monitoring medical devices</li> <li>• Approval and adoption of new concepts and drugs depends whether this is a centralised or decentralised task; public funding for clinical trials is needed across the EU</li> </ul>
Knowledge gaps on implementation	<ul style="list-style-type: none"> <li>▪ Incentive structures that promote innovation that capitalises on the joint effort of everyone in an organisation to reduce overall healthcare costs</li> <li>▪ How do we incentivise the hospitals to buy something that enables the hospital to share care with the GPs and with the nursing home?</li> <li>▪ Innovation in reimbursement models for doctors, nurses, hospitals and other actors</li> <li>▪ Development of new kinds of evidence</li> <li>▪ How to get people excited about new technology; a focus on appeal and design needed</li> <li>▪ Engineers and doctors who innovate for hospitals lack training in taking human interaction into consideration</li> <li>▪ Allocation of time solely for research and education is needed in hospitals</li> </ul>
Impact	Best value for money, cost efficiency, general health of the population
Scientific disciplines and stakeholders	Disciplines: Architecture, engineering, medicine, social sciences and humanities, Stakeholders: Administrators/procurers, doctors, entire population, hospital staff, patients, relatives, tax payers,

## Annexes

### Case 1 – Improving empirical antibiotic treatment using a computerised decision support system

#### The solution

Severe infections acquired in community and healthcare settings incur significant morbidity and mortality. Bloodstream infections alone represent the seventh leading cause of death in North America and Europe, with population-based estimates of 575,000–677,000 episodes of bloodstream infection per year in North America and 1.2 m in Europe and 79,000–94,000, and 157,000 deaths combined. These infections and deaths are largely preventable.

A strong determinant of case fatality is time from onset of infection to institution of adequate antibiotic treatment, which is empirical since currently available diagnostic tests cannot identify the pathogen responsible until 24-48 hours after onset. Predicting the causative pathogen and its antibiotic susceptibilities and thus prescribing adequate empirical treatment is complex since it entails accurate diagnosis of the infection and the pathogen characteristics of the patient's individual epidemiological circumstances. Worldwide, the average rate of inappropriate empirical antibiotic prescription for bacteremia is about 30% and the mortality rate in this group is about twice that of patients given appropriate empirical antibiotic treatment. The benefit of empirical antibiotics is a strong driver for such treatment, but results in the largely unquantified problem of unnecessary and overly broad-spectrum antibiotic prescription that drives antibiotic resistance in the community and in healthcare settings. Antibiotic stewardship programmes have been devised to deal with judicious antibiotic prescription in hospitals, mainly targeting the problem of superfluous antibiotic use, but have little impact on patient-related outcomes and have failed to curb resistance development in hospitals over the years.

Consequently we devised a computerised decision support system called TREAT to prescribe antibiotic treatment among inpatients. The objectives of the system are to improve appropriate empirical antibiotic prescription and to reduce superfluous antibiotic use, thus reducing infection-related mortality and curbing resistance development. The system is based on a causal probabilistic network that maps the infection domain. The system uses individual patient data to predict the existence of a bacterial infection, its source, the pathogen and its antibiotic susceptibilities. The system is calibrated locally to formularies, costs and bacterial epidemiology using easily available data. It can also be calibrated to target more aggressive or conservative antibiotic treatment, depending on local needs. The system was tested in a randomised controlled trial in three countries (Israel, Germany and Italy) showing that the system significantly improves appropriate empirical antibiotic treatment using less broad-spectrum antibiotics, decreases hospital stay and lowers mortality.

#### International collaboration and knowledge transfer

TREAT was developed in an EU Fifth Framework Programme project and involved information technology (Denmark), clinical development and evidence-based data compilation (Israel) and clinical centres for development and testing (Denmark, Italy, Germany and Israel). International collaboration was essential since epidemiological considerations differ in different countries and testing the system's values in different epidemiological settings was essential. Surprisingly, use of the system by low (Denmark), moderate (Germany) and high-resistant settings (Israel) improved rates of appropriate empirical antibiotic treatment and reduced superfluous antibiotic use, thus establishing the role of the system in different epidemiological settings.

