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LIST OF ABREVIATIONS

A&E	Accident & Emergency
ADPF	Adjusted Disease Prevalence Factor
ALOS	Average Length of Stay
BHF	British Heart Foundation
BMA	British Medical Association
CBA	Cost–Benefit Analysis
CEA	Cost-Effectiveness Analysis
CHD	Coronary Heart Disease
CHF	Chronic Heart Failure
CHP	Community Health Partnership
COPD	Chronic Obstructive Pulmonary Disease
CPI	Contractor Population Index
CPM	Combined Predictive Model
CQC	Care Quality Commission
CSO	Chief Scientist Office
CVD	Cardiovascular Disease
DALLAS	Delivering Assisted Living Lifestyles At Scale
DoH	Department of Health
EHR	Electronic Health Record
EPS	ePrescription Service
EPS R1	Electronic Prescription System Release 1

EU	European Union
EUR	Euro; also represented as €
FCE	Finished Consultant Episodes
GBP	Great Britain Pound; also represented as £
GDP	Gross Domestic Product
GMS	General Medical Services
GP	General Practitioner
HES	Hospital Episode Statistics
HTA	Health Technology Assessment
ICT	Information and Communication technologies
IPHS	Integrated Personal Health Systems
ISD	Information Services Division
IT	Information Technology
JIT	Joint Improvement Team
LDP	Local Delivery Plan
LOS	Length of Stay
LSE	the London School of Economics and Political Science
MTEP	Medical Technologies Evaluation Programme
NAO	National Audit Office
NHS	National Health Service
NICE	National Institute for Health and Clinical Excellence
NPfIT	National Programme for IT
NSF	National Service Frameworks
NYY	North Yorkshire and York
OECD	Organisation for Economic Co-operation and Development
PARR	Patients At Risk of Rehospitalisation
PCT	Primary Care Trust
PMS	Personal Medical Services
PPP	Purchasing Power Parity
PTG	Preventative Technologies Grant
QOF	Quality and Outcomes Framework
RCT	Randomised Control Trial
RMT	Remote Patient Monitoring and Treatment
SCDU	Strategic Commissioning Development Unit
SCT	Scottish Centre for Telehealth
SIGN	Scottish Intercollegiate Guidelines Network
SIM	Subscriber Identity Module

SIMPHS2	Strategic Intelligence Monitor on Personal Health Systems phase 2
STS	structured telephone support
TDP	Telecare Development Programme
TSA	Telecare Services Association
TV	Television
UCL	University College London
UK	United Kingdom
USB	Universal Serial Bus
VHA	Veterans Health Administration
WSD	Whole System Demonstrators
WSDAN	WSD Action Network
YHEC	York Health Economics Consortium

1. SIMPHS2 background and rationale for this report

1.1 Research approach and objectives

This document presents an analysis of the data collected in the UK in relation to the integration of ICT, disease management and RMT at local/regional level (meso and micro level) covering England and Scotland, in the framework of the SIMPHS2 project.

A combination of desk research and interviews has been used as the basis for analysing IPHS deployment in the two home countries. The International congress on telehealth and telecare organised by the King's Fund in March 2011[1] showed that in the UK the main initiatives in the field of interest are taking place in England and Scotland. SIMPHS1 had previously identified interesting initiatives in Northern Ireland but we concluded that focusing on Scotland and England was more relevant for SIMPHS2. In addition, the fact that the two countries have adopted somehow different approaches to promote RMT and integrated care contributes to providing a richer picture of the diversity of initiatives underway in the EU.

Interviews in each setting have involved stakeholders at different levels: policy-makers, project managers, health and social care professionals (at primary and community care as well as at hospital level), patients, academic evaluators and health technology assessment experts.

In total in England eleven stakeholders were involved: a senior consultant to the Whole System Demonstrators (WSD) providing the policy vision and extensive data on telehealth and telecare deployment; two members of the National Institute for Health and Clinical Excellence (NICE), the agency responsible for Health Technology Assessment in England; a clinical champion in telehealth; a project manager in one of the pilots; two district nurses; one academic researcher working on telehealth/telecare evaluation and three patients.

In Scotland, ten stakeholders were involved: four experts at policy-making level; a project manager; a nurse; two patients; and two GPs, one of them also being involved in evaluating IPHS from an academic perspective.

This document is structured as follows. It starts with a general introduction to the UK situation including some background data on population, health and chronic diseases as well as context information on the healthcare system, its organisation and the approach to chronic disease management. Areas that are common to both England and Scotland are covered, where this is not the case it will be pointed out.

In the next section, results from the Scotland field study are reported including an analysis of the Scottish eHealth approach as well as developments and trends in telehealth and telecare. They are followed by an assessment of the issues of governance, innovation and impact assessment.

Along the same lines as the above, the following section is dedicated to the case of England.

Finally, policy implications drawing on all previous sections are presented in the concluding section of this report.

2. Introduction to the UK

2.1 Socio-demographic background

The United Kingdom is composed of four home countries: England, Scotland, Wales and Northern Ireland. In 2009, the UK population was estimated at almost 61 million[1] (see Annex I, figures 14-15), out of which nearly 52 million corresponded to England[2] and 5.2 million to Scotland[3]. Since 1980, the UK population has increased by 7.55%. However when looking at the age structure, this increase is not uniform amongst population groups: the population group 0-14 years has decreased by 9.72% whilst the population group 65-79 has increased by 12.57% and that of the 80+ group has increased by 39.24%.

Whilst employment levels have remained quite stable since 2000, education levels have increased and salaries have more than doubled from an average value of £13,134 (or €21,015) in 1997 to £27,487 (€31,884)[1] in 2009 (see Figure 15 to Figure 17, Annex I)

As detailed in Annex I (Figure 18), life expectancy at birth as a proxy of health status of the population in 2007 was 79.1 i.e. 1% above the average of 17 selected EU Member States for which data was available. Total healthcare expenditure per capita calculated on US$ 2000 PPP (see Figure 19, Annex I) was 2,571[2] which is also above average (by 7%). In historical terms, healthcare expenditure in the United Kingdom has risen significantly in recent years, with total spending on healthcare as a proportion of GDP increasing from 5.6% in 1980 to 8.7% in 2008. In particular, spending increased rapidly between 1997 and 2008, from 6.6% to 8.7% of GDP, corresponding to an increase in expenditure in cash terms from £55.1 billion (about €88.63 billion) to £125.4 billion[4] (about €145.8 billion)[3].

2.2 Chronic diseases prevalence and associated costs

The statistics speak for themselves. In 1950, less than 1% of the global population was over 80 years old. In OECD countries, the share of those aged 80 and over is expected to increase from 4% in 2010 to nearly 10% in 2050 [5]. This ageing population is generating high demand and pressures on costs to healthcare systems. Already the 30% of the population with long term conditions accounts for 70% of NHS spending in the UK[6].

Data from the Quality and Outcomes Framework (QOF) provides an overview of the most prevalent health conditions in the four home countries.[4]

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1 Exchange rate used from European Investment Bank historical data

2 US$ adjusted to year 2000 purchasing power parity

3 Exchange rate used from European Investment Bank historical data

4 Further details on the QOF is provided in this document and in Annex III – Quality Outcomes Framework (QOF) Clinical and organisational domains and payments.

Figure 1 – UK (and home countries) average disease prevalence (2009/10) - % population

UK average disease prevalence (2009/10)				
DOMAIN	**ENGLAND**	**WALES**	**SCOTLAND**	**N IRELAND**
	2009/10	**2009/10**	**2009/10**	**2009/10**
Coronary heart disease	**3.4**	**4.1**	**4.5**	**4**
Asthma	5.9	6.7	5.5	5.9
Cancer	1.4	1.1	1.1	1.3
COPD	**1.6**	**1.4**	**1.9**	**1.6**
Diabetes	**5.4**	**4.9**	**3.9**	**3.7**
Epilepsy	0.8	0.7	0.7	0.8
Hypertension	13.4	15.1	12.9	12.4
Hypothyroidism	2.9	3.5	3.3	3.2
Mental health	0.8	0.7	0.8	0.8
Stroke/TIA	1.7	2	2.1	1.7
Atrial fibrillation	1.4	1	1.3	1.3
Chronic kidney disease	4.3	1.9	2.7	3.1
Dementia	0.5	0.2	0.6	0.6
Depression 1 - Case finding: diabetes/CHD patients	-	7.9	7.3	6.9
Depression 2 - New diagnosis	-	8.7	7	8.8
Heart failure	**0.7**	**0.9**	**0.9**	**0.8**
Learning disability	0.4	0.4	0.4	0.4
Obesity	10.5	10.1	7.3	9.3
Palliative care	0.1	0.1	0.1	-
Smoking status	-	25.5	23.3	22.1

Source: Quality and Outcomes Framework 2011/2012[7]

Amongst these long-term conditions, some are more prevalent than others. For instance, the prevalence of diabetes[8] in the adult population across the UK was over 2.6 million in 2009/10, corresponding to 5.4% of the population in England and 3.9% in Scotland. For COPD, there are an estimated 3.7 million people with COPD in the UK, although only an estimated 900,000 (1.6% of the population) are correctly diagnosed. 24,160 people in the UK died as a result of COPD in 2005 [9].

In order to better grasp the impact of chronic diseases, detailed data for cardiovascular disease (CVD) is provided. Heart and circulatory disease (cardiovascular disease or CVD) is the UK's biggest killer. It accounts for almost 191,000 deaths each year in the UK. During 2008, it killed more than 157,000 people in England and almost 18,000 in Scotland.[10] Obesity, diabetes and physical inactivity are all major risk factors for coronary heart disease (CHD).

Figure 2 - Total deaths by cause, 2007, UK

	All ages
Coronary heart disease	91,458
Stroke	53,186
Other CVD	48,643
Lung cancer	34,552
Colo-rectal cancer	16,025
Breast cancer	11,995
Other cancer	96,739
Respiratory disease	78,330
Injuries and poisoning	20,371
All other causes	115,852

Source: British Heart Foundation [10]

CVD is also a major cause of premature death (death before the age of 75) accounting for 28% of premature deaths in men and 20% of premature deaths in women representing a total of 50,000 premature deaths in the UK during 2008.

CHD is the most common cause of premature death in the UK the cause in itself of 28,000 premature deaths during 2008. Although mortality from coronary heart disease (CHD) is falling rapidly, the prevalence of CHD and other circulatory diseases appears to be rising, especially for men in older age groups. Since the late 1980s, it has risen by 52% in men aged 75 and older. Nearly all deaths from CHD are from a heart attack. Approximately, 1.4 million people in the UK have had a heart attack at some point in their lives and 2 million people suffer from angina, the most common symptom of CHD. In 2007, 141,000 people suffered from a heart attack and 720,000 had a definite heart failure.

Figure 3 - Decrease in death rate from CHD, men and women under 65, 2002-07, UK and Europe

	Men	Women
UK	24%	31%
England	25%	32%
Scotland	15%	26%
Wales	26%	33%
Northern Ireland	19%	26%
Netherlands	31%	38%
Finland	17%	22%
European Union	14%	17%

Source: British Heart Foundation [10]

In addition, death rates from CHD differ strikingly across regions as a result of socio-economic disparities in prejudice of lowest socio-economic groups with a clear gradient across social groups. This inequality is more pronounced in women than men.

The cost of CHD to the healthcare system in the UK is huge - around £3.2 billion (around €3.68 billion using 2011 exchange rate) a year. Hospital care accounts for the vast majority of these costs - about 73% of total CHD costs. But looking only at the costs of CHD to the healthcare system grossly underestimates the total cost to the nation. CHD also costs the UK economy over £5.8 billion (around €6.68 billion using 2011 exchange rate) because of days lost due to death, illness and informal care of people with the disease. In total, CHD costs the UK economy about £9.0 billion (around €10.36 billion using 2011 exchange rate) a year [10]

Further details on prevalence and costs associated for each of the three conditions (CVD, COPD and diabetes) is provided in Annex II – Descriptive statistics on CVD, COPD and diabetes).

2.2.1 Overview of contacts with the healthcare system related to CVD, COPD and diabetes

Data for outpatient consultations[5] is not included in this document given that primary diagnosis is not a mandated field in the outpatients' dataset, therefore coverage within this field is poor. Indeed, the data on outpatient consultations in England shows that almost 97% of attendances relate to "Unknown and unspecified causes of morbidity"[11], thus, providing data only for the remaining 3% which relate to specified causes was considered too weak a basis for further analysis.

Data on hospitalisations was also retrieved for a selection of conditions – COPD, diabetes, CVD (henceforth to be termed as: "selected conditions"- for the period 2009-2010 in England and in Scotland (see Figure 24 to Figure 29in Annex II). Notwithstanding that the data must be treated with caution in general since the frequency of hospital discharges is strongly influenced by variations in the availability of health resources over time and by changes in clinical practice and

[5] Outpatient consultations data represents hospital outpatient consultations, not GP consultations

even more for cardiovascular disease in particular[6]: when comparing hospitalisations for the three selected conditions with total hospitalisations, they represent 1.20% of finished consultant episodes (FEC)and 3.38% of total bed days of all FEC as detailed in Figure 4 below.

The difference between FEC and FEC bed-days already implies that these conditions have longer length of stay (LOS) on average, thus, it is not only about the number of episodes taking place but also about higher LOS with the associated increase on resource consumption. It is striking to see that an average of the median length of stay (LOS) for the selected conditions is 67, whilst the same value for overall conditions is 1 day (see Figure 5). Moreover, the average age for the selected conditions is 67 compared to the average age for all conditions being 51 which may explain higher LOS but also reflects future trends in the healthcare system in light of the ageing population.

Figure 4 – Hospitalisations in England for selected diseases (inpatient) compared with total hospitalisations. 2009-2010

	Total episodes	Finished consultant episodes	Day case (patients admitted just for the day)	FCE Bed Days
Total selected conditions	354,271	201,978	3,419	1,742,962
Total all conditions	**16,806,196**	**16,806,196**	**5,474,889**	**51,493,494**
% selected conditions vs. all conditions	2.11%	1.20%	0.06%	3.38%

Source: HES 2009-2010[11]. Note: details of the conditions selected are available in Annex II

Figure 5 – Waiting period, length of Stay (LOS) and mean age comparison of hospitalisations for selected conditions with total hospitalisations. England 2009-2010

	Mean time waited (days)	Median time waited (days)	Mean LOS (days)	Median LOS (days)	Mean age
Average selected conditions	13	10	6	67	67
All conditions	**50**	**34**	**5.6**	**1**	**51**

Source: HES 2009-2010[11]. Note: details of the conditions selected are available in Annex II

It is also relevant to point that length of stay has decreased over the years[12], however, in the light of the increasing prevalence of these diseases, the economic impact on healthcare resources is still of serious concern.

In sum, the data on prevalence, healthcare consumption and economic impact for COPD, CVD and diabetes in the UK together with the specific data for England and Scotland show that:

- CVD is the primary cause of death among chronic diseases, however specific cost data for this condition is difficult to gather given the wide spectrum of interventions associated to it;
- prevalence of CVD, diabetes and COPD as well as hospitalisations for the three of these conditions (see Figure 28) is higher amongst the 65+ and their average length of stay is also higher;

[6] For cardiovascular diseases only a selection of conditions for inpatient details has been retrieved. Cardiovascular diseases actually involve both coronary heart disease (CHD) and cerebrovascular disease, in addition a large set of procedures are associated to CHD, i.e.: re-vascularisation procedures (Coronary Artery Bypass Grafts and Coronary Angioplasties), treatment of acute myocardial infarction, Percutaneous Coronary Interventions, and many more. Thus, for the sake of illustration only some of them have been included.

- although the total number of outpatient visits has decreased in the last few years (see Figure 31) attendance to A&E for the 65+ has been increasing (see Figure 32 to Figure 35) at least in Scotland. This reality is likely to be valid also across the UK.

For all of the above, the UK health system has aimed to address this challenging reality in a variety of ways as will be described in the rest of this document.

2.3 Social and Healthcare organisation

The Secretary of State for Health, who is accountable to Parliament[7], is responsible for the heavily tax funded health care system. The respective Department of Health (one in England and one in Scotland) is the policy-making body responsible for the National Health Service (NHS), public health, adult social care and other related areas[4].

The NHS is an almost-universal system, free at the point of service with little co-payments (mainly for pharmaceuticals) involving different tiers of care. The gate-keeping primary care role is delivered by independent GP practices contracting with the NHS (Box 1 in the next section provides details on primary care organisation). GPs are usually the first contact point with the healthcare system for patients except when they attend A&E directly.

Until recently, healthcare has been geographically organised in primary care trusts (PCTs) in England and NHS Boards in Scotland. 80% of the NHS budget sits within PCTs or Health Boards which contract with GP practices and also fund any specialised care and hospitalisations when patients get referred by their GP. A&E is also financed by the PCT regardless of whether they end up in hospitalisation or not.

PCTs and NHS Boards include community nurses as part of their staff. Community nurses often coordinate primary and social care services to cover the needs of patients within the community and also provide home nursing where required. They are often coordinated by the more senior role of district nurses. As of 2004, in England the clinical role of community matrons was defined as very experienced and skilled members of staff holding the role of case managers in particular for patients with complex and long-term conditions and intense needs. In Scotland, instead, there was little enthusiasm for the role of community matrons.

Regarding social care, it has traditionally been the competence of the local authorities or councils with adult social services responsibilities, until the recent reform which transferred adult social care to the NHS. Whilst healthcare is free at the point of service regardless on ability to pay, social care financing is means-tested[4], often involving private payments or co-payments through out-of-pocket or insurance schemes depending on the user. Social care is delivered either directly by the public sector, or by the public sector contracting or coordinating with the private sector and other non-government organisations, many of which are non-for-profit.

Traditionally, the coordination between health and social care was mainly supported at local level through community nurses. More recently competences for adult social care have been shifted to the pertinent Department of Health, hence, aiming to integrate services for adults. This shift is too recent to assess its impact in social and health care coordination nationwide.

2.3.1 Primary care in the UK

Comparing primary care data with that of dentists historically, the number of GP visits per year has fluctuated between 5 and 6 per person during the 2000-2008 period, as opposite to that of dentists which has remained almost constant below 1 visit per person, as shown in Annex I (Figure 20). Nowadays, most GP consultations take place in the surgery in contrast with the trend in the

[7] Please note, in 1999, the Scottish Parliament received full legislative powers. Thus, since then, there is a Scottish Parliament and an English Parliament and also a Secretary of State for Heath in each jurisdiction accountable to the corresponding parliament.

1970s when home visits were more frequent (see Box 1 for a description of general practice in the UK)

Box 1 – General Practice in the UK

General Practitioners (GPs) are usually the first point of contact for an individual and deal with most general medical issues, with the ability to refer on to more specialized care when required. They provide a range of diagnostic services, some minor surgery and family planning, as well as care for acute and chronically ill patients, and people who are terminally ill. Obstetric care, prenatal care and perinatal care are arranged through general practice. GPs also provide preventive services such as vaccination, immunization and cancer screening, as well as health promotion such as general advice on healthy living or smoking cessation clinics.

Practice nurses work within GP practices and are usually registered general nurses. They may provide a range of services including immunization, chronic disease management, health promotion and health assessments of older people.

GP consultations mainly take place in the surgery – in 2008 around 86% of the total, with 11% by telephone and 3% in the patient's home. The number of home visits has fallen considerably: from 22% in 1971 down to 6% in 1998. The average number of GP consultations per year in 2008 was 5.9 per person whereby older people tend to use GP services more frequently

Source: United Kingdom (England) - Health system review, 2011[4]

In June 2003, 79.4% of UK GPs voted to accept a new contract for the delivery of general medical services (GMS). Currently, the GMS is the NHS contract most widely used to structure the services provided by GP practices (not individual GPs) contracting with PCTs or Health Boards. The contract came into force on 1 April 2004 and the Quality Outcome Framework (QOF) as part of this contract defined and bound GP practices' financial income to a set of criteria and population outcomes delivered by the practice (a brief description of the QOF indicators are available in Box 2, whilst Annex III – Quality Outcomes Framework (QOF) Clinical and organisational domains and payment provides the full list). Currently, some amendments to the QOF are being made aiming to adapt to the current population status and needs. Although participation by practices in the QOF is voluntary, participation rates are very high, with most Personal Medical Services (PMS) practices taking part. PMS are also defined within the GMS as "an opportunity for GPs, nurses and Community Trusts to test different ideas for delivering existing GMS contracts, focusing on local service problems and bringing out improvements. Such pilots are implemented through a local agreement". Thus, PMS may be understood as specific tailor-made contracts between the GP practice and the corresponding PCT or NHS Boards that take place in specific communities where the needs of the population may require a different way to approach and deliver services and may involve other community stakeholders.

Box 2 – The Quality and Outcomes Framework

The Quality and Outcomes Framework (QOF) rewards practices for the provision of 'quality care' and helps to standardise improvements in the delivery of clinical care. Practice participation in QOF is voluntary but most practices on General Medical Services (GMS) contracts, as well as many on Personal Medical Services (PMS) contracts, take part in QOF. It was introduced as part of the new GMS contract in 2004.

The QOF has four main components:

- clinical standards: indicators covering a variety of clinical areas, including coronary heart disease, stroke or transient ischemic attacks, hypertension, diabetes, COPD, epilepsy, cancer, mental health, hypothyroidism and asthma;
- organizational standards: indicators covering records and information about patients, information for patients, education and training, practice management and medicines

management;

- experience of patients: indicators covering the services provided, how they are provided and patient involvement in service development plans; and
- additional services: indicators covering a variety of service areas including cervical screening, child health, maternity and contraceptive services.

Source: NHS

The QOF represents an effort at primary care level to improve quality of care and to manage chronic conditions that fall within the framework such as diabetes and heart disease. As a result of its introduction in 2004, the number of patients registered for instance as diabetics under the care of GPs rose rapidly (although it is estimated that many diabetics are still not registered) and the number of patients with cardiovascular problems receiving statins also increased.

Moreover, recent evaluations of the QOF concluded that it has improved quality of care since its introduction in 2004[13].

2.3.2 Integrated care and management of chronic conditions

As much as community nurses play a key role and represent a serious effort in supporting the delivery of integrated care, coordination of primary and secondary care in the UK has always been a challenging issue from a health policy perspective and the same applies to health and social care coordination. Such a weak coordination has resulted in extra expenditure and ineffective provision and use of services, often leading to long hospitalisation due to failure to cater for patients' needs within the community.

NHS defines integrated care or "intermediate care" as “a range of integrated services to promote faster recovery from illness, prevent unnecessary acute hospital admission, support timely discharge and maximise independent living” thus helping to prevent premature or unnecessary admission to hospital or long-term residential care and supporting patients within the community. Rehabilitation services mainly for chronic diseases (including mental diseases which may not be age-related) are included within this definition[4]. These services often include sessions to train patients to self-manage their condition and identify symptoms that indicate their condition is worsening, thus helping them to have an extramural life with their condition.

In addition, NHS Direct (in Scotland, the term for this service is NHS24) was established as a service providing health information and self-care advice. The service interacts with patients using different channels including web information and as a 24 hour phone service. The phone service is not the equivalent to emergencies, it is run by trained call-handlers and is meant to act as a triage point for the NHS. Additional channels for NHS Direct or NHS24 are being developed as it will be revealed in later sections of this document. However, as much as one of the purposes of the service is to support self-care, the cost-effectiveness of this service has not yet been proved due to different biases that evaluations embed[14].

Beyond the establishment of NHS24 and NHS Direct in each setting, specific approaches to promote integrated care and to keep patients in the community (outside hospital) have taken place in Scotland and in England as discussed in the following sections.

Integrated care and management of chronic conditions in Scotland

The number of older people in Scotland is projected to rise by 12% between 2010 and 2015 (from 881,000 to 991,000), with an 18% increase in the number of people aged 85 and over (from 106,000 to 125,000). This will increase demand for health and social care services. The Scottish Government has reported that the amount spent on health and social care services would need to increase by £3.5 billion (or € 4.01 billion) by 2031 if systems remain as they are now[15].

In the light of this, beyond the QOF linking GP pay to specific activities for chronic disease management and aiming at integrated care activities, Scotland addressed these issues mainly through two parallel and complementary initiatives: (i) the development of chronic disease management guidelines as part of the so-called *outcomes focused approach* which included a section on long-term conditions; and (ii) the development *of community health partnerships* (CHPs).

The 2007 action plan "Better Health, Better Care"[16] was defined so as to enable joint roles, responsibilities and actions to be agreed at local level through Community Planning arrangements. In line with it, the 2011/12 NHS Board Local Delivery Plan (LDP) asked NHS Boards to highlight their role in delivery of local outcomes for communities through collaborative working with other Community Planning Partners. Targets for these health improvement activities included targets in longer healthy life years beyond the QOF. Moreover the responsibility was within community partners as opposite to the QOF which is restricted to GP practices. In line with this and the so-called Outcomes Focused Approach a set of guidelines were developed by the Scottish Intercollegiate Guidelines Network (SIGN)[8] on a variety of conditions including cancer, CHD and Stroke, mental diseases, diabetes and a set of respiratory diseases amongst others.[15]

In addition to the Local Delivery Plan and their Outcomes Focused Approach, community health partnerships (CHPs) were established. These ended up evolving into two different structures: a health-only and a health and social care structure. In June 2011, there were 36 CHPs in Scotland with 7 integrated CHPs and 29 health-only CHPs. Membership of all CHP committees was defined by the Scottish Executive and included key NHS stakeholders such as elected members of local councils, GPs and members of the local public partnership forum. Thus, although the CHPs committees and their budgets often involved different stakeholders, in many cases the structure was mainly healthcare focused rather than integrating health and social care.

A recent audit of the CHP revealed that in 2009/10[15], CHPs managed around £3.2 billion (or €3.73 billion of health and social care expenditure, approximately 28,500 health and 5,300 social care staff, and other resources such as premises and equipment. However, this data was considered an underestimate because not all CHPs provided information on budgets and staffing. As stated in the results, the overall aim of the audit was to "examine whether CHPs were achieving what they were set up to deliver, including their contribution to moving care from hospital settings to the community and improving the health and quality of life of local people". The audit concluded that there was a need for further cooperation and engagement between health and social care at CHP level in order to meet the targets established at national level through the Outcomes Focused Approach. In addition, the audit also emphasized "the need to progress the eCare agenda to help address local barriers to sharing information for planning and service delivery purposes".

As an attempt to promote integrated care and management of chronic conditions, CHPs were also eligible to apply for funding to use IPHS systems supporting patients living in the community as it will be further detailed later in this document.

Integrated care and management of chronic conditions in England

The government of England started to address the issue of integrated care and chronic conditions in the beginning of the years 2000, in recognition of the need to tackle the challenges posed by an ageing population and reduce preventable emergency admissions from patients with long-term conditions. This appears from a series of complementary measures adopted along the last decade, as shown below.

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[8] The Scottish Intercollegiate Guidelines Network (SIGN) develops evidence based clinical practice guidelines for the National Health Service (NHS) in Scotland. SIGN guidelines are derived from a systematic review of the scientific literature and are designed as a vehicle for accelerating the translation of new knowledge into action to meet our aim of reducing variations in practice, and improving patient-important outcomes. More information is available at: http://www.sign.ac.uk/index.html

NHS and Social Care Long-term Conditions Model

Building on US experiences such as the Evercare model, the Kaiser Triangle or the Chronic Care Model [9], in 2005, the Department of Health defined the "NHS & Social Care Long Term Conditions Model" which was an adaption of these models to the health and social care structures in England. The objective of this model was to keep patients with long-term conditions within the community. The overall aim was to provide guidance to social and health care teams at local level to deliver integrated care.

Complementary to the model and in order to ensure that limited access to healthcare services was not the driver for patients to attend A&E, policies facilitating access - such as setting thresholds for waiting times at different tiers of care, establishing the so-called "walk-in centres" and promoting the role of prescribing pharmacists and nurses who have undergone additional training - were implemented [4].

The National Service Frameworks

Before the above mentioned QOF linking GP pay to specific activities related to chronic disease management was introduced in primary care in 2004, England had already established the so-called National Service Frameworks (NSF) as a set of strategies (and often targets) to set clear quality requirements and standards, based on the best available evidence of what treatments and services work most effectively for patients.

These NSF which are defined as "inclusive, having been developed in partnership with health professionals, patients, carers, health service managers, voluntary agencies and other experts", made clear that intermediate care services should be targeted at people in order to decrease hospitalisations which are avoidable and hospital length of stay.

In addition, more targeted strategies were introduced for a number of chronic conditions like coronary heart disease (CHD), chronic obstructive pulmonary disease (still work in progress), and diabetes alongside other conditions like stroke, end-of-life care, dementia, adult autism and musculoskeletal conditions. For instance:

- The NSF for CHD which was launched in 2000 with the aim of reducing CHD and stroke-related deaths by 40% by March 2010 achieved remarkable results as this target was met five years ahead of schedule[17].
- The first part of the NSF for Diabetes, published in December 2001, defined for the first time a set of national standards to develop patient-centred services and improve health outcomes for people with diabetes homogeneously throughout England by raising the quality of services to patients and preventing new cases (i.e.: preventing child obesity). The second part - the Diabetes NSF Delivery Strategy, published in 2003 - defined national targets to measure local NHS performance against these standards for services such as routine screening for diabetic retinopathy. Most recently, the National Institute for Clinical Excellence (NICE) launched in 2011 quality standards for diabetes supporting the NSF and calling for better coordination between health and social care as well encouraging the work to decrease inequalities when it comes to diabetes prevalence. Results have not yet been released.
- The NSF for COPD was established as a priority in 2005 and it has not been released yet.

The reform of services introduced in the NSFs and other strategies typically involved changes to the organization of hospital services and better definition of the care pathways for individual patients across hospital and community care services. The QOF somehow translated the above guidelines into specific financial incentives for GPs to adhere to them.

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[9] If the reader is interested in specific details on these models, a suggestion would be reading the book: *Tackling chronic disease in Europe Strategies, interventions and challenges, Busse et al. 2010. Available at* http://www.euro.who.int/__data/assets/pdf_file/0008/96632/E93736.pdf

CQC reviews

Whilst the NSFs formulate quality standards and treatment pathways for certain conditions, hospital services, whether provided by the public or private sector, are regulated by the Care Quality Commission (CQC). CQC is defined as "the independent regulator of health care and adult social care services in England. Their role also involves carrying out periodic reviews of the performance of NHS trusts and special service reviews such as the 2010 one on the quality of care for stroke patients. This recent review can be understood as an indicator that stroke has become a priority within the healthcare system.

