



Remote Accessibility to Diabetes Management and Therapy in  
Operational healthcare Networks

REACTION (FP7 248590)

## **D9-4 Healthcare economics and reimbursements**

Date 2011-02-25

Version 2.0

Dissemination Level: Public

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## Document control page

<b>Code</b>	D9-4_2011-02-25_Healthcare_economics_and_reimbursements_V20_IN-JET.doc			
<b>Version</b>	2.0			
<b>Date</b>	2011-02-25			
<b>Dissemination level</b>	PU			
<b>Category</b>	R			
<b>Participant Partner(s)</b>	IN-JET			
<b>Author(s)</b>	Trine F. Sørensen (IN-JET), Helene Udsen (IN-JET), Jesper Thestrup (IN-JET), Mette B. Andersen (IN-JET/DI), E. Mantovani (VUB), Paul Quinn (VUB)			
<b>Verified and approved by</b>				
<b>Work Package</b>	WP9			
<b>Fragment</b>	No			
<b>Distribution List</b>	All			
<b>Abstract</b>	This deliverable provides a socioeconomic foundation for the development of a business framework for deploying the REACTION platform that aligns with realities of healthcare economic and reimbursement schemes.			
<b>Comments and modifications</b>				
<b>Status</b>	<input type="checkbox"/> Draft <input checked="" type="checkbox"/> Task leader accepted <input type="checkbox"/> WP leader accepted <input type="checkbox"/> Technical supervisor accepted <input type="checkbox"/> Medical Engineering supervisor accepted <input type="checkbox"/> Medical supervisor accepted <input type="checkbox"/> Quality manager checked <input type="checkbox"/> Project Coordinator accepted			
<b>Action requested</b>	<input type="checkbox"/> to be revised by partners involved in the preparation of the deliverable <input type="checkbox"/> for approval of the task leader <input type="checkbox"/> for approval of the WP leader <input type="checkbox"/> for approval of the Technical Manager <input type="checkbox"/> for approval of the Medical Engineering Manager <input type="checkbox"/> for approval of the Medical Manager <input type="checkbox"/> for approval of the Quality Manager <input type="checkbox"/> for approval of the Project Coordinator <b>Deadline for action:</b> N/A			
<b>Keywords</b>	eHealth, Telemonitoring, European, Healthcare, Reimbursements, REACTION			
<b>References</b>				
<b>Previous Versions</b>				
<b>Version Notes</b>	Version	Author(s)	Date	Changes made
	0.9	J. Thestrup	2010-11-14	Table of Contents
	1.0	T.F. Sørensen, H. Udsen	2010-12-13	Revised TOC, Text in Section 6
	1.1	T.F. Sørensen	2010-12-19	+ Finland, Netherlands, Hungary
	1.2	T.F. Sørensen, H. Udsen, M.B. Andersen	2011-02-02	Sect. 2+3+4+5, Sect. 6 expanded
	1.3	T.F. Sørensen, J. Thestrup, H. Udsen, M.B. Andersen	2011-02-14	TOC revised, section 4 + 5 expanded, section7 added
	1.4	E. Mantovani, P. Quinn, H. Udsen	2011-02-17	Section 4.3, various additions and editing
	2.0	H. Udsen, J. Thestrup	2011-02-25	Final version submitted to the European Commission

<b>Internal review history</b>	Reviewed by	Date	Comments made
	Jo Fursse (CHC)	2011-02-22	Various minor comments and suggestions
	Manuel M. Perez (ATOS)	2011-02-21	Addition to Section 5.12.2, various minor comments

## **1. Executive Summary**

The REACTION project will develop an integrated approach to improved long-term management of diabetes. Included will be continuous blood glucose monitoring, clinical monitoring and intervention strategies, prediction of related disease indicators, risk assessment, and, ultimately, automated closed-loop delivery of insulin. A range of REACTION services will be tailored to insulin-dependent type I diabetic patients, and complementary services will be aimed at the long-term management of all diabetic patients.

The purpose of this deliverable is to provide insight into the REACTION solutions target market in support of the future deployment of the REACTION platform in different business settings. When planning commercial deployment of the REACTION platform, it is important to know the market structure but even at the design stage, this information is necessary to make sure that country-specific deployment and installation requirements are identified and recorded early in the project. The content will also provide a starting point for the development of appropriate business models in a framework commensurate with the realities of healthcare economics and reimbursement schemes.

### **1.1 European healthcare systems and diabetes**

To provide a sound appreciation of the market opportunities for the REACTION platform we need to understand the market for healthcare applications in general and for telemonitoring services in particular, to make way for the definition sustainable business cases for deployment in this very diverse market.

For a successful exploitation across Europe of the REACTION solutions it is essential to take into account the different structures of the European healthcare systems, both in terms of provisioning, financing and reimbursement and in terms of societal approach.

National health legislation and healthcare policies are the responsibilities of the governments of the EU Member States, who also set the overall financial framework for the healthcare sector, but there are great variations in devolvement of responsibilities and mandates between the Member States. Some retain control at central level, while others provide and decide for their citizens in the local community.

Healthcare services across Europe face massive challenges in the future as the European population is ageing and more and more people develop chronic diseases, challenges which concern both the quality of healthcare and the availability of resources.

At the same time, a smaller working population means less tax revenue to finance the public healthcare systems and further burdens in managing costs and meeting needs.

Diabetes mellitus has reached epidemic proportions in western countries. It is one of the fastest growing chronic conditions, with the associated morbidity and mortality representing a major health threat posed by the possible complications, especially in combination with other risk factors such as hypertension, hyperlipidemia and obesity.

#### **1.1.1 Financing healthcare**

Healthcare services in Europe are provided mainly by the public sector and financed either via taxes, via statutory health insurance or through a mixture of the two systems.

For both the tax-based and the social health insurance-based system the public funds account for the majority of total health expenditure; private expenditure is generally low, though usually somewhat higher for insurance-based systems.

The public and private expenditure on health as a percentage of the gross domestic product in the EU Member States averaged 8.3% in 2008, varying between 11.1% (France) and 7.4% (Hungary) for the countries considered in this report.

### 1.1.2 European health policy, action plans and standards

To help EU Member States pool their expertise on health and to identify and share best practices, three important initiatives have been in play:

**The i2010 action plan** had a particular focus on the development of eHealth strategies and defined an interoperability roadmap for greater use of technologies, new services and systems.

**The Digital Agenda** is part of the Europe 2020 Strategy, identifying a number of eHealth measures to be put into place or proposed over the next 2-3 years. It includes measures to use technology to address rising healthcare costs and help Member States cope with their ageing populations.

**The European Health Strategy** aims to provide an overarching strategic framework in the field of health and lists as strategic themes: *Fostering Good Health in an Ageing Europe, Protecting Citizens from Health Threats, and Dynamic Health Systems and New Technologies*. The REACTION platform will implement strategic areas covered by the strategy.

**The European Committee for Standardisation** declares in a feasibility study that there is a considerable interest in European standardisation activities related to the provision of healthcare services. It is likely that European standards could be developed and be beneficial to the citizens, healthcare providers and governments for a growing number of issues in this very large and complicated sector.

### 1.1.3 Cross-border healthcare

Open borders are always a key point in European roadmaps and are a central part of the Digital Agenda.

The legal aspects of cross-border healthcare are covered, specifically in the context of legal safeguards that should accompany patients using mobile health technologies when travelling, social security coordination between healthcare systems and policies in the area of reimbursement, and Electronic Health Records and the risks associated with the systematic flow of personal health data.

## 1.2 National healthcare systems

In Section 5 healthcare provisioning and financing, ICT and eHealth and reimbursement schemes in 15 European countries have been compiled. The main findings are summarised in Table 1.

As the table shows, there are great national differences in the way healthcare is provided, both in terms of administrative responsibility and decision making, funding, reimbursement methods and healthcare coverage.

Though funding falls in three categories, tax-based, social insurance-based or a mixture of these, no two healthcare systems are the same.

Total private health expenditure, which covers out-of-pocket payments and private health insurance, also varies considerably, from 15.5% in Denmark to 40.7% in Switzerland. In Greece, at 39.7%, it is the largest part of funding of healthcare, with National Health Insurance (NHI) and taxes making up approx. 30% each.

In addition to the financing and reimbursement mechanisms being very diverse we found that financing and reimbursement of eHealth services such as telemonitoring are practically non-existent.

Country	Main admin level for primary healthcare	Main funding	Healthcare coverage	GP payment mode	Hospital Payment scheme	ICT Rank
Austria	Regions	NHI/taxes	Multiple insurers	Fees/capitation	Per case/DRG	17
Belgium	Regions	NHI	Multiple insurers	Fees	Per case/procedure/drugs	23
Denmark	Municipal	Taxes	Local services	Fees/capitation	Global budget/per case/DRG	4
Finland	Municipal	Taxes	Local services	Salary/fees/capitation	Per case/DRG	12
France	Regions	NHI	Multiple insurers	Fees	Per case/DRG	18
Germany	Regions	NHI	Multiple insurers	Fees	Per case/DRG	13
Greece	Regions	Private/NHI/taxes	Multiple insurers	Salary	Per diem + costs	30
Hungary	Municipal	NHI	Local services	Capitation	Per case/DRG	34
Italy	Central	Taxes	National services	Capitation	Per case/DRG	28
Netherlands	Central	NHI	Multiple insurers	Fees/capitation	Global budget/per case/DRG	5
Slovakia	Central	NHI	3 insurers	Capitation	Per case/DRG	38
Spain	Regions	Taxes	Local services	Salary/capitation	Line-item budget	25
Sweden	Regions	Taxes	Local services	Salary	Per case/DRG/Global budget	1
Switzerland	Regions	NHI/Private/taxes	Multiple insurers	Fees	Per case/DRG or Global budget	7
UK	Regions	Taxes	National services	Salary/capitation/fees	Per case/DRG/Global budget	10

Table 1 Summary of healthcare systems in 15 European countries

### 1.3 Prospects for telemonitoring services

To ensure continued delivery of quality healthcare to the citizens of Europe a change in the way healthcare is delivered and the way medical knowledge is managed and transferred to clinical practice is called for. Telemonitoring may offer useful capability to open new opportunities in health and disease management, to improve illness prevention, facilitate chronic disease management through active patient participation and to enable personalisation of care that will contribute to improving the productivity of healthcare provisioning.

Self-management of diabetes is an area that offers exceptionally good prospects, both in clinical terms and in economical terms. The overall health status of diabetics can be improved by adequate management/therapy of diabetes and of the associated risk factors.

To be successful, the design and implementation of telemonitoring system architectures must go beyond the technical functionality and fulfil clinical, organisational, and patient requirements.

On this basis and in line with agreed clinical pathways, a series of potentially exploitable Telemonitoring services, their drivers and inhibitors and likely entry points for the services have been identified. A service-oriented approach will be assumed, with built-in rules processing so that services can be dynamically configured.

Healthcare professionals are needed in any telemonitoring application or service to secure correct medical intervention and monitoring, but a large number of routine tasks can be better left to ICT systems. These tasks include routine monitoring of physiological parameters, based on clinical significance and combined with filtering of data to facilitate event detection and handling.

A number of drivers and inhibitors have been identified, which may be medical, organisational, financial or regulatory in nature. Other motivational factors rely on patients' acceptance or demography, e.g. the ageing population in Europe.

The group of healthcare commissioning bodies and healthcare providers includes national and regional healthcare authorities, hospitals and clinics. They are prime customers for telemonitoring services as part of the overall healthcare system. Other stakeholders are strategic health authorities, insurance groups and patient organisations.

The main reason for the lack of successful services is rooted in lack of organisational acceptance and insufficient acceptance among healthcare commissioning bodies so that funding and appropriate reimbursement schemes are missing.

#### **1.4 Conclusions**

The first conclusion of this report is that the financing and reimbursement schemes for health services vary greatly among the EU Member States.

The second conclusion is that, based on this fragmented picture, business models and business cases for the REACTION platform must be tailor-made for every Member State.

The third conclusion is that very few reimbursement schemes for eHealth services such as telemonitoring exist.

## 2. Glossary of Terms, Abbreviations and Acronyms

### 2.1 Definition of terms

In the context of this document the following definitions of various terms and concepts have been used:

**eHealth** is used as an umbrella term that includes telehealth, electronic medical records, and other components of health IT, i.e. healthcare practice supported by electronic processes and communication.

**mHealth** (or mobile health) is a term used for the practice of medical and public health, supported by mobile devices. The term is most commonly used in reference to using mobile communication devices, such as mobile phones and PDAs, for health services and information.

The mHealth field has emerged as *a sub-segment of eHealth*, the use of information and communication technology, such as computers, mobile phones, communications satellite, patient monitors, etc., for health services and information. mHealth applications include the use of mobile devices in collecting community and clinical health data, delivery of healthcare information to practitioners, researchers, and patients, real-time monitoring of patient vital signs, and direct provision of care (via mobile telemedicine).

**Remote patient monitoring** is the same as *telemonitoring*

**Telehealth** is the delivery of health-related services and information via telecommunications technologies. Telehealth delivery could be as simple as two health professionals discussing a case over the telephone, or as sophisticated as using videoconferencing between providers at facilities in two countries, or even as complex as robotic technology.

Telehealth is an *expansion of telemedicine*, and unlike telemedicine (which more narrowly focuses on the curative aspect) it encompasses preventive, promotive *and* curative aspects. Originally used to describe administrative or educational functions related to telemedicine, today telehealth stresses a myriad of technology solutions. For example, physicians use email to communicate with patients, order drug prescriptions and provide other health services.

**Telemedicine** is the application of *clinical medicine* where medical information is transferred through interactive audiovisual media for the purpose of consulting, and sometimes remote medical procedures or examinations.

Telemedicine may be as simple as two health professionals discussing a case over the telephone, or as complex as using satellite technology and videoconferencing equipment to conduct a real-time consultation between medical specialists in two different countries. Telemedicine generally refers to the use of communications and information technologies for the delivery of clinical care.

**Telemonitoring** is a medical practice that involves remotely monitoring patients who are not at the same location as the healthcare provider. In general, a patient will have a number of monitoring devices at home, and the results of these devices will be transmitted to the healthcare provider.

## 2.2 Abbreviations and acronyms

For the purposes of this deliverable, the following abbreviations and acronyms apply:

AC treatment	Anticoagulation treatment
ALD	Affections de longue durée
AORTA	National infrastructure for data exchange between healthcare providers in the Netherlands
ASIP	Agence des Systèmes d'Information Partagés (Agency for health information systems in France)
CMT	Community Matron Team (in the UK)
CNAMTS	Caisse National d'Assurance Maladie des Travailleurs Salaries (health insurance fund in France)
COPD	Chronic Obstructive Pulmonary Disease
CPS	Carte de Professionnel de Santé (Health Professional Card in France)
DMP	Dossier Médical Personnel (EHR in France)
DRG	Diagnosis-Related Group(s)
DRG creep	Term often used pejoratively to connote changes in hospital record-keeping practices to increase case-mix indexes and reimbursement
DVB-MHP	Digital Video Broadcasting - Multimedia Home Platform
DYPE	Regional health authority in Greece
ECG	Electrocardiogram
EHR	Electronic Health Record
EMD	Electronic medication record in the Netherlands
EMR	Electronic Medical Record
EMV	Europay, MasterCard and VISA, the global standard for inter-operation of integrated circuit cards
ERA	European Research Area
FVD	Flemish Vaccination Database
GDP	Gross Domestic Product
GP	General Practitioner
HIF(A)	Health Insurance Fund (Administration) in Hungary
HMO	Health Maintenance Organisation
HRG	Health Resource Group
HTA	Health Technology Assessment
IASYS	National health system for data management in Greece
ICPC	International Classification of Primary Care
INSALUD	National Institute of Health in Spain
IPA	Independent Practice Association
LTC	Long-term care OR long-term condition
NGO	Non-Governmental Organisation
NHIC	National Health Information Centre (in Slovakia)
NHI(S)	National Health Insurance (System)

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NHS	National Health Service
NIHDI	See RIZIV
NordDRG	DRG system shared in the Nordic Countries
NPfIT	National Programme for IT (for NHS in England)
NSIS	New Health Information System (in Italy)
NYHA	New York Heart Association
NZa	Nederlandse Zorgautoriteit (Dutch Healthcare Authority)
OECD	Organisation for Economic Co-operation and Development
PCT	Primary Care Trust (local health authority in England)
PDA	Personal Digital Assistant
RAID	Redundant Array of Independent Disks (for data storage)
RIZIV	Rijksinstituut voor ziekte- en invaliditeitsverzekering (National Institute for Health and Disability Insurance in Belgium)
RPM	Remote Patient Monitoring
SHA	Strategic Health Authority in England
SHI	Social Health Insurance
WDH	Electronic general practitioner's records in the Netherlands
WHO	World Health Organization
WSD	Whole System Demonstrator

## 3. Introduction

### 3.1 Purpose, context and scope of this deliverable

The purpose of this deliverable is to provide insight into the REACTION target markets in support of the future deployment of the REACTION platform in different business settings. When planning commercial deployment of the REACTION platform, it is important to know the market structure: who is the ultimate decision maker, who are the users, who determines the price, and where are the most likely entry points. But even at the design stage, these considerations are necessary to make sure that country-specific deployment and installation requirements are identified and recorded early in the project. Hence, the purpose of this deliverable is to give an overview of the country-specific conditions for deployment of eHealth services across Europe as input to the requirement engineering process and later to the process of developing sustainable business models and realistic business cases.

The content thus contributes to the socioeconomic foundation for the work carried out in Task T9.4 'Healthcare economics and business models', the objective of which is to develop a business framework that aligns with the realities of healthcare economics and reimbursement schemes. The socioeconomic foundation will also be an integral part of the scenarios to be used in the comprehensive user validation foreseen in the project.

The provisioning and financing of long-term healthcare and home care differs between the EU Member States and a solid understanding of these differences is required to ensure successful integration of REACTION applications into these different healthcare systems.

While the potential market is global in terms of geography, the initial focal point will be Europe, specifically the EU Member States. This report covers relevant aspects of the healthcare systems and related environments in the following 15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hungary, Italy, the Netherlands, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

It has been the intention to gather as much relevant information as possible for all 15 countries, but the outcome differs in terms of depth and provision of details, specifically in relation to procuring up-to-date information on reimbursement fees and other cost information. This is partly due to the fact that publicly available information is not always current, partly because the information is only available in the native language of the country in question.

### 3.2 Structure of the document

This document is structured in the following way:

**Section 1** is the Executive Summary.

**Section 2** contains a Glossary of Terms, Abbreviations and Acronyms.

**Section 3** is an Introduction describing the purpose, content, scope and background of this deliverable.

**Section 4** describes the European Healthcare Systems including future challenges, financing characteristics, European policies, action plans and standards and finally the legal aspects of cross-border healthcare, also in terms of telemedicine and mHealth.

**Section 5** details the National Healthcare Systems in terms of administration, provisioning, financing, ICT/eHealth and reimbursement schemes for 15 European countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hungary, Italy, the Netherlands, Slovakia, Spain, Sweden, Switzerland, and the United Kingdom.

**Section 6** outlines Prospects for Telemonitoring Services, including tasks, stakeholders, drivers and inhibitors, market entry points and prospects for reimbursement schemes.

**Section 7** contains the Conclusions of the report.

**Section 8** lists the tables in the document.

**Section 9** lists References.

### 3.3 Background

Diabetes mellitus has reached epidemic proportions in western countries, and diabetes is one of the fastest growing chronic conditions in the developed world.

Though the incidence in the rest of the world is lower, the expected growth rates are even higher. On a global scale the number of diabetes sufferers is predicted to rise from 194 million in 2003 to 333 million in 2025, as shown in Figure 1.

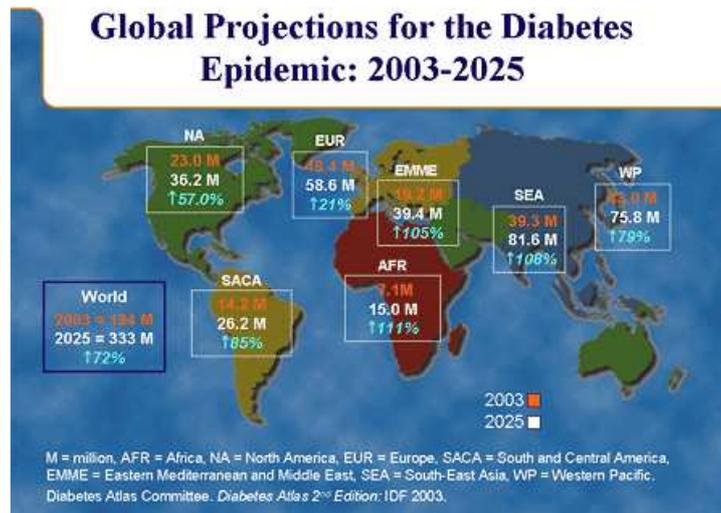


Figure 1 The Global Diabetes Epidemic

Diabetes has been associated with a two- to four-fold increase in hospitalisation rates, and hyperglycaemia in admitted patients has found to be an important marker of poor clinical outcome and mortality, especially in patients with type 2 diabetes.

There is abundant evidence that tight control of the blood glucose level is vital for good diabetes management and insulin therapy. Good glucose control requires frequent measurement of blood glucose levels and complicated algorithms for assessing the insulin dose needed to adjust for short-term variations in activity, diet and stress.

Poor blood glucose control is also associated with severe, even fatal, long-term complications for diabetes patients; all these issues will be addressed in the REACTION project.

### 3.4 The REACTION Platform

The REACTION project will develop an integrated approach to improved long-term management of diabetes; continuous blood glucose monitoring, clinical monitoring and intervention strategies, monitoring and predicting related disease indicators, complemented by education on lifestyle factors such as obesity and exercise and, ultimately, automated closed-loop delivery of insulin.

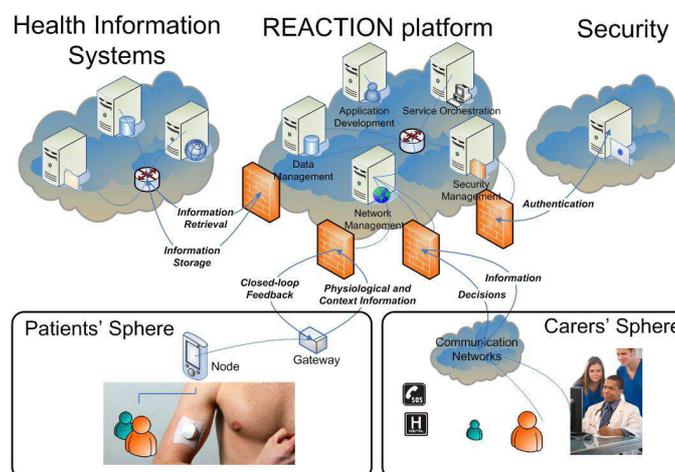
The REACTION project seeks to use the great potential of new technologies to address the major societal challenges in coping with the increasing number of citizens suffering from insulin-dependant diabetes. The success of the new technological applications depends heavily on the acceptance from end users, i.e. patients, relatives and professional carers as well as the acceptance from healthcare commissioners, business stakeholders, and regulatory authorities.

Technically, the REACTION platform will feature an interoperable peer-to-peer communication platform based on a (SoA) service oriented architecture where all functionalities, including devices, are represented as services and applications consist of a series of services orchestrated to perform a desired workflow. The REACTION platform also features a Model Driven Application Development environment based on extensive use of dynamic ontologies and advanced Data Management capabilities with algorithms for clinical assessment and rule-based data processing. A simplified interpretation of the platform architecture is shown in Figure 2.

A range of REACTION services will be developed targeted to insulin-dependent Type I diabetic patients. The services aim to improve continuous blood glucose monitoring (CGM) and insulin therapy, by both basal dose adjustment and contextualised glycaemic control based on patient activity, nutrition, stress level, etc. Decision support will assist healthcare professionals, patients and informal carers to better manage diabetes therapy and make correct choices about e.g. good blood glucose control, nutrition and exercise.

REACTION will further develop complementary services targeted at the long-term management of all diabetic patients, Type I and Type II. Integrated monitoring, education, and intervention will ensure all patients remain at healthy blood glucose levels, with early detection of onset of complications.

Security and safety of the REACTION services will be studied and necessary solutions to minimise risks and preserve privacy will be implemented. Legal framework for patient safety and liability as well as privacy and ethical concerns will be analysed and an outline of a policy framework will be defined. Moreover, impacts on healthcare systems will be analysed and health economics and business models will be developed.



**Figure 2 The REACTION Platform**

A solid economic foundation is required for a similar successful integration of REACTION applications into healthcare systems in Europe. A suitable framework for analysis of value creation and business modelling will be developed, which will allow accurate and viable metrics for cost-effectiveness, organisational adaptation and sustainable business and cost-benefit models for the stakeholders. Clinical and medical scenarios will be used to capture parts of the service concept idea and to contribute to a common understanding between stakeholders. Moreover, the business cases will be an integral part of the scenarios for the purpose of user validation. It is thus important that the scenarios are also capable of capturing parts of the service value model and not just focus on functionalities and other inherent attributes.

The development and implementation of ICT in healthcare requires willingness to invest large sums without expecting to see the economic benefits immediately. The eHealth Impact<sup>1</sup> project has demonstrated that there is at least a 4 years payback period of ICT investments in eHealth. After this period, there will be a 2:1 ratio between costs and benefits, thus illustrating the overall benefits of investing in ICT in healthcare. Most governments are adapting this view and beginning to see ICT investments as long term investments a major priority in order to ensure an efficient and cost-effective healthcare system in the future.

In the trail of the extensive ICT developments within the healthcare systems in Europe in recent years, there is a fertile environment for the introduction of yet more comprehensive services for improving healthcare and make healthcare providers more effective. But the valorisation of new ICT service in healthcare is becoming more and more focused on real value creation. Every new product has to provide a viable cost-benefit to the healthcare provider or it has to provide real, measurable advances in medical practice in a prioritised area. Understanding the business framework in this ecosystem is an essential prerequisite for the successful deployment and exploitation of new services and applications.

<sup>1</sup> eHealth-Impact, EU funded project under the 6th Framework Programme, [www.ehealth-impact.org](http://www.ehealth-impact.org)

## **4. European Healthcare Systems**

In order to understand the market opportunities for the REACTION platform, and thus put the full set of requirements into perspective, we need to understand the market for the healthcare applications in general and for telemonitoring services in particular. Understanding the market conditions, the buying behaviour and stakeholder dynamics, and the drivers and inhibitors for market take-up will allow us to better define the proper business models and the sustainable business cases for successful deployment in this market.

### **4.1 The healthcare domain in brief**

The structures of European healthcare systems are diverse and it is therefore necessary to be aware of fundamental differences in order to be able to commercially exploit REACTION solutions successfully across Europe.

Healthcare is divided into three areas: primary, secondary and tertiary care. Primary care can be defined as the basic or general healthcare focused on the point at which a patient ideally first seeks assistance from the medical care system. Primary healthcare is usually provided in the community by general practitioners (GPs), local health clinics, district nurses and primary care specialists (e.g. physiotherapists). In Europe, primary care generally falls within the administrative responsibility of regions/districts, while local municipalities are often responsible for long-term care and home care. Secondary care covers ambulatory medical services and hospital care (inpatient and outpatient services), thus offering specialised care generally provided through referral from primary care providers. Tertiary care is the highly specialised care offered in specialist (or university) hospitals with sophisticated technological facilities and support. Hospitals offering secondary and tertiary care are generally administered at regional/district level or privately, although some EU Member States have a more centralised administration of hospitals.

National health legislation and healthcare policies are the responsibilities of the governments of the EU Member States. National governments also set the overall financial framework for the healthcare sector, albeit with varying degrees of control of the management of the allocated financial resources for healthcare services.

#### **4.1.1 Healthcare challenges**

Healthcare services across Europe face massive challenges in the future as the European population is growing older, more and more people have chronic diseases, and the general needs and expectations for efficient and effective healthcare services increase. These challenges concern both the quality of healthcare and the availability of resources – human as well as economic resources – to deliver healthcare services. Most European Member States are likely to face a severe shortage of healthcare staff to care for the growing number of patients.

From the economic perspective, a smaller working population means less tax revenue to finance the public healthcare system, thus placing additional strain on the resources within public healthcare delivery. Public healthcare systems face serious challenges in controlling and managing healthcare costs while at the same time meeting healthcare needs. At the same time, the general public is likely to have higher demands requiring an efficient healthcare system. Public demands of high-quality care, easy access and fast and reliable treatment are most likely to become even more firm and influential in the future.

#### **4.1.2 Challenges to healthcare systems from diabetes**

Diabetes mellitus has reached epidemic proportions in western countries (Zimmet2001) and is now one of the fastest growing chronic conditions in the developed world. In Britain, a total of about 3% (1.3 million) of the population have diagnosed diabetes. It is estimated that an additional 2% of the population have undiagnosed diabetes.

The associated morbidity and mortality of diabetes represents a major healthcare burden. Diabetes can cause many complications if the disease itself and associated risk factors (e.g. hypertension and hyperlipidemia) are not adequately controlled. These complications include cardiovascular diseases (CVD), chronic renal failure, eye disease leading to blindness and neuropathy. Thus, diabetes more

than doubles CVD risk, which is the most common cause of renal failure and blindness, and increases the risk of amputation by 20-30%.

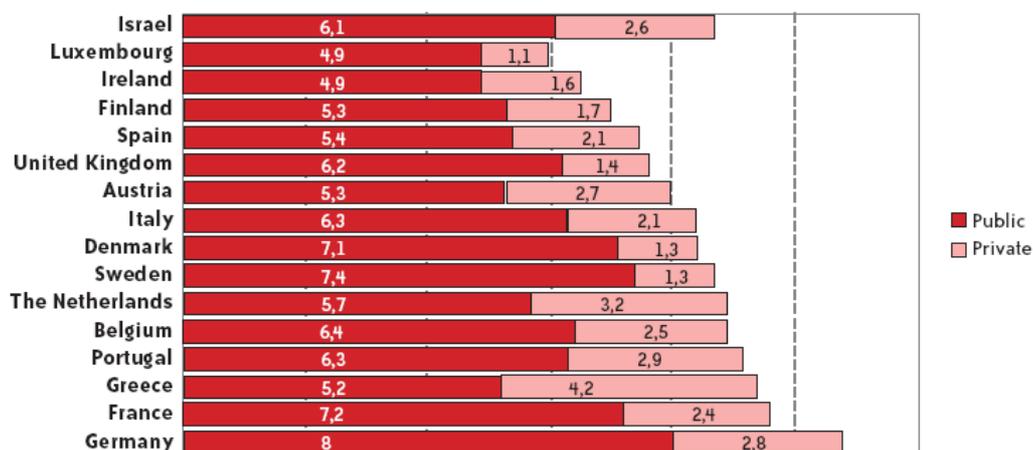
Diabetes type 2 is closely linked to lifestyle and the emerging epidemic of obesity, which is now a major cause of preventable health problems. Lifestyle diseases are also increasingly affecting the younger population, with increased incidences of obesity, hypertension, high cholesterol and diabetes type 2.

#### 4.1.3 Financing healthcare in Europe

Healthcare services in Europe are mainly provided by the public sector. It is possible to distinguish between a) tax-based systems (based on the so-called Beveridge Model (PHNP2010)) where healthcare services are funded through general national tax revenue and provided by the public sector free of charge, and b) statutory health insurance systems (based on the Bismarck model (PHNP2010)) where healthcare services are funded through non-risk related insurance contributions and provided by a greater mixture of public and private providers. The UK, Italy, Spain, Denmark and Sweden have tax-based healthcare systems, whereas e.g. Germany and France have social health insurance based healthcare systems. Greece falls in-between the two systems as healthcare services are financed both by general taxes and statutory insurance contributions.

For both the tax-based and the social health insurance-based system, the public funds account for the majority of total health expenditure. Private expenditure on healthcare services is generally relatively low and mainly consists of out-of-pocket payments for over-the-counter medical products, dentistry and private voluntary health insurance. In EU Member States with a health insurance-based healthcare system (i.e. France and Germany) the percentage of private expenditure on health is generally higher compared to EU Member States with a tax-based healthcare system. This is partly because the former have some private co-payments (out-of-pocket) for certain public healthcare services at the point of use. In Greece and the Netherlands the percentage of private expenditure on health is also relatively high as there are private co-payments (out-of-pocket) for some public health services. Sweden does also have private out-of-pocket fees for inpatient services with a ceiling setting the limit of private expenditure per year.

