

Incentivising Wellness



Improving the treatment of
long-term conditions

Henry Featherstone & Lilly Whitham
Edited by Max Chambers

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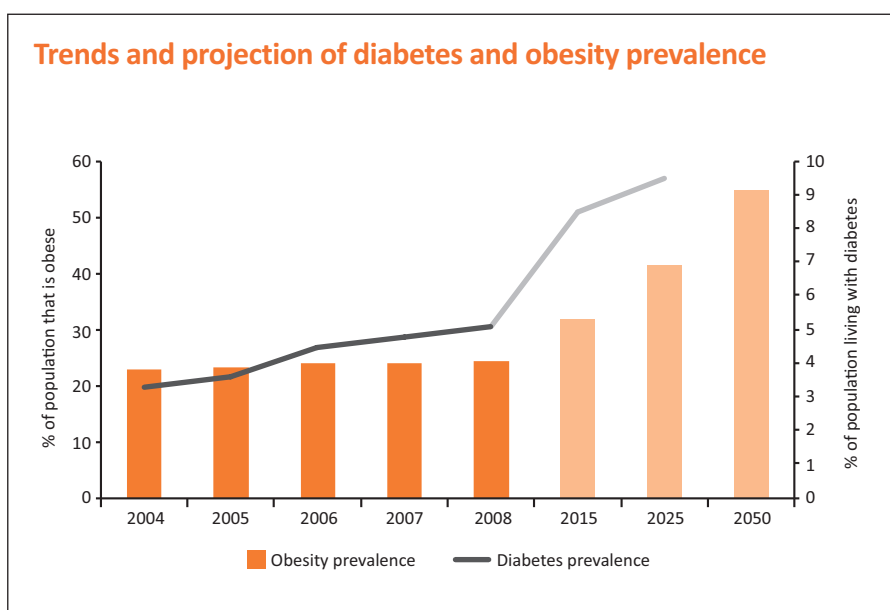
Executive Summary

People with diabetes are at risk of developing serious complications such as coronary heart disease, stroke, blindness, kidney failure, nerve damage and limb amputation. Diabetes is the leading cause of blindness in people of working age in the UK and prevalence rates are increasing. The OECD says that diabetes, “is one of the most important public health challenges of the 21st century”.

There are two different types of diabetes each requiring different treatment regimens; however, advances in treatment and technology mean that most of the complications can be significantly delayed and/or prevented. For example, before the discovery of insulin in 1924 in Toronto, a diagnosis of Type 1 diabetes meant certain death, but now people with Type 1 diabetes can maintain healthy lifestyles with the aid of glucose monitors and insulin pumps.

The trend of increasing diabetes prevalence in the UK is largely linked to the rise in obesity, since an ‘obesogenic lifestyle’ of high calorie intake and low calorie expenditure is a key factor in developing Type 2 diabetes. Future projections for the trend in both obesity and Type 2 diabetes are alarming – as shown in the diagram below – and have seen policy focus on trying to reduce the burden of these diseases.

However, despite the claims made for the various NHS initiatives for improving the management of long-term conditions, hospital admissions for people with Type 2 diabetes have increased by a staggering 65% in the last decade. Moreover, amongst OECD countries the UK has the third highest admission rates for avoidable diabetes complications, with 32 per 100,000 population. This is above the level of the admission rates seen in Canada, the Scandinavian countries and 50% greater than the OECD average of 21 per 100,000 population.



Introduced in 2004, the Quality and Outcomes Framework (QOF) seeks to incentivise GPs to improve the quality of care for their patients by giving financial rewards for clinical best practice. The most recent QOF scores for all practices in England show that on average GP practices achieved 98% of all possible QOF points for diabetes care, which suggests that care for people with diabetes should be unparalleled. But the annual National Diabetes Audit finds that only half of Type 2 and a third of Type 1 people with diabetes are receiving all of their recommended care processes which are designed to monitor the disease so as to prevent serious complications. QOF rewards GPs for performing tests once every

“There is no incentive mechanism in the NHS to improve medicines compliance; no financial rewards for actively reducing the number of hospital admissions for people with long-term conditions”

15 months whereas NICE recommends some care processes should be performed every 6 months. Meanwhile, hospital admissions for people with diabetes are increasing, as are serious complications such as renal failure, heart failure and stroke.

It will come as no surprise that studies have found that medication non-adherence among people with diabetes coincides with higher levels of blood glucose, blood pressure, cholesterol and all-cause hospitalisation. These general findings add weight to the assessment by the National Diabetes Audit that the increase in the number of emergency admissions for Type 1 diabetes, “must mean that more people with Type 1 are sometimes omitting insulin now than six years ago”. This is because the NHS business model focuses on treating sickness, not ensuring wellness.

There is no incentive mechanism in the NHS to improve medicines compliance; no financial rewards for actively reducing the number of hospital admissions for people with long-term conditions; or for ensuring that people at risk do not go on to develop diabetes and its complications. The business models in the NHS have not been designed to treat patients with long-term conditions. The resources, processes and financial incentives of GP practices and hospitals were designed to manage acute events, not prolonged periods of care.

The division of the funding structures in the NHS means that GP practices aren't rewarded for providing improved services to people with diabetes, but perversely hospitals receive payments when patients become sicker. Aided by the NHS payment system, the NHS fights to maintain its existing structures of GP practices and acute hospitals, and this limits the spread of new treatments and technologies which require new models of care.

Of course the aim of technological advance in treating patients with long-term conditions should be fewer hospital admissions, fewer attendances at Accident & Emergency and fewer outpatient visits. This is a good thing, especially for the patients concerned. However, the consequence of this progress would be a reduction in hospital income which means potentially needing fewer doctors, fewer nurses and in the long-run fewer hospitals. This trade off in utilising new technologies to improve health outcomes needs to be made explicit and explained to the public.

The evolution of long-term condition management in the NHS is classical 'incremental innovation', with its relatively stable market of existing GP practices and hospitals providing the same established and widespread treatment model.

But to address the needs of patients with long-term conditions we need a new business model focused on maintaining wellness, not treating sickness. Not surprisingly the empirical literature in business finds that disruptive solutions – such as those are required – are more commonly developed and commercialised by new entrants to a market, rather than by incumbent organisations. The disruptive solution for the NHS is the very process of creating a new business model which uses existing technologies that have so far failed to spread.

There are many examples of US based organisations using technology to improve long-term condition management. The Veteran's Association has used home telehealth combined with case management for a number of years. Through this approach it has seen a 25% reduction in bed days, 20% reduction in admissions and an 86% patient satisfaction rating. It is now scaling up its approach to reach 110,000 patients by 2011.

In order to produce a step change in the care for people with long-term conditions, we recommend:

- Given the scale of the projected increase in diabetes, accurate surveillance is essential. The NHS should scale-up the National Diabetes Audit, making it mandatory for all GP practices and PCTs (and subsequently GP consortia) to submit data. This requirement could be introduced as part of the process of holding a registered list of patients and becoming a member of a GP consortium. Over time, the national audit process should be extended to other long-term conditions.
- The Department of Health should commission academic work to calculate the current healthcare-related costs of the most common long-term conditions, including asthma, diabetes, coronary heart disease and chronic obstructive pulmonary disease. This work should be performed at the lowest level possible (GP practice or per capita) in order to help inform future business modelling for evolving GP consortia.
- The Quality and Outcomes Framework should be overhauled so that processes measures, such as albumin testing, are recorded on an annual basis with more frequent testing for specific measures (HbA1c). Additional indicators for all long-term conditions should be developed which concentrate on outcome measures. For example, in diabetes these would reward reduced numbers of people with diabetes suffering renal failure or being admitted to hospital with life threatening diabetic ketoacidosis.
- New business models need to be developed in the NHS so that new technologies and ways of working can improve care for patients with long-term conditions. The NHS is about to undergo a period of re-organisation with funding being devolved to GP practices which are expected to aggregate into GP consortia to replace PCTs. We believe that alongside this process, the Department of Health should encourage, rather than seek to limit, newly formed GP consortia to pilot new business models which focus specifically on long-term condition management.
- In order to drive the step change in the care for patients with long-term conditions we believe that the Coalition should set out a clear statement of strategy. Hospital utilisation for long-term conditions should be reduced by 20% over the next five years.

1

Diabetes as a Long-term Condition

1 Department of Health, *Improving the health and well-being of people with long term conditions: world class services for people with long term conditions information tool for commissioners*, 2010, available at: http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/@ps/documents/digitalasset/dh_111187.pdf

2 The World Health Organisation, *Chronic disease risk factors*, accessed on June 17th 2010, available at: <http://www.who.int/dietphysicalactivity/publications/facts/riskfactors/en/index.html>

3 The Department of Health, *Ten things you need to know about long-term conditions*, accessed on June 23rd 2010, available at: <http://webarchive.nationalarchives.gov.uk/+www.dh.gov.uk/en/Healthcare/Longtermconditions/tenthingsyouneedtoknow/index.htm>

4 Ibid.

5 The Department of Health, *Raising the profile of long-term conditions: a compendium of information*, 2008.

6 Department of Health. *Improving the health and well-being of people with long term conditions*, 2010.

7 The Department of Health. *Ten things you need to know about long-term conditions*, accessed on June 23rd 2010.

8 Starfield B, et al, "Comorbidity: implications for the importance of primary care in 'case' management" *Annals of Family Medicine*, vol 1, pp8-14, 2003.

9 Bodenheimer T, and Berry-Millett R, "Care Management of patients with complex care needs," *Robert Wood Johnson Foundation Research Synthesis Report*, no 19, 2009.

10 The Department of Health, *Ten things you need to know about long-term conditions*, accessed on June 23rd 2010.

11 Organizational for Economic Cooperation and Development (OECD), *Health at a Glance 2009*, 2009.

As healthcare and living conditions improve, so the burden of disease increases. In the UK this is seen in the growing impact on the NHS of long-term conditions. The Department of Health defines a long-term condition as "one that cannot currently be cured but can be controlled with the use of medication and/or other therapies."¹ Most people will recognise the major long-term conditions: heart disease, respiratory disease, diabetes, asthma and cancer. The course of these diseases can be now be modified considerably by modern medicine.

On a worldwide basis, long-term conditions account for 59% of the 57 million deaths annually and 46% of the global burden of disease.² The Department of Health estimates that 15.4 million people in England have a long-term condition,³ and many people have more than one. These are referred to as co-morbidities, which become more prevalent with increasing age: 60% of people in the UK over 60 will have one or more long-term condition and this number is expected to increase to almost 75% in the next 25 years.⁴ In 2008, over 35% of people over 80 years old had two or more long-term conditions.⁵

People with long-term conditions are intensive users of healthcare services. The Department of Health's best estimate is that the treatment and care of people with long-term conditions account for 70% of the total health and social care spend in England.⁶ They comprise 31% of the UK population, but account for 52% of GP appointments and 65% of hospital outpatient appointments.⁷ A body of research demonstrates that spending and the amount of healthcare resources consumed escalate as the number of co-morbidities increases.^{8,9} Most long-term conditions are managed by GP practices: it is estimated that the treatment and care of those with long-term conditions accounts for 69% of the primary and acute care budget in England.¹⁰ For this study we have chosen to focus on diabetes, labelled by the OECD as "one of the most important public health challenges of the 21st century"¹¹ but many of the observations we make will have general application across many other long-term conditions.

What is diabetes?

Diabetes Mellitus is a chronic metabolic disease, whereby reduced or absent insulin production or the body's inability to respond to insulin causes high blood sugar (glucose) levels. The hormone insulin is required to turn the food that we eat into energy our bodies can use. There are two different forms of diabetes: Type 1 (formerly called insulin dependent) and Type 2 (formerly non-insulin dependent). Type 1 can manifest at any age, but most commonly occurs in younger people between the ages of 4-13 years. It develops secondary to auto-immune destruction

of the cells in the pancreas that produce insulin. The exact cause of Type 1 is unknown although it is believed to be partially genetic, resulting from environmental factors in the early years of life.¹² Patients with Type 1 diabetes are absolutely dependent on insulin for life. Indeed, before the discovery of insulin in 1924 in Toronto a diagnosis of Type 1 diabetes meant certain death. Unlike many other long-term conditions Type 1 diabetes is not caused by unhealthy behaviour and newly diagnosed patients tend not to be obese.¹³

Unhealthy lifestyles, such as high fat and sugar diets coupled with inadequate physical activity leading to obesity, are a key factor in Type 2 diabetes, although because not all obese people develop diabetes there is also thought to be a genetic component.¹⁴ Type 2 diabetes occurs most commonly in the middle aged and is characterised by the body developing a resistance to the action of insulin. This resistance causes an initial compensatory increase in insulin levels, and on occasion later complete failure of the pancreas. Excessive calorie intake from a high fat and sugar diet and inadequate energy expenditure resulting in obesity is referred to medically as a diabetogenic lifestyle. Indeed, diabetes is increasing rapidly in every part of the world, to the extent that it has now assumed epidemic proportions.¹⁵

Most recent estimates suggest that there are 12 times the number of people living with Type 2 diabetes than Type 1. Indeed, those with Type 2 make up about 92% of the total population with diabetes.¹⁶ Type 1 diabetes is not associated with social deprivation and is found in a consistent percentage of the entire population.¹⁷ By contrast, Type 2 diabetes is strongly associated with ethnicity, social deprivation and age.¹⁸ Traditionally Type 2 affected individuals older than 40 years, but now it is being recognized increasingly in children,^{19, 20, 21} as well as genetically susceptible ethnic groups (e.g African-Caribbean and Asian) and the obese.²²

Blood glucose monitoring

People with Type 1 diabetes and those with Type 2 diabetes using insulin should self-monitor blood glucose levels on a daily basis. Typically, patients might monitor their blood glucose up to three times a day, such as before meals or exercise and before bed. Regular monitoring of blood glucose is an important test to help prevent long-term complications because its level will determine the amount of insulin required.

A longer term measure of blood glucose control is through HbA1c levels. HbA1c, or haemoglobin A1c, or glycosylated haemoglobin is created when glucose in the blood sticks to haemoglobin in red blood cells. The HbA1c test is used to measure blood glucose levels over 8–12 weeks – which is the life span of a red blood cell – and predicts the progression of micro-vascular complications associated with diabetes.

National recommendations are that people with Type 1 diabetes should be offered HbA1c testing between two and four times each year, with more frequent testing if there are concerns about poor control.²³ The recommended level for HbA1c in people with Type 1 diabetes is <6.5%, but <7.5% for those at risk of developing low blood glucose.

People with Type 2 diabetes should be offered HbA1c measurements between two and six monthly intervals, depending on stability of blood glucose control and changes in medications.²⁴ The NICE recommended level for HbA1c in people with Type 2 diabetes has recently been increased to <7.5% from <7% because of concerns that lower levels do not provide substantial benefit and may actually increase the risk of adverse outcomes.

12 Hussain A and Vincent M, *Diabetes Mellitus, Type 1: Treatment and Management*, eMedicine Specialties, accessed on 8 June 2010, available at: <http://emedicine.medscape.com/article/117739-treatment>.

13 Ibid.

14 Ligaray K and Isley W, *Diabetes Mellitus, Type 2*. eMedicine Specialties, accessed on 29 June 2010, available at: <http://emedicine.medscape.com/article/117853-overview>

15 Organizational for Economic Cooperation and Development (OECD), *Health at a Glance 2009*, 2009.

16 Yorkshire & Humber Public Health Observatory and the National Diabetes Support Team, *Diabetes Key Facts*, March 2006.

17 Marmot M et al., *The Marmot Review: Fair Society, Health Lives*, Strategic Review of Health Inequalities in England post-2010. 2010.

18 NHS Information Centre, *The National Diabetes Audit Executive Summary 2008-2009*, 2010.

19 Ehtisham S et al., "Prevalence of type 2 diabetes in children in Birmingham" *British Medical Journal*, vol 322, pp 1428, 2001.

20 Ehtisham S et al. "First UK survey of paediatric type 2 diabetes and MODY" *Archives of Disease in Childhood*, vol 89, pp 526-529, 2004.

21 Feltbower RG et al. "Type 2 and other forms of diabetes in 0-30 year olds: a hospital based study in Leeds, UK", *Archives of Disease in Childhood*, vol 88, pp 676-679, 2003.