The role of the National Institute for Health and Clinical Excellence (NICE)

The National Institute for Health and Clinical Excellence (NICE) is "an independent organisation responsible for providing national guidance on promoting good health and preventing and treating ill health"[10]. Their spectrum of activities is quite broad.

NICE is internationally known for their health technology appraisals (HTA) and often, it is assumed that this is their only activity. Given that HTA when released are mandatory to the NHS, the role of NICE in diffusing innovations is very relevant. In addition, NICE guidance is also relevant in terms of chronic disease management and evidence-based guidelines. Thus, they have played an active role in chronic disease management and disseminating approaches for the NHS to address the needs of the ageing population. For instance guidance on care and treatment for COPD, diabetes, obesity, cardiovascular diseases or the assessment and prevention of falls have been produced and updated over time by NICE. It is relevant to point that often NICE recommendations are also adopted UK-wide and they are not only limited to England.

WSD

Additional activities aiming at integrated care and management of chronic conditions are the Whole System Demonstrator pilots. The WSD trials were 2-year pilot programmes using telehealth and telecare technologies aiming to keep people within the community. Details of the programme will be covered in later sections within this document.

The development of rehabilitation packs

Until recently, PCTs were responsible for commissioning health services. Recent plans aim to shift this responsibility to GPs and transitionally dismantle PCTs in England. As part of the GP commissioning plan, the Department of Health has set the Strategic Commissioning Development Unit (SCDU). The SCDU is responsible for developing the so-called Commissioning packs. Commissioning packs are tools to help commissioners improve the quality of services for patients, through clearly defined outcomes that help drive efficiency by reducing unwarranted variation in services. So far the cardiac rehabilitation pack has been published whilst those for diabetes and COPD amongst other conditions are currently work-in-progress.

The cardiac rehabilitation pack comprises a costing tool which has two key functions:

- Pathway costing – This section of the model provides a means with which to calculate the total cost for the cardiac rehabilitation pathway on a per-patient basis. This will help determine the affordability of local cardiac rehabilitation requirements and enable the value-for-money evaluation of providers' quotes.
- Cost–benefit analysis – The model also enables cost–benefit analysis (CBA) of implementing a cardiac rehabilitation programme targeting CHD patients, and this can be used in business cases. Technically speaking, it is actually a cost minimisation analysis. The summary of the analysis is available in ANNEX IV – Cost benefit analysis for cardiac rehabilitation in **England**). Based on some assumptions it is concluded that the new cardiac

[10] More information about them is available at http://www.nice.org.uk/

rehabilitation programme represents a £90 (around €105) saving per patient. This new programme does not involve any IPHS; however, given the level of detail of the data, some of it could be potentially used to quantify the impact of IPHS bearing in mind that the cheapest Telehealth technology solution can be obtained for £750 in England (around € 875) +VAT.

Conclusion on approaches to integrated care and chronic disease management

In sum, both England and Scotland have targeted their efforts at coordinating health and social care as well as offering support to chronic conditions as a response to the challenges posed by ageing populations.

Scotland has aimed at integrated care and chronic disease management by developing the CHPs at local level and the Outcomes Focused Approach establishing targets for them. Thus, it could be argued that Scotland has had a greater focus on fostering the approaches at local level.

Policies in England involved the NHS & Social Care Long Term Conditions Model providing guidance on integrated care, development of NSFs defining strategies, pathways and targets for chronic conditions complemented by CQC regulating quality of care and reviewing performance of NHS trusts. Most recently, the development of rehabilitation packs also provides guidance on services to be delivered to keep patients within the community. Thus, the approach in England seems driven from the top defining targets at local level.

In contrast, the QOF in primary care, the guidelines produced by NICE which are often adopted in the two home countries, the establishment of NHSDiret in England and NHS24 in Scotland or the role of community nurses are examples of common approaches to chronic disease management in the two settings.

The measures adopted in both cases have always aimed at reducing reliance on hospital care, enabling or improving self-care and keeping patients within the community. Finally, although a set of standards and care pathways have been defined, the approaches adopted always emphasized quality of care and measurement, and incentives were always to be assessed against health outcomes.

So far, this section has provided an overview on initiatives and services developed to tackle integrated care strictly from a health and social policy perspective. In addition, and in line with their efforts on integrated care, both England and Scotland launched integrated care pilots designed to cross boundaries between primary, community, secondary and social care. These efforts are the subject of the next sections on the developments on ICT and IPHS supporting integrated care initiatives in each area.

2.3.3 Role of ICT/EHR in promoting integrated care in Scotland

ICT developments

As noted by Protti, "By 2006, "over 90% of GP practices in Scotland were computerised. Although only 3% would consider themselves to be paperless"[18]. This penetration is very high compared to the EU average. GPASS whose origin dates back to 1984 is the dominant EHR system in Scotland with around 85% of the market[18]. Notwithstanding GPASS being the prominent software in use, there is not yet a fully operational EHR system nationwide and as a result there is not integration of eCare either.

Following the 2007 action plan “Better Health, Better Care”[16], the eHealth Programme in Scotland was launched. The ultimate goal of the eHealth Programme aims at providing integrated care supported by ICT. As stated by the Scottish Government, "it is not just about technology, it is about modernising processes and encouraging new ways of working".

As defined by NHS Scotland [19], the eHealth Programme is essentially a "programme of programmes" which points at the scenario of introducing platforms to access and retrieve data from different tiers of care rather than implementing a unique EHR system. Indeed, although there

is no fully integrated EHR system in Scotland, interviews with policy-makers revealed that there are platforms allowing for data sharing by means of overnight updates of NHS24 and A&E data. In addition, twice a day patient medication data is transmitted from EHR at GP practices to a central drug summary database that is accessible to hospital and ambulance services. There are also some cases (local experiences) of patient portals where patients can introduce some information in their EHR as well as download their summary record.

In the light of the above, the overarching goal of the eHealth Strategy for 2011-14 is interoperability which the Scottish government steers through a middle-out approach[20]. As a result, it does not centralise IT procurement but it supports the development process - i.e. by approving the adoption of SNOMED CT[18] whilst allowing direct involvement of NHS Boards. Other ICT developments nationwide include a digital channel for users registered with Virgin and Sky as well as an application for smartphone users launched by NHS24. The channel is an interactive TV service which provides relevant information to patients (NHSinform), and allows them to book their GP appointment and order repeat prescriptions. The plan is to expand the spectrum of services offered through this channel.

In sum, ICT for health in Scotland has reached a high penetration and additional channels are being used aiming to reach all the population thus facilitating and supporting integrated care and opening room for additional innovations such as IPHS deployment. However, interoperability still remains a challenge and as a result gaps hampering coordination between tiers of care still remain as will be later detailed in the specific cases zoomed in.

Telecare, telehealth and telehealthcare in Scotland - TDP, JIT and the role of partnerships

The deployment of RMT in Scotland is closely related to the adoption of the National Telecare Development Programme (TDP)[11]. By the time TDP was launched in August 2006 with an original budget of £8m (about €11.7 at the time), first generation telecare services were widely established (indeed about 180,000 people benefitted from telecare services in Scotland as of March 2010) and the programme targeted second and third generation telecare developments. Thus, TDP originally aimed at telecare services coordinated by both health and social care services. The aim behind it was not only to promote the use of RMT technologies but also coordination between health and social services. In March 2008, the Scottish Government announced further TDP funding until 2011. In total £20m (about €25.7 million) were invested during the period April 2006 till March 2011. This funding was made available under the conditions that a *local partnership* between health and social care services would jointly apply, thus reflecting the aims of getting these two tiers of care to work together and provide integrated services to patients. Allocations to each partnership were based on their populations and funds were distributed by the Joint Improvement Team (JIT) after receiving satisfactory applications outlining partnership intentions. The second round of funding (2008-2010) also introduced satisfactory progress of the partnerships as a criterion for funding [21]. It is relevant at this stage to emphasize that the first round of TDP funding was mainly targeting telecare and some telehealth services whilst the second one prioritised telehealthcare, which shows that the TDP promoters took advantage of the momentum gained through widespread availability of telecare services and the existence of champions to spread telehealthcare and make an additional £12m (about €14million at the time) funding available.

Established in 2004, the JIT was not only responsible for allocating the funding to the partnerships applying but JIT also worked directly with the partnerships across Scotland, supporting the activities of the partnerships and promoting know-how exchange amongst them. The concept of partnerships came a long way since the 90s and as stated by the JIT: "there is consensus that effective partnership between health and social care working was essential in order to design, develop and deliver personal services for those requiring support and assistance to optimise their independence and happiness".

[11] Although this study focuses on diabetes, COPD and CHD, TDP funding was made available for additional conditions including mental disabilities or substance misuse

Many partnerships received funding and deployed telehealthcare. The specific cases zoomed in Bute and Telescot, in Scotland are reported in chapter 3 of this document

2.3.4 Role of ICT/EHR in promoting integrated care in England

ICT developments

The national programme for IT (NPfIT) launched in 2002 by the Department of Health aimed to establish a common centralised IT system in the English NHS, with the planned delivery of:

- an ePrescription service (EPS)
- an eBooking and eReferral systems;
- a fully integrated EHR system involving the Detailed Care Record accessible to patients' GP and the Summary Care Record accessible to all NHS staff treating the patient;
- and the Spine (a central link to the patient register, the ePrescription service, messaging service, and the summary care record).

The NPfIT which involved a high budget - estimated at £12.7 billion [22] [12] (or €14.8 billion) and a large number of staff working at the NHS is largely behind schedule, with the Department of Health's latest forecasts putting completion at 2014–15.

According to the recent NAO report [23] and previous official publications on the topic, there is evidence that the NPfIT aimed both at a common centralised IT system in the NHS and at having hospitals adopt the new IT system.

Regarding primary care, 97% of the 8,900 GP practices in England already had a GP clinical computer system before the NPfIT was launched[18]. Currently, there are about 8 different IT software providers for primary care and as an attempt to integrate them within the NPfIT, various platforms are in use allowing for exchange between GP's current IT systems and the Spine e.g. SystemOne which highlights key diagnoses and conditions on patients' records, and enables GP practices to access information held on the Spine, transmit electronic prescriptions and utilise the eBooking and eReferral systems. Furthermore, since 2005 the NPfIT also supported the development of the Quality Management and Analysis System which supports and provides feedback to individual practices and PCTs on the QOF. In addition, the NPfIT has supported the development of "GP2GP", a system that allows the electronic transfer of the medical records of a patient who moves from one GP practice to another.

The NPfIT has achieved more than critics actually say. What was considered key deliverables when the NPfIT was launched [24] were four items: the Spine, ePrescription, eBooking (the so called 'choose and book') and EHR. Out of these:

(i) The Spine has already been delivered;

(ii) 99% of GP sites (i.e. 8,200 sites) have implemented EPS R1[13] and the total number of R1 prescription messages sent as of 16 May 2011 was 500,045,090, which shows successful implementation of the ePrescription service in primary care;

(iii) Use of the eBooking system was 12% in early 2007[25]; reasons for such a low uptake seemed to be due to slow performance of the system;

(iv) Central to the Programme, however, is the creation of a fully integrated EHR system whose delivery has been considered a failure.

EHR are at the core of any other healthcare application, whose contribution in terms of quality of care and efficiency is weakened in the absence of EHR. It should be noted that the EHR or NHS Detailed Care Record was considered illegal under human rights or data protection laws [26] and it

[12] The amount varies, the 2011 NAO report states £11.4 billion programme of investment.

[13] Electronic Prescription System Release 1

took time for policy makers to find the right formulation to comply with the laws. Thus, legal issues also explain part of the delay in delivering the EHR. Nevertheless, until a fully operational national EHR system is delivered by the NPfIT (or through other means) integrated care will keep on finding barriers to develop its full potential.

In sum, although progress in England for full interoperability is well ahead of other Member States, it is still not clear whether and when the NPfIT will fully deliver and critics often blame the top-down approach as one of the reasons for the uncertainty surrounding the success of the programme[27]. Whatever the reasons, the situation is similar to that of Scotland, as high ICT development open room for the deployment of IPHS but there are still gaps in the system to allow for fully coordinated care.

Telecare and telehealth in England

Following an £80 million (around €117.65 million at the time) funding by the Department of Health to local authorities through the Preventative Technologies Grant (PTG) to further consolidate and enhance telecare services in England[28], the White Paper "Our health, our care, our say: a new direction for community services" [29] published in 2006, highlighted the need for further evidence on the benefits of telehealth for both patients and carers' quality of life as well as cost effectiveness of care.

This White Paper paved the way for the Whole Systems Demonstrators (WSD) programme, driven by the ageing of the population: over the next fifty years the number of people over 65 in England was predicted to rise from 9.3 million to 16.8 million; an estimated 90% of older people want to live in their own home while approximately 500,000 elderly live in care homes. Research funded by the Department of Health suggested that as many as 35% of those people could be supported to live at home or in extra care housing schemes through the use of telecare. Currently over half of the people die in a hospital, only a fifth die at home, with others dying in care homes or hospices. Yet surveys suggest that the majority of people would prefer to be supported to die in their own homes.

There were over 1.6 million emergency admissions for patients aged 65 years and over in 2003/2004. Telecare was seen as an opportunity to reduce unnecessary hospital admissions and improve people's quality of life. The introduction of a national tariff under Payment by Results (introduced in April 2006) to cover pricing for A&E visits, emergency admissions and ambulance call outs, as well as elective surgery, provides a real incentive for PCTs to work with their partners to develop telecare.

Against the background of the PTG funding made available for the period 2006-2008, the WSD programme was launched using funding outside the PGT. From 2006 onwards, the bidding process for the WSD started. It was clear from the beginning that 3 sites would be selected and that it had to be health and social care at local level bidding together. Chapter 4 will report findings on the WSD and on other smaller initiatives across England.

3. ICT and IPHS in Scotland

3.1.1 RMT in the Highlands

Background

Scotland has 14 NHS Boards, one of them being NHS Highland which Bute & Argyle belong to. Interviews were carried out in the Isle of Bute.

NHS Highland covers a population of about 350,000 people and is the biggest board in Scotland covering 41% of the Scottish land. It includes numerous islands (30-40 islands) and rural areas with Inverness as the only big city which makes delivering healthcare a challenge. The Isle of Bute (hereafter Bute) has 7,000 inhabitants although in the summer its population doubles as it is a holiday destination. In Bute, 25% of the population are over 65. This is partly explained by the fact that Bute is a retirement destination for Glasgow citizens.

As seen earlier, Scotland has a long tradition of telecare which helped telehealth come right to the top of the policy agenda through the Telecare Development Programme (TDP). There were 4,000 patients at NHS Highland under the telecare programme with response alarm services handled through a call centre based in Aberdeen. The call handlers are not clinical staff (as opposed to NHS24 who are nurses) but they are trained to follow a specific protocol developed when handling calls as well as to listen and calm down the patient.

In 2007, NHS Highland obtained TDP funding and JIT (Joint Improvement Team) supported them in developing services with this funding. When the funding was made available, a project manager was contracted to implement the goals of the partnership. A first company was found for the technology provision but as the project stakeholders found out that this company was not meeting their needs, it was decided to look for a more suitable provider. Telehealth Solutions Ltd, a small company keen to design the technology and shape it according to the needs of the partnership, was the provider of choice.

As part of the JIT supporting role, the charity "Carers Scotland"[14] was offered to participate in the TDP pilot which they accepted and as a result a questionnaire for carers was included in the evaluation of this initiative. Carers were also involved in the technology design with the selected company by providing informal feed-back only including through the questionnaire, although the latter was not used systematically for this purpose.

In the rural areas of Scotland, local hospitals are often small facilities mainly run by GPs and offering rehabilitation and maternity services. Specialised care in these hospitals takes place through programmed visits (maybe once or twice a month) when external consultants carry out visits and small interventions. Thus, although called hospitals they operate almost like a policlinic with some beds for overnights stays used in very specific cases. In the particular case of Bute, there is one GP practice with 7 GPs, which can be a problem for overnight shifts/out of hours. In case of emergencies for severe conditions that require immediate hospitalisation (i.e. heart attack), patients need to be transported to a hospital with more resources than the local one by ferry (with one of the two ambulances available) or by helicopter depending on the patient's condition and on the weather. In this context, the aim is to prevent unwellness and to avoid the use of helicopter.

The pilot

Two types of Telehealthcare initiatives were piloted in Bute through the TDP grant, both at primary and community care level:

[14] Carers Scotland is the arm of carers UK operating in Scotland. Carers UK is a charity playing a relevant role nationwide supporting those caring for an elderly or a disabled relative.

(i) Community Telehealth Pods – these Pods, although not fully within the scope of SIMPHS2, will be covered briefly.

(ii) Home Telehealthcare Pods for patients with COPD

The COPD Pods were initially implemented for a total of 80 patients in Highlands distributed as follows:

- 40 in Argyle and Bute (15 in Bute and 25 in the rest of the county),
- 16 on the Isle of Sky,
- 8 in Inverness
- 16 patients in Naim (a location near Inverness).

These COPD Pods were installed in March 2009.

The technology

Community Telehealth Pods measure basic patient constants such as blood pressure, weight and include a questionnaire on health habits (i.e. smoking, diet, exercise). The service is available in different languages and each patient selects the appropriate language. These Pods are located in the waiting room of GP practices and the system is designed in such a way that the information it generates is integrated in the EHR. Patients walk into the practice a few minutes before their appointment and use the Pod. According to one of the GPs in the practice, training patients to use this technology prior to the visit was hard and it was important that the GP convinced/advised patients to use the Pod.

Figure 6 – Community telehealth Pods in Bute displaying language choice

When patients visit their GP, because they have used the Pod and the data is transferred to the EHR prior to the appointment, the data is already available to the healthcare professionals. The time GPs dedicate to patients can therefore be optimised focusing on quality and added-value work towards the patient's condition and needs instead of carrying out these measurements. This is important given that policy in the UK requires GPs to spend a maximum of 10 minutes per patient while, 5 minutes were already spent carrying out these measurements before the Pod was implemented.

Moreover, some of the data generated by the Pod is part of the data that GPs are meant to submit for reporting purposes under the QOF programme and this factor may have acted as an enhancer for uptake.

Home Telehealthcare Pods (or COPD Pods) are Pods for patients suffering from COPD. The patient data generated by these Pods is not integrated with the EHR. The aim of this telehealthcare initiative is that both A&E and hospitals could discharge patients earlier and integrate them within the community with telehealthcare support.

The Home pod for COPD (displayed in figure 8) is the standard equipment patients are provided but the technology provider has developed up to 12 peripherals for additional measurements, if required. Depending on the data entered in the Pod, the system provides advice to the patient about e.g. the need to take steroids or antibiotics, or if they have been putting on weight advice on exercise and diet, or on 'practice your chest clearance technique'. The aim is to get patients to self-

manage their condition and once this is achieved, remove the technology from them and give it to other patients.

Figure 7 – Home pod for COPD with peripherals

The home pod is a remote monitoring and treatment (RMT) system which is very similar to the community Pod. It uses a monitor with a password-protected windows operating system and has a set of peripherals connected through USB to the Pod. It can measure weight, heart rate, blood pressure and oxygen levels in blood. In addition, it displays a questionnaire that patients go through which is specific to their condition, asking e.g. whether the patient is breathing normally, whether she is coughing, what kind of coughing etc.

Thus the Pod gathers objectives measurements (through the peripherals) and subjective measurements (through the questionnaire). All data is transferred via a Vodafone SIM card which enables patients to take their pod with them when travelling.

The data that RMT patients send is available through an interface to community nurses. It is important to note that a specialist nurse model has been developed in the case of the Highlands. One of the advantages of telehealth is that these nurses can still be in Oban (where most of these specialist nurses sit) and support the work of nurses in Bute, for instance.

The rest of this section will mainly focus on the home pods for COPD. Where this is not the case, it will be duly specified.

The service

Community nurses in Bute were provided specific levels of training about the conditions they were looking after in order to ensure that each specialist team received appropriate education to perform their work. The community nurses that ended up running the RMT service were already responsible for the COPD programme – a 10 week programme of 2 hours a week offered to patients after hospital discharge in order to train them about their condition and how to manage it together with the help of a support group. Patient education for breathing is a core component of this programme.

When the COPD home Pod was presented to be used in Bute, the nurses involved in the COPD programme had already selected the patients that were eligible for it based on their condition: not all patients were eligible for the pilot as they had to fulfil requirements about minimum number of exacerbations and minimum number of hospitalisations in the last 12 months. This previous selection facilitated the training the nurses gave to the patients both on their condition and on the use of the technology as they had already engaged in a patient - healthcare professional relationship with them. Furthermore, the Pods were not imposed, it was the lead community nurse who accepted the scheme, the GP approving it (even though GPs are not directly involved in the RMT activities) and nurses voluntarily offering to take the lead in the implementation, having received the guarantee that extra time would be set aside for them to work on these activities.

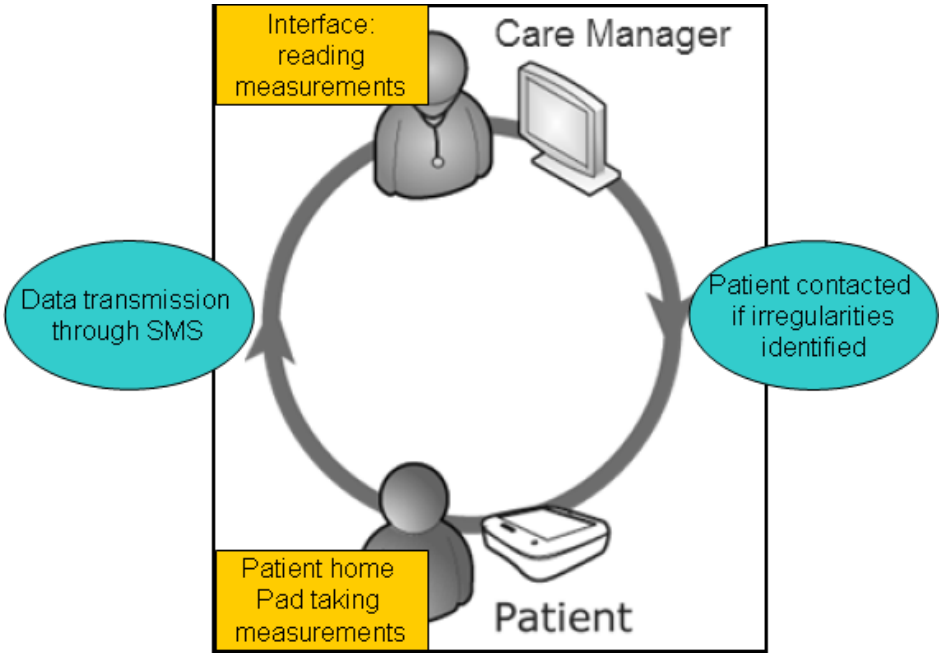
An office located in what is currently a long-term/ elderly care ward (very near the GP practice) is where nurses can access the interface/back-end to review patients' data sent through RMT. This interface is placed within the NHS firewall. Nurses connect to the interface through a web portal entering a personal username and password which is assigned by the technology provider after approval from the NHS Highland health board IT department. This is an example on the amount of support required from the NHS Highland health board IT department which originally was underestimated especially with regard to managing security and data safety issues. One of the lessons learnt is therefore that it is important to involve the relevant body when choosing technology suppliers and designing how the service will be operationalised.

In Bute, nurses usually dedicate a maximum of 1 hour per day to review the RMT data transmitted but one should bear in mind that there are not too many patients in the scheme. The nurses receive all measurements and the patients' answers to questions prompted by the pod software on their screen. Therefore, objective and subjective measurements are part of the data collected and transmitted from the patient to the system interface.

There are six community nurses in Bute and everyday one of them is assigned the RMT readings task which consists in reviewing the cases and writing a note through their interface about the cases that are irregular but did not require immediate action (e.g. note on the treatment prescribed and the need for follow-up). The system displays the note and the name of the nurse who wrote that note to the other community nurses so the next nurse in line is fully informed about patients' needs, thus enabling continuity of care. The system displays graphs showing evolution for all parameters, including objective (weight, oxygen metre) and subjective (cough, sputum, breath ability) measurements. The system also allows nurses to enter information and contact details for patient carers and relatives.

As the data transmission happens via a mobile SIM card, patients can travel with their pod and send their data from somewhere else. Thanks to this mobility feature, one of the patients in Bute could go to Glasgow for a planned hernia surgery and stay at his son's after discharge for two weeks during which he was still being monitored as he had all the devices with him.

Figure 8 – RMT application diagram



If the nurse considered that the patient was not doing well, they would first ring the patient and if appropriate would schedule a visit to the GP. For instance, in the case of a patient taking antibiotics because of coughing, after the RMT readings detected coughing, the patient was rang to go to the

GP and the GP prescribed him antibiotics which prevented the beginning of another exacerbation and another hospitalisation. While the patient is likely to get better, the nurses need to keep an eye on him until his breathing is restored to normality for his condition.

As much as patients using the home Pod seemed extremely satisfied with the system, there is a clinical gap around this. Many patients on top of their standard medication (i.e.: mainly inhalers) have additional medication at home; because they have been trained to manage their disease, they now know how to treat their condition and know for instance, when they need to take antibiotics because they are coughing so as to prevent exacerbation; or when they need steroids because they are too short of breath. Given this reality, the GP would prescribe them all the medicines they may potentially need so they have these drugs at home and can take immediate action instead of waiting for a doctor appointment. In such cases, the RMT system does not actually record that the patient is taking any additional treatment. Ideally if RMT and EHR were integrated and the RMT system enabled the patient to enter data on any extra medication s/he is taking this type of information would be captured. Thus, as much as it is about self-management, exploring the possibility to record information that might be relevant to assess patients' treatment and evolution of their condition would be beneficial.

Progress towards interoperability has been made by the RMT technology provider, however in their experience in different settings across the UK, barriers to interoperability are not only technical. According to some stakeholders, lack of interoperability is also driven by lack of will on the part of EHR providers to integrate with them.

Costs and funding issues

For the current Pods already installed and in order to guarantee maintenance and connectivity, in the current two-year framework contract, the following costing was agreed with the technology provider:

- £400/year (equivalent to €466/year) for each Community Pod IT support
- £200/year (equivalent to €233/year) for each COPD home Pod IT support

Aiming at mainstreaming these applications and at ensuring sustainability in the medium-term, a new five-year contract framework has been agreed with the technology provider. The costs of acquiring the technology have remained the same, the main change has been in the contract related to maintenance services, according to which:

- The cost of acquisition of new Community Pods will remain at £4,000 (or the equivalent to €4,663) per Pod (usually one POD per surgery), a lump-sum that includes:
    - The same services included so far:
        - Peripherals
        - Integration of data with EHR
    - An additional service of five year IT maintenance (provided by the technology supplier not by the NHS Highland health board IT department) which so far was not include din the standard price
- The costs of acquisition of **home COPD Pods** remains at £ 1,400 (or €1,632) per Pod, a lump sum which includes:
    - The same services included so far:
        - Peripherals
        - Data transmission costs (paid to Vodafone),
        - The nurse web interface data retrieval.

- An extra five year IT maintenance (provided by the technology supplier not by the NHS Highland health board IT department), which so far was not include din the standard price

Given that funding for telehealthcare is not earmarked at the level of NHS Board, the 5-year maintenance included in the new framework contract serves as means to guarantee continuity until new funding is obtained from NHS Highland.

Initially, the community pods were financed by the TDP grant but after the grant finished, the GP practice is meant to pay for it which is proving quite challenging.

There have been attempts to get the NHS Boards to commit to telehealth after the TDP funding is finished in order for telehealth to be a routine way of delivering care. Because NHS Boards are forced to reduce costs every year, one of the experts interviewed believes that it is the right time to convince them even if this is not an easy undertaking. On the other hand, there are ongoing costs to maintain the RMT equipment but these are still lower than hospital costs. The challenge is to have telehealthcare funding included in the budget of any NHS Board.

Results of the pilot

Anecdotal evidence shows that the Community Pod is a good tool to improve efficiency as one of the nurses interviewed noted: "*from the moment the Pod was implemented, the diabetic clinic run on time for the first time ever*." One of the GPs interviewed also highlighted that the technology reduces GP workload whilst it was not perceived as a means to improve patient care. Currently, the community telehealth Pod is being used around 277 times per month, which represents almost 277 patients/month as most patents only visit the practice once a month.

COPD Pods were initially implemented for a total of 80 patients in Highlands (as detailed in section 1.1.1.9). An evaluation[15] of the COPD patients with home Pods, comparing the periods March-November in 2008 and 2009 (i.e. pre and post-Pod installation) concluded that there was a reduction in:

- GP visits (from 47 down to 28),
- A&E attendances (from 9 to 2) and
- hospital admissions related to COPD, both in terms of numbers (from 11 down to 1) and days of bed occupancy (from 72 to 8).

Qualitative feedback from patients, carers and healthcare professionals about the use of the home COPD Pods in Argyll & Bute was also generally very positive, although a number of issues related to training, communication, and integration with existing work patterns were identified[30]. Interviews revealed that it took about a year to have all services working on a routine basis both from the patients and healthcare professionals' side, since the introduction of the home Pods in March 2009, which somehow confirms the results of the qualitative evaluation.

According to evaluators' comments, the number of patients was too low to carry out a cost-effectiveness analysis (CEA).

A new evaluation is planned for the 80 COPD patients and 10 CHF patients that are using a specific pod for their condition by the same evaluator (Centre for Rural Health), but as for the first evaluation this will not be a RCT, this will be a 'natural evaluation'. The methods will be the same used so far – mixed methods evaluation (qualitative and quantitative).

Reorganisation of care delivery and mainstreaming

In the case of Bute, the hospital (a very small one) is located next to the GP practice and close by the elderly care ward with 30 beds and a day hospital, where the RMT interface offices are also located. Since RMT was introduced, the elderly care ward has been seen as the old way of delivering

[15] An evaluation was carried out but it was not a RCT, there was no control group

long-term and social care services and the plan is for the ward to stop operating as a long-term care home and as a day-centre. The long-term beds will be removed and the rest will be turned into a community rehabilitation centre (with no overnight stays) and care staff offices for social care staff and social workers including occupational therapy and for the health community nurses monitoring the RMT patients. Additionally, health promotion activities and programmes will also take place there (e.g. breast feeding advice, healthy eating, etc). In sum, from the moment the ward will be closed as a long-term care place, telehealthcare is expected to become the routine way of delivering care.