The public and private expenditure on health as a percentage of the gross domestic product in the different EU Member States is illustrated in Figure 3.



Source: OECD Health Data 2004, 1st edition; Israel data from World Health Report, 2004 estimated for 2001

Figure 3 Public and private expenditure on health as percentage of GDP in EU-15

Statutory insurance contribution-based healthcare systems in Europe have a greater mixture of public and private providers of both primary and secondary healthcare services. The statutory health insurance schemes mainly act as purchasers of healthcare services from both public and private providers, albeit they may provide some healthcare services as well. The statutory health insurance schemes are responsible for providing public healthcare services and are the major source of financing healthcare.

## 4.2 European policy framework and action plans

The main thrust of EU public health policy is to help EU Member States pool their expertise on health, to identify and share best practices and to help coordinate the EU-wide response to health threats such as infectious disease outbreaks. Fostering cooperation between EU Member States' healthcare systems is also becoming an increasingly important area of activity.

### The i2010 action plan

The i2010 action plan (EC2011a) had a particular focus on the development of eHealth strategies and defined an interoperability roadmap for greater use of technologies, new services and systems, to create a "European eHealth Area". The roadmap identified various steps involved in order to reach its goals, of which some are being addressed by REACTION:

- Recommend a set of guidelines to facilitate Member States' decision-making on eHealth interoperability, and to assess what aspects of interoperability are most urgent (e.g., Electronic Health Records, health messaging and patient identifiers);
- Reinforce appropriate collaborations by/with industrial players and public-private partnerships;
- Propose possible legislative or regulatory approaches to eHealth interoperability, including aspects relating to data privacy and security.

The i2010 action plan states that trustworthy, secure and reliable ICT are crucial for a wide take-up of converging digital services.

### The Digital Agenda

In 2010 The European Commission has set out its Digital Agenda (EC2011b), which part of the Europe 2020 strategy. The agenda identifies a number of eHealth measures that will be put into place or proposed over the next 2-3 years, leading to follow-up actions up to 2015. The initiative will then be developed over the next 10 years, as a part of the Europe 2020 Strategy.

The Digital Agenda includes measures to use technology to address rising healthcare costs and help Member States cope with their ageing populations. The European Commission will set up wide-scale pilots to take forward the ideas in the Digital Agenda. One of these will aim to give Europeans secure, online access to their medical health data so they can share it with doctors. The action plan says the planned delivery date for this initiative is 2015-20. Another activity will aim to "increase safety and medical assistance to Europeans, for instance in an emergency abroad, by defining a minimum set of health information to be included on patient records that can be accessed electronically anywhere in the EU." This action is planned for implementation by 2012.

In addition to more specific actions around eHealth, the agenda also outlines plans to provide effective interoperability between IT products and services to "build a truly digital society". These will include new legal measures to reform the rules on the implementation of ICT standards.

### The European Health Strategy

The new European Health Strategy (EC2007a) aims to provide an overarching strategic framework in the field of health and lists as strategic themes: *Fostering Good Health in an Ageing Europe, Protecting Citizens from Health Threats, and Dynamic Health Systems and New Technologies.*

The REACTION platform will implement these strategic areas covered by the strategy:

- a. New disease management strategies, better lifestyles of elderly people and new care models for chronic diseases
- b. Dynamic health systems, facilitated with eHealth solutions, will allow for personalised care models, effective clinical pathways and optimised workflows in the healthcare sector.

#### 4.2.1 European standards

Over the years the EU has established standards and laws on the protection of people's health. The Health and Consumer Protection Directorate General has the task of keeping these laws up to date, to check what is really happening and that the rules are being applied properly in all EU Member States.

CEN (European Committee for Standardisation) declared in a feasibility study (CEN2004) that there is considerable interest in European standardisation activities related to the provision of healthcare services. It is likely that European standards could be developed and be beneficial to the citizens, healthcare providers and governments for a growing number of issues in this very large and complicated sector. However, it is national, regional or even local governments in EU Member States who actually apply the EU's health and consumer protection laws.

### **4.3 Cross-border healthcare in Europe**

Open borders are always a key point in European roadmaps and are a central part of the Digital Agenda (EC2011b). Cross-border aspects are relevant to many usage areas, including healthcare, but their relevance is rising in the context of mHealth (mHealth or m-health or mobile health is the term used for the practice of medical and public health, supported by mobile devices) because of the increasing mobility of EU citizens. Patients enrolled in continuous care solutions using mHealth technologies must be able to travel freely in Europe, and indeed throughout the world, while continuing to enjoy the security and safety of care.

#### **4.3.1 Legal aspects of cross-border healthcare**

This Section, written from a legal perspective, analyses some of the implications of cross-border healthcare in the European Union. With the expression "cross-border healthcare", we mean the interactions between people (patients and health professionals), goods (devices, software, pharmaceuticals) and services (provided by health providers), all of which are granted freedom of movement across the internal borders of the European Union. This Section, more specifically, will pause on three topics or interactions. The first topic concerns the legal safeguards that should accompany patients using mHealth technologies and wishing to travel in Europe while continuing to enjoy the security and safety of care. The second area delves on the social security coordination between healthcare systems and policies in the area of reimbursement. The third area deals with Electronic Health Records (EHRs) and the risks associated with the systematic flow of personal health data that EHRs imply.

##### **Legal safeguards**

The possibility of travelling safely through European Union Member States using an mHealth device requires a blend of legal, organisational and technical measures to avoid unjustified or excessive drawbacks for the patient or affected parties, e.g., GPs, nurses or hospitals. From a legal point of view, the use of mHealth technologies raise questions about who is liable and to what extent in case a component fails to work properly, for instance the communication system falls out, or in case the system is victim of a malicious hacking attack, e.g. "illegal access", "illegal interception", "data system interference", "computer related fraud". These questions invest criminal law aspects as well as civil law and liability aspects.

Currently, there is no binding regulatory framework determining jurisdiction in criminal matters. The basic rule is that states incriminate actions that happen on their territory. However, Member States, *rectius*: the judicial authorities of Member States, tend to broaden the notion of territory by using criteria, such as the ubiquity of trans-border action committed via electronic means, arguing that they are competent for similar facts and at the same time. To avoid conflicts of jurisdiction, the 2001 Council of Europe Cybercrime Convention provides for a guideline imposing that "the Parties involved shall, where appropriate, consult with a view to determining the most appropriate jurisdiction for prosecution" (CE2001). The 2005 EU Framework Decision 2005/222/JHA on attacks against information systems requires the Member States concerned to cooperate in order to decide which of them will prosecute, with the aim, if possible, of centralising proceedings in a single Member State (Article 10, paragraph 4). Besides the issue of jurisdiction, which awaits an international solution, the Cybercrime Convention considers criminal offences the production, sale, distribution of hacking software (Article 6). In addition, both the 2001 Cybercrime Convention and the 2005 Framework Decision, attribute criminal liability to legal persons, e.g., in case a company did not provide adequate supervision (Article 8 and 9 of the 2005 Framework Decision, Article 12 2001 Cybercrime Convention).

When a person using mHealth devices travels abroad he or she will be surrounded by a number of service providers. If a security failure occurs in such an environment, the person harmed would have to find the specific provider who committed the fault, prove that he or she committed the fault that caused the damage. This is difficult to prove. That is why Directive 85/374 on liability for defective

products stipulates that producers are jointly and severally liable. It also creates a 'liability without fault' (or strict liability) because it is 'the sole means of adequately solving the problem, peculiar to our age of increasing technicality, of a fair apportionment of the risks inherent in modern technological production.' The directive does not apply to services and it is unclear whether it applies to software. In many cases, in an Aml world, the general rules on liability will still apply and problems remain. For instance, the directive does not provide that a product is defective when it insufficiently protects against privacy violations or when it easily allows identity theft.

The e-commerce directive 2000/31 provides specific provisions on the liability of electronic service providers. The directive limits the liability of intermediary service providers in three situations, namely mere conduit (transmission in a communication network of information or provision of access to a communication network, Article 12) caching (automatic, intermediate and temporary storage of information, Article 13), and hosting (storage of information, Article 14).

In conclusion, law on liability is only partially harmonised at the EU level, liability being mostly regulated by national laws of Member States. The question arises as to which Member State's law is applicable to cross-border situations. As far as the contractual obligations are concerned, the law applicable is indicated by Convention 80/934/ECC on the law applicable to contractual obligations (aka the Rome Convention on the law applicable to contractual obligations). For non-contractual obligations, the EU recently adopted a regulation which unifies the rules on the law applicable, Regulation (EC) No 864/2007 of 11 July 2007 on the law applicable to non-contractual obligations (aka Rome II Regulation).

Furthermore, interoperability is crucial to ensure that health information society systems and networks are compatible when used in different countries. To this end, an important legal instrument is the Directive on technical standards and regulations, which regulates some aspects of standardisation in the Union (EC1998). Regarding interoperability of software programmes the Software Directive obliges Member States to protect computer programmes by copyright and asserts that only a specific expression and not the underlying ideas and principles or any element of the computer programme are protected.<sup>2</sup> The Universal service directive recognises the need to provide universal services to citizens at an affordable price (EC2002). These and other instruments are important to ensure that mHealth technologies run smoothly throughout EU territory. They will be analysed in greater detail in deliverable D9.2 on the Regulatory framework.

### **Social security coordination**

A growing number of EU citizens (and indeed citizens of Non-Member States) are travelling across borders to receive health treatment, to avoid waiting lists or to seek specialist treatment that may only be available abroad. The EU is working towards ensuring that its citizens who move across borders have access to healthcare anywhere within the EU. This has led to healthcare systems and policies becoming more interconnected.

While citizens in the EU are, in principle, free to seek healthcare wherever they want and from whatever provider is available, in practice this freedom is limited by their ability to pay for it or by the conditions set out by public and private funding systems for healthcare (Palm2010). Essentially, free movement of patients revolves around the question of whether the right to healthcare extends to service providers outside the state where the citizen's social security is affiliated (state of affiliation).

Since its foundation, the European Union's policy of granting access to healthcare outside the state of affiliation has been governed by secondary legislation enacted to realise the fundamental principle of free movement. Based upon Article 42 TEC, now Article 48 of the Treaty on the Functioning of the European Union (TFEU), the Community framework was established to ensure the coordination of social security rights of internal migrant workers and their families. Article 22 and 22-bis of EC Regulations 1408/71/EEC and 574/72/EEC specifically address the question of access to treatment outside the "home state". Basically, access to care outside the state of affiliation is awarded to people requiring care that has become medically necessary during a temporary stay or to people receiving authorisation from their competent institution in their home state to obtain treatment in another Member State.

The general rule of what can be termed "coordination route" is that people who fall under the scope of this mechanism and qualify for treatment are covered as though they were insured under the statutory

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<sup>2</sup> Council Directive 91/250/EEC of 14 May 1991 on the legal protection of computer programmes OJ L 122, 17.5.199, repealed by Directive 2009/24/EC of 23 April 2009.

system of the Member State where they are treated, at the expenses of the competent Member State, usually being the state where the person pays social security contributions. In practice, the tariffs, benefits, and reimbursement conditions of the state in which treatment occurs apply to patients affiliated to another Member State. The coordination has been revised several times to adapt to societal developments, which have resulted in the expansion of the treatment cover by the Article 22 mechanism and in the inclusion of non-EU nationals who are affiliated to a social security scheme within the EU (EC2003a). A new Social Security Regulation was issued in 2004 which replaced Regulation 1408/71/EEC and will enter into force once the implementing regulation, replacing regulation 574/72/EEC, is adopted.

As discussed below, the case law of the European Court of Justice (ECJ) has reduced the scope of application of the coordination route. Since the landmark Kohll and Decker case (ECR1998), the ECJ has repeatedly stated that Article 22 of Regulation 1408/71/EEC, mentioned above, does not prevent the reimbursement by Member States of costs incurred in connection with treatment provided abroad (at the tariffs, conditions etc. applied in the state of treatment), even without prior authorisation.

Since 1998, thanks to the case law of the ECJ, reimbursement of healthcare provided in another Member State by the state of affiliation can be claimed not on the basis of the social security coordination route (as based on Article 42 of the TEC), but on the basis of the fundamental principles of free movement of goods and, in particular for our purposes, services as enshrined in Article 28 and 49 of the TEC, respectively (now Article 34 and 56 TFEU).

The Court, in the Geraets-Smits and Peerbooms case (ECR2001), has made clear that a medical activity is a service under the terms of Article 50 TEC (now Article 57 TFEU), regardless if it is provided in a hospital setting or not. A medical service performed in a Member State but eligible for reimbursement under another Member State's insurance system, according to the Court, still falls within the scope of the freedom to provide services, even if the treatment is conditioned by the possibility to cover its costs, which is a decision of national legislation of Member States (ECR2001), (ECR2003). As reimbursement schemes present conditions that may hinder the decision of individuals to travel abroad to seek medical care, it follows that reimbursement for cross-border care cannot be unduly restricted without infringing on Article 49.

The EU has in fact no general competence in the field of healthcare. Public health law, which concerns the organisation of social security systems and healthcare, is an area of exclusive competence of the Member States. Accordingly, healthcare services have been excluded from the application of the Directive on Services in the Internal Market, also called the Bolkestein Directive (EC2006a). However, the Court has made clear that Member States must nonetheless comply with Community law, in particular with the provisions on the freedom to provide services. Accordingly, measures that deter, hinder or make it more difficult for patients to seek treatment from providers in other Member States is prohibited, unless justified by "overriding reasons of general interest", which must be necessary, proportional and reasonable, and non-discriminatory. Thus, limiting reimbursement to providers established in the Member State of affiliation would be contrary to Article 49 (ECR2004a); also submitting reimbursement to the condition of prior authorisation can be regarded as an obstacle to freedom of movement, if prior authorisation for treatment abroad is more difficult to obtain than prior authorisation for treatment in the state of affiliation (ECR1998), (ECR2004b). In Geraets-Smits and Peerbooms, the court went further to argue that a state cannot restrict reimbursement for treatments that a Member State considers "normal", thus not experimental, in its own national professional circles. In order to refuse reimbursement the Member State must consider "what is sufficiently tried and tested in international medical science" (ECR2001).

Later the Court in Müller-Fauré and in Geraets-Smits and Peerbooms contended that prior authorisation (certifying that the state of affiliation will cover healthcare costs incurred in another Member State) cannot be justified for non-hospital services. For the Court, the choice of patients to receive such medical services in another Member State would have no or limited financial impact, given that patients would, in any case, be able to claim reimbursement for outpatient care under the same conditions and according to the same tariffs as applicable at home. For hospital care, by contrast, the Court accepted that considerable costs, increasing needs, scarce financial resources etc., justify the necessity for planning, including submitting reimbursement for services provided in another Member State to prior authorisation, provided this is proportional and non-discriminatory (ERC2004c).

In conclusion, within the European Union there exists a dual system of access to cross-border healthcare (Palm2000). One based on the freedom of movement of persons (Article 42 TEC) and the

other based on the freedom of movement of services (Article 49 TEC). The social coordination route guarantees patients that health costs incurred for treatments previously agreed upon will be covered (as though patients were insured in the country of treatment). The Article 49 access route created by the case law of the ECJ is more flexible, allowing patients to claim expenses as part of their right to seek medical services abroad (as though the treatment were provided in the country of affiliation).<sup>3</sup>

Reimbursement issues pose a challenge to telemedicine. As the Standing Committee of European Doctors has stated, European telemedicine projects have often failed because they were too expensive and/or because health insurance funds would not cover the costs (CPME2002). According to the European Commission, arguably the reason why telemedicine services cannot be covered by reimbursement schemes is that for some Member States a medical act to be legally recognised as such, requires the presence of the patient and the health professional in the same place (EC2008b), (Callens2010), (Callens2002).

The de-personalisation of the medical act fails to fulfil one of the conditions for reimbursement, physical presence, which is inherent to telemedicine. As discussed above, under the social coordination route, states can determine the conditions under which a person can subscribe to a social security scheme as well as the conditions under which the right to obtain reimbursement or other benefits exist. It is necessary to remember that the EU has no general competence to regulate healthcare; pursuant to Article 46 for public health reasons, Member States can view the condition of physical presence as imperative in the common interest.

We have seen, however, that such “prior authorisation”, viz. the list of treatments performed abroad that can be covered by national health insurance, cannot be too restrictive or based on merely “national” criteria, as that would hinder the freedom of movement of services (protected under Article 49) and be turned down by courts. Taking Article 49 into account, therefore, if a person seeks medical diagnosis from a health provider located in another country by electronic means, that person cannot be refused reimbursement by the state of affiliation by arguing that a “cross-border” act of telemedicine does not represent a medical act.

However, if a Member State does not recognise on its territory telemedicine as a medical act due to the lack of physical presence, its refusal to grant reimbursement for the same act performed by a practitioner located abroad does not amount to undue restriction of cross-border freedom of movement of services as the restriction applies both in situ and abroad, the cross-border element is therefore not involved, Article 49 is not involved.

Further reflection at the European level will be needed to produce guidance on what telemedicine treatments can be considered as medical acts for the purpose of reimbursement.

For the purpose of reimbursement, one should recall Article 4 of the e-commerce Directive 2000/31/EC (EC2000). According to Article 4.1 “Member States shall ensure that the taking up and pursuit of the activity of an information society [including telemedicine] service provider may not be made subject to prior authorisation or any other requirement having equivalent effect.” However, Article 4, paragraph 2 specifies that “paragraph 1 shall be without prejudice to authorisation schemes which are not specifically and exclusively targeted at information society services, or which are covered by Directive 97/13/EC on a common framework for general authorisations and individual licences in the field of telecommunications services”. This provision incorporates an important principle, namely, that Member States may subject reimbursement to the fulfilment of certain conditions. Telemedicine projects and actors operating in Europe will have to comply with those conditions, i.e. authorisation, licences or diplomas, if the treatments they provide are to qualify as health treatment “assumable” under social security national schemes.

### **Electronic Health Records**

The European Union has taken the political leadership with the Health Information Exchange Scheme. Indeed, several projects and cross-border initiatives to exchange Electronic Health Records (EHR) and information concerning electronic prescription are being carried out between Member States and different healthcare providers. EHR systems are critical to an accurate and usable exchange of health information, as well as the laying of the foundations for reducing healthcare costs in the long term.

While electronic health records can contribute to enhance patients’ safety by allowing healthcare actors to manage in a systematic way information concerning patients, the use of EHRs that contain

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<sup>3</sup> The distinction is introduced by Palm & Glinos, “Enabling patient mobility in the EU”, (Palm2010) , p. 520

data supplied by and accessible to a variety of healthcare actors, also poses risks (EC2004). According to Article 29 Working Party opinion on Electronic Health Records (DPWP2007), (Pouillet2010), "In compiling existing medical information about an individual from different sources with the result of allowing for easier and more widespread access to this sensitive information, EHR systems introduce a new risk scenario, changing the whole scale of possible misuse of medical information about individuals." The WP is of the view that eHealth systems which provide direct access to a compilation of data from different sources and throughout a sustained period of time (also a lifetime), transgress the traditional boundaries of individual direct control and of the relationship with care professional or institutes of care (DPWP2007). Telemedicine applications, in addition, usually involve a team of physicians and nurses who have access to personal data, not only the treating physician, and multiple access points. This raises the risk that health data are used for purposes other than that originally foreseen (treatment). The risk scenario is that data become readily available to a wider circle of recipients in particular international conglomerates of health actors, both private and public, located in different parts of the world under different data protection regimes.

The Working Party is of the opinion that accessing medical data in an EHR for purposes other than those mentioned in Article 8 (3) of the Data Protection Directive 95/46/EC should in principle be prohibited. Article 8.3 allows derogation from the principle enshrined in Article 8.1, which sanctions a general prohibition on the processing of health data. According to Article 8.3 health data can be processed when this is "required" for the purposes of preventive medicine, medical diagnosis, the provision of care or treatment or the management of healthcare services (necessity), and when it is carried out by persons subject to a legal obligation of professional secrecy. In the view of the Working Party, this provision would exclude access to EHR by medical practitioners who act as experts for third parties: e.g. for private insurance companies, in litigations, for granting retirement aid, for employers of the data subject etc.

In the view of the European data protection authority, explicit and express consent must be asked before any new processing of health data contained in an EHR. Patients must be always asked for consent as to which actors, or categories of actors are allowed to have access to their records. In a more recent opinion in December 2009 (DPWP2009), the Working Group went further suggesting the elaboration of mechanisms for "assisted decision making", which can assist the individual and prevent that patients are illegally induced to disclose their EHR data, e.g. upon request of a possible future employer or a private insurance company.

#### **4.3.2 Global eHealth strategy**

The European Union has a new policy framework which brings together internal and external policies around the objective of improving the EU collective contribution to global health (EC2010). The Commission's Communication aims to contribute to improve governance at global and national levels. In this context, the EU will work to enhance its data collections on healthcare with relevant national and international bodies such as WHO, the OECD and the Health Metrics Network, to improve health information systems and the collection of comparable data and statistics to allow benchmarking and inform global, European and national policies. The EU will also continue to promote the use of ICT, including eHealth. The Communication provides an opportunity to better link EU efforts in advancing health knowledge with global needs and, in turn, to better link this knowledge and evidence with our dialogues on health policies.

## 5. National Healthcare Systems

Sections 5.1 through 5.15 describe healthcare provisioning and financing, ICT and eHealth and reimbursement schemes in Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hungary, Italy, the Netherlands, Slovakia, Spain, Sweden, Switzerland, and the United Kingdom.

The following sources have been used extensively for statistical and other information:

\* Source: WHO/Europe, European Health for All Database, July 2010;

\*\* Source: Paris, V., M. Devaux and L. Wei (2010), "Health Systems Institutional Characteristics: A Survey of 29 OECD Countries", *OECD Health Working Papers*, No. 50, OECD Publishing;

\*\*\* Source: [http://www.itu.int/ITU-D/ict/publications/idi/2010/Material/MIS\\_2010\\_Summary\\_E.pdf](http://www.itu.int/ITU-D/ict/publications/idi/2010/Material/MIS_2010_Summary_E.pdf)

Other references are listed in Section 9.

### 5.1 Austria

The tasks of the Federal Government are largely delegated to the Länder within the framework of indirect federal administration and/or to the self-governing social insurance institutions. However, the Federal Government retains an important role in policy-making and as a supervisory authority for the enforcement of the laws on healthcare provision.

 Austria	Total healthcare expenditure as % of GDP (2008)*	10.1%
	Provision of primary healthcare coverage**	Multiple insurers
	Predominant primary care physician payment mode**	Fee-for-services/Capitation
	Predominant outpatient specialist payment mode**	Fee-for-services
	Hospital payment scheme**	Payment per case/DRG (47%)/ Retrospective reimbursement of costs (48%)
	Population in thousands (2010)	8,397
	Regions (Länder) and Municipalities	9 and 2359
	Number of hospitals per 100,000 inhabitants (2008)*	3.2
	Hospital beds per 100,000 inhabitants	771
	Number of physicians and nurses per 100,000 inhabitants (2008)*	460 and 752
ICT Development Index/Rank (2008)***	6.72/17	

Table 2 Healthcare statistics – Austria

#### 5.1.1 Healthcare provisioning and financing

The Länder and municipalities play an important role in establishing, implementing and monitoring the various aspects of the public health service. Legislation at Länder level is made by the Länder parliaments, whose members are elected by proportional representation.

The organisational structure of the Austrian healthcare system is defined by the interaction of public, private non-profit-making and private profit-making players. There are three levels of organisation, the federal level, the Länder and local community level and the self-governmental level (social insurance and service providers).

Primary care services are mainly provided by private solo practices. Outpatient specialist services are also predominantly provided by private solo practices, but also by public hospitals.

Acute hospital care is mainly provided by public hospitals, but also by private not-for-profit and for-profit hospitals; the ratio of number of beds is approx. 72:19:9.

The management of public hospitals in all Länder has been outsourced to hospital operation companies organised according to private law, with the exception of Vienna. Apart from the hospitals sector, healthcare provision for the Austrian population is organised by negotiations between the social insurance institutions and the professional or statutory representatives of the service providers.

In accordance with the tasks defined by the constitutional and social insurance laws, the financing of healthcare expenditure is pluralistic. Social health insurance, which covers the risk of illness of around 98% of the population, is the most important source of financing. It financed 45% of healthcare expenditure in 2004. Including the expenditure for long-term care (7.7%), 25% was financed from general tax revenue. Including the expenditure on private health insurance, private households financed 25% of health expenditure (Hofmarcher2006).

<b>Total public</b>	Public General government	Public Social security	<b>Total private</b>	Private Out-of-pocket	Private health insurance
<b>76.4%</b>	31.6%	44.8%	<b>23.6%</b>	15.4%	4.6%

**Table 3 Health expenditure by financing agent in Austria\*\***

### 5.1.2 ICT in Healthcare and eHealth

Nearly all GP practices use a computer; however, there is a noticeable difference depending on the size of the practice. 77.3% of single GP practices use computers compared to 91% for practices with 2-3 GPs and 98.6% for practices with 4+ GPs. Also, the use of Internet varies significantly depending on the size of the GP practice: 56.4% for single GP practice compared to 97.1% for practices with 4+ GPs.

Computers are mainly used for the electronic recording and storing of administrative and medical patient data. The electronic transfer of administrative and medical patient data is hardly used. The electronic transfer of laboratory results is quite low (37.1%) but this still places Austria in the middle compared to other EU Member States. The electronic exchange of patient data for the purpose of prescriptions to pharmacies (ePrescriptions) is very low (2%) but nevertheless places Austria among the top 10 in the EU. Overall, Austria is placed in middle (average eHealth performer) when it comes to eHealth performers in the EU (EC2008a).

Like other Western countries, Austria has been working to modernise its health system by implementing IT solutions for many years and, like other countries, these solutions are often highly fragmented and generally not compatible with each other.

In The Austrian Health Reform Act 2005, the use of information technologies in healthcare was defined as a priority. Also, the Health Telematics Act aims at the secure exchange of individual health data.

#### E-card and GIN

The implementation of the E-card (Health Insurance Card) was completed in 2005. Initially, the E-card was used to verify health insurance entitlement, but in 2006 integration of the hospital information systems began and the plan is to add a range of functionalities which will be offered to e-card users (EC2007b).

To establish the connection, doctors use a virtual private network, GIN ("Gesundheits-informationsnetz", health information network), which was installed at the same time as the nationwide roll-out of the E-Cards. Despite some initial difficulties with the network, the E-Card roll-out is largely considered a success.

At this stage GIN is a purely an administrative tool for the social security system, used exclusively by doctors in private practice. More demanding health IT projects can be found in Austria's hospitals, which are engaged in both smartcard projects and regional networking projects.

## **NÖMED WAN**

NÖMED WAN is one of the biggest medical regional networking efforts in the German speaking countries. Its aim is to give hospitals and doctors access to patients' medical history in the federal Austrian state of Lower Austria. Another goal is to network the hospitals without forcing them to buy new hospital information systems.

NÖMED WAN has created a regional master patient index for 27 hospitals. At the moment, it is also piloting an 'electronic medical history' in five hospitals, with direct access to discharge letters. In order to identify a patient in the system, doctors use the patient's 'E-Card' in offline mode.

## **ELGA**

ELGA stands for "Elektronische Gesundheitsakte" (electronic health record). The long-term goal of the project is the implementation of a decentralised electronic health record system. In this vision, patient data will remain with individual hospitals, but made accessible to doctors in private practice and the patients themselves.

The key to accessing the patient data will be the E-Card. Alongside the electronic medical records will be other medical applications including electronic prescriptions, referrals and discharge letters, electronic laboratory data and electronic medication history.

An online portal with health information for citizens will also be developed, allowing citizens access to their individual patient data after E-Card-identification. Finally, a national medical document registry is required to enable doctors to view the medical history of a patient and to access patient data.

### **5.1.3 Reimbursement schemes for healthcare and eHealth**

#### **Reimbursement of GPs**

In Austria, "contracted" primary care doctors working in private practice are paid by a capitation, for "basic services", and by fee-for-service. Capitation accounts for almost 70% of their income (Hofmarcher2006). A fee-for-services system is the predominant mode of payment for outpatient specialist services.

#### **Regulation of prices/fees for physicians' services**

Fees are negotiated between insurers and government and physician representatives. This applies to both primary care physicians and specialist services. However, a significant proportion of physicians and specialists are allowed to charge prices higher than "official fees".

#### **Reimbursement for hospital services**

Hospital payments are a combination of activity-related payments and retrospective funding of all costs.

#### **Regulation of prices/fees for hospital services**

Payment modes and levels are negotiated at central level. Hospitals can charge patients for superior accommodation, such as private rooms.

## 5.2 Belgium

The Belgian health system is mainly organized on two levels, i.e. federal and regional. Since 1980, part of the responsibility for healthcare policy has been devolved from the federal Government to the regional governments. Responsibility for healthcare policy is shared between the federal Government, and the Dutch, French and German speaking community Ministries of Health.

 <b>Belgium</b>	Total healthcare expenditure as % of GDP (2008)*	9.7%
	Provision of primary healthcare coverage**	Common health insurance scheme
	Predominant primary care physician payment mode**	Fee-for-services
	Predominant outpatient specialist payment mode**	Fee-for-services
	Hospital payment scheme**	Payment per case (45%) + Payment per procedure (41%) + payments for drugs (14%)
	Population in thousands (Jan 2010)	10,882
	Regions, Provinces and Municipalities	3, 10 and 589
	Number of hospitals per 100,000 inhabitants (2009)*	1.92
	Hospital beds per 100,000 inhabitants	660
	Number of physicians per 100,000 inhabitants (2008)*	298 (Number for nurses not available)
ICT Development Index/Rank (2008)***	6.36/23	

Table 4 Healthcare statistics - Belgium

### 5.2.1 Healthcare provisioning and financing

The Belgian health system is based on the principles of equal access and freedom of choice, with a compulsory national health insurance, which covers almost 99% of the population and has a very broad benefits package. Compulsory health insurance is combined with a private system of healthcare delivery, based on independent medical practice, free choice of service provider and predominantly fee-for-service payment. All individuals entitled to health insurance must join or register with one of several sickness funds, which are a non-profit, non-commercial organization.

Primary care services are mainly provided by private solo practices, but also by private group practices. The same is the case for outpatient specialist services.

Acute hospital care is provided by private not-for-profit hospitals and public hospitals; the ratio of number of beds is approx. 66:34.

The federal government is responsible for regulating and financing the compulsory health insurance, for determining accreditation criteria, for financing hospitals and so-called heavy medical care units, for legislation covering different professional qualifications and for registration of pharmaceuticals and their price control.

Numerous public authorities are responsible for the funding of healthcare and for overseeing its organisation. The division of responsibilities is mirrored by the fragmented structure of the Belgian State.

The **RIZIV** (Rijksinstituut voor ziekte- en invaliditeitsverzekering – National Institute for Health and Disability Insurance) is a federal institution under the Minister of Social Affairs which organises, manages and supervises the correct application of the compulsory insurance in Belgium. The RIZIV determines the conditions to obtain the different benefits (disease, accident, maternity, paternity, adoption) and the calculation of the benefit amounts.

Social security contributions and subsidies from federal government are the main funding sources for the compulsory health insurance system. In 2005, social contributions accounted for 74.8%, state subsidies for 11.4% and alternative financing (mainly from indirect tax revenues) for 13.8% of the general social security scheme.

Patients participate in healthcare financing via co-payments. There are two systems of payment: (i) a reimbursement system, for which the patient pays the full costs of services and then obtains a refund for part of the expense from the sickness fund, which covers ambulatory care; and (ii) a third-party payer system, for which the sickness fund directly pays the provider while the patient only pays the coinsurance or co-payment, which covers inpatient care and pharmaceutical.

<b>Total public</b>	Public General government	Public Social security	<b>Total private</b>	Private Out-of-pocket	Private health insurance
<b>75.1%</b>	12.4%	62.7%	<b>24.9%</b>	19.0%	5.6%

**Table 5 Health expenditure by financing agent in Belgium\*\***

## 5.2.2 ICT in Healthcare and eHealth

Nearly all GPs use a computer in their practice but with a small difference depending on the size of the practice. Thus, of single GP practices 80.1% use computers compared to 96.4% of practices with 2-3 GPs and 96% for practices with 4+ GPs. This difference is also evident in relation to the use of the Internet: 77.9% single GP practices compared to 96.4% of practices with 2-3 GPs and 92% for practices with 4+ GPs. Interestingly, all of the practices with 2-3 GPs that use computers also use the Internet.