22 The Yorkshire & Humber Public Health Observatory and NHS National Diabetes Support Team, *Diabetes in England 2008*, 2008.

23 NICE Guidelines for the diagnosis and management of Type 1 diabetes in children, young people and adults. Guideline Number 15. 2004

24 NICE. *The management of type 2 diabetes*. 2008.

25 Evans J, "Frequency of blood glucose monitoring in relation to glycaemic control: observational study with diabetes database", *BMJ*, vol 319, pp:83-86, 1999.

26 Bode B, et al., "Continuous glucose monitoring used to adjust diabetes therapy improves glycosylated haemoglobin: a pilot study" *Diabetes Research and Clinical Practice*, vol 46, pp: 183-190, 1999.

27 Norries et al., "Long-term non-pharmacological weight loss intervention for adults with type 2 diabetes mellitus (Review)" *The Cochrane Collaboration*, 2009.

28 Thomas et al., "Exercise for type 2 diabetes mellitus", *The Cochrane Collaboration*, 2009.

29 Facchini FS, Hollenbeck CB, Jeppesen J, Chen Y-DI, Reaven GM. Insulin resistance and cigarette smoking. *Lancet* 1992;339:1128-30

30 Targher G, et al., "Cigarette Smoking and Insulin Resistance in Patient with Noninsulin-Dependent Diabetes Mellitus", *The Journal of Clinical Endocrinology & Metabolism*, vol 82, pp: 3619-3624, 1997.

31 Janzon L, Berntorp K, Hanson M, Lindell SE, Trell E. Glucose tolerance and smoking: a population study of oral and intravenous glucose tolerance test in middle-aged men. *Diabetologia* 1983;25:86-8.

32 Welschen L et al. "Self-monitoring of Blood Glucose in Patients with Type 2 Diabetes Who Are Not Using Insulin", *Diabetes Care*, vol 28, pp: 1510-1517, 2005.

33 Davis W, et al, "Is self-monitoring of blood glucose appropriate for all type 2 diabetic patients? The Fermantle Diabetes Study", *Diabetes Care*, vol 29, pp: 1764-1770, 2006.

34 Farmer A et al. "Impact of self monitoring of blood glucose in the management of patients with non-insulin treated diabetes: open parallel group randomised trial", *BMJ*, vol 335, pp: 132, 2007.

35 International Diabetes Federation, *Complications of diabetes*, accessed on May 27th 2010, available at: <http://www.idf.org/complications-diabetes>

36 Bunce C and Wormald R, "Leading causes of certification for blindness and partial sight in England & Wales", *BMC Public Health* vol. 6, pp:58, 2006.

37 Wanless, Derek, *Securing good health for the whole population*, HM Treasury, 2004.

The mainstay of Type 1 diabetes treatment is insulin therapy combined with a balanced diet and efforts to maintain a healthy weight. However, because insulin cannot be taken orally – it is broken down in the digestive system – a diagnosis of Type 1 diabetes requires patients to inject themselves with insulin multiple times each day for the rest of their lives. The use of insulin requires self-monitoring of blood glucose – through repeated pinprick tests – and this proven to be an effective way to maintain stable glucose levels.^{25,26} Despite insulin pumps offering much better diabetic control for people with Type 1 diabetes, their uptake in the UK remains stubbornly low.

Dietary modification has been the cornerstone of Type 2 diabetes management, however, a range of new drug therapy options have become available in the last 10 years, enabling sustainable control of blood sugar levels previously beyond the reach of medical therapy. Insulin treatment in Type 2 diabetes is used only in a minority of cases. Despite the improvements in drug therapy the benefits of lifestyle modification in Type 2 diabetes cannot be overstressed. Regular exercise improves insulin sensitivity and glucose control,^{27, 28} whereas smoking disrupts insulin levels and increases the risk of developing complications.^{29, 30, 31} There remains debate over the costs and benefits of daily self-monitoring of blood glucose for people who are non-insulin dependent.^{32, 33, 34}

Complications

People with diabetes have a high risk of developing complications including coronary heart disease, stroke, blindness, kidney failure, nerve damage and limb amputation.³⁵ This is because the high blood glucose of diabetes principally causes damage to both small and large blood vessels. It is the leading cause of blindness in people of working age in the UK.³⁶ Almost a quarter of people with diabetes have nerve disease, the most common manifestation of which is foot ulceration, which can ultimately lead to lower limb amputation if not adequately treated.³⁷ Someone with diabetes will have their life expectancy reduced by 10-15 years compared to someone without.³⁸

Reduced life expectancy in Type 2 diabetes

A male non-smoker diagnosed with diabetes at the age of 45 who maintains healthy glucose, cholesterol and blood pressure levels has an 11.5% chance of dying before his 60th birthday. This risk of death for a woman is 8.9%.³⁹

The "ticking clock" hypothesis of diabetic complications asserts that the clock starts ticking for small vessel risk at the onset of high blood glucose, while the clock starts ticking for large blood vessel risk at some earlier point, most likely with the onset of insulin resistance.⁴⁰ Consequently, the risk of severe complications can be significantly reduced and/or delayed by control of blood glucose levels within tight limits.

Two landmark studies – the UK Prospective Diabetes Study and the Diabetes Control and Complications Trial Research Group – have both confirmed that accurate disease management, namely glucose control, reduces the risk of

developing future complications. These studies demonstrated that keeping glucose levels around the NICE benchmark of 6.5% of HbA1c can reduce risk of developing complications such as retinopathy (which can lead to blindness) by 76% and heart disease.^{41, 42} While tight control of blood glucose levels is essential, the onset of complications is also prevented by maintaining good blood pressure and cholesterol levels.^{43, 44} Both can be managed through medication, as well as improved health behaviours, such as smoking cessation, improved diet, moderate drinking and salt consumption, and regular physical activity.

Long-term conditions also tend to occur among deprived groups. The unhealthy behaviours associated with poor health concentrate among the less well off: smoking, lack of exercise and obesity are all more pronounced in lower socioeconomic groups than higher ones. People living in deprived areas also receive worse care from their GP and less support to change their health behaviour.⁴⁵

How many people have diabetes?

The number of people in a given population living with a particular disease is referred to as the prevalence rate. In England there is no single complete source for diabetes prevalence rates. Instead there are three different national data sources which can be used to track diabetes prevalence over time: the National Diabetes Audit (NDA), the Health Survey for England, and the Quality and Outcomes Framework (QOF) database.

In most OECD countries, between 5 and 9% of the adult population have diabetes. Less than 5% of adults aged 20-79 years in Iceland, Norway and the United Kingdom will have diabetes in 2010, according to the International Diabetes Federation. This contrasts with Mexico and the United States, where more than 10% of the population of the same age have the disease.⁴⁶ The UK has relatively low levels of diabetes, although academic studies within the UK also show increasing numbers of diabetes diagnoses.^{47, 48} However, disease surveillance for conditions such as diabetes remain poor, especially for the NHS which is state controlled.

Table 1.1: Diabetes prevalence around the world

	Estimates of diabetes prevalence in 2010 (%)
China	4.5
UK	4.9
India	7.1
Sweden	7.3
Japan	7.3
Spain	8.7
France	9.4
Germany	12
USA	12.3

Source: International Diabetes Federation, Diabetes Atlas, accessed on July 12th, see: <http://www.diabetesatlas.org/content/regional-data>

38 Yorkshire & Humber Public Health Observatory and NHS National Diabetes Support Team, *Diabetes in England*, 2008.

39 Ibid.

40 Haffner SM, Stern MP, Hazuda HP, Mitchell BD, Patterson JK: Cardiovascular risk factors in confirmed prediabetic individuals. Does the clock for coronary heart disease start ticking before the onset of clinical diabetes? *JAMA* 263:2893-2898, 1990

41 The Diabetes Control and Complications Trial Research Group, "The Effect of Intensive Treatment of Diabetes on the Development and Progression of Long-Term Complications in Insulin-Dependent Diabetes Mellitus", *The New England Journal of Medicine*, vol 329, pp: 977-986, 1993.

42 UK Prospective Diabetes Study (UKPDS) Group, "Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): prospective observational study", *BMJ*, vol 321, pp: 405-411, 2000.

43 Turner R, Holman R, Stratton I et al. "Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes (UKPDS 38)", *British Medical Journal* vol 317, pp:703-713, 1998.

44 Diabetes UK, *Blood fats (cholesterol)*, accessed on June 11th 2010, available at: http://www.diabetes.org.uk/Guide-to-diabetes/Treatments/Blood_fats_cholesterol/

45 Care Quality Commission. *Closing the gap: Tackling cardiovascular disease and health inequalities by prescribing statins and stop smoking services*. September 2009.

46 The Organisation for Economic Cooperation and Development (OECD), *Health at a Glance 2009*, 2009.

47 Gonzales M, Johansson S, Wallander M-A, Rodriguez LAG, "Trends in the prevalence and incidence of diabetes in the UK: 1996-2005", *Journal of Epidemiological Community Health*, vol 0, pp 1-5, 2009.

48 Gardner S, Bingley P, Sawtell P, Weeks S, Gale E, "Rising incidence of insulin dependent diabetes in children aged under 5 years in the Oxford region: time trend analysis" *British Medical Journal*, vol 315, pp 713-717, 1997.

The National Diabetes Audit

The National Diabetes Audit (NDA) has been tracking diabetes prevalence, as well as the care given to diabetic patients annually since June 2004. However, data collection for the NDA relies on Primary Care Trusts (PCTs) and GP practices voluntarily submitting information. While all PCTs have submitted data in recent years not all GP practices participate: only 9 PCTs managed to include every GP

“ This incomplete understanding of changing prevalence rates over time makes it difficult to estimate how much the burden of diabetes will increase in the future and will impact on NHS resource and workforce planning ”

practice in their area and in 3 PCTs less than 20% of GP practices submitted data.

In 2008-2009 the NDA covered only 75% of the 2.2 million diabetics registered with GPs.⁴⁹ For participating GP practices the prevalence rate of diagnosed diabetes is 4.13%, which is a substantial increase from the previous year's prevalence rate of 3.91 %. Estimates from the NDA are used by the Department of

Health, NHS Diabetes (a specific NHS body) and Diabetes UK (the main diabetes charity) and are generally respected throughout the diabetes community. Since these figures cover the majority of the diabetic population they provide the most accurate estimate of how many people are living with diabetes in England today.

The Health Survey for England

The Department of Health commissioned Health Survey for England (HSE) is conducted through a random sample of people over the age of 16 and, more recently, including children 2-15 years old living in private households. The sample is drawn based on postcodes and data is collected through interviews and nurse visits.⁵⁰ From 2002 onwards estimates of diabetes prevalence have been made and weighted for the number of people that did not respond to the survey. In 2006 the HSE estimated that diabetes prevalence was 4.9% of the population, a staggering increase from 2.4% in 1994. The HSE has only reported on diabetes prevalence on four occasions since 1994; and because it samples only a section of the population it does not provide a complete picture of diabetes prevalence. Nevertheless, it does provide the best available prevalence data for prior to 2004.

The Quality and Outcomes Framework

The Quality and Outcomes Framework (QOF) was introduced into the General Medical Services (GMS) contract in 2004 to incentivise GP practices to improve the quality of patient care by financially rewarding best practice.⁵¹ Participation in QOF is voluntary, but virtually all practices take part. QOF data estimates disease prevalence by dividing the number of people on clinical registers for any given long-term condition by the total GP practice list.⁵² GPs receive QOF points, and therefore NHS funds, for maintaining a list of patients with diabetes.

However, diabetes prevalence rates calculated by QOF exclude people under the age of 17, although, as has been noted previously, the number of young people developing diabetes is growing.⁵³ Further, the method for undertaking the prevalence calculation has been amended during the QOF data series, which contributes to the substantial increase seen in prevalence rates between 2005/06 and 2006/07 in the graph opposite.⁵⁴

49 The NHS Information Centre, *National Diabetes Audit Executive Summary 2008-2009*, 2010.

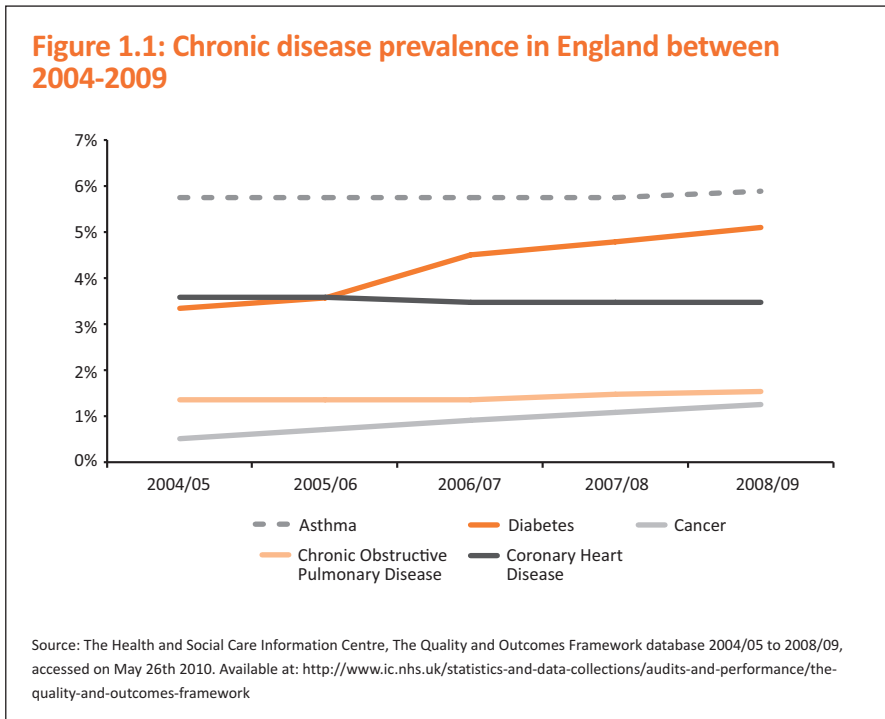
50 National Centre for Social Research and Department of Epidemiology and Public Health UCL Medical School, *Health Survey for England 2008: Volume 2 Methods and documentation*, 2009.

51 The Health and Social Care Information Centre, *The Quality and Outcomes Framework Achievement Data 2008/09*, 2009.

52 Ibid.

53 The NHS Information Centre, *National Diabetes Audit: Key findings about the quality of care for people with diabetes in England and Wales*, 2008.

54 Ibid.



There is, however, a more fundamental problem with QOF which undermines its validity as a data source: GPs can voluntarily exclude patients from their reporting. Under QOF doctors are allowed to omit patients unnecessarily for reasons such as: the patient does not attend appointments; prescriptions cannot be issued because of potential complications; or because the patient is either newly diagnosed or recently registered with the GP.⁵⁵ These relatively trivial omission criteria mean that GPs can exclude some of the sickest patients from their reporting, which seems to not only defeat the purpose of QOF but also provides an inaccurate picture of prevalence rates for patients with long-term conditions.

Table 1.2: Diabetes prevalence estimates

	Diabetes prevalence %							
	1994	2003	2004	2005	2006	2007	2008	2009
National Diabetes Audit ⁵⁶	-	3.3	3.48	3.74	3.79	3.90	4.31	-
Health Survey for England ^{*57}	2.4	3.9	-	-	4.9	-	-	-
Quality and Outcomes Framework ^{*58}	-	-	3.34	3.55	4.50	4.80	5.10	-

*QoF and HSE only include adults over the age of 17 and 16 respectively in their estimate.

55 BMA and NHS Employers, *Guidance on Exception Reporting*, 2006, available at: <http://www.brightonandhovepct.nhs.uk/healthprofessionals/gener alpractice/qualityindicators/clinic alcodes/documents/QOFexception reportingguidanceOct06.pdf>

56 NHS Information Centre, *National Diabetes Audit Executive Summary 2008-2009*, 2010.

57 The NHS Information Centre, *Health Survey for England 2008 – trend tables*, accessed on May 26th 2010.

58 The Health and Social Care Information Centre, *The Quality and Outcomes Framework Achievement Data 2008/09, 2009* and The Health and Social Care Information Centre, *The Quality and Outcomes Framework Achievement Data 2004/05, 2005*.