In line with the planned reorganisation of care services, NHS Highland – with the support of NHS Scotland - plans to mainstream the application not only for COPD patients but for other long-term conditions. Now that they are confident that RMT for COPD worked very well, they feel they confident to extend telehealthcare to other conditions such us diabetes, CHF, mental health, palliative care, weight management or bowel conditions. The aim is to provide proactive care rather than reactive care. In addition, through this experience they have learnt that with telehealthcare one size fits all is not the right approach, each system needs to be adapted to each patient according to each particular condition. For instance, for people who cannot read, a voice application in different languages is being developed. The application using the Braille system is also being implemented. Children or adults with learning disabilities and people with severe dementia are the only type of patients left that may not be able to use RMT unless additional applications are developed for them or for their carers.

As resources are limited and in order to allow for mainstreaming, NHS Highland plans to:

- Release nurses from training duties and have trained teams to install telehealth and telecare (e.g. the team responsible for healthcare logistics and inventory of material, including the Pods could be responsible for installations) and provide one-on-one training to patients until they feel comfortable with the technology (usually 1 hour or less). This would reduce the nurses' workload enabling them to follow more patients as required when mainstreaming.
- Inform patients that the Pod is only a temporary support tool to learn to manage their condition, know when they are not well and understand what to do when they are not well so they can keep stable. Once the self-care learning is completed the tool will be removed from patients. The technology is aimed at helping patients with this learning process but they should not become dependent on the technology. Should the patient's condition worsen after removal of the pod, he/she may temporarily get it back.

Nevertheless, based on a few patient interviews, it becomes clear that certain patients are more vulnerable than others (i.e.: 85+ and or with comorbidities) and these may require the pod for longer periods or even for the rest of their lives.

Bute has redesigned some of its hospital care pathways which is another reason why it is possible to make telehealthcare a routine way of delivering care in Bute.

In the light of the recent service reform in the organisation of health and social care services across Scotland, adult social care services are now the responsibility of NHS Boards, which translates into adult health and social care falling under the responsibility of the same body. It is not clear yet how this will be operationalised but in order to bring health and social care services together, the respective IT systems would have to be compatible. Social care services would need to have access to the EHR information for instance. Ultimately, EHR data, telehealthcare data and NHS24 data will have to be integrated. This integration is likely to take place trough platforms of information exchange, in a kind of middle-out approach, as opposed to a hypothetical long-term plan from NHS Scotland to centralise all information which would be much more of a top-down approach.

The telecare patient alarm system that was run from Aberdeen has recently been redirected to NHS Highland as a result of an organisational redesign, partly influenced by the work carried out in telehealthcare through the partnerships. The advantage is that the team taking care of these calls

at NHS Highland is now sitting next to the NHS24 team and to ambulance services. When, the service was located in Aberdeen it was found that often call-handlers would automatically ask the ambulance to assist the patient when the alarm went on, whilst now, call handlers will be trained to enquire more about the patient situation and needs before sending the ambulance. They now know that when for instance the same patient has generated an alarm three times a week because the patient 'fell' – this is likely to mean that the patient is in need of social care assistance rather than of a high-cost ambulance service. At the time of writing, a team of social workers was about to be created and co-located at the call centre together with NHS24. Co-location (as part of service coordination and reorganisation) is key to delivering the adequate care and to covering the real needs of patients. In the light of the service reorganisation, call handlers within NHS24 could also be trained to carry out the telehealthcare triage (i.e.: make the first phone call when there is a telehealth alert). This may help sort out many of the alerts that are often false alerts thus freeing up nurse time for their core tasks.

Lessons learnt

Based on the case described above and the information provided in stakeholders' interviews the following lessons can be learnt:

- It is important for NHS IT services to be involved in the selection of technology providers and they cooperate together so that solutions are developed in line with their standards and are compatible with the current information systems in place for health and social care. In addition, solutions need to be flexible enough to adapt to each patient's condition. Furthermore, some of the barriers for interoperability seem to be driven by industry tensions and this is something that could be addressed at policy-making level.
- Because RMT experiences are still limited, the champions involved felt they were learning by doing and often they were not aware of what they did not know. It would be helpful to have some guidelines on "how to do telehealthcare" or a checklist on what to look at.
- Involving and engaging with healthcare professionals (even with those who may not be directly dealing with RMT) before launching the initiative is important for its success
- Implementing RMT has led to a service reorganisation
- Co-location (as part of service re-organisation) is key to delivering the adequate care and to covering the real needs of patients.
- Better coordination and communication between different tiers of care is required alongside alignment of incentives between tiers of care (e.g. hospitals have an incentive to have a patient with a hospital episode)
- Results from the interviews highlighted that for GPs to adopt RMT a series of conditions had to be met:
    - funding has to be made available for it (which was not always the case in the past);
    - the role of a champion should not be neglected (i.e. healthcare professionals using a system talk about it and others trust their peers);
    - there has to be evidence about benefits (or simply making evidence more visible than it used to be);
- Healthcare professionals (nurses, doctors, etc) are learning to work smarter rather than work harder. The way care is delivered has not changed much since the NHS was created 63 years ago and it is time to act now that the population is getting older and has different needs.
- Some of the patients using the technology are extremely satisfied with it and they become patient champions. In order to convince other patients to use RMT, the possibility of

organising patient groups with patient champions to promote the use of the technology would be a good solution. Unfortunately, due to ethical issues, this alternative is not feasible. The influence of healthcare professionals on patients' behaviour and attitude towards RMT is also very important and shall not be disregarded.

This Telehealthcare experience was led by community nurses and endorsed by primary care; as a result coordination with primary care was very smooth but it might no be assumed that this smooth coordination also applies to other tiers of care and other settings. Coordinating the different services may be a challenge. For this to happen, better communication and coordination between GPs (community) and hospital care is required and initiatives by NHS boards to stimulate this would be helpful. Such a good communication often takes place spontaneously in rural areas, but in urban areas stronger policy intervention would be needed for this to happen.

3.1.2 The Telescot experience

Background

The chief scientist of Telescot had several years experience with telephone consulting funded through a grant by the Scottish Chief Scientist Office (CSO)[16] when TDP funding became available. Against this background and because of their past experience in developing telecare, those managing Telescot saw an opportunity to apply for this funding to implement telehealth.

The Telescot programme is an academic research programme whose aim is to investigate telemetric supported self-monitoring of long term health conditions in the West Lothian region. West Lothian is a deprived area of Scotland where social care and NHS were integrated and formed a single body when the CHP was established (as opposite to the health-only partnerships). In spite of this, the Telescot programme has mainly been led by healthcare professionals while social care stakeholders have hardly been involved. Telescot is based on the collaboration between a number of public, private and voluntary sector organisations supporting the development of innovative healthcare in the Lothian region of Scotland[17]. The organisations involved include University of Edinburgh and the NHS Lothian Board which is also one of the funders alongside the Scottish Centre for Telehealth, the BUPA foundation, Edinburgh city council, CSO (Chief Scientist Office), Chest Heart and Stroke Scotland and the High Blood Pressure foundation[31].

Both quantitative and qualitative methods are being used in Telescot to assess the potential of telemetric systems (such as RMT) as a basis for prevention and early intervention. The assessment under the telescot experience is expected to deliver results on clinical outcomes, cost efficiency, and user experience for the following conditions: hypertension, chronic obstructive pulmonary disease (COPD), congestive heart failure, and diabetes.

The pilots

The most advanced of all trials is that for COPD. In Spring 2011, recruitment for COPD was completed with 256 patients finally selected to take part in a randomised control trial (RCT). The trial was planned to last for 12 months during which measurement data from the patients is being gathered. Qualitative work has also taken place and some results are already available as to what patients and professionals involved in the service think of the equipment, the service in general and their role in self managing their condition.

Recruitment for the other conditions is still taking place as follows:

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[16] CSO is part of the Scottish Government Health Directorates. As CSO states it, CSO provides funding aiming "to support and promote high quality research aimed at improving the quality and cost-effectiveness of services offered by NHS Scotland and securing lasting improvements to the health of the people of Scotland. CSO supports research initiated by the research community in Scotland and advises the Scottish Government on how research contributes to improvements in health and healthcare". Their current 5-year research strategy focuses on "Investing in Research: Improving Health". Additional information on CSO is available at: http://www.cso.scot.nhs.uk/

[17] See http://www.telescot.org/index.html

- For diabetes the plan is to carry out an RCT (sponsored by CSO) with 320 patients (160 in the control group and 160 in the intervention group).
- For hypertension (sponsored by BUPA foundation), a randomised controlled trial (RCT) involving recruitment of 400 people who have high blood pressure is foreseen. 200 will continue receiving usual care while the other 200 will be given a blood pressure monitor to use at home. The monitor transmits readings via mobile phone to a secure website which can be accessed by patients and their practice nurse who can give advice to them by telephone, text or email.
- The study on heart failure (sponsored by the Scottish Centre for Telehealth) involves qualitative interviews to learn from patient and staff experiences with using the technology.

In addition, future planned research will also include IPHS for dementia and depression.

The technology

The technology used and the technology providers involved in Telescot vary depending on the condition addressed in the trial. Tunstall and Intel are two of the providers involved.

Figure 9 – COPD home pod used in Telescot

The equipment deployed in the COPD trial provides information to patients and telemonitoring staff, facilitating rapid advice to patients. Objective measurements of parameters are gathered through peripherals. Subjective parameters (i.e.: cough, presence of sputum) are gathered through a questionnaire embedded in the software under use. A patient recording a deteriorating symptom or parameter is immediately detected and contacted by telemonitoring staff allowing timely diagnosis and therapeutic intervention. Contact would be established by phone or through video-conferencing, given that the technology also provides this feature. The cost of the technology is £2,000 (about €2,330).

The service

Once patients were eligible and accepted to be part of the trial the installation team would visit them, install the technology and go through it with patients. In addition to the first visit from the installation team, patients were also visited by the team of researchers and by nurses. Actually, these visits were often used by patients to get more confident with the technology, although this was not originally their objective.

Operationalisation is similar to that of Bute in the sense that it was often lead by community nurses. An interface where the readings of RMT data were made and alarms triggered was developed. The healthcare staff at the other end of the interface were responsible for two activities: (i) carrying out the readings from all patients through the interface; (ii) video-conferencing sessions either scheduled or on the spot depending on the severity of the alarm triggered. These often took place through a webcam connected to their PCs from the interface side rather than using the same technology as that provided to patients. Given that video-conferencing activities were part of the service, broadband availability at both ends was a requirement which in cases represented a challenge.

Responsibility to monitor and take action on the RMT service varies per condition. In general GPs, with some exceptions, are not directly involved in monitoring the RMT data transmitted. For instance, the hypertension trial involves 22 general practices and one or two people (mainly community nurses or practice nurses) dedicating an estimated 1-2 hours a week. This example represents the standard way of delivering the service

As an exception, the COPD trial involves one full-time physiotherapist looking at the RMT data for all patients with no direct involvement of nurses or GPs unless recommended by the physiotherapist after assessing a situation when an alarm is triggered.

Costs and funding issues

The initial funding made available under the TDP funding to NHS Lothian was £2 million (or €2.3 million) for a 3-year period. However, at a later stage an extra £1 million (around €1.16 million) was made available to carry out an evaluation and the pilot took the form of RCT

Regarding costs associated to each condition in control and intervention groups, these were not revealed given that the quantitative evaluation is still taking place.

First pilot results

Whilst the quantitative work is still taking place (results for the COPD trial will only be available in summer 2012), results from the qualitative evaluation have already provided findings[32].

Patients and carers were very positive about the telecare system, even where there were operational problems. They consistently echoed a range of benefits as reported in "Reconfiguring Care for Chronic Disease with Home Monitoring"[32]. This study revealed that being (and feeling) monitored as well as learning to manage their condition resulted in faster and better access to a GP or an intervention when required which in addition translated into reduced anxiety for patients and carers.

As mentioned earlier, the quantitative evaluation is not yet completed, however, interviews revealed that the Telescot COPD pilot will be evaluated in terms of cost-effectiveness analysis (cost per QALY[18]). Preliminary results show that the analysis is very sensitive to the cost of the equipment. Similar findings to those in Bute were portrayed in terms of telehealth helping patients to be more responsible and more aware of their condition rather than the benefit being from the technology itself: as patients get used to the equipment they actually learn to look after themselves. Thus, rotating the technology from patient to patient seemed also a reasonable option to stakeholders involved in the Telescot experience.

Mainstreaming

Mainstreaming is mainly dependant on political willingness whilst the trial results will be used to identify areas for improvement unless the results are strikingly negative. Nevertheless a set of challenges were identified for mainstreaming as outlined in the next section.

Lessons learned

Although the research is still underway, the following challenges were identified during the interviews:

- There are difficulties with recruiting patients because when they are not technologically savvy, they do not feel comfortable about using the technology. Those who accept it do so because they like to get into technologies i.e.: they may already be email or internet users, and they enjoy trying something new. Consequently, they are keen to learn to use RMT and they engage very well. However, it would be difficult to remove these technologies from them which represents a double-edged sword. At the other end, there is a number of patients who would refuse trying the technology, thus, it will be difficult for RMT to penetrate within this group.
- Training one-one-one sessions with patients was possible during the trial, however, if the service was to be mainstreamed different alternatives should be explored given how time consuming these sessions were;

[18] QALY stands for Quality Adjusted Life Years.

- Connecting RMT to EHR is a major challenge both in terms of interoperability and data organisation. Ideally RMT data should be integrated but in reality this does not happen which represents a source of confusion and frustration for the patient. For instance, patients with hypertension use the technology constantly but when they go to their GP, the GP does not have their RMT data because it is not integrated with the EHR. The GP goes through the patients' tension measurement again disregarding all the data that has been transmitted in the last few weeks. Beyond addressing interoperability issues, there is an issue on which data to integrate and how to organise it. Telehealth generates high amounts of data and ideally the data to be integrated within the EHR would be a summary of the telehealth data. It is not clear yet how data can be synthesised and integrated for primary care purposes. As part of the Telescot project a qualitative study has been launched aiming to find conclusive results on this. This initiative aims to test a software developed by the Newham PCT (one of the WSD sites in England as it will be later detailed in this document) with healthcare professionals retrieving different data summaries and in different forms and obtain some form of clinical consensus on what data to be included in the EHR. It is also expected that synthesising the data to be integrated within the EHR would result in lower resistance from primary care teams;
- Healthcare professionals' resistance is a barrier. Convincing GPs to adopt RMT can be difficult. It was easier with hypertension as they saw time savings benefits (in terms of the QOF payment) and they found it simple. GPs therefore accepted to participate and they transferred the RMT hypertension work to their nurses. In contrast, for COPD, it was impossible to convince GPs, which is why a physiotherapists was contracted to follow up patients. If payments to GPs were different and there were incentives for the COPD case, GPs would be more likely to adopt it.
- Lack of flexibility and suitable solutions from the industry is another source of frustration. Technology (and technology providers) is leading the service while it should be clinicians and patients leading the service and technology providers developing solutions according to their needs;
- Often, the alarms triggered resulted in false alarms which needs to be refined in order improve service efficiency.
- Data transfer requires the use of Broadband or mobile phone. Installing broadband which is required for videoconferencing is a major issue as broadband is not widespread in West Lothian. On the other hand using a SIM card, as done in Bute, has the disadvantage that there may not be coverage in isolated rural areas so they have had to change mobile operator. However, all in all, the use of a SIM card seemed simple and reasonably effective, as a transition solution until there is higher broadband penetration and chronic patients become savvier using technologies.
- RMT mainly delays death and hospitalizations before death. If patients were willing to die at home RMT technologies would save money, otherwise they may not lead to savings as RMT only delays time-to-death and from a crude cost perspective, extending lives will never save money. In relationship to this, it is relevant to make a difference between two groups of patients suffering from chronic conditions:
    - on the one hand, for COPD and CHF patients who are already not working (i.e. already disabled to work) RMT will never get them back to work, hence RMT will only extend their lives which will always come at a cost and it only seems reasonable if the patient is willing to die at home.
    - on the other hand, diabetes and hypertension are the only cases where RMT may help prevent deterioration while the patient is actively working. Thus the benefits of RMT are very different in these cases.

3.2 Conclusions on telehealthcare in Scotland

3.2.1 Diffusion of innovation

Types of innovation

From an innovation perspective, all stakeholders involved seemed to conclude that there are two types of innovations involved:

- one is the technology itself;
- the other one is the organisational change associated with it. It represents a new form of delivering care and of cooperation between tiers of care

However, to fully reap the benefits of the two, interoperability is required for RMT data to be integrated with other health records and for systems from different tiers of care to share and exchange information. This represents a challenge not only from a technical and data organisation perspective but also due to additional tensions amongst industry players which policy-makers need to address promoting cooperation amongst them.

A set of barriers to further diffuse these innovations are also identifiable: on the one hand, resistance from healthcare professionals mainly driven by financial barriers such as misalignment of incentives in different tiers of care, lack of clinical consensus on what RMT data to integrate within the EHR, liability concerns and the need for evidence supporting the business case.

On the other hand, improvements on the technology solutions available also represent a challenge, in some cases. Healthcare professionals felt the service was often technology driven rather than clinically driven and suggested the need for solutions addressing the actual clinical needs. Furthermore, the digital divide represents a challenge for patients with long-term conditions as they are often senior citizens and not necessarily techno-enthusiasts. Using patient champions to diffuse technologies resulted unfeasible for ethical reasons. The use of interactive TV may be an appropriate channel for some of them.

Drivers to diffuse the innovation are clinical and project champions, financial incentives in some cases (i.e.: TDP funding, QOF for hypertension), the role of nurses coordinating services and patients needs as well as evidence on the savings on healthcare resources.

Dissemination

In each of the TDP pilots presented in this report, telehealthcare implementation and day-to-day activity were mainly driven by community nurses (or by physiotherapists in one of the Telescot experiences), who are healthcare professionals trained on the specific conditions they are caring for. For the pilots, all professionals involved received additional, specific training about the conditions they were dealing with and about the RMT technology. They were also responsible for training the patients who were willing to start using these applications. In all cases, patient-level data collected through RMT readings was not integrated with the EHR. However, in some of them community nurses also had access to the EHR using a remote desktop application. This allowed nurses to better assess the condition for each patient and better coordinate each case. In addition, when community nurses were involved, they would also coordinate with social care services. Thus, during the first telehealthcare TDP funded pilots, coordination between tiers of care was achieved though community nurses who played a key role in supporting the organisational change as well as holding a very relevant know-how on the new service delivery.

Long-term care services were traditionally the competence of adult social care services and often delivered through elderly care wards. Through the partnerships and their pilots, patients were meant to be at home using telehealthcare, thus freeing up resources in the wards.

In addition, a project management team was appointed. The project management team was responsible for catalysing the coordination between health and social care services, for procuring the technology, supporting implementation and reporting on the development of the partnership

amongst others. This role helps identify gaps and unmet needs and suggest actions to address these. They also play a relevant role in disseminating and promoting the use of these technologies in the longer run as well as in supporting the role of the community nurses.

Sustainability

Given that TDP funding is not meant to continue as it is considered that there is no need for additional pilots, financing for the mainstreaming of telehealthcare is foreseen to come from two main sources outside TDP. On the one hand, a proportion of the new NHS budget has been ring-fenced to one specific purpose: reshaping services and keeping patients with long-term conditions at home (the so-called Reshaping Care for Older People Programme). The amount dedicated to this is £70 million (about €80.6 million) for 2011 and the same amount for the next 3 years. This is where telehealthcare as one of the interventions for these £70 million will fit. It is relevant to highlight that this allocated funding is new and is building on the reorganisation that has taken place between health and social care in the local partnerships. It is also interesting to reflect that, at policy making level telehealthcare is not being imposed but it is framing budgets and objectives in a way that NHS Boards will find telehealthcare appealing. In spite of this, NHS boards are still free to choose how they will achieve these objectives, be it through telehealthcare or through other means.

In addition, £10 million (about €11.5 million) will be invested to promote assisted living technologies and services enhancing well-being and providing top quality health and care, enabling people to live independently. This amount is co-funded by the Scottish government and the Technology Strategy Board[19] as part of the recently launched DALLAS programme – Delivering Assisted Living Lifestyles at Scale[33]. Given that RMT applications fall within the scope of this programme, this will involve implementing and evaluating the use of these technologies and reorganising healthcare service delivery for the 10,000 users coming from different socio-economic backgrounds, as established by the DALLAS co-funding. Results are expected by 2015.

If the impact of the DALLAS initiative in 2015 results positive and considering that the population of Scotland is 5.2 million and these 10,000 patients will be located in different areas of Scotland, Scotland will have succeeded with mainstreaming telehealthcare. The main reason is that the services would have been reorganised around these 10,000 patients nationwide, with much more profound implications than one might think at first sight.

However, whether Scotland will deliver successfully remains to be seen and some challenges to be tackled have already been identified. As a result of the integration amongst tiers of care, information amongst them shall also be shared and this would imply making their IT systems compatible. Patient level information on the EHR, telehealthcare data and information recorded through NHS24 needs to be integrated. This integration would also need to include the integration between the different EHR systems currently in use. Thus, although interoperability of the different IT systems used in the different tiers of care remains a challenge, some of the funding made available is meant to be used for this purpose.

In addition, at local level, NHS Boards are expected to develop the right policies for A&E and hospitals to reshape services and keep patients with long-term conditions at home. This new discharge process is likely to imply early discharge coordinated by health management supported by ICT. For this to happen, better communication and coordination between GPs at community level and hospital care is required and NHS Boards are expected to launch initiatives to stimulate this. Hence, part of the funding is aimed at supporting and consolidating this process.

3.2.2 Governance

From a governance perspective, Scotland followed what seems to be a middle-out approach. Indeed, policy-makers would first promote and support a change at local level and then consolidate

[19] Note that the TBS is UK-wide business-led government body. The DALLAS programme aims at 5 initiatives each of them in different parts of the UK and here only the one planned for Scotland is being discussed.

this change through mainstreaming. In addition, the organisational change promoted at policy level was very much mirrored by the actual organisational change at community or local levels where health and social care cooperation supported people to stay within the community. The role of community nurses in supporting this process and as the main telehealthcare operators has been identified as a driving force for this change. In addition, further coordination with other care services such as NHS24 and ambulance service would represent a further step towards this service reorganisation.

When going historically through the different policy documents, the increasing importance for policy makers of this organisational evolution is also reflected in the terminology used whereby in 2006 the term telecare (meaning by it third generation of telecare services) was used while towards 2010 the term telehealthcare gained presence thus reflecting the involvement of both health and social care in the process. The Scottish government believes that the TDP funding was very effective in changing the way care was traditionally delivered by inducing the organisational changes associated with the need to coordinate health and social care and the cultural change for stakeholders involved at local level: healthcare professionals, patients and carers as well as the overall community. Taking advantage of this change and the momentum generated, mainstreaming implies consolidating this change.

It actually translates into a variety of policies having a strategic impact that is also reflected at local level.

A Strategic Framework[34] was proposed and approved in 2010. The aim was to assist the transition from discrete projects that had been supported by the Scottish Centre for Telehealth (SCT) into mainstream service delivery for telehealthcare. The document guides the delivery and development of telehealthcare services in Scotland aiming at mainstreaming. Also, as a result of this, the SCT and the JIT team – so far supporting TDP funded initiatives – have recently been integrated within NHS24 (the out-of-hour services). The aim of this integration is to develop the right structure to deliver the national telehealthcare programme with all services coordinated. However, for this to happen not only interoperability is required but also training and education for healthcare professionals (nurses, doctors and call handlers from NHS24) as well as patients and carers.

In addition, social care services, so far run by local councils, will focus their responsibilities in providing services to children. Adult services are now the responsibility of NHS boards, thus integrating adult health and social care services into one sole organisation.

At local and operational level, the re-organisation underway also reflects the above policies and initiatives. Telehealthcare alarm call handlers being the responsibility of the Health Boards would now be co-located with NHS24 service staff, community nurses and ambulance services. A team of social workers is also planned to be co-located with them as part of the service coordination. With this new structure and co-location the aim is to deliver the adequate care and to cover the actual needs of patients. Trained call handlers would be the first contact point responsible for making the triage of phone calls and telehealthcare alarms towards the appropriate service.

3.2.3 Impact

From an impact perspective, the first evaluation of the TDP was carried out by the York Health Economics Consortium (YHEC) for the 2006-08 period mainly looking at telecare. It was concluded that there was a need for partnerships to develop indicators otherwise the feasibility of any evaluation would always be limited. [21]

Following this first output by YHEC, no health technology assessment (HTA) authority was involved in evaluating the impact of the numerous pilots, instead academic organisations are carrying out evaluations. Different methods are being used. In terms of quantitative results, so far, the impact assessment carried out (such as the one detailed in the experience in the Highlands) has focused on the impact on service utilisation in terms of attendance to A&E, GP consultations, number of hospitalisations and their length of stay. This has represented enough evidence for policy-makers to define their policies. It would be useful for the forthcoming evidence to be complemented by more

robust methods including cost- effectiveness analysis (CEA), such as the forthcoming Telescot results. It is also relevant to note that the CEA perspective is very sensitive to the cost of the technology and if the technology was to be rotated among patients the outcomes of such an assessment would vary greatly. Finally, qualitative assessments of some of these experiences have been positive from a patients and a carers' perspective.

Newhaven Research was also commissioned by JIT to assess the development of telecare during 2006-2010 concluding that the overall gross value of TDP funded efficiencies over the period 2006-10 reached approximately £48.4 million (about €56.6 million) at 2010 prices resulting from reduced visits and hospitalisations. The financial value of gross benefits achieved was fairly close to expectations, given the uncertainties necessarily involved in business planning[35]

A qualitative evaluation of the Telescot trial for COPD patients in Lothian concluded that patients using the telehealthcare applications felt safer and reassured. Patients felt that telehealthcare facilitated access to a GP/intervention; it facilitated greater anticipatory care; and, it reinforced life-style changes and supported compliance

At the time of writing, many of the partnerships were still at quantitative evaluation stage, including the Telescot programme. Despite this fact, the evidence available was considered to be sufficient for policy makers to decide that telehealthcare was to be mainstreamed in Scotland and thus, there was no need to start new pilots. Indeed, the second round of TDP funding actually aimed at establishing a common approach to the broader question of 'telehealthcare' implementation, that is, the organisational evolution towards health and social care convergence [35].

3.2.4 Final remarks

In sum, compared with most other countries, Scotland is currently performing well in the development and implementation of telehealth and telecare services for its citizens. Around 19% of those aged 65 and over use community alarm systems, 3.5% enjoy more sophisticated social care packages and 1% benefit from a bespoke telehealth package which is now to be mainstreamed. It is also relevant to highlight that budget cuts in the Scottish government have not taken place yet and such cuts are likely to reach them in the coming months. As much as the DALLAS funding is ring-fenced and unlikely to be affected by any budget cuts, other telehealthcare initiatives beyond the DALLAS programme may be affected by budget reductions. Thus, uncertainties related to the future of telehealthcare deployment arise as a result of the current economic situation.

4. ICT and IPHS in England

4.1 The Whole Systems Demonstrators (WSD) programme in England

Once the way for WSD had been paved and the budget for it set aside, a call for proposals for those health and social care partnerships interested in applying was launched. Twenty-five responses were received out of which six were shortlisted until the selection of the final three sites to be funded was announced in May 2007.

4.1.1 The Randomised Control Trial

The Whole System Demonstrator (WSD) programme was conceived as a two year research project funded by the Department of Health and originally aiming at finding out how technology can help people manage their own health while maintaining their independence. Participants in the trial were recruited at the three selected demonstrations sites (Cornwall, Kent and Newham) which were chosen due to the diversity of their populations [36]. This is an important aspect since it is proven that an individual's socio-economic background has a high impact on the likelihood to develop diabetes, CHF and COPD thus representing a source of social inequalities.

Cornwall is the poorest County in England, with a dispersed rural population of almost 500,000 where 46% of the population live in settlements of less than 3,000 people. 99.1% of the population in Cornwall are white British. It is one of the favourite retirement destinations in England which accounts for the fact that 10.3% of the population are aged over 65, 7.2% over 75 and 2.6% over 85. In addition, 21% of the population report having a limiting long term illness.

Kent has a population of 1.37 million (excluding the area corresponding to Medway which was not included in the trial) both rural and urban, mainly composed of white British. In terms of ageing, 17.3% of the population are aged over 65, 8.4% over 75 and 2.2% over 85. Within the Kent population, individuals report having an average of 1.6 of the three target conditions of CHD, COPD and type 2 Diabetes. Thus the presence of co-morbidities is high across the Kent population.

Finally, Newham is one of the most deprived areas in the UK. With a population of 270,442, Newham has the second most diverse population in the UK with less than 60% white British and over 100 languages spoken. In terms of ageing, 8.5% of the population are aged over 65 and 17.3% of the population has a limiting long term illness. The highest UK death rate from stroke and COPD is in Newham. In terms of prevalence rates, Newham is also number one when it comes to diabetes in the UK. Substantial health inequalities with the adverse impact of poverty and deprivation represent an even more serious concern to the health and social care authorities in this part of England.

Following the announcement of the three sites in 2007, each of the sites started by establishing teams. During 2008, patient recruitment took place through GP practices and data gathering started for the evaluation. In total, 6,191 participants were recruited to participate in the trial which correspond to 5,721 service users plus 470 carers involving 238 GP practices, sending of 27,000 letters and carrying out 9,000 home visits. This makes the WSD the largest trial of telecare and telehealth in the UK and internationally. It is also likely to be the largest healthcare trial worldwide to date.

Half of the participants were in the control group receiving "conventional" care for 12 months. Ethical requirements implied that those in the control group would also be given the technology once the trial was completed.

Originally, WSD was planned to be divided into three groups: telecare (with and without intervention), telehealth (with and without intervention) and telehealth+telecare (with and without intervention). However, when recruiting patients, the three sites realised it was difficult to find

patients eligible for the third group; thus, the trial was limited to telehealth on the one hand and telecare on the other.