Computers are mainly used for the electronic recording and storing of administrative and medical patient data and Belgium is placed in the lower top group in the EU. The exchange of administrative and medical patient data (both 12.9%) to other care providers/professionals is hardly used, except for the transfer of laboratory results which is quite high in comparison (73.5%). Prescriptions to pharmacies (ePrescriptions) are practically not used (1.6%). Overall, Belgium is in the top group among the average eHealth performers in the EU (EC2008a).

Belgium's eHealth strategy focuses on using ICT to improve the quality of healthcare delivery, including the exchange and sharing of healthcare information. Basic interoperability has been achieved, and the priority is now on the development of "intelligent" applications (used for decision support) for general practitioners, and on the structure and codification of patient files for other practices (EC2007b).

Several national and regional projects have been launched to promote eHealth through pilot and validation projects, especially regarding sharing of patient data, cooperation between healthcare professionals, set-up of regional networks, home care, authentication and identification services.

Initiatives at the federal level include the introduction of eID (electronic identification card), the decision and the effective set-up of a eHealth backbone infrastructure (Governmental Decision of December 2004), the registry of health professionals, a legal initiative on electronic signatures, the labelling of EHR systems for GPs, for dentists, for nurses and for physiotherapists, etc. (Devlies2006)

Funding of hospitals for specific IT implementation requirements and to promote data exchange with local/regional GPs amounts to approx. EUR 1 million annually, while regional funding of health networks differs between EUR 250,000 and EUR 1.5 million per network per year, with an additional EUR 250,000/year from federal level.

### Pilot projects in telemedicine and telemonitoring

The RIZIV funds 6 telemedicine projects with a total budget of EUR 500,000. The duration of projects varies from 18 months to maximum 3 years. The 6 projects are (NIHDI2007):

1. Belgium-HF (Better Efficacy in Lowering Events by General Practitioner's Intervention Using remoter Monitoring in Heart Failure)
2. Telemonitoring of NYHA III-IV patients with heart failure

3. Tele-Heart Failure II Study
4. Pilot Study: importance of home telemonitoring in the COPD patient
5. Telemonitoring at risk from hypertension 6) Pilot project on dementia.

### FVD and Vaccinnet

A Flemish Vaccination Database (FVD) and web portal Vaccinnet have been developed to increase and sustain child vaccination rates across Flanders, Belgium. The FVD and Vaccinnet are web-based applications that contain the vaccination requirements and records of all children born in Flanders as well as comprehensive information on stocks and shipping.

### 5.2.3 Reimbursement schemes for healthcare and eHealth

The RIZIV establishes rules for the reimbursement, determines the tariffs of the healthcare services and pharmaceuticals, and publishes the fees for GP and specialist health services (RIZIV2010).

#### Reimbursement of GPs

Physicians – whether they are GPs or specialists – are paid on a fee-for-services basis.

The patient pays the set fee for a consultation directly to the physician and is then reimbursed by the sickness fund. For patients without preferential reimbursement, most services are reimbursed at a rate of 75%, so the patient shares 25% of the cost. The share is 35% for a GP home visit and 40% for a consultation with a specialist or a physiotherapist.

The co-payment for preferential-reimbursement-rate beneficiaries amounts to about 10% for a GP office consultation, 10% for a GP home visit, 15% for a specialist consultation, and more than 20% for physiotherapy.

The fees charged by GPs may differ depending on qualifications, specialisation and place and time of day.

Ninety percent of the physicians receive bonuses representing 2% of their revenues for the management of chronic diseases.

Code	Health service	Payment, EUR
101010	Consultation with health professional	14.18
101032	Consultation with regular GP	19.64
101076	Consultation with specialty GP	22.98
107030	Care programme for Type 2 diabetes patient	81.87

Table 6 Typical fees paid for medical services (RIZIV2010)

#### Regulation of prices/fees for physicians' services (Corens2007)

Fees are negotiated at the central level by interested parties (social health insurance and/or government and physician representatives).

The fees for GPs, specialists in hospitals and office-based specialists are negotiated at national level in the National Convention Committee of Sickness Funds and Physicians of the RIZIV-INAMI.

The resulting agreement (so-called convention) needs the endorsement of the Minister of Social Affairs and is normally concluded for a two-year period. The agreement is then referred to all individual physicians for approval.

As an incentive for GPs to adhere to the conventional tariffs, the RIZIV-INAMI contributes to a fund for granting additional old-age or disability pensions to providers who respect the conventional tariffs.

When the agreement comes into force, each physician who has accepted the agreement becomes a "convention" physician and is obliged to respect the set fees. Non-convention physicians can set their fees freely. However, the agreement will also set certain conditions under which even convention physicians can charge higher fees. These depend on the time and place of consultation and the

economic situation of the patient. A significant proportion of physicians are allowed to charge prices higher than official fees (OECD2010a).

### **Reimbursement for hospitals services**

Hospital payments are a combination of payment per case (45%), payment per procedure (41%) and payments for drugs (14%).

Medical and medico-technical services (consultations, laboratories, medical imaging and technical procedures) and paramedical activities (physiotherapy) are reimbursed via a fee-for-services system to the service provider.

Hospitals receive additional funding from:

- Sale of pharmaceutical products
- A prospective budget for pharmaceuticals for inpatient care
- Specific ambulatory activities, e.g. day hospitalisation, dialysis and rehabilitation, which are reimbursed per patient via lump sums
- Subsidies for investments from the communities
- Personal contributions and supplements charged to patients
- Non-hospital activities, such as commercial operations and rest and nursing homes, cafeteria, newspaper shop, etc.

Inpatient care is covered by the third-party payer system. An insured person only pays a co-payment, while the bulk of the cost of treatment is directly paid by the sickness fund to the hospitals.

For inpatient care, a patient's out-of-pocket payments consist of (Corens2007):

- A flat rate per day for hospitalisation
- A room supplement for a single or double room
- The physician's fee supplements for non-convention physicians
- Costs of certain non-reimbursable medical products or pharmaceuticals
- A flat rate charge per day for pharmaceuticals (EUR 0.62), per inpatient stay for diagnostic tests (EUR 7.44), and per inpatient stay for radiology (EUR 6.20).

Services of accommodation (nursing units), emergency admission (accident and emergency services), and nursing activities in the surgical department are financed via a fixed prospective budget system based on "justified activities".

In 2001 an annual maximum co-payment for hospital services was introduced. This measure restricted the out-of-pocket maximum by setting a threshold of EUR 450 for vulnerable groups, EUR 650 for children and a ceiling of up to EUR 1,800 for others, depending on net family income. Further reductions apply for chronic illnesses.

### **Regulation of prices/fees for hospital services**

Prices paid for hospital services are negotiated as part of the annual budget process at the federal level.

### **eHealth reimbursement**

There is no specific reimbursement of eHealth services as such. They are funded indirectly through enabling investments in standards, in a thesaurus and other databases and needed infrastructures.

### 5.3 Denmark

The main feature of the Danish healthcare system is a decentralised responsibility for primary and secondary healthcare. There are three administrative levels: the State, the regions and the municipalities, each with clearly defined responsibilities. All residents enjoy free access to health services.

 Denmark	Total healthcare expenditure as % of GDP (2008)*	9.9%
	Provision of primary healthcare coverage**	Local health services
	Predominant primary care physician payment mode**	Fee-for-services/Capitation
	Predominant outpatient specialist payment mode**	Salary
	Hospital payment scheme	Prospective global budget (80%) + Payment per case/DRG (20%)
	Population in thousands (Sept 2010)	5,558
	Regions and Municipalities	5 and 98
	Number of hospitals per 100,000 inhabitants (2007)*	Not available
	Hospital beds per 100,000 inhabitants	369
	Number of physicians and nurses per 100,000 inhabitants (2007)*	342 and 1429
ICT Development Index/Rank (2008)***	7.53/4	

Table 7 Healthcare statistics – Denmark

#### 5.3.1 Healthcare provisioning and financing

The state (the Ministry of Health) is responsible for national health policy, financing of the health system and health insurance. The five regions are overall responsible for the healthcare system (i.e. hospitals and general practitioners).

The regions finance private practitioners, e.g. general practitioners (GPs), specialists and physiotherapist. The municipalities are responsible for disease prevention, health promotion, long-term care, rehabilitation, and social care.

The regions own and operate 96.7% of the hospitals. 2.5% of the hospitals are owned and operated by not-for-profit organisations and 0.8% is owned and operated by for-profit companies (Paris2010).

The financing of the healthcare system is obtained through earmarked proportional taxation at the national level. Eighty percent of this revenue is redistributed to the regions via block grants, based on objective criteria (social and demographic indicators). The remaining 20% is redistributed to the municipalities which use these funds to co-finance regional hospital services for the respective population. Self-employed practitioners are financed through taxes and out-of-pocket user charges.

Central government in Denmark finance more than 80% of the expenditures of the health services. Private out-of-pocket payments cover nearly 14% and include payments for dental care, specialised services etc.

Trends within the national healthcare provisioning, point towards a decrease in the length of hospitalised treatment and an increase in outpatient treatment at clinics or at home (Strandberg2007).

Total public	Public General government	Public Social security	Total private	Private Out-of-pocket	Private health insurance
84.5%	84.5%	0.0%	15.5%	13.8%	0.2%

Table 8 Health expenditure by financing agent in Denmark\*\*

### 5.3.2 ICT in Healthcare and eHealth

Denmark can be regarded as the European frontrunner concerning the availability of ICT infrastructure as well as when it comes to the use of eHealth among General Practitioners. Both computer and Internet are available in virtually all Danish GP practices and only an absolute minority (8%) does not resort to broadband connections.

In all three use categories under observation (Electronic storage of patient data, Computer use in consultation, Electronic transfer of patient data), usage rates in Denmark are among the highest found in the EU27, Iceland and Norway. As regards patient data transfer, Denmark is the top performer including in the area of ePrescribing.

The use of Electronic Health Records (EHR) is well deployed among Danish general practitioners, which all have offices with a computer and electronic records of patients. However, there is still a lack of one single national electronic health record for every patient. The challenge is the interaction and communication between electronic health records at the general practitioner, in hospitals and at the municipalities.

In spring 2010 the five regions established The Regions' Organisation for eHealth (RSI2010a). The purpose of the RSI organisation is to strengthen cooperation and procurement of eHealth among the regions. In June 2010 RSI launched a strategy with 24 initiatives aiming at a common implementation of eHealth in Denmark. Among the 24 initiatives (RSI2010b) the ones most relevant for REACTION are:

- Development of a strategy for how telemedicine solutions can optimize the operations of the hospitals by 2011. The strategy will be a common agreed upon document covering all five regions. The Capital Region of Denmark is in charge of this work.
- All hospitals have a single-sign-on access for personnel working at a hospital by 2013.
- All regions will take ICT and automation into account when new facilities are designed and built starting from year 2010. Telemonitoring can alter the demand for hospital beds and will require more ICT facilities at the hospitals.
- All regions will have e-boards providing information about acute patients arriving at an emergency centre/hospital by 2011. The e-board will be connected with the ambulance service.
- All regions will provide an electronic health record by 2013.
- All regions will provide a clinical ICT workplace for all personnel working at a hospital by 2013.

### MedCom – The Danish Healthcare Data Network

MedCom (MedCom2010) provides standards for eHealth with a healthcare data network. The penetration and rates of use of the Healthcare Data network is: GPs 97%, specialists 74%, pharmacies and hospitals 100%, local authorities 44%. The types of eHealth service delivered through the network include: referrals and discharge summaries, prescriptions, teleradiology, laboratory results look-up through the National Health portal (sundhed.dk). MedCom is financed by: Ministry of Health, Ministry of Social Affairs, Association of Danish Regions, Association of Local Government Denmark and Danish Pharmaceutical Association.

MedCom currently handles over 500.000 messages pr month. MedCom activities in 2011 are expected to be with a focus on telemedicine as they aim at being a national centre for telemedicine.

MedCom co-manages a telemedicine programme with Nation Coordination body for eHealth (MedCom2010, SDSD2010). The programme is financed by the Ministry of Finance's Danish PWT Foundation for Investment in Public Welfare Technology (ABT2010). The programme aims at:

- The national spread of telemedicine solutions
- Help to mature telemedicine concepts for national deployment
- Evaluate telemedicine concepts
- Collect knowledge about challenges and obstacles for the deployment of telemedicine.

## **NSI**

NSI, the National Coordination body for eHealth in Denmark (NSI2011), is a new body for coordination of eHealth in Denmark. NSI will replace an older, similar institution 'Digital Sundhed' (SDSD2010a). The Ministry of Finance is in charge of the new coordination body.

NSI is still in the making, but the expectation is that NSI will carry on with some of the projects initiated under the 'National Strategy for Digitalisation of the Danish Healthcare Service 2008-2012', which was launched in 2007 (SDSD2010b). The objectives of the Strategy are:

- Supporting healthcare quality and productivity
- Improving services and involve citizens and patients
- Creating digital coherence by strengthening cooperation

These objectives support coherence between digitalisation of the healthcare service and the strategy for digitalisation of the public sector in general. The strategy is based on the previous national IT strategies for the hospital system 2000-2002 and for healthcare service 2003-2007, which have so far been the common framework for digitalisation of the Danish healthcare service.

## **Sundhed.dk**

Sundhed.dk (Sundhed2010) is the official Danish eHealth portal for the public Danish healthcare services. Sundhed.dk makes it possible for patients and healthcare professionals to access information and to communicate with each other.

Citizens have access to an ever-increasing number of online services such as appointment booking, prescription renewal, and e-consultation. Patients can obtain information about prevention, treatment and coping, waiting list information for all hospitals, health laws and regulations etc., and they have access to their own health data, cross-sector personal electronic medicine profile, patients' medical history (since 1977) and online Donor Registration.

Health professionals have access to patient appointment calendar, web access to laboratory data, ICPC search of diagnoses, patient records (medicine records, medical records etc.), secure e-mail communication and many other features.

### **5.3.3 Reimbursement schemes for healthcare and eHealth**

#### **Reimbursement of GPs**

One third of the income for the general practitioners is a capitation fee per patient, while two thirds of the income is related to the activities delivered by the general practitioner. These activities are reimbursed as fee-for-services.

The reimbursable services cover outpatient primary care, outpatient specialist referrals, clinical laboratory tests and diagnostic imaging. The capitation fee per patient was DKK 345 in October 2009.

In 2008 capitation fees paid to GPs totalled DKK 1,800 million, covering consultations in person and by telephone, tests etc. At national level, total expenses covering fee-for-services payments to GPs was DKK 5,000 million in 2008.

In 2003 a new activity was introduced for e-mail consultations, and another activity for treatment of diabetes was introduced in 2006 (FM2010).

Prices for some of the most commonly used activities:

Number	Activity	Payment, DKK
		Exchange rate: EUR 100 = DKK 745
0101	Consultation	129.40
0105	E-communication (including communication with social worker and caretaker)	50.67
0106	Planned consultation with prevention purpose	215.36
0107	Care programme for patients with diabetes	1121.15
0201	Consultation by telephone	25.34

Table 9 Fees for GP activities, October 2010 (DMA2010)

### Regulation of prices/fees for physicians' services

Prices are negotiated annually between the Association of Danish Regions and the Danish Medical Association (the general practitioners organization, PLO, is part of the Danish Medical Association). The prices are negotiated by a committee made up by representative from Ministry of Health, Ministry of Finance, Association of Local Government and a representative from each of the five regions. GPs can charge a reasonable price for patients insured in group 2, i.e. 2% of the population.

By December 2010 the new agreement contained elements of treatment of chronically ill patients. To secure a coherent treatment the regions, the municipalities and the GPs are obliged to work closer together with a common responsibility. With the new agreement GPs are obliged to implement new ICT tools (dknyt2010).

### Reimbursement for hospital services

The hospital activities are reimbursed through a global budget covering 80% of the expenses and 20% is covered by DRG payments (Paris2010). The global budget is negotiated annually between the Association of Danish Regions and the Ministry of Finance.

The Ministry of Health calculates yearly a DRG payment for health activities provided at the hospitals. The DRG payments reflect an average of the expenses in each group of patients across all hospitals. As the DRG payments reflect the average expenses at a national level a hospital can either have expenses below or above the average. This difference is due to differences in productivity, patients etc.

Group	Activity	Payment, DKK
BG50A	Outpatient visit (patient more than 7 years old)	1,185
BG50B	Outpatient visit (patient between 0-6 years old)	1,686
BG50C	Outpatient visit with anamnesis/journaling	1,930
BG50D	Emergency room	911
BG50E	Telephone and e-mail consultations	171
BG50F	Substitution fee for (outpatient) telemedicine	593

Table 10 Prices paid to hospitals for outpatient activities (SUM2010)

### Regulation of prices/fees for hospital services

DRG payments are set by the Ministry of Health. Suggestions for new services can be sent to the Ministry of Health, Centre for Health Economics. The typical request for change is submitted by the regions, hospital management or doctors in clinical associations. All these parties may suggest payments for new services. Suggestions must be sent no later than March 1st 2011 for DRGs for 2012. The DRG payments are regulated and published once a year by the Ministry of Health (SUM2010).

### eHealth reimbursement

As of January 2011 new DRG codes for telemedicine and telemonitoring were introduced in the DRG system. Until then the DRG system included telemonitoring and telemedicine in the general budget given to the hospitals by the regions. With the new DRG payment the health service of telemonitoring, treatment of diseases by distance and e-mail consultation for doctors at the hospital are reimbursed with a new DRG payment set by central government.

Group	Activity	Payment , DKK
ST01A	Pacemaker check - telemedicine	825
ST01B	Lung function check - telemedicine	1,527
ST01C	Lung function check + reversibility test - telemedicine	2,475

**Table 11 Prices paid to hospitals for telemedicine activities (SUM2010)**

The activities which take place between hospitals as telemedicine activities (evaluation of images etc.) are perceived as assistance and therefore not included in the new DRG payment.

The new DRG payments cover three areas:

- Chronic obstructive pulmonary disease
- Pacemaker monitoring
- Anticoagulation therapy

The Minister of Health announced in January 2011 that more DRG payments for telemedicine and telemonitoring services are to come.

## 5.4 Finland

In Finland, the healthcare system is decentralised with the 342 self-governing municipalities responsible for health and social services (among others.) The state is responsible for legislation related to healthcare and social policies. The healthcare system is primarily funded by taxes and compulsory National Health Insurance fees and covers all residents.

 Finland	Total healthcare expenditure as % of GDP (2008)*	8.4%
	Provision of primary healthcare coverage**	Local health services
	Predominant primary care physician payment mode**	Salary/Capitation/Fee-for-services
	Predominant outpatient specialist payment mode**	Salary
	Hospital payment scheme	Payment per case/DRG
	Population in thousands (Jan 2011)	5,377
	Districts/Municipalities	20/342
	Number of hospitals per 100,000 inhabitants (2008)*	5.82
	Hospital beds per 100,000 inhabitants	652
	Number of physicians and nurses per 100,000 inhabitants (2007)*	269 and 1547
ICT Development Index/Rank (2008)***	7.02/12	

**Table 12 Healthcare statistics – Finland**

### 5.4.1 Healthcare provisioning and financing

In effect there are three different publicly funded healthcare systems in Finland: i) municipal healthcare, ii) private healthcare, and iii) occupational healthcare. These three systems differ in relation to the services they provide, user fees and waiting times.

The municipal healthcare system organises the majority of healthcare services. The municipalities are responsible for providing healthcare to all their residents. Each municipality may determine the range of services they offer but generally this range is very broad and includes also preventive care, rehabilitation, long-term care and specialised care. They may also purchase healthcare services from other municipalities or hospital districts, private providers or the third sector (non-governmental

organisations and foundations). Municipalities fund healthcare services mainly through taxes but they also receive some state subsidies and user fees.

Each municipality must have a health centre which provides primary health services. The physicians who work in these municipal health centres are typically salaried employees of the municipalities. However, the payment system of GPs varies between each municipality.

All residents are covered by the statutory National Health Insurance (NHI) scheme. The NHI is funded by employers (33% in 2006), the insured (38%) and the state (28%). The NHI mainly funds private healthcare, occupational healthcare, outpatient drugs, and sickness allowances. Private healthcare mainly consists of ambulatory care available in larger cities. The NHI covers approximately one third of the actual costs of the private health services.

NHI funding is divided into two pools: Income Insurance and Medical Sickness Insurance. The Income Insurance is funded by the insured (also via fees collected through taxation) and employers. It covers occupational healthcare, sickness and maternity leave allowances. About 40% of the employers' expenses are reimbursed by the NHI. The Medical Sickness Insurance is funded equally by the insured (via fees collected through taxation) and the state, and it covers those services not covered by the Income Insurance.

Municipalities have authority to collect taxes for the purpose of providing health services. Finland has 229 primary healthcare centres (2007). The municipalities are responsible for financing and managing the hospital district. Hospital districts have different methods for collecting funding. Finland is divided into 20 hospital districts, and each hospital district operates publicly owned hospitals. There are a few private hospitals in Finland, but they represent less than 5%. Eleven percent of all GPs work in a private practice (Castro2009). The Finnish system can be described as one of the most decentralised in the world.

The provision of hospital services and prices are negotiated between the municipalities and their respective hospital district on an annual basis. There is no provider-purchaser split as virtually all municipalities both fund services and own the service provision organisations. This also means that hospital districts do not act as third-party purchasers and the municipalities are ultimately responsible and must cover any deficits and will retain any savings made. To counteract the economic risk for small municipalities of high cost patients, there is an equalising mechanism and a funding pool to cover these expenses in place within the hospital district. However, high cost patients still pose a significant economic risk especially to the smaller municipalities.

Non-governmental organisations and foundations provide a broad range of healthcare services and they are quite active in the healthcare sector (Teperi2009, Vuorenkoski2008).

Total public	Public General government	Public Social security	Total private	Private Out-of-pocket	Private health insurance
<b>74.6%</b>	60.1%	14.5%	<b>25.4%</b>	18.9%	2.1%

Table 13 Health expenditure by financing agent in Finland\*\*

#### 5.4.2 ICT in Healthcare and eHealth

All GP practices in Finland use computers and the Internet. Computers are mainly used for the electronic recording and storing of administrative and medical patient data as well as for the transfer of lab results. The electronic exchange of medical patient data to other care providers/professionals is also high (54.8%) in comparison with other EU Member States (second after Denmark) as is the electronic exchange of administrative data to other care providers (20.8%). ePrescription is not in use (see below) but still Finland is among the 5 frontrunners in eHealth use among GPs (EC2008a).

Finland has worked to develop a common national health IT infrastructure. Although much of the work to integrate it into health organisations and build regional networks occurs at the local level, local systems use common infrastructure and services defined at the national level. The use of electronic health records are widely used at Finnish hospitals as well.

ePrescription is only in use in the GP offices but it is not connected to the pharmacies. Finland ran an e-prescribing pilot project between 2004 and 2006 but discontinued the project. Although Finnish physicians almost universally have access to an electronic health record system that allows prescription entry at present, they cannot transmit prescriptions electronically to the pharmacy (Castro2009).

### **Strategies**

In 1996 Finland's Ministry of Social Affairs and Health established the first strategy focused on using IT to create a more integrated, patient-focused healthcare system. The government revised the strategy in 1988 to target specific goals for eHealth, including an electronic health record for every patient, interoperability with legacy systems, and high levels of security and privacy.

By 2011 all GPs are required to use the new national patient record system. Pharmacies must also use the new e-prescribing service.

### **Health portal for patients**

Finland's national eHealth portal "TerveSuomi" (HealthFinland) provides citizens with online access to timely and relevant healthcare information. The portal does not offer access to patients' electronic health records or to online health services. Finland's government develops common metadata standards and ontology so that data can be easily aggregated from more publishers.

### **Video teleconference**

Finland was an early adopter of the use of video conferencing in healthcare. Patients in regional healthcare centres in Finland can attend a videoconference session with their primary care provider and a nurse at another location; at a hospital the specialist and nurse provide the consultation. Specialists can provide consultation through video conferencing in 14 of Finland's 21 hospital districts, and patients can participate at 17% of the healthcare centres nationwide.

### **KanTa – electronic health IT infrastructure**

While Finland has had a high adoption of electronic health records, interoperability between these systems continues to be a problem. A major component of KanTa will be a centralized national electronic archive called eArchive, to which healthcare providers will provide official health records, allowing data to flow seamlessly between health providers. It will also give patients access to their personal health information. The planned completion of KanTa is 2011 (Castro2009).

### **Terivan Antico**

Terivan Antico is a treatment specific ICT solution for anticoagulation (AC) treatment follow-up in primary healthcare. The service provides decision support and follow-up data visualisation tools for both healthcare professionals and patients. Further services include user-to-user communication and multimedia information about AC treatment and follow-up. For healthcare professionals, the primary media portal is web-based, whilst follow-up patients also utilise mobile, and in the future, DVB-MHP compliant digi-TV portals. Digi-TV is a particularly interesting media for use among older patients who are accustomed to using standard analogue television.

The service includes functionality for submitting AC treatment follow-up test results, either automatically from laboratory information systems or manually by nurses and patients. If this is done manually, the follow-up is achieved through point-of-care testing on a portable meter. The GP submits new treatment guidelines, based on the follow-up tests. It has been operational since 2003, in the municipal primary health centre of Ikaalinen in southwest Finland, following a pilot project in 2001 (EC2003b).

## **5.4.3 Reimbursement schemes for healthcare and eHealth**

### **Reimbursement of GPs**

Most doctors working in municipal health centres are salaried employees. In some centres, patients are assigned to a specific doctor. In those cases doctors are paid through a mix of salary (60%), capitation (20%), fee-for-services (15%) and other allowances (5%) (Paris2010).

Another unique characteristic of the system is the existence of a secondary public finance scheme (the National Health Insurance scheme, NHI), which partly reimburses the same services as the tax based system, but also services which are provided by the private sector. NHI also partly reimburses the use of private hospital care.

There is a co-payment of EUR 13.70 – 27.40 per visit for adult patients in public health centres, with an annual cap. Children are exempt.

Reimbursements of private physicians' fees are based on fixed charges. The National Social Insurance Institution reimburses 60% of the physician's fee. However, in most cases the actual charge is higher and thus the reimbursement is less than 40 per cent (NOMESCO2008).

### **Regulation of prices/fees for physicians' services**

Capitations rates and salaries are set by negotiations between the interested parties at the central level.

### **Reimbursement for hospital services**

Hospital districts are managed and funded by the member municipalities. Funding is mainly based on municipal payments to hospital districts according to the services used. Additional funding is provided through user fees and government grants.

In the absence of nationally set regulations or even guidelines, each hospital district determines the payment methods used to reimburse its hospitals. Because payment methods are district based, they may vary from district to district. The pricing trend has been consistently moving away from the bed-per-day price towards case-based prices. Presently, 13 out of 21 districts use DRG-based pricing. The principles and rules for DRG usage vary greatly between hospital districts because there are no national guidelines (Häkkinen2010).

### **Regulation of prices/fees for hospital services**

As purchasers, municipalities negotiate annually the provision of services with their hospital district. There are different contractual or negotiation mechanisms between hospital districts and municipalities for agreeing on target volumes and payments.

Both the volumes and costs are planned based on the previous year. The budget of each hospital district is based on these negotiations and is formally decided by Council, whose members are appointed by each municipality. The council approves the financial statements (such as payment methods and levels of payments) and makes decisions about major investments. The major purpose of hospital pricing systems has been to cover the costs of production and to allocate hospital costs fairly between the municipalities financing the provision of services within a hospital district.

DRG rates are negotiated between municipalities and hospital districts, which are owned by the municipalities.

User fee for adults for hospitalisation is EUR 32.50 per day and EUR 89.90 for day surgery. There is an annual cap, after which services are free of charge for the rest of the year, with the exception of short-term stays in institutions/hospitals. Children are exempt. (NOMESCO2008).

The negotiation mechanisms are under continuous change and development. The budget of each hospital district is based on these negotiations and is formally decided by a Council, whose members are appointed by each municipality. The council also approves the financial statements (such as payment methods and levels of payments/prices) and makes decisions about major investments.

Thus, in the absence of nationally set regulations or even guidelines, each hospital district determines the payment methods used to reimburse its hospitals. Because payment methods are district based, they may vary from district to district. The pricing trend has been consistently moving away from the bed-per-day price towards case-based prices.

Presently, 13 out of 20 hospital districts use DRG-based pricing. The principles and rules for DRG usage vary greatly between hospital districts because there are no national guidelines.

DRGs are used for calculating the costs of diseases. At present, register-based indicators (both at the regional and hospital levels) on the content of care, costs and outcomes between 1998 and 2007 are available for seven health problems. The indicators are freely available on the internet, and they will

be routinely updated using more recent information. They have been widely used in local decision-making and also have been discussed in the media.

### eHealth reimbursement

Both public and private sector providers can receive reimbursement for remote consultations (Castro2009).

Reimbursement of eHealth services primarily exist at the level of general practice activities in Finland (Doupi2005). There is no specific reimbursement scheme for eHealth, but if telemedicine services are a part of some private healthcare service, the reimbursement mechanism follows the normal rules for this service. The same applies when municipalities purchase care from hospital districts, etc.

## 5.5 France

The French healthcare system is decentralised at regional level whereas power of the health insurance fund has shifted more to the state. The structure of the public healthcare system can be divided as follows: the state, regional level, departmental level (local communities) and statutory health insurance. The National Health Insurance System (NHIS) guarantees universal access to healthcare for the whole population resident in France.

 <b>France</b>	Total healthcare expenditure as % of GDP (2008)*	11.1%
	Provision of primary healthcare coverage**	Multiple insurers
	Predominant primary care physician payment mode**	Fee-for-services
	Predominant outpatient specialist payment mode**	Fee-for-services
	Hospital payment scheme	Payment per case/DRG
	Population in thousands (Jan 2010)	65,447
	Regions, Departments and Municipalities	26, 100 and 36,569
	Number of hospitals per 100,000 inhabitants (2008)*	4.92
	Hospital beds per 100,000 inhabitants	711
	Number of physicians and nurses per 100,000 inhabitants (2008)*	345 and 819
ICT Development Index/Rank (2008)***	6.55/18	

Table 14 Healthcare statistics – France

### 5.5.1 Healthcare provisioning and financing

Primary and secondary care is primarily provided by self-employed doctors and medical auxiliaries and to some extent by salaried staff in hospitals.

France's health system is based on a national social insurance system complemented by elements of tax-based financing (especially the General Social Tax) and complementary voluntary health insurance. The Government decides the methods of financing and sets tariffs. The Ministry of Finance and Ministry of Social Affairs and Employment holds authority over finances, including the financial administration of the French healthcare system.

All legal residents of France are covered by public health insurance. The population has no choice to opt out of this scheme. All residents are automatically affiliated to a health insurance scheme on the basis of their professional status and place of residency. Family members are also covered. The health insurance systems determine which services are reimbursed; recently more types of preventive care have become eligible for reimbursement. In addition, nearly all residents have complementary

private health insurance which provides additional reimbursements for the costs charged by the social health insurance.

Patients have to pay a statutory co-payment for most services and are then reimbursed. The co-payment varies depending on the type of treatment but is generally higher for outpatient care (60%) than for hospital treatment. However, exemption is granted in certain cases, including for patients diagnosed with chronic illnesses (affections de longue durée - ALD).

Patients with chronic diseases are referred to special organisations (*Réseau* - or network) created in the different health regions. Each chronic disease has its own network such as the “Réseau Diabète” (RD) for diabetics. There are 78 RDs in France and the overseas departments. The RDs take care of the overall coordination of the treatment and offer a range of services specific to the disease such as: medical, dietary, physiotherapy, pedicure, psychology and sports services (Galmiche2011). A RD typically employs a coordinating doctor, a coordinating nurse and a few staff members. All services to the patients are provided by local healthcare and other professionals. The RDs are typically organised as associations and receives the vast majority (95%) of their funding from the health insurances (l'Assurance Maladie) and the rest from local government and other contributors.

The CNAMTS (Caisse National d'Assurance Maladie des Travailleurs Salaries) accounts for 80% of the NHIS. It covers mainly employees in the commercial and industrial sectors, as well as their families. The remaining 20% of the NHIS consists of funds for agricultural workers, independent professions, civil servants, doctors and students.

