

Quest for
Quality and
Improved
Performance

QIP

Value for money in the English NHS

Summary of the evidence

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QQUIP and the Value for Money project

QQUIP (Quest for Quality and Improved Performance) is a five-year research initiative of The Health Foundation. QQUIP provides independent reports on a wide range of data about the quality of healthcare in the UK. It draws on the international evidence base to produce information on where healthcare resources are currently being spent, whether they provide value for money and how interventions in the UK and around the world have been used to improve healthcare quality.

The Value for Money component of the QQUIP initiative provides a series of reports that enable comparisons to be made between the scale of benefits and costs across a number of different disease groups. It also provides a methodological framework for examining the costs and benefits of national policies for treatment of conditions such as coronary heart disease and mental health.

For more information visit www.health.org.uk/qquiip

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Executive summary

The Labour Government has been committed to a wide ranging reform of the National Health Service (NHS) that has been described as the most ambitious and comprehensive effort to improve the quality of healthcare of any country (Leatherman and Sutherland, 2003). Since 2000, a key plank of this effort has been reversing the historic underfunding of the service by matching European levels of spending on healthcare. In practice, this equates to extra spending in England of around £6 billion per year.

While this unprecedented extra funding for the NHS has been broadly welcomed, questions remain over where the extra money has gone and how wisely it is being spent. The extent to which the NHS secures value for money for taxpayers has become a central issue of political and public debate. This report therefore seeks to answer the following questions:

- How much extra money has been made available to the NHS?
- What has the extra money been spent on?
- What improvements have been made in the volume and quality of healthcare?
- What are the implications for productivity?

There has been a flurry of research activity designed to address these and similar questions. The report seeks to bring together this research in a concise format and draws some tentative conclusions about recent productivity changes in the NHS. It finds that there is considerable evidence of growth in both the volume and quality of NHS activity. However, in general this has not kept pace with the growth in expenditure.

1. NHS expenditure, inputs and activity levels

This section provides details of recent trends in NHS expenditure, labour and capital inputs, and activity levels, and examines the associated value for money measures. It shows that although NHS expenditure has increased, the costs of goods and services purchased by the health service have also increased, and by considerably more than the price of goods and services across the UK economy as a whole. It also illustrates how NHS inputs, such as beds, staffing and equipment, have changed.

For example, the number of speciality beds has fallen by 25% between 1991/2 and 2004/5, mainly in areas such as mental health, learning disability and elderly care, where people are now supported in the community. Acute beds have fallen by 5% but are now rising again and day beds have increased massively, reflecting changes in surgery. The number of staff working in the NHS has increased by around a quarter from 1999/2000 to 2004/05, including a 31 per cent increase in consultants and a 10 per cent increase in the number of GPs.

Aside from staff, pharmaceuticals are the other major area of spending. This has increased by 40 per cent between 1999/00 and 2004/5. The average cost per item has remained reasonably stable at around £8.50 but the number of statin prescriptions has increased rapidly from 1.1 million in 1995 to 32.4 million in 2005, in line with practice observed in most developed countries.

The section goes on to examine clinical outcomes and patient experience. Data are provided for surgery, fractured femur, coronary artery bypass and stroke. Apart from fractured femur, death rates have all decreased. Waiting times have also reduced

significantly with fewer than 1,000 patients now waiting for more than 6 months, compared to 192,000 patients in 2002. Finally, satisfaction measures for the various components of the health service show that GPs are rated the most highly, although their satisfaction rates have declined since the early 1990s.

2. Where is the expenditure growth going?

This section presents some details about where the new NHS funding has been spent. It finds that since 2001/02, an average of £5.7 billion each year extra has been spent in the NHS. Of this, 43 per cent has been spent on extra staff, activity and drugs, 33 per cent on pay rises, 18 per cent on additional expenditure and staff training and 7 per cent on increases in prices and negligence costs.

This section also examines how to interpret the increases. For example, when considering the extra cash allocated to NHS wages, is the infusion of funds attracting and retaining a more highly skilled workforce or is it merely an unproductive outflow of taxpayers' money to public sector employees?

3. NHS productivity change

This section summarises recent studies that have sought to incorporate the information above into a single measure of NHS productivity. Much depends on how the various activities undertaken by the NHS are aggregated into a single measure of 'output'. Since 2004 the Office for National Statistics has steadily refined this measure, with the most recent estimates suggesting output growth of about 4.8 percent per annum. The ONS has also sought to incorporate measures of the quality of NHS outputs into its estimates, such as the survival rates of patients and waiting times. However, methodology in this domain is at a much less advanced stage of development, and results depend heavily on a number of key assumptions.

Productivity is estimated by dividing the output measure by a measure of NHS inputs. The ONS estimates that – without any adjustment for quality – over the period 1995-2004 productivity fell by an average of between -0.6% and -1.3% per year. Adjustments for quality reduce these estimates of the annual drop in productivity, and under some assumptions suggest that productivity may even have slightly improved over recent years.

The report discusses the current state of productivity measurement methodology, and assesses its strengths and limitations. It argues that we have to accept that there is currently no definitive measurement of NHS productivity and that, with various figures available, commentators may choose to cite the measure that supports their argument and ignore the others. The appropriate way forward is to have a well-informed and wide-ranging debate on the topic in order to identify the main priorities for methodological clarification.

Conclusion

The report concludes by pointing out that for many years the UK has spent far less on healthcare, as a proportion of its gross domestic product, than most of its European counterparts. This may have contributed to poor UK health outcomes, for example in cancer survival rates, relative to other countries.

It argues that if there was a cumulative under-spend of £267 billion from 1972 to 1998 (in 1998 prices), it is unlikely that an additional £6 billion per year will transform the NHS in the space of five or six years. Some of the additional resources could be seen as investment in labour and capital needed to overcome the years of under-investment.