The fact that it is an RCT posed further challenges, often related to RCT patient eligibility. For instance, patients who had already been on telehealth and telecare in the past or patients who could not read and write English were considered non-eligible patients. The latter represented a serious limitation in an area like Newham. In addition, for patients to be eligible certain parameters related to the severity of the illness (diabetes, COPD, heart failure) or the use of A&E in the last few months had to be fulfilled. Hospitalisation on the other hand was not a criterion to be eligible for RCT.

The telecare service was aimed at vulnerable people who needed the support of Social Care or Health Services to keep living on their own, for example those with physical disabilities, the frail and elderly or those suffering from dementia or epilepsy. The telehealth service was aimed at helping people manage their long-term health conditions in their own home. Conditions covered by telehealth included diabetes, CVD and/ or COPD.

The technology

Each of the three sites had different contractual agreements with technology suppliers and standardising the technology across the three sites was never considered as an option.[37]

Cornwall and Kent, although using different technology providers, both used applications that involved a screen and buttons for patients (users) to navigate through the system as well as peripherals providing objective metric measures (similar to that described in Bute, Scotland). Newham instead, used a set-up box that would connect to the home TV screen as detailed in the figure below.

Figure 10 – Telehealth technology in Newham show flat

The technology used in Newham consisted of a set-top box connected to the TV set and a remote control. The TV is the patient's own TV, i.e. it is not part of the technology provided for the trial. Data is sent from the devices either by Bluetooth or USB connection to the set up box which channels the information from the peripherals to be displayed on the TV screen. A team of technicians was established to install and show patients how the technology worked. One day after the demonstration, if patients could not manage the system properly, they could ring and a technician would go through the process with them over the phone. In the most extreme cases a nurse would visit the patient and provide additional training until the patient was comfortable using RMT. The software was similar to that described for Bute in terms of the type of data collected and questions prompted to patients which were tailored to each condition.

In addition, the system was configured for a target range of optimal values personalised for each patient, which nurses could iteratively modify remotely after reading the RMT data in order to induce discrete changes in patient behaviour rather than computer-defined unrealistic values. For instance, when the range objective is too far from the patient's actual condition, nurses would smooth it in order to provide feasible objectives and would keep on adjusting and nudging periodically as achievements are reached until the ideal range is achieved. Thus, personalisation took place in the Newham trial.

The services

The implementation of telehealth at the WSD sites was run in a similar way as in Scotland and mainly community matrons, the specialised senior nurse role contracted by the PCT, were responsible for the operationalisation. Reorganisation of services and coordination between health

and social care took place in the three WSD sites, like in Scotland. The recently published WSD research protocol details the service as described in the box below.

Box 3 – WSD Telehealth and telecare service delivery

Monitoring centres were staffed by specialist nurses and community matrons. Incoming telehealth readings were automatically classified using a traffic light system of red, amber or green alerts based on relevant NICE guidelines or on individually tailored criteria specified by clinicians familiar with the case history. Red alerts in telehealth usually represent an opportunity for early intervention to prevent or minimise imminent clinical deterioration (e.g. titration of medications in response to a sudden weight change in heart failure may prevent critical exacerbation of symptoms and avoid the need for more costly and/or more risky treatments). Incoming data from certain telecare sensors (e.g. fall detector, heat sensor, smoke alarm) generated a red flag if outside set parameters to indicate a potential emergency situation requiring an immediate response. Other telecare sensors (e.g. bed/ chair occupancy sensors) generated more ambiguous information and usually required contact with the user to establish their status. Telehealth alerts were typically monitored during office hours on a daily basis (Monday to Friday), while telecare alerts were monitored 24 hours per day, 365 days per year. Monitoring centre staff provided a stepped-care response to alerts ranging from reviewing recent clinical readings but taking no further action or requesting a repeat reading (these responses are for telehealth only) through to contacting the participant via the base unit or telephone, visiting the participant or referring on to another healthcare professional (e.g. GP, secondary care services or emergency services).

Source: Bower et al, 2011[37]

As outlined in earlier sections, given the lack of a unified EHR system and access by health and social care professionals across England, where nurses considered appropriate the availability of patients' EHR to properly assess the patient condition, access to patient data would be requested to the relevant GP practice. The practice would facilitate it via fax. Thus, interoperability remained an issue. Motiva and Philips (the providers of the telehealth application in Newham) developed the interface so the Motiva-Philips technology can be integrated with EMIS (one of the eight software programmes used at GP practices in England) although it has not been integrated yet.

Costs and funding issues

The total funding allocated to the WSD was £31 million (about €45.6 million at the time), including evaluation costs which represented 12-15% of the overall budget.

Information on costs associated to IPHS service delivery was not publicly available at the time of writing. Preliminary findings in Newham pointed at £35.00 (€42) per month based on the cost of the Motiva system used for the WSD trial in this site. This value excluded the cost of the technology kit as this was purchased for the trial. The cost of such a system outside trial conditions was estimated at around £50.00 (around €60) per kit plus £50.00 (around €60) monitoring per month. These values would result in an estimated cost of £3.50 (around €4.2) per day. When including costs associated to batteries the daily cost could reach up to £5.00 (around €6) per patient. Given the sensitiveness to technology costs applications at lower costs were being explored.

Available information reveals that the WSD evaluation addresses a number of themes (see next section on Pilot Results for further themes details) out of which three deal with cost data[37] from a healthcare resource utilisation perspective. These were as follows:

- Theme 1 used administrative data on hospital use (number of planned and unplanned admissions and length of stay), A&E, outpatient visits, primary care visits by type, prescriptions and home visits by community matrons. Where possible social care use such as home or residential care will also be tracked. The costs associated to each unit are those related to Payment by Results tariffs (for hospitalisations) and reference costs for the rest. The timeline was five years: three-year before, one year intervention

and 12 month after intervention. As outlined in Figure 11, theme 1 relies on the use of the so-called Combined Predictive Model (CPM). CPM, same as the Patients At Risk of Rehospitalisation (PARR++), is a risk stratification tool. These tools have been developed to support healthcare professionals and policy-makers in targeting care more effectively in order to reduce emergency admission rates. Thus, they do not only play a relevant role for evaluation purposes but they can also play a relevant role in identifying and targeting those patients that are more likely to benefit from telehealthcare applications.

- Themes 2 and 3 included the same type of costs were possible but using patient reported data on service utilisation and on outcome measures instead of administrative one. The timeline for these two themes is limited to the intervention period and it will track use at 3 and 12 month intervention periods.

In addition to costs, the analysis to be carried out under themes 2 and 3 also includes measures on effectiveness including health outcomes. A set of tools are used such as EQ-5D assessment of quality of life and disease specific questionnaires. A detailed list and description of the tools used is provided in Annex V - Assessment instruments to calculate effectiveness in themes 2 and 3 for WSD evaluation

Pilot results

The evaluation aims at providing a comprehensive analysis of how the addition of telecare and telehealth contributes to a process of whole systems re-design, using a variety of methods and different levels of analysis. Led by City University London and co-ordinated by the University of Birmingham, six different research institutions are involved as detailed in the figure below.

Figure 11 – WSD evaluation details

Institution	Research question	Type of data gathered
Nuffield trust	Theme 1 - Service utilisation. Does the introduction of telehealth or telecare result in reduction of service utilisation and costs of care?	5721 participants Combined Predictive Model data gathering Quantitative study
UCL	Theme 2 - Clinical effectiveness. Does the introduction of telehealth or telecare result in improvements in quality of life, well being, self care, and carer burden?	3445 participants 470 informal carers Quantitative study
LSE	Theme 3 - Cost-effectiveness. What are the economic consequences of introducing telehealth and telecare?	3445 participants 470 informal carers Professional interviews to gather self-reported quality of life and healthcare consumption Quantitative study
Manchester University and Oxford University	Theme 4 - Patient and professional experience. What is the experience of service users, carers and health and social care professionals during the introduction of telehealth and telecare?	45 participants & informal carers 15-30 non-participants 75 health & social care professionals Qualitative study
Imperial College	Theme 5 - Service delivery and organisation. What organisational factors facilitate or impede the sustainable adoption and integration of telehealth and telecare?	45 key WSD managers and commissioners in health & social services. Staff from 3 WSDAN sites and 3 non WSD related sites

Source: elaborated from presentation at International Congress on Telehealth and Telecare, 2011[38] and Bower et all, 2011[37]

The trial period ended in September 2010. Shortly after, the data gathering process for evaluation purposes was completed [39].

The evaluation is not completed yet, however preliminary results indicate that the technology only represents 10% of the solution and the remaining and most challenging 90% are about getting the organisation turned around[39]. In addition, early findings from the quantitative assessment made available in December 2011 concluded that telehealth could result in a reduction of healthcare resources utilisation. A serious reduction in mortality was also identified [40] (see additional details in 4.2.3)

Originally, WSD was to prove that health and social care working together would reap joint benefits in terms of costs, effectiveness and promoting patients to stay in the community. However, the final trial evaluation assessed the added value of telehealth and telecare over a reorganised service and not the benefits of whole systems redesign compared to conventional care. Moreover, the trial did not aim to assess the effects of individual technologies used but of telehealth and telecare supported services[37]. Therefore, the reorganisation of services and coordination between health and social care took place in the three WSD sites, like in Scotland, and as a result a technical issue is raised: ideally in a RCT, one would have a control group receiving conventional care in the traditional organisational set-up while the intervention group would use RMT based care under the new reorganised healthcare delivery model (health and social care coordination/integration). Instead, WSD trials involved a reorganised care delivery system in both groups. Therefore, generalisation of the results will be limited to reorganised services.

Mainstreaming

Whilst the evaluators were still working on the results (expected to be published in November 2011), the trial was completed and policy-makers would not make any additional funding available or mainstreaming plans until results were available. At that point in time, PCTs at Kent and Cornwall decided to mainstream the service through their own funding sources. In the light of additional policy reforms taking place in England, Newham (the WSD third site) concluded they were not in a position to mainstream. These policy reforms referred to the White Paper published in 2010 "Liberating the NHS" [41] suggesting that GPs organise themselves into GP consortia which would be responsible for commissioning services. As a result PCTs would be dismantled and PCT community matrons running telehealth and telecare services with them.

This was accompanied by job cuts within the NHS which press sources revealed to translate into 53,150 posts due to be lost across 155 hospital trusts, 126 PCTs, 23 ambulance trusts and 54 mental health trusts in England[42]. As expected, these recent events generated high resistance from both the general public and healthcare professionals.

Furthermore, given the lack of integration of RMT data with the EHR, in Newham attempts to integrate the data were made. These attempts did not only involve the technology development to transfer data, but it also aimed at clinically identifying which data would be transferred in the light of the high amount of data that RMT generates. Against this background, software was developed which was tested with clinicians to identify what would be the most suitable data and how it would be structured to ease GPs works. The same tool is also being tested by the clinicians involved in the Telescot initiative. Results are not yet available. The relevance of this tool lies in the fact that healthcare professionals are often concerned with data overload related to RMT applications. Thus, if a tool is developed providing a synthesis of the relevant data, one of the barriers for mainstreaming RMT applications would be overcome. Furthermore, the attempts to integrate RMT data with EHR data are also relevant in the light of the forthcoming DALLAS programme which mandates advances towards interoperability for proposals to be funded under this programme[43].

Later on in December 2011, the same publication making available the positive impact of telehealth and telecare in the WSD also announced the mainstreaming plans through the “Three Million Lives” campaign 40. This was accompanied by UK Prime Minister speech announcing their mainstreaming plans to improve three million lives over the following five years 44. This news opened the question mark on how to align the new policy to mainstream with the reorganisation of services required to roll-out and the funding required for it. The answer to this question still remained unclear at the time of writing.

4.1.2 Additional telehealth and telecare results in England complementary to WSD

WSD Action Network - WSDAN

While the results of the WSD evaluation were not delivered at the time of writing, the WSD programme was not the only telehealth experience in England. In parallel, there has been about 100 telehealth pilots taking place in 50-70 PCTs. Some of these small-scale proof-of-concept studies (typically less than 100 patients enrolled) have been coordinated alongside the WSD under the WSD Action Network (WSDAN) umbrella [45]. WSDAN sites were also funded by the Department of Health. The sites involved in WSDAN are:

1. Croydon
2. Birmingham
3. Barnsley
4. Southampton
5. Nottingham
6. Leicester
7. Leeds
8. East Riding
9. Norfolk
10. Lincolnshire
11. Lancashire
12. Hull

As outlined in Figure 12, some of the WSDAN sites are also involved in the WSD evaluation under theme 5. WSDAN officially ended in June 2011.

Results from North Yorkshire and York (NYY)

In addition there are other telehealth initiatives and evaluations going on outside the WSDAN. Amongst them, the experience in North Yorkshire and York (NYY) have already provided some results.

The driver for NYY to trial telehealth was based on the fact that non-elective admissions were increasing by 5-10% a year against a background of reduction in financial allocation. For instance, COPD patients were responsible for a high number of admissions to hospital costing £10 million during 2008/09 (about €11.6 million for the corresponding period). Since the pilot run during 2009/10 with 91 patients enrolled, Telehealth has delivered at least £85,000 (about € 99,000) gross savings based primarily on non-elective admission avoidance. The table below provides a summary of the savings:

Figure 12 – Evaluation of the telehealth pilot in North Yorkshire and York (NYY)

Acute care events		Before telehealth	After telehealth	difference
Elective admissions	activity	21	11	10
	cost	£15,750	£11,729	£4,001
Non -elective admissions	activity	83	50	33
	cost	£119,051	£205,493	£86,442
A&E visits	activity	49	68	19
	cost	£5,321	£7,433	£2,113
Total cost		£224,675	£140,122	£84,558

Source: Telehealth pilot in North Yorkshire and York, 2010[46]

The NYY results are very much in line with theme 1 of the WSD evaluation and like in Scotland, the evidence so far is only showing savings in healthcare resources, but it does not address wider and more rigorous impact like the five themes under WSD evaluation.

A Hospital-led experience

The University of Hull's Postgraduate Medical Institute is a vibrant Faculty which is home to a number of highly successful researchers both in clinical and lab based areas. Within it the Centre for telehealth brings together telehealth expertise from academia, primary and acute care, local authorities, industry and third sector partners to develop the new service concepts in telehealth that will form the future basis for telehealth service delivery in the NHS and elsewhere.

Their interest in telehealth dates back to 1999, when Hewlett Packard (HP) approached a senior consultant in cardiology who considered the technology could be valuable to patients and started working with it. After a while, HP lost interest in this market and as a result Agilent Technologies was born developing IPHS as a spin-off from HP. Later on, Philips acquired Agilent Technologies. During this period, a RCT was conducted demonstrating a reduction in one year mortality from 45% with usual care to 29% with telehealth and savings around £1000 (around €1,471 at the time) per patient per year in avoided hospital admissions.[47]

At some point Philips also lost interest in the RMT market and all these confusing developments caused a great deal of frustration to the cardiologist at Hull who was interested in developing telehealth with the associated benefits to patients. Instead of relying on industry funding, he approached the PCT in the area and convinced them to use telehealth for chronic heart failure. So, from 2008 onwards RMT activities continued with the corresponding PCT in the area and additional funding was obtained to use RMT for chronic heart failure.

An additional study involving the same team at Hull with other scholars compared telephone support with telehealth. The research concluded that telehealth interventions are more effective to improve outcomes[48]. The reasons for this are of different nature. On the one hand, telephone support is often provided in the form of structured telephone support (STS), thus voice interactive and as a result the patients often get frustrated and quit the system. When it is nurse telephone then it increases patient compliance. However, telephone support applications rely on the patient himself detecting symptoms (thus, patient lead) whilst telehealth improves detection by a healthcare professional. In addition, because nurse telephone support has proven to be very expensive and being patient-lead can be unreliable at times (given that it relies in patients detecting symptoms as opposite to RMT detection for instance), telehealth represents a better alternative.

Implementation of telehealth in a hospital setting differs a bit from that of community care. In the Hull hospital, care integration is done through nurses with four different nurse constituencies in the hospital: two discharge nurses, one nurse responsible for telemonitoring readings and one

specialist community nurse coordinating with primary care and GP practice nurses. In addition, Hull University has a certified educational programme for all of those nurses as training is a fundamental part.

Although it was acknowledged that lack of funding and lack of reimbursement continued to be a barrier for widespread roll-out of telehealth services, today, three clinical telehealth services are operating at Hull with several more under development. These three services target Heart Failure, COPD and diabetes. Moreover, Hull became a member of the Whole Systems Demonstrator Action Network (WSDAN). Activities in Hull are rooted in a series of specific projects using a range of this technology and a report to Cabinet in April 2007 that agreed Hull could take specific opportunities in both the service transformation and economic development. Even though WSDAN ended in June 2011, the initiatives in Hull are still being rolled-out through the support received by the PCT.

As outlined earlier, this experience has been hospital initiated, as opposite to WSD that are led by the GP practice and the community. Stakeholders involved in this initiative highlighted the advantages to have telehealth initiated at hospital level with experts on the particular condition and with nurses coordinating with primary care. What is required is a mechanism to coordinate both (primary and secondary care) and this can be done through for instance policlinics and through a proper EHR application, so at some point telehealth can be transferred from hospitals to these policlinics. Unfortunately, nowadays in the UK both are missing: policlinics are not a widespread form of care delivery and EHR systems are not quite there yet although eventually it may happen.

Lessons learnt

A summary of the lessons learnt based on the findings presented in this section and stakeholders interviews is outlined below:

- Stakeholders involved underlined that telehealth requires much more patient commitment, participation and self-management than telecare;
- Telehealth actually implies that people are kept out of hospital, so it could be argued that hospitals are losing money and business. Only by having all tiers of care coordinated and incentives aligned, can telehealth work. For this to happen, a full reorganisation of care delivery is required;
- Like in Scotland, using patient champions to diffuse the innovation was considered but due to ethical issues, this alternative is not feasible;
- As much as the Department of Health may be keen to go ahead with telehealth initiatives, these services are not to be mainstreamed in England at least until results from the WSD evaluation are made available which may result in losing momentum;
- The role of matrons and specialised nurses was key to deliver the service; dismantling PCTs and these roles within them may result in losing competences and know-how for large – scale IPHS deployment.
- The use of tools such as the one developed by Newham to assist shaping the kind and form of data to be transferred to the EHR would play a relevant role in achieving interoperability which is not only limited by technical issues but also by clinical ones. In addition the role of these tools should also be complemented by frameworks addressing liability concerns in order to make the system more transparent and overcome some of the resistance posed by healthcare professionals.

In addition, some challenges arose from the fact that WSD was an RCT (as opposed to a pilot):

- Recruiting patients represented an 80-day process per patient. Under normal conditions, had it not been an RCT, this process would have taken 3 days.
- Trying to isolate costs that are due to the trial from those that would have occurred without an RCT is not an easy task.

- Data collected from GP practices was less accurate than expected
- It was assumed that through the patient's NHS number it would be possible to attach the data gathered from GP practices and hospitals to each individual patient. Against all expectations, the data gathering revealed that most GPs do not use the NHS number (often, surname and date of birth are used instead) and most hospitals only use a hospital number (which is different from NHS number). Thus, huge efforts had to be made to clean the data.
- Social and health needs do not overlap as much as expected at first glance – very few patients having both health and social care needs are eligible for social care (given that social care is means tested) – it was expected that 80% of patients would be in that situation, however there was hardly any patient in this group.
- Dealing with huge amounts of data represented a challenge for data sharing. The lack of awareness about the need for standards on how to accumulate and manage large datasets was a problem. In addition, there was no database able to manage the huge amount of information and data given the size of the trial.

4.2 Conclusions on telehealth and telecare in England

Like in Scotland, telecare services in England are already very well developed and widespread. Indeed, out of the 1.75 million people currently relying on a telecare service in the UK[20], between 1.6 and 1.7 are in England[45]. Annex VII – Telecare mapping in England provides a mapping exercise of telecare in England and highlights the role of the private sector be it for profit or non-for-profit organisations in delivering and supporting telecare services. The research found that charges range from 'free' to £40 (about €46) per week. However, this price range refers to price for the user. As detailed in section 2 of this document, social care is means tested. This explains why for some users (those with little means) the service is free of charge, whilst in other cases there is some form of co-payment and for the wealthier, the service is fully paid for by the user. In addition, prices also vary per type of technology those being higher for third generation telecare systems. From a geographical perspective, no major horizontal inequalities in service availability have been identified.

Annex VI - Telehealth mapping in England provides a mapping of the different telehealth pilots including where available costs, evaluation results, funding and technology providers. Based on Annex VI - Telehealth mapping in England, it is estimated that roughly 37,000 patients have been (or are about to be) exposed at some point to telehealth across England, which positions England as one of the front runners when it comes to IPHS. The most prominent initiatives are those related to WSDAN financed by the Department of Health (DoH). However, the other approaches taken together represent a high critical mass of experiences. Of particular relevance among non-WSDAN experiences in terms of volume are the cases of North Yorkshire and York planning to extend the service to 2,200 users by October 2011, and NHS Birmingham East and North, and NHS Bradford and Airedale with 2,000 and 5,000 patients respectively. The sources of financing for these experiences have not been analysed in depth although it is very likely that many of them have been PCT led, thus making telehealth reach beyond DoH initiatives.

RMT solutions developed in England so far are not interoperable with current systems used in primary care. Thus, although interoperability remains an issue, in the light of the recent developments of the NPfIT, progress towards interoperability is likely to make its way ahead. On the other hand, the uptake of the NPfIT applications once completed remains to be seen.

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[20] This data has been obtained from the Telecare Services Association (TSA). TSA represents the telecare industry in the UK. TSA members include telecare service providers, those who commission telecare services such as local government and housing associations, manufacturers, academics and others with a professional interest in these services. More information is available at: http://www.telecare.org.uk/

Two types of experiences have been described in England, those led by primary and community care and one in a hospital. In both cases training and involving healthcare professionals was a relevant determinant for success. In addition, lack of coordination between primary and secondary care is often a challenge.

Although available tools can assist in identifying patients' eligibility for IPHS, discussions with stakeholders shape the picture in a complementary direction in terms of type of patients and the impact of those applications. For instance, for patients with very severe conditions IPHS will make their life better but not their clinical state; for others, IPHS will result in avoiding hospitalisations; for others, IPHS may delay the development of co-morbidities; for others, IPHS may assist them in keeping working instead of early retirement. Thus, there will always be very different categories of patients and very different results in each category. Although tools like PARR++ or CPM may assist in effectively identifying those patients that are more likely to benefit from telehealthcare applications, a value judgement may also be involved in these decisions.

4.2.1 Diffusion of innovation

Types of innovation

From an innovation perspective, results are similar to those in Scotland in the sense that there are two types of innovations involved:

- technology itself, accounts for 10%[39] of the innovation; and
- the remaining 90% correspond to the organisational change associated to it. It represents a new form of delivering care and of cooperation between tiers of care.

As already stated, data information sharing between tiers of care and also involving RMT data is hampered by lack of interoperability, like in Scotland.

Diffusion of innovation

There are commonalities in terms of outcomes in Scotland and those in England. Healthcare professionals' adoption of these technologies is low and this is due to a misalignment of incentives and lack of robust evidence supporting the business case. The WSD evaluation expected to be published in November 2011 is very likely to have an impact on the diffusion of the innovation.

Drivers so far have relied on public funding made available and the role of highly motivated clinical champions and healthcare professionals, in particular specialist nurses and community matrons.

As mentioned in section 2, NICE plays a key role in developing guidelines including those for chronic disease management and in HTA. However, the agency has not been involved at all in the WSD evaluation or in any other evaluation on IPHS applications. Given that NICE plays a key role fostering research and disseminating innovations across the NHS their involvement through for instance the MTEP[21] or though other arms of the agency would contribute to further diffuse these innovations.

In addition, current policy reforms dismantling PCTs and with this losing the role of specialist nurses are also likely to impact the diffusion. It does not necessarily imply that diffusion will be hampered but it will definitely influence how and through which channels innovation is diffused.

Sustainability

As earlier detailed, telecare applications in England could be considered a routine service, and sustainability has already been achieved whilst Telehealth deployment in England has reached about 37,000 patients and telehealth is not yet the default option. When looking at the WSD trial sites, some areas including Kent and Cornwall are already mainstreaming the service. In addition

[21] In November 2009, NICE launched the Medical Technologies Evaluation Programme (MTEP) focusing specifically on the selection and evaluation of new or innovative medical technologies (including devices and diagnostics) and particular products that give advantages to patients

other sites like North Yorkshire and York, NHS Birmingham East and North, and NHS Bradford and Airedale are about to mainstream as well. Therefore, it can be argued that those who have successfully reorganised their services are keen to maintain the service in the long-run. On the other hand, the current service reorganisation through policies aiming at GP commissioning points at the opposite direction providing a controversial picture and uncertainty on sustainability.

Furthermore, delays in delivering results from the WSD evaluation are somehow acting as unintended catalysts for losing momentum.

In chapter 3 reporting findings from Scotland, it was described how the DALLAS programme and additional funding from the Scottish government would contribute to make the innovation sustainable at least until 2015.

The DALLAS programme comprised an £18m (about €20.7 million) investment by the Technology Strategy Board (TSB) and the National Institute for Health Research, with a further £5m (about €5.75 million) contribution from the Scottish Government, thus a total of £23 million (about €26.5 million). £10 million (about €11.5 million) have been allocated to Scotland and there is still £13 million (about €15 million) remaining of the TSB funding to be allocated. The programme foresees the set up of up to 5 sites across the UK involving a minimum of 10,000 users in each of them. The aim is to show how assisted living technologies and services can improve lifestyles to promote health and well-being. In addition, to be successful, final DALLAS proposals must show significant advances towards interoperability. DALLAS will not be a RCT but a real-life demonstration. The idea is to test whether these services are still providing the same benefits at large scale as in small scale experiments. There were 468 applicants for DALLAS at the 27 July 2011 deadline for the bidding process. Sites in England eligible for funding were not published at the time of writing. The programme implementation is foreseen to start in April 2012.

Additional funding to sustain the innovation would be local authorities' budgets for telecare. Moreover, the Secretary of State in England in October 2010 announced the allocation of £70 million (around €81.6 million) to enhance hospital discharge, keep patients outside hospital and reduce dependence on home care support. Telehealth and telecare could be solutions supporting these goals.

4.2.2 Governance

The top-down approach in England is visible in both the NPfIT with a centralised procurement and in the WSD sites (three big demonstrator sites). However, this approach was at the same time complemented by less centralised initiatives. For instance, the software used by GP practices was never centralised by the NPfIT and instead applications such as "GP2GP" were developed. In the case of telehealth, in addition to the WSD and as detailed in Annex VI - Telehealth mapping in England, other telehealth initiatives took place. Putting this reality in context, it is relevant to bear in mind that the English NHS was historically run from Whitehall until reforms in 2002 loosened such a monolithic approach. Thus, although England has followed a top-down approach it was still loose enough in comparison to their prior system.

Nevertheless, the governance approach followed in England has political implications. The strong push for telehealth and telecare in England was driven by the labour government. The more decentralised activities resulting in scattered pilots taking place across the country were driven by local councils, PCTs and in some cases hospitals whilst supported by central funding (i.e.: the Preventative Technology Grant). In recent years, PCTs have been at the centre of the NHS controlling 80% of the NHS budget, such a financial position for PCTs opened the floor for them to carry out these telehealth small-scale pilots. In contrast, current policies and plans by the new coalition government tend to move towards a middle-out approach instead and although not cancelling previous initiatives, these are not being pushed either. Thus, one relevant learning point is that governance has been politicised as it is often the risk with top-down approaches, which translates into uncertainties on sustainability of telehealth.

Also relevant to highlight is the political commitment in late 2011 to mainstream telehealth and telecare in England as a result of the impact assessment made available. The policy implications associated with it make it a very interesting case. First, it proves how England is strongly evidence-based driven when it comes to healthcare interventions. Second, at the time of writing it is not clear how the services will be re-organised to implement telehealth and telecare driven at primary care level and where the financial back-up will come from. Finally, the political approach followed to mainstream is likely to face similar challenges to those found in the NPfIT: strong political will associated with a top-down approach finding it difficult to engage with practitioners at local level.

4.2.3 Impact assessment

Evidence from both hospital care and from some pilots in primary care (i.e.: North Yorkshire and York) highlight the benefits of telehealth. However, this evidence was considered insufficient at policy-making level to mainstream nationwide and additional evidence is expected to be available after the WSD evaluation assessing the impact has taken place. Given the variety of methods involved and the high amount of patients involved in the trial, the WSD evaluation results seem promising and are expected to represent the most relevant source of impact of telehealth and telecare. The international community is looking forward to knowing about them. Notwithstanding that the WSD is the largest RCT of its kind worldwide and that the combination of evaluation methods will provide very robust evidence, generalisation of the results will be limited to reorganised service delivery systems.

As outlined in the sections on costs and pilot results of the WSD, five themes are being evaluated. Theme 1 focuses on service utilisation using administrative data, themes 2 and 3 measure clinical outcomes and health utilisation providing a comprehensive cost-effectiveness assessment. In light of the evaluation tools used and the high sample size, from a quantitative perspective this evaluation is likely to provide very robust results including the impact on carers and social care services although as explained not necessarily generalisable. Finally, themes 4 and 5 complement the quantitative assessments using qualitative evaluations on the impact on patients, carers and social and healthcare professionals and analysing drivers and barriers related to the reorganisation of services when using telehealth and telecare technologies.

As already outlined, preliminary findings on the impact assessment were made available in December 2011. These concluded that "if used correctly telehealth can deliver a 15% reduction in A&E visits, a 20% reduction in emergency admissions, a 14% reduction in elective admissions, a 14% reduction in bed days and an 8% reduction in tariff costs. More strikingly they also demonstrate a 45% reduction in mortality rates" [40]

Finally and as mentioned earlier, NICE was not involved in the impact assessment. It is still likely that the results published by the academic evaluators of the WSD would be adopted by NICE as guidance for the NHS which may promote the diffusion of these innovations. Indeed, the Prime Minister' s speech in late 2011 announcing the NHS plans to mainstream telehealth also reflected on the influence of NICE in diffusing innovations and the gap originated by not involving them in the WSD [44].

4.2.4 Final remarks

Notwithstanding, funding to sustain or mainstream IPHS through the DALLAS programme and through the £70 million announced by the Secretary of State, additional funding from other sources may also be used to further push telehealth and telecare. For instance, in January 2011, an extra £162 million (about €186.6 million) was announced to support winter pressures (e.g. infections in COPD patients increase during this period), which could potentially be supported by telehealth and telecare applications.