The national funds of the three main health insurance schemes also conclude agreements with self-employed healthcare professionals practicing privately: general practitioners, specialists, dental surgeons, nurses, physiotherapists, biologists, midwives, speech therapists, orthoptists and ambulance personnel. These agreements concern the conditions and level of charges for treatment. Home care is delivered by self-employed professionals or by specialised home care services (WHO2004).

The majority of hospitals (40%) are privately owned (for profit), whereas 33% of hospitals are private non-profit and 25% are public. Public and private hospitals provide different services; public hospitals provide rehabilitation, long-term care, psychiatric treatment and emergency services whereas private hospitals mainly provide minor surgical procedures. Regional multi-disciplinary teams provide preventive care, treatment, follow-up care and rehabilitation.

Regional health agencies negotiate multi-year contracts with individual hospitals which includes services to be provided and provisions for bed capacity.

Primary and secondary healthcare that do not require hospitalization is delivered by self-employed doctors, dentists and medical auxiliaries working in their own practices, and to a lesser extent, salaried staff in hospitals and health centres. Outpatient care is largely provided by self-employed doctors (both generalists and specialists) in their own practices. There is an increasing shift towards “hospitalization at home” in France.

Total public	Public General government	Public Social security	Total private	Private Out-of-pocket	Private health insurance
79.0%	5.2%	73.8%	21.0%	6.8%	13.4%

Table 15 Health expenditure by financing agent in France\*\*

## 5.5.2 ICT in Healthcare and eHealth

In France, nearly all GP practices use computers and an average of 73.2% use the Internet. Computers are mainly used for the electronic recording and storing of administrative and medical patient data, as well as for the electronic transfer of lab results. The latter is relatively low though compared to other EU Member States (32.8%). ePrescription is practically not used (EC2008a).

The French eHealth strategy focuses on using ICT for optimisation and reengineering of the healthcare system. eHealth has already been implemented at both local and regional levels. A

national eHealth virtual community has also been realised through the national mapping of all eHealth initiatives.

Four major objectives have been outlined for eHealth in France:

- Contribute to national public health objectives: improve organisation and coordination of care.
- Contribute to national planning objectives: facilitate the access to proximity healthcare, in particular in rural areas.
- Contribute to the training of healthcare professionals.
- Ameliorate the problems arising from demographic change (for citizens, patients and healthcare professionals).

Several outstanding regional applications and platforms, in the fields of telematics, telehealth, and telemedicine are already in use in different regions. Some of the eHealth implementations include the CPS (Carte de Professionnel de Santé – Health Professional Card), a microprocessor card whose functionalities include identification, authentication and electronic signature of health professionals, and a microprocessor card (carte Vitale) which contains health insurance data for the insured and their beneficiaries. In the near future, the Vitale card will be replaced by a new one, the Vitale 2. Also, the public has access to health information online.

In 2004, a report by the Parliamentary Office for the Evaluation of Scientific and Technologic Choices (OPECST), entitled “New Information Technologies and Healthcare Systems” focused on eHealth in hospitals. The report recommended various initiatives such as eHealth funding for hospitals, the creation of a specialisation in eHealth and associated specific training by medical faculties, and that primary care providers charged with public duties should have online links to a hospital.

### **Esante.gouv.fr**

The 'Agence des Systèmes d'Information Partagés de Santé' (in short, 'ASIP Santé') - the public agency for shared health information systems in France - and its partners<sup>4</sup> have launched a national eHealth database. The national eHealth database is seen as a tool to pursue the goal of making France a world leader in the field of eHealth; a goal which depends on determination and cooperation among public and private actors.

The database provides a window to eHealth as well as to its public and private actors by presenting solutions and their potential use, from the perspectives of both research and concrete applications/achievements.

The main steps for the database are:

- Since September 2010 the database has been under the 'listing phase': companies and ordering parties can list themselves in the database by simply accepting its rules of use.
- Beginning of 2011, opening of the consultation, i.e. that all web surfers will be able to visit the database without restrictions.

### **The electronic health record (DMP)**

The centrepiece of the French healthcare IT programme is its national web-based EHR programme, the Dossier Médical Personnel (DMP), to be delivered through six regional consortia. As well as delivering patient care and patient safety benefits the French government has estimated that the DMP will decrease fraud and save the state EUR 2,000-3,000 million per year. The DMP is in fact a wide-range IT project made up of four principal information systems.

At the heart of the project is the DMP IT system which will make it possible to create, add to and consult electronic health records. Healthcare professionals (with the patient's permission) and the patient will be able to consult and add to the DMP. This complex project is itself composed of several sub-projects, since the DMP must be accessible through different channels – via an internet browser, and in the form of web services enabling healthcare professionals to integrate the DMP into their normal work environment. If patients give their consent, their DMP will also be interfaced with external data sources such as their health insurance reimbursement history and their pharmaceutical file. They

<sup>4</sup> The partners of ASIP Santé are six representative bodies for France's eHealth industry.

must also be interfaced with health professional card (CPS) systems so that healthcare professionals can be reliably authenticated.

The project also includes the implementation of a dedicated DMP communications portal (which will make a vast amount of information available to patients and healthcare professionals), a support information system for the user support team, and a management information system. The aim was that the DMP project would be operational and accessible to users by the end of 2010. From that point on, it will be rolled out in stages, in a coordinated manner, with all of the partners involved (patients and healthcare professionals, publishers of software for healthcare professionals, healthcare institutions, regional digital health environments, technical platforms, etc).

### 5.5.3 Reimbursement schemes for healthcare and eHealth

Prices for healthcare services may differ across providers. Financial incentives to comply with established treatment guidelines or practice protocols are in place.

The government is responsible for the fixing of the rate at which medical expenses should be negotiated. The Ministry of Health directly negotiates prices of medicine with the manufacturers, based on the average price of sale observed in neighbouring countries. A board of doctors and experts decides if the medicine provides a valuable enough medical benefit to be reimbursed (note that most medicine is reimbursed, including homeopathy). In parallel, the government fixes the reimbursement rate for medical services: this means that a doctor is free to charge the fee that he wishes for a consultation or an examination, but the social security system will only reimburse it at a pre-set rate. These tariffs are set annually through negotiation with doctors' representative organisations. The government is also responsible for managing the health insurance funds, i.e. to ensure that they are correctly managing the payments they receive, and to ensure supervision of the public hospital network.

An important element of the French insurance system is that the more ill a person becomes, the less they pay. This means that for people with serious or chronic illnesses (affections de longue durée - ALD), the insurance system reimburses them 100% of expenses, and waives their co-payment charges. Presently, 30 diseases have been categorised as ALD, including diabetes type 1 and 2.

#### Reimbursement of GPs

Primary care doctors and specialists providing outpatient services are paid on a fee-for-services basis. Patients pay their GP first and are then reimbursed. Usually, the patient is reimbursed 75-80%. The balance is effectively a co-payment paid by the patient but it can also be recovered if the patient pays a regular premium to a voluntary health insurance scheme. Nationally, about half of such co-payments are paid from VHI insurance and half out-of-pocket.

Overall, there are no general and fixed performance-related payment incentives (bonus scheme) in place for primary physicians, specialist or hospitals, and they are also not penalised if volume targets are exceeded. However, in 2009 a voluntary performance-related payment incentive scheme for generalists was introduced where generalists can sign individual contracts with the health insurance fund. This scheme offers additional payments for the achievements of targets related to the quality of care and the efficiency of drug prescription. Preventive activities are included in the assessment of quality of care. Approximately one-third of all generalists have signed on.

Chronically ill patients enrolled in the *Réseau* are reimbursed with the general consultation fee for every office visit (minimum 4 per year). In addition, the GP compiles an annual report to the *Réseau* listing the patient's treatments during the year. The GP is reimbursed EUR 1,100 for this report.

Table 16 below shows the fees for some typical consultations (Wikipedia2010):

Activity	Fee, EUR	% reimbursed	Patient charge, EUR
Generalist consultation	23.00	70%	6.60
Specialist consultation	25.00	70%	7.50
Psychiatrist consultation	37.00	70%	11.10
Cardiologist consultation	49.00	70%	14.17
Prescription Medicine	variable	35 - 100%	variable

Table 16 Typical consultation fees in France

### Regulation of prices/fees for physicians' services

The central government and the statutory social health insurance funds set the remuneration methods for physicians.

The government and social insurance negotiate how physicians are paid (payment method). The fees themselves are negotiated at national level between third-party payers (health insurance funds) and providers (e.g. physicians' unions), but physicians may actually charge prices higher than those officially determined in some instances. For example, if a patient consults a specialist without a referral the specialist often charges a higher price. Health insurance typically covers 60% of the fee.

### Reimbursement for hospital services

The hospital payment scheme is based on a system of payment per case and/or DRG (*Tarifification à l'activité* (T2A)) and is applied to both the public and private sector, although the tariffs differs. The tariffs for public hospitals cover all of the costs linked to a stay (including medical personnel, all the tests and procedures provided, etc.), while those for the private sector do not cover medical fees paid to doctors (which are paid on a fee-for-service basis) and the cost of biological and imaging tests (e.g. scanners,) which are billed separately (Or2009).

The T2A is a mixed system with five different modes of financing (Torbica2009):

- Tariffs per hospital stay (DRG-based fee and supplement)
- Tariffs per medical procedure (ambulatory, outpatient, emergencies, organ retrievals)
- Real cost payment (expensive drugs, prostheses)
- Annual envelope (emergencies, organ retrievals)
- Envelope for general interest missions and contracting promotion.

Acute hospital care is paid through payment per case. DRG rates are set at national level for both public and private hospitals. Public rates include all services while private rates do not include medical services, which are invoiced separately and paid on a fee-for-service basis.

Specialists providing inpatient care in public hospitals are paid by salary. In contrast, specialists who provide inpatient services in private-for-profit hospitals usually functions as self-employed physicians. However, in cases where private patients are treated in a public hospital, specialists are paid on a fee-for-service basis. Overall, 49% of specialists are salaried compared to 51% who work as self-employed.

The co-insurance rate for hospital care is 20% plus a daily co-payment of EUR16.

Hospital patients suffering from acute, chronic, or long-term illnesses are not expected to pay first. The hospitals are paid directly, and patients are not required to make a co-payment, irrespective of whether they could get it reimbursed or not. Patients who are not exempt and have to pay in the first instance are reimbursed, as with ambulatory care (Elkan2003).

### Regulation of prices/fees for hospitals services

The payment methods for hospitals are determined by central government.

Since 2004, a DRG funding scheme in both the public and private sectors has been in place in France. Therefore, most devices are included in the DRG tariff funded by the Health Insurance. In that case, hospitals are purchasers in the context of public tender regulation and there is no health technology assessment at national level. It is the role of COMEDIMS (Comité des Médicaments et des Dispositifs Médicaux Stériles) to proceed to the assessment for enlisting on the hospital formulary and decide for the purchasing. Hospitals are increasingly grouping in procurement organisations to obtain lower prices and encouraged to do so by the Ministry of Health.

Some innovative and/or costly devices are excluded from DRG funding and reimbursed separately from a specific budget. In that case, prices are regulated by the government and procurement by hospital is managed by negotiations which may result in discounted prices.

**Agences Régionales de Santé** (regional health agencies) result from the combination of previous hospital regional agencies (set up in 1996), regional statutory health insurances (CRAM) and their unions (URCAM) and state regional health authorities (DRASS). Their role is to plan hospital and ambulatory resources in the region according to the population needs, to implement national health plans at regional level, to contract with hospitals for optimizing the healthcare provision to the

population and negotiate their budgets for the part not financed by the DRGs. Part of the contracts are related to appropriate utilisation of costly drugs and medicals devices (ISPOR2010).

## 5.6 Germany

Germany is a federal republic consisting of 16 states (Länder). The Federal Government provides the regulatory framework for healthcare, but the Länder are responsible for providing healthcare and planning capacities, including financing investments in hospitals, nursing homes and institutions for social care.

 <b>Germany</b>	Total healthcare expenditure as % of GDP (2008)*	10.4%
	Provision of primary healthcare coverage**	Multiple insurers
	Predominant primary care physician payment mode**	Fee-for-services
	Predominant outpatient specialist payment mode**	Fee-for-services
	Hospital payment scheme	Payment per case/DRG
	Population in thousands (Dec 2009)	81,802
	Number of Regions and Municipalities	16 and 12,000
	Number of hospitals per 100,000 inhabitants (2008)*	4.02
	Hospital beds per 100,000 inhabitants	817
	Number of physicians and nurses per 100,000 inhabitants (2008)*	354 and 1053
ICT Development Index/Rank (2008)***	6.95/13	

Table 17 Healthcare statistics – Germany

### 5.6.1 Healthcare provisioning and financing

The German healthcare system is based on statutory healthcare insurance system where healthcare services are funded through non-risk related insurance contributions and provided by a greater mixture of public and private providers.

The German healthcare system has a decentralised organisation, characterised by federalism and delegation to non-governmental corporatist bodies as the main actors in the social health insurance system: the physicians' and dentists' associations on the providers' side and the health insurance funds and their associations on the purchasers' side.

The number of health insurance funds has decreased (through mergers) from 420 in 2000 to 166 as of April 2010. Long-term this number is expected to be reduced even further, to between 30 and 50 health insurance funds. Health insurers can and do choose providers freely.

The health insurance funds collect contributions and purchase proactively or pay retroactively for health and long-term care services for their members. Since 1996 almost every insured person has had the right to choose a health insurance fund freely, while funds are obliged to accept any applicant. Patients can choose primary care physicians, specialists and hospitals freely. Registration with a primary care physician is voluntary though financially encouraged, as is referral to access secondary or specialised care. Health insurance funds offer Disease Management Programmes for six chronic diseases, among them diabetes type 1 and type 2.

In 2007, Germany adopted an important reform which took effect in 2009. Health insurance funds now collect contributions as a uniform percentage of gross wages or income. Contributions are pooled in a central national fund, together with tax-financed subsidies paid by the federal government to cover children. The central fund then re-distributes a uniform capitation rate to health insurance funds, adjusted for age, gender and about 80 chronic conditions. While the basic benefits package is defined

at central level via a negative list, which includes both medical procedures and pharmaceuticals, funds are given more flexibility to define benefits covered. Funds can offer plans with additional benefits in exchange for higher cost-sharing or acceptance of a set of constraints, such as restricted provider networks, or specified healthcare pathways (7.4% of the insured were enrolled in such plans in 2008). Funds can also offer options with lower premiums and higher cost-sharing, as well as no-claim bonuses. Health insurance funds with a financial surplus are also permitted to offer additional benefits or premium rebates while funds with a deficit may be obliged to charge their enrollees an additional premium, capped at 1% of the insured's gross wages or income (Cheng2008)

People earning high revenues are allowed to opt out from social health insurance to enrol in private health insurance, with 15% of the population actually doing so.

Primary care services are mainly provided by private solo practices, and the same is the case for outpatient specialist services.

Acute hospital care is provided by both public hospitals and private not-for-profit and for-profit hospitals; the ratio of number of beds is approx. 50:35:15.

Hospitals are financed by DRG payments, and salary is the predominant mode of payment for doctors providing inpatient services. Hospital managers have complete autonomy to recruit and pay medical staff.

Budget constraints for public spending are defined annually, with sub-targets for different health services. Overshooting the targets has typically resulted in cost-containment measures such as delisting of medical goods or services and increased private out-of-pocket payments.

A complex Health Technology Assessment structure exists; the use of HTA results has mainly been for the purpose of decision-making on the coverage of technologies in the benefits package (Busse2002).

In 2007 77% of the healthcare system was publicly funded while the remaining 23% was privately funded. Of total expenditure, 68% of the funds came from statutory health insurance and 9% from government sources. Private health insurance financed 9%; this includes primary coverage for people who have opted out of the public health insurance scheme. Private out-of-pocket payments amounted to 13%, mostly covering purchases of over-the-counter drugs and co-payments for prescribed drugs. Co-payments for outpatient visits were introduced in 2004 and raised for virtually all other benefits (Busse2004).

Total public	Public General government	Public Social security	Total private	Private Out-of-pocket	Private health insurance
76.9%	9.0%	67.8%	23.1%	13.1%	9.3%

Table 18 Health expenditure by financing agent in Germany\*\*

## 5.6.2 ICT in Healthcare and eHealth

While practically all GPs use a computer, in average only a little more than half (58.9%) use the internet. Germany is thus below the European average in relation to Internet connectivity and broadband connections.

Nearly all German GPs use computers for the recording and storing of administrative and medical patient data but only 66% use it for electronic exchange of patient data. In this case, the use concerns mainly laboratory results whereas the transfer of administrative patient data to other care providers, care professionals, and/or reimbursing bodies is very low compared to other EU Member States. ePrescribing is not practiced at all by general practitioners (EC2008a).

Germany has already taken steps towards implementing eHealth services. The implementation of an Electronic Health Card, which allows patients and healthcare professionals universal access to information, started in 2008 and is ongoing – despite the already considerable delay and much opposition from the medical profession. The aim is to connect 2,200 hospitals, 100,000 GPs, 21,000 pharmacies and all public health insurance companies, presently about 160 in number. In contrast to most other European countries, Germany has chosen to start with security issues and is currently

setting up the necessary infrastructure. Once this is in place, a number of national eHealth applications will then be made available. The principal applications are a national electronic prescribing record (mandatory for all); an electronic emergency data set and a personal electronic health record (both voluntary).

Moreover, a German eHealth Strategy was published in 2005 which focuses on improving the ICT infrastructure. In particular, an online verification of insurance status including availability of all data for the electronic European Health Insurance Card and the implementation of a private electronic patient record are emphasized in the report (EC2007b).

The German national health IT organisation 'gematik'<sup>5</sup> – although officially an independent legal body – is functionally a government agency.

### **5.6.3 Reimbursement schemes for healthcare and eHealth**

#### **Reimbursement of GPs**

The predominant mode of payment for primary care doctors and outpatient specialist care in Germany is fee-for-services.

#### **Regulation of prices/fees for physicians' services**

A resource-based relative value scale is negotiated at the central level, and the point-value is determined *ex-post* by dividing the regional budget for physician services by the number of "points" earned by doctors. This applies to both primary care doctors and specialist services.

#### **Reimbursement for hospital services**

Hospitals are paid through DRG payments. DRG weights are defined at federal level, but rates differ across hospitals and Länder. Professional fees are not included in DRG rates. Private health insurance also uses DRGs to pay for hospital services; they may pay supplements, e.g. for private rooms.

#### **Regulation of prices/fees for hospital services**

DRG rates are set or negotiated collectively at the local level between the public health insurance funds and the German Hospital Association. DRG budgets are capped, and rates may decrease if the budget target is exceeded.

There are no performance-related payment incentives in play, neither for primary care, specialists nor hospitals.

#### **Pharmaceuticals**

Prices for pharmaceuticals are not regulated, but maximum reimbursement prices are set by health insurance funds for clusters of products with similar indications and pharmacological properties, which cover a significant part of the market (75% of prescriptions in 2008).

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<sup>5</sup> <http://www.gematik.de>

## 5.7 Greece

The Greek healthcare system is characterised by the coexistence of the National Health Service (NHS), a compulsory social insurance and a voluntary private health insurance system. The NHS provides universal coverage to the population and operates on the principles of equity, equal access to health services for all and social cohesion.

 Greece	Total healthcare expenditure as % of GDP (2008)*	9.7%
	Provision of primary healthcare coverage**	Multiple insurers
	Predominant primary care physician payment mode**	Salary
	Predominant outpatient specialist payment mode**	Fee-for-services/salary
	Hospital payment scheme	Per diem and retrospective payment of costs
	Population in thousands (Jan 2010)	11,306
	Regions, Prefectures and Municipalities	13, 54 and 1034
	Number of hospitals per 100,000 inhabitants (2008)*	2.81
	Hospital beds per 100,000 inhabitants	477
	Number of physicians and nurses per 100,000 inhabitants (2008)*	601 and 341
	ICT Development Index/Rank (2008)***	6.03/30

Table 19 Healthcare statistics – Greece

### 5.7.1 Healthcare provisioning and financing

The Ministry of Health and Social Solidarity decides on overall health policy issues and on the national strategy for health. It sets priorities at the national level, defines the extent of funding for proposed activities and allocates resources. Seven regional health authorities (DYPE) are given extensive responsibilities for implementing national priorities at the regional level, coordinating regional activities and organising and managing the delivery of healthcare and welfare services within their area.

Health services in Greece are funded almost equally through public and private sources. Public expenditure is financed by both taxes (direct and indirect) and compulsory health insurance contributions (by employers and insured people).

As the largest social security fund, IKA is mainly responsible for primary healthcare delivery to 5.5 million beneficiaries, about half the population.

The level of taxes earmarked to public healthcare and the total budget for public funds allocated to healthcare are decided by central government. The basis and level of social contributions for health are set by central government and individual health insurers.

Voluntary payments by individuals or employers represent a very high percentage of total health expenditure (more than 42% in 2002), making Greece's healthcare system one of the most "privatised" among the European Union countries.

97% of the population is covered by approx. 35 different social insurance funds (compulsory social insurance), whereas 8% of the population maintains complementary voluntary health insurance coverage bought on the private insurance market. There are multiple insurers and people are assigned to an insurer according to their professional status. Insurers determine themselves the benefits they cover and the level of coverage, as well as their contribution rates. Affordability is the main criteria for reimbursement decisions.

Taxes finance about 70% of all hospital funding, whereas the remaining 30% is derived from a mixture of social security and out-of-pocket payments. Tax revenue is often used to fill the gap between the

officially determined level of social security funding (by fixed per diem or per-case fees) and the actual cost of the provided services (WHO, 2004).

The share of out-of-pocket co-payments is 9% for inpatient curative care and 53% for basic medical and diagnostic inpatient services.

Patients with certain medical conditions or disabilities and/or with a low income are exempted from co-payments. In addition, healthcare centres and NHS hospitals' outpatient units dispense free care to the uninsured.

Currently, the National Health Service undergoes a major reorganisation (Stithoskopio2011) in several areas including:

- Consolidating the health sector
- Financial management of the health sector
- Harmonisation of health services for beneficiaries of all Insurance Agencies
- Provision of services and incentives towards:
  - public private collaborations of health providers
  - creation of an integrated network of primary care, specialists and hospital care
  - effectiveness of hospital services
  - pharmaceutical consumption
  - human resource management
- Promotion of health and disease prevention
- Data collection and evaluation of health technologies
- Expenditure control mechanisms

Total public	Public General government	Public Social security	Total private	Private Out-of-pocket	Private health insurance
60.3%	29.1%	31.2%	39.7%	Not available	Not available

Table 20 Health expenditure by financing agent in Greece\*\*

### 5.7.2 ICT in Healthcare and eHealth

Nearly all GPs in Greece use computers in their practice; the percentage is somewhat lower for single GP practices (74.2%) compared to practices with 4+ GPs (96.1%). The numbers are somewhat less in relation to the use of the Internet. Here the total use for GP practices is 66.3%, with single GP practices scoring 60.4% and practices with 4+ GPs scoring 88.2%. Computers are mainly used for storage of medical and administrative patient data. Implementation of ePrescribing has started in 2010 for GPs involved in the public social insurance fund. Implementation is accomplished in phases gradually encompassing all public social insurance funds. Transfer of patient data and transfer of lab results are quite low in comparison to other EU Member States (EC2008a).

The Ministry of Health and Social Solidarity released a national eHealth Roadmap in 2006 which set out priorities, strategies and action plans in relation to the quality and safety of health services for the period 2006+2015. The main strategy is to establish the National Health Information System (NHIS); a national system for organising health related information through a series of Regional Healthcare Information System projects. A main objective of the NHIS is to implement an Electronic Patient Record system.

The eHealth Roadmap is divided into three implementation phases:

- Phase 1 focused on information distribution infrastructures and systems, which enable decentralised public health and welfare services to be based more effectively on evidence and operational data. These systems include enterprise and cross-enterprise applications including ERP, patient administration, medical applications, Laboratory Information Systems, Management Information Systems (MIS), primary care centre information system, central patient registry, regional MIS, Regional Health Authority portal, integrated booking service.

- Phase 2 focuses on health networking and telematics services, which are based on a secure data network linking health and social security bodies, and healthcare, community care and social-security professionals. These services include ePrescribing, eReferrals, and eLabs together with adequate provisions for appropriate accreditation, testing and certification. Such projects may be taken up in partnership with the private sector
- Development of information systems to improve the services provided by welfare and mental health bodies to the elderly and people with special needs.

The main objectives and projects include:

- a Health Portal as the interface to the national health information system and a platform for eHealth services to citizens
- a study on the National Telemedicine Service, that will define the co-ordination and support of delivery of telecare between points of health service provision, according to contracts and agreed protocols
- an eHealth Forum Portal for professionals, providing access to tools and information for professionals, including health standardization information
- Information system covering transactions between hospitals and insurance organisations on patient charges
- Telemedicine.

Currently, several Regional Healthcare Information System projects are under development throughout Greece.

### **5.7.3 Reimbursement schemes for healthcare and eHealth**

#### **Reimbursement of GPs**

All NHS staff members (doctors, nurses, dentists, pharmacists and technical and administrative support staff) are salaried government employees. NHS doctors are forbidden to practise privately (except within the hospital premises out of hours, for which they are compensated on a per-case/appointment basis). Following the new government's pre-election commitment to remove it, this restriction is currently under review.

There are no financial incentives (e.g. bonus schemes) in place to ensure that GPs or specialists meet targets. However, GPs receive financial incentives to establish their practice in underserved and/or poor areas.

A consultation with a private GP costs on average EUR 32.50. Normally, if a patient sees a private GP or a non-associated GP he will get a fixed sum of EUR 20 back. If the patient has a private insurance the amount he/she is reimbursed depends on the insurance scheme in question.

Informal payments to doctors in Greece are very frequent, which makes it difficult to assess the prices paid for healthcare services.

#### **Regulation of prices/fees for physicians' services**

Salaries for primary care physicians are set by negotiations between interested parties at the central level.

#### **Reimbursement for hospitals services**

Hospitals are paid on an activity-related basis with retrospective funding of all costs.

Hospitals are financed by the State (70% through global budget) and by social security funds, which pay services on a per diem basis.

There are no financial incentives in place to ensure that hospitals meet targets, nor are there financial penalties if volume targets are exceeded.

## Regulation of prices/fees for hospital services

Prices for hospital services are set by negotiations between interested parties at the central level.

## eHealth reimbursement

Currently, no eHealth or telemedicine services are offered in the public sector as part of the public healthcare system. Some companies offer these services in the private sector and charge depending upon the service.

## 5.8 Hungary

There are three levels of public administration in Hungary: the national government, local county governments and local municipal governments. The local governments are the main providers of healthcare services whereas the Minister for Health is responsible for health and health insurance, which includes health policy development, health sector regulation, strategic planning, ensuring the operation of the public health network and the healthcare system. Healthcare coverage is virtually universal. A healthcare reform in Hungary was carried out in 2006-2007 which included structural changes in inpatient care and of health insurance.

 Hungary	Total healthcare expenditure as % of GDP (2008)*	7.4%
	Provision of primary healthcare coverage**	National health services
	Predominant primary care physician payment mode**	Capitation
	Predominant outpatient specialist payment mode**	Salary
	Hospital payment scheme	Payment per case/DRG
	Population in thousands (Jan 2010)	10,014
	Counties and Municipalities	20 and 446
	Number of hospitals per 100,000 inhabitants (2008)*	1.75
	Hospital beds per 100,000 inhabitants	704
	Number of physicians and nurses per 100,000 inhabitants (2008)*	309 and 615
ICT Development Index/Rank (2008)***	5.64/34	

Table 21 Healthcare statistics – Hungary

### 5.8.1 Healthcare provisioning and financing

Local governments are responsible for healthcare provision to their inhabitants and for making investment decisions. Municipalities are responsible for primary care and county governments are responsible secondary and, in some cases, tertiary care. If municipalities are able and willing to provide secondary care, the county government must then transfer the responsibility to the municipality.

Local governments own and operate hospitals and outpatient clinics, and are responsible for the daily operation of healthcare institutions. Primary care has been privatised and self-employed GPs are contracted by the local governments to provide primary healthcare. Nearly all secondary outpatient care and other specialist care are provided by salaried staff.

Some high-cost, high-tech interventions and public health and emergency ambulance services are delivered and financed by the central government.

Local governments may also contract out service delivery to private providers, but except for primary care the private healthcare delivery sector is still small; only a few hospitals (previously owned by the Church) and the pharmaceutical industry have been privatised.

All citizens are covered by the statutory health insurance scheme, paying contributions via taxes; employees pay 3% of their gross salary and employers pay 11%. The National Assembly determines the annual budget of the National Health Insurance<sup>6</sup> Fund (HIF), whereas the Ministry of Health makes decisions regarding contributions and provider payment methods. The Ministry is also responsible for covering any deficit of HIT from its budget.

The healthcare system is mainly financed by health insurance contributions collected by the Tax and Financial Control Administration, which then transfers these resources to HIF. The HIF is a national pool which is separated from the central budget and it is administered by the National Health Insurance Fund Administration (HIFA).

In addition, the national government provides considerable financial aid to healthcare services through conditional and matching to the local governments, and in effect the national government finances most investments in healthcare. There are some out-of-pocket payments, such as co-payments for medicine, medical aids and prostheses and chronic long-term care. Patients pay the full price for excluded services or fee-for-service to those private providers which do not have a contract with the National Health Insurance Fund Administration.

Total public	Public General government	Public Social security	Total private	Private Out-of-pocket	Private health insurance
70.6%	12.4%	58.2%	29.4%	24.9%	1.1%*

Table 22 Health expenditure by financing agent in Hungary\*\*

### 5.8.2 ICT in Healthcare and eHealth

Hungary is among the average eHealth performers in the EU27. While the use of computers in Hungarian GP practices can be regarded as universal, only around half of the practices are connected to the Internet. This figure stays below the EU27 average, as does the rate of broadband connections (36% vs. 48%). All Hungarian GP practices store electronic administrative patient data and nearly all practices report storing at least one type of medical patient information as well. The transfer of either medical or administrative data is however not yet a reality. The use of a PC for consultation purposes (84%) and the use of Decision Support Systems (93%) are well established: Hungary stores at or above EU27 averages with regard to both indicators (EC2008a).

The process of implementation of the eHealth programme started in January 2004. The programme identified 11 activity groups which covered about 25 projects complying with the programme objectives. Key areas covered with these projects included maintenance of the information strategy, eApplication data models and communication standards, ontology management standard, introduction of digital signatures, electronic public certified registries, access to health-related information and advice services and evidence-based medical knowledge bases (Duplaga2007).

The European Health Telematics Association concluded in 2008 that telemedicine and the regulatory and policy framework for telemedicine are not yet implemented in Hungary. The reasons why telemedicine is not (yet) on the priority list can be that there is a major restructuring - structural and financing - reform process going on in Hungary; there is no appropriate and ready-to-use interoperable communication infrastructure; there is no supportive legal environment; and there is a minimal awareness by the local, regional and national competent authorities (Ethel2008).

There is no common EPR architecture available on national level in the country.

#### Pilot projects

The European Regional Development Fund for IT development in healthcare has given a grant to at Hungarian eHealth project which aims at connecting all levels of healthcare and provide eHealth services such as an eHealth record, eConsultation and ePrescription. A pilot system of Electronic Certified Public Registries in the Health and Social Sector is under development and the registries will be available on the Hungarian Health Portal (EC2007b).

<sup>6</sup> [www.oep.hu](http://www.oep.hu)

There has been a fax-ECG communication system in the country operating as a pilot project for several years and transtelephonic ECG (“beeper”) placed by the patient can be found. Small teleradiology R&D projects were done in the area of tele-traumatology, and tele-consultation through web is available in limited areas (Novotny2004).

### **GYOGYINFOK – Centre for Healthcare Information**

GYOGYINFOK<sup>7</sup> is part of the Ministry of Health, Social and Family Affairs. The centre has developed the DRG payment system in Hungary and provides information about DRG payments.

### **Hungarian Medical Association**

Under the auspices of the Hungarian Medical Association<sup>8</sup> several solutions are available. Whether these solutions are widely implemented is not known.