#### Key success factors for implementation

Throughout the period between completing the system's development and testing and attaining clinical installation, we identified barriers and success factors for implementation. The basic prerequisite for implementation was the

randomised controlled trial showing the benefits of the system, where patient-relevant clinical outcomes had more importance than intermediary outcomes.

Barriers	Success factors
Technological: Interface and integration with the electronic resources of hospitals	Development of mechanisms for easy local adaptation of interface features and content; integration with computerised patient files
Resistance from content experts	Working with hospital administration, ignoring content experts to some degree; ultimately did not work Better solutions involved adapting the system to the needs of local experts needs and stressing the adaptive nature of the system as a tool to serve those needs
Funding – TREAT systems	National grants, private foundations
Funding – individual hospitals	Local resources, private foundations and competitive research grants
Rapid change of the clinical scene – case mix, diagnostics	Ongoing development team adhering to optimal methodology – highly demanding
Economical models of healthcare systems, focusing on direct antibiotic costs	Defining joint outcomes of interest when implementing the TREAT system
Economic model – TREAT systems	Dependent on own resources and funding

**Other success factors:**

- Involving the hospital administration in decisions and implementation
- Definition of a local project team
- Good collaboration with local IT department

**Scientific disciplines involved**

Clinical microbiology, evidence-based medicine, infectious diseases, information technology

**Stakeholders involved**

Antimicrobial stewardship teams, hospital administration, infectious diseases/ clinical microbiology/ infection control, inpatients, the Ministry of Health, society

**Key funding sources**

Private foundations, competitive research grants

## Case 2 - Implementation of OPUS treatment: Early intervention services to treat psychotic illness

**The solution**

The OPUS trial was developed by researchers and practitioners in countries such as the UK, Denmark, Italy, Canada and Australia, based on the awareness of the huge difficulties associated with the early phases of psychosis, e.g. high risk of complications such as suicidal acts, development of co-morbid use of substances and criminality. It was hypothesised that the first five years of treatment are a critical period that represents a window of opportunity in terms of optimal possibilities to change the long-term course of the psychotic disease. Psychotic illness in young people implies severe consequences for both the individual and relatives. In some cases the

symptoms have been present for several years and social consequences such as unemployment or loss of school affiliation, social isolation, change of interests and habits and diurnal rhythm may be present already.

Based on the research and development of early intervention services initiated in the 1990s, the OPUS programme consists of three key elements:

- Assertive community treatment with the aim to maintain or develop the patient's coping skills and integration in society
- Family involvement in multi-family groups, single family sessions offered to all families with or without the patient, survival skills workshops for all interested relatives and friends
- Social skills training offered to patients with impaired social skills, organised in groups of six to eight participants or individually

The OPUS programme was clinically tested in a five-year research programme by three small teams Denmark's two largest cities. The trial created evidence after two years of treatment that the OPUS programme showed positive effects on:

- Psychotic and negative symptoms
- Secondary substance abuse
- Adherence to treatment
- Lower dosage of antipsychotic medication
- Higher treatment satisfaction
- Fewer psychiatric inpatient days
- Remarkably better satisfaction with treatment among relatives and more knowledge about schizophrenia and daily stress

Health economic analyses also showed that despite the fact that OPUS is a far more intensive programme requiring more human resources for the treatment, it is not more expensive after two years of treatment than the standard treatment it was replacing. The evidence after five years of treatment was very clear. The OPUS programme was cheaper and associated with a better outcome for 70% of the patients.

#### **International collaboration and knowledge transfer**

The OPUS concept was developed and implemented in parallel in several countries, including Denmark and the UK. The researchers involved also drew on experience from countries such as Australia and Canada. International collaboration was important due to mutual inspiration between the countries developing the OPUS concept. Subsequent to rollout of the programme in Denmark, the concept has been directly transferred to e.g. Iceland and the Faroe Islands.