The NHS operating framework launched in April 2011 established overarching principles and priorities for the health services and the sharing of funding with local authorities for people to live in the community as well as telehealth and telecare were mentioned there. In addition, out of the £100 billion (about €115 billion) yearly expenditure corresponding to the NHS running costs the

NHS is meant to make 20 billion (about €23 billion) of efficiency savings by 2015. As part of the framework, GP commissioning is meant to be implemented in 2013 and GP consortia are meant to contribute to these savings. Dismantling PCTs is also part of these planned savings.

After evidence on the benefits of telehealth was made available end 2011, a political commitment to mainstream was announced in late 2011. Notwithstanding these positive developments for telehealth, other policy developments seem to point towards a different direction. There are serious criticisms about the new GP commissioning including how realistic the 2013 objective is and how the transition is being dealt with. For instance, criticisms are related to competences within GP consortia in managing higher budgets or on their independence when contracting services. Moreover, one of the concerns is about GP consortia possibly having to go through EC procurement law. Generally, it is thought that the Consortia themselves will be statutory organisations once the act is approved. However, it looks like it might get more complex when GPs need to commission services on behalf of the consortia to their own practice (thus, practices being at risk of serving their business interests only) or from other parts of the NHS (e.g. acute hospitals, community providers that would become social enterprises) in an environment that will have opened up to 'any willing provider' (now being referred to as 'any qualified provider'). The Department of Health is expected to release legal guidance on whether the consortia would be subject to EU procurement laws. Critics also suggest that there is a conflict between patient choice and competition/procurement requirements. If Patient X would like to go to hospital Y which may not be on the 'approved register', then Company Z who is on the register could make a complaint. In fact, the last British Medical Association (BMA) Annual Representatives' Meeting in 2011 decided that market-based policies in NHS healthcare must be abandoned.

The impact of GP commissioning on the widespread of IPHS is controversial. On the one hand, currently (prior to commissioning), GPs do not really have an incentive to decrease hospitalisations (PCTs do but not GPs directly) and with the new GP commissioning system GPs will have an incentive to avoid the hospital tariff charge. Thus, this would open a window for instance for telehealth being hospital initiated and then transferred as a routine service to a policlinic contracted by GPs or even RMT monitored by the GP practice itself. Therefore, somehow, it would be like privatising some of the services that PCTs currently offer and GPs contracting these services.

On the other hand, under the NHS operating framework payment to hospitals is made through the PbR (payment by results) scheme. Recent reforms implemented as of 1 April 2011 in England define that a hospital readmission within 30 days of discharge will not be reimbursed to the hospital. PCTs as part of their dismantling are not employing anymore physiotherapists and nurses (who were paid by PCT not by GPs) and these healthcare professionals are moving towards acute hospital. With the new PbR scheme, it makes sense for hospitals to employ them as they really have an incentive for it and in addition continuity of care is likely to be promoted as a result.

Hence, in the above context and in the light of population trends, it seems that current policy reforms are defining a scenario favourable to IPHS growth. However, as much as the current QOF payment system would represent an incentive for the use of technologies that lead to better health outcomes, the upfront investment required to acquire these technologies may be an issue. Indeed, historically GPs have not been very keen on investing in technology themselves. In addition, it is unlikely that direct eCare payment such as 'reimbursement for telemedicine' will replace the current QOF payment system. One possible scenario is that the Department of Health makes funding available to cover for technology purchase upfront costs, which in the light of current cuts to NHS services seems pretty unlikely. The WSD evaluation results may shed light on future scenarios for IPHS deployment in England.

5. Conclusions and Policy Implications

The conclusions presented in this section draw on the experiences in both England and Scotland and go beyond the analysis of governance, innovation and impact assessment presented in chapter 4, in an attempt to provide future directions, integrating the perspectives from different stakeholders and current policies underway which may shape future deployment of IPHS.

The interest in telecare and telehealth solutions has been driven by the anticipated challenges of providing care for an increasingly aging population in the UK where 17.5 million adults have chronic illnesses a figure set to rise to 35 million by 2030[28].

In the UK, the interest in telehealth has been highly influenced by the positive experience of the US Veterans Health Administration (VHA) with these applications. In both England and Scotland, the case for assistive technologies has been growing as a result, with a number of successful pilots and trials across the two home countries mainly primary care driven with the exception of a hospital experience. Telecare is well established in both settings whilst telehealth is not yet widespread.

In England, after waiting for evidence from the WSD programme, a strong policy commitment to mainstream these applications was made and the "Three Million Lives" campaign was launched. Nevertheless, the WSD results were limited to reorganised services and it remains to be seen how the mainstreaming plans will be operationalised. In contrast, the evidence gathered in Scotland, while lacking a strong evidence-base compared to that of WSD, seemed to be sufficient for policy makers to build their case and further mainstream telehealthcare. It can therefore be concluded that the need for evidence and robustness varies and other factors also play a crucial role at policy level. It can be argued that Scotland being more rural than England, the case for telehealthcare there seems more attractive from the outset. For instance, in some areas in the Highlands some patient emergencies require the transfer of the patient by helicopter with the associated resource consumption and anxiety for the patient. Although, the evidence gathered in Scotland never included a case of helicopter transfer given the small number of patients involved, policy-makers are likely to include this kind of issues during the decision-making process.

In England, if the GP commissioning strategy is successful, GP consortia would decide whether to invest in telehealth services or not. Hence, the question mark on how the mainstreaming plans will take place at local level. Meanwhile, judging from the experience in Newham, England may have lost momentum when it comes to telehealth and this may come at a price. Furthermore, the role of specialised nurses in delivering the service and supporting the reorganisation has been key for telehealth implementation. With PCTs being dismantled this role is disappearing with the experience and know-how associated to it. In a way, the new GP commissioning can be understood as a form of privatising some of the services that PCTs were delivering. Ideally, the new commissioning would improve coordination between primary and hospital care and thus potentially there will be room for telehealth initiatives coordinated at all levels, even if those are hospital initiated as a starting point which may be appropriate for certain conditions as described in the hospital experience.

Scotland has followed more of a middle-out approach when compared to the top-down approach in England. Indeed, Scotland started by promoting a service reorganisation at local level and recent developments have aimed at reorganising services at policy level; thus opening the floor for further IPHS deployment. It could be argued that this approach is feasible for a smaller country like Scotland in terms of population whilst it may be more challenging in a larger country like England. In addition, other factors may also influence the approaches used in each case. For instance, historically the Scottish have contended for autonomy until their own parliament was established in 1999. This background may well contribute to explain why a top-down approach would be difficult to apply in this case. In contrast, as described earlier, the English NHS was centrally run from Whitehall until 2002. In sum, it is unlikely that there is a magic governance formula or panacea to diffuse innovations. Their diffusion would always depend on additional elements beyond the

innovation itself including organisational, cultural, historical factors and maybe even the size of the country. However, it is relevant to state that top-down approaches are more vulnerable to political changes and face the challenge to succeed in engaging with local practitioners.

In both settings significant funding has been made available to pilot and develop telehealth and telecare applications and the evolution of this funding allocation is also worth noting. The significant level of funding both through TDP in Scotland and PTG in England and the fact that such funding was not limited to initiating activities but further funding was made available for further deployment has been key to allow for mainstreaming. In both settings, the funding made available was mainly targeting the development for telecare and telehealth applications. Likewise the new funding made available under the DALLAS programme focus on assisted living technologies and services. Additional programmes may represent a source for further funding. For instance, the "Reshaping care for Older people" programme which foresees £70 million (about €80.6 million) per year for three years in Scotland provides an opportunity for IPHS deployment at least until 2015. Along the same lines, the Secretary of State for Health recently announced the allocation of the same amount in England to provide post-discharge support to people in their homes. What makes these programmes interesting from an IPHS perspective is that their scope is broader. These are financing frameworks with defined goals under which IPHS applications may fit as a means to achieve these goals, although they do not specifically suggest the introduction of any specific technology and leave enough flexibility for each bidder to define the paths and ways to support people stay in the community.

Therefore, it looks like originally in the UK funding was made available exclusively for IPHS in an attempt to give a push to these technologies but once this was achieved, financing does not aim at it directly anymore, although it may indirectly. This approach may be setting a new path for the future to finance the implementation of IPHS technologies whilst leaving room and flexibility for each healthcare provider to decide how to achieve a set of defined goals.

The above seems to be very much in line with current incentives at primary care level through the QOF. England and Scotland have coordinated approaches to chronic disease management and integrated care, and as much as patient pathways are often defined around this, incentives are based on quality of care and patient outcomes and telehealth as such does not come into the picture. When looking at the literature this seems the approach recommended by many academics and experts: in order to promote ICT the best payment methods is that based on capitation combining quality of care and outcomes. Often using direct eCare payment (or pay-per-use) during implementation is also suggested, but only during implementation and not for routine care delivery. As much as payment focusing on outcomes is strongly supporting the promotion of ICT applications, whether this represents the most appropriate financial and payment method remains to be tested.[49] [50] Nevertheless, any policy maker aiming to mainstream IPHS may consider whether to directly finance (or reimburse) eCare or whether it is preferable to establish financing frameworks for each health organisation to define the best way to meet their goals.

On the other hand, when looking at different tiers of care, the picture becomes more complex. Incentives and reimbursement remain an issue for widespread adoption in particular because of the different incentives in different tiers of care. Hospitals in Scotland have a financial incentive to shorten lengths of stay whilst in England hospitals do not only have a financial incentive to shorten length of stay but also to avoid re-admissions within 30 days after discharge. From a frivolous perspective, in both settings, hospitals do not necessarily have an incentive to avoid future episodes (beyond 30 days since hospital discharge) as those may represent a source of additional income. Currently, GPs have an incentive to keep patients within the community but it is not strong enough to push them to make pressure on hospitals or coordinate with them. Alignment of incentives and sharing the benefits at different tiers would help promote coordination. Therefore, when defining policies ensuring there are no spurious incentives or contradictory designs and regulations at different levels would contribute to better achieve widespread IPHS deployment. The proposed GP commissioning in England might pave the way for better alignment and coordination amongst tiers of care.

Regarding innovations in place, in both England and Scotland, two types of innovation have been identified: technology innovation itself and the innovation related to the reorganisation of services, the latter being the most significant. As shown earlier, the recent transfer of adult care services to the healthcare system is one of the examples that illustrate the way policies also accompany service reorganisation.

From a patient perspective, the UK experience shows that patients are much more likely to engage with IPHS if advised and encouraged by healthcare professionals. Given the resistance that this collective poses to the uptake of these technologies and the fact that they highly influence patients' attitudes, nudging healthcare professionals is likely to indirectly improve IPHS adoption by patients

Notwithstanding that nudging healthcare professionals may result in higher uptake among patients, additional policies targeting healthcare professionals would also be required. Beyond the need for appropriate incentives to be in place, defining and structuring the data to be transferred to the EHR that represents added value information to healthcare professionals is very important. Furthermore, liability frameworks have not yet been addressed and uncertainty around this represents a source of resistance.

Moreover, our findings show that IPHS can not be delivered in the form of "one size fits all" and the service needs to be personalised for each patient and their particular condition and needs. Because each patient and his/her condition are different, the benefits offered by IPHS will also be different. For instance, for those patients with severe conditions, IPHS are unlikely to radically increase their quality of life instead IPHS would assist in stabilising their condition. Thus, for these patients IPHS is likely to be an effective intervention as far as patients would be willing to stay at home until they die which is often the case. As shown by the results of a recent YouGov poll, 66 per cent of respondents reported preferring to die at home, a figure in line with other polls on the subject[51]. Yet, if healthcare systems do not manage to reorganise their services and deliver care around this, they will fail to address patients' needs whilst at the same time exposing their sustainability.

Last but not least, from an industry perspective, and assuming the situation in each setting stands as pointed by their recent policy developments, the type of solutions they deliver in each setting - be it England or Scotland - will differ given that services, financing and their needs will be organised differently. The same would apply if they were to deliver solutions outside the UK. It is not only about the technology developed, it is about delivering a solution that suits the healthcare needs in each setting based on their specific context and policies. In addition, a Memorandum of Understanding between the Department of Health in England and the telehealth and telecare industry was signed in January 2012. The aim was to promote and accelerate the deployment of these technologies [52]. This represents a relevant milestone from both sides and a good starting point promoting public-private partnerships in this field.

More generally, interoperability remains a challenge which seems to go beyond technical issues; policy makers should continue to foster cooperation amongst industry players and the DALLAS programme making progress towards interoperability as eligibility criteria for funding represents a relevant step towards this. Finally, coordinating with the NHS IT services has proven to be very relevant for IPHS deployment in the UK, especially at operational level and involving them may also contribute to pave the way for interoperability.

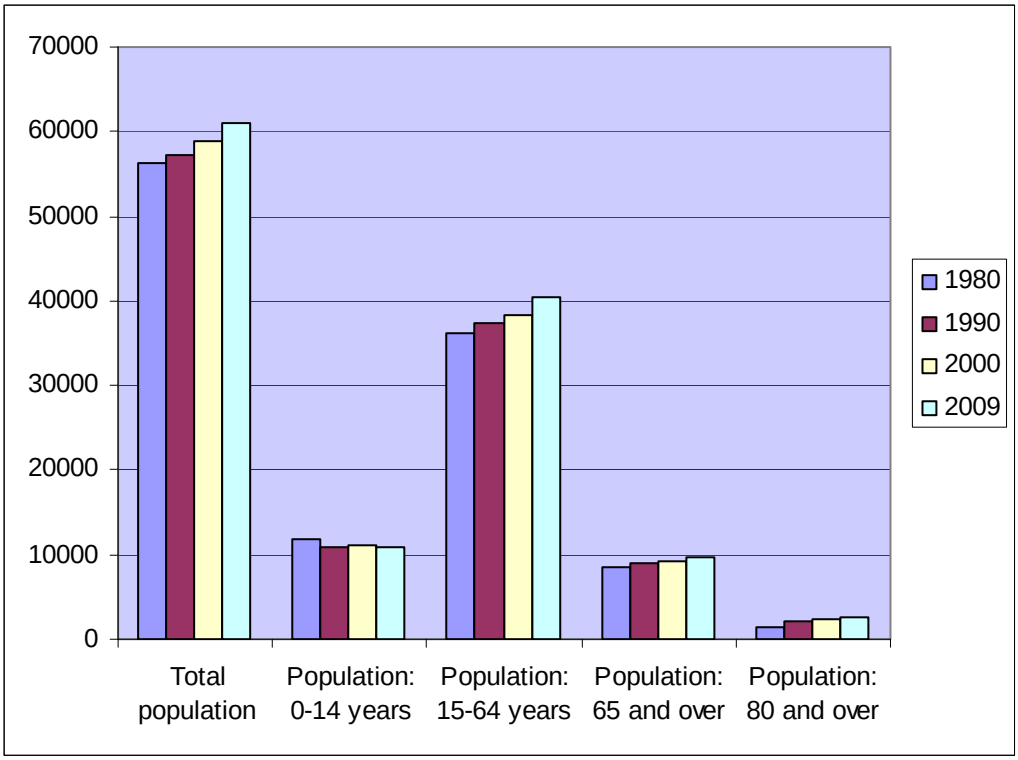
ANNEX I – SOCIO-ECONOMIC DATA, UK

Figure 13 – Age structure of the UK population (in thousands of persons) selected years

	1980	**1990**	**2000**	**2009**	% increase (1980-2009)
Total population	56330	57237	58886	60930	7.55%
Population: 0-14 years	11828	10876	11204	10780	-9.72%
Population: 15-64 years	36079	37358	38375	40517	10.95%
Population: 65 and over	8423	9003	9308	9634	12.57%
Population: 80 and over	1519	2080	2365	2500	39.24%

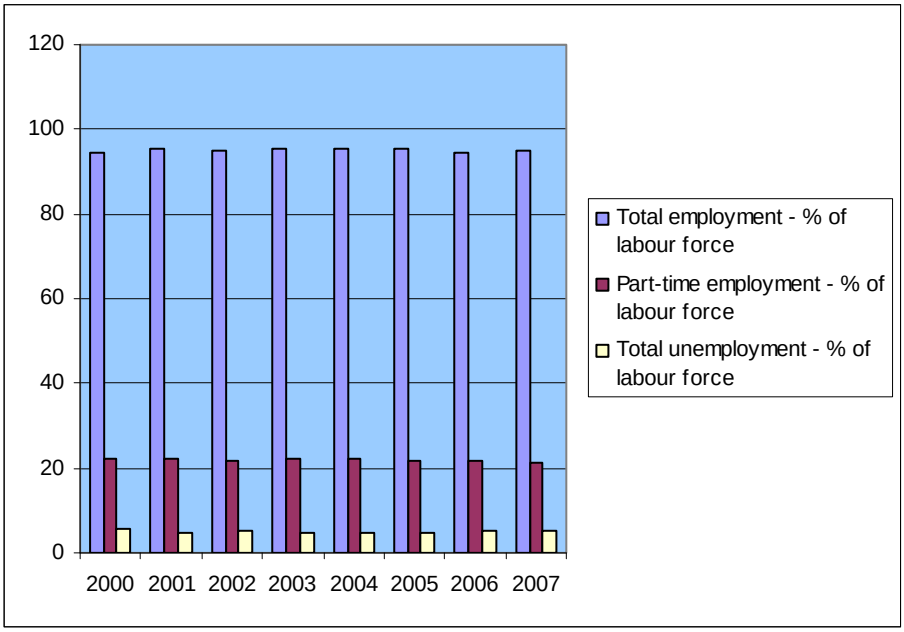
Source: OECD HEALTH DATA 2010, June [1]

Figure 14– Age structure of the UK population (in thousands of persons) selected years



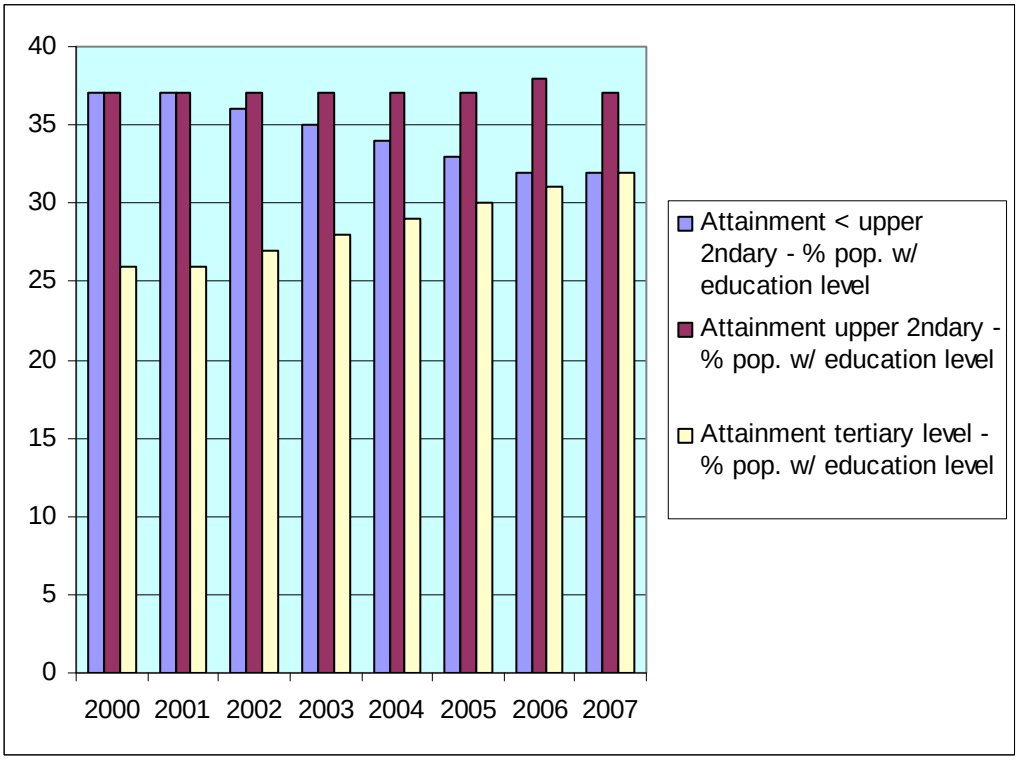
Source: Authors' elaboration based on OECD HEALTH DATA 2010, June [1]

Figure 15 – Employment evolution in the UK (2000 -2007)



Source: Authors' elaboration based on OECD HEALTH DATA 2010, June 2011 [1]

Figure 16 - Evolution educational level in the UK (2000-2007)



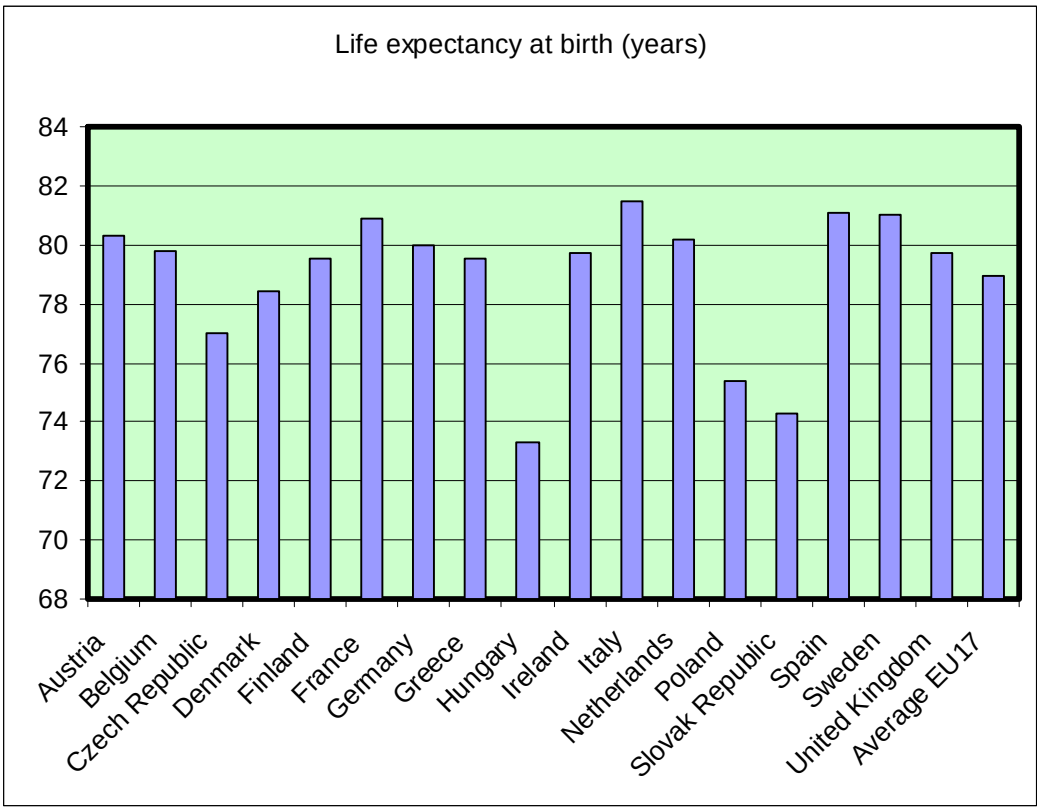
Source: Authors' elaboration from OECD HEALTH DATA 2010, June 2011[1]

Figure 17 – Average earnings of production worker[22] in the UK (1998-2009)

Source: Authors' elaboration based on OECD HEALTH DATA 2010, June 2011 [1]

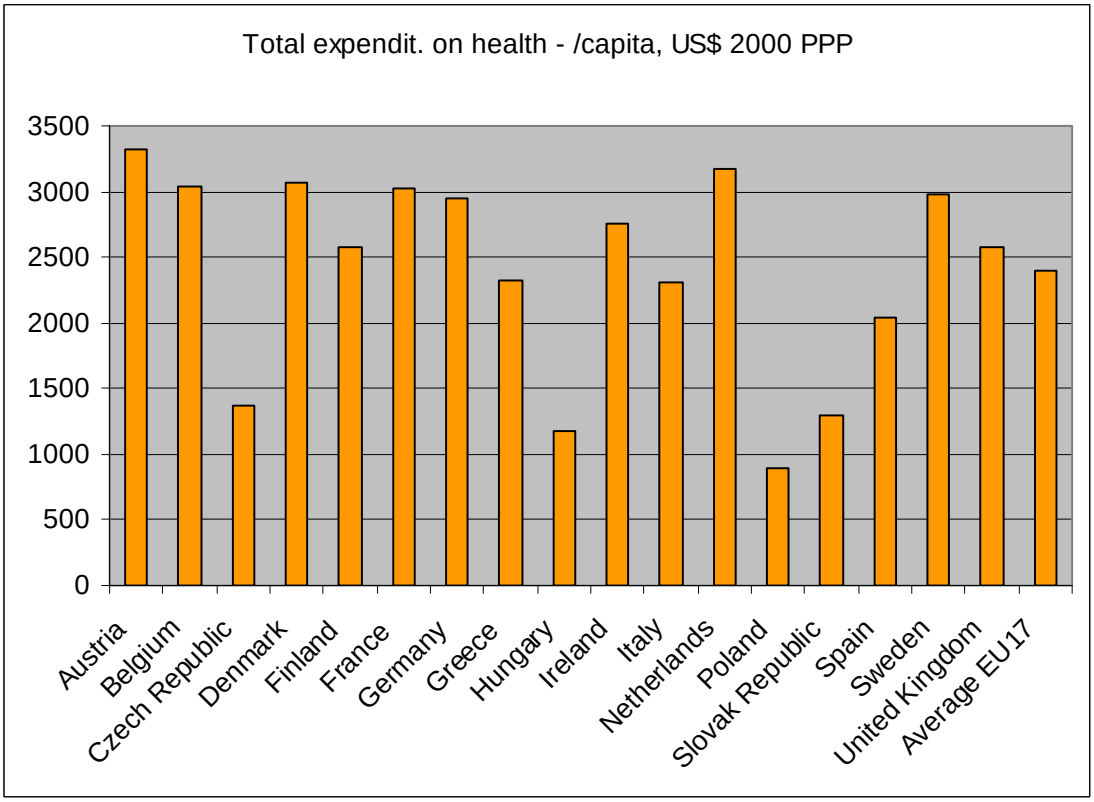
[22] Average earnings of production worker are defined as gross wage earnings less personal income tax plus social security contributions and universal cash transfers received from general Government for an average full-time adult worker in the manufacturing sector. The average worker is assumed to be a one-earner married couple at 100% of average earnings, and have two dependent children aged between 5 and 12 years old included.

Figure 18 – Life expectancy at birth for 17 selected EU countries, 2007



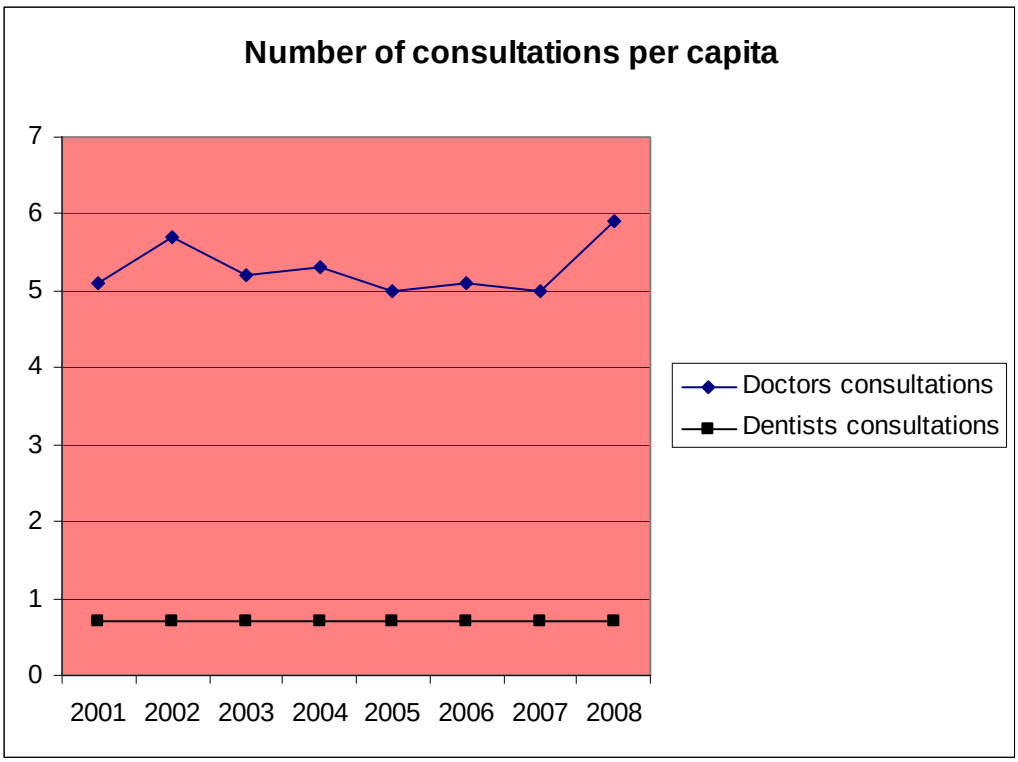
Source: Authors' elaboration based on OECD HEALTH DATA 2010, June 2011 [1]

Figure 19 – Total healthcare expenditure per capita in US$ adjusted to year 2000 purchasing power parity



Source: Authors' elaboration based on OECD HEALTH DATA 2010, June 2011[1]

Figure 20 – Number of GP and dentists consultations per capita in the UK (2001-2008)



Source: Authors' elaboration based on OECD HEALTH DATA 2010, June 2011 [1]

ANNEX II – DESCRIPTIVE STATISTICS ON CVD, COPD AND DIABETES

Chronic obstructive pulmonary disease (COPD)[9]

- COPD is an umbrella term for a group of lung diseases that include chronic bronchitis, emphysema and small airways disease. Lung damage over a long period of time impairs the flow of air in and out of the lungs and causes breathlessness
- COPD is the 5th biggest killer in the UK and the 5th biggest killer worldwide. Every hour COPD is estimated to kill over 250 people worldwide.
- COPD is the only major cause of death whose incidence is on the increase and is expected to be the third leading cause of death worldwide by 2020 (exceeded only by heart disease and stroke)
- There are an estimated 3 million people with COPD in the UK, although only an estimated 900,000 (1.5% of the population) are correctly diagnosed,
- 24,160 people in the UK died as a result of COPD in 2005.The disease kills more people every year in the UK than bowel cancer, breast cancer or prostate cancer.
- COPD is the third biggest cause of respiratory death in the UK, accounting for more than one fifth (23%) of all respiratory deaths.
- In 2005 COPD killed more women than breast cancer: 11,302 died of COPD, 10,969 died of breast cancer.
- In the UK, the rate of COPD has been increasing nearly three times faster amongst women than men.
- Women are more susceptible to developing COPD than men – their lung function worsens with less duration of smoking or intensity of smoking than that of men.
- COPD is caused mainly by smoking, but also by exposure to airborne pollution, to harmful fumes or particles at home or at work, or by inheriting a genetic deficiency. Some research suggests that COPD may be related to childhood lung disease

Diabetes[8]

There are 2.6 million people who have been diagnosed with diabetes in the UK (2009). By 2025, there will be more than four million people with diabetes in the UK.