This incomplete understanding of changing prevalence rates over time makes it difficult to estimate how much the burden of diabetes will increase in the future and will impact on NHS resource and workforce planning. Further, one of the primary reasons for focussing on diabetes in this research is that there are many people living with the disease that are unaware of their condition. According to recent modelling by the Yorkshire & Humber Public Health Observatory

(YHPHO), 27% of people with diabetes had no knowledge of their condition.⁵⁹ If these patients were included in prevalence estimates there could be as many as 7.4% of the adult population with diabetes. This higher figure is much more closely aligned with the prevalence rates seen in other countries.⁶⁰

Future projections

The National Service Framework for Diabetes, published in 2001, set out a vision in which fewer people would develop the disease;⁶¹ however, the recent trend of increasing diabetes prevalence is set to continue because many people are living diabetogenic lifestyles with excessive calorie intake and reduced energy expenditure. Obesity and simply being overweight is one of the top risk factors for developing diabetes: an obese person is 20 times more likely to develop Type 2 diabetes than a lean person.^{62, 63} In England, a third of the population are obese, and its prevalence is growing at an alarming rate – it has increased by 11% in the past 15 years alone.⁶⁴

Other risk factors are similarly bad. Smoking is not only a risk factor for developing diabetes^{65, 66} but also increases the risk of complications, and is much more prevalent in deprived populations.⁶⁷ Approximately 65% of people are not exercising regularly,⁶⁸ and on average people are only eating 3.5 portions of fruit and vegetables a day, which is less than the government recommended ‘5 a day’.⁶⁹

The graph below shows the past and future trend relationship between obesity and diabetes. Data up to 2008 is from official NHS sources, while the projections are from the Foresight Report, commissioned by the previous government, which predicted that rising obesity levels will result in a 70% increase in new diabetes diagnoses by 2035 – this would be a larger increase than any other long-term condition.⁷⁰ The future diabetes prevalence rates are from modelling conducted by the YHPHO and paint a bleak picture for the future. We make the observation again, that Type 2 diabetes – about 90% of the total – is largely preventable.⁷¹

59 The Yorkshire and Humber Public Health Observatory, *APHO Diabetes Prevalence Model: Key findings for England*, 2010.

60 Ibid.

61 Department of Health. *National Service Framework for Diabetes: Standards*. London: Department of Health, 2001.

62 Field A, et al., “Impact of Overweight on the Risk of Developing Common Chronic Disease During a 10-year period,” *Archives of Internal Medicine*, vol 161, pp: 1581-1586, 2001.

63 Foresight, *Tackling Obesity: Future Choices – Project Report*, 2nd Edition, Government Office for Science.

64 The NHS Information Centre, *Health Survey for England 2008: Physical Activity and Fitness – Volume 1* 2009.

65 Turner RC, et al., “Risk factors for coronary artery disease in non-insulin dependent diabetes mellitus: United Kingdom prospective diabetes study (UKPDS 23)”, *BMJ*, vol 316. Pp: 823-828, 1998.

66 UK Prospective Diabetes Study Group (UKPDS), “Intensive blood glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33)”, *The Lancet*, vol 352, pp: 837-853, 1998.

67 The NHS Information Centre, *Health Survey for England – Adult trend tables 2008*, accessed on June 10 2010, available at: <http://www.ic.nhs.uk/statistics-and-data-collections/health-and-lifestyles-related-surveys/health-survey-for-england/health-survey-for-england--2008-trend-tables>

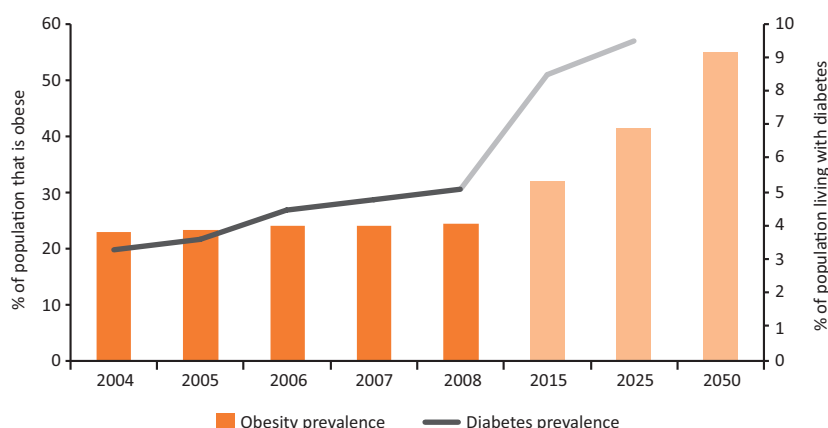
68 Ibid.

69 Ibid.

70 Foresight, *Tackling Obesity: Future Choices – Modelling future trends in Obesity and the impact on Health*, Government Office for Science, 2007.

71 The Organisation for Economic Cooperation and Development (OECD), *Health at a Glance* 2009, 2009.

Figure 1.2: Trends and projection of diabetes and obesity prevalence



Source: The Health and Social Care Information Centre, *The Quality and Outcomes Framework database 2004/05-2008/09*, accessed on May 26th 2010 and The NHS Information Centre, *Health Survey for England 2008: Physical Activity and Fitness – Volume 1* 2009. Projection for diabetes from: Yorkshire and Humber Public Health Observatory, *APHO Diabetes Prevalence Model: Key Findings for England*, 2010. Projections for diabetes are an average of the male and female prevalence rates from: McPherson K, et al., *Foresight: Tackling Obesity: Future Choices – Modelling Future Trends in Obesity & Their Impact on Health*, Government Office for Science, 2007.

Recommendation: Given the scale of the projected increase in diabetes accurate surveillance is essential. We recommend that the NHS scale-up the National Diabetes Audit, making it mandatory for all GP practices and PCTs (and subsequently GP consortia) to submit data. This requirement could be introduced as part of the process of holding a registered list of patients and becoming a member of a GP consortium. Over time, the national audit process should be extended to other long-term conditions.

Current costs

According to the Department of Health 5% of all NHS resources and 10% of hospital in-patient costs are used on diabetes.⁷² This translates to about £2,100 per diabetic patient.⁷³ Although these figures were quoted to us frequently during our research, the Department of Health have been unable to confirm the basis on which these figures were calculated.⁷⁴ In response to Freedom of Information requests the Department of Health say it is likely that the figures date back to the late 1990s and were calculated for the original National Service Framework for Diabetes.^{75, 76}

Given that there are now more accurate estimates of the number of people living with both types of diabetes and that standard reference costs for NHS services are readily available, we were surprised by the paucity of baseline costing data.⁷⁷ We understand that the Department of Health are currently working with NHS Diabetes to update their estimates, although we struggle to understand why this only happens once every decade. In previous research, we have remarked on the generally unhelpful and impenetrable nature of NHS costings and accounts. We make this observation again and stress that long-term conditions are going to be the main burden on NHS care in the future, so accurate costings are important to help strategic decision making, both within the Department of Health and for local health economies. Before any improvements can be made it is important that the NHS first understand its baseline costs.

By way of comparison, the medical expenditure on diabetes in the US in 2007 was estimated at \$116 billion (£76 billion), with almost half that sum being spent on diabetes-related chronic complications.⁷⁸ This translates to about £4,450 per diabetic patient. It should be noted, however, that the USA spends approximately twice the amount, in GDP terms, on healthcare compared to the NHS.⁷⁹

Recommendation: We recommend that the Department of Health should commission academic work to calculate the current healthcare-related costs of the most common long-term conditions, including asthma, diabetes, coronary heart disease and chronic obstructive pulmonary disease. This work should be performed at the lowest level possible (patient or GP practices) in order to help inform future business modelling for evolving GP consortia.

72 The Department of Health, *About Diabetes*, 2009, accessed on May 24, 2010, available at: http://webarchive.nationalarchives.gov.uk/+/www.dh.gov.uk/en/Healthcare/Longtermconditions/Vascular/Diabetes/DH_074762

73 The National Diabetes Audit says there are 2.2 million diabetics on the NHS Quality Management Analysis System. The Total NHS expenditure in 2007-08

74 Freedom of Information request to the Department of Health.

75 Bottomley JM and T2ARDIS Steering Committee and UK Centres, "Managing care of type 2 diabetes. Learnings from T2ARDIS", *The British Journal of Diabetes & Vascular Disease*, vol 1, pp:68-72., 2001.

76 Currie CJ, et al., "NHS Acute Sector Expenditure for Diabetes: the Present, Future and Excess In-patient Cost of Care", *Diabetic Medicine*, vol 14, pp: 686-692, 1997.

77 The Department of Health, *NHS Costing Manual 2009/10*, 2010.

78 American Diabetes Association, "Economic Costs of Diabetes in the US in 2007", *Diabetes Care*, vol 31, pp 596-615, 2008.

79 Organization for Economic Cooperation and Development, *OECD Health Data*, 2009.

2

Policy Failures in Long-term Condition Management

Self-care isn't working

Because they live with the condition, patients tend to be the most knowledgeable about day-to-day care of diabetes. The charity Diabetes UK estimates that 95% of all diabetes care is through self-care as people have to make daily decisions about their diet, when to administer insulin and how much, taking other medications, exercise levels and smoking habits.⁸⁰ People with diabetes might only see a GP once a year to have tests to monitor HbA1c levels and blood pressure as well as screening for complications, such as kidney failure and heart disease.⁸¹

The growing burden of long-term conditions on the NHS has led the Department of Health policy to focus on improving self-care. Since the NHS Plan in 2000, various reviews and government papers have tried to put self-care at the centre of the NHS.^{82, 83, 84} The thrust of these documents was the same: the NHS needs to improve the support for patients so that they can take better control of their own condition. This focus on self-care has been indicative of a broader shift in the traditional treatment model in healthcare that gives patients a greater role in the decision-making process about their care. The concept of the 'expert patient' has emerged with the realisation that patients with long-term conditions know more about their health than the healthcare professional, and should therefore be involved in planning it.⁸⁵

Over time self-care grew as a significant strategy for the NHS because while it had the potential to significantly improve patient's health, it could also create savings. The widely respected 2002 Wanless Review suggested that for every £100 invested in self-care £150 of benefits would be delivered.⁸⁶ Patients were rightly seen as the health service's biggest untapped resource. The benefits of improved self-care listed by the Department of Health were many: increases in life expectancy, better control over symptoms, reductions in pain, anxiety and depression levels, and improvement in quality of life from greater independence. Department of Health publications suggested that the NHS could see significant savings from improving and focussing on self-care: a 40% reduction in GP visits; decreases in hospital admissions up to 50%; and A&E visits reduced by 50%.⁸⁷ However, the reality has been somewhat different, with hospital admissions for long-term conditions such as diabetes continuing to increase.

The Expert Patients Programme (EPP) was the first practical step towards realising the shift towards self-care. The EPP consists of a number of different training courses, led by lay-trainers and tutors with long-term conditions

80 Diabetes UK, *Care recommendations: self-monitoring of blood glucose (SMBG)*, accessed on June 8th 2010, available at: http://www.diabetes.org.uk/About_us/Our_VIEWS/Care_recommendations/Self-monitoring_of_blood_glucose/.

81 NHS Information Centre, *Quality and Outcomes Framework Achievement Data 2008/09, 2009*.

82 Wanless D, *Securing our future health: taking a long-term view (final report)*, London: HM Treasury, 2002.

83 Department of Health, *Support people with long term conditions to self care: a guide to developing local strategies and good practice*, 2006, p. 2.

84 Department of Health, *Our health, our care, our say: a new direction for community services*, 2006.

85 Department of Health, *The expert patient: a new approach to chronic disease management for the 21st century*, 2001.

86 Wanless D, *Securing our future health: taking a long-term view (final report)*, London: HM Treasury, 2002.

87 Department of Health, *Support people with long term conditions to self care: a guide to developing local strategies and good practice*, 2006.

themselves, to help people develop the skills needed to effectively manage their care.⁸⁸ Despite being implemented in 2001, the EPP has yet to create any significant reductions in healthcare utilisation.^{89,90,91} A number of reasons for this failure have been mooted: that the programmes were not led by qualified trainers; there was no targeting of high risk individuals, and an absence of teaching specific clinical, disease management skills.^{92,93} Further, the self-care movement didn't seem to spread amongst patients with any momentum. A 2007 survey of patients with long-term conditions found that four in five adults had never heard of training courses that would teach them self-care skills.⁹⁴ Only 12% of adults with long-term conditions had heard of self-care training courses, with only a quarter of these people actually using them.⁹⁵

Almost any intervention that is designed to improve glucose control in diabetes or to reduce the probability of acute or chronic complications seeks to do so by influencing patient self-care behaviours. While early efforts focused on patient education, more recently the importance of behavioural interventions and structured education programmes recognises the fact that knowledge alone is insufficient to produce significant changes in behaviour.⁹⁶ Structured education programmes specifically for diabetes are now being used in the NHS, Diabetes Education and Self-Management for Ongoing and Newly Diagnosed (DESMOND), Dose Adjustment For Normal Eating (DAFNE) are being rolled out across the NHS. The DAFNE programme is thought to be able to pay for itself within four to five years due to the reduced complication rate expected through improved glucose control.⁹⁷ The scope for structured education programmes is promising; however, only 15,000 people with Type 1 diabetes have yet received the DAFNE programme.⁹⁸

Care planning is another initiative which seeks to further involve patients in the care of their own condition. It is the process of creating a package of care that is personal to the patient and involves collaborative working between the professional and patient so that each properly understand their needs and goals.⁹⁹ The 2008 White Paper, *High Quality Care for All*, committed that by 2010 all patients with a long-term condition would have a personalised care plan.¹⁰⁰ But the progress report in 2009 showed that only 60% of people with long-term conditions had a care plan in place.¹⁰¹ And when looking at patient surveys, only 32% of patients with long-term conditions believe they have sufficient care planning support from their primary care team – which is what care planning is all about.¹⁰²

The Year of Care, a programme developed by NHS Diabetes, found that patients actually follow their care plan when it is created collaboratively, as opposed to the doctor just giving them one.¹⁰³ There is, however, limited evidence that care planning translates into improved health outcomes.¹⁰⁴ Like the self-care training programmes outlined earlier, implementation of this policy has not met expectations. Only 48% of diabetes patients responding to a 2006 survey said they'd discussed their own ideas about managing their condition with a GP.¹⁰⁵

The introduction of National Service Frameworks (NSFs) for the first time set clear quality requirements for clinical care. These are essentially treatment protocols which are based on the best available evidence of what treatments and services work most effectively for patients. The National Service Framework for

88 Department of Health, *What is the Expert Patient Programme?*, accessed on 13th July 2010, see: http://webarchive.nationalarchives.gov.uk/+/www.dh.gov.uk/en/Aboutus/MinistersandDepartmentLeaders/ChiefMedicalOfficer/ProgressOnPolicy/ProgressBrowsableDocument/DH_5380860

89 Griffiths CJ, Motlib J, Azad A, Ramsay J, Eldridge S, Khanem R, et al. Randomised trial of a lay-led self-management programme for Bangladeshis in the UK with chronic disease. *Br J Gen Pract* 2005;55:837-42.

90 Buszewicz M, Rait G, Griffin M, Nazareth I, Patel A, Atkinson A, et al. Self management of arthritis in primary care: randomised controlled trial. *BMJ* 2006;333:879-83.

91 Kennedy A, Reeves D, Bower P, Lee V, Middleton E, Richardson G, et al. The effectiveness and cost effectiveness of a national lay-led self care support programme for patients with long-term conditions: a pragmatic randomised controlled trial. *J Epidemiol Community Health* 2007;61:254-61.

92 Rogers A, "Advancing the Expert Patient?", *Primary Health Care Research & Development*, vol 10, pp 167-176, 2009.

93 Griffiths et al., "How effective are expert patient (lay led) education programmes for chronic disease?" *BMJ*, pp 1254-1256, 2007.