Among the solutions (EC2003b) are:

- 1) Remote healthcare providing system (Virtual clinic). The heart of the solution is a distributed knowledge centre that can connect several remote healthcare providers. Clinical departments, diagnostic units, mobile monitoring devices and consulting offices are supported.
- 2) The Dialysis and Transplantation Card System supports the follow-up of patients both in need of and after dialysis and transplantation. The chip card is an additional data storage and management tool (emergency data, patient's medical history data), as well as a communication tool. It connects, for example, the GP's PC to other parts of the net. The patient's self-monitoring device becomes part of this network.
- 3) Modular Digital Picture Archiving System - RAID based picture archiving system, which is optimal for the stepwise installation in radiological departments running different software systems.
- 4) Multifunctional Smart Card for Doctors. Issued to all Hungarian MDs, the card offers Membership and licence functions (basic registration and administration of the medical licences and practices, administration of the continuous postgraduate medical education, identification as being a MD), as well as banking functions (both magnetic stripe and EMV standard chip-based transactions).

## **5.8.3 Reimbursement schemes for healthcare and eHealth**

### **Reimbursement of GPs**

In primary care, payment for services is based on capitation. GPs are paid by local government as independent private practitioners or through the local hospital. The majority (77%) of GPs opt for ‘functional privatisation’, a payment scheme in which GPs contract with the National Health Insurance Fund (HIF) and are paid a capitation fee based on a patient list (Ferguson2003).

Patient capitation was introduced for family doctor services in 1992. Under the functional privatisation scheme, family doctors contract with the municipality as private providers for a primary care district, but they work in a local government-owned surgery with local government-owned equipment. The private family doctor services provider is paid an adjusted capitation fee to cover recurrent expenses directly from the HIF, according to the number of registered inhabitants, while the municipality remains responsible for capital costs according to the principle of “maintenance obligation”.

Family doctors can work as independent private providers with no municipal contract and no territorial supply obligation, if patients choose them, but they are only entitled to capitation payment from the HIF if they have a minimum of 200 patients.

The population is divided into 5 groups. For a person aged 0 to 4 years family doctors receive 4.5 points, between 5 and 14 years 2.5 points, between 15 and 34 years 1 point, between 35 and 60 years 1.5 points and over 60 years 2.5 points. If he is a private entrepreneur with an NHIFA contract the family doctor receives the calculated practice income directly from the NHIFA. If the family doctor is a salaried employee of the local government, the NHIFA transfers the capitation payment to the local government who then pays the family doctor's salary.

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<sup>7</sup> <http://www.gyogyinfok.hu/angol.htm>

<sup>8</sup> [www.mok.hu](http://www.mok.hu)

User fees are charged at HUF 600 (~EUR 2.20) per visit to the GP. A fee of HUF 1000 (~EUR 3.70) is payable for any treatment given out of hours. Some clinics charge HUF 1000 if you require treatment without a doctor's referral. There are exemptions from the payment, which include children under the age of 18, treatment for pregnancy and childbirth and some emergency medical care. A fee of HUF 300 per day is generally made for inpatient treatment. This fee level is valid for the first 20 days of treatment.

### **Regulation of prices/fees for physicians' services**

Capitation fees and salaries are unilaterally set by third-party payers or by the government at the central level.

### **Reimbursement for hospital services**

Hospital services are reimbursed based on diagnosis-related groups. Hospital outpatient clinics are paid fees-for-services, and acute/chronic centres are paid according to a DRG-based system and by length of hospital stay. Hospital acute care is paid exclusively through payment per case in Hungary (Paris2010).

Information about providers' prices and whether these prices may differ is not available. Information is only published by insurers and media.

In the late eighties, Hungary started implementing DRG-based system. In 1997, DRGs for all hospitals were equalised to pay for average costs, regardless of actual cost differences between hospitals. From 1993 until 2006, cost weights in Hungary have been regularly adjusted to better reflect actual cost, change in technology and care process, different policy priorities, and to address cheating and DRG creep (Schneider2007).

When the stay is below a certain minimum number of days, the hospital gets a lower reimbursement. For stays over a certain maximum, a small daily allowance is reimbursed for the extra days. The range between minimum and maximum stay is based on a normative length of hospitalisation for this DRG case. This provides a financial incentive to reduce the length of stay to the minimum (Kroneman2000).

### **Regulation of prices/fees for hospital services**

Hospitals contract with the National Health Insurance Fund Administration for capacities defined in terms of acute and chronic beds per specialty, and are reimbursed according to various payment methods. Acute inpatient care is paid on the basis of diagnosis related groups (DRGs), while chronic inpatient care is paid by patient days adjusted for the complexity of the case.

Payment methods for various services are determined in the acts on the yearly budgets of the HIF, while detailed regulations are provided in a governmental and a ministerial decree (Gaál2004)

Most hospital staff members are civil servants and as such their pay is regulated by public service law.

### **eHealth reimbursement**

No specific reimbursement schemes to support the diffusion and implementation of eHealth applications have been identified.

## 5.9 Italy

The Italian National Health Service (NHS) provides universal healthcare coverage. Pursuant to the 2001 reform of the Italian constitution, the NHS has become more decentralized, and the state and the regions share responsibility for healthcare.

 Italy	Total healthcare expenditure as % of GDP (2008)*	9.0%
	Provision of primary healthcare coverage**	National health services
	Predominant primary care physician payment mode**	Capitation
	Predominant outpatient specialist payment mode**	Salary
	Hospital payment scheme	Payment per case/DRG
	Population in thousands (July 2010)	60,495
	Regions, Provinces and Municipalities	20, 109 and 8,100
	Number of hospitals per 100,000 inhabitants (2008)*	2.08
	Hospital beds per 100,000 inhabitants	370
	Number of physicians and nurses per 100,000 inhabitants (2008)*	412 and 619
	ICT Development Index/Rank (2008)***	6.15/28

Table 23 Healthcare statistics – Italy

### 5.9.1 Healthcare provisioning and financing

The Ministry of Health is responsible for healthcare planning and financing, framework regulation, monitoring, and general governance of the National Institutes for Scientific Research. Regional governments are responsible for meeting the national objectives set by the National Health Plan at the regional level. Regions are also responsible for legislative and administrative functions, for planning healthcare activities, for organising the supply in relation to population needs and for monitoring the quality, appropriateness and efficiency of the services provided.

Local health units (public health enterprises legally independent from the regions) are responsible for delivering healthcare services at the local level. Local health units are organised into health districts responsible for ensuring the accessibility, continuity and timeliness of care.

The Italian healthcare system is mainly financed by indirect taxes. The Ministry of Health is responsible for proposing the amount of public resources to be dedicated to healthcare and how these resources should be allocated among levels of care. The budget for public funds allocated to healthcare is set by both the central and regional governments and they both influence the decision regarding the level of taxes which will be earmarked to healthcare.

The Ministry of Health manages the National Health Fund and allocates resources to regions from the global national budget. The allocation aims to ensure uniform availability of resources in the regions. The regions have to finance the remaining healthcare expenditure from their own sources.

Throughout the 1990s social health insurance contributions represented more than 50% of total public financing of the healthcare system. In 1998, a regional business tax replaced social contributions. This tax is supplemented by a national grant financed with revenues from the value-added tax to ensure adequate resources for each region. Out-of-pocket payments refer to cost sharing for public services, such as co-payments for diagnostic procedures, pharmaceuticals and specialist consultations (Donatini2001).

Total public	Public General government	Public Social security	Total private	Private Out-of-pocket	Private health insurance
76.5%	76.4%	0.1%	23.5%	20.2%	0.9%

Table 24 Health expenditure by financing agent in Italy\*\*

## 5.9.2 ICT in Healthcare and eHealth

Almost all GP practices use computers and the Internet use is also above average with a usage rate of 70.7% for single GP practices and 85% for practices with 4+ GPs. Computers are mainly used for the electronic recording and storage of patient data (administrative and medical data). The electronic transfer of patient data for any purposes is still very low and ePrescribing is virtually non-existent (EC2008a).

The Italian eHealth Strategy aims to improve the efficiency and effectiveness of the healthcare systems as a whole, to assure the fundamental levels of healthcare services throughout the country, and to speed up the technological innovation in patient-centred social and healthcare services.

In Italy the architecture of the National eHealth system is developed around the Electronic Health

Record (EHR) that contains information regarding a patient's medical history. A network of regional systems in which EHR will be stored composes the system. This network will be accessible anywhere in Italy. There are regional variations in relation to the implementation of the system; regions in which the eHealth System is more advanced are: Lombardy, Piemonte, Veneto, Emilia Romagna, Abruzzo, Campania, Basilicata, Puglia Sardegna, and Sicilia.

Electronic European Health Cards - In Italy 13 million Smart Cards have been issued, which can be used as an Electronic Health Card and as an Electronic Identity Card. As with the EHR, the diffusion of Electronic Health Cards depends on regional authorities. Lombardy is the region in which smart cards are more diffused (9 millions) among citizens and already in use.

### The New National Healthcare Information System (NSIS)

The NSIS was proposed in February 2001 by the Permanent Committee for political issues between central and regional authorities (Conferenza Stato-Regioni) as a governance tool for supporting, supervising and monitoring the Fundamental Levels of Healthcare Services (LEA; Livelli Essenziali di Assistenza). These are the healthcare service levels guaranteed by the National Healthcare Service as appropriate to particular clinical conditions and care contexts. The NSIS strategic framework has two primary development objectives:

- build an integrated system of homogeneous individual healthcare information records, where the patient information and the care delivery structure are the central information entities. The goal is to make information available on the operating facilities at all healthcare levels, the services delivered, the resources used, and the related costs
- contribute significantly to Public Health Authorities' governance principles and capabilities by ensuring the required analytical data on individual citizen healthcare is available, and using pseudo-anonymisation of patient identifiers to preserve privacy, while grouping all healthcare events for each patient.

The result is an information system defining a minimum dataset for analytical data to be used for governance needs for health authorities.

### Mattoni

The Mattoni programme, started in 2004, has established the semantic toolkit required to ensure a common language to classify and codify the concepts in a uniform manner (e.g. services, facilities), to share methodologies for measuring quality, efficiency, and appropriateness of the Regional Healthcare Services (e.g. waiting times, appropriateness of services) and to achieve a uniform approach in the generation of the information when organising, managing, and governing the Fundamental Levels of Healthcare Services. The toolkit also helps to ensure that the information

systems autonomously developed by the Regions, and by the local healthcare Administrations, will all interoperate. The common elements, named Mattoni (“Bricks”) of the Healthcare System, have been organised into 15 thematic sub-projects, with a Region responsible for managing each sub-project. One particular brick” defines the guidelines to develop the Electronic Patient File.

### **The eHealth Board (TSE)**

In 2004, an eHealth Board (TSE; Tavolo di lavoro permanente per la Sanità Elettronica) was established by the Ministry of Health and of the Department of Innovation and Technologies of the Ministry of Reforms and Innovations in Public Administration. The main responsibility of the TSE is to help the implementation of national and regional eHealth policies and action plans. It also provides a context for technical discussions and consultations in order to harmonise the national and regional eHealth policies and to help coordinated implementation of the respective action plans.

TSE’s first result is the document “Shared policy for eHealth” (Politica condivisa per la Sanità Elettronica) which adopts the European Union’s strategic objectives contained in the 2004 eHealth Action Plan in the Italian context. In March 2006, TSE published the document “Architectural strategy for eHealth” (IBSE; Strategia architetture per la Sanità Elettronica). The document constitutes a first high level guideline addressing the design of the national architecture for Health. The architectural vision considers as essential the following requirements (EC2007b):

- all clinical information of the patient is available anytime and anywhere,
- the system respects of the federated architecture of the Italian Healthcare System,
- the system has a high level of security and respects the Italian legislation on privacy,
- the system has a high level of reliability and availability,
- the system has a modular structure which enables a progressive implementation nationwide,
- the system safeguards existing investments and takes into account the interactions required with existing legacy systems,
- the system is based on the use of open standards.

TSE has also launched other important eHealth pilots, such as:

- general practitioners’ network for eHealth services (13,500 GPs in nine Southern Regions),
- eBooking (five regions),
- eSignature for operators (200,000 smartcards in 16 regions),
- telemedicine and tele-education,
- Oncology Excellence Centres Network,
- proactive prevention (disease management).

### **Electronic Health Programme**

Launched in 2004, Italy’s Electronic Health programme aims to build on existing national health IT programmes, such as NSIS and Mattoni, together with regional clinical eHealth initiatives and EU eHealth project. The programme will help address the increasing disparities in healthcare between the regions, and support quality and cost-effectiveness improvements, including improve levels of healthcare and disease prevention, reduce the cost of healthcare for the public, and reduce hospital waiting lists and bed occupancy time. The development of telemedicine and an online booking system is also prioritised. The programme is also considered as an essential tool to address Italy’s demographic pressures: by 2015 one quarter of all Italians will be elderly. Overall, the Electronic Health Programme incorporates a greater clinical focus than the original NSIS programme.

## **5.9.3 Reimbursement schemes for healthcare and eHealth**

In Italy there is a strict health budget for public spending on healthcare. Targets are further divided in sub-target by the regions. The definition of the benefit basket for medical procedures is determined at central level based on the criteria of clinical effectiveness.

### **Reimbursement of GPs**

GPs and paediatricians delivering primary care and preventive medicine are mainly paid on a capitation basis, and hospital physicians delivering secondary care (inpatients and outpatients) are paid by salary. In addition to fixed amount per patient, GP receives funding in relation to their age, years of experience, and number of patients enrolled in the list (per capita fee significantly decreases

with higher number of patients). A bonus scheme is in place for primary care physicians, rewarding them when they meet targets in relation to chronic diseases and preventive care.

### Regulation of prices/fees for physicians' services

Capitations rates are set by negotiations between interested parties at the central level

### Reimbursement for hospital services

The hospital payment scheme is based on a payment per case and DRG system.

If volume targets are exceeded hospitals are penalised and have to pay a partial refund to the health insurance funds.

### Regulation of prices/fees for hospital services

DRG weights are defined at the central level and rates are set at the local/regional level. National standards are defined, but DRG prices can be modulated by region. Regions are competent for decisions and policies on DRGs and are allowed to rearrange case mix tools or tariffs and to contract price cuts or to set co-payments. Regions define the annual budgets according to their priorities.

## 5.10 The Netherlands

In 2006 a fundamental reform of the healthcare system in the Netherlands was introduced. The reform replaces the previous dual system of public and private insurance for curative care with a single compulsory health insurance scheme. A recent report from WHO (Shäfer2010) states that the new system is still under implementation and the healthcare system is therefore best described as in transition.

 <b>The Netherlands</b>	Total healthcare expenditure as % of GDP (2008)*	9.1%
	Provision of primary healthcare coverage**	Multiple insurers
	Predominant primary care physician payment mode**	Fee-for-services/Capitation
	Predominant outpatient specialist payment mode**	--
	Hospital payment scheme	Adjusted global budget (80%) + Payment per case/DRG (20%)
	Population in thousands (Jan 2011)	16,642
	Provinces and Municipalities	12 and 430
	Number of hospitals per 100,000 inhabitants (2008)*	1.11
	Hospital beds per 100,000 inhabitants	425
	Number of physicians and nurses per 100,000 inhabitants (2007)*	370 and 1051
ICT Development Index/Rank (2008)***	7.37/5	

Table 25 Healthcare statistics – the Netherlands

### 5.10.1 Healthcare provisioning and financing

With the 2006 healthcare reform, the roles and responsibilities of the government, providers, insurers and patients have changed. The reform has in effect created three sub-markets: the health insurance market, the healthcare provision market and the healthcare purchasing market. Insurers and providers now directly negotiate the price, quality and volume of care; a process which nevertheless is safeguarded by the government and as such represents a context of managed competition. Insurers thus also compete for patients enabling them to act more like free consumers.

Patients may freely choose the provider they prefer and the healthcare insurance policy best fitted to their situation. All residents are required to purchase health insurance coverage. Health insurers may not reject new applicants and premiums may not be adjusted according to the risk profile of the applicant (Shäfer2010). However, patients may be obliged by their health insurer to follow specific care pathways or plans, which have a limited network of providers. Should patients wish to use a provider outside this defined network they may do so for a higher co-payment fee (Paris2010).

A Risk Equalisation Fund has been created in 2006 which compensates the insurance for patients with predictably high medical expenses.

There are three compartments of the health insurance scheme; i) a compulsory publicly-financed scheme for long-term care for patients with chronic and continuous care needs, ii) a publicly-financed scheme system that covers the entire population (basic health insurance), and iii) complementary voluntary health insurance.

The provision of services lies mainly with private healthcare providers. Municipalities are responsible for disease prevention, health promotion and health protection. Municipal healthcare services are carried out by the 29 municipal health service centres covering a total of 430 municipalities. Public health service centres are the main providers of preventive care. Home care services and social support are the responsibility of the municipalities who make their own care arrangements. The competition among providers (nursing homes, residential homes and home care organisations) in relation to long-term care has increased as a result of the reform.

Patients' first point of contact is usually the GP who functions as a gatekeeper to specialists and secondary care. There are special GPs in place to provide care to patients with non-life threatening conditions out of hours. Secondary care provided by hospitals thus requires referral from the GP (except in case of emergency care). Blood tests, ECGs and lung function tests, etc. are performed in GP laboratories. Hospitals provide both inpatient and outpatient secondary care (Shäfer2010).

Not-for-profit privately owned hospitals are the dominant providers of acute hospital care.

Total public	Public General government	Public Social security	Total private	Private Out-of-pocket	Private health insurance
81.4%	5.8%	75.6%	18.6%	6.0%	6.2%

Table 26 Health expenditure by financing agent in the Netherlands\*\*

### 5.10.2 ICT in Healthcare and eHealth

Virtually all GPs practices use computers and the Internet. The Netherlands is in the top group of EU Member States that use computers and the Internet for the electronic storage of administrative as well as medical patient data, the transfer of lab results, ePrescribing, and the transfer of administrative patient data to reimbursing bodies or other providers (EC2008a).

#### The Dutch Healthcare Authority – NZa

The Dutch Healthcare Authority (NZa) is the supervisory body for all the healthcare markets in the Netherlands. The NZa supervises healthcare providers and insurers. The NZa was established in 2006.

#### National IT Institute for Healthcare in the Netherlands – Nictiz

Nictiz is the national coordination point and knowledge centre for IT and innovation in the healthcare sector. Nictiz manages the National Switch Point, which is a system where health providers can request patient data from hospitals, pharmacies, and GPs. The platform can be accessed from anywhere in the Netherlands. Nictiz develops standards for electronic communication in healthcare (Nictiz2011).

In 2009 Nictiz launched a national programme for healthcare (Nictiz2009) with focus on the following three elements:

1. Infrastructure and standards programmes (Telemedicine)
2. Basic electronic patient data programme (e-mental, e-care, e-dossier)
3. Multidisciplinary care, disease management and prevention programmes (e-diabetes).

Also in 2009 Nictiz launched an electronic diary for patients with diabetes: diabetesdagboekje.nl. The project is called 'e-Diabetes'. The main goal of the e-Diabetes programme is to define standards for communication between healthcare professionals dealing with diabetic patients. It supports exchange of information from the electronic health records of diabetic patients. The electronic diabetes record and a self-management tool provide patients access to their own diabetes data, allow patients electronic access to their own (general) record, and add electronic prescription functions to the electronic medication record (EMD).

Nictiz, healthcare professionals and the government have worked together to create the foundation for the electronic communication and the exchange of medical data in the healthcare sector. The aim is to use ICT to improve the quality, effectiveness and accessibility of healthcare across the country.

### **Ministry of Health, Welfare and Sports<sup>9</sup>**

The Ministry of Health, Welfare and Sport has initiated several eHealth projects regarding identification and authentication: Unique Healthcare Professional Identification for healthcare providers (UZI), Electronic Health Record Cards, which is a collection of applications connected to the national infrastructure (EPD), Electronic Medication Record (EMD), and Electronic General Practitioner's Record (WDH). Telemedicine services are being used to great effect in areas with large rural or remote populations (OECD2009).

A national Electronic Health Record, including an Electronic Medication Record (EMD) and an Electronic General Practitioner's Records (WDH), has been implemented. The EMD gives healthcare providers access to the medication history of patients while the WDH provides GPs who stand in for the colleagues (a common phenomenon due to shortage of GPs and that many GPs work part-time) with access to a summary of the patient's history. Any information the stand-in GP adds in a special locum report can later easily be added to the record by the regular GP.

In 2006, the national infrastructure for healthcare (AORTA) was established. Medical data is securely and systematically stored using an extensive identification and authentication system (for both patients and healthcare providers). The National Switch Point (NSP) provides a reference index for routing, identification, authentication, authorisation and logging.

### **Telemedicine and telemonitoring pilot projects**

In the Netherlands a lot of small pilot projects are being implemented involving telemedical applications and devices. Self-management and telemonitoring for diabetes is offered by the Diamuraal foundation. Portavita supports self-management of anticoagulation therapy through telemonitoring and teleconsultation. Other telemonitoring services are offered to citizens with chronic heart failure (CHF), obstructive lung disease (COPD) and diabetes in many regions, e.g. Amsterdam, Zwolle, Groningen, Maastricht and Rotterdam.

The KOALA project aimed at understanding the effects of video interaction between patients and medical service centres for home care providers. More than half of the patients in the project were satisfied with e-consulting. The challenge turned out to be related to the training and different daily routines for the healthcare professionals.

Another project is KSYOS TeleDermatologie®: Through this teleconsultation service a GP can consult a dermatologist via the internet. This reduces patient referrals to the dermatologist by 50 - 70%. Teledermatology is perceived as a success among many healthcare professionals (Konstantinova2010). The teleophthalmology systems developed by KSYOS are used for the periodical fundus screening of diabetes patients by the local optometrist and digital photographs are sent to the general practitioner who, in case of abnormalities shown in the screening, can submit the photograph to an ophthalmologist (teleophthalmological consultation).

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<sup>9</sup> <http://www.rijksoverheid.nl/ministeries/vws>

### 5.10.3 Reimbursement schemes for healthcare and eHealth

#### Reimbursement of GPs

Since 2006 GPs have been paid through a combination of capitation payment (EUR 52 per patient) for each patient on their practice list and a fee per consultation. The patient fee is EUR 9 for a consultation. GPs deliver health services such as consultations, consultations by phone and vaccinations. Some of the prices are fixed while others can be negotiated.

The Dutch Healthcare Authority (NZA) sets capitation rates and price ceilings. GPs are not allowed to charge prices higher than the official fees.

Independent specialists (75% of specialists) are paid through the Dutch version of DRGs known as Diagnosis Treatment Combinations (DTCs), which defines standard time and hourly tariffs for health services. Most specialists are hospital based.

NZA publishes information about prices paid to GPs and hospitals (NZA2011), including prices for the 12 regions with a total number of 56 different locations for GP services. The price for a telephone consultation is fixed for all locations in all 12 regions at EUR 25, while the price for consultation and a visit varies from EUR 32.58 for a consultation and EUR 48.87 for a visit in Beverwijk, Noord Holland to EUR 159.79 for a consultation and EUR 239.68 for a visit in Oostburg, Zeeland.

Price examples (NZA2010):

Location Noord Holland	Code	Phone, EUR	Consultation, EUR	Visit, EUR
Beverwijk	295-0812	25.00	32.58	48.87
West-Friesland Hoorn	295-0806	25.00	65.31	97.97
Alkmaar	295-0805	25.00	83.06	124.59
Amsterdam	295-0801	25.00	95.40	143.11
Purmerend	295-0810	25.00	100.33	150.49

Location Zeeland	Code	Phone, EUR	Consultation, EUR	Visit, EUR
Terneuzen, Hulst	295-1002	25.00	73.52	110.28
Vlissingen, Zierikzee, Goes	295-1003	25.00	124.86	187.29
Oostbrug	295-1001	25.00	159.79	239.68

#### Regulation of prices/fees for physicians' services

The fees for GPs are negotiated at the central level by interested parties (social health insurance and/or government and GP representatives) (Paris2010).

Independent specialists are paid through the DTC system and not by the fees set by central government. Based on an assessment of time and resources required by an independent commission, fees are negotiated between the government and specialists. Hospitals and specialists can negotiate further, within a range of EUR 6.

#### Reimbursement for hospital services

Information about prices paid for hospital services is published by the government, insurers and NGOs.

The hospital services are paid through a DRG payment (DBC in Dutch) for 20% of the services.

Payment for hospital services are divided into two segments, the A segment and the B segment. The A segment covers approximately 90% of all treatments in a hospital and the prices are fixed, whereas the remaining 10% of the treatments in the B segment have negotiable prices. As of 2005 hospitals can freely set the price for B segments, meaning that government no longer provides the prices. Insurers can negotiate prices and quality with the hospital.

Prices may differ between providers but only for the B segment which accounts for 34% of all DRG services (Paris2010). Patients can check prices and their account via a web portal hosted by the Dutch Healthcare Authority, who also publishes information about DRG prices (NZa2011).

### Regulation of prices/fees for hospital services

Prices for hospital services are negotiated at the central level with possible further negotiations between individual hospital service providers and insurers.

DRG payments are based on an average for all treatments. The NZa sets the DRG payments for the A segment annually. The price is based on costs. The price of the B segment is set by the hospital and negotiated with the insurer. Hospitals are obliged to publish the standard price list for the B segment (CTI2011).

### eHealth reimbursements

Direct reimbursement for eHealth is not being used (OECD2009).

## 5.11 Slovakia

The healthcare system in Slovakia is based on a mixture of decentralised and centralised structures. The Ministry of Health is responsible for proposing principal directions and priorities of state health policies. The Ministry also controls the health insurance companies.

 <b>Slovakia</b>	Total healthcare expenditure as % of GDP (2008)*	7.8%
	Provision of primary healthcare coverage**	Multiple insurers
	Predominant primary care physician payment mode**	Capitation
	Predominant outpatient specialist payment mode**	--
	Hospital payment scheme	Payment per case/DRG
	Population in thousands (June 2010)	5,430
	Regions and Municipalities	8 and 2922
	Number of hospitals per 100,000 inhabitants (2008)*	2.55
	Hospital beds per 100,000 inhabitants	656
	Number of physicians and nurses per 100,000 inhabitants (2007)*	300 and 631
ICT Development Index/Rank (2008)***	5.38/38	

Table 27 Healthcare statistics – Slovakia

### 5.11.1 Healthcare provisioning and financing

In the Slovak Republic all workers (45% of the population) are covered by mandatory health insurance financed through employer and employee contributions linked to revenues, while their families and other non-workers are covered via direct payments from the national government who pays premiums to health insurance companies on behalf of the beneficiaries.

A total of three not-for-profit insurers provide basic health coverage for the typical employed adult. The social security funds are the main funder, providing about 60% of total health spending. Insurer can be chosen freely and switched annually. Insurers cannot modulate premiums and are required to offer the same benefit package and the same level of coverage. They can select providers and negotiate contracts with specialists and individual hospitals about the prices, quantity and quality of healthcare services. A healthcare provider may contract with any or all health insurance companies and vice versa. Patients can choose primary care physicians, specialists and hospitals freely. Registration with

a primary care physician is compulsory, as is referral to access secondary or specialised care. Private health insurance is practically non-existent.

Primary care services and outpatient specialist services are mainly provided by private group practices, with some specialist services being offered by public hospitals.

Until 2003, the Ministry of Health owned, ran and controlled the vast majority of inpatient facilities. Today, due to decentralisation only a few specialised inpatient care providers and a few major regional and teaching hospitals are still under state ownership and centralised management.

Hospitals are financed by DRG payments, and salary is the predominant mode of payment for specialists providing inpatient services. Hospital managers have complete autonomy to recruit and pay medical staff.

Acute hospital care is provided by public hospitals and private for-profit hospitals, the latter contributing 40% of acute beds.

The benefit package for medical procedures is established at central level via a positive list based on clinical effectiveness, cost-effectiveness and affordability.

The parliament sets the level of taxes earmarked for healthcare and the basis and level for social contributions for healthcare. The central government sets the total budget for public funds allocated to health. Social health insurers decide resource allocation between sectors of care, either collectively or individually. They collectively determine resource allocation between regions, set remuneration methods for physicians and define payment methods for hospitals.

The healthcare providers are responsible for financing new hospital buildings, new high-cost equipment and for financing maintenance of hospitals. The individual insurers finance primary care services, specialists in outpatient care and hospital current spending.

Budget constraints for public spending are defined annually, with sub-targets for different health services. There is no structure or capacity for health technology assessment (Paris2010).

<b>Total public</b>	Public General government	Public Social security	<b>Total private</b>	Private Out-of-pocket	Private health insurance
<b>66.8%</b>	6.8%	60.1%	<b>33.2%</b>	26.2%	0

**Table 28 Health expenditure by financing agent in Slovakia\*\***

### 5.11.2 ICT in Healthcare and eHealth

While most GPs use a computer, on average less than half use the internet. Slovakia is thus below the European average in relation to Internet connectivity and broadband connections. Computers are mainly used for storage of patient administrative data. Transfer of data is only done for laboratory results, and only to a very limited extent.

A Decision Support System is available in 88% of the practices, and many GPs have a dedicated network connection to their insurer. Most GPs obtain patient consent for electronic data storage and/or transfer; almost 90% of consents are in writing (EC2008a).

In 2006 an eHealth Roadmap and Action Plan was approved in Slovakia. The programme resulted in the foundation of the National Health Information Centre (NHIC). The NHIC is supervised by the Ministry of Health via the eHealth committee, which works as a consultation organ and coordinator for developing eHealth strategies.

The Slovakian eHealth strategy aims at the development of the National Healthcare Information System, a national healthcare portal, as well as an ePrescribing system that is to include a patient medication record combined with a decision support system. Some of these components have been introduced recently while others are not yet implemented.

### 5.11.3 Reimbursement schemes for healthcare and eHealth

#### Reimbursement of GPs

The predominant mode of payment for primary care doctors in Slovakia is by capitation.

A resource-based relative value scale is built for outpatient specialist services at the central level and insurers can negotiate volumes and value points with providers.

#### Regulation of prices/fees for physicians' services

Capitation rates are unilaterally determined by third-party payers or the government for primary care services.

#### Reimbursement for hospital services

Reimbursement for hospitals for acute inpatient care is payment per case/DRG exclusively. Payment schemes are the same for public and private hospitals under contract with the National Health Service.

Information on prices for consultations and medical procedures is readily available.

Prices for pharmaceuticals are regulated for all covered medicines, with maximum reimbursement prices for some clusters of products.

#### Regulation of prices/fees for hospital services

The Ministry of Health sets a minimum and a maximum price for each DRG, and insurers can purchase services within this range. Health insurances and hospitals negotiate contracts.

Performance-related payment incentives exist for specialists and hospitals, with bonuses linked to quality targets for clinical outcomes, appropriate processes, patient satisfaction and patient experiences. The government and insurers publish information on all aspects of quality. There are no such incentives for primary care physicians (Paris2010).

## 5.12 Spain

Spain's healthcare system is tax-based, and during the past two decades the responsibility for healthcare has largely been devolved to Spain's 17 regions, the autonomous communities.

 <b>Spain</b>	Total healthcare expenditure as % of GDP (2008)*	8.7%
	Provision of primary healthcare coverage**	Local health services
	Predominant primary care physician payment mode**	Salary/Capitation
	Predominant outpatient specialist payment mode**	Salary
	Hospital payment scheme	Line item budget
	Population in thousands (Oct 2010)	46,122
	Regions, Provinces and Municipalities	17, 50 and 8112
	Number of hospitals per 100,000 inhabitants (2008)*	1.68
	Hospital beds per 100,000 inhabitants	322
	Number of physicians and nurses per 100,000 inhabitants (2009)*	362 and 504
ICT Development Index/Rank (2008)***	6.27/25	

Table 29 Healthcare statistics – Spain

### 5.12.1 Healthcare provisioning and financing

The Ministry of Health and Consumer Affairs establishes laws that define the minimum standards and requirements for healthcare provision, has regulatory power, sets up information systems and assures cooperation between national health authorities and the autonomous communities. The autonomous communities decide how to organise or provide health services and implement the national legislation.

The inter-territorial council (Consejo Interterritorial Del Sistema Nacional de Salud) is composed of representatives of the autonomous communities and the state administration and is in charge of promoting the cohesion of the health system. The role of municipalities is limited to complementary public health functions linked to hygiene and the environment.

Alongside the hospital system there is an extensive network of outpatient ambulatory centres. In the reformed model of provision, members of the specialist teams in clinical departments rotate to cover outpatient care in ambulatory centres.