In 2008 145,000 people were diagnosed with diabetes in the UK. It is equivalent to:

- around 400 people every day
- almost 17 people every hour
- three people every ten minutes.

It is estimated that there are up to half a million more people in the UK who have diabetes but have not been diagnosed. It is estimated that up to one in 20 people in England has diabetes (diagnosed and undiagnosed). UK-wide, it is not quite one in 20.

Figure 21 - Prevalence of diabetes by age group in England (2006)

age	men	women
16–24	0.8%	0.9%
25–34	1.2%	1.2%
35–44	2.4%	1.2%
45–54	6.0%	3.6%
55–64	8.5%	6.0%
65–74	15.7%	10.4%
75+	13.5%	10.6%

Source: Diabetes UK[8]

In 2001, one in five people over the age of 85 had diabetes. Around one in four people in care homes (27 per cent) had diabetes which is a higher prevalence than in the comparable general population. The figures may have increased since 2001.

Figure 22 - Distribution of diabetes by age group in Scotland (2008)

Age	Percentage
15–44	11%
45–64	38%
65–84	46%
85+	4%

Source: Diabetes UK[8] . *Note: This is not prevalence, but distribution across the age group*

Financial costs are currently estimated that 10 per cent of the NHS budget is spent on diabetes.

This works out at around £9 billion (a bit less than €13 billion at the time) a year (based on 2007/2008 budget for the NHS of approximately £90.7 billion or about €119 billion at the time). It can also be expressed in terms of:

- £173 million a week (or about € 240 million at the time)
- £25 million a day (or about €35 million at the time)
- £1 million an hour (or about €1.4 million at the time)
- £17,000 a minute (or about €24,000 at the time)
- £286 a second (or about €400 at the time).

In 2006, 28.4 million items to treat diabetes were prescribed at a cost of £561.4 million (about €823 at the time). Diabetes prescribing now accounts for 7 per cent of all prescription costs.

Diabetes also has a significant impact on health and social services.

- People with diabetes are twice as likely to be admitted to hospital. At least one in ten people in hospital has diabetes at any moment in time.
- People with diabetes experience prolonged stays in hospital. This results in about 80,000 bed days per year.

- The presence of diabetic complications increases NHS costs more than five-fold, and increases by five the chance of a person needing hospital admission.
- One in 20 people with diabetes incurs social services costs. More than three-quarters of these costs were associated with residential and nursing care, while home help services accounted for a further one-fifth. The presence of complications increases social services costs fourfold

Hospital data for England

Hospital data for England was obtained from the Hospital Episode Statistics (HES) for the period 2009-2010[11] (this period covers from 1st April 2009 to 30th March 2010). In total HES collected more than 16 million records detailing episodes of admitted patient care delivered by NHS hospitals in England and English NHS commissioned activity in the independent sector.

- There were 16,806,196 finished consultant episodes (FCEs); this represents an increase of 573,617 FCEs (3.5%) from 2008/09.
- The 16,806,196 FCEs represents 100.00% of activity in English NHS Hospitals or English NHS commissioned activity in the independent sector.
- Of the 16,806,196 FCEs, 14,537,712 (86.5%) were admission episodes; of these admission episodes 5,177,887 (35.6%) were emergency admissions.
- The time between decision to admit and admission (time waited) had a mean average of 50 days and a median of 34 days, most people (44.5%) waited under 1 month.
- The age group with the greatest number of patients was 60-74 (21.7%), the average age of patients was 51.

Hospital data was collected for inpatient and outpatient care. Figure XX, shows details for inpatient for a selection of diseases. As stated somewhere else in this document, data for outpatient consultations[23] of the selected diseases has not been included given that primary diagnosis is not a mandated field in the outpatients' dataset, therefore coverage within this field is poor. Indeed, the data showed that almost 97% of attendances are "Unknown and unspecified causes of morbidity"[11], thus, providing data only for the remaining 3% was considered too weak and inappropriate for SIMPHS2 purposes. However, the total amount of outpatient consultations is available and considered relevant.

Figure 23 – attendances to outpatient care by primary diagnosis. England, 2009-2010

	All attendances	Attended first appointment	Attended first tele consultation	Attended subsequent appointment	Attended subsequent tele consultation	Attended but first/subsequent/tele unknown	Percentage of all attendances
Total all conditions	**67,414,037**	**20,782,376**	**69,228**	**46,222,116**	**239,594**	**100,723**	**100%**
Unknown and unspecified causes of morbidity	*65,324,615*	*20,286,519*	*65,809*	*44,705,948*	*228,659*	*37,680*	*96.90061%*

Source: HES 2009-2010[11]

As detailed in figure 23, teleconsultations account for 69,228 for first attendance and for 239,594 of subsequent attendances. Thus, in total teleconsultations represent 0.46% of all attendances.

[23] Outpatient consultations data represents hospital outpatient consultations, not GP consultations

Figure 24 – Hospitalisations in England for selected diseases (inpatient). England, 2009-2010

	Total episodes	Finished consultant episodes	Mean time waited (days)	Median time waited (days)	Mean LOS (days)	Median LOS (days)	Mean age	Age 0-14	Age 15-59	Age 60-74	Age 75+	Day case (patients admitted just for the day)	FCE Bed Days
Diabetes episodes													
Diabetes with Hypoglycaemic Disorders 70+ years	10,686	6,810	9	7	3	81	81			2,025	8,657	29	48,641
Diabetes with Hypoglycaemic Disorders >69 years	6,289	4,567	18	4	1	51	51		4,045	2,235		236	15,849
Diabetes with Hyperglycaemic Disorders 70+ with Major CC	3,239	1,599	6	16	11	81	81			656	2,581	6	28,254
Diabetes with Hyperglycaemic Disorders 70+ with Intermediate CC	6,693	4,034	15	7	4	79	79			1,864	4,829	122	29,012
Diabetes with Hyperglycaemic Disorders 70+without CC	932	714	17	6	2	78	78			316	614	119	3,311
Diabetes with Hyperglycaemic Disorders >69 years with Major CC	2,654	1,388	15	10	6	48	48	12	1,891	744		8	14,851
Diabetes with Hyperglycaemic Disorders >69 years with Intermediate CC	15,902	10,266	20	4	2	44	44	14	12,929	2,932		412	40,911
Diabetes with Hyperglycaemic Disorders >69 without CC	9,652	7,093	16	2	1	36	36	48	8,872	724		984	12,890
Diabetes with Lower Limb Complications with Major CC	2,134	917	6	29	16	70	70		462	720	940	5	27,106
Diabetes with Lower Limb Complications without Major CC	5,804	3,393	10	13	7	65	65		2,045	2,039	1,689	20	35,793
COPD episodes													
Chronic Obstructive Pulmonary Disease or Bronchitis LOS 1 day or less	61,222	43,158	17	1.6	1	70	70		10,549	26,683	23,949	1,266	35,863
Chronic Obstructive Pulmonary Disease or Bronchitis with Intubation with Major CC	62	41	0	14.4	10	70	70		13	27	22		700
Chronic Obstructive Pulmonary Disease or Bronchitis with Intubation with CC	133	101	0	9.7	8	67	67		32	63	38		891
Chronic Obstructive Pulmonary Disease or Bronchitis with Intubation without CC	5	5	0	12.0	5	61	61		2	3			59
Chronic Obstructive Pulmonary Disease or Bronchitis with NIV without Intubation with Major CC	1,800	1,132	18	13.9	10	71	71		237	815	748		17,581
Chronic Obstructive Pulmonary Disease or Bronchitis with NIV without Intubation with CC	3,453	2,316	19	9.4	7	70	70		545	1,675	1,233		23,292
Chronic Obstructive Pulmonary Disease or Bronchitis with NIV without Intubation without CC	259	196	36	6.8	6	66	66		51	160	48		1,317
Chronic Obstructive Pulmonary Disease or Bronchitis without NIV without Intubation with Major CC	24,489	10,626	9	15.0	10	76	76		1,551	8,054	14,873		223,695
Chronic Obstructive Pulmonary Disease or Bronchitis without NIV without Intubation with CC	78,987	40,461	7	8.2	6	73	73		8,474	32,353	38,105	4	417,575
Chronic Obstructive Pulmonary Disease or Bronchitis without NIV without Intubation without CC	15,804	9,653	21	6.2	4	68	68		3,333	7,539	4,921	1	67,515
Heart (limited to heart failure)													
Heart Failure or Shock with CC	43,462	19,656	7	16	11	81	81		1,661	7,638	34,141	22	390,279
Heart Failure or Shock without CC	60,610	33,852	18	9	6	78	78		4,184	15,734	40,637	185	307,577

Source: HES 2009-2010[11]

Hospital data for Scotland

Hospital data for Scotland was obtained from Information Services Division (ISD) of NHS Scotland for the period 2010[53] (this period covers from 1st April 2009 to 30th March 2010) and completed with other periods in some cases. In sum for the 2010 period:

- The total number of hospital discharges (episodes) has remained constant at approximately 1,400,000 for the last two financial years ending March 2009 and March 2010.
- There were 529,000 emergency inpatient discharges (episodes) and 440,000 day case discharges (episodes) in the year ending March 2010, a decrease of 2.0% and an increase of 2.8% respectively on the previous year.
- Neoplasms (including cancer) were the most common main diagnosis for patients discharged from hospital in the year ending March 2010, accounting for 14.1% of all primary diagnoses. This figure has remained at approximately 14% for the last three financial years.
- 4,583,000 outpatients were seen at consultant clinics in the year ending March 2010, showing a slight decrease of 1.1% when compared to year ending March 2009. In 2009/10, 1,467,000 were new outpatient attendances, a slight increase of 0.3% from 1,463,000 in 2008/09.
- In 2009/10 there were around 106,000 hospital admissions (episodes) for children aged 14 years and under. This is similar to the number of admissions in 2007/08 and 2008/09.

Figure 25 Number of inpatient episodes, from all specialties in Scotland. Periods from April 2005 till March 2010

	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010
All Patient Types	**1,276,725**	**1,317,195**	**1,346,834**	**1,401,066**	**1,402,809**
Day cases	392,842	405,740	403,471	428,098	439,950
Elective inpatients	210,184	205,065	198,904	203,225	199,161
Emergency Inpatients	487,019	508,440	530,020	539,310	528,612
Transfers	186,680	197,950	214,439	230,433	235,086

Source: ISD Scotland[53]

Thus, for the period 2009/10, out of the 1,402,809 inpatient episodes, 439,950 were day cases and 962,859 resulted in hospital stays with an average length of stay (LOS) of 5.3 days.

Figure 26 Number of inpatient episodes, length of stay and average length of stay by admission type. Scotland 2009/2010

	All Admission Types		
NHS Treatment	**Episodes**	**Stay (days)**	**Average length of stay**
Scotland	962,859	5,088,990	5.3

Source: ISD Scotland[53]

Figure 27 - Number of hospital episodes by main diagnosis and financial year; and rates per 100,000 population. Selected conditions. Scotland, period 2005/6 to 2009/10

Diagnosis Description	Number of Episodes by Financial Year					Rates per 100,000 Population by Financial Year				
	2005/06	2006/07	2007/08	2008/09	2009/10	2005/06	2006/07	2007/08	2008/09	2009/10
All Diagnosis	1,268,891	1,309,231	1,338,671	1,393,042	1,394,685	24,906	25,586	26,023	26,953	26,852
A Diabetes mellitus	6,177	6,238	6,634	6,686	6,760	121	122	129	129	130
B Diseases of the circulatory system	141,173	140,340	140,107	146,491	144,795	2,771	2,743	2,724	2,834	2,788
-Hypertensive diseases	1,836	1,905	1,818	1,728	1,865	36	37	35	33	36
-Angina pectoris	13,037	11,786	14,322	12,639	10,252	256	230	278	245	197
-Acute myocardial infarction	17,076	16,278	15,617	19,177	20,906	335	318	304	371	403
-Other ischaemic heart disease	20,770	21,187	19,238	17,705	16,768	408	414	374	343	323
-Pulmonary heart disease & diseases of pulmonary circulation	3,101	3,253	3,702	3,912	4,229	61	64	72	76	81
-Conduction disorders and cardiac arrhythmias	15,772	16,072	16,519	17,376	17,594	310	314	321	336	339
-Heart failure	10,931	10,776	10,957	11,500	11,169	215	211	213	223	215
-Cerebrovascular diseases	20,792	20,571	20,827	21,962	22,377	408	402	405	425	431
-Atherosclerosis	1,170	1,048	902	751	640	23	20	18	15	12
-Varicose veins of lower extremities	6,104	6,313	5,039	5,221	4,694	120	123	98	101	90
-Other diseases of the circulatory system	30,584	31,151	31,166	34,520	34,301	600	609	606	668	660
C Chronic obstructive pulmonary disease and bronchiectasis	20,861	23,190	24,153	26,777	24,658	409	453	470	518	475
% (A+B+C)/all diagnosis	13.26%	12.97%	12.77%	12.92%	12.63%	13.26%	12.97%	12.77%	12.92%	12.63%

Source: ISD Scotland[53]. Note: Data is all Inpatient & Day Case discharges from "acute" specialties, i.e. excludes obstetric & psychiatric specialties.

Figure 28 - Number of hospital episodes incidence by main diagnosis and financial year; and rates per 100,000 population. Selected conditions. Scotland, period 2005/6 to 2009/10

Diagnosis Description	Incidence by Financial Year					Rates per 100,000 Population by Financial Year				
	2005/06	2006/07	2007/08	2008/09	2009/10	2005/06	2006/07	2007/08	2008/09	2009/10
All Diagnosis	705,166	715,445	720,454	737,600	733,626	13,841	13,982	14,005	14,271	14,124
A Diabetes mellitus	2,328	2,200	2,115	2,194	2,129	46	43	41	42	41
B Diseases of the circulatory system	69,917	67,360	65,821	66,695	64,461	1,372	1,316	1,280	1,290	1,241
-Hypertensive diseases	1,246	1,198	1,131	979	991	24	23	22	19	19
-Angina pectoris	6,187	5,541	6,377	5,648	4,535	121	108	124	109	87
-Acute myocardial infarction	7,871	7,297	6,823	7,855	8,110	154	143	133	152	156
-Other ischaemic heart disease	9,969	9,541	8,392	7,152	6,648	196	186	163	138	128
-Pulmonary heart disease & diseases of pulmonary circulation	1,835	1,847	2,095	2,168	2,343	36	36	41	42	45
-Conduction disorders and cardiac arrhythmias	8,001	7,963	8,024	8,094	8,016	157	156	156	157	154
-Heart failure	4,879	4,536	4,585	4,754	4,403	96	89	89	92	85
-Cerebrovascular diseases	9,465	9,345	9,013	9,414	9,331	186	183	175	182	180
-Atherosclerosis	583	479	447	392	387	11	9	9	8	7
-Varicose veins of lower extremities	3,966	3,843	3,396	3,666	3,302	78	75	66	71	64
-Other diseases of the circulatory system	15,915	15,770	15,538	16,573	16,395	312	308	302	321	316
C Chronic obstructive pulmonary disease and bronchiectasis	5,305	5,985	5,729	6,552	5,647	104	117	111	127	109
% (A+B+C)/all diagnosis	11.00%	10.56%	10.22%	10.23%	9.85%	11.00%	10.56%	10.22%	10.23%	9.85%

Source: ISD Scotland[53].

Note1: Data is all Inpatient & Day Case discharges from "acute" specialties, i.e. excludes obstetric & psychiatric specialties.

Note2: Incidence count looks for the first occurrence of a diagnosis within a given time period. The incidence table is based on a 10 year incidence look back period. For example, a patient is admitted in 2005 and again in 2006 for the same diagnosis. Only the episode in 2005 will be counted. If the patient had also been in hospital for the same diagnosis in 1998, then neither the 2005 nor the 2006 episode would be counted in the incidence table.

Figure 29- Number of hospital episodes and bed days by main diagnosis and CHP for Long Term Conditions; and rates per 100,000 population

Total	Diabetes	Hypertensive Diseases	Angina Pectoris	Acute Myocardial Infarction	Other Ischaemic Heart Disease	Heart Failure	COPD	Asthma	Total	Diabetes	Hypertensive Diseases	Angina Pectoris	Acute Myocardial Infarction	Other Ischaemic Heart Disease	Heart Failure	COPD	Asthma
Number of Bed Days by Long Term Condition									**Bed Days Rates per 100,000 Population**								
423,863	35,801	7,981	24,868	76,804	35,581	94,339	130,833	17,656	8,201	693	154	481	1,486	688	1,825	2,531	342
Number of Episodes by Long Term Condition									**Episode Rates per 100,000 Population**								
100,503	6,760	1,865	10,252	20,906	16,768	11,169	24,658	8,125	1,945	131	36	198	404	324	216	477	157

Source: ISD Scotland[53].

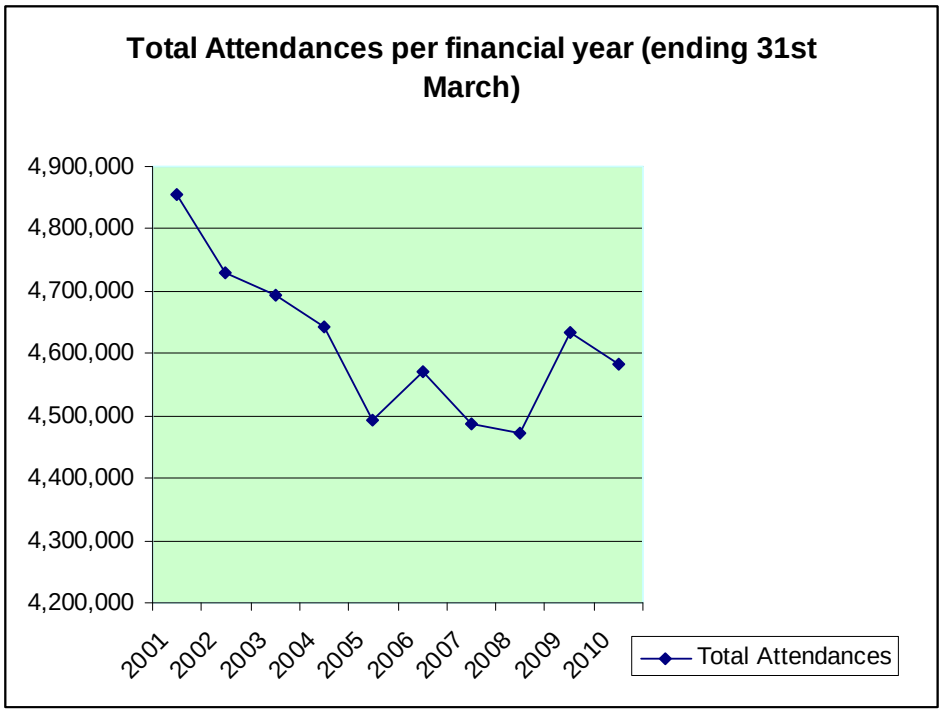
Figure 30 - Inpatient facilities and average Length of Stay (LOS) for all specialties. Scotland, 2001-2011

Indicator	Financial Year Ending 31st March									
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Average Available Staffed Beds	33,160	31,930	30,793	29,886	29,069	28,351	27,735	27,051	26,587	25,743
% Occupancy	80.8	81.4	81.4	80.4	80.0	80.7	80.7	79.8	79.7	80.0
Mean Stay (Days) per Episode	10.2	9.9	9.7	9.1	8.7	8.4	8.1	7.7	7.3	7.1
Throughput	28.9	29.9	30.6	32.5	33.7	35.0	36.5	38.2	39.7	41.1

Source: ISD Scotland[53]. Note1: The figures include NHS beds/patients in joint-user and contractual hospitals. Note2: all specialties include GP as some practices have inpatient facilities (in particular in rural areas)

Regarding outpatient data, the situation is similar to that of England in the sense that details on the type of condition for consultation was not available as detailed in the figure below and all we can get is a historical overview of outpatient consultations and observe how it has been dropping over time.

Figure 31 - Outpatient consultations, all specialties (excluding A&E)



Source: ISD Scotland[53].

In addition, the Information Services Division (ISD) of NHS Scotland also compiles data for long-term conditions and for 65+ as detailed in the figures below.

If we were to identify the average length of stay for these long-term conditions, roughly we could calculate it using the ratio of number of bed days and number of episodes from the figure above, thus resulting in:

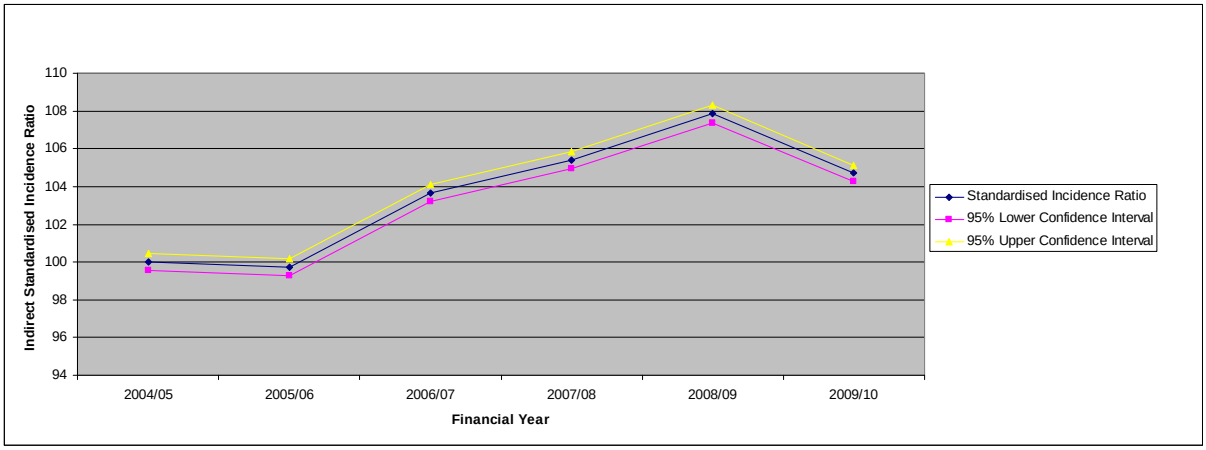
As for 65+ population, data from emergencies for this population in Scotland was gathered and standardised in terms of deprivation and sex.

Figure 32 - Number and Standardised Incidence Ratio of Emergency Admissions for Patients Aged 65+

Financial Year	Observed Cases	Standardised Incidence Ratio	*95% Lower Confidence Interval*	*95% Upper Confidence Interval*
2004/05	191,876	100	100	100
2005/06	193,555	100	99	100
2006/07	203,277	104	103	104
2007/08	208,956	105	105	106
2008/09	216,378	108	107	108
2009/10	212,997	105	104	105

Source: ISD Scotland[53].

Figure 33 - Trend of Standardised Incidence Ratio of Patients Aged 65+ for All Emergency Admissions



Source: ISD Scotland[53].

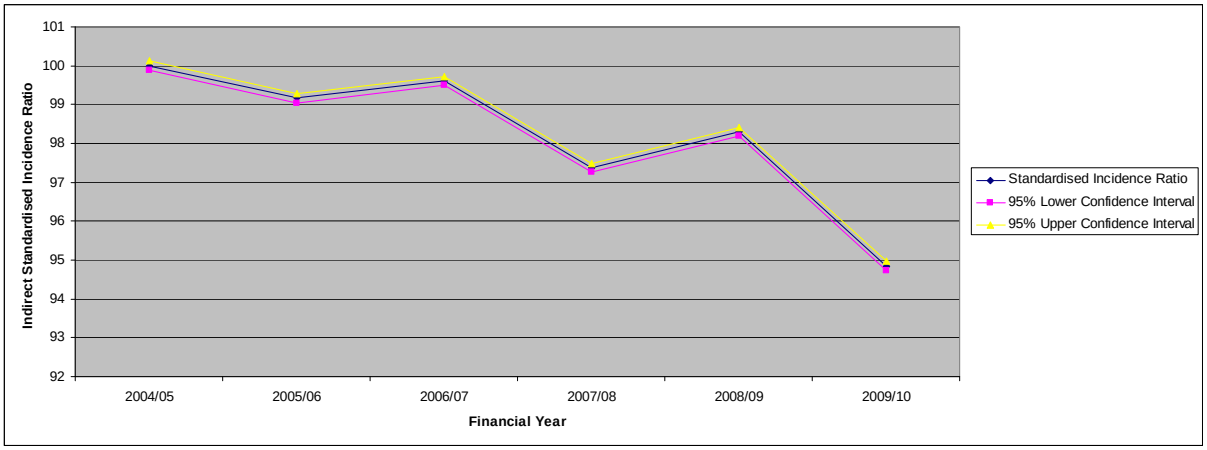
Thus, as observed, the trend is increasing reflecting the increase in demand from the 65+ population. Yet, when comparing the same data in terms of bed days (see figures 34 and 35), the trend is towards a decrease in bed days which might be explained by efficiencies developed.

Figure 34 - Bed days and Standardised Incidence Ratio of Emergency Admission Bed days for Patients Aged 65+ for All Emergency Admissions

Financial Year	Observed Bed days	Standardised Incidence Ratio	*95% Lower Confidence Interval*	*95% Upper Confidence Interval*
2004/05	2,811,417	100	100	100
2005/06	2,830,680	99	99	99
2006/07	2,885,852	100	99	100
2007/08	2,857,365	97	97	97
2008/09	2,920,479	98	98	98
2009/10	2,859,999	95	95	95

Source: ISD Scotland[53].

Figure 35 - Trend of Standardised Incidence Ratio of Bed days for Patients Aged 65+ for All Emergency Admissions



Source: ISD Scotland[53].

ANNEX III – QUALITY OUTCOMES FRAMEWORK (QOF) CLINICAL AND ORGANISATIONAL DOMAINS AND PAYMENTS.

QUALITY AND OUTCOMES FRAMEWORK 2011/12			
Total quality points	1,000		
Cardiovascular disease primary prevention	13	Depression	31
Secondary prevention of CHD	76	Chronic kidney disease	38
Heart failure	29	Atrial fibrillation	27
Stroke/TIA	22	Obesity	8
Hypertension	79	Learning disabilities	7
Diabetes	92	Smoking	60
COPD	30	Records and information	86
Epilepsy	14	Information for patients	2
Hypothyroid	7	Education and training	28
Cancer	11	Practice management	13.5
Palliative care	6	Medicines management	36
Mental health	40	Patient experience	33
Asthma	45	Additional services	43
Dementia	26	Quality and productivity	96.5
Quality offset for PMS practices is 102.9 point			

QUALITY PAYMENTS

List size adjustment: Quality payment is adjusted according to national average practice list sizes, known as the contractor population index (CPI). The 2011/12 CPI is as follows: in England, divide the registered patient list by 5,891. In Wales, divide it by 5,885, in Scotland, by 5,100 and in Northern Ireland, by 4,914.

ASPIRATION PAYMENT

The 2011/12 aspiration payment is based on 70% of the 2010/11 final quality score. Multiplying this by £130.51 (about €150 for 2011) for the annual figure and dividing by 12 for the monthly payment.

ADJUSTED DISEASE PREVALENCE FACTOR

Achievement payments in clinical domains are adjusted by an adjusted disease prevalence factor (ADPF) to reflect the practice's disease prevalence compared to the national average. From 1 April 2010, practices with low prevalence are not rounded up to the 5 per cent level in the national range

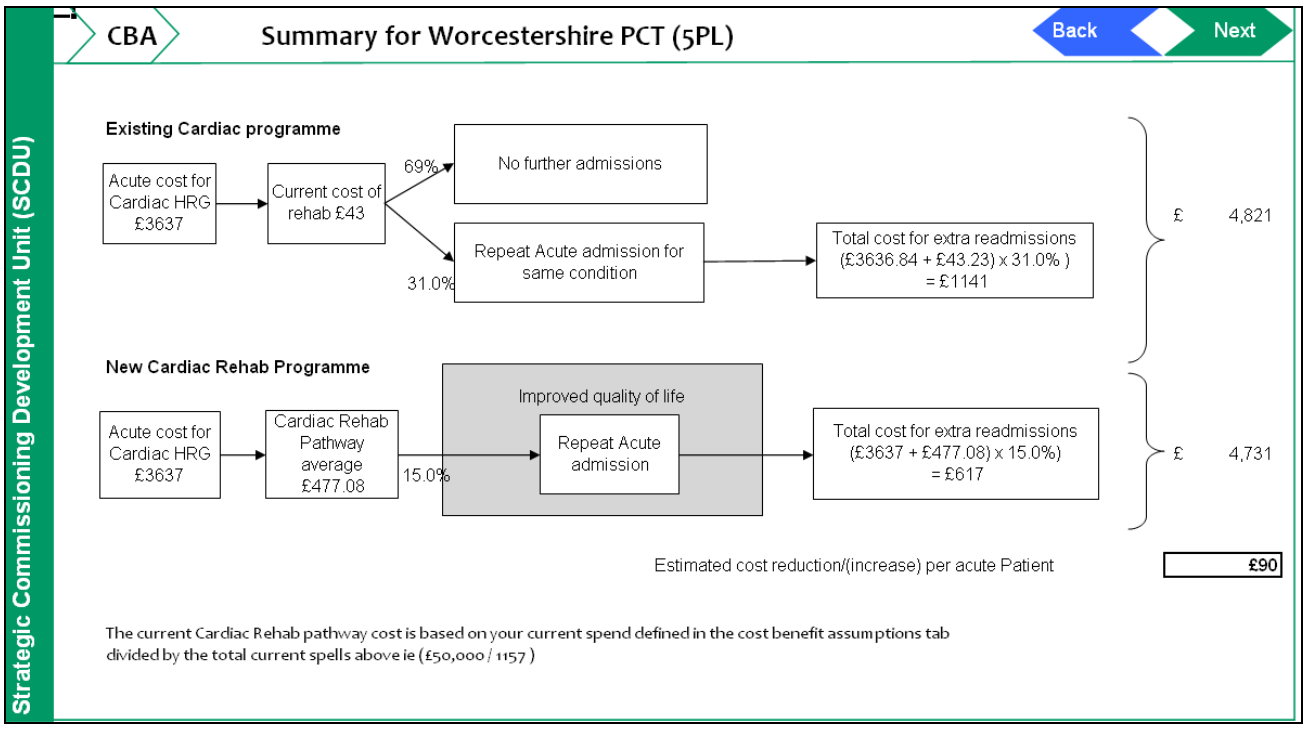
of practice disease prevalence. The value of quality points will be weighted according to true prevalence.