94 Department of Health, *Self care: A National View in 2007 Compared to 2004-05 – Part 2: Views of People with Long Term Conditions*, prepared by MORI, 2008

95 Ibid.

96 Peyrot M. Behavior change in diabetes education. *Diabetes Educator*, 1999, 25: 62 - 73.

97 Shearer A, Bagust A, Sanderson D, Heller S, Roberts S. Cost-effectiveness of flexible intensive insulin management to enable dietary freedom in people with Type 1 diabetes in the UK. *Diabetic Medicine* 2004; 21 (5):460-67

98 Department of Health. Six Years On: Delivering the Diabetes National Service Framework (Feb 2010)

99 Department of Health, *High Quality Care for All: NHS Next Stage Review Final Report*, 2008.

100 Department of Health, *High Quality Care for All: NHS Next Stage Review Final Report*, 2008.

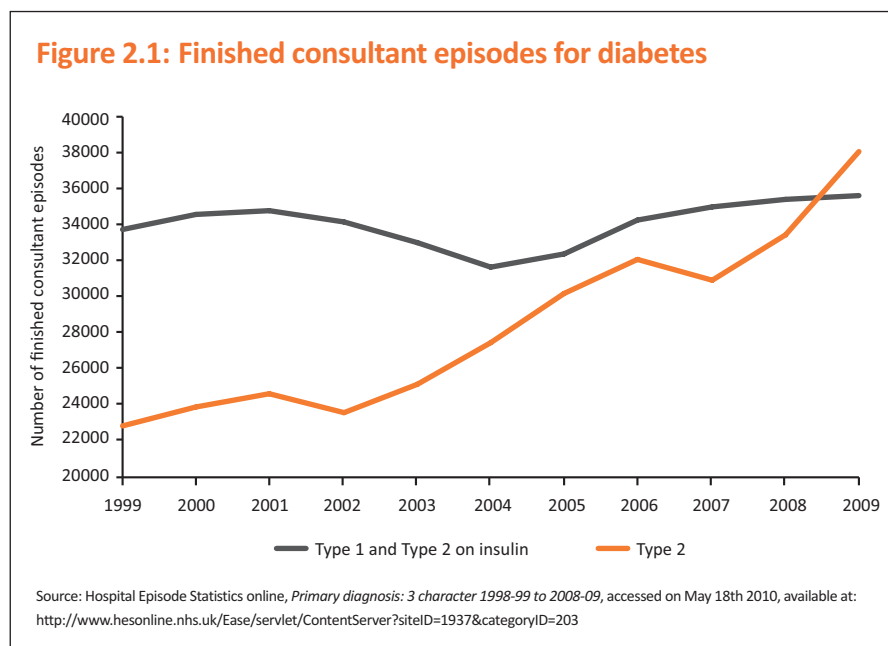
101 Darzi, A, *A year of progress towards High Quality Care for All*, Department of Health, 2009.

Diabetes comes in two parts. The first outlined a set of national standards aimed at improving health outcomes for people with diabetes. The second part – The Diabetes NSF Delivery Strategy – sets out the national targets against which local PCTs are to be judged. The NSF recommended as a minimum, every year, people with diabetes should expect to be checked for early signs of complications that can be treated; to have a care plan to which they have agreed; to have the name of someone to contact to guide them through the system at any stage, and the offer of appropriate information and education about diabetes both at diagnosis and as they need it.¹⁰⁶

The focus of the delivery strategy for the National Service Framework for Diabetes was to prevent people from developing serious complications and reducing admissions to hospital. This was to be achieved through the rigorous application of a set of indicators which monitored clinically agreed processes in diabetes care.¹⁰⁷ The specific targets include measurement of HbA1c levels; routine screening for diabetic retinopathy and blood pressure monitoring. However, despite the claims made for the various initiatives for improving the management of long-term conditions, hospital admissions for people with Type 2 diabetes have increased by a staggering 65% in the last decade.

Hospital admissions are increasing

Finished consultant episodes (FCEs) are a commonly used measure of a period of in-patient care provided by a particular consultant within a single hospital.¹⁰⁸ The graph below shows the increase in numbers of people with Type 2 diabetes admitted to hospital, from around 22,850 in 1999 to over 38,000 in 2009. Of course, some of the increase could be due to other factors, such as the four hour waiting target in A&E; the introduction of Payment by Results and population ageing.¹⁰⁹ And as we have shown earlier, prevalence rates for Type 2 diabetes have also risen slightly over the same period.



102 Department of Health, *Practice Report, Results of GP Patient Survey 2009/10; GP Practices in England – Planning Your Care*, accessed on July 19th 2010, see: <http://www.gp-patient.co.uk/results/>

103 NHS Diabetes, *Care Planning*, accessed on 13th July 2010, see: http://www.diabetes.nhs.uk/year_of_care/care_planning/

104 Lewin S, Skea Z, Entwistle VA, Zwarenstein M, Dick J. Interventions for providers to promote a patient-centred approach in clinical consultations. *Cochrane Database of Systematic Reviews* 2001, Issue 4. Art. No.: CD003267. DOI: 10.1002/14651858.CD003267

105 The Healthcare Commission, *Diabetes: The views of people with diabetes – Key findings from the 2006 survey*, 2006.

106 Department of Health. *National Service Framework for Diabetes: Delivery Strategy*. 2003.

107 Ibid.

108 The Department of Health, *Hospital Episode Statistics, 2007*, accessed on June 1, 2010, available at: http://www.dh.gov.uk/en/Publicationsandstatistics/Statistics/StatisticalWorkAreas/Statisticscalworkareaneighbourhood/DH_4116710

109 Blunt J, Bardsley M, Dixon J. Trends in Emergency Admissions in England 2004–2009. The Nuffield Trust. 2010.

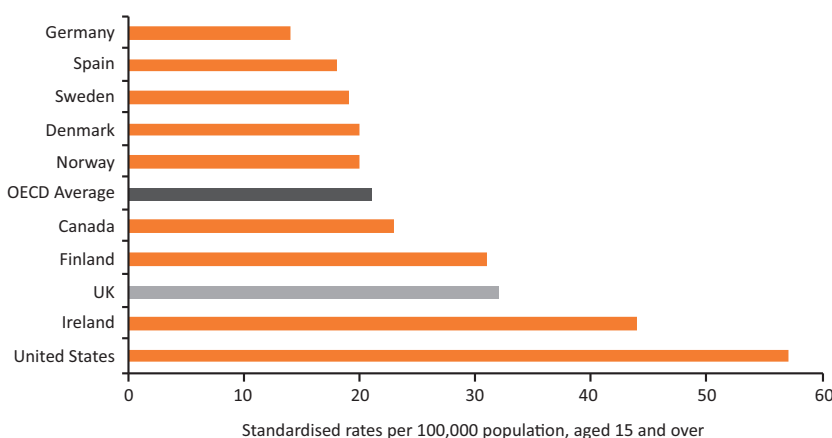
Type 1 and Type 2 on insulin

Hospital Episode Statistics (HES) the source for our above data on diabetes admissions, divide diabetes admissions by “insulin dependent” and “non-insulin dependent”. Since only a small number of people with Type 2 diabetes use insulin, the overwhelming majority of patients categorised as “insulin dependent” have Type 1 diabetes and all of the people categorised as “non-insulin dependent” will have Type 2 diabetes.

It is beyond the scope of this publication to disaggregate the relative contribution of the multiple factors behind the rise in hospital admissions; however, on any measure a 65% increase for Type 2 diabetes represents a huge failure to improve healthcare for people with diabetes. Each admission is enormously disruptive for the patient and their family, and many of them are avoidable because Type 2 diabetes can be controlled in primary care if patients take their medication. For a decade we have known that sustained tight control of blood glucose limits organ damage and vascular complications.^{110, 111} Something in the care management process is breaking down.

A recent OECD study looking at comparative data on hospital admissions for acute diabetes complications underlines the concerns about the quality of long-term condition management in the UK.¹¹² The study finds that the UK had the third highest admission rates in 2007 for avoidable complications due to diabetes, with 32 per 100,000 population.¹¹³ This was above the level of the admission rates seen in Canada, the Scandinavian countries and 50% greater than the OECD average of 21 per 100,000 population.¹¹⁴ The level of admissions for acute diabetic complications is regarded by the OECD as a suitable measure of the quality of care in general practice.¹¹⁵ However, we should also note that the OECD analysis of performance indicators fails to account for the variety of disease states, because important confounders (e.g. patients’ age and health status) are not adjusted for.¹¹⁶

Figure 2.2: Diabetes acute complications admission rates among OECD countries, 2007



Source: The Organisation for Economic Cooperation and Development (OECD), *Health at a Glance 2009*, 2009.

110 Ho M, et al. “Effect of Medication Nonadherence on Hospitalisation and Mortality among Patients with Diabetes Mellitus”, *Archives of Internal Medicine*, vol 166, pp 1836-1841, 2006.

111 UK Prospective Diabetes Study (UKPDS) Group, “Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): prospective observational study”, *BMJ*, vol 321, pp: 405-411, 2000.

112 The Organisation for Economic Cooperation and Development (OECD), *Health at a Glance 2009*, 2009.

113 Ibid.

114 Ibid.

115 Ibid.

116 Si D, Baillie R, Wang Z, Comparison of diabetes management in five countries for general and indigenous populations: an internet-based review. *BMC Health Services Research* 2010, 10:169doi:10.1186/1472-6963-10-169

Rise in emergencies due to diabetes

More concerning is the proportion of patients who are being admitted to hospital through the Accident & Emergency (A&E) department. In 2008/09, over three quarters (77%) of admissions for Type 1 and over half (56%) of admissions for Type 2 diabetes were emergency admissions, compared to about 35% for the NHS as a whole.¹¹⁷ These are serious life threatening circumstances when blood glucose levels become dangerously high (diabetic ketoacidosis) or dangerously low (hypoglycaemia) when patients are often in coma.¹¹⁸

Of course, the rise in emergency admissions for diabetes could be a result of other factors as noted previously, although it is beyond the scope of this publication to disaggregate the relative causes. However, research by the Nuffield Trust suggests that demographic pressures are only thought to account for 40% of the total increase in all emergency admissions from 2004 to 2009; and that the large rise in short-stay admissions suggests that the clinical threshold for acute admissions has been lowered.¹¹⁹ The Department of Health’s review of the Diabetes National Service Framework offers two further suggestions, “The reasons for this [increase in emergency admissions] are not clear; it could be due to the increasing number of people with diabetes, or poorer levels of care.”¹²⁰

117 Hospital Episode Statistics online, *Primary diagnosis: 3 character 2008-09*, accessed on May 18th 2010, available at: <http://www.hesonline.nhs.uk/Ease/servlet/ContentServer?siteID=1937&categoryID=203>

118 Boon A, Colledge N, Walker B, Hunter J, Davidson’s Principles and Practice of Medicine. 19th Edition.

119 Blunt J, Bardsley M, Dixon J. Trends in Emergency Admissions in England 2004–2009. The Nuffield Trust. 2010.

120 Department of Health. Six Years On: Delivering the Diabetes National Service Framework (Feb 2010)

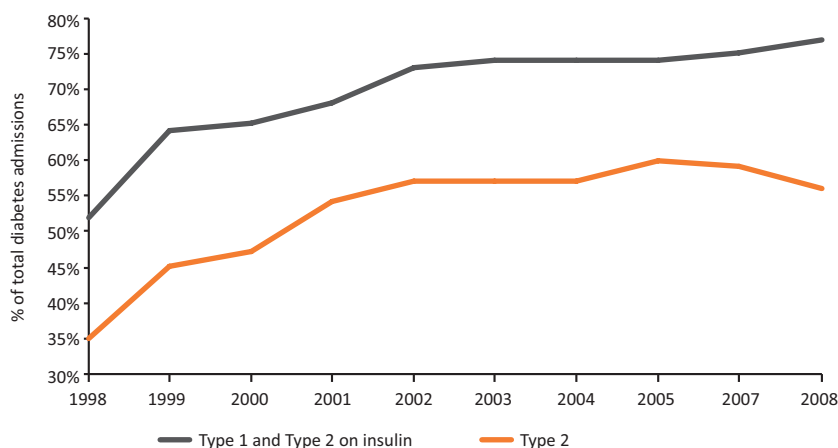
121 National Institute for Health and Clinical Excellence, *Type 1 diabetes in adults: National clinical guideline for diagnosis and management in primary and secondary care*, CG15, The National Collaborating Centre for Chronic Conditions, 2004.

122 National Institute for Health and Clinical Excellence, *Type 2 diabetes: National clinical guidelines for management in primary and secondary care (update)*, CG66, The National Collaborating Centre for Chronic Conditions, 2008.

123 NHS Information Centre, *The National Diabetes Audit Executive Summary 2008-2009*, 2010.

124 Diabetes UK, *Diabetes UK survey of people with diabetes and access to healthcare services 2009*, 2009.

Figure 2.3: Emergency admissions for diabetes



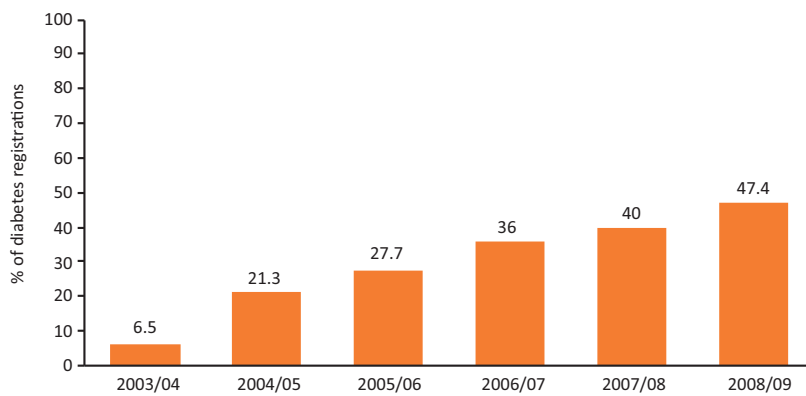
Source: Hospital Episode Statistics online, *Primary diagnosis: 3 character 1998-99 to 2008-09*, accessed on May 18th 2010, available at: <http://www.hesonline.nhs.uk/Ease/servlet/ContentServer?siteID=1937&categoryID=203>

Failure to deliver basic care processes for people with diabetes

The National Diabetes Audit tracks the quality of care for people with diabetes and is the world’s largest audit of its type. It specifically tracks whether people with diabetes are receiving the set of nine tests recommended by NICE at least once a year; including HbA1c levels; foot examination; eye examination, cholesterol testing, and urine testing.^{121, 122} This set of indicators helps monitor their long-term disease control. However, as we have pointed out earlier, the audit only covers 75% of patients with diabetes, leaving a substantial gap in information about care quality.¹²³ Furthermore, about 40% of patients say they don’t even get their test results back from their GP before their next check-up a year later, which does appear to undermine the rationale for testing.¹²⁴

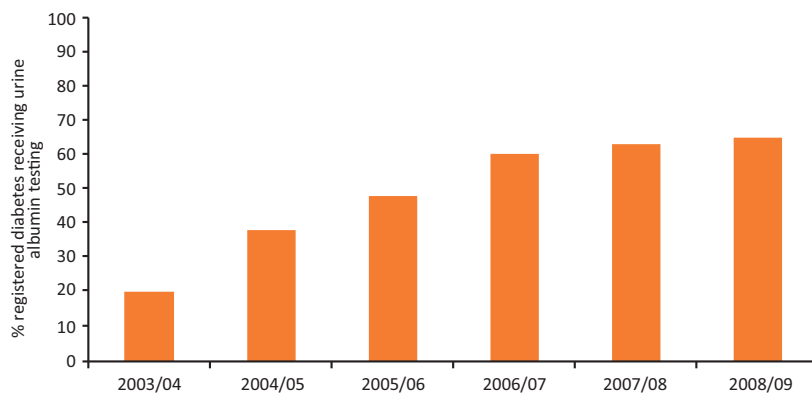
The results of the most recent audit show that many people with diabetes are still not receiving effective care, despite the fact that more are regularly seeing health professionals. In 2008/09, half of people with Type 2 diabetes and two thirds of those with Type 1 diabetes did not receive all of the nine essential care processes. Interestingly, however, there is no link between low levels of care processes and social deprivation which suggests a complete failure of policy rather than an association with inadequate supply of GP services in areas of deprivation.¹²⁵

Figure 2.4: Percentage of diabetics who are receiving all of their essential care processes



Source: The NHS Information Centre, *National Diabetes Audit*, reports for the years 2008/09, 2007/08, 2006/07, 2005/06.