Home care is delivered mainly by the primary care team. The National Institute of Health (INSALUD) in Spain has successfully used a model of home care that has two major components, each using the physician as part of the team that provides care at home. The first component is home healthcare that is provided to chronically ill, terminally ill and homebound patients, whereby professionals of primary care provide care for the patient at home, along with other professionals who provide specialized care as support elements. The second component is hospitalization at home, whereby care is provided to acutely ill patients or patients with a precocious medical or surgical discharge from the hospital. The professionals from the hospital provide the basis of care and the primary healthcare professionals are the support elements.

The healthcare system is financed out of general taxation such as value-added tax and income tax but also regionally raised taxes. The regions may modify the rate of taxation at the regional level up to a threshold fixed by the national government. Some autonomous communities also receive grants from the state. Private healthcare financing complements public financing with out-of-pocket payments to the public system (such as co-payments for pharmaceuticals). Primary care in public health centres is free, but patients pay directly for visits to specialists in private practice. If they are covered by private insurance, they will receive part or full reimbursement, depending on the type of insurance.

Private insurance companies provide complementary healthcare coverage and increasingly play a role in covering services not included in the basic package and designed to avoid waiting lists (Duran2006).

Total public	Public General government	Public Social security	Total private	Private Out-of-pocket	Private health insurance	Total public and private
71.8%	66.7%	5.1%	28.2%	21.1%	5.9	100%

Table 30 Health expenditures by financing agent in Spain\*\*

### 5.12.2 ICT in Healthcare and eHealth

The majority of Spanish GP practices use computers (77.2%) even though the score is slightly lower for Spain than for other EU Member States. For practices with 4+ GPs the score is 87.1% whereas for single GP practices the score is only 68.2%. The use of the Internet is rather low, namely 39.1% for single GP practices, 55.7% for practices with 2-3 GPs, and 60% for practices with 4+ GPs. Computers are mainly used for the electronic storage of patient medical and administrative data and to a lesser degree for the transfer of lab results. Transfer of patient data to other care providers/professionals and/or reimbursers is virtually not in use. ePrescribing is gradually being deployed regionally in Spain. Overall, Spain is placed among the large group of average eHealth performers in Europe (EC2008a).

The national programme for the healthcare system in Spain is defined in the Plan for Quality in the National Health System. The strategic goals of the Plan for Quality include improving citizen participation in their own healthcare, increasing patient safety through improved quality of care, intensifying healthcare ICT security by continuous assessment, and increasing the use of ICT by adapting the human resources policy to the changing service needs.

Within the national health system framework, the regional health authorities are also developing numerous initiatives for improving their healthcare services based on use of new ICT. eHealth services such as electronic health records, medical appointments through the Internet, ePrescribing, telemedicine systems and the patient health card are therefore being implemented – to differing extents – in all Spanish Regions (EC2007b).

### **Plan Avanza**

The Avanza Plan (ERA2007) is an initiative to bring the various regions of Spain into compliance with i2010, the European Union's initiative to ensure that Europe's governments, businesses, and citizens make the best use of Information and Communication Technology (ICT). In the effort to improve industrial competitiveness, to support growth and the creation of jobs, and to address key societal challenges, all cornerstones of i2010, promoting the social and regional equality and improving the citizens' quality of life, Avanza will ensure that Spain's communications standards evolve with the rest of the European Union. Digital Public Services (“Servicios Públicos Digitales”) was one of the five areas of performance identified in Avanza. This action area addresses new measures focused on improving the services of the public administrations, increasing the quality of life of the citizens and the efficiency of companies. This line of action is directly relevant for eHealth. In particular healthcare professionals are specifically targeted in the dissemination activities for five projects: health identification card database, digital clinical record, ePrescription, telemedicine, tele-appointment and interoperability. Plan Avanza ran until 2010 and the ensuing eHealth activities are expected to continue and expand to other provinces and regions.

### **SITIC Strategic Plan 2008-2011**

The SITIC Strategic Plan 2008-2011 (Gencat2010) is an initiative from the Department of Health of the Government of the Spanish Autonomous Community of Catalonia (Generalitat de Catalunya, in Catalan). It focuses in particular on the deployment of the Telemedicine and the Medical Tele-assistance Plan, the implementation of electronic prescriptions on the entire territory and the promotion of digitisation of medical images (echography, computed tomography, endoscopy, spirometry, etc). The SITIC Strategic Plan is planned to give a definitive boost to information systems and information and communication technology in the health field in Catalonia with the aim of improving the quality, the efficiency and the equity of the Catalan health system.

In order to optimise the quality, efficiency and equity of health services in Catalonia, the Telemedicine and Medical Tele-assistance Plan aims to accelerate the implementation of technological applications by using telecommunications. In addition, the Plan prioritises real-time communication between the practitioner and the patient as well as using telemonitoring in the case of chronic patients with diabetes, respiratory failure or heart disease.

### **ePrescribing**

The Regional Government of Extremadura has implemented an electronic prescription system in 680 pharmacies in Extremadura, connecting health centres and pharmacies to enable prescribing and dispensing of prescription medications electronically. Moreover, patient's electronic record can be accessed and updated from any primary health centre in the region. Patients can get prescription refills without having to return to the doctor's office, working with pharmacists who are in direct contact with health professionals. The doctor accesses the JARA, (the medical records database of the Extremadura Health Services) which provides prescription assistance tools. The treatment is recorded in the system and the patient's electronic medical record is automatically updated. Patients receive a list of prescribed medicines and dosage instructions that have a barcode, or "identity mark" for their individual treatment. In the pharmacy, a pharmacist fills the prescription from the updated health record, which is encrypted to ensure the confidentiality of patient information

Similar initiatives are being deployed in other Spanish regions, e.g. Andalusia, Valencia and Madrid.

### 5.12.3 Reimbursement schemes for healthcare and eHealth

In Spain, an estimated 1.5 million people suffer from Type 2 diabetes and the average annual cost per diabetic patient is estimated to be EUR 1,305 (compared to EUR 1,129 for the general population).

Hospital Costs, EUR	Other Drugs, EUR	Anti-diabetic Drugs: Insulin and Oral Hypoglycaemic, EUR	Primary Healthcare Consultations	Specialist Consultations, EUR	Other Costs/Consumables, EUR
933 million	777- 932 million	313 million	181-272 million	127-145 million	70-81 million

**Table 31 Costs related to diabetes in Spain**

This amounts to 4.4% of the global healthcare expenditure in Spain. Hospital costs account for 32%, primary health costs for 25.6%, insulin and oral hypoglycaemic drugs for 4.6% each, and other drugs for 33.2% (fundaciondia2011). The table below demonstrates the average annual costs of diabetic patients in Spain:

#### Reimbursement of GPs

In Spain general practitioners receive a fixed salary plus a capitation component. There are regional variations in salaries paid to GPs as well as to specialists. The capitation component depends on various factors, e.g. on the age of patients they treat or the nature of the population in their service area, e.g. the percentage of the population over 65 years of age. The exact kind of capitation component depends on the province as it is responsible for the regional health system. There is a bonus system in place which rewards GPs and specialists for meeting targets in relation to preventive care and management of chronic diseases.

#### Regulation of prices/fees for physicians' services

Capitations rates and salaries are set by negotiations between interested parties at the central level.

#### Reimbursement for hospital services

Hospitals in Spain are paid using line-item budgets which consist of block grants earmarked to cover specific cost categories of hospitals. They may be based on historic costs and/or expected volumes, but are usually prospective. This type of payment does not favour efficient reallocation of resources between different inputs.

#### Regulation of prices/fees for hospital services

Salaries are set or negotiated collectively between interested parties at the local level.

### 5.13 Sweden

Sweden has an integrated public healthcare system in which the majority of financing and almost all the delivery is provided by the public sector. The healthcare system is mainly financed by regional taxes. The Swedish National health service (NHS) provides coverage for all residents irrespective of nationality.

 Sweden	Total healthcare expenditure as % of GDP (2008)*	9.1%
	Provision of primary healthcare coverage**	National health service
	Predominant primary care physician payment mode**	Salary
	Predominant outpatient specialist payment mode**	Salary
	Hospital payment scheme	Payment per case/DRG (55%) + global budget
	Population in thousands (Nov 2010)	9,413
	Counties (Län) and Municipalities	21 and 290
	Number of hospitals per 100,000 inhabitants (2003)*	0.90
	Hospital beds per 100,000 inhabitants	Not available
	Number of physicians and nurses per 100,000 inhabitants (2006)***	358 and 1083
ICT Development Index/Rank (2008)***	7.85/1	

Table 32 Healthcare statistics – Sweden

#### 5.13.1 Healthcare provisioning and financing

The responsibility for health and medical care is divided between the state, county councils and municipalities. The state, operating at the national level, is responsible for overall health and medical care policy through laws and ordinances. The overall responsibility for healthcare rests with the Ministry of Health and Social Affairs (Socialdepartementet); supervision of the delivery of healthcare is performed by an independent government authority, the National Board of Health and Welfare (Socialstyrelsen).

The 21 county councils are responsible for providing, organising and financing healthcare services. The county councils own and run the hospitals, health centres and other health institutions, even if these institutions are supplemented by private providers which, in most cases, have contracts with the county councils to supply certain services. The county councils decide on the allocation of resources to the health services and are responsible for the overall planning of these services.

The 290 municipalities are responsible for long-term care, care of the elderly and social welfare services. They deliver and finance welfare services such as care for the elderly and people with disabilities. They operate public nursing homes and home care services. Half of the municipalities in the country have agreed with the county council to take over responsibility for elderly and disabled people living at home. In the other municipalities, such care remains the responsibility of the county councils.

Primary care services are mainly provided in public medical centres, and the same is the case for outpatient specialist services.

Acute hospital care is almost exclusively provided by public hospitals.

Almost all hospitals are owned and operated by the county councils. Hospitals have traditionally had large outpatient departments (health clinics), reflecting low levels of investment in primary care. Private hospitals mainly specialise in elective surgery and work under contract with county councils.

Each region is responsible for funding the healthcare for their inhabitants. The county council uses different models for financing the different healthcare settings. Global budgets are decentralised to healthcare districts. Global budget is the most common model within primary care whereas secondary care often is funded from a mix of global budget and activity-based budget.

The DRG system takes account of costs and it is used for benchmarking in the hospital sector. The DRG system is also used as a basis for funding the hospitals or for hospital internal budgets. NordDRG, a system shared in the Nordic Countries, has been developed for inpatient care, psychiatry, rehabilitation, day surgery and outpatient care in hospitals. The use of DRG systems is not mandatory in Sweden, but 17 of 21 County Councils and Regions are using DRG systems.

Healthcare in Sweden is mainly financed by local taxation, i.e. municipal, county and parish taxes. The county councils and the municipalities have the right to levy income tax on their residents and to decide the rates of taxation. Local taxes are proportionate to income. Other important revenue sources for the county councils are grants and payments for certain services received from central government and user charges.

The National Healthcare System provides coverage for all residents of Sweden and no substitute private coverage is available. However, it is possible to take out a supplementary voluntary insurance which is mainly done by employers on behalf of their employees. It is most often taken out to cover payments for employees' long-term sick leave and/or in order to have faster access to treatment (Glenngård2005).

Healthcare can be outsourced to contractors and the number of private physicians and primary care centres vary widely between counties. The amount of care supplied by private providers rose from a very small percentage in 1990 to 9% of total county council expenditure in 2000.

Total public	Public General government	Public Social security	Total private	Private Out-of-pocket	Private health insurance
81.7%	81.7%	0.0%	18.3%	15.9%	0.2%*

Table 33 Health expenditure by financing agent in Sweden\*\*

### 5.13.2 ICT in Healthcare and eHealth

Sweden can be regarded as one of the European frontrunners in eHealth use among general practitioners. With regard to data storage, as well as in relation to the networked exchange of medical data, usage rates are well above the average found in the EU27. With respect to infrastructure, Sweden is exceptionally well positioned with virtually all GP practices being equipped with a computer, 99% of practices being connected to the Internet and 88% of these GP practices using a broadband connection. As regards patient data transfer, Sweden is one of the top performers, especially in the area of ePrescribing. (EC2008a).

#### Strategy

A National High Level Group for eHealth was established in 2005 and presented the first National eHealth Strategy including social care in March 2006. The objectives were the creation of a common information infrastructure, the accomplishment of laws and regulations and the facilitation of interoperable, supportive ICT systems (MHSA2006). The strategy's policy objectives were to create a broad national consensus on future investments in eHealth and encourage healthcare politicians and decision makers to use eHealth as the main tool for renewal and improvement of health services.

In 2009 the Swedish strategy for eHealth was evaluated and new targets were set. The new steps include bringing laws and regulations into line with extended use of ICT, creating a common information structure, creating a common technical infrastructure, facilitating interoperable, supportive ICT systems and making information and services easily accessible to citizens and personnel (MHSA2009).

## National systems

**Carelink** – is a Swedish national organisation supporting IT development to increase cooperation between healthcare organisations, established in December 2000. Carelink runs Sjunet, see below.

**E-prescription** – A national e-prescription system has been deployed connecting all of the pharmacies in the country to a majority of primary care physicians. The first efforts in e-prescription date back to 1981 with a national working party, in collaboration with the county hospital in Jönköping. By May 2008 over 75% of all e-prescriptions were sent electronically from doctors' offices to pharmacies. More than two million electronic prescriptions were transmitted during the single month of January 2009. Penetration across counties ranges from 51% to 92%. E-prescription has led to a reduction in phone calls and has contributed to a 30 minutes per day time saving for both physicians and pharmacists (OECD2010b).

**Sjunet** –allows the secure transmission of healthcare data and applications on a dedicated IP network. The network is used for telemedicine videoconferences, teleradiology, remote access to medical applications, database access, secure e-mail, EDI messages and also IP telephony. It is also useful for eLearning in medical education and the further training of health personnel. The platform and service has been fully operational since January 2001. All 80 public hospitals and about 800 primary care centres are connected to the network. The number of users of Sjunet varies between the different applications and services. The most commonly used application is the telephone directory, which has over 100 000 users. Several private hospitals and primary care centres are connected, as are the Swedish pharmacies and some commercial service providers and vendors. A project has also been launched to connect municipal home care and nursing homes to Sjunet (EC2008a).

## Projects

**Mobipen** – a digital pen for registration of home care services (NCM2010). The project is a digital pen that home care providers carry when they arrive at a client's home. They use it to mark a laminated paper label hidden in the doorframe in the homes. The system registers who is holding the pen, whose home and what time it is. The aim of the project is to establish a new standard for documenting in-home care provision in the municipalities. The technology was developed in collaboration between Cartel and Solna municipality.

## Telemedicine and eHealth Network

The Telemedicine and eHealth Network (GoodEhealth2010) establishes a common communication platform for several disciplines and applications, servicing three specific fields: Orthodontics, Teledermatology and Telepathology. It has been implemented in three hospitals with a total of 1,100 beds and in the offices of 160 GPs. The network is located in and chiefly funded by the county of in Västerbotten and has been operating since 1999.

The network supports 75 systems used for many kinds of services such as therapeutic advice, diagnostics, rounds, care planning and education. The network provides support for a range of technologies optimised as a function of the operating environment, including optical fibre, power line and wireless access. Both fixed and mobile technologies are used.

## ACTION

The ACTION service (GoodEhealth2010) is a home care service for elderly citizens. It maintains and enhances the autonomy and quality of life for frail and disabled people and their family carers by providing information, advice and support in the home.

The service provides a call centre, a computer station complete with a videophone, and many information and educational programmes about caring and decision-making in daily life for various different situations. ACTION was established back in 1997.

### 5.13.3 Reimbursement schemes for healthcare and eHealth

#### Reimbursement of GPs

Physicians employed at public medical centres and hospitals are paid their salary by the county councils. They may receive compensation for off-duty work, etc.

The few general practitioners who are running their own private clinics are paid on a fee-for-services basis.

### Patient fees

Each county council sets its own fees for outpatient care. The patient fee for consulting a primary care doctor varies from SEK 100 to SEK 150 (2011).

To limit personal expense there is an annual ceiling for patient user fees for adults, while all medical treatment for children and young people under 20 is free of charge.

The patient user fee for consulting a hospital consultant or a doctor in private practice ranges from SEK 180 to SEK 300.

The county councils also set patient fees for medical treatment provided by other health professionals such as physiotherapists, occupational therapists and nurses, both in the public health services and, where appropriate, in private care. The fees vary from SEK 50 to SEK 100 per visit (2011), depending on the county council.

### Regulation of prices/fees for physicians' services

The Swedish Medical Association is the union and professional organisation for medical practitioners. Important issues dealt with include doctors' work environment, salaries, working hours, training and research. Over 90% of Sweden's doctors belong to the SMA. Members of this organisation have access to salary statistics.

General state grants are delegated to the county councils for funding general practitioners. The county councils pay private practitioners connected to regional insurance offices who have an agreement with the county council, and private specialists are paid fee-for-services. The rates are determined by the National Social Insurance Board (FK2010). The private providers have the right to charge patient fees according to the fee level determined by the county council (WHO2001).

### Reimbursement for hospital services

The activity-based part of the hospital reimbursement is often based on the NordDRG system, a system shared in the Nordic Countries.

The County Councils decide what kind of organisation of healthcare and what sort of reimbursement system they want to use.

DRG statistics are available at the website for Socialstyrelsen (Socialstyrelse2010). The database contains number of treatments, number of diagnoses/treatments, number of patients above 75 years, costs for 1997-2007 etc. Data are available on national level and for each hospital. The guidelines contain descriptions of diseases, while prices are not listed in the guidelines. Guidelines for NordDRG 2011 are available at the website for Socialstyrelsen (Socialstyrelse2011)

The Association for municipalities and counties provides access to a database with DRG prices (SKL2009a).

DRG	Number of cases	Average cost	Median cost	DRG weight
Exchange rate: EUR 100 = SEK 875				
295 Diabetes < 36 yrs	2,032	45,379	29,320	1.053
294 Diabetes >35 yrs	5,668	35,577	26,110	0.766

Table 34 DRG prices 2009, SEK (SKL2009b)

For short-term care the hospitals are paid by DRG payment, while long-term psychiatric care, geriatrics, emergency services are paid by global budget.

### Regulation of prices/fees for hospital services

DRGs are the most common case system with respect to short-term somatic care. Prices are determined through negotiations between purchasers and providers. The extent of DRGs and other classification systems, however, varies among regions and county councils. Per-case reimbursements

for outliers, such as complicated cases that grossly exceed the average cost per case, may be complemented by per-diem payments.

Some county councils have introduced a purchaser-provider organisation. The purchasing organisation negotiates with hospital healthcare providers and establishes financial and activity contracts. These contracts are often based on fixed prospective per-case payments, complemented with price or volume ceilings and quality components.

## 5.14 Switzerland

Switzerland is divided into 26 cantons. Health insurance is compulsory, with health insurers operating at the cantonal level.

 Switzerland	Total healthcare expenditure as % of GDP (2008)*	10.5%
	Provision of primary healthcare coverage**	Multiple insurers
	Predominant primary care physician payment mode**	Fee-for-services
	Predominant outpatient specialist payment mode**	Fee-for-services
	Hospital payment scheme	Payment per case/DRG (2/3 of cantons) + global budget
	Population in thousands (Dec 2009)	7,783
	Regions (Cantons) and Municipalities	26 and 2596
	Number of hospitals per 100,000 inhabitants (2008)*	4.23
	Hospital beds per 100,000 inhabitants	531
	Number of physicians and nurses per 100,000 inhabitants (2008)*	389 and 1519
ICT Development Index/Rank (2008)***	7.19/7	

Table 35 Healthcare statistics – Switzerland

### 5.14.1 Healthcare provisioning and financing

Basic primary health coverage is supplied by not-for-profit insurers. These social security funds are the main funder. Of total public expenditure General government covers 16.5% and Social security 42.8%. Of private expenditure out-of-pocket payments account for 30.6% and private health insurance for 9.2%.

Though health insurance is compulsory for all, it is not entirely financed through income-related contributions. Instead, individuals pay community-rated premiums to competing private health insurance funds. However, health insurance markets are strongly regulated to address market failures and guarantee universal access to health insurance: health insurers are not allowed to deny coverage to applicants and mechanisms of risk-adjustment exist to manage costs and risks. Therefore, health insurance in Switzerland is classified as “social health insurance”, rather than “private” in the international system of health accounts. People can choose their insurer. Health insurers are required to enrol all applicants and to accept contract renewal. There are set constraints on premium increases for renewals. Consumers are allowed to switch health plans annually. The switching rate is 7%. A uniform benefit basket is defined and insurers are not allowed to modulate it. 30% of the population is covered by supplementary insurance. Registration with a primary care physician is voluntary though financially encouraged, as is referral to access secondary or specialised care.

Insurers are required to collect uniform premiums from all their enrollees but can offer lower premiums in exchange for “managed care plans” or higher cost-sharing. Students and children benefit from reduced premiums, and 30% of the population receive means-tested subsidies for the purchase of health coverage. Consumer information on benefits covered is published by individual funds.

Insurers have the right to require prior authorisation for the use of certain services. About 24% of the insured are enrolled in one of the three forms of managed care plans: health maintenance organisations (HMOs), independent practice associations (IPAs) or fee-for-service plans with gate-keeping provisions. HMOs directly employ physicians (staff model) or contract with groups paid on a per capita basis. IPAs use networks of generalists acting as gatekeepers. Both HMOs and IPAs are more likely to use prior authorisation (Leu2009).

Hospital costs are shared between health insurance and cantonal authorities and patient choice for hospital care is in principle limited to hospitals of their canton, except in case of emergency or referral for specialised care not available in their own canton.

Each canton determines regulations in areas such as the degree of public hospital autonomy in making capital investments; cantons do not regulate private hospital investments for high-cost equipment.

A central prospective budget for healthcare is not defined, though some cantons set budget envelopes for hospital care and reduce their participation to the cost of hospitalisation beyond a certain volume of care. In addition, insurers and physician associations sign agreements on expected volumes of care, according to which overall costs of physician services are monitored and measures can be taken to limit spending growth if necessary (Paris2010).

Total public	Public General government	Public Social security	Total private	Private Out-of-pocket	Private health insurance
59.3%	16.5%	42.8%	40.7%	30.6%	9.2%

Table 36 Health expenditures by financing agent in Switzerland\*\*

## 5.14.2 ICT in Healthcare and eHealth

### eHealth strategy

In June 2007 the Federal Council adopted the national strategy "eHealth" Switzerland submitted by the Federal Office of Public Health. The objective of the strategy is to deliver by 2015, with the means of the new technologies, better and efficient health services in Switzerland.

The goals of the strategy are to contribute to ensuring access to a health service in Switzerland which is affordable, efficient, safe and of high quality. Key elements of the strategy are on the one hand the gradual establishment of an electronic patient's file and on the other a health portal with quality-assured online information and access to one's own patient file by 2015.

### eHealth cards

Electronic health insurance cards have been issued since 2008. Cardholders are required to show them when making use of doctors', hospitals' or pharmacists' services to be covered by the health insurance funds. By introducing the cards, Switzerland's Federal Council aims to simplify transactions covered by compulsory health insurance and to improve efficiency. Electronic storage of the person's name and social insurance number, as well as the name of the insurer, reduces the administrative burden. The details are stored on the card and in a database which can be accessed by doctors' surgeries, hospitals and pharmacists.

If they so wish, holders can also have medically important information added to their cards. Relevant data could include current illnesses, accident sequels and allergies. These details will be added by the service provider – generally a doctor – with the patient's consent, to increase medical safety, particularly in emergencies.

All such additions are purely voluntary and can be deleted at any time if the cardholder requests this. Patients can protect their medical data by using a PIN with the card. Insurers do not have access to the voluntary additional data.

## **TarMed**

In 2004 TarMed replaced local healthcare-funding arrangements made by the Swiss cantons with a single federal scheme. It institutes a detailed body of disease and therapy codes, and requires a rigorous audit system. In addition, TarMed introduced strict new regulations for doctors, allowing them only to practice in those areas in which they have been fully certified by central federal authority. As part of the new regulations, primary care doctors must record each transaction and session.

Hospitals need to track all goods from purchase to use, in order to claim funds back from the federal authorities under TarMed. The federal government also uses this information to assess the cost of treatment under each disease code.

### **5.14.3 Reimbursement schemes for healthcare and eHealth**

#### **Reimbursement of GPs**

In Switzerland fee-for-services is the predominant mode of payment both for primary care doctors and for outpatient specialist services.

#### **Regulation of prices/fees for physicians' services**

A resource-based relative value scale is negotiated at the central level and the point-value used to determine the fee for each service is negotiated between the cantons and physician representatives. This applies to both primary care physicians and specialist services.

#### **Reimbursement for hospital services**

The cantons determine how they pay hospitals. Two thirds of cantons use payment per case (DRG) and the others use global budgets. As of 2012 a DRG-based hospital reimbursement scheme will be introduced nationwide. Switzerland faces major problems in financing increasing expenditure in healthcare. The split reimbursement of hospital care between the local government and the insurances favours hospital-based healthcare. In order to optimise the facilities, the ambulatories are extended. Ambulatory care at any hospital is entirely reimbursed by the insurances and not regulated. Hospital care and costs of ambulatory care units have therefore substantially increased (Rohrbasser2010).

#### **Regulation of prices/fees for hospital services**

Payment modes and levels are negotiated at cantonal level. Hospitals can charge patients for superior accommodation, such as private rooms.

## 5.15 The United Kingdom

The United Kingdom has devolved responsibility for healthcare to its four constituent countries. The four health services operate independently, but there is close cooperation and collaboration. They mainly fund healthcare through national taxation, deliver services through public providers and have devolved purchasing responsibilities to local bodies: primary care trusts (PCTs) in England, primary care partnerships in Northern Ireland, health boards in Scotland and local health boards (LHBs) in Wales.

The United Kingdom 	Total healthcare expenditure as % of GDP (2008)*	9.0%
	Provision of primary healthcare coverage**	National health insurance
	Predominant primary care physician payment mode**	Salary/Capitation/Fee-for-service
	Predominant outpatient specialist payment mode**	Salary
	Hospital payment scheme	Payment per case/DRG (70%) + global budget (30%)
	Population in thousands (Sept 2010)	61,792
	Countries and Regions <sup>10</sup>	4 and 89
	Number of hospitals per 100,000 inhabitants (2008)*	Not available
	Hospital beds per 100,000 inhabitants	338
	Number of physicians and nurses per 100,000 inhabitants (2009)*	269 and 957
ICT Development Index/Rank (2008)***	7.07/10	

Table 37 Healthcare statistics – United Kingdom

### 5.15.1 Healthcare provisioning and financing

The Department of Health is responsible for the National Health Service (NHS) which provides the majority of healthcare. Coverage is available to 100% of the population and is free at the point of use. The Department of Health controls England's 10 Strategic Health Authorities (SHAs), which oversee all NHS activities in England. The SHAs sets the overall budgets and priorities for their associated PCTs. Within this structure, the PCTs have their own budgets and set their own priorities.

In England, the PCTs are both providers and commissioners for different healthcare services. As a commissioning body, the PCTs commission healthcare services from the public, private and voluntary sector in order to meet national delivery and service requirements. However, on 12th July 2010 the White Paper, 'Equity and Excellence: Liberating the NHS', was released which describes significant structural changes to the NHS, including abolishing SHAs and PCTs (from 2013) with GPs taking over the commissioning responsibilities they formerly held. The main objective is to put the patient in the centre, cutting bureaucracy and improving efficiency. Also, services will be more joined up to support integration across health and social care. A significant change for patients is the free choice of GP practice (2012), and choice of treatment and provider in most of NHS-funded services (2013/14).

Subsequently, the White Paper requires various primary legislation reforms which were introduced in the autumn of 2010. Moreover, in order to implement these reforms as successful as possible the government will publish several documents seeking views on the main reform proposals, e.g. commissioning for patients, local democratic legitimacy in health, freeing providers and economic regulations etc. In addition, the Department of Health will carry out various consultation activities with the different stakeholders (including with NHS staff, patients, patient groups, the public, local

<sup>10</sup> The administrative geography of the United Kingdom is complex, multi-layered and non-uniform

governments, voluntary sector etc.). This strategic reform of the NHS will be implemented gradually over the next 2-3 years. (DH2010).

The NHS is mainly funded through general taxation: direct taxes, value-added tax and employee income contributions. Local taxation provides further funding for social services. Private funding can be broken down into out-of-pocket payments for prescription drugs, ophthalmic and dental services and private medical insurance premiums. However, some patients are exempted from co-payments, e.g. patients with certain medical conditions or disabilities, seniors, children, low income groups etc. According to a survey in 2008, the uptake of private medical insurance had increased by 2.7% in 2008 so that approximately 12% of the population has some form of private health cover.

Total public	Public General government	Public Social security	Total private	Private Out-of-pocket	Private health insurance
81.7%	81.7%	0.0%	18.3%	11.4%	1.1%

Table 38 Healthcare expenditure by financing agent in the United Kingdom\*\*

The Department of Health uses a weighted capitation formula to allocate funding. The majority of the funds the PCTs receive from Department of Health (approximately 90%) are used to cover the healthcare services which the PCTs commission. A smaller percentage of the funds (approximately 10%) covers the costs of the healthcare services provided by the PCTs, such as district nursing, health visitors and local clinics

### 5.15.2 ICT in Healthcare and eHealth

eHealth use includes the use of local and networked EHRs, exchange of administrative patient data, and computer use in consultation. The storage of administrative and medical data is already implemented and is used by almost all GPs. However, while nearly all GP practices (89%) transfer some sort of medical patient data, only around half of the practices transfer administrative data. ePrescribing was introduced in England in 2005 and the scheme is planned to be extended to the whole UK. Figures from 2007 indicate that the usage is still comparatively low (0.3%) (EC2008a).

#### Strategy

In the White Paper, 'Equity and Excellence: Liberating the NHS', one of the government's objectives is to "develop a coherent 24/7 urgent care service in every area of England that makes sense to patients when they have to make choices about their care...We will make care more accessible by introducing, informed by evaluation, a single telephone number for every kind of urgent and social care and by using technology to help people communicate with their clinicians..." (DH2010).

#### National systems

The UK is one of the frontrunners in Europe in relation to eHealth. A national health portal, NHS Direct Online, was established in 2000 and has by now become a matter of course in the UK. NHS Direct Online includes a digital TV service. NHS Direct Online provides vast information on the NHS system and its services, including practical information for patients, i.e. information about health, illness and health services to enable patients to make decisions about their healthcare and that of their families.

#### Projects

NHS Connecting for Health is an integral agency of the Department of Health and is responsible for delivering the National Programme for IT (NPfIT) for the NHS in England. It is funded directly by the Department of Health. The NPfIT, launched in 2002, is one of the largest public sector health ICT projects in the world and aims to provide authorised access to patient information whenever and wherever it is needed.

The NPfIT aims include:

- creating a NHS Care Records Service to improve the sharing of consenting patients' records across the NHS and also provide patient access to their own health records (patients may opt out)

- making it easier and faster for general practitioners (GPs) and other primary care staff to book hospital appointments for patients
- providing a system for electronic transmission of prescriptions.

A key part of the NHS Care Record Service is the development of The Spine. The Spine interfaces with local IT systems and will store patient information (e.g. personal, demographic and clinical information).

By 2004, several services had been implemented (EC2007b), including:

- the Personal Demographic (PDS) containing identity details of over 48 million patients
- the Messaging Service (TMS) handling 220 million messages on an annualised basis
- access controls to ensure that only authorised access points and authorised personnel can connect to the live services
- the Choose and Book facility to allow GP Practices to book appointments for their patients at particular hospitals.

The UK is also one of frontrunners in Europe in eHealth use among GPs. In all four countries in the UK, the implementation of an Electronic Health Record (EHR) is a key component of the health information system. The new EHR will contain structured data, text and images and each patient will have access to his own health record.

### **Telemedicine and telemonitoring pilot projects**

Several NHS Direct case studies have demonstrated how and for what services can be used. One worth mentioning here is the Birmingham OwnHealth (NHS2006) for people living with long-term conditions. The service provides regular telephone based coaching and care advice. It has helped many patients to manage their condition better, change behaviour (diet, exercise, smoking habits) and have improved cholesterol, blood sugar and blood pressure control.