ACHIEVEMENT PAYMENT 2011/12

Automatically assessed on 31 March 2011 by the quality framework management and analysis system (QMAS or equivalent).

1. Clinical domain: £130.51 (about €150 for 2011) per point multiplied by relevant ADPF and by CPI.
2. All other domains: £130.51 (about €150 for 2011) per point multiplied by CPI.
3. Total achievement payment: adding the above amounts and deducting aspiration payment.

ANNEX IV – COST BENEFIT ANALYSIS FOR CARDIAC REHABILITATION IN ENGLAND



Source: SCDU, Department of Health. Available at: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/Browsable/DH_117504

ANNEX V – ASSESSMENT INSTRUMENTS TO CALCULATE EFFECTIVENESS IN THEMES 2 AND 3 FOR WSD EVALUATION

Scale	Items	Description
EQ-5D	6	Generic preference-based measure of health for use in economic evaluations of health care
ICECAP	5	Measure of quality of life for use in economic evaluation of health and social care interventions
ASCOT	2	Adult Social Care Outcomes Toolkit measure of social care related quality of life
Client Services Receipt Inventory (CSRI) user and carer schedule [4]	23 24	Measure of service use, patterns of support from families, living arrangements, receipt of benefits and employment status (where relevant).
Brief STAI	6	Measure of anxiety
CES-D 10	10	Measure of depression
UK SF12	12	Measure of health-related quality of life
HEIQ (selected sub-scales)	27	Measures of quality of health education programs
MLHFQ	20	Minnesota Living with Heart Failure Questionnaire measure of the effects of congestive heart failure on their lives
CRQ - Chronic Respiratory Questionnaire (adapted for study)	20	Chronic Respiratory Questionnaire measure of quality of life for patients with chronic lung disease
DHP- Diabetes Health Profile (with additional subscale developed for the study)	18	Measure of diabetes-specific quality of life
Generic Self-care Behaviours (developed for the study)	6	Measure of use of 6 recommended health scare behaviours
Self-care Behaviours Self Efficacy Scale (developed for the study)	6	Measure of confidence in performing self-care behaviours
EHFSCB – European Heart Failure Self Care Behaviours scale	12	Measure of behaviour that heart failure patients perform to maintain life, healthy functioning, and well-being
COPD-SCB (developed for the study)	24	Measure of COPD self-care behaviours

SDSCA - Summary of Diabetes Self-Care Activities Measure (adapted for study)	11	Measure of diabetes self-management
Generalized Self Efficacy Scale	10	Measure of optimistic self-beliefs to cope with a variety of difficult demands in life
Social Network Assessment Instrument	10	Measure for identification of types of social network
Acceptability of telehealth and telecare (developed for the study)	22	Measure of participants' beliefs and perceptions of telemonitoring equipment
Carer's confidence and anxiety (developed for the study)	13	Measure of carer's confidence and anxiety
Care-giver Strain Index	13	Measure of strain related to care provision
Illness Strain Index (developed for the study)	9	Measure of strain related to having a chronic illness - revision of Care-giver Strain Index for cared for person
Impact of Illness Scale	9	Measure of the degree that illness/problems interferes with key roles and responsibilities in daily living
Townsend Disability Scale	8	Measure of activities that assesses physical ability in social terms
Subjective Norms	4	Measure of social pressure to perform or not perform the target behaviour

Source: Bower et at, 2011 [37]

ANNEX VI – TELEHEALTH MAPPING IN ENGLAND

The table below represents an effort to map home-based remote telehealth monitoring in England. The work was originally carried out by Mark Clark, Co-project Lead, Whole System Demonstrator Action Network, UK. Details are available at: http://maps.google.co.uk/maps/ms?hl=en&ie=UTF8&msa=0&msid=100406857045032193451.00047bfad6341183c8523&ll=54.329338,-1.604004&spn=8.052625,18.676758&z=6
It also includes the 3 Major demonstrator sites and a further 12 in the Whole System Demonstrator action network

In addition, over 2500 telehealth items on the NHS PASA (NHS Purchasing and Supply Agency) framework were purchased. Unfortunately this agency closed its doors in May 2010, thus, tracking additional purchases since then is challenging. Moreover, given that the WSD involves 3,000 patients in telehealth, it is likely that additional purchases were made through other channels beyond NHS PASA.

Site	conditions	# of patients	technology	comments
NHS Barnsley	COPD and CHF. Diabetes is also planned	Aiming at 2,500. Total target population in Barnsley estimated at 60,000 patients	In 2008, Doc@Home by Docobo. In 2010, WSD site with Bosch telehealth plus	WSD, initially started with 250 patients with COPD and telecare being evaluated http://www.wsdactionnetwork.org.uk/news/wsdan_progress/the_telecare_and.html
NHS Bath and North East Somerset	CHF	n/a		evaluation report of the Telecare & **Telehealth** pilot was produced in December 2007
Bexley Care Trust	COPD and CHF	n/a	Tunstall group	Announced in 2010 - http://www.prohealthservicezone.com/Customisation/News/AssistedIndependent_Living/Telehealth/Bexley_Care_Trust_deploys_teleheath_system_to_manage_long_term_health_patients.asp
NHS Birmingham East and North	CHF, COPD, diabetes, chronic kidney disease, stroke, blood pressure or	Over 2,000 patients. phase 2 of the project seeks to extend the OwnHealth service to 27,000 users by 2012.	Pfizer Health Solutions who in turn, contracted NHS Direct to provide nurses	Own Health programme including video and telephone based system launched in 2006. More info available at: http://www.scielosp.org/scielo.php?pid=S0042-96862009001000006&script=sci_arttext&tlng=en Evaluation shows strong decrease in GP visits. Specialist visits, A&E and hospital admissions have also been decreased.
NHS Bolton	Diabetes and Blood pressure	Pilot with 17 patients		

Site	conditions	# of patients	technology	comments
NHS Bradford and Airedale	COPD and CHF	5,000 for COPD and 140 for CHF	Healthy Outlook	Heart Patient PDA system being used in Barnsley for around 40 people, with this being increased by a further 100 units. Healthy Outlook® is a service created by the Met Office in order to help people with COPD take control of their own health. It monitors environmental conditions and warn people when their health is likely to be affected, giving them the opportunity to take action to stay well. PCTs pay the Met Office to receive this service
NHS Brighton and Hove	COPD	6 patients over six months	Tunstall	Planned launch was for February 2009
NHS Bromley	COPD	10 patients and plans for 10 hospital units		Telehealth project for 10 service users with COPD (Chronic Obstructive Pulmonary Disorder) and further 10 units for hospital discharges (June 2009).
NHS Buckinghamshire	COPD CHF			Telehealth results show reductions in hospital admissions by 10%. Sheffield Pilot they used 30 high risk patients and calculated that based on a cost of £2000 per admission, saving 50 admissions a month could potentially save the PCT £1,200,000 a year. Buckinghamshire had in 2006/7 some 626 unscheduled admissions with 4712 bed days. From data collected earlier this year for levels of COPD within Buckinghamshire over the last 12 months by a consultant employed by Buckinghamshire NHS, it would appear there were 626 unscheduled admissions at an average cost of £1253 using 4712 bed days. As at June 2007 there were 4965 registered COPD patients within Buckinghamshire.
NHS Cambridgeshire	COPD, CHF, diabetes and stroke	n/a but mainstreaming	Tunstall Healthcare	As well as improving quality of life for people we save the Cambridgeshire heath and social care economy £2 million a year. The savings made in avoiding hospital, residential and respite care admissions outweigh the costs of the equipment provided. Twenty five per cent of technological devices loaned in 2006/07 are still being used today – which means fewer people are being institutionalised. Since we started in 2002 we've supported over 3,000 people, with evermore complex cases being referred to the service
NHS Camden	COPD, CHF, diabetes	n/a (they are community pods – it is difficult to assess	Telehealth Solutions' SurgeryPod and PharmacyPod	They are community pods in pharmacies and GP practices
Central and Eastern Cheshire PCT	COPD, CHF, diabetes	200	Genesis machine	Patients in shelter housing
NHS Central Lancashire	COPD	40	Intel Health Guide (distributed by GE healthcare)	The pilot started in June 2010 and is planned for 12 months

Site	conditions	# of patients	technology	comments
NHS City and Hackney	COPD	25 (aiming at 200)	Docobo	Choose Independence Ltd (CI) supporting the service (not providing the technology)
NHS Cornwall and Isles of Scilly	COPD, HF and diabetes		Tunstall Healthcare to supply 1600 telehealth patient systems	WSD site (see details in main document) RCT = 1400 people signed up to the project and over 700 installs complete across telecare and telehealth work streams. 520 patients with long-term conditions are receiving care and support via telehealth monitoring, and telecare is helping 518 clients to remain safe and independent in their homes. In April 2010, they decided to mainstream
County Durham PCT	COPD	12		Telehealth pilot was conducted for 12 patients with long term conditions. Evaluation has demonstrated a 16% reduction in GP consultations, a 26% reduction in District Nurse visits and a 38% reduction in hospital bed days during the pilot period. The majority of patients found the system offered reassurance and improved their quality of life.
NHS Cumbria	COPD and HF	33 to COPD patients and 7 to HF patients	Tunstall	The 6 months- pilot demonstrated decreased admissions in six patients (20% of the patient cohort) and this fell below what has bee achieved in other areas. This was due to the majority of the selected patients being stable already having a high degree of clinical input. However, since it has already taken more than a year to plan and initiate this project, the Stakeholder Board decided not to widen the scope to include other areas. There was insufficient data gathered to properly evaluate THM owing to the short trial period, the slow roll out of the units and various other factors contributed to this, as outlined in this report; however, telehealth has been used to successfully reduce admissions in other areas (where pilot projects have lasted longer and had greater support) The cost of the project has been £125/ month incorporating installation of equipment at patient's homes, monitoring staff and project management. There is scope to reduce this to £39/ month in the future if installation and monitoring is carried out by clinicians. The potential cost savings in Carlisle and Eden have been extrapolated from savings achieved in South East Essex (see Section 4.2 of report available) and this shows that a total annual saving of more than £400,000 might be achieved.
NHS Darlington	COPD and HF	20		Two Telehealth pilots (20 people) were commenced during Autumn 2008. The pilots focus on patients diagnosed with Chronic Obstructive Pulmonary Disorder (COPD), Heart Failure and Angina
NHS East Lancashire	COPD and HF			Telehealth pilot for heart conditions or chronic lung or breathing complaints (
NHS East Riding of Yorkshire	COPD/HF/Diabetes	9	Selected for high NHS use	WSDAN member site During the six months prior to the installation of Telehealth, the nine patients in the pilot had a combined total of 30 hospital admissions. In the six months following installation, there were just six admissions.

Site	conditions	# of patients	technology	comments
NHS East Sussex Downs and Weald	COPD and HF			system which allows results of checks to be transmitted electronically down a telephone line to a specially trained nurse monitoring from their computer.
NHS Eastern and Coastal Kent	COPD/HF/Diabetes	250 patients during 2005-2007 + 1,000 telecare WSD – 2,013 participants and aiming at 3,383 for the whole trial		WSD site (see details in main document). They have also decided to mainstream
Gateshead PCT	COPD/HF/Diabetes			a pilot Telehealth Project is to be undertaken in the summer of 2008 in partnership with Gateshead Primary Care Trust, funded initially by the Preventative Technology Grant. Once the outcomes of the pilot has been evaluated, they aim to expand the service and identify mainstream funding through the Primary Care Trust.
NHS Gloucestershire	COPD/HF		Tunstall HF and docobo COPD	Heart Failure (HF) Service – 60 monitors bought / 72 patients since Nov 2008 Chronic Obstructive Pulmonary Disease (COPD) Team – 12 monitors bought /15 patients since Jan 2009 Each admission costs: – HF - £2,700 – COPD - £2,300 Follow Up Out Patients Appointments: – HF - £80 – COPD - £99
NHS Great Yarmouth and Waveney	COPD/HF	COPD – 18 patients HF - 13		Project evaluated
NHS Greenwich	COPD	12	Tunstall	Telehealth project (12 patients). Evaluation concluded a 25% reduction in hospital admissions
NHS Halton and St Helens	COPD/HF	60	Tunstall Healthcare	140,400 £
NHS Hammersmit	Health promotion	165,000 patients	iPLATO Patient Care Messaging service	large scale telehealth services involving 90% of the practices for a 2-month period mhealth

Site	conditions	# of patients	technology	comments
h and Fulham	encouraging healthy health style	In 26 doctor's surgeries		
NHS Hull				£500,000 + The University of Hull has recently committed over almost £1m. to taking identified health expertise closer to local business and community. The delivery of pilot and demonstration projects with a range of external partners and funders. These include The EU funded HeartCycle project led by Philips. Stream is involved in a DC10 Digital Switchover workstream funded independent living pilot in Birmingham and the development of a next generation connectivity infrastructure project in Manchester (with Stream based approaches to independent living support being one of the types of services that could be delivered over the infrastructure). Stream is also part of two BIS Technology Strategy Board's Assisted Living Programme funded projects - one is with telehealth provider Docobo and one with a consortium. See main document for further details
NHS Knowsley	HF/COPD	9 PATIENTS	TUNSTALL and additional 9 patient trial with docobo for technology comparison	
NHS Leeds	COPD	43	Tunstall	WSDAN site 18 month pilot with the intention of extending the pilot for use with chronic heart failure patients. This project will be assisted by Leeds Teaching Hospitals as part of a RCT. More info available at http://www.Tunstall.co.uk/assets/literature/Telehealth%20Management%20of%20COPD%20-%20NHS%20Leeds.pdf
Leicestershire	COPD	40	Docobo	City of Leicester WSDAN site intention Run by University Hospitals of Leicester NHS Trust. results of the 12-month pilot study calculated that it has saved "around 144 unnecessary hospital admissions, potentially saving the trust around £259,000 over the course of a year." After the results the site did not expand its telehealth activities. There were plans for commissioning a 360-patient pilot scheme in 2009/10 to test the potential benefits that could be achieved from wider application.
NHS Lincolnshire	COPD and HF			WSDAN site In 2010 £2m telecare and telehealth programme was announced and is currently being implemented In addition to a history of innovation in the telecare field, Lincolnshire is seeking to gain funding for a technology-assisted medication compliance project to assist people to manage their medication; coordinate their medication reviews; and reduce medication wastage. Lincolnshire PCT also has a small scale telehealth pilot.

Site	conditions	# of patients	technology	comments
NHS Medway	COPD and HF	10	Tunstall	The cost of emergency admissions for 2005 - 2006 was approximately £1.7m and will continue to rise in the future. Medway PCT invested £50,000 to establish the service with Medway Council Control Centre hosting the central station and supporting the installation and monitoring of the equipment. The telehealth service is now mainstreamed in Medway with 10 telehealth units and findings so far, in terms of clinical, psychological and financial benefits, have been very encouraging. Projected cost savings are over £300,000 and this will increase considerably as more patients and healthcare services are included.
NHS Milton Keynes	COPD	Initially 10 monitors for COPD in 2006	Tunstall for both telehealtha nd telecare	Telecare: Preventive technology Grant (PTG) funding for Milton Keynes was: - 2006/2007 - £ 95,000 - 2007/2009 - £ 160,000
NHS Newham	diabetes, heart failure and/or COPD	Around 2,000 local people are taking part and have the opportunity of using either the TeleCare or TeleHealth systems in their homes.	Philips Motiva system for telehealth and Tunstall is the main provider for telecare 9otehr monitors are from GE	WSD site WSD site (see details in main document)
NHS Norfolk	COPD and HF	152	Partnership with Telemedcare and Barchester Healthcare Group	Telehealth project with Greater Yarmouth and Waveney WSDAN Site A Independent evaluation of the AT service, with 152 users, confirmed a positive impact on people's safety, security and quality of life: 10.5 per cent of people reported avoiding hospitalization, 38 per cent delayed or avoided residential or nursing care, and 28 per cent experienced postponement, avoidance or reduction in domiciliary/ homecare packages Telecare: 25,000 homes linked to Community Alarm systems. In 2008, 4,000 homes were assessed and people supported with stand alone Telecare solutions Awards: • Health and Social Care awards - Regional winner 2008 (Innovative Health and Social Care Technology Award) • E-Health insider Award 2009 - Winner of Category: Best use of Telecare and Telehealth
NHS North East Essex	COPD and HF	40	Tunstall Healthcare	In April 2009 this pilot was launched to run for 1 year. Results showed that the average number of GP visits made by patients had reduced by 66%,

Site	conditions	# of patients	technology	comments
				the average number of patient hospital attendances or 999 callouts had reduced by 44% and the average number of home visits required had dropped by 19%. They are considering extending telehealth to 100 patients during 2010
NHS North Yorkshire and York	COPD and HF	100 2,100	Tunstall Healthcare	The first Telehealthcare phase launched in September 2009 involved 100 units. The roll-out was planned to start in October and continue throughout the next 12 months with 2,000 units, spending around £3.2m on the new systems (see details in main document)
NHS Nottingham City	COPD and HF		Tunstall	This site will mainstream the use of telehealth through the deployment of monitors to around 800 people every year with long-term conditions such as COPD and congestive heart failure. This follows a successful 12-month pilot in 2007, which saw a reduction in hospital admissions, GP visits and matron and community nurse home visits, enabling primary and secondary care teams in Nottingham to make the best possible use of healthcare resources. A local randomised controlled trial has been established to evaluate impact. telehealth Pilot in 2007 with 10 units. • Mainstreaming in 2008 - 300 units. • RCT in 2009 - 250 units.
NHS Salford	COPD			Small pilots took place in 2008. a budget estimate for full implementation for COPD forecasted a budget of £400k
NHS Sheffield	COPD		Tunstall healthcare	During a recent pilot, home visits by community COPD nurses were reduced by an astonishing 80%, cutting travel costs and enabling healthcare staff to prioritise their workload, which ensured the most effective use of their time. This innovative approach saw COPD-related hospital admissions dramatically decrease by 50%, saving the PCT £30,000 to £40,000 on a small number of patients and allowing them to purchase more monitors, to further expand the use of telehealth for the management of long-term conditions.
NHS South East Essex	COPD	80	docobo	Evaluation results on Utilisation of health services for patients on the pilot changed dramatically; the pilot group produced the following results: 11.8% reduction in the length of Community Matron face to face visits 75% reduction in A&E visits 83% reduction in hospital admissions 72% reduction in 999 calls 56% reduction in GP visits
NHS South Gloucestershire	CHF	110	Tunstall Healthcare	funded by a technology grant from the council together with three years project support from Takeda UK Ltd.

Site	conditions	# of patients	technology	comments
NHS Southampton City	COPD CHF and diabetes		Diabetes: T+ medical mhealth tool with any operator COPD and CHF: Docobo:	WSDAN site This site is running telehealth systems in COPD and CHD as part of ALIP1 - an EU project. A diabetes project is seeking to enable improved monitoring of clients condition to prevent admissions. The site is also part of the PEACE project seeking to develop inter-operability between telehealth and telecare systems with out of hours and community alarm systems. The PEACE project is funded by the Assisted Living Innovation Platform (ALIP). Source: http://www.telecare.org.uk/files/48292/FileName/WC07ChrisWebb.pdf
NHS Stockton on Tees	COPD		Tunstall	Small project in 2009
Sunderland PCT	COPD CHF and diabetes	61 patients	Tunstall	51 units http://www.sunderland.gov.uk/CHttpHandler.ashx?id=9281&p=0. last news is from 2009
NHS Surrey	n/a	n/a	docobo	Project in 2006 – findings resulted in One typical admission in North Surrey costs £15K
NHS Swindon	COPD and diabetes		Tunstall	Target at 250 after pilot in 2007
NHS Telford and Wrekin	COPD			a six month project commenced at the end of April 2010
NHS Wakefield District	CHF		Intel & BT	pilot
NHS Walsall	COPD CHF and diabetes	266 patients + 150	Tunstall =COPD T+ = diabetes Ownhealth: CHF and diabetes	Three pilots: (i) COPD Tunstall Telehealth Project This project is a collaboration of NHS Walsall, the Council and Tunstall. The project was launched in December 2007 but started in January 2008, achieving reduction in hospital admissions, detection in trends in vital signs, support community matrons in their case load, avoiding hospital admissions; reduce risk of our hospitals going onto level 4 alerts, give patients self confidence in their own homes and deliver support and care in the patients preferred place of care. (ii) OwnHealth Telehealth Selfcare Project Walsall Own Health is a partnership service between NHS Walsall, NHS Direct and Pfizer Health Solutions to support people living with long term conditions such as diabetes, cardiovascular disease (CVD) and heart failure. This project started in April 2008 and currently has 266 patients enrolled onto the project. There is however capacity for 400 (iii) T Plus Medical Telehealth Project This project is collaboration between Walsall NHS and T + Medical diabetes project. A selected group of diabetic patients enter data such as blood glucose through a secure line onto their

Site	conditions	# of patients	technology	comments
				mobile phones. NHS Walsall has brought 150 licences of which 3 are active. This project started around October 2007 and is in its second year of activity.
NHS Wandsworth	CHF and COPD	127 patients	Tunstall for COPD	WtPCT have allocated £30K from their own resources for additional 13 units for telehealth for use by respiratory nurses and community matrons on top of the pilot that was carried out for CHF Total set-up costs for 4 x CVW (community virtual ward) for 1 year = £600,000 Ongoing costs per CVW (GP, ward clerk, IT, admin) = £130,000 per year
NHS West Kent				WSD site (see main document for further details)
NHS Western Cheshire	COPD, diabetes and CHF	20 units	Tunstall	
NHS Wiltshire	COPD pilot		Tunstall	Pilot announced in September 2010
NHS Wirral		20 units		Pilot in 2007
NHS Wolverhampton	COPD	40 units		The pilot, funded by central government's Preventative Technology Grant, tested the feasibility of introducing telehealth across the city by setting up 40 health monitors and providing training. They also piloted the pill dispenser

ANNEX VII – TELECARE MAPPING IN ENGLAND

This section covers charging information from a wide range of telecare service providers in England. There are different service models - service provision is either subcontracted or run directly by the council who purchases the technology or run by an organisation in the form of an NGO operated by the council involving in some cases other NGOs (i.e.: AgeConcern). Others are run by the so-called 'social landlords' or housing associations (= property management organisations offering housing services often on a non-for-profit basis – i.e.: Severnside Housing or Aragon Housing Association or cirrus). There are also companies offering integrated telecare solutions such as Invicta, Orbit services or Astraline. In other cases, services are offered by a neighbouring council.

Thus, entries cover local authorities, housing organisations, independent and commercial providers. In most cases, services are accredited by the Telecare Service Association (TSA). In addition, the audit officers inspect every aspect of our service to ensure the quality of the service

Information for users: in addition to the local council information, there are broader sites such as www.housingcare.org (nationwide) especialised in housing information for older people including telecare services or http://www.londontelecare.com/, focusing on telecare services across greater London.

Extracts on charging were obtained during the period September to December 2010 from public web sites which are also listed.

It is a good idea to check the context of the charging information by looking at the web site – there may also be changes from time to time. There may be variations relating to eligibility, financial assessment, Supporting People, housing service charges, benefits and VAT.

Weekly charges range from 'free' to over £40 if sophisticated sets were to be acquired.

This mapping exercise was originally carried out by Mark Clark, Co-project Lead, Whole System Demonstrator Action Network, UK. Details are available at:

http://maps.google.co.uk/maps/ms?hl=en&ie=UTF8&msa=0&msid=100406857045032193451.0004540c223f16f2d1c9d&ll=52.842595,-1.867676&spn=8.339986,18.676758&z=6

Location	Service providers	Charges and additional comments
Ormskirk, Lancashire		all retirement properties (1,200 properties) are connected to Home Care Link Control Centre 24 hours a day, 365 days a year, through pull cords in the lounge/kitchen, bathroom and bedroom Charging - no information available
Manchester, Greater Manchester M60 2LY		AIM is an Alarm Receiving Centre servicing the requirements of the UK's independent security installers.
Preston, Lancashire PR2 2YB		Places for People At Home Solutions: home hub and wireless emergency button from 75p a day. The Mobile Emergency Locator works by pressing an emergency button. Once activated, this clever device is able to tell the call centre exactly where the user is. Available to buy at £199, the Locator operates by using a SIM card of your choice.
Rochdale OL16		The charge is currently £24 per week

Location	Service providers	Charges and additional comments
Accrington BB5	Hyndburn Homes Limited	Charge from 50 pence a day
Preston, Lancashire PR1 8UY	Community Gateway Association (CGA)	Charge from 37 pence per day
Congleton, Cheshire CW12 1DT	Neighbourhood investor/Plus Dane Group	small weekly charge for a Community Alarm
Penrith, Cumbria CA11 7YE	Eden Community Alarms	
Stockport, Cheshire SK1 1NZ	Carecall	There is an initial installation charge of £25.60 and then a weekly charge of £5.07
Saint Helens, St. Helens WA10 1HF	carline	n/a
Poole, Dorset BH15 2RU	Poole Lifeline	Lifeline Hire with Monitoring Service costs £3.28 per week which is payable quarterly - £42.64 + VAT where applicable. Lifeline Hire with Mobile Service costs £5.13 per week which is payable quarterly - £66.69 + VAT where applicable. Short-term Lifeline Mobile Service for existing Monitoring clients costs £15.00 + a £60.00 charge for any call-outs. Short-term Lifeline Mobile Service for new clients costs £30.00 + a £60.00 charge for any call-outs.
Allerdale, Cumbria	Aid-Call is a personal SOS system provided by Age Concern	Age Concern's Personal Alarm Service has been operating for 30 years. We are a national network looking after over 40,000 satisfied customers who gain peace of mind and the freedom to live in their own homes 24 hours a day, 7 days a week, 365 days a year. The lowest charge is an initial fee of £49 plus £41.05 per quarter
Barrow, Cumbria	Homelink,	
Blackburn with Darwin Community Alarms	Lifeline (operated by Twin Valley Homes) and Aid-call operated by Age-concern	
Blackpool, Lancashire	Vitaline	up to £7 plus VAT
Bolton, Lancashire	careline	From £13.62 per month
Barnsley	CENTRALCall	4,700 users The cost to the service user ranges from an extra 50p per week to an extra £1 per week on top of the existing £3 charge for our service
Adur, West Sussex		£4.10 per week
Amber Valley Housing	Amber Valley Housing Ltd Lifeline and Carelink Service	n/a
Arun, Bognor Regis, West Sussex	Arun Lifeline	

Location	Service providers	Charges and additional comments
Ashford Telecare	Ashford Telecare (Lifeline)	no charging for first month then from £39.07 per quarter (Sept 2010)
Aylesbury, Buckinghamshire	Aylesbury Vale Lifeline Emergency Alarm Services	Charging - small monthly rental - not specified
Barking, greater London	Barking and Dagenham careline and telecare	Charges - Careline £3.79 per week - Telecare is provided free of charge as long as your assessment has shown you need it (Sept 2010)
Barnet, London	Barnet Assist -This service run by Barnet Homes. n addition to the Assist service, Telecare equipment is also available. This is similar to the use of alarms, but with more complex equipment such as bed exit monitors and flood detectors.	Charging - All Telecare equipment is given out on a loan basis at no charge. However, there is usually a charge for the call centre service, depending on your financial circumstances.
Basildon, Essex	Basildon Careline. Technology provided by Tunstall	
Bath and North East Somerset	Bath and North East Somerset Community Alarm and Telecare Services	Installation charge- £30.00 Hire and monitoring - £3.60 per week Payment is in advance and charged quarterly which equates to £46.80. If an alarm user is on certain means tested benefits we may be able to apply for a grant that pays for the alarm unit and the installation. The charge would then be £2.55 per week for the monitoring the service.
bedford	Aragon Housing Association in association with Tunstall	Charges: n/a
Bexleyheath, London	Bexley emergency link line (Bell)	Charges: n/a
Birmingham	Birmingham Telecare	Charging for careline - £1.76 per week
Bracknell Forest	Forestcare lifeline Alarms	complex menu of charges the simplest is 3.55 or 4.17 per week depending on location
Braintree, Essex	Carecall	Charges: n/a
Bradford	Careline	Charges: n/a
Brent, London		Initial amount of £175 - which then gives a reduce weekly charge of £1.60 or pay the full weekly rate of £3.55
Brighton	CareLink Plus Alarm Service	Alarm unit and pendant with a minimum of two keyholders (standard) = £3 per week
Bristol	Bristol Lifeline Personal Alarms and Careline	£45.50 per quarter (13 week period). This charge covers providing the alarm equipment, pendant, 24 hour cover by our emergency control centre and all maintenance. There is a one off installation charge of £25 (Sept 2010)

Location	Service providers	Charges and additional comments
Bromley, London	Bromley CareLink Community Alarm Scheme	the Monitoring Service costs £3.72 per week with a call out charge of £71.96 the full Mobile Responsive Service costs £7.18 per week.
Bromsgrove, Worcestershire	Bromsgrove Lifeline	Charge: One-Off Installation Fee: £21.57 Hire of Equipment (inc maintenance) =£1.74 per week cover) Monitoring Charge (per person) = £1.39 per week Total = £3.13 per week
Bury, Lancashire	Bury Carelink: emergency alarms and telecare equipment	Emergency alarms = a maximum weekly charge of £3.35 for the service.
Cambridgeshire	Cambridgeshire Emergency Alarms includes: Cambridge City: Community Alarm service operated by Independent Living Servces South Cambridgeshire: Community Lifelines Officer Huntingdonshire: service operated by Huntingdonshire Housing Partnership (HHP) Community Alarm Scheme Fenland: service operated by Cross Keys Homes, Peterborough, via their Lifeline Hot Desk East Cambridgeshire: Hereward Housing Association for residents of East Cambridgeshire (not only Hereward tenants.) Technology providers: Tunstall and easylinkUK	Alarms can be rented at less than £5 per week
Camden, London	Camden Care Line Community Alarm Service	Charging - up to £4.60 per week
Canterbury, Kent	Canterbury Lifeline	The service, including rental of the lifeline and pendant breaks down to approximately £2.75 a week (Excluding VAT). There are no installation costs.
Cornwall	Cornwall Council including Tremorvah Industries	WSD site