Figure 2.5: Percentage of diabetics receiving urine albumin testing



Source: The NHS Information Centre, *National Diabetes Audit*, reports for the years 2008/09, 2007/08, 2006/07, 2005/06 and personal correspondence.

It would, of course, be unreasonable to expect 100% of people with diabetes to receive all of the nine recommended care processes, although the results are impressive for some individual tests: blood pressure is the most frequently recorded process with 97% of Type 2 and 89% of Type 1 people with diabetes tested in 2008/09. But highly

125 Department of Health. *Tackling Health Inequalities 10 years on*. 2009.

concerning is that the test which could detect the earliest stage of kidney disease – urine albumin levels – is taken less frequently than any other test, with only 68% of Type 2 and 51% of Type 1 people with diabetes receiving this test in 2008/09. The number of diabetics receiving this test has plateaued over the last three years at around 65%.

In 2008 NICE made a number of revisions to the recommended targets for some of the nine care processes. It increased the recommended target for blood pressure from $\leq 135/75$ mmHg in 2007/08 to $\leq 140/80$ mmHg for those without eye, kidney and vascular disease and $\leq 130/80$ mmHg for those with these complications. Even with this revision, only 69% of patients with Type 1 diabetes and 60.2% of patients with Type 2 diabetes met the $\leq 140/80$ mmHg target, regardless of eye, kidney or vascular disease.¹²⁶ NICE also changed targets for cholesterol levels in 2008, making them more stringent at <4.0 mmol/l, compared to the previous target of <5.0 mmol/l. The old target was met by 56.1% of Type 1 and 73.2% of Type 2 diabetics, under the new target this declined to 23.5% and 37.3% respectively.

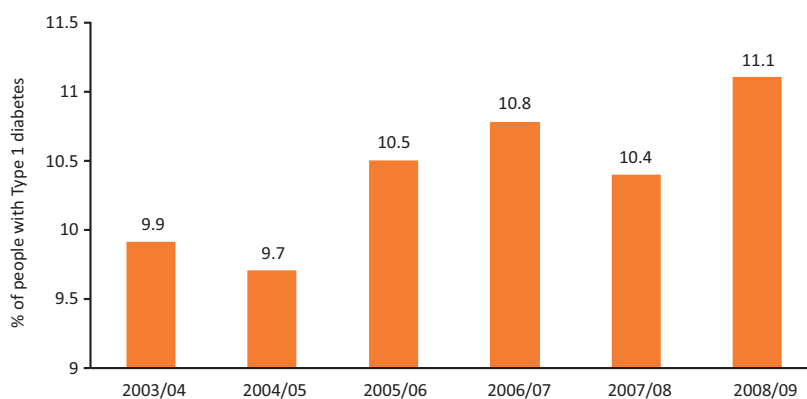
Table 2.1: Percent of people with diabetes not meeting NICE good health targets in 2008/09

	Glucose control (HbA1c 7.5% or less)	Obese BMI (BMI 30-34.9 kg/m ²)	Blood pressure (less than 135/75 mmHg)
Type 1	71.4%	73.7%	71.4%
Type 2	33.4%	49.8%	71.4%

Source: NHS Information Centre. The National Diabetes Audit, Executive Summary 2008-2009, 2010.

The poor progress in ensuring that all patients receive essential care processes is reflected in the increase in the number of people experiencing serious complications.¹²⁷ Diabetic ketoacidosis (DKA), is the most frequent complication for people with Type 1 diabetes; it is life-threatening and can result in a coma and neurological damage. It occurs when glucose levels are dangerously high and can readily be prevented with better insulin control. Over 11% of people with Type 1 diabetes had an episode of DKA in the past five years, and this a 10% increase since the introduction of the National Service Framework for Diabetes.¹²⁸

Figure 2.6: Diabetic emergencies: DKA



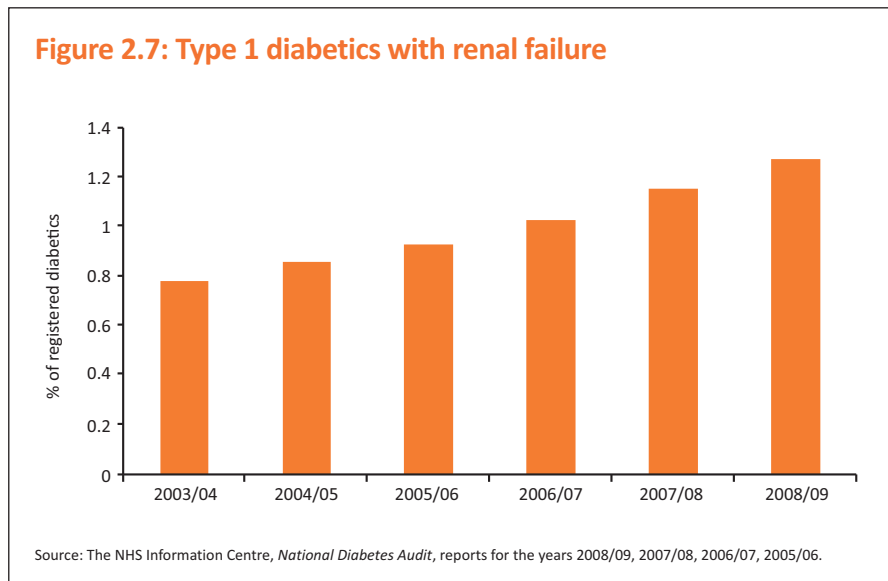
Source: The NHS Information Centre, National Diabetes Audit, reports for the years 2008/09, 2007/08, 2006/07, 2005/06

126 NHS Information Centre, *The National Diabetes Audit Executive Summary 2008-2009*, 2010.

127 Hospital Episode Statistics online, *Primary diagnosis: 3 character 1998-99 to 2008-09*, accessed on May 18th 2010, available at: <http://www.hesonline.nhs.uk/Ease/servlet/ContentServer?siteID=1937&categoryID=203>

128 NHS Information Centre, *The National Diabetes Audit Executive Summary 2008-2009*, 2010.

Renal failure is another life-threatening complication since affected patients will need life-long dialysis treatment and, for the most fortunate, kidney transplants hold out some hope of a normal life. However, the prevalence of this complication amongst people with diabetes has almost doubled in the past six years. The National Diabetes Audit calculates that in England 11,500 people with diabetes currently require dialysis or kidney transplantation. As noted previously, this complication can be detected early through urine albumin testing, the least frequently conducted care process.



These results for the NDA are in line with international comparisons on diabetes management which find that, although the UK has relatively high rates for testing markers of disease, such as HbA1c, the actual levels of those markers tend to be much worse.¹²⁹

GP performance

The Quality and Outcomes Framework was introduced in the 2004 General Medical Services contract, and sought to incentivise GPs to improve the quality of care for their patients by giving financial rewards for best practice.¹³⁰ GPs are awarded points based on whether they meet any of 129 indicators which relate to the four domains of: clinical practice; patient experience; GP practice organisation and a grouping of other additional services. A general criticism of QOF is that the indicators were set too low and studies have shown that GPs have achieved well above expected in the first year QOF was introduced.¹³¹

The QOF indicators relating to diabetes can be grouped into two general categories: first, the percentage of patients that meet a specific target for a clinical measure, such as HbA1c or blood pressure. Second, the percentage of patients that have received a test or screening for a clinical measure or the presence of a complication in the past 15 months.¹³² One specific indicator – and by implication financial reward – is for simply maintaining a register of all patients over 17 with either Type 1 or Type 2 diabetes.¹³³ Other indicators cover the same

129 Si D, Bailie R, Wang Z, Comparison of diabetes management in five countries for general and indigenous populations: an internet-based review. *BMC Health Services Research* 2010, 10:169doi:10.1186/1472-6963-10-169

130 The Health and Social Care Information Centre, *The Quality and Outcomes Framework Achievement Data 2008/09*, 2009.

131 Campbell S, et al., "Quality of Primary Care in England with the Introduction of Pay for Performance", *The New England Journal of Medicine*, vol 357, pp 181-190, 2007.

132 The Health and Social Care Information Centre, *The Quality and Outcomes Framework Achievement Data 2008/09*, 2009.

133 Ibid.

care processes as monitored by the National Diabetes Audit in that they monitor HbA1c; blood pressure; and other complications such as diabetic foot neuropathy.

Another criticism of QOF is that GPs receive financial benefits for simply testing a patient and no additional financial gains are received for treating them beyond the point where they meet QOF indicators.¹³⁴ The most recent QOF scores for all practices in England show that GP practices on average achieved 98.4% of all possible QOF points for diabetes care, which suggests that care for people with diabetes should be unparalleled. But, as we have shown earlier, the National Diabetes Audit finds that only half of Type 2 and a third of Type 1 diabetics received all their required care processes.¹³⁵ Meanwhile hospital admissions for people with diabetes are increasing as are serious complications such as renal failure, heart failure and stroke.¹³⁶

The principal reason for the wide disparity seen in the table below is that while the National Diabetes Audit looks at adherence to NICE care processes on an annual basis, the QOF indicators measure, and financially reward GPs for performing these tests within the previous 15 months. Moreover, NICE recommends that the nine indicators are performed on an annual basis, with HbA1c recorded every two to six months.^{137, 138}

Table 2.2: QOF indicators met v care processes received by patients

	National Diabetes Audit patients receiving all care processes (%)	Quality Outcomes Framework GPs providing all care processes (%)
2004/05	21.3	93.2
2005/06	27.7	97.4
2006/07	36.3	97.5
2007/08	40.0	98.0
2008/09	47.4	98.4

Source: The NHS Information Centre, *National Diabetes Audit*, reports for the years 2008/09, 2007/08, 2006/07, 2005/06. The NHS Information Centre, *QOF 2004/05-2008/09 data tables*, *National Clinical Data Tables*. See: <http://www.ic.nhs.uk/statistics-and-data-collections/audits-and-performance/the-quality-and-outcomes-framework>

Recommendation: The Quality and Outcomes Framework should be overhauled so that processes measures, such as albumin testing, are recorded on an annual basis with more frequent testing for HbA1c. Additional indicators for all long-term conditions should be developed which concentrate on outcome measures. For example in diabetes these would reward reduced numbers of people with diabetes suffering renal failure or being admitted to hospital with diabetic ketoacidosis.

Adherence to medications is poor

It is surprising to learn that people who are prescribed self-administered medications typically take less than half the doses prescribed.¹³⁹ Debate about medicines in the UK media usually concerns the rationing role of NICE; however, medicines compliance is a universal problem which imposes a considerable financial burden on modern health care systems.¹⁴⁰ Patients don't adhere to their

134 National Primary Care Research and Development Centre. Spotlight: What difference has QOF made? 2009.

135 The NHS Information Centre, *National Diabetes Audit, Executive Summary 2008/09*, 2010.

136 Ibid.

137 National Institute for Health and Clinical Excellence, *Type 1 diabetes in adults: National clinical guideline for diagnosis and management in primary and secondary care, CG15*, The National Collaborating Centre for Chronic Conditions, 2004.

138 National Institute for Health and Clinical Excellence, *Type 2 diabetes: National clinical guidelines for management in primary and secondary care (update)*. CG66, The National Collaborating Centre for Chronic Conditions, 2008.

139 Haynes RB, Ackloo E, Sahota N, McDonald HP, Yao X. Interventions for enhancing medication adherence. *Cochrane Database of Systematic Reviews* 2008, Issue 2. Art. No.: CD000011. DOI: 10.1002/14651858.CD00011.pub3

140 Vermeire E, et al., "Patient adherence to treatment: three decades of research. A comprehensive review" *Journal of Clinical Pharmacy and Therapeutics*, vol 26, pp331-342, 2001.

prescribed treatment for a number of different reasons: poor understanding of their condition; lack of clarity over the need for treatment; insufficient confidence in the clinician or medication; an overly complex dosing regimen or because of negative side effects.¹⁴¹

The extent of non-adherence is difficult to measure principally because patients don't want to admit that they aren't following their recommended treatment regime,¹⁴² and since adherence tends to decline over time patients with long-term conditions present the biggest challenge. One study of patients using statins, a blood cholesterol lowering medication, found that after a year adherence dropped to 50%.¹⁴³ A number of other studies have shown that medications adherence for chronic disease is generally around 50%.^{144, 145} A systematic review of adherence for cardiovascular disease and diabetes therapy found that only 59% of patients took their therapies more than 80% of the time.¹⁴⁶ And the picture of adherence to treatment in diabetes is complicated by the finding that there is variation in the different elements of the treatment regimen (i.e. self-monitoring of blood glucose; injection of insulin or taking oral anti-hyperglycaemic agents, diet and other self-care practices).¹⁴⁷

But adherence is just another process measure; it is a means to an end. Interventions to increase adherence consume resources and, at least in theory, could increase adverse effects of the prescribed medication, although for diabetes beneficial effects of adherence are far greater.¹⁴⁸ It will come as no surprise that studies have found that medication non-adherence among people with diabetes coincides with higher levels of blood glucose, blood pressure, cholesterol and all-cause hospitalisation.¹⁴⁹ These general findings add weight to the assessment by the National Diabetes Audit of the increase in the number of emergency admissions for Type 1 diabetes, "This must mean that more people with Type 1 are sometimes omitting insulin now than six years ago". So there is a substantial group of patients that are not properly managing their diabetes and part of the solution may simply be motivating people to take their medication. The cost savings seem intuitive and are backed by studies looking specifically at diabetes which have demonstrated that higher medications adherence results in lower medical costs.¹⁵⁰ However, simply improving medication adherence will not automatically translate into clinical benefits for the patient and so any proposed solution needs to evaluate both adherence and clinical outcomes.

Generally, interventions to improve adherence can be grouped into four categories: patient education, improved dosing schedules, increased access to a healthcare professional and improved communication between physicians and patients.¹⁵¹ In cases where interventions are successful they often involve a complex combination of these four elements because multiple factors that contributes to poor adherence.¹⁵² For example, bi-weekly automated telephone assessments and self-care education calls with a nurse were found to improve medication adherence among diabetics.¹⁵³ Another successful intervention for diabetes treatment adherence included the patient's entire family in problem-solving and communication skills training, sessions to psychologically restructure family behaviours that reinforce non-adherence and family and patient therapy sessions.¹⁵⁴ While these and other interventions are successful their complexity means they are hard (although not impossible) to reproduce outside of a research environment, especially when cost-containment is a priority.¹⁵⁵

141 Vlasnik J, et al., "Medication Adherence: Factors Influencing Compliance with Prescribed Medication Plans", *The Case Manager*, vol 16, pp 47-51, 2005.

142 Vermeire E, et al., "Patient adherence to treatment: three decades of research. A comprehensive review" *Journal of Clinical Pharmacy and Therapeutics*, vol 26, pp331-342, 2001.

143 Benner JS, et al., "Long-term persistence in use of statin therapy in elderly patients", *JAMA*, vol 288, pp 455-461, 2002.

144 Schlenk EA, et al., Behavioural strategies to improve medication-taking compliance, in Burke LE and Ockene IS (eds), *Compliance in Healthcare and Research*, New York: Futura Publishing Co. 2001.

145 Haynes RB, Ackloo E, Sahota N, McDonald HP, Yao X. Interventions for enhancing medication adherence. *Cochrane Database of Systematic Reviews* 2008, Issue 2. Art. No.: CD000011. DOI: 10.1002/14651858.CD000011.pub3

146 Cramer JA, et al., "The significance of compliance and persistence in the treatment of diabetes, hypertension and dyslipidaemia: a review", *International Journal of Clinical Practice*, vol 62, pp 76-87, 2008.

147 The World Health Organisation, *Adherence to Long Term Therapies: Evidence for Action, Section III, Chapter X – Diabetes*, Geneva: WHO, 2003.

148 Haynes RB, Ackloo E, Sahota N, McDonald HP, Yao X. Interventions for enhancing medication adherence. *Cochrane Database of Systematic Reviews* 2008, Issue 2. Art. No.: CD000011. DOI: 10.1002/14651858.CD000011.pub3

149 Ho M, et al., "Effect of Medication Nonadherence on Hospitalisation and Mortality Among Patients with Diabetes Mellitus", *Archives of Internal Medicine*, vol 166, pp 1836-1841, 2006.