A very small sample of other eHealth and telemedicine projects related to diabetes and/or monitoring are described briefly below.

### **The Whole System Demonstrator (WSD) programme**

This is a two-year research project that was launched in May 2008. It was funded by the Department of Health to find out how technology can help people manage their own health while maintaining their independence. The programme concerns both Telecare and Telehealth services. The first results of the WSD are being presented in early March 2011.

The Telecare service is aimed at vulnerable people who need the support of Social Care or Health Services to keep living on their own. This includes people with physical disabilities, the frail and elderly or those suffering from dementia or epilepsy.

The Telehealth service is aimed at helping people manage their long-term health conditions in their own home. Conditions include - diabetes, heart failure and/or chronic obstructive pulmonary disease. Thousands of members of the public will be involved in the programme with individuals being recruited at three sites (Cornwall, Kent and Newham).

### **Newham Whole Systems Demonstrator**

The Newham Whole Systems Demonstrator (HBA2010) project (see the description of the overall WSD project above) won a 2010 Telehealth Award. The project allows Newham residents with long-term health conditions to be assisted to live in their own home. Some 400 patients are being monitored. Each patient is provided with diagnostic equipment, such as an SPO2 meter for blood oxygen, which clips on the patient's finger. Information is then reported back through the phone line.

The Newham trial includes patients with diabetes, heart disease or breathing problems. Part of the project is a trial of TeleHealth based on mobile phone technology called Think Positive (t+). The study aims to examine the impact of the t+ application on outcomes such as blood pressure and body weight. It will also examine the impact of t+ on factors such as diabetic patients' quality of life, health status, self-care and perceived control of diabetes.

### **The Community Matron Team, Wolverhampton City Primary Care Trust**

The Community Matron Team (CMT), part of Wolverhampton City Primary Care Trust, won a commended recognition for Telehealth in 2010 (HBA2010). The CMT serves a city with a population of 240,000 and a high incidence of COPD, Heart Failure and Diabetes. The CMT was set up to assist in the management of patients with long-term medical conditions and minimise unplanned hospital re-admissions. The trust commissioned 40 tele-healthcare monitors to record vital signs such as weight, pulse, blood pressure and oxygen saturation, and they also ask the patient specific questions related to their condition. Each of the Community Matrons was trained on the Tele-healthcare system along with support staff and was allocated one patient to enable them to become familiar with the system and its benefits. Wolverhampton City PCT is looking to expand the Telehealth service later this year to include the Heart Failure Team.

### **Wireless Network and IP Telephony in Emergency Care Setting**

York Hospitals NHS Foundation Trust has a converged voice and data network with almost 4000 telephones and over 2000 PCs (epractice2009). A system has been developed to make use of the wireless network, using wireless phones which integrate with the hospital's patient record.

There are two main routes for emergency admissions into the Hospital. A GP may phone the hospital to arrange an emergency admission, at which point the Bed Manager records the details directly into the electronic patient record. Alternatively a patient may have arrived in the Emergency Department, and a decision to admit is recorded on the system from there. Either of these events will create a "pending admission" on the system, and send a message to the wireless phone of the on-call doctor(s), and the ward will also be notified of the pending admission, because it appears on their own "ward list" and electronic whiteboard. From either a wireless phone or a computer screen on the ward, the medical staff will be able to see some basic details of the patient including the reason for admission, and any other information passed by the GP, along with alerts such as MRSA status.

When the patient arrives on the ward, they are "accepted" by the ward staff, and a further message is sent to the wireless phone, informing the doctor that the patient is present. The doctor, using the phone, can acknowledge and accept the admission, which lets others know they have accepted the responsibility of attending the patient. A list of "my patients" is always accessible on the wireless phone. The staff on the ward can see that the patient has been accepted using the electronic whiteboard which is automatically updated.

### **Wellness Project**

This project (NHS2010) aims to improve the health of patients with long-term conditions or those at risk of developing them, by providing them with telephone and web-based motivational support. The service will be delivered by NHS Direct health advisors or health coaches, and will bring together the latest information, advice and techniques from both the NHS and the third sector. This 6-month pilot will help improve the health and wellbeing of up to 1,000 patients across a number of PCTs.

The Wellness service is designed to work either as a stand-alone personal care plan or run along side local, face-to-face services such as Health Trainers, Healthy Eating and Exercise campaigns. In addition, the development of a user friendly website with web chat/social networking type facilities will encourage peer support and enable patients to help each other rather than rely solely on health professionals.

### **Telehealth Project**

The Telehealth project (NHS2010) is an extension of a small, but successful pilot being run in South East Essex, where NHS Direct health advisors remotely monitor and support patients in their own homes, who have Chronic Obstructive Pulmonary Disease (COPD). The results to date in South East Essex have been impressive, so NHS Direct now plans to run a much larger project across two or three PCTs covering patients with long-term conditions such as Chronic Heart Disease and Diabetes, as well as COPD.

This is a turnkey or 'off the shelf' type of service. The aim will be to assess whether it is nationally scalable and can continue to deliver the huge patient and service benefits seen in South East Essex. At the same time, it is important that we can offer commissioners a fully managed 'expert' service at an affordable entry level, by capitalising on economies of scale, with commissioner commitment that as savings are generated, the service can be expanded.

### **Expansion of Chronic Disease Management to reduce secondary care admissions and preventable admissions (TELEHEALTH)**

This project (York2010) was started by NHS North Yorkshire and York in May 2010 and will run until March 2011. Its objective is to give patients the tools to gain control of their condition and retain their independence. The project aims to develop services that operate seamlessly across primary, secondary and tertiary care, so patients are able to access pathways of care that place them in control of their condition. There will be a particular focus on telehealth as an enabler to reduce the reliance on secondary care by those with long-term conditions (LTCs) and deliver tailored health and social care for patients in their own home. The implementation of a telehealth unit in a patient's home with daily monitoring is expected to reduce the number of GP visits/community visits required, and to allow the patient to remain at home. The PCT will undertake the largest telehealth project in the UK with an outcome that telehealth is the default package of care for all patients with a LTC above a set threshold.

#### **5.15.3 Reimbursement schemes for healthcare and eHealth**

The budget for public funds allocated to health, the level of taxes earmarked to healthcare and the basis and level of social contributions for health are all set by negotiations between parliament, central government and the regional/local governments, as are decisions in relation to physicians' payment methods. Remuneration levels for prices paid by basic primary health insurance are negotiated between the Ministry of Health, NHS employers and professionals' representatives. In order to contain costs, strict budget restraint for public spending at the macro-level is in place in the UK. Cost-effectiveness, clinical effectiveness and affordability/budget impact are used as criteria to be taken into account when determining which basic medical procedures are to be included in the basis benefit basket (coverage decisions).

#### **Reimbursement of GPs**

Most GPs work as independent contractors in private group practices and are paid through a mix of capitation payments and fee-for-service payments for the provision of enhanced services and bonuses. A bonus scheme is in place for primary care physicians, and virtually all GPs receive bonuses which are linked to quality targets in relation to preventive care, management of chronic diseases and patient satisfaction. A total of 15% of GPs' revenue come from these bonus payments.

Both inpatient and outpatient specialist are paid a salary. In the UK, patients can be treated privately in public hospitals, in which case the specialist is paid a fee-for-service when treating a private patient whether in public or private hospitals. Salaried physicians who work in public hospitals may in some circumstances also treat private patients on a fee-for-service basis.

Almost all funding is practice based. This means that payments are made to the practice and not the individual GPs. Typically, at least half of the money that a practice receives is in the form of a 'global sum'. The exact amount a practice receives is calculated based on the workload from each of its patients. For example, the global sum takes into account age and gender of patients, levels of morbidity and mortality in the local area, the number of registered patients in nursing and residential homes (who have a higher workload), patient list turnover (newer patients tend to need more services than longer-established ones) and a market forces factor which reflects staff costs locally (BMA2008).

About 60% of the fee scale is made up of the following:

- A standard payment for each patient on a GP's list;
- A registration fee for taking on new patients;
- Fees for child health checks;
- A supplement paid to GPs working in deprived areas;
- A similar payment made to GPs working in rural areas.

According to the latest available figures (October 2008), GP practices receive a global sum at the average rate of £56.20 per patient per annum.

The distribution of general practice expenditure is as follows (ONS2009):

Capitation fee	Quality outcomes framework	Premises	Out of hours	Other
30%	15%	8%	5%	42%

**Table 39 General practice expenditure**

In 2007 83% of GP consultations were conducted in surgery premises, 11% were on the telephone, 4% were home visits and 3% were conducted at other locations (NHS2008).

### Regulation of prices/fees for physicians' services

Capitations rates and salaries are determined through negotiations between the interested parties at national level. All providers are paid a unique price and the price billed by primary care providers must be equal to the prices/fees paid by third-party payers. Specialist may in some circumstances charge higher prices for private services (fee-for-services).

### Reimbursement for hospital services

Since 2005, hospitals have been remunerated by a Payment by Results system called Health Resource Groups (HRG). This is a DRG system specially targeted to the NHS system and organisation. Overall, hospital payment is primarily based on a payment per case (or payment by result)/DRG basis (70%) and to a lesser extent on global budget (30%).

The Payment by Results system is based on national tariffs which are determined through detailed and consistent information on costs and prices. It aims to encourage stronger incentives to improve performance and accountability.

Table 40 below shows the admitted patient care mandatory tariff in relation to diabetic patients in 2010-11 (DH2011).

A bonus scheme is also in place for specialists and hospitals. Specialists thus receive bonuses for meeting targets in relation to preventive care and management of chronic diseases. Hospitals receive bonuses for meeting targets in relation to clinical outcome, process, patient satisfaction and patient experience. At the same time, if volume targets are exceeded a penalty is invoked, i.e. a reduction of the physician's fee.

### Regulation of prices/fees for hospital services

Under 'Payment by Results' English NHS hospitals are (to be) paid a fixed price per inpatient spell, day case, outpatient attendance and Accident & Emergency (i.e. Emergency Room) attendance. Prices are fixed nationally but vary according to which of over 500 Healthcare Resource Groups (HRGs) the activity is coded under. HRGs are, in effect, an English version of the Diagnosis Related Groups (DRGs) used for activity-based funding purposes in other countries.

The national tariffs are derived from reference costs. Payment by results system pays hospitals for the work they do, rewarding efficiency and quality. It does this by paying a nationally set price or tariff for each procedure, classified by Healthcare Resource Group (HRG), based on an average of all hospital costs for that procedure (reference costs). Separate tariffs will exist for elective and emergency care and, at least initially, some more specialised work will not be included. No local price negotiations will take place for work covered by the tariff except where service changes result in significant efficiency gains (e.g. reductions in the local length of stay) or if the costs of new technology are not reflected in the tariff. Unavoidable regional cost differences will be funded nationally.

All service agreements will determine the exact amount of work to be done (based on HRGs) and the exact price to be paid (based on the standard national tariff). They will also cover arrangements for risk sharing between the commissioner and the provider, for example, when caring for patients who stay in hospital substantially longer than average.

NHS organisations will be more accountable locally, less reliant on central intervention and top-down performance management and more subject to checks and balances within a system, subject to effective external regulation (AC2004).

HRG name	Combined Day case/ Elective tariff (£)	Elective long stay trimpoint <sup>11</sup> (days)	Non-elective spell tariff (£)	Non-elective long stay trimpoint (days)	Per day long stay payment (for days exceeding trimpoint) (£)	% applied in calculation of Reduced short stay emergency tariff	Reduced short stay emergency tariff (£)
CC is chronic complications						Exchange rate: EUR 100 = GBP 84	
Diabetes with Hypoglycaemic Disorders 69 years and under	1.199	30	2162	24	176	25%	541
Diabetes with Hypoglycaemic Disorders 70 years and over	639	8	1291	10	206	45%	581
Diabetes with Hyperglycaemic Disorders 70 years and over with Major CC	3.641	45	3.641	45	178	25%	910
Diabetes with Hyperglycaemic Disorders 70 years and over with Intermediate CC	1.027	10	2.113	22	196	25%	528
Diabetes with Hyperglycaemic Disorders 70 years and over without CC	396	1	1.506	13	182	25%	377
Diabetes with Hyperglycaemic Disorders 69 years and under with Major CC	2.339	26	2.339	26	181	25%	585
Diabetes with Hyperglycaemic Disorders 69 years and under with Intermediate CC	855	1	1.336	11	194	45%	601
Diabetes with Hyperglycaemic Disorders 69 years and under without CC	396	1	830	6	199	70%	581
Diabetes with Lower Limb Complications with Major CC	4.756	75	4.756	75	194	25%	1.189
Diabetes with Lower Limb Complications without Major CC	1.810	27	2.595	28	193	25%	649
Diabetes Mellitus	959	6	959	6	253	N/A	N/A

Table 40 Mandatory tariffs for diabetes patients 2010-2011

<sup>11</sup> Trimpoint is the upper quartile length of stay plus 1.5 times the inter-quartile range of length of stay

## 6. Prospects for Telemonitoring Services

The emerging situation in Europe, of delivering quality healthcare to all its citizens, calls for a change in the way healthcare is delivered and the way medical knowledge is managed and transferred to clinical practice. Telemonitoring may offer useful capability to open new opportunities in health and disease management, improve illness prevention, facilitate chronic disease management through active participation of patients and enable personalisation of care that contributes to improving the productivity of healthcare provisioning.

Good control of diabetes, as well as increased emphasis on blood pressure control and lifestyle factors, may improve the risk profile of most complications and attain future good health. Hence, self-management of diabetes is an area that offers exceptionally good prospects, both in clinical terms and in economical terms. The overall health status of type 2 diabetics can be improved by adequate treatment of diabetes and of the associated risk factors.

In this chapter we will identify a series of potentially exploitable Telemonitoring services and their motivation (drivers and inhibitors). We will also assign tasks to the different stakeholders. From the discussion of experts, we have identified likely entry points (early adopters) for the services and the most effective procedures for deploying such services.

### 6.1 Telemonitoring definition

Telemonitoring, also called remote patient monitoring, is a medical practice that involves remotely monitoring patients who are not at the same location as the healthcare provider. A patient may have a number of different monitoring devices, e.g. a blood pressure monitor, scales, a pulse oximeter and a blood glucometer. Some of these devices are in the patient's home and some are portable, and the results of these devices will be transmitted to the healthcare provider. Telemonitoring is a convenient way for patients to avoid travel and to perform some of the more basic work of healthcare for themselves.

In addition to objective technological monitoring, telemonitoring programmes may include subjective questioning regarding the patient's health and comfort. This questioning can take place automatically, e.g. over the telephone, or telemonitoring software can help keep the patient in touch with the healthcare provider. The provider can then make decisions about the patient's treatment based on a combination of subjective and objective information similar to what would be revealed during an on-site appointment.

### 6.2 Tasks in telemonitoring services

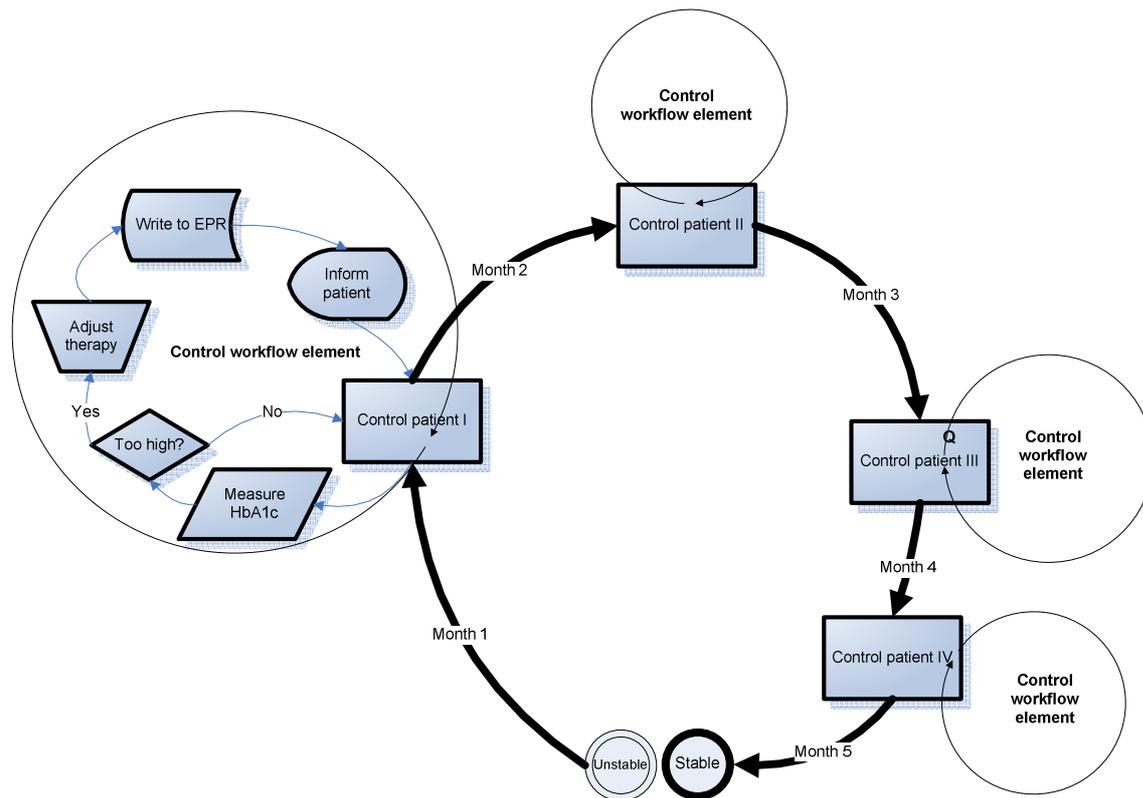
It is universally accepted that in order to be successful, or even marginally successful, the design and implementation of telemonitoring system architectures must go beyond the technical functionality and fulfil clinical, organisational, and patient requirements.

Hence we have investigated what would need to be included in a successful telemonitoring service and how the tasks would be shared between the healthcare professionals and the ICT system.

#### 6.2.1 Clinical logistics

Most existing telemonitoring services cannot perform more than single tasks of data recording, simple filtering and an abundance of event generation. Very few of the known solutions have cognitive elements and they have very little clinical decision power.

Clinical practice is organised around a series of connected, but individually confined, tasks or services. Typically, the pathway is an iterative approach until the patient is stable or has recovered. A typical flow of connected activities is shown in Figure 4. In this example, the pathway calls for a monthly control of HbA1c followed by a possible decision to change the medical therapy.



**Figure 4 Closed-loop clinical workflow**

In reality, patient's pathways are often much more complex and they often contain complex tasks, such as multi-parametric recordings, data analysis, filtering of data, event alerting etc. In many cases the pathways are determined by standard care models, instituted by the healthcare institution or at the national or even international level.

Clinicians construct each individual pathway by putting together standard clinical tasks personalised for the individual patient. One patient needs to have blood pressure measured three times and an average made, whereas another patient may need to measure many more times and discard the first measurements. Some patients need to have other measurements performed such as body temperature and weight. This calls for very flexible and open telemonitoring services with strong focus on personalisation of services.

Moreover, the pathways are executed in an order determined by the clinician based on a medical assessment of the progress or deterioration of the patient's present health status. The decision is, however, often based on standard care models applying standard decision support. This calls for a service-oriented approach with built-in rules processing so that services can be dynamically configured.

The telemonitoring service must be able to support this "clinical logistics chain" providing multi-parametric data recording, analysis and fusion, complex rule processing based on dynamic health status, predefined roles in care models and, eventually, risk assessment and decision support with the help of models, evidence and knowledge management databases. Individual tasks (or services) must be orchestrated to follow a specific "clinical logistics chain" as defined by the individual clinician in each specific case.

### 6.2.2 Healthcare professionals

Healthcare professionals are needed in any telemonitoring application or service in order to secure the medical and clinical integrity of the service and to minimise risk of malpractice. There are several tasks that require deep involvement of the healthcare professionals.

First of all, the design and setting up of schemas for monitoring must be designed by and modifiable by the healthcare professionals. The schemas must be designed to report exceptions and identify events, but the medical interpretation of events must be directed to healthcare professionals. If the

system involves feedback loops, the clinical analysis and change of regime must be under the control of the medical professional. A video link to the patient would greatly increase the usefulness and thus the acceptance of telemonitoring services for case management. Finally, a telemonitoring service may also be a support for healthcare professionals in better managed admissions.

In conclusion, no telemonitoring service can be left to operating on its own. In order to secure correct medical intervention and monitoring, the healthcare professionals must be in full charge of vital elements such as schema definition, diagnosis and change of regime. Routine monitoring, filtering and event identification can be left to the ICT systems.

### 6.2.3 ICT systems

Thus having identified the roles of the humans, a large number of routine tasks can be better left to the ICT systems.

Firstly, the routine monitoring of physiological parameters can very well be left to the telemonitoring service: Frequent checks for blood glucose, blood pressure, oxidation, heart rate, skin temperature, etc. Also constant monitoring for event or epochs, including early warning and short-term predictions of e.g. hyperglycaemia and hypoglycaemia are critical services. The services can be made at different intervals from weekly or daily to several times a day. Measurements are either performed automatically, with wearable sensors, or manually by patients performing the measurement and reporting the results to the system.

However, the monitoring task must be designed based on clinical significance. For example, there is usually no need for monitoring blood glucose levels in type 2 diabetes patients on a daily basis. The best way to control type 2 diabetes is to test for glycosylated haemoglobin every two weeks. The HbA1c level is proportional to the average blood glucose concentration over the previous four weeks to three months and will thus represent an aggregated quality measure of the patient's level of glycaemic control.

This monitoring can be combined with filtering of data, so that only those outside the normal range will be fed on to the healthcare professionals. Data can further be analysed, aggregated, linearised, modified and condensed using advanced medical algorithms thus leading to better and easier-to-digest medical information.

Filtering can be combined with event detection and handling. An event occurs when a *transition* (change of state) take place and alarm responses can be initiated by the occurrence and detection of events corresponding to a predefined schema. The alarm handling can take the form of a simple, predefined feedback to the patient: "Your blood sugar level is slightly elevated. You need to adjust your insulin dose at next injection" or more complex medical feedback to healthcare professional or crisis management teams.

Other useful feature of the telemonitoring service is the ability to collect and store massive amount of data and analyse trends, both in populations and in individual patients. Automated data collection and storage in EPR systems means great savings in time and resources in healthcare organisations.

Finally telemonitoring services must take an end-to-end approach. In order to be acceptable and easy to deploy, they must include the entire chain from sensors and devices to user terminals and interoperability with legacy Hospital Information Systems. The overall design must be user-friendly and adapted to the workflow of the healthcare professionals. It must be easy to use and present an intuitive and logical user interface. And last, but not least, the telemonitoring service must offer a high level of privacy and data security.

## 6.3 Drivers and inhibitors

The market for general telemonitoring services is emerging. From a technological point of view, the main elements of the communication infrastructure and the service components exist or can be easily developed. From a clinical point of view, the evidence base is growing. Even patients have, in most pilots, valued the technology positively.

However, telemonitoring has not penetrated into the general medical professional community. We need to fully understand why this is not the case.

From numerous studies we know that the main reason for the lack of successful services is rooted in lack of organisational acceptance and insufficient acceptance among healthcare commissioning bodies so that funding and appropriate reimbursement schemes are missing.

Most, if not all, of the telemonitoring services are firmly rooted in technological solutions and not in clinical practice.

In this section we will look deeper into the drivers and inhibitors of telemonitoring services in this perspective.

### **6.3.1 Drivers**

We have identified some drivers for widespread use of telemonitoring services. However, the description is not exhaustive:

- Medical
- Patient
- Organisational
- Demography
- Financial

#### **Medical**

The medical benefits of telemonitoring have been demonstrated in many studies. There is evidence of improved quality of treatment in CHD, hypertension, diabetes, treatment of wounds, and many other diseases. A survey of 24 telemedicine project in CHF suggests that telemonitoring, used either alone or as part of a multidisciplinary care program, facilitates early detection of deterioration, supports appropriate decision-making and reduces hospital admissions and hospital bed occupancy (Louis2003).

Teleradiology, i.e. service involving the electronic transmission of radiographic images from one geographical location to another for the purpose of interpretation and consultation, is an area of telemedicine which is in an advanced stage of deployment. Its benefits include: helps dealing with peak workloads, ensures 24-hour services, reduces waiting list for specific examinations and cuts costs (EC2008b). Several regional authorities in Denmark have successfully contracted with a renowned radiology service in Barcelona, Spain for interpretation and diagnoses.

#### **Patient**

The studies referenced above shows that patient acceptance of and compliance with telemonitoring is high. Patients benefit from being treated at home and do not have to come into the healthcare clinics, which tend to stigmatise some patients or patient groups. Further, it provides increased comfort to the patients, mobility and significant savings in time. Finally, telemonitoring offers, or is perceived to offer, good health and better quality of living. None of the patients interviewed during the REACTION projects initial phase had any reservations towards being monitored at home.

#### **Organisational**

From an organisational point of view, telemonitoring unquestionably offers increased efficiency in ward or GP office workflows. Provided with good, intelligent filtering capabilities, telemonitoring applications have the potential to drastically increase the number of patients that can be monitored during treatment or rehab. On top of offering reduced admissions, the services even offer better controlled admissions and thus better resource utilisation.

The interoperability of systems and devices could have a positive effect on patient safety issues. Evidence shows that hundreds of thousands Europeans are affected by the incidences of avoidable deaths due to medical intervention, adverse drug effects and preventable injuries. Research into these issues has been carried out in the USA; however, it is widely believed that one can find similar deficiencies in the vast majority of European health delivery contexts.

Findings from the USA also showed that more than one million patients suffer injuries each year as a result of broken healthcare processes and system failures. Also, an estimated thirty to forty cents of every United States' dollar spent on healthcare, or more than USD 500 milliards per year, is spent on costs associated with "overuse, underuse, misuse, duplication, system failures, unnecessary repetition, poor communication, and inefficiency". According to the United States Institute of Medicine,

over a half million people are injured each year because of adverse drug events, many of which could be avoided if healthcare providers had complete information about which drugs their patients were taking and why (EC2006b).

### **Demography**

The population of Europe is growing older and requiring more care and the number of people with chronic diseases is increasing. At the same time, the number of people in the workforce is rapidly decreasing, so more work must be done by fewer hands. This inevitable trend spells havoc for healthcare systems and quality of life for European citizens as we know it today. There is no other way than to automate and substitute human work tasks with machine or ICT technology wherever possible, if we want to maintain our quality of life and a working healthcare system.

### **Financial**

Although not clearly recognised yet by the healthcare commissioning bodies, the financial drivers are certainly real. There is undoubtedly a potential large, positive cost-benefit from introducing telemonitoring services but because of lack of implantation of long-term telemonitoring, there is a fundamental lack of evidence for cost-effectiveness and cost-benefit to the healthcare systems.

### **6.3.2 Inhibitors**

We have also identified the following inhibitors for widespread use of telemonitoring services. Again, the list may not be exhaustive:

- Medical
- Patient
- Organisational
- Regulatory
- Market Fragmentation
- Financial

#### **Medical**

There is still a lack of *definitive* evidence for clinical effectiveness (Wootton2001). Some failures can be attributable to technical issues, especially with the early equipment (Hopp2006).

#### **Patient**

The acceptance by patients is not universal. In some cases, patients have readily accepted the service and find it useful. Other cases are less successful. Some failures can be attributable to technical issues, poor interface design and complicated operations. Moreover, ethical and privacy concerns have not been satisfactorily addressed. Many patients, especially elderly, object to the notion of “a hospital at home” and find it intrusive. Their home contains precious memories that they do not want to erase by creating a “sterile hospital atmosphere” in the home.

#### **Organisational**

A formidable inhibitor for introduction of telemonitoring services is the reluctance of professionals to embrace the new technology and adjust to the new roles, i.e. supervisor of filtered telemonitoring data rather than front end enquirer in the presence of the patient. Also delegation of responsibilities between professional groups and across different sectors (such as health and social services) is a strong inhibitor.

The need for direct contact with the patient is a real issue in telemonitoring, because much of the context of the disease is only visible when the doctor has direct contact with the patient. The telemonitoring services should not try to eliminate this need. Rather, it should have clear, built-in rules defining when and under what circumstances a patient should be referred to face-to-face consultations at the healthcare clinic. An intermediate step could be to include videoconferencing with the patient via the telemonitoring platform.

## Regulatory

The principal organisational inhibitor for telemonitoring services is the lack, in practically all Member States, of a regulatory framework that can facilitate integration of telemonitoring services in national healthcare systems. Moreover, there are unresolved issues of liabilities for malpractice and *mea culpa* for malfunctioning services and equipment.

Also, more work needs to be done to investigate the whole range of legal issues relevant to the use of ICT tools and services in healthcare and to draw conclusions about the regulatory needs which may exist in a European-wide or cross-border environment (EC2006b).

## Market fragmentation

Financing and reimbursement schemes for health services vary greatly, among the EU Member States and even more so globally. Therefore it is likely that business models and business cases must be tailor-made for every Member State.

## Financial

The financial inhibitors are equally worrying. Since different groups benefit from and pay for telemonitoring services, it becomes difficult to create convincing business models. Although in theory it is possible, moving budgets between sectors is in real life almost impossible. Or at least, it has to be decided at a very high level, typically at government level and in ministries of health. In order to really facilitate telemonitoring services, and thus fully utilising the medical and demographic benefit, requires a major revamp of the DRG reimbursement systems in most countries (EC2008b).

## 6.4 Early adopters and market entry points

With the aim of securing early and successful entry into the market, it is essential that the exploiter aligns with partners in the healthcare system, who are willing to take the role as early adopters and can act as ambassadors for the services. The following entry points have been identified:

- Healthcare commissioners and providers
- Strategic health authorities
- Payers, insurance groups
- Patient organisations

### 6.4.1 Healthcare commissioners and providers

The group of healthcare commissioning bodies and healthcare providers includes national and regional healthcare authorities and hospitals. They are prime customers for telemonitoring services as part of the overall healthcare system. The primary healthcare providers (GPs and outpatient clinics) cannot be regarded as early adopters of telemonitoring services.

Public bodies often act as both providers and commissioners (purchasers) of health services. In the UK there is a strict separation between commissioning and providing healthcare services in the NHS; commissioning indicates a strategic planning function, which in the UK is the responsibility of health authorities, such as the PCTs. Although, other EU Member States with tax-based healthcare system may not have a similar strict separation between commissioning and providing, the following UK definition of commissioning is useful for a general understanding of the strategic underpinnings of commissioning responsibilities:

*“Commissioning is the process by which PCTs identify the health needs of their population and make prioritised decisions to secure care to meet those needs within available resources. It includes longer term strategic planning (three year Local Delivery Plans) and the shorter term agreement and performance management of Service Level Agreements.”*

Pilot projects are carried out by healthcare providers. They are very useful, sometimes required, entry points for introducing telemonitoring services into the healthcare system. Pilot projects allow medical and organisational teams to gain hands-on experience with the services and the potential benefits and may, if they are sufficiently comprehensive, provide medical evidence as to their effectiveness in disease management.

After successful execution of the pilots, the commissioning bodies may decide to include the telemonitoring service in their strategic planning.

Pilot projects usually do not require approval at the highest level, but can be instated at the department level. However, it is very depending on the local culture. For example in Denmark, it is strongly recommended to start introducing concepts for pilot services at the highest levels in the regional healthcare systems, i.e. healthcare or ICT directors. The capital's regional healthcare organisation has approx. EUR 70 million annually for investments in equipment and ICT systems and has entered into more than 400 cooperation agreements with commercial companies through their innovation unit Tectra (Sørensen2009).

#### **6.4.2 Strategic health authorities**

In some Member States strategic health authorities are identical to the Ministry of Health or the healthcare provisioning bodies. In other cases they are separate entities funded by government grants or a mix of government grants and private funding.

In France, the state regulates the quality of health service organisation, monitors safety, regulates the volume of health services supply and oversees social protection and regulates the healthcare system. In Denmark an agency under the Ministry of Interior and Health, the supreme healthcare authority has been delegated to the National Board of Health. It is their task to set the best possible frames within the healthcare system for the prevention and treatment of illness and to provide national guidelines for disease management.

The strategic health authorities may decide to support telemonitoring as a strategic tool, because it supports their plans for disease management.