Location	Service providers	Charges and additional comments
Loughborough, Leicestershire	Charnwood Lifeline	Installation Charge one off payment of £30.00 Monitoring charge: £50.00 A quarter plus VAT
Chelmsford, Essex	Chlemsford Careline Service provided by Chelmer Housing Partnership	
Cheltenham, Gloucestershire	Cheltenham Lifeline	Charging - £2.99 per week (+ VAT if applicable)
Chester, Cheshire	Chestercare Telecare Service	Charge n/a
Chesterfield, Derbyshire	Chesterfield Telecare And Tunstall equipment	
Chichester, West Sussex	Chichester Community Careline	Established in 1987 and offered service to over 1 million people since then. Charge: There is a small weekly fee for the service
Coventry, West Midlands	Coventry Careline Community Alarm Services	there are two options: • Option 1 - Purchased Unit. One off fee of £120 to purchase the unit. £1.49 per week for monitoring. • Option 2 - Private Rental Unit. £3.77 per week. (Customers who have a social worker can be referred by social services at a discounted rate.)
Croydon, London	Croydon Careline Service	The current weekly or quarterly costs are shown below: Options: Weekly charge (W) and Quarterly Charge (Q) Telephone monitoring and response: £5.71W; £74.23Q Telephone monitoring and response (if in receipt of Pension Credit or Income Support): £3.11W; £40.43 Q Additional pendant: £0.72p (W); £9.36 (Q) One off installation charge (for new installations only): £27.72
Carlisle, Cumbria	Service providers: County Careline Cumbria County Council Adult Social Care Eden Community Alarms Eden Housing Association Riverside South Lakes Housing Tunstall Group Limited	There are two parts to the cost of Telecare: 1. The cost of the Telecare equipment, its installation and maintenance - this is provided free of charge to you. This cost is met by Adult Social Care as the Telecare equipment is provided to you on a loan basis and remains the property of the council. 2. The weekly service charge for the call handling centre and the mobile response service (if this is available in the area you live). This charge varies but is around £9 per week. You may be asked to contribute to this cost.
Dacorum, Hertfordshire	Dacorum Lifeline - Community Alarm System	Charging - up to £1.06 per week

Location	Service providers	Charges and additional comments
Darlington	Darlington Lifeline Service	Charging - up to £4.57 per week. However, this sum could be reduced to £1.60 depending on user financial circumstances.
Derbyshire	Derbyshire Telecare	Charging - up to £5 per week
Devon	Devon Telecare & Tunstall	Free of charge after assessment
Doncaster	Doncaster Community Alarm Service	There is a small weekly charge of £2.37 for the monitoring service. There is no charge for the equipment or installation. In some circumstances users can be financially assessed for the service
Dorset	Dorset Telecare and Community Alarm Services	Charging - up to £3.95 per week
Dudley	Dudley Telecare	Charging - from £11 per month
Durham	Durham Telecare Care Connect - Community Alarm Service	there is a charge of £3.80 per week + VAT (but no VAT is chargeable if a VAT Exemption form is completed). the service may be received free of charge if the user is under means tested benefits:
Ealing, London	Ealing Careline	Charging - up to £68.25 per quarter
East Devon	East Devon Home Safeguard	Charging- £3.17 per week
East Sussex	East Sussex Telecare	Charge: means tested
Eastbourne, East Sussex	Wealden and Eastbourne Lifeline (WEL)	Charging- from £3.50 per week Fitted as one off installation £35
Hailsham, East Sussex	Wealden and Eastbourne Lifeline (WEL)	Charging- from £3.50 per week Fitted as one off installation £35
Esher, Surrey	Elmbridge Telecare	£3.80 per week or £49.40 quarterly.
Epping, Essex	Epping Forest Care Alarm System	Costs for the joint funded scheme are: Lifeline unit and up to four sensors £95.30 per annum Lifeline unit and five sensors or more £219.00 per annum Private scheme Lifeline unit with pendant £179.50 per annum Additional pendants £40.30 per annum Control Monitoring (per speech module) £95.35 per annum
Forest of Dean, Gloucestershire	Forest of Dean Linkline	Charging - from £2.80 per week
Gateshead	Gateshead Care Call	Gateshead Care Call provides emergency cover to more than 11,000 connections
Gloucestershire	Gloucestershire Telecare	Charge: fee of charge after means-testing. For those people who do not meet the County Council Fair Access to Care Criteria to receive the Telecare System free of charge but feel that they would benefit from the system they can contact their local Careline/Linkline who will be able to provide details of how to hire/buy the equipment.

Location	Service providers	Charges and additional comments
Guildford, Surrey	Guildford Telehealth and Telecare Services Community Alarms	Charging- from £55.25 per quarter
Hackney, London	Hackney Community Alarm Service	No charging information
halton	Halton Telecare	The cost is now rolled out on three different levels. • Level one community alarm with pendent and smoke alarm. • Level two as above with two further environmental sensors i.e., heat sensor, floor sensor etc. • Level three level one plus more than two above and or some lifestyle monitoring i.e. bed/chair sensor, property exit sensor, falls sensor etc.
Hammersmith, London	Careline and telecare	There are no charges for the alarm equipment There is no installation fee. There is a monthly charge for the gold and the silver service and in some cases the service is free of charge.
Hampshire	Hampshire Telecare	Charge details n/a
Market Harborough, Leicestershire	Harborough Careline	Charging - from £2.21 per week
Haringey, London	Haringey Safe and Sound Community Alarms	Charge details n/a
Harlow, Essex	Harlow Careline	Charge details n/a
Hart - Sentinel Communicare, Hampshire	Hart - Sentinel Communicare	established in 1986
Hereford, County of Herefordshire	Herefordshire Telecare	Charging- currently no charge
Hillingdon, London	Hillingdon Careline	Charging- £4.91 plus VAT
Horsham, West Sussex	Horsham Community Link	Charging - £3.60 per week
Huntingdon, Cambridgeshire	Huntingdonshire Community Alarms	Charging - from £4.34 per week
Isle of Wight	Wightcare Lifeline	Charging - no detailed information
Kensington, London	RBKC Community Alarm	By the end of 2005 90 per cent of the community alarm service clients living on their own were able to use alarm systems in their home with the capacity to take on telecare products
Kingston, London	Kingston Careline	Charging - no detailed information
Kirklees	Kirklees Carephone	Charging- £3.55 per week

Location	Service providers	Charges and additional comments
Lambeth, London	Lambeth Careline	There is a small monthly charge. This includes: • equipment rental • installation and maintenance • 24-hour monitoring and emergency response
Lancaster, Lancashire	Lancaster Lifeline Connect	Charging - from £3.48 per week
Leeds	Leeds Care Ring Emergency Alarm Call Service	Charging - The Care Ring emergency alarm call service is free of charge
Leicester	LeicesterCare	Charging - £2.58 per week
Leicestershire	Services: Charnwood Lifeline Control Centre Hinckley and Bosworth - Customer Services Melton Lifeline Harborough - Lifeline Call Centre (24hrs) North West Leics -Customer Services Oadby and Wigston - Customer Services Blaby - Lifeline Services	
Lewisham, London	Lewisham Linkline	The current Telecare charges are: • mobile response £5.12 per week • telephone on response £3.22 there are no charges for equipment
Lincoln	Lincoln Community Alarm Service	Starter Pack (includes dispersed alarm unit, pendant, registration and installation) equipment: Rental: ☐Quarterly Statement £43.50 ☐Half Year Statement £87.00 ☐Yearly Statement £174.00 Purchase: ☐ Starter Pack £205 Yearly Connection Charge to the Control Centre £43.00 All prices are VAT exclusive
Lincolnshire	Lincolnshire Telecare	Charging up to £3 per week
Liverpool	Liverpool Telecare	Charging - no current charges for telecare
Luton, Bedfordshire	Luton Telelink Care Service	Charging - £2.73 per week

Location	Service providers	Charges and additional comments
Manchester	Manchester Community Alarm	If individuals receive housing benefit, income support, guaranteed pension credit or full council tax rebate then the response and monitoring service will be free to Manchester residents. If residents are receiving no benefits the charge for the alarm, response and monitoring service will be charged at £18.46 per month.
Medway	Medway Lifeline	Charging - £4.51 per week
Merton	Merton Mascot Telecare	Charging - up to £32.90 per month
Milton Keynes	Milton Keynes Community Alarm and Telecare	The charge for Telecare Solutions is £1.50 plus VAT per week, in addition to the cost of the user's Community Alarm. However, this charge covers individuals for an unlimited number of sensors, so no matter how many sensors the user requires the price will stay at £1.50.
Mole Valley, Surrey	Mole Valley Community Alarm and Telecare Services	There is an all-inclusive charge for the service, which provides: • The Telecare equipment • Free installation and maintenance • 24 hours support by the Care Centre As a guide, the charge for the basic package of an alarm unit and pendant is £4.00 per week.
Newcastle Upon Tyne	Your Homes Newcastle Community Alarm	Charging - Free (85 and over) to £8.55 per week
Newcastle-under-Lyme	Aspire Housing Care Call	Charging – n/a
Newham, London	Newham Network Telecare Services	WSD site – see main document
Norwich, Norfolk	Norwich Community Alarm Service	Charging- £32.76 per quarter plus VAT
Hitchin, Hertfordshire	North Herts Careline Community Alarm Service Tunstall is one of the main technology providers	Charge is needs and means assessed
North East Lincolnshire	North East Lincs Careline	Charging from free to £12 per month
North Kesteven	North East Lincolnshire Carelink	Charging: - installation = £25 - Monitoring charge = £72 yearly - equipment: o rent: £12/month o purchase: £72 - £180
North Lincs	North Lincs Emergency Alarm Call System	Charge – n/a
North Norfolk	North Norfolk Careline	Rental £2.72 per week. Connection charge £25.00/annually
Weston-super-mare	North Somerset Carelink	Charging for Carelink - £4.08 per week

Location	Service providers	Charges and additional comments
North Tyneside	North Tyneside Care Call	Charging - £3.83 per week
North Warwickshire	BoroughCare 24 hour Community Alarm Service	Charging - no detailed information
Northampton	Northampton Lifeline	Charging - £4.25 per week
Northumberland	Northumberland County Council Valley Care service	Free of charge for 85+ as part of a 1-year trial
Peterborough	Service provided by Cross Keys Homes	From £4.20 a week or £150 for the first year.
Portsmouth	Telecare community alarms Portsmouth City Council	Free installation and small weekly charge
Reading, Berkshire	Reading Community Alarms and Telecare with Tunstall technology	There is no charge for Telecare equipment. For monitored service to work the cost is a few pounds a week.
Redbridge, London	Redbridge Lifeline	Free installation and small weekly charge
Richmond	Richmond Careline	Charging - £46.77 per quarter
Rochdale, Lancashire	Rochdale Careline	Charges: start from £1 per week
Battle, East Sussex	Casa Lifeline	Casa Lifeline operates across Kent and East Sussex providing service for over 7,000 customers. Charges: n/a
Rugby, Warwickshire	Rugby Community Alarm Services	Charging: means tested. Specific details n/a
Runnymede, Surrey	Runnymede Careline	The cost of this system is 4.40 per week for the basic alarm unit plus an additional charge for Telecare equipment.
Oakham, Leicestershire	Community Alarm Services in Rutland	Charging - no detailed information
Salford, Lancashire	Salford Care On Call	Charging: means tested. Specific details n/a
Wiltshire	CareConnect	By 2010, Careconnect offered telecare services to 3,800 people within Wiltshire including salisbury
Sandwell	Telecare Assisting You (STAY)	There is a nominal weekly charge made by the alarm response centre to cover the cost of the rental of the alarm and 24/7 monitoring.
Southport	Sefton Lifeline	Charging - no detailed information
Sheffield	City Wide Care Alarms	"Sheffield city council Corporate plan 2010 – 2013" - We will provide adaptations to around 900 homes during the year. The City Wide Care Alarms monitoring and response service is £3.95 per week. (Any alarm calls made will use your phone line, therefore there will be the additional cost of the phone call each time the alarm is used).
Shepway, Kent	Shepway Lifeline	Charging- base unit £2.57 per week, sensors from £0.95 to £4.64 per week (Sept 2010)
Shrewsbury, Shropshire	24 Severn Careline	Charging - no detailed information

Location	Service providers	Charges and additional comments
Slough	Slough Community Alarm Service	Initial installation cost: £81 Quarterly rental: £28 plus VAT
Solihull	Solihull Safe and Sound Scheme	Charges: Means tested. Details n/a
South Bedfordshire	Telecare Service is provided by Aragon Housing Association in partnership with Central Bedfordshire and Bedford Borough Council Social Services, Bedfordshire Primary Care Trust, Tunstall Group and North Herts Careline	The subscriber is responsible for the payment of all electricity and telephone charges accrued by the equipment and will be responsible for providing a suitable BT socket and electricity supply. Aragon is contracted to carry out repairs and maintenance to the equipment where faults occur due to fair wear and tear. Any costs arising from the misuse or loss of equipment will be paid by the subscriber. Monitoring service charge – n/a
South Derbyshire	South Derbyshire Careline	Careline charging - £5 per week
Bristol	South Gloucestershire Lifeline	Charging - Lifeline £71.75 per year
South Kesteven, Lincs	South Kesteven Alarm	Rental Including Monitoring £2.78
South Somerset	South Somerset Careline	Charging for pendant alarm - £1.65 for equipment and £1.90 for monitoring per week
South Tyneside	South Tyneside Telecare and Community Alarm Service	Charging £3-£8 per week
Southend-on-sea, Essex	Southend Careline	Charging- up to £9.42 per month for careline
Southwark, London	Southwark Monitoring and Alarms	Charges: Means tested. Details n/a
Staines Stockport,	Spelthorne Personal Alarm Network (SPAN)	Charging - £4.30 per week for lifeline
Cheshire	Stockport Telecare	Maximum charge - £5.07 per week
Stockton-on-tees	Stockton Telecare Services	Charging - from £3.60 per week for careline
Stoke-on-trent, Staffordshire	Stoke Lifeline and Telecare	Charging Details n/a
Sunderland	Sunderland Telecare	Charging - free equipment and small weekly monitoring charge
Kingston Upon Thames, London	Richmond & Kingston Careline http://www.richmond.gov.uk/emergency_alarms	Equipment can be purchased for a one-off payment of £215.25 plus £20.61 per quarter for the 24 hour answering service. If subscriber chooses to rent, the cost is £47.94 per quarter all inclusive. Prices don't include VAT but most subscribers will be exempt. With both options, installation is free.

Location	Service providers	Charges and additional comments
Swindon, Wiltshire	Swindon Telecare	No Charging information
Tameside	Tameside Community Response Service	Charging - £5.24 per week for alarm
Limpsfield	Tandridge Community Alarm Service	Charging - £3.70 per week excluding VAT
Taunton, Somerset	Deane Helpline	Lifeline Rental, Monitoring, Keyholding & Emergency Response Service £4.20 per week; £54.60 per quarter; £218.40 per year
Teignbridge	Teigncare	No Charging information available
Thurrock, Essex	Thurrock Careline	No Charging information available
Tower Hamlets, London	Telecare: community alarm service	Free of charge if meeting criteria
Walsall	Walsall Community Alarms and Telecare Service	No charge following assessment
Waltham Forest, London	Waltham Forest Community Alarms	Charging - £3.88 per week for alarm service
Wandsworth, London	MASCOT Telecare service	For individual customers within Merton, there is a weekly charge to cover the monitoring and response, maintenance and rental costs which may be charged through their rent and this cost is eligible for housing benefit
Birchwood	Warrington Carecall Service	Carecall costs less that the cost of a daily newspaper. There is an initial installation charge plus a quarterly charge for the service for the provision of Carecall
Warwick	Warwick Lifeline	local charities to provide the equipment for users for which a donation is made. Alternatively, equipment can be provided on a rental basis, subject to availability. For a modest charge the service will monitor the equipment and provide mobile warden support for you when necessary.
Warwickshire	Warwickshire Telecare	Charges made on the basis of assessment carried out by a social worker or an occupational therapist
Westminster, London	Westminster Telecare	If you already receive services from Westminster Adult Services and have been assessed to pay for these, you will not pay extra for the community alarm or for telecare equipment. If you choose to have one installed yourself and have keyholders, or are not receiving any other services, you may have to pay a charge. This charge is for the community alarm 'monitoring' service, not the equipment
Leigh, Wigan	Wigan Assistive Technology	Starting Point, run by the local Age Concern and funded by Wigan Council, should be your first point of contact for this type of service and they will be able to explain the choice of service providers available. If you are on a means tested benefit, you may qualify for this service to be provided free of charge but Starting Point will be able to advise you in the first instance.
Winchester, Hampshire	Winchester Community Alarm Services	Charging - up to $4.63 per week

Location	Service providers	Charges and additional comments
Windsor and Maidenhead	Windsor and Maidenhead Care Alarms	Charging - lifeline system from £2 per week
Wallasey	Wirral Assistive Technology Service	Charging - free
Worcestershire	Worcestershire Telecare worcstelecare.org/	2010 # users for worctelecare (total = 18,906) Monitoring only: 12,957 Equipment suppl: 5,949 installation charge: £36.00; maintenance/support weekly charge: £3.88
High Wycombe, Buckinghamshire	Wycombe Community Call	Charges n/a
York	York Warden Call Service	Charging - £4.10 per week
Hadleigh	Babbergh Response	No longer offering new service
Barnet, London	Barnet Telecare	All Telecare equipment is given out on a loan basis at no charge. When the user no longer needs the equipment they are expected to return it. There is usually a charge for the call centre service, depending on your financial circumstances
Waltham Cross, Hertfordshire	Broxbourne Community Alarm	Charge information not available
Buckinghamshire	Vale of Aylesbury Housing Trust Wycombe monitoring centre Paradigm Age Concern Senior Link SAGA Supporting People	The Wycombe monitoring centre currently has 3668 tenants and users they are currently monitoring for Telecare. Vale of Aylesbury Housing Trust has around 2500 tenants and users of Telecare. Paradigm has around 900 tenants using Telecare. Age Concern with their Aid Call service based in Devon has 1364 users. Help The Aged with their Senior Link service and using Elder Care as the monitoring service provider, has 256 users. SAGA has a newly developing service, they are currently monitoring fewer than 100 users and use Initial as the monitoring service provider. Supporting People provide funding to some of the above for a Telecare only capacity of around 1241, capacity within sheltered services is 2264, total 3505. The total population within Buckinghamshire receiving a Telecare service is estimated to be around 9,000 users of Telecare. The Preventative Technology Grant was made available in two payments for years 06/07 and 07/08 which for BCC were £229,000 and £384,000 respectively. BCC like some other authorities, has not fully utilised their grant allocation and has therefore been allowed a final rollover period in which the PTG must be used by end of March 2009. In addition money from Supporting People has been made available to contribute to developing a Telecare service; this too has to be used by end of March

Location	Service providers	Charges and additional comments
		2009. There is also £385,000 available from Adult Social Care. The potential for telecare is huge based on population over 65+ in Buckinghamshire: 2008 = 77,600; 2010 = 81,600; 2015 =93,500; 2020 = 101,400; 2025 = 111,300. In 2009, the total population within Buckinghamshire receiving a Telecare service is estimated to be around 9,000 users of Telecare.
Burton upon Trent, Staffordshire	*FirstCall TwentyFour/seven provided by* provided by Trent & Dove Housing Limited	Charge information not available
Cambridge	Cambridge Community Alarm Service	Quarterly charge - £69.35 with VAT
Chesterfield, Derbyshire	Chesterfield Telecare	No installation charge Service costs are from n £2.48 per week. The service may be free of charge to people in receipt of certain benefits
Worthing - RedAssure	RedAssure - part of Worthing Homes	Charges from £4.32 per wee
Colchester, Essex	Colchester Helpline	Charging free for 12 weeks then £5.80 per week. Additional charge when more than 4 sensors
Corby, Northamptonshire	Corby Community Alarm	Charging - equipment is free, monitoring charge
Crawley, West Sussex	Crawley Lifeline	Different prices for each detector/sensor ranging from £0.81 till £5.01 per weekly rent and maintenance
Derby	Derby Care Link and a variety of suppliers including Tunstall, Chubb, Bosch, Wristcare	2009 # of users = 2799 out of which 1037 was agreed to be free of charge through SP (Supporting People) funding. Health and Social Care have jointly agreed to continue funding the six week free service to all users and all Telecare equipment. Funds have also been made available as a contribution towards staffing costs. Funding was guaranteed until March 2010.
Enfield, London	Enfield Community Alarm and Telecare	There is a weekly charge for the Community Alarm service. Telecare sensors operate through your Community Alarm Service. There is no extra charge for Telecare. Charges differ depending on level of service. Users may qualify for financial assistance.
Greenwich, London	Greenwich Telecare	Charging up to £4.90 per week
Harrow	Harrow Helpline and Telecare	Maximum charge is £4.60 per week
Hartlepool	Hartlepool Community Alarm Services	Often funded through the SP (Supporting People) funding
Havering	Monitoring services provided by Newham (WSD site)	All the equipment is free, the only charge is for the response service

Location	Service providers	Charges and additional comments
Hertfordshire	References to local community alarm providers Broxbourne Community Care and Alarm Service Dacorum Community Alarm Service. Lifeline North Herts District Community Alarms Riversmead Housing Association Community Alarm Service (East Herts) St Albans Community Alarm Service Stevenage Careline Alarm Service Three Rivers Community Alarm Service / Lifeline Welwyn Hatfield Council Community Alarm Service	Normally a weekly charge for community alarms Telecare - equipment usually free if eligible
Hounslow	Hounslow Homes Linkline	Maximum cost is £3.08 per week
Islington, London	Islington Community Alarm Service	Charging - up to £6.96 per week
Maidstone, Kent	Maidstone service provided through Golding Homes	Charging - monthly charge for lease of lifeline and calls monitoring is £13.40 + VAT. Also set up charge
Hull	Kingston Care Lifeline Service	The charge for this service ranges from £2.62 per week (private clients) or £3.90 per week (council clients)
Knowsley	Knowsley Telecare	Charging - Equipment free, nominal monitoring charge ranging from £1-£2 per week
Lancashire	Lancashire Telecare	Charging - weekly cost - £8.86
Mid Suffolk	Mid Suffolk Community Alarm Service	Charging £3.09 per week. Installation charge one-off installation fee of £25.00 (there may be a grant to help pay this)
North Yorkshire	North Yorkshire Telecare	Small weekly charge (which may be free means tested)
Wellingborough, Northamptonshire	Northamptonshire Telecare	Charging £4.25 per week
West Bridgford	Nottinghamshire Telecare through local providers: Ashfield Homes 'First 4 Support' service	Small weekly charge varying per service provider and per user (means tested)

Location	Service providers	Charges and additional comments
	Bassetlaw - A1 Housing supported warden service Broxtowe Borough Council Lifeline Service Mansfield District Council Lifeline and Telecare service Newark and Sherwood Homes Careline service	
Oxford	Oxfordshire Telecare	Charging details not available. Subsidies available
Shropshire	Shropshire Community Alarm	If not in receipt of means-tested benefits, users would normally pay £2.80 +vat per week for a Community Alarm.
Southampton	Southampton Careline Community Alarm Service	Charging - £2.50 to £3.50 per week plus VAT. Installation charge £10 - £20 depending on geographical location
Staffordshire	Staffordshire Home Alarm Services Links made to local providers: Staffordshire Moorlands Newcastle Stafford Borough Burton upon Trent Lichfield District Cannock District South Staffs District Tamworth District	Charges vary per local provider and on user means
Stevenage, Hertfordshire SG1 1HN	Stevenage Careline	Charging - £1.82 to £3.33
Sutton, Greater London SM1 1EA	Sutton Community Alarm Services	Charges vary per local provider and on user means
Newton Abbot, Devon	Teign Housing - TeignCare	Charging - From £3.00 per week + one off installation payment - £35 excluding VAT
Torbay	Torbay Care Trust Lifeline Alarms	Charging - menu from £2.69 per week for basic service
Uttlesford, Essex	Uttlesford Lifeline	Charging - free for first three months
Wakefield	Wakefield Telecare	Charging - may be a small weekly charge
Waveney, Suffolk	Waveney Home Alarm	Charging details not available

Location	Service providers	Charges and additional comments
Godalming, Surrey	Waverley Careline Service	Charging - 12 week free post discharge service
Welwyn Garden City, Hertfordshire AL8 6AE	Welwyn Hatfield Lifeline	Charges: a weekly charge to council tenants, and a quarterly charge for private tenants and home owners who do not live in sheltered schemes.
Woking, Surrey GU21 6YL	Woking Careline	No charging information
Wolverhampton WV1 1SH	Wolverhampton Carelink	Charging - maximum of £3.50 per week
Age Concern, Ashburton	Age Concern Personal Alarm Service	Various payment options, the fastest and simplest is An initial fee of £49 plus £41.05 per quarter
Halifax	Alertcall	Charging - no detailed information
New Milton, Hampshire	Cirrus Careline	Charging - no detailed information
Saint Neots, Bedfordshire PE19 6RE	Hanover on call	Charging - no detailed information
Borough Green	Invicta Telecare	Invicta Telecare is the largest independent provider of Telecare services in the UK, delivering a real lifeline and peace of mind to over 95,000 people. They are partners at the Kent WSD
Poynton	Astraline	No charging information available
Coventry CV3 2SU	Orbit Services	No detailed charging information
Wokingham, Berkshire RG40 1BN	Services in Wokingham provided by Forestcare	complex menu of charges the simplest is £3.55 or £4.17 per week depending on location
Maidenhead, Windsor and Maidenhead SL6 8BY	Housing Solutions Group Lifeline	Charging - from £2 per week
Newbury, West Berkshire RG14 5EE	Sovereign Careline	Charging - from £2.75 per week
Andover, Hampshire SP10 5NA	Testway Telecare Services	Charging - from £3.73 per week
Redcar TS10 5JR	Coast and County Independent Living Services	Charging - various, Homecall £4.20 per week
Bamber Bridge	Progress Lifeline	Charging - less than 55 pence per day
Liverpool L5 8UX	VNC Lifeline	Charging - Lifeline £2.99 per week
Rudheath	Weaver Vale Careline	Charging - no detailed information
Birkenhead CH41 4PE	WP Homes	Charging - from £11.84 per month

Location	Service providers	Charges and additional comments
Northallerton DL6 2YD	Broadacres Hambleton Lifeline	Hambleton Lifeline has over 4,500 connections Charging - no detailed information
Sutton-in-ashfield, Nottinghamshire NG17 1AL	Ashfield Lifeline – first4support service	There is a charge for the Call Monitoring and Home Visiting Packages, though in many cases funding is available via the Supporting People Partnership in Nottinghamshire.
Boston, Lincolnshire PE21 6BZ	Boston Mayflower Careline	£2.29 per week
Loughborough, Leicestershire LE11 2TN	Charnwood Lifeline	Installation Charge one off payment of £30.00 £50.00 A quarter plus VAT
Glossop, Derbyshire SK13 8AF	High Peak Community Housing Carelink	Installation fee of £25 Monthly charge for 24 hour emergency service including 3 monthly visit, £30.68
Leicester LE2 7EA	LHA Service 24	Service 24 has more than 30,000 agency customers including 12,000 LHA-ASRA customers and 700 private telecare alarm customers Charging - no information provided. Leicester began to mainstream an assistive technology service in May 2007 as part of social care packages for all client groups, enabling users access to a range of individually-tailored telecare products.
Hereford, County of Herefordshire HR1 1LN	Herefordshire Housing Careline	Herefordshire Careline was established in 1984 and is now in the top ten providers of Social Alarm Monitoring in the United Kingdom. They have over 26,000 alarms connected Charging - no detailed information
Lichfield, Staffordshire WS13 6WA	Homezone Lifeline	A set weekly charge for the emergency alarm service, no matter how many times it is used. There is minimum contract period of three months. However, the weekly charge does not include telephone charges, and telephone bills are paid as usual to the normal supplier of the user
Hopton, Stafford	Stafford and Rural Homes Lifeline	Charging - no detailed information
Chelmsford CM2	Chelmer Telecare which is part of the Northern Housing Consortium	Charging - no detailed information
Bedford MK40 1NY	BPHA Carelink	Charging - no detailed information provided. Installation is free of charge BPHA is a not-for-profit housing association in North Bedfordshire Borough Council
Plymouth, Devon PL6 8UF	Call24 Hour	Charging - there is a 'one off' installation fee + the weekly cost of Call24 alarm unit includes, rental, monitoring and repair (values not specified). Their system has a tool that allows them to report to SP

Location	Service providers	Charges and additional comments
Saint Neots, Bedfordshire PE19 6RE	Hanover On Call (HOC)	HOC currently provides services to 25,000 service users throughout England. Charging - no detailed information
Dorchester, Dorset DT1 1SW	Magna Careline	Magna careline serves over 11,500 private customers and additional business customers. Charges vary per detector: bogus alarm button = £57.54 plus VAT while fall detector stands at £115.10 plus VAT (not clear the period for this price)
Landkey	North Devon homes Homelink	Charging - no lump sum to pay just a weekly cost
Bournemouth BLEEP	BLEEP - Bournemouth Line of Emergency for Every Person	Charging – Equipment rental and 24 hour monitoring starts at £2.78 excluding VAT. A one-off installation and set up fee of £30 will be payable.

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Abstract
This study presents and discusses the status for integrated personal health systems (IPHS) in the United Kingdom. It aims to illustrate through case studies the patient and health monitoring systems that are available, the level of implementation of these systems, the impact they have on the general socio-economic context, as well as their cost-effectiveness where applicable. The analysis presented in this report is based on interviews with key experts and stakeholders from the United Kingdom and a substantial secondary data collection.

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