150 Sokol M et al., "Impact of Medication Adherence on Hospitalisation Risk and Healthcare Cost", *Medical Care*, vol 43, pp 521-530, 2000.

151 Osterberb L and Blaschke T, "Adherence to Medication", *The New England Journal of Medicine*, vol 353, pp 487-97, 2005.

152 Ibid.

153 Piette JD, et al., "Do automated calls with nurse follow-up improve selfcare and glycemic control among vulnerable patients with diabetes?" *The American Journal of Emergency Medicine*, vol 108, pp 20–7, 2000.

154 Wysocki T, et al., "Behaviour Therapy for Families of Adolescents with diabetes: maintenance of treatment effects", *Diabetes Care*, vol 24, pp 441-446, 2001.

155 Haynes RB, et al., *Interventions for enhancing medication adherence (Review)*, Cochrane Database Systematic Review, Issue 7, 2010.

156 Nunes V, et al., *Clinical Guidelines and Evidence Review for Medicines Adherence: involving patients in decisions about prescribed medicines and supporting adherence*. National Collaborating Centre for Primary Care and Royal College of General Practitioners, 2009.

157 Vermeire E, et al., "The adherence of type 2 diabetes patients to their therapeutic regimens: a qualitative study from the patient's perspective" *Practical Diabetes International*, vol 20, pp: 209-214, 2003.

158 Green L, Myerson J. A Discounting Framework for Choice with Delayed and Probabilistic Rewards. *Psychological Bulletin*, Vol 130(5), Sep 2004, 769-792. doi: 10.1037/0033-2909.130.5.769

159 Haynes RB, Ackloo E, Sahota N, McDonald HP, Yao X. Interventions for enhancing medication adherence. *Cochrane Database of Systematic Reviews* 2008, Issue 2. Art. No.: CD000011. DOI: 10.1002/14651858.CD000011.pub3

The Royal College of General Practitioners stress, quite rightly, that non-adherence should not be considered the fault of the patient, but rather it is a failure of the healthcare system to provide support for patients as they care for their long-term conditions.¹⁵⁶ Indeed, qualitative data from people with diabetes cite as reasons for non-adherence their poor knowledge of their own disease and being given incomplete information on how to adjust their medication or treatment depending on their blood glucose levels. Patients also commonly reported that their daily health was largely irrespective of how they took their medications and the risk of future complications was seen as too intangible to get them to change their behaviour.¹⁵⁷ The tendency of people to discount rewards, or health benefits, that appear some way off in the future is a well-recognised phenomenon.¹⁵⁸

A Cochrane Review of interventions for enhancing medication adherence offers some important insights. Of the studies which reported statistically significant improvements in outcomes for long-term conditions almost all the effective interventions were highly complex. They included combinations of more convenient care, information, reminders, self-monitoring, reinforcement, counselling, family therapy, psychological therapy, crisis intervention, manual telephone follow-up, and supportive care.¹⁵⁹ If there is a common thread; it is more frequent interaction with patients, giving specific attention to adherence.

3

Why Hasn't Technology Transformed Long-term Condition Management?

In an event at Policy Exchange, Dr Molly Coye, widely regarded as one of the world's leaders on the use of information technology in healthcare, presented evidence of a transformative new treatment in long-term condition management.¹⁶⁰ The results of a study which focussed on cardiovascular disease were impressive: a 63% reduction in cardiac-related hospitalisations, with a 72% reduction in hospital admissions for heart failure.¹⁶¹ The new treatment wasn't a fantastic new blockbuster drug, but rather the use of information and communication technologies for enabling remote patient management.

Dr Coye listed other trials of remote patient management among clinical groups such as high risk patients with diabetes which had seen a 32% reduction in inpatient admissions; 34% in A&E attendances, and 49% reduction in outpatient visits. There is huge potential for technology to transform the management of long-term conditions and improve the quality of care for people with diseases such as diabetes. But, as Dr Coye highlighted, these savings are not accomplished by merely connecting a sensing device in the home; they require substantial reorganization of models of care, and a funding system that rewards disruptive leaps forward in performance.

Poor spread of technology in the NHS

A previous Policy Exchange report, *All Change Please*, highlighted the NHS's inability to spread new medical technologies even when their effectiveness is backed by strong evidence.¹⁶² The UK is one of the slowest adopters of new health technologies, falling dramatically behind countries like Canada, France, Sweden and Spain;¹⁶³ and as a consequence our overall health outcomes are significantly behind that of comparable countries.¹⁶⁴ Spending on health technologies is reflective of low adoption, with only 4.5% of the NHS budget being spent on technological innovation, compared to the European average of 6.3%.¹⁶⁵

Technologies that help enable both diagnosis and treatments have the potential to improve the way healthcare is delivered, but both Computerised Tomography (CT) and Magnetic Resonance Imaging (MRI) scanners are a classic example of poor technology adoption. Despite huge investment in the NHS, the UK falls below the European and international averages for the provision of these effective

160 Coye MJ, HealthTech Presentation to Policy Exchange, "Transformation in Chronic Disease Management Through Technology: Improving Productivity and Quality in the Shift From Acute to Home Based Settings", 24 June 2009.

161 SPAN-CHF II: Tufts-New England Medical Center; Lahey Clinic; Beth Israel-Deaconess Medical Center; Rhode Island Hospital. Weintraub et al AHA 2005

162 Barlow J and Burn J, *All Change Please: Putting the best new healthcare ideas into practice*, Policy Exchange, 2008.

163 Packer C, et al., "International diffusion of new health technologies: A ten-country analysis of six health technologies", *International Journal of Technology Assessment in Healthcare*, vol 22, pp 419-428, 2006.

164 Nolte E, McKee CM. *Measuring The Health Of Nations: Updating An Earlier Analysis*. *Health Affairs*, 27, no. 1 (2008): 58-71 doi: 10.1377/hlthaff.27.1.58

165 The Medical Technologies Group, *Briefing: Good Technologies Going to Waste*, 2009.

166 Leatherman S and Sutherland K, *The quest for quality in the NHS: a mid-term evaluation of the 10-year quality agenda*, The Nuffield Trust, 2003.

167 Organization for Economic Co-operation and Development. *Health at a Glance 2009*. 2009.

168 Bentzen SM, et al., "Towards evidence-based guidelines for radiotherapy infrastructure and staffing needs in Europe: the ESTRO QUARTS project", *Radiotherapy and Oncology*, vol 75, pp 355-365, 2005.

169 National Radiotherapy Advisory Group, *Radiotherapy: developing a world class service for England*, 2007.

170 The Medical Technologies Group, *Briefing: Good Technologies Going to Waste*, 2009.

171 Tattersall RB, Home blood glucose monitoring. *Diabetologia* 1979 Volume 16, Number 2, 71-74, DOI: 10.1007/BF01225453

172 Misso M, et al., *Continuous subcutaneous insulin infusion (CSII) versus multiple insulin injections for type 1 diabetes mellitus*, The Cochrane Collaboration, 2010.

173 Hoogma R, et al., "Comparison of the effects of continuous subcutaneous insulin infusion (CSII) and NPH-based multiple daily insulin injections (MDI) on glycaemic control and quality of life: results of the 5-nations trial", *Diabetic Medicine*, vol 23, pp: 141-147, 2005.

174 Misso M, et al., *Continuous subcutaneous insulin infusion (CSII) versus multiple insulin injections for type 1 diabetes mellitus*, The Cochrane Collaboration, 2010.

175 NICE Technology Appraisal Guidance 151. *Costing template for Diabetes – insulin pump therapy*. 2008.

176 Selam JL, "CSII in Europe: where we are, where are we going? An analysis of articles published in Infusystems International", *Diabetes Research and Clinical Practice*, vol 74, pp: S123-S126, 2006.

177 The National Institute for Health and Clinical Innovation, *Continuous subcutaneous insulin infusion for the treatment of diabetes mellitus: Review of technology appraisal guidance 57*, 2008.

178 Ulahannan T, et al., "Making the case for insulin pump therapy", *Practical Diabetes International*, vol 24, pp:252-256, 2007.

technologies.^{166, 167} Radiotherapy is a key component in cancer treatment, but the UK ranks tenth of 13 European countries in radiotherapy provision based on the needs of the population, alongside countries from Eastern Europe and significantly behind Sweden, France, Belgium and Germany.¹⁶⁸ There is an estimated 63% gap between the need for and the delivery of radiotherapy, with a 91% increase in activity levels needed to meet the demands of the growing cancer population.¹⁶⁹ Implantable Cardioverter Defibrillators (ICDs) are another clinically effective technology with poor uptake in the NHS. ICDs help to prevent heart attacks and heart failure; and when combined with certain drugs can result in a 50% reduction in cardiac deaths. Yet uptake in the UK is 30% lower than the European average.¹⁷⁰

Before 1980 people with diabetes could only monitor their blood glucose levels indirectly through urine testing. However, technological advance which has seen the development of glucose oxidase sticks and reflectance meters has brought blood glucose testing out of hospital into people's homes. Moreover, when patients moved from measuring blood rather than urinary glucose they were found to understand the disease better, become more motivated and glucose control was greatly improved.¹⁷¹ The development of cheaper and more portable machines has followed over the last 30 years and now virtually all people with Type 1 diabetes and many people with Type 2 diabetes have blood glucose meters.

Insulin pumps are another example of a technology that could improve treatment for people with diabetes, but at present this technology is not reaching patients because the NHS business model focuses on treating sickness, not ensuring wellness. Insulin pumps offer an alternative to multiple daily injections for people with diabetes; they help people achieve much better glucose control than injections and result in fewer and less severe incidences of low blood sugar (hypoglycaemia) as they supply a continuous stream of insulin, with increased doses before meals.^{172, 173} Pumps also give people much more flexibility in their daily lives because most pumps are the size of a mobile phone and can be attached discreetly to a patient's body.¹⁷⁴

Interestingly, NICE estimates of the uptake of insulin pumps at 12% are based on "anecdotal evidence", whereas the Medical Technology Group suggests that, in England, the use of insulin pumps is limited to about 4-5% of people with Type 1 diabetes.¹⁷⁵ Of course insulin pumps are not suitable for everyone; however, across Europe uptake is between 10-20% and in the USA as high as 25%.¹⁷⁶ Part of the reason behind the poor uptake in England is that NICE guidance restricts insulin pumps to people that have demonstrated consistently bad diabetes control. For example, the requirement of first showing consistently high blood glucose levels – as measured by HbA1c – and frequent episodes of low blood sugar (hypoglycaemia), typically caused by too much insulin administration.¹⁷⁷ Whereas from a clinical perspective maintaining good HbA1c control reduces the risk of long-term complications, low blood sugar levels can quickly cause brain damage and death. The NICE criteria are a barrier to adoption – with the associated risk of disastrous complications – rather than viewing the technology as a way to improve patient care and create savings by preventing hospital admissions and unnecessary primary care visits.¹⁷⁸

Not only do insulin pumps result in fewer admissions for people with Type 1 diabetes, but patients are more satisfied with their health than those on daily

injection therapy.¹⁷⁹ Studies have found that patients using insulin pumps have a lower perception of diabetes-specific restrictions and that they feel less limited in aspects related to their diet and everyday activities.^{180, 181} The importance of including patient satisfaction in healthcare decision-making is growing in the UK and internationally.¹⁸²

At long last the NHS has begun to measure patients' views through Patient Reported Outcome Measures (PROMs), which have been implemented from 2009.¹⁸³ PROMs are series of structured questions that ask patients about their health, not about the quality of specific services they've received, with the purpose of producing a measure for health, not service quality.¹⁸⁴ Indeed, Policy Exchange first recommended the use of outcome measures, including PROMs, in our report *Measure for Measure* back in 2007. PROMs are not yet part of care for people with diabetes, but the 2010 White Paper, *Equality and excellence: Liberating the NHS* promises to expand their validity, collection and use. As PROMs begin to take hold in the NHS and people are able to choose their GP practice, then those GP practices which provide insulin pumps for their diabetic patients will have improved health outcomes and happier patients.

“Not only do insulin pumps result in fewer admissions for people with Type 1 diabetes, but patients are more satisfied with their health than those on daily injection therapy”

NHS payment system promotes fee for service, not incentivising wellness

While the 2010 White Paper, *Equality and excellence: Liberating the NHS*, will radically change NHS funding structures in the future it is important to understand how NHS funding arrangements currently produce incentives to treat sickness rather than maintain wellness.

At present NHS funds are allocated to PCTs to contract with primary care providers such as GP practices. Under the 2004 General Medical Services (GMS) contract, each GP practice is funded through the Global Sum payment, essentially a capitated payment, which includes provision for staff costs. The Global Sum payments are allocated to each GP practice by its PCT according to the practices weighted population. However, it should be noted that currently these allocations are only indicative amounts, whereas the White Paper reforms will give real budgets to GP practices. There are also a number of fixed payments to GPs, such as the Minimum Practice Income Guarantee (MPIG), which ensures that practices maintain historic levels of income; and additional seniority payments for long-standing service. The QOF payments which seek to financially incentivise best practice typically account for 25% of GP practice income, costing the NHS about £1 billion per year. Therefore, current primary care payment mechanisms reward GPs for diagnosis and providing a set level of care – as measured by QOF – but as we have seen earlier the number of avoidable hospital admissions and serious complications for people with diabetes is increasing.

NHS hospitals, on the other hand, are funded through a system where payment is based on the quantity of services they provide. Payment by Results was introduced to improve efficiency, facilitate choice, enable service innovation and improvements in quality. It uses a national tariff of fixed prices that reflect national

179 Hoogma R, et al., “Comparison of the effects of continuous subcutaneous insulin infusion (CS11) and NPH-based multiple daily insulin injections (MDI) on glycaemic control and quality of life: results of the 5-nations trial”, *Diabetic Medicine*, vol 23, pp: 141-147, 2005.

180 Nicolucci A, et al., “Quality of life and treatment satisfaction in adult Type 1 diabetes: a comparison between continuous subcutaneous insulin infusion and multiple daily injections” *Diabetic Medicine*, vol 25, pp: 213-220, 2008.

181 Hoogma R, et al., “Comparison of the effects of continuous subcutaneous insulin infusion (CS11) and NPH-based multiple daily insulin injections (MDI) on glycaemic control and quality of life: results of the 5-nations trial”, *Diabetic Medicine*, vol 23, pp: 141-147, 2005.

182 Appleby J and Devlin N, *Getting the most out of PROMs: Putting health outcomes at the heart of NHS decision-making*, The King's Fund, 2010.

183 The Department of Health, *The Operating Framework for the NHS of England 2008/09*, 2007.

184 Appleby J and Devlin N, *Getting the most out of PROMs: Putting health outcomes at the heart of NHS decision-making*, The King's Fund, 2010.

average prices for hospital procedures. However, this is a fee for service payment system so a hospital benefits from seeing more patients. To put it crudely – more admissions mean more income. Indeed, research by the Nuffield Trust into the rise in emergency admissions suggests that the clinical threshold for admission has been reduced.¹⁸⁵

By becoming ever more complex and focussing on subspecialties hospitals around the world are no-longer suitable for the needs of most patients with long-term conditions.¹⁸⁶ The level of medical care provided by a modern acute NHS hospital enables them to address the needs of a relatively small population of very sick patients, but in doing so the needs of a much larger group of patients with much less complex cases are no-longer catered for. Many of the patients in hospital 20 years ago are not there today; they're being treated in primary care settings and receiving sub-optimal care and being admitted to hospital for relatively trivial reasons.

The division of the funding structures in the NHS means that GP practices aren't rewarded for providing improved services to people with diabetes, but perversely hospitals receive payments when patients become sicker. There is no incentive mechanism in the NHS to improve medicines compliance; no financial rewards for actively reducing the number of avoidable hospital admissions; or for ensuring that people at risk of developing diabetes do not become a statistic in one of the major public health challenges of the 21st century.