#### **Key success factors for implementation**

A particular training programme targeting professionals who treat young people with psychosis was developed drawing on internationally recognised expertise. It instructed and supervised the establishment of the key elements of OPUS. Supervision was taken over by Danish experts and a public grant facilitated development of a training concept.

An OPUS handbook with detailed descriptions of all elements of the OPUS programme serves as a manual for new staff members involved in offering the OPUS programme.

The highly positive results of the OPUS trials encouraged the people behind the programme to convince Danish politicians and healthcare authorities to implement early intervention services throughout the country. A Cochrane



Review recognised the evidence, thus providing an additional scientific quality assessment that augmented the power of the evidence. NICE guidelines in UK also included evidence from the OPUS trial as part of their rationale for recommending specialised early intervention services for patients with first-episode psychosis. This was used to push for large-scale implementation of OPUS. In a document endorsed by all regional health authorities in Denmark, early intervention services were included as a particularly important recommendation. The Danish Parliament created special grants that regional health authorities could apply for to fund wider uptake of the OPUS programme.

A fidelity scale for OPUS treatment is now available in a beta version. After finalising the scale, it will be published in an international journal and will serve as a safeguard for the programme, ensuring that future practice will adhere to the concept.

#### **Scientific disciplines involved**

Anthropology, health economics, medicine, psychiatry, psychology,

#### **Stakeholders involved**

The Danish Ministry Children, Gender Equality, Integration and Social Affairs, Ministry of Internal Affairs and Health, regional authorities

#### **Key funding sources**

National and regional research funding programmes, private foundations, dedicated grants for trial and for dissemination

### **Case 3 – The use of technological solutions for self-care combined with services offered by the public health system**

The Northern Norway Regional Health Authority and the Norwegian Centre for Integrated Care and Telemedicine (NST) participated in the EU project RENEWING HEALTH, which researched and tested a variety of technological aids for self-management and monitoring of chronic conditions. The illnesses included in the project were Type 2 diabetes, chronic obstructive pulmonary disease and cardiovascular diseases. The participating countries ran large-scale pilot projects focusing on the use of technological solutions for self-care combined with services offered by the public health system.

#### **The solution**

In the Norwegian project, a mobile app was tested in partnership with people with type 2 diabetes. The goal was to gain experience about the prerequisites and framework that must be in place to enable such tools to be used in everyday life so that they provide benefits to patients as well as to the health service. The project included trials of new technology and explored the mechanisms that contribute to:

- Easier and better self-management of illness
- Success in achieving the changes in habits and lifestyle needed to improve quality of life for people with diabetes
- Enabling the introduction of this type of service both in the private sector and in the public health service

NST's diabetes team conducted research on ways of including patient data in what is now called the Diabetes Diary app in consultation with health professionals and on whether this could improve the follow-up of patients. The team also researched the app as a collaboration tool between the patient and the specialist health service, and ways to use the app as part of the health service. Now available for free from App Store and Google Play in Norway, the Diabetes Diary app is used daily by a large number of Norwegians with diabetes.

**Key success factors for implementation**

The project has been concluded but final results from the RCT trial are as yet not complete. Identified during the initial phases of the project, the following factors are relevant for implementation of the service.

Barriers	Success factors
Technological – the technology changes rapidly	When the clinicians see the positive effects on the patient’s blood glucose levels, they become advocates for change
Pinpointing whether the customer is hospitals, GPs or the vendors of electronic health record (EHR) systems is difficult Setting up a business plan before this is clarified is difficult	The users (patients) have to be part of the entire development phase and the implementation phase
The hospital organisation and ICT department have no clear strategy on how to integrate self-management apps into their workflow and electronic health record systems	Easy to use – developed in close cooperation with users

**Scientific disciplines involved**

Economics, information technology, medical research in diabetes, social sciences

**Stakeholders involved**

GPs, the Norwegian Diabetes Association, North Norwegian Health Authorities, NST, Patients (users), University College of Oslo, University Hospital of Northern Norway