This report shows that following countries have a separate entity for the promotion of eHealth: Belgium (NIHDI), Denmark (NSI formerly known as SDSD), France (ASIP Santé), Germany (Gematik), the Netherlands (Nictiz), Italy (TSE) and Sweden (Carelink), while the strategic promotion of eHealth strategies, pilot projects etc. is in integrated part of the government structure in Austria, Finland, Greece, Hungary, Slovakia, Spain, Switzerland and the United Kingdom.

The role of the strategic entities is to formulate strategies and coordinate national initiatives such as the deployment of best practice or the implementation of cross-sector infrastructure.

In Denmark the NSI monitors a strategy, which calls for a common infrastructure to be established as a foundation for exchanging and sharing data across healthcare sectors. At the same time, a number of specific shared services are to be developed, making data and/or functionality available across the healthcare sector. In most cases, the shared services will provide both data and functionality – either directly to users, for example via sundhed.dk (the public health portal in Denmark), or via integration with the local solutions of the individual players, which can then make them available to users (for example via integration with EPR, ECR or practice systems). In addition to shared services making data available, it may be relevant to establish shared services making functionality available. For example, *“shared services could make certain telemedicine solutions available to all relevant healthcare users”* (SDSD2010b). These projects have yet to be implemented as funding and organisational changes have delayed the delivery of the projects. As can be seen from this example, some strategic health authorities see eHealth services, which include telemonitoring, as a strategic investment in healthcare which needs to be addressed at the national level rather than by the individual regional healthcare providers. The eHealth platform could also be used to enforce certain national clinical protocols, which are part of a national plan for disease management, and for collecting health data on a massive scale as part of a national programme for monitoring prevalence of e.g. certain chronic diseases.

In any case, it is to be expected that the investment needed to commission and install the service will be financed by the government (i.e. Ministry of Health or similar) and the healthcare providers may use the service, either for free or with a calculated usage fee to be decided as part of the annual budget negotiations.

#### **6.4.3 Payers, insurance groups**

Some Member States have statutory insurance contribution-based systems where there is a mixture of public and private providers and where some services must be paid for at the point of use. This is true for Germany, France and, to some extent, Greece. The statutory health insurance schemes

mainly act as purchasers of healthcare services from both public and private providers, albeit they may provide some healthcare services as well (as in Greece). In France, statutory health insurance funds approximately three quarters of total health expenditure, while in Germany statutory health insurance funded approximately 57% in 2002, with other statutory insurance funds contributing 10%.

The issue of cooperation and communication between various healthcare providers, and in-between the public and private sector, plays an important role for the efficiency and quality of healthcare services to the patients.

The statutory health insurance groups have a direct interest and influence on any cost containment effort or efficiency improving methods, including telemonitoring. They have a history of funding large scale pilots to achieve these goals or even carrying out the pilots themselves. Their role in the pilots is often to involve the user groups (patients and healthcare professionals) and recruit patients for the trials and, of course, analyse and evaluate the results.

In the case of telemonitoring, the health insurance groups will be interested to deploy services with a potential for large cost-benefit gains. They may fund both the pilots and, if successful, a collective investment in operational services, perhaps in cooperation with the strategic health authorities.

#### **6.4.4 Patient organisations**

Patient organisations have emerged worldwide in the last few decades. They are present in every region and country in the Western world and work to represent and support patients, their families and carers in a wide range of diseases. A patient is a person with any chronic disease, illness, syndrome, impairment or disability.

The Alliance of Patients' Organizations (IAPO) is a global alliance representing patients' organizations working at the international, regional, national and local levels. In Europe alone, more than 625 patient associations are members of the IAPO.

Patient organisations are generally very aware of the key global issues surrounding health technologies. IAPO emphasizes the important issues for patients, giving the patients' perspective. They are normally aware of the potential of eHealth and telemonitoring to patient health outcomes but also advocate the concerns such as privacy of personal medical information and that, in addition to patients' rights, patients also have responsibilities in their self-management.

The patient organisations are keen to understand the various systems that are already available or which are under development, and to assist in designing and implementing eHealth solutions.

Patient organisations can be a formidable partner in opening the market for telemonitoring services, because they have a powerful political agenda and are well recognised in the healthcare systems. However, the problem remains to convince a patient organisation that there are measurable benefits to their members, i.e. to their patients, families and carers. Once that is achieved, the patient organisation can be expected to act in several ways.

Most likely, the patient organisation will contribute to a pilot project with knowledge and evaluation support. They may provide input for patient centric requirements engineering and perform validation and evaluation of the outcome. They can also be extremely supportive post-pilot with dissemination and lobbying vis-à-vis the strategic healthcare authorities, healthcare commissioners and providers and even the general political establishment.

In some cases, where the national healthcare system is not putting enough priority to their field of interest, it may be possible that the patient organisation decides to bring out an eHealth service by itself. It could, for example, be a telemonitoring service, which promotes self-management among patients with diabetes; or a service providing continuous monitoring for epileptic epochs including crisis management. In such case, the cost of the platform may be born exclusively by the patient organisation from their member revenues, or at a subscription fee from members.

#### **6.5 Prospects of reimbursement schemes**

This document clearly demonstrates the great variety in payment methods for health services, eHealth services and telemonitoring services. Some countries choose to incorporate the payment of eHealth services and telemonitoring as part of a general budget paid to hospitals or the salaries paid to general practitioners. It then becomes part of the job description to apply new technology for the healthcare professionals. Other countries such as Denmark are incorporating new payments in the

existing DRG payment system for hospital services and develop specific payments for general practitioners care programmes for diabetes treatments.

Denmark is among the frontrunners regarding introduction of reimbursement schemes for telemedicine. Below the current situation in Denmark will be described. As of January 2011 new telemedicine DRG payments for hospital services were implemented. To illustrate the challenges in the reimbursement of telemedicine health services an interview with an expert in telemedicine, Dr. Klaus Phanareth, MD<sup>12</sup>, was carried out on February 11<sup>th</sup> 2011. The following information is based on this interview. It should be noted that the information provided and Dr. Phanareth's viewpoints may not necessarily apply to other countries than Denmark, because this was not asked in the interview.

*The reimbursement challenge in telemedicine arises because telemedicine is provided across sectors, responsibilities and professionals*

Telemedicine can be used as a tool for obtaining a coherent, connected and efficient care programme for patients. Telemedicine treatments are shared between hospital services provided by the five Danish Regions, services at the general practitioner and home care services provided by the municipalities. Each sector is governed by its own legislation which creates the mayor challenge for telemedicine solutions: Who gets reimbursed, when the service is provided by three or more actors?

*Incentives for the municipalities to invest in preventive care is weakened*

The payment for a hospital service is shared between the hospital and the municipality where the patient lives. The idea is to create an incentive for the municipality to reduce the number of inpatients in hospital by having a co-payment/shared payment for hospital services. The municipality thus pays for example 20% of the cost of a treatment of lung disease at the hospital. The purpose is to make the municipality engage in preventive care and to provide services for patients in their own homes, as these services ought to be cheaper for the municipality compared to the payment for hospital services. However, many municipalities choose to keep patients in hospital for treatment because it is less expensive than providing the right nursing care at home. The incentive for the municipalities to delivery preventive care is challenged by the telemedicine treatment, because the expenses are less when patients stay in the hospital. The drawback of the payment system is the reduced incentive for the municipalities to invest in preventive care. Municipalities use hospital services as a less expensive way to deliver home care service for their patients.

*Incentive for the hospitals to apply telemedicine treatment is still lacking*

Even with the newly introduced DRG payments for telemedicine the challenges are not solved. The incentive for hospitals to apply telemedicine treatments are weakened because the DRG payment only relates to outpatient consultations. The DRG payment does not cover the telemedicine health treatment, which is provided in the patient's home by the health personnel at the hospital via videoconference calls etc. The DRG payment only covers health treatment at the hospital. The telemedicine treatment is not only a replacement for an outpatient consultation but a replacement for a health service delivered in a hospital bed.

The new Danish DGR payment for telemedicine does not solve the fundamental challenges of reimbursement of telemedicine health services, since the DRG payment only relates to services delivered in the hospital and only for an outpatient consultation.

As an example the DRG payment for the treatment of a lung disease at the hospital is DKK 25,000 for the entire treatment. The municipality pays DKK 5,000 as a co-payment. If the patient is discharged from the hospital within the first 48 hours the DRG payment will only be DKK 12,500 leaving no resources for the delivery of the telemedicine treatment at home. A new payment should correlate with the number of days the patient stays in hospital as a reward for the hospitals who succeed in reducing the number of days in hospital.

The challenge for telemedicine treatment is that the hospital continues to deliver the health treatment at the patient's home. However, the hospital is only being paid the DRG payment while the patient is in the hospital.

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<sup>12</sup> Klaus Phanareth is heading a research unit for telemedicine at Frederiksberg Hospital Denmark. He is chairman of Danish Society for Clinical Telemedicine. <http://www.dskt.dk>

*Lack of clinical proof for telemedicine is holding back the professionals*

Health professionals cannot provide clinical proof that telemedicine treatment is delivered with the same or better quality. Until proof is provided the deployment of telemedicine will be challenged by some health professionals.

*The future for reimbursement for telemedicine*

Devising a reimbursement system which offers incentives for the deployment of telemedicine will require rethinking and reorganising of the payment system and the sharing of responsibility between the hospitals and the municipalities. Home treatment programmes must be a shared responsibility between municipalities and hospitals.

The payment must take into account both resources and results. The payment must reflect the achievement of keeping the citizens healthy by preventive care, thus reducing the need for acute treatment or outpatient visits to the hospitals.

A major part of the benefit of telemedicine is related to better preventive care provided by the ICT tools and the patient involvement. Preventive and nursing care should be part of a new activity-based payment, which encompasses more than just the hospital treatment: An activity-based telemedicine payment which transverses sectors, responsibilities and health professionals.

## 7. Conclusions

The first conclusion of this report is that the financing and reimbursement schemes for health services vary greatly among the EU Member States, including administrative level of responsibility and decision making.

The second conclusion is that, based on this fragmented picture, business models and business cases for the REACTION platform must be tailor-made for every Member State. The lack of a pattern in the use of reimbursement schemes may turn out to be an inhibitor for the wider deployment of the REACTION platform.

The third conclusion is that very few reimbursement schemes for eHealth services such as telemonitoring exist.

This study, involving 15 EU Member States and Switzerland, shows that the financing and reimbursement mechanisms of health services are very diverse, and the finance and reimbursement of eHealth services such as telemonitoring are practically nonexistent. In line with the visions and objectives of the REACTION project we were particularly interested in investigating reimbursement schemes in relation to diabetes care. Payments for diabetes care programmes (with or without telemonitoring service), e-mail, telephone and video-consultations have only been identified in a few countries: Belgium (payment to GPs for diabetes treatment at GP practices/clinics), Denmark (DRG payments for telemedicine diabetes treatment at the hospital and a fee paid to GPs for telephone consultations), Finland (payment for video consultations), the Netherlands (payment to GPs for telephone consultations), Sweden (payment for diabetes treatment at the hospital) and UK (payment for diabetes treatment at the hospital). Payment for diabetes treatment and telemedicine health services may be hidden in the global budgets for the operation of a hospital.

If the Internal market for health services is to become a mature market, the approach must take into account that different health models require different solutions. It is unlikely, based on the findings from the Member States, that a one-fits-all business model can be developed.

In recent years, the health, financial and social advantages of telemedicine have been highlighted in numerous EU and national reports. The EU Commission continues to encourage Member States to develop telemedicine services in order to meet the challenges of an ageing population, the increasing number of patients with chronic conditions and spiralling healthcare costs. In a communication (EC2008b) the EU Commission highlights the lack of legal clarity with regard to reimbursement. It is concluded that only a few Member States have clear legal frameworks addressing reimbursement.

The overall conclusion of this report supports the conclusions of the EU Commission.

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## 9. References

- (ABT2010) <http://www.abtfonden.dk>
- (AC2004) [http://www.audit-AuditCommissionReports/NationalStudies/PaymentByResults\\_report.pdf](http://www.audit-AuditCommissionReports/NationalStudies/PaymentByResults_report.pdf)
- (BMA2008) How is General Practice funded?, 2008
- (Busse2002) Busse R, Perleth M; International Society of Technology Assessment in Health Care. Meeting. Annu Meet Int Soc Technol Assess Health Care Int Soc Technol Assess Health Care Meet. 2002; 18: abstract no. 2
- (Busse2004) Busse, R. & Riesberg, A. Healthcare Systems in Transition: Germany. European Observatory of Health Systems and Policies, 2004
- (Callens2002) Callens, S., "Tele-medicine and European Law", in *Telehealth Law*, 2 (2002), 34-40
- (Callens2010) Callens, S., "The EU legal framework on e-health, in Mossialos, E., Permanand, G., Baeten, R. and Harvey, K.T., *Health systems governance in Europe. The role of the European Union Law and Policy*, 2010. p 561-589
- (Castro2009) ITIF, D. Castro, 2009: Explaining international It application leaderships: Health IT
- (CE2001) Council of Europe - ETS No. 185 - Convention on Cybercrime, article 22
- (CEN2004) CEN/BTTF 142/N43, Health Care Services — Feasibility of CEN Standardisation Activities, 2004
- (Cheng2008) Cheng T.M, and U. Reinhardt (2008), Shepherding major health system reforms: a conversation with German health minister Ulla Schmidt, *Health affairs*, Vol. 27, N<sup>3</sup>, pp. w204-w209
- (Corens2007) Corens, D.: Health system review, Belgium, 2007, Health system review: Belgium. *Health Systems in Transition*, 2007; 9(2): 1–172  
[http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0007/96442/E90059.pdf](http://www.euro.who.int/__data/assets/pdf_file/0007/96442/E90059.pdf)
- (CPME2002) Standing Committee of European Doctors, The practice of telemedicine in Europe: analysis, problems and CPME recommendations, 202M/027, 2002, p. 18
- (CTI2011) <http://ctg.bit-ic.nl/Nzatarieven/top.do>
- (Devlies2006) Devlies J., Thienpont G., Moor G., 2006: eHealth strategy and implementation activities in Belgium Report in the framework of the eHealth ERA project
- (DH2010) Department of Health, Equity and Excellence: Liberating the NHS, 2010.  
[http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_117353](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_117353)
- (DH2011) <http://data.gov.uk/dataset/payment-by-results-2010-11-national-tariff-information>
- (dknyt2010) <http://dknyt.dk/sider/artikel.php?id=52894>
- (DMA2010) [http://www.laeger.dk/portal/page/portal/LAEGERDK/Laegerdk/P\\_L\\_O/Overenskomster/Honorartabel/%2001-10-2010/%C2%A7%2068%20Ydelsel%20i%20dagtiden](http://www.laeger.dk/portal/page/portal/LAEGERDK/Laegerdk/P_L_O/Overenskomster/Honorartabel/%2001-10-2010/%C2%A7%2068%20Ydelsel%20i%20dagtiden)
- (Donatini2001) Donatini A, Rico A, D'Ambrosio MG, Lo Scalzo A, Orzella L, Cicchetti A and Profili S (2001). *Health Care Systems in Transition: Italy*. Copenhagen, WHO Regional Office for Europe <http://www.euro.who.int/document/e73096.pdf>
- (Doupi2005) eHealth in Europe: Towards higher goals, P. Doupi, Vol. 41 No. 2, *World Hospitals and Health Services*

- (DPWP2007) Article 29 Data Protection Working Party, Working Document on the processing of personal data relating to health in electronic health records (EHR), adopted on 15 February 2007, 00323/07/EN WP 131
- (DPWP2009) Article 29 Data Protection Working Party, The Future of Privacy. Joint contribution to the Consultation of the European Commission on the legal framework for the fundamental right to protection of personal data, Adopted on 01 December 2009, 02356/09/EN, WP 168
- (Duplaga2007) Duplaga M. et al: eHealth strategy and implementation activities in Hungary, 2007, [http://www.ehealth-era.org/database/documents/ ERA\\_Reports/eH-ERA\\_Hungary\\_report\\_January\\_2007.pdf](http://www.ehealth-era.org/database/documents/ ERA_Reports/eH-ERA_Hungary_report_January_2007.pdf)
- (Duran2006) Duran, A., J.L. Lara, and M. v. Waveren. (2006). [Spain: Health System Review, Health Systems in Transition](#). Organisation for Economic Co-operation and Development
- (EC1998) Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998, Official Journal L 204, 21/07/1998 P. 0037 – 0048
- (EC2000) Directive 2000/31/EC of 8 June 2000 on electronic commerce, Official Journal L 178 , 17/07/2000 P. 0001 - 0016
- (EC2002) Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 on Universal Service and Users' Rights Relating to Electronic Communications Networks and Services (Universal Service Directive) OJ L 108, 24.4.2002, p. 51–77
- (EC2003a) Council Regulation (EC) No 859/2003 of 14 May 2003 extending the provisions of Regulation (EEC) No 1408/71 and Regulation (EEC) No 574/72. OJ L 124, 20.5.2003, p. 1–3
- (EC2003b) [http://www.epractice.eu/files/download/awards/D6\\_Award1\\_ExhibitorsCatalogue.pdf](http://www.epractice.eu/files/download/awards/D6_Award1_ExhibitorsCatalogue.pdf)
- (EC2004) European Commission, e-Health: making health care better for European citizens: an action plan for a European e-Health area, COM (2004) 356 final, 30 April 2004
- (EC2006a) Directive 2006/123/EC of the European Parliament and of the Council of 12 December 2006, OJ L 376, 27.12.2006, p. 36–68
- (EC2006b) European Commission, Connected Health: Quality and Safety for European Citizens, 2006
- (EC2007a) European Commission (2007). Telemedicine; Removing obstacles to the Development of Patient-Centred Healthcare, eHealth. [http://ec.europa.eu/information\\_society/events/telehealth\\_2007/docs/200711telemedicine-pom.pdf](http://ec.europa.eu/information_society/events/telehealth_2007/docs/200711telemedicine-pom.pdf)
- (EC2007b) European Commission, eHealth: priorities and strategies in European countries, eHealth ERA Report, 2007 [http://ec.europa.eu/information\\_society/activities/health/docs/policy/ehealth-era-full-report.pdf](http://ec.europa.eu/information_society/activities/health/docs/policy/ehealth-era-full-report.pdf)
- (EC2008a) European Commission, Benchmarking ICT use among General Practitioners in Europe, 2008
- (EC2008b) European Commission: On telemedicine for the benefit of patients, healthcare systems and society, COM (2008) 689, 2008
- (EC2010) European Commission (2010). Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on “The EU Role in Global Health”, COM(2010)128 final
- (EC2011a) [http://ec.europa.eu/information\\_society/eeurope/i2010/index\\_en.htm](http://ec.europa.eu/information_society/eeurope/i2010/index_en.htm)

- (EC2011b) [http://ec.europa.eu/information\\_society/digital-agenda/index\\_en.htm](http://ec.europa.eu/information_society/digital-agenda/index_en.htm)
- (ECR1998) Case C-158/96, Kohll. Union des Caisses de Maladie [1998] ECR I-1931.  
Case C-120/95, Decker v. Caisse de Maladie des Employés Privés [1998] ECR 1831
- (ECR2001) Case C-157/99, *Geraets-Smits and Peerbooms* [2001] ECR 5473
- (ECR2003) Case C-385/99, *Müller-Fauré* [2003] ECR 4509
- (ECR2004a) Case C-496/01, *Commission v. France* [2004] ECR I-02351
- (ECR2004b) Case C-8/02, *Leichtle* [2004] ECR I-02641, paragraph 32
- (ECR2004c) Case C-372/04, *Watts* [2004] ECR I-4325
- (Elkan2003) <http://www.walterelkan.co.uk/pdf/health.pdf>
- (epractice2009) [http://www.epractice.eu/files/ICT's Role in Healthcare Transformation.pdf](http://www.epractice.eu/files/ICT's_Role_in_Healthcare_Transformation.pdf)
- (ERA2007) [http://www.ehealth-era.org/database/documents/ERA\\_Reports/Spain\\_eHealth-ERA\\_Country\\_Report\\_final\\_29-05-2007a.pdf](http://www.ehealth-era.org/database/documents/ERA_Reports/Spain_eHealth-ERA_Country_Report_final_29-05-2007a.pdf)
- (Ethel2008) Ethel, Sustainable Telemedicine: paradigms for future-proof healthcare, 2008, <http://ehel.org/forum/tasks-sources/task-force-sustainable-telemedicine-and-chronic-disease-management/ehel-briefing-paper-sustainable-telemedicine-paradigms-for-future-proof-healthcare-1/files/ehel-briefing-paper-sustainable-telemedicine.pdf>
- (Ferguson2003) Hungary's Healthcare System, Shannon C. Ferguson and Ben Irvine (2003)
- (FK2010) <http://www.forsakringskassan.se/privatpers>
- (FM2010) Ministry of Finance, 2010, Annual Budget Report, <http://www.fm.dk/Publikationer/2010/2113-Budgetredegoerelse%202010/8%20Praksissektoren.aspx>
- (foundationdia2011) <http://www.fundaciondiabetes.org/diabetes/cont03d.htm>
- (Gaál2004) European Observatory on Health Systems and Policies Health Care Systems in Transition, Péter Gaál, 2004, Hungary
- (Galmiche2011) Private interview with Dr. André Galmiche, La Brienne, France (February 2011)
- (Gencat2010) <http://www.gencat.cat/salut/depsalut/html/es/dir3591/doc33320.html>
- (Glenngård2005) Glenngård A H, Hjalte F, Svensson M, Anell A & Bankauskaite V. Health Systems in Transition: Sweden. Copenhagen, WHO Regional Office for Europe on behalf of the European Observatory on Health Systems and Policies, 2005.
- (GoodEhealth2010) [http://kb.good-ehealth.org/browseContent\\_alt.do?contentId=30&action=v3](http://kb.good-ehealth.org/browseContent_alt.do?contentId=30&action=v3)
- (HBA2010) <http://www.hbawards.co.uk/award-categories/3-awards-category-one/126-telehealth-award>
- (Hlavačka2004) Hlavačka S, Wágner R, Riesberg A. Health care systems in transition: Slovakia. European Observatory on Health Systems and Policies, 2004
- (Hofmarcher2006) Hofmarcher, M. & Rack, H. Healthcare Systems in Transition: Austria. European Observatory of Health Systems and Policies, 2006
- (Hopp2006) Hopp, F. Whitten, P. Subramanian, U. Woodbridge, P. Mackert, M. & Lowery, J.: Perspectives from the Veterans Health Administration about opportunities and barriers in telemedicine. *Journal of Telemedicine and Telecare*, 12 404-409, 2006
- (Häkkinen2010) Euro observer Autumn 2010 Volume 12, Number 3, The Health Policy Bulletin, of the European Observatory on Health Systems and Policies
- (ISPOR2010) <http://www.ispor.org/htaroadmaps/FranceMD.asp>

- (Konstantinova2010) Konstantinova, 2010: ESST - European Studies on Society, Science and Technology, Master thesis, "The users' role within the dynamics of European healthcare, ICT: A comparative analysis on e-consulting practices for diabetics in the Netherlands and Finland"
- (Kroneman2000) Kroneman M., Nagy J. Introducing DRG-based financing in Hungary August 2000
- (Leu2009) Leu, R.E., Rutten, F.F.H, Brouwer, W., Matter, P., Rüttschi, C. The Swiss and Dutch Health Insurance Systems: Universal Coverage and Regulated Competitive Insurance Markets
- (Louis2003) Louis, A.A. Turner, T. Gretton, M. Baksh, A. Cleland, J.G.F.: A systematic review of telemonitoring for the management of heart failure. European Journal of Heart Failure 2003 Oct;5(5):583-90
- (MedCom2010) <http://www.medcom.dk/wm109991>
- (MHSA2006) <http://www.sweden.gov.se/content/1/c6/06/43/24/f6405a1c.pdf>
- (MHSA2009) Ministry of Health and Social Affairs, Swedish Association of Local Authorities and Regions, SALAR National Board of Health and Welfare, Association of Private Care Providers: 2009 Status Report, Swedish Strategy for eHealth: Safe and accessible information in health and social care, <http://www.sweden.gov.se/content/1/c6/12/48/02/a97569e9.pdf>
- (NCM2010) Health Innovation in the Nordic Countries, 2010, Nordic Council of Ministers
- (NHS2006) <http://www.nhsdirect.nhs.uk/Commissioners/CaseStudies/BirminghamOwnHealthCaseStudy>
- (NHS2008) <http://www.ic.nhs.uk/webfiles/publications/Qresearch/QRESEARCH%20Consultation%20CALENDER%20FINAL%20revised.pdf>
- (NHS2010) <http://www.nhsdirect.nhs.uk/Commissioners/NewsDirect/NewsDirectArchive/NewsDirect-March2010/ThreeNewInnovationProjects>
- (Nictiz2009) NICTIZ, 2009: eHealth in The Netherlands: Policies, developments and status of cross enterprise information exchange in Dutch healthcare. Sande Druk-Nootdorp, Den Haag
- (Nictiz2011) <http://www.nictiz.nl/page/Home/English>
- (NIHDI2007) NIHDI, 2007 : The NIHDI - A closer look, Role, Partners and Ambitions [http://www.riziv.fgov.be/presentation/fr/publications/prospectus/pdf/prospectus\\_allen.pdf](http://www.riziv.fgov.be/presentation/fr/publications/prospectus/pdf/prospectus_allen.pdf)
- (NOMESCO2008) <http://nomesco-eng.nom-nos.dk/filer/publikationer/NB%20Helse%202006.pdf>
- (Novotny2004) Petr Novotny, 2004 European Commission, DG Information Society, eHealth Unit: Ehealth in central and East European countries with focus on Czech Republic, Hungary, Poland and Slovenia.
- (NSI2011) <http://www.nsi.dk>
- (NZa2010) <http://www.nza.nl/98174/139255/2010-HDS-tarieven-december.pdf>
- (NZa2011) <http://www.nza.nl/regelgeving/tarieven/>
- (OECD2009) OECD, 2009: Expert group - Incentives for Implementation of Information, Communication Technologies in the Health Sector Achieving Efficiency Improvements through ICTs
- (OECD2010a) OECD, Health at a Glance: Europe 2010, OECD Publishing
- (OECD2010b) OECD, 2010: Achieving Efficiency Improvements in the Health Sector through the implementation of Information and Communication Technologies, Directorate for Employment, Labour and Social Affairs
- (ONS2009) Measuring Growth in the Volume of Input for General Practice Services, Office for National Statistics, 2009.

- (Or2009) <http://eurodrp.projects.tu-berlin.de/publications/Activity%20based%20payment%20in%20France%20-%20Zeynep%20Or.pdf>
- (Palm2000) Palm W., et al., *Implications of recent jurisprudence on the coordination of health care protection systems*, General Report produced for the Directorate General for Employment and Social Affairs of the European Commission, 2000, p. 132
- (Palm2010) Palm W., Glinos A.: "Enabling patient mobility in the EU: between free movement and coordination" in Mossialos, E., Permanand, G., Baeten, R. and Harvey, K.T., *Health systems governance in Europe. The role of the European Union Law and Policy*, 2010, p. 509-561
- (Paris2010) Paris, V., M. Devaux and L. Wei (2010), "Health Systems Institutional Characteristics: A Survey of 29 OECD Countries", *OECD Health Working Papers*, No. 50, OECD Publishing.
- (PHNP2010) [http://www.pnhp.org/single\\_payer\\_resources/health\\_care\\_systems\\_four\\_basic\\_models.php](http://www.pnhp.org/single_payer_resources/health_care_systems_four_basic_models.php)
- (Pouillet2010) Pouillet Y., Gutwirth S., De Schutter O., Lax V.M. (2010) The contribution of the Article 29 Working Party to the construction of a harmonised European data protection system: an illustration of 'reflexive governance'?. Human rights in the web of governance: towards a learning-based fundamental rights policy for the European Union, from Collection du Centre des Droits de l'homme de l'UCL, eds. Jean-Yves Carlier, Olivier De Schutter & Marc Verdussen
- (RIZIV2010) <http://www.riziv.fgov.be/insurer/nl/rate/index.htm>
- (Rohrbasser2010) [http://www.equip.ch/flx/national\\_pages/switzerland](http://www.equip.ch/flx/national_pages/switzerland)
- (RSI2010a) <http://www.regioner.dk/Sundhed/Sundheds-IT/RSI.aspx>
- (RSI2010b) Pejlemærker for Sundheds-IT 2010, Danske Regioner, [http://www.regioner.dk/Sundhed/Sundheds-IT/~/\\_media/451FF22296124C9FB78A6EFE881FCBC3.ashx](http://www.regioner.dk/Sundhed/Sundheds-IT/~/_media/451FF22296124C9FB78A6EFE881FCBC3.ashx)
- (Schneider2007) Provider Payment Reforms: Lessons from Europe and America for South Eastern Europe Policy Note, Pia Schneider, October 2007, The World Bank, p. 27
- (SDSD2010a) <http://www.sdsd.dk>
- (SDSD2010b) [http://www.sdsd.dk/~/\\_media/Files/Strategi/Strategy\\_english.ashx](http://www.sdsd.dk/~/_media/Files/Strategi/Strategy_english.ashx)
- (Shäfer2010) Schäfer et al., *Healthcare Systems in Transition: The Netherlands*. European Observatory of Health Systems and Policies, 2010
- (SKL2009a) <http://www.skl.se/web/Databas.aspx>
- (SKL2009b) [https://stat2.skl.se/kpp/FR09/rap\\_vikt\\_tot\\_2009.htm](https://stat2.skl.se/kpp/FR09/rap_vikt_tot_2009.htm)
- (Socialstyrelse2010) <http://www.socialstyrelsen.se/klassificeringochkoder/norddrg>
- (Socialstyrelse2011) <http://www.socialstyrelsen.se/Lists/Artikelkatalog/Attachments/18198/2010-12-12.pdf>
- (Stithoskopio2011) <http://stithoskopio.blogspot.com/2011/01/7-1.html>
- (Strandberg2007) Strandberg-Larsen M, Nielsen MB, Vallgård S, Krasnik A, Vrangbæk K, Mossialos E Denmark: Health system review. *Health Systems in Transition*, 2007 Vol. 9
- (SUM2010) Ministry of Health, Guide to DRG payment system for 2011, 2010 [http://www.sum.dk/Sundhed/DRG-systemet/Takster/~/\\_media/Filer%20-%20dokumenter/DRGtakster/Takstvejledning/Takstvejledning\\_2011.ashx](http://www.sum.dk/Sundhed/DRG-systemet/Takster/~/_media/Filer%20-%20dokumenter/DRGtakster/Takstvejledning/Takstvejledning_2011.ashx)
- (Sundhed2010) <https://www.sundhed.dk/profil.aspx?id=11062.105>
- (Sørensen2009) Sørensen, J.C.: *Healthcare technologies as engine for innovation in the Capital Region of Denmark*, Federation of Danish Industries, 2009

- (Teperi2009) Teperi, J., Porter, M.E., Vuorenkoski, L., & Baron, J.F., The Finnish Health Care System: A Value-Based Perspective, Sitra Reports 82, 2009
- (Torbica2009) [http://www.aiesweb.it/convegni/appuntamenti/sem0003/pdf /torbica.pdf](http://www.aiesweb.it/convegni/appuntamenti/sem0003/pdf_torbica.pdf)
- (Vuorenkoski2008) Vuorenkoski, L., Healthcare Systems in Transition: Finland. European Observatory of Health Systems and Policies, 2008
- (WHO2001) European Observatory on Health Care Systems Sweden, Catharina Hjortsberg and Ola Ghatnekar, 2001, <http://www.saglik.gov.tr/EN/dosya/2-1001/h/sweden.pdf>
- (WHO2004) Health Care Systems in Transition – France, 2004  
<http://www.euro.who.int/document/e83126.pdf>
- (WHO2011) Atlas eHealth country profiles Global Observatory for eHealth Series, Vol. 1)
- (Wikipedia2010) [http://en.wikipedia.org/wiki/Health\\_in\\_France](http://en.wikipedia.org/wiki/Health_in_France)
- (York2010) [http://www.yorksandhumber.nhs.uk/search\\_results/index.php](http://www.yorksandhumber.nhs.uk/search_results/index.php)
- (Wootton2001) Wootton, R.: Recent advances: Telemedicine. British Medical Journal, 323 227-560, 2001
- (Zimmet2001) Zimmet, P., Alberti, K.G., Shaw, J. (2001): Global and societal implications of the diabetes epidemic. Nature 414:782-787, 2001