In the USA powerful institutions in the healthcare system fight against simpler alternatives to complex and expensive treatments because those alternatives threaten their livelihoods.¹⁸⁷ Aided by the NHS payment system, the NHS fights to maintain its existing structures of GP practices and acute hospitals, and this limits the spread of new treatments and technologies which require new models of care. That the NHS doesn't adopt and spread new technologies, such as insulin pumps or ICDs, is because they will disrupt the status quo. As Professor Paul Corrigan often remarks in relation to the NHS, "Culture eats strategy for breakfast."¹⁸⁸

Of course the aim of technological advance in treating patients with long-term conditions should be fewer hospital admissions; fewer attendances at A&E and fewer outpatient visits. This is a good thing, especially for the patients concerned. However, the consequence of this progress would be a reduction in hospital income which means potentially needing fewer doctors, fewer nurses and, in the long-run, fewer hospitals. This trade off in utilising new technologies to improve health outcomes needs to be made explicit and explained to the public.

Under the previous Government the strategy for improving the NHS was through purchasing more and more of the existing model of care. Investment on unprecedented levels has been used to buy more doctors, more nurses and newer hospital buildings. The political rhetoric of the last 12 years has been, "more, more, more", so the public come to equate *more* with *better*. And so the converse is true: service reconfigurations which are based on sound clinical evidence and require some transfer of services from one hospital to another are regarded as bad thing by the public and their elected representatives. Service reconfigurations are seen as "cuts" (and therefore a worse NHS), whereas in reality fewer people being admitted to hospital as a result of their long-term conditions is progress.

¹⁸⁵ Blunt I, Bardsley M, Dixon J. Trends in Emergency Admissions in England 2004–2009. The Nuffield Trust. 2010.

¹⁸⁶ Christensen C, et al., "Will Disruptive Innovations Cure Health Care?" *Harvard Business Review*, September-October 2000.

¹⁸⁷ Ibid.

¹⁸⁸ Moyes B, Corrigan P. Future Foundations: towards a new culture in the NHS. Policy Exchange, 2010.

The benefits of technology in healthcare

The potential for technology to transform the delivery of healthcare has not yet been realised. Telemedicine has a wide scope, from remote consultations bringing distant doctors and patients together, to in-home monitoring of elderly and vulnerable people, to the use of text messaging and email allowing doctors to communicate with patients.¹⁸⁹ Telemonitoring broadly refers to the remote monitoring of patient's vital signs, such as blood pressure and HbA1c.¹⁹⁰ Currently GP's are rewarded financially for measuring these vital signs once every 15 months, but with telemonitoring health professionals can see patients' vital signs as they are recorded, on a daily basis. Clinical monitoring can be automated through the use of sophisticated algorithms with doctors being alerted once pre-determined clinical thresholds are breached. The goal of telemonitoring people with long-term conditions is to fill the gap between the GP practices and the hospital, and motivate people to adhere to their treatment.

Although the deployment of technology intuitively seems able to improve healthcare, systematic reviews of telemedicine have concluded that the evidence for improving outcomes and reducing costs is uncertain.¹⁹¹ However, we should add the caveat that most of the uncertainty about the benefits comes from a lack of well conducted research, and not necessarily because the interventions themselves don't work.^{192, 193, 194} As a result, the Department of Health is currently engaged in the largest trial of telehealth & telecare in the UK. The Whole System Demonstrators (WSD) is a programme of evaluation across three sites in Kent, Cornwall and the London Borough of Newham which are investigating the benefits of telehealth & telecare. In this context telehealth is the use of ICT aimed at helping people manage their long term health conditions in their own home, whereas telecare is the enablement of ICT to allow vulnerable people who need the support of Social Care or Health Services to keep living on their own.¹⁹⁵

The WSD study is following a total of 6,000 people, including those with Chronic Obstructive Pulmonary Disease (COPD), heart failure and diabetes, and also adults with health and social care needs who are at increased risk of hospital admission. The programme will assess the impact of ICT on emergency admissions; the number of hospital bed days used; patient and carer experience; quality of life and the effects on primary care. The WSD programme is expected to report soon.

In advance of the WSD results we have considered a number of studies which have looked at how elements of the long-term condition pathway or adherence to treatment can be improved through the use of technology. Again with the advent of Patient Reported Outcome Measures (PROMS) forming part of the payment structure in the NHS, it is important to note that people tend to report positive experiences with telemonitoring and that they are generally satisfied with the systems and processes used.¹⁹⁶

Reminders and monitoring without clinician support

It is widely recognised that stable blood glucose control is difficult to achieve in children and adolescents with diabetes, with adherence to treatment being one of the main influencing factors for improved control.^{197, 198, 199} Engaging patients in understanding more about their condition is a key success factor in improving health outcomes at lower overall costs.²⁰⁰ Specifically with respect to children and

189 Urquhart C and Wainwright P, *Telemedicine versus face to face patient care: effects on professional practice and health care outcomes*, The Cochrane Database of Systematic Reviews, Issue 2, 2000.

190 Barlow J, et al., "A systematic review of the benefits of home telecare for frail elderly people and those with long-term conditions" *Journal of Telemedicine and Telecare*, vol 13, pp 172-179, 2007.

191 Ibid.

192 Bensink M, et al., "A systematic review of successes and failures in home telehealth", *Journal of Telemedicine and Telecare*, vol 12 suppl. 3, pp 8-16, 2006.

193 Barlow J, et al., "A systematic review of the benefits of home telecare for frail elderly people and those with long-term conditions" *Journal of Telemedicine and Telecare*, vol 13, pp 172-179, 2007.

194 Bergamo T, "Can economic evaluation in telemedicine be trusted? A systematic review of the literature", *Cost Effectiveness and Resource Allocation*, vol 7, pp 18-28, 2009.

195 Department of Health. Whole Systems Demonstrators: an overview of telecare and telehealth. 2009.

196 Paré G, et al., "Systematic Review of Home Telemonitoring for Chronic Diseases: The Evidence Base", *Journal of the American Medical Informatics Association*, vol 14, pp 269-277, 2007.

197 Mortensen H, Hougaard P, "Comparison of metabolic control in a cross-sectional study of 2,873 children and adolescents with IDDM from 18 countries", *Diabetes Care*, vol 20, pp 714-720, 1997.

198 Amiel S, et al. Impaired Insulin Action in Puberty. *N Engl J Med* 1986; 315:215-9

199 Hoey H. Psychosocial factors are associated with metabolic control in adolescents: research from the Hvidoere Study Group on Childhood Diabetes. *Pediatr Diabetes*. 2009 Dec;10 Suppl 13:9-14.

200 Wanless, D. Securing our Future Health: Taking a Long-Term View. HM Treasury. 2002

201 Franklin V, et al., "A randomised control trial of Sweet Talk, a text-message system to support young people with diabetes", *Diabetic Medicine*, vol 23, pp 1332-1338, 2006.

202 Atun RA, "Use of mobile technologies to enhance control of type 1 diabetes in young people: economic evaluation", The Vodafone Policy Paper Series, vol 4, 2006.

203 Franklin VL, et al., "A randomised control trial of Sweet Talk, a text-message system to support young people with diabetes", *Diabetic Medicine*, vol 23, pp 1332-1338, 2006.

204 Ibid.

205 Atun RA, "Use of mobile technologies to enhance control of type 1 diabetes in young people: economic evaluation", The Vodafone Policy Paper Series, vol 4, 2006.

206 Bergenstal R, et al., "Impact of Modem-Transferred Blood Glucose Data on Clinician Work Efficiency and Patient Glycemic Control", *Diabetes Technology & Therapeutics*, vol 7, pp: 214-247, 2005.

207 Barlow J, et al., "A systematic review of the benefits of home telecare for frail elderly people and those with long-term conditions" *Journal of Telemedicine and Telecare*, vol 13, pp 172-179, 2007.

208 Ibid.

209 Piette JD, "Do automated calls with nurse follow-up improve self-care and glycemic control among vulnerable patients with diabetes?" *American Journal of Medicine*, vol 108, pp 20-7, 1998.

210 Farmer A, et al. "Randomized Controlled Trial of the Effect of Real-Time Telemedicine Support on Glycemic Control in Young Adults With Type 1 Diabetes", *Diabetes Care*, vol 28, pp 2697-2702, 2005.

211 Cherry JC, et al., "Diabetes Disease Management Program for an Indigent Population Empowered by Telemedicine Technology", *Diabetes Technology & Therapeutics*, vol 4, pp 783-791, 2002.

212 Chumbler N, et al., "Health Services Utilisation of a Care Coordination/Home-Telehealth Program for Veterans with Diabetes: a matched-cohort study", *Journal of Ambulatory Care Management*, vol 28, pp 230-240, 2005.

adolescents frequent communication about their condition can also help them feel like they have more control over their care.²⁰¹

The use of existing technologies to improve patient engagement have been studied and text messaging reminders to children and adolescents was found to be an effective way of improving adherence among this hard-to-reach group.²⁰² For example, a programme has been developed and trialled in the UK that targets young people with Type 1 diabetes and sends them appropriately tailored messages to reinforce their personal care goals.²⁰³ Text messages are related to all areas of treatment, some examples being: "Fruit, celery or carrot sticks, pretzels, plain popcorn make healthy snack" and "Don't 4get 2 inject!" When combined with intensive therapies, like insulin pumps, the patients on the programme saw improvements in their HbA1c levels and even those without insulin pumps had higher self-reported adherence and felt increasingly confident to manage their care independently.²⁰⁴ These programmes are delivered at relatively low cost, with the major cost burden coming from the insulin pump needed for intensive therapy.²⁰⁵

However, prompting patients to self-care through one-way communication is not a panacea. Other studies which examined the effect of patients sending their vital information to a clinician through existing consumer technologies such as a mobile phone have demonstrated mixed results.²⁰⁶ A key systematic review of telemedicine found that one-way lines of communication may not always be sufficient to produce improvements in clinical outcomes.²⁰⁷ Moreover, the most effective interventions for both improving clinical indicators and reducing costs are those which combine the automated monitoring of vital signs with telephone follow-up by trained clinicians, usually nurses.²⁰⁸

Patient monitoring with clinician support

Automated follow-up with patients in the form of nurse calls have been found to improve glucose self-monitoring, foot inspection and weight monitoring at follow-up, although early studies found little change in HbA1c levels.²⁰⁹ While some studies have failed to find any substantial difference in clinical outcomes when a nurse is involved in care management, more evidence points to improved outcomes than away from it.²¹⁰ One review of remote monitoring with nurse follow-up and guidance led to reductions in inpatient hospitalisations, and a tripling in medications adherence rates among deprived populations in the US.²¹¹ Other studies focussing on continuing and daily telephone support have found reduced or delayed hospital admissions and lower associated costs in people with diabetes.^{212, 213} More generally, interventions with nurse follow-up are found to be cost-effective, although it should be noted that these studies were US-based where baseline costs are considerably higher.²¹⁴

Specific studies examining telemonitoring with nurse follow-up have demonstrated only small effects on blood sugar control; however, the key point is that this form of monitoring is found to be effective in people with Type 1 diabetes with previously inadequate glucose control.²¹⁵ More recent studies have shown that active care management with home telemonitoring is significantly better than a single monthly care coordination telephone call and, importantly, this finding was in both people with Type 1 and Type 2 diabetes with previously inadequate control in primary care.²¹⁶ The critical point to note is that this form of remote monitoring can help those very patients who are at increased risk of admission to hospital.

A model of wellness not sickness

The structure of the American healthcare market creates financial incentives to reduce avoidable hospital admissions – a healthier member of an insurance plan uses fewer services. This financial incentive has manifested itself in much more active engagement with people suffering with long-term diseases. Many insurers now use a case management approach which focuses human resources and new technologies on patients with the most complex problems. The greatest impact is obtained when attention is focused on those patients with the most complex problems, and who use hospitals most intensively.²¹⁷ Monitoring for each long-term condition is slightly different, but diabetes programmes follow a similar model. A diabetic will connect their blood glucose monitors to their mobile phone through wireless internet or Bluetooth technology or they will input their own vital signs data into their mobile phone which is then sent to a central server. The server compiles the information and can both transmit it back to a patient in meaningful formats and inform a nurse of the patient's status. The nurse will then contact a patient if their vital signs indicate problems with adherence to their medication. Nurses offer advice and support to the patients, helping them navigate the reasons behind their non-adherence, eventually coming to a realistic solution based on the needs of the individual.

There are many examples of US-based organizations using technology to improve long-term condition management. The Veterans Association has used home telehealth combined with case management for a number of years. Through this approach it has seen a 25% reduction in bed days, 20% reduction in admissions and an 86% patient satisfaction rating. It is currently engaged in scaling up its approach to reach 110,000 patients by 2011.²¹⁸

213 Bensink M, et al., "A systematic review of successes and failures in home telehealth", *Journal of Telemedicine and Telecare*, vol 12 suppl. 3, pp 8-16, 2006.

214 Handley MA, et al., "Cost-effectiveness of Automated Telephone Self-managed Support with Nurse Care Management Among Patients with Diabetes", *Annals of Family Medicine*, vol 6, pp 512-18, 2008.

215 Montori V, et al., "Telecare for Patients With Type 1 Diabetes and Inadequate Glycemic Control", *Diabetes Care*, vol 27, pp 1088-1094 2004.

216 Stone R, et al. Active Care Management Supported by Home Telemonitoring in Veterans With Type 2 Diabetes. The DiaTel randomized controlled trial. *Diabetes Care* March 2010 vol. 33 no. 3 478-484.

217 Garside P. Lessons from the US: using technology and homecare to improve chronic disease management. *Healthcare at Home*. 2010.

218 Coye MJ, Haselkorn A and DeMello S. Remote Patient Management: Technology-Enabled Innovation And Evolving Business Models For Chronic Disease Care. *Health Affairs*, 28, no. 1 (2009): 126-135. doi: 10.1377/hlthaff.28.1.126

Table 3.1: Reductions in hospital utilisation by the Veterans' Association

Long term condition	Number of patients	Decrease in hospital utilisation (%)
Diabetes	8,954	20.4
Hypertension	7,447	30.3
Congestive Heart Failure	4,089	25.9
Chronic Obstructive Pulmonary Disease	1,963	20.7
Post-Traumatic Stress Disorder	129	45.1
Depression	337	56.4
Other Mental Health	653	40.9
Single Condition	10,885	24.8
Multiple Conditions	6,140	26.0

Source: Darkins A, et al. Care Coordination/Home Telehealth: The Systematic Implementation of Health Informatics, Home Telehealth, and Disease Management to Support the Care of Veteran Patients with Chronic Conditions. *Telemedicine & eHealth*. December 2008. 1118-1126. DOI: 10.1089/trmj.2008.0021

As we have highlighted, the current structures and funding arrangements in the NHS limit the appetite for new organisational forms that focus on long-term condition management. Despite their widespread use in the USA, the Somerset Integrated Chronic Obstructive Pulmonary Disease Service (COPD) is one of only a

handful of examples of patient management effectively being implemented in the UK. This service was commissioned by the practice-based commissioning consortium of Somerset GPs. It is being delivered by a partnership between Avanaula Systems, (formed by 2 experienced Somerset GPs) and Clinovia Ltd (a company with many years experience in out of hospital healthcare services). Under their COPD management programme a patient will undergo a rigorous and evidence-based assessment process, from which a personalised care plan is developed. The service provides routine assessment clinics, bi-weekly pulmonary rehabilitation exercise and education programmes, 24-hour community-based rapid response for urgent care, access to unscheduled appointments with professionals or home visits.

UnitedHealth UK

UnitedHealth UK has taken managing long-term conditions to the next level and developed a sophisticated screening tool which identifies which patients are at risk of a future unplanned hospital admission due to a chronic disease. This RISC tool is already being used by many PCTs and GPs around England.

The system works by bringing together data from existing information silos, which allows commissioners to capture and analyse trend data across care pathways which look at both activity and cost. Moreover, data can be analysed for an entire population, including those who are currently well, to reduce the risk of disease in the future. There are generally three tasks such a system hopes to accomplish:

1. Prevent and delay the onset of disease among those who are well; for example those with obesity,
2. Teach self-management to those with early illness such as Type 2 diabetes, and
3. Prevent complications and deterioration among people with advanced disease.

The system is able to risk-stratify the whole PCT population, ranking people from the sickest to the healthiest, so that scarce resources can be targeted on patients with high needs and who are at risk of admission to hospital. The task is then to communicate with those that the commissioner – either PCT or GP consortia – wishes to target using a format that will best engage with them and lead to a change in their behaviour. Some people will communicate most effectively over email, others over text-message, others through a telephone conversation.

The specific programme for patients with long-term conditions begins by starting a conversation between the patient and nurse about their condition, but also about their lifestyle and personal circumstances which can impact on their condition. All of this information, as well as their clinical measurements, prescriptions, their test results, their glucose levels, their lifestyle habits are tracked through a remote monitoring system. This system provides nurses with a set of tools which enable them to view and analyse the data and offers decision support by identifying each individual patient's clinical priorities.

The doctor continues to remain at the centre of the patient's care and they receive regular updates about their patients' health. The nurses which interact with UnitedHealth's systems act as an extension of the GP's office and bridge the divide between hospital and primary care.

4

A Disruptive Solution for the NHS

In his book, *The Innovator's Prescription*, Harvard Business School Professor Clayton Christensen applies his theory of 'disruptive technology' to healthcare.²¹⁹ Disruptive innovation isn't about turning an existing industry upside down. A 'disruption' is an innovation that makes operations simpler and more affordable and 'technology' is a way of combining inputs, like information, materials and labour, into an output that is more valuable to the consumer. Innovative technologies should be used to transform care for people with long-term conditions into a system whose purpose is to maintain wellness, not treat sickness. This theory of disruption in order to drive improvement is central to our vision for a reformed NHS.

'Disruptive technologies' make a product or service cheaper and more accessible to a new market of people who either couldn't afford or didn't know how to use the product. At first the disruptive technology isn't attractive because the product or service is as good as what's already being provided. Recall the insulin pump which NICE recommends for use only *after* conventional treatments have been shown to put the patient at risk. Over time the disruptive technology then builds a customer base that is entirely different to that in the original market. The incumbent firm never invests in the disruptive technology because they're offering the established and widespread technological solution. But slowly the sophistication of the disruptive technology grows, and so does the market. In the USA, where there is a much more market-based healthcare system, insulin pumps are at 25% penetration compared to 5% in the UK.

In business theory 'incremental innovation', or 'sustaining innovation', typically introduces relatively minor changes to existing products, exploits the potential of established designs and reinforces the dominance and capabilities of existing organisations. They help an organisation do things faster or better, but don't change the way a current system functions. Sustaining technologies make airplanes fly faster; mobile phone batteries last longer; or give television screens higher definition. The evolution of long-term condition management in the NHS can be viewed as 'incremental innovation' – it fits the classic characteristics of a relatively stable market with existing GP practices and hospitals providing the same established and widespread treatment model.

Academic literature suggests that the organisational approaches adopted by incumbents, such as GP practices and hospitals, and the very routines which support success in one technological model may actually create barriers to operating in new technological arenas.²²⁰ Disruptive innovation is difficult for incumbent firms to adapt and respond to because the knowledge and skill sets

219 Christensen C, et al., *The Innovator's Prescription: A Disruptive Solution for Health Care*, New York: McGraw Hill, 2009.

220 Nelson, RR and SG Winter (1982). *An Evolutionary Theory of Economic Change*. Cambridge: Belknap Press.

required are not normally present in the original organisation.²²¹ Consequently, the emergence of disruptive innovations that require new structural relationships create difficulties for organisations that have well established routines which are based in earlier technological models. Applying this reasoning to the NHS, it is easy to understand how the existing structures and routines contribute to why many new treatments and technologies have failed to spread throughout the NHS.

The academic literature categorises ‘disruptive innovation’ as either radical or architectural in nature. Whereas radical innovation uses engineering or scientific knowledge to open up new markets, architectural innovation is the way in which the components of a product offering are linked together. While leaving the core design concepts untouched, architectural innovation reconfigures established technologies in new ways and thus potentially destroys the usefulness of organisations’ existing architectural knowledge.²²²

Disruptive innovation in computing

The personal computer (PC) is the classic example of a disruptive innovation. PCs were originally used only for word processing documents or building simple spreadsheets, activities that paled in comparison to the processing abilities of large mainframe computers. During the first ten years of the existence of the PC the people who routinely used mainframe computers couldn’t use a PC because the technology was too basic for their needs. The original mainframe companies, Control Data Corporation (CDC) and Digital Equipment Corporation (DEC) were not threatened by the PC because they were so simple their customers didn’t have any use for them. PC and mainframe computers were originally competing in two different markets, but then the speed and processing abilities of the PC started to grow. Even as the performance of the PC improved it never made sense for CDC and DEC to start making PCs; their internal organisation and business structure could only focus on producing bigger and faster mainframe computers. In the end the power of the PC improved so much that they could do the same complex operations as the mainframe, but cheaper and smaller PCs were accessible to more people. The existing incumbent firms CDC and DEC failed and were replaced by International Business Machines (IBM).

IBM was a mainframe manufacturer, but what it did to become the market leader in this technology was unique to any incumbent firm and essential to their success. Although they were competitors in the mainframe industry, IBM saw the potential of the PCs and decided to invest in making them. But simply investing in a disruptive technology isn’t enough to ensure an incumbent firms success. IBM created a completely independent business unit to develop the PC and gave it complete freedom to compete against the other IBM business units. It was the creation of the new business model in a separate business unit that ensured IBM’s continued success.

As the example with IBM demonstrates, disruptive technology alone isn’t enough to change a market, there also needs to be the right business model in place to capitalise on the benefits of the emerging new technologies.²²³ A new business model requires the new technology, but also a new set of resources and processes to deliver that new technological solution. It might require new ways of working, as well as a wholly different financial formula to help define prices and volumes.

221 Henderson, RM & Clark K. Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms. *Administrative Science Quarterly*, 35, 9–30. 1990.

222 Ibid.

223 Chesbrough H, and Rosenbloom R. The Role of the Business Model in Capturing Value from Innovation: Evidence from Xerox Corporation’s Technology Spin-off Companies. *Industrial and Corporate Change* 11, no. 3 (June 2002).

In the NHS patients with long-term conditions are similar to the customers that couldn't access or use mainframe computers: their needs are not being met with the current system of healthcare. The business models in the NHS have not been designed to treat patients with long-term conditions. The resources, processes and financial incentives of GP practices and hospitals were designed to manage acute events, not prolonged periods of care. The 10 minute GP visit is perfect example.²²⁴ When the majority of patients suffered from acute illnesses, like infectious diseases, they would easily be diagnosed and given a short course of treatment, with perhaps one follow-up appointment. Within a few weeks they would either be cured, or they would require admission to hospital for further treatment. These separate interactions were appropriate for dealing with more immediate episodes of care.²²⁵

People with long-term conditions need more from the NHS than diagnosis and initial therapy. These people need a business model which helps them adhere to the recommended therapy, which could be an hourly, daily or monthly procedure they have to perform for the rest of their lives. The business challenge for a state-funded healthcare system is to motivate this process-driven behaviour, not design ever more technologically complex solutions which cater for ever decreasing numbers of people.²²⁶ Over the last 100 years hospitals have developed into technologically and organisationally complex organisations which are unsuitable organisations for maintaining the health of 15.4 million people with a long-term condition.

To address the needs of patients with long-term conditions we need a business model focused on maintaining wellness and the disruptive solution for the NHS is the very process of creating a new business model which uses existing technologies that have so far failed to spread. Not surprisingly, however, the empirical literature finds that disruptive solutions are more commonly developed and commercialised by new entrants to a market, rather than by incumbent organisations.^{227, 228, 229} The example of IBM represents the exception rather than the rule.

Recommendation: We need to develop new business models in the NHS so that new technologies and ways of working can improve care for patients with long-term conditions. The NHS is about to undergo a period of re-organisation with funding being devolved to GP practices which are expected to aggregate into GP consortia to replace PCTs. We believe that alongside this process, the Department of Health should encourage, rather than seek to limit, newly formed GP consortia to pilot new business models which focus specifically on long-term condition management.

How do we create a model for the future to incentivise wellness?

The question which follows the above recommendation is whether the NHS can adapt and embrace a new business model? While in the academic literature the majority of examples focus on incumbent firm failures and new entrant successes, there are sufficient examples of incumbent organisations successfully

224 Wagner E, et al., "Organising Care for Patients with Chronic Illness", *The Milbank Quarterly*, vol 74, pp 511-544, 1996.

225 Ibid.

226 Christensen C, et al., *The Innovator's Prescription: A Disruptive Solution for Health Care*, New York: McGraw Hill, 2009.

227 Anderson, P & Tushman ML. Technological discontinuities and dominant designs: A cyclical model of technological change. *Administrative Science Quarterly*, 35, (1990), 604-633.

228 Christensen, CM. *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. 1997 Boston, MA: Harvard Business School Press.

229 Henderson RM, Clark K. Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms. *Administrative Science Quarterly*, 35, (1990) 9-30.

adapting to disruptions and remaining in the market, often as technological leaders.^{230, 231, 232} Studies of these firms' successes show how, through the development of new business models, periods of incremental innovation can simultaneously be combined with the benefits of disruptive innovation. Not each organisation studied adopted the same business model; rather there have generally been three organisational approaches that were used: internal ventures, joint ventures, and acquisitions.²³³ We will also consider, briefly, the role of outsourcing.

Internal ventures

An internal venture is a distinct structure in an organisation which is developed to implement a set of routines and practices that are different and separate from the original set of operations. The internal venture may be a separate division, a separate project within an existing division or even a geographically separate division from the rest of the firm. As with the example of IBM, internal ventures have objectives that are largely independent, and even diametrically opposed, to the rest of the firm. The distinct routines of the internal venture are specifically developed to commercialise the new technology.

In theory, the NHS is ideally placed to exploit such an organisational structure. But as was highlighted in previous Policy Exchange work it is systemically risk averse.²³⁴ NHS managers, even the most senior, are typically in place for less than two years which is too short a time period. Moreover, the strict performance management regime operated by the previous government from the Department of Health through Strategic Health Authorities to Primary Care Trusts, means that the blame for failure has always far outweighed the reward for success.

Joint ventures

A joint venture is a new organisational relationship with one or more partner organisations that allows the originating organisation to gain access to its partner's knowledge and capabilities.²³⁵ Joint ventures are typically used when originating organisations are unable or unwilling to develop new technologies on their own. The new joint organisation can then develop and commercialise technologies for new ways of working, leveraging the unique skill sets that each organisation offers. As the joint venture advances and the organisational relationships become established, new routines evolve specifically to support the objectives behind its creation.

In relation to the NHS the principle advantage in utilising this organisational approach is transfer of financial risk. The level of transfer would depend upon the relative proportions of the joint venture held by each of the partner organisations. It would also offer a relatively quick and easily implementable solution since work on optimising care pathways, determining relevant technologies and clinical indicators could begin once the joint venture had been set up rather than waiting for them to be developed by the NHS. For example there was a 14 month delay between the two parts of the diabetes National Service Framework.

A joint venture model could easily fit into the NHS structures and payment mechanisms as envisaged in the White Paper, *Equity and excellence: Liberating the*

230 Rothaermel, F. T. (2001), Incumbent's advantage through exploiting complementary assets via interfirm cooperation. *Strategic Management Journal*, 22: 687–699. doi: 10.1002/smj.180

231 Macher, Jeffrey and Richman, Barak D., Organizational Responses to Discontinuous Innovation: A Case Study Approach. *International Journal of Innovation Management*, Vol. VII, No. 1, March 2004.

232 Cusumano M, Mylonadis Y, and Rosenbloom RS. Strategic Maneuvering and Mass Marketing Dynamics: The Triumph of VHS over Beta. *Business History Review* 66, no. 1 (spring 1992).

233 Macher, Jeffrey and Richman, Barak D., Organizational Responses to Discontinuous Innovation: A Case Study Approach. *International Journal of Innovation Management*, Vol. VII, No. 1, March 2004.

234 Barlow J and Burn J, *All Change Please: Putting the best new healthcare ideas into practice*, Policy Exchange, 2008.

235 Kogut B. Joint ventures: Theoretical and empirical perspectives. *Strategic Management Journal*, 1988. 9: 319–332. doi: 10.1002/smj.4250090403

NHS. The joint vehicle could be created between the GP consortia and private companies which specialise in long-term condition management. The purpose of creating this new business model would be to create and maintain wellness instead of rewarding sickness; the joint venture would span the current chasm between GP practices and hospitals. The incentive would be to maintain health and avoid unnecessary hospital admissions because admissions to hospital would be charged to the joint venture at the full NHS Tariff rate. Furthermore, much higher levels of adherence to NICE care processes could be introduced as part of the contractual processes.

A joint venture implies some form of gainsharing mechanism between the GP consortia and the private companies which specialise in long-term condition management and crucial to this implementation is understanding baseline costs and resource allocation.

“The purpose of creating a joint business model would be to create and maintain wellness instead of rewarding sickness; the joint venture would span the current chasm between GP practices and hospitals”

Acquisition

Organisations that are unable to execute the desired technology strategy – either on their own or with partners – can acquire separate organisational structures. These separate organisations will have already begun to exploit the new technologies. When it makes such an acquisition, the originating organisation gains access both to new technologies themselves and to the new routines and practices developed to exploit the new technologies. However, the risk with acquisitions, as with internal ventures, is that the existing routines and practices in the NHS (i.e. the culture) will come to dominate the acquired or newly created organisation.²³⁶

Outsourcing

In general, outsourcing refers to the reliance on external sources for the performance of value-adding activities. In the context of reforming the delivery of long-term condition management, outsourcing does merit consideration, although complete outsourcing for all long-term conditions is unlikely to be the panacea. This is because outsourcing can erode the originating organisation's potential for learning and development, particularly those skills necessary for the development of core capabilities.²³⁷ While careful outsourcing of supporting activities can certainly help organisations concentrate resources to build core skills, the exact balance in this context would be down to individual GP consortia to decide.

Although diabetes is largely a preventable disease, prevalence rates and hospital admissions are increasing. Despite the frequent use of performance management and national target setting by the previous government to drive improvement in the NHS long-term conditions has had only one time limited target which was met early. The objective was to reduce emergency bed days by 5% by 2008 (from the expected 2003/04 baseline), through improved care in primary care and community settings for people with long-term conditions.²³⁸

236 Mullins L. Management & Organisational Behaviour. 4th Edition

237 Mahnke V. The Process of Vertical Dis-Integration: An Evolutionary Perspective on Outsourcing. Journal of Management and Governance Volume 5, 2001, Numbers 3-4, 353-379, DOI: 10.1023/A:1014003229386

238 Department of Health. National Standards, Local Action Health and Social Care Standards and Planning Framework 2005/06–2007/08. 2004.

We appreciate that the introduction of targets can drive perverse incentives and behaviour; however, we believe that there needs to be a clear direction for GP consortia to follow.

Recommendation: In order to drive the step change in the care for patients with long-term conditions we believe that the Coalition should set out a clear statement of strategy. Hospital utilisation for long-term conditions should be reduced by 20% over the next five years.

People with diabetes are at risk of developing serious complications such as coronary heart disease, stroke, blindness, kidney failure, nerve damage and limb amputation. Diabetes is the leading cause of blindness in people of working age in the UK and prevalence rates are increasing. The OECD says that diabetes, “is one of the most important public health challenges of the 21st century”.

At present, there are a number of problems with the way long-term conditions such as diabetes are dealt with by the NHS. There is no incentive mechanism in the NHS to improve medicines compliance; no financial rewards for actively reducing the number of hospital admissions for people with long-term conditions; or for ensuring that people at risk do not go on to develop diabetes and its complications. The business models in the NHS have not been designed to treat patients with long-term conditions. The resources, processes and financial incentives of GP practices and hospitals were designed to manage acute events, not prolonged periods of care.

The division of the funding structures in the NHS means that GP practices aren’t rewarded for providing improved services to people with diabetes, but perversely hospitals receive payments when patients become sicker. Aided by the NHS payment system, the NHS fights to maintain its existing structures of GP practices and acute hospitals, and this limits the spread of new treatments and technologies which require new models of care.

This report argues that new business models need to be developed in the NHS so that new technologies and ways of working can improve care for patients with long-term conditions. The NHS is about to undergo a period of re-organisation with funding being devolved to GP practices which are expected to aggregate into GP consortia to replace PCTs. We believe that alongside this process, the Department of Health should encourage, rather than seek to limit, newly formed GP consortia to pilot new business models which focus specifically on long-term condition management.

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