On the capital side, the downward trend in the number of acute beds has now been reversed and there has been dramatic growth in the number of day beds. Moreover, hospital activity levels are increasing, though not in proportion to the funding increases. One reason for this is that the new consultant and GP contracts, as well as Agenda for Change, have consumed a significant percentage of the funding increase.

Additional cost pressures have also been imposed by National Institute for Health and Clinical Excellence (NICE) recommendations, the hospital building programme and a considerably increased intake to medical schools. Whether these will lead to measurable health gains is also a matter for debate. However, in the short term, the impact of these cost pressures means that much less money is available for increased activity, which is the prime driver of NHS output.

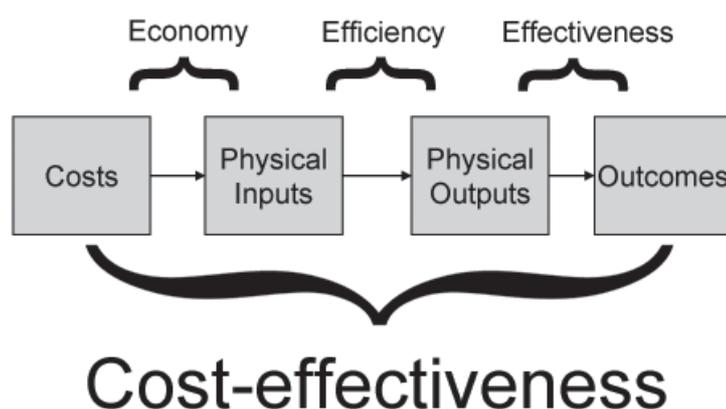
There remain many important unresolved issues, including the proper treatment of physical and human capital, the measurement of healthcare quality, the handling of 'hard to measure' areas such as mental health and the treatment of pharmaceutical price changes. However, it is becoming clear that the careful measurement of productivity growth plays a central role in deciding how much of taxpayers' money to spend on healthcare and in holding the NHS to account for its spending.

Introduction

During 1997 and 1998 the Labour Government set out to ‘modernise the NHS [National Health Service]’ (Department of Health (DH), 1997). A wide-ranging set of reforms has been put into place which has been described as the most ambitious and comprehensive effort to improve the quality of healthcare of any country (Leatherman and Sutherland, 2003). However, recognising that a factor in the underperformance of the NHS was historical underfunding, in January 2000 Tony Blair committed his Government to matching European levels of spending on healthcare. At that time the UK spent 7.3 per cent of its gross domestic product (GDP) on healthcare. By 2008 this proportion is set to reach 9.4 per cent and this is expected to be broadly comparable with other European countries (Oliver, 2005, p S80). Between 2000 and 2008, NHS expenditure is set to increase by over 10 per cent per annum in real terms (that is, relative to the GDP deflator). This can be contrasted with the period from 1992 to 2000 when the average annual real increase was just over 3 per cent (relative to the GDP deflator).

These large funding increases were expected to deliver correspondingly large service improvements, and the NHS Plan was designed to secure these (DH, 2000a; 2000b). Several studies have sought to evaluate whether these funding increases have delivered the expected improvements in health status and increased public satisfaction. Such studies have typically used several indicators – such as waiting times, cancer survival rates and heart disease death rates – to evaluate whether the desired performance improvements have been forthcoming (see, for example, Bosanquet et al (2005); King’s Fund (2005); NHS Confederation (2005)). At the same time, the Atkinson Report (2005) on the measurement of government output and productivity for the National Accounts has encouraged the DH and Office for National Statistics (ONS) to devise and apply new methods of measuring NHS output and productivity growth. In contrast to the other studies cited above, measuring NHS output for the National Accounts leads to a ‘single number’ measure of the output of a large and complex system.

Figure 1: The components of value for money



The traditional accounting framework for discussing value for money is shown in Figure 1. Financial inputs (in the form of costs) are converted into physical inputs (such as labour and capital). The success of this conversion is often referred to as the ‘economy’ with which inputs are purchased. Physical inputs are in turn converted into physical outputs (such as an episode of hospital care). The relationship between physical inputs and outputs is often referred to as ‘efficiency’. Depending on the quality of care, the physical outputs then create eventual outcomes, for example, increases to the quality and length of life. The success of this conversion is referred to as ‘effectiveness’.

It is conventional to consider various value for money measures under these headings. For example, the traditional measure of 'length of stay' for a hospital episode is an efficiency measure as it indicates the level of physical inputs (bed days) required to produce a physical output (an 'episode'). In contrast, the post-operative mortality rate is a measure of the quality of that output and therefore a signal of effectiveness. The holy grail of value for money is therefore cost-effectiveness: the ratio of outcomes to inputs. For example, the 'cost per quality adjusted life year' used by the National Institute for Health and Clinical Excellence (NICE) to assess new technologies is a cost-effectiveness ratio, and the recent efforts to develop a single number measure of NHS productivity represent an attempt to move from the piecemeal assessment of indicators of economy, efficiency and effectiveness towards a more comprehensive measure of cost-effectiveness. The World Health Report 2000 (WHO, 2000) also sought to develop measures of the cost-effectiveness of entire health systems, and the subsequent debate on that exercise has illustrated many of the issues associated with developing a single number measure of system performance (Murray and Evans, 2003).

This paper provides an assessment of the recent performance of the NHS and highlights some of the challenges involved in coming to a definitive conclusion regarding value for money. Section 1 provides some conventionally reported metrics of recent trends in NHS expenditure, labour and capital inputs, and activity levels, and examines the associated value for money measures. Section 2 presents some details about where the extra NHS funding has been spent and, in particular, partitions the extra funding between that used to:

- meet increased costs for existing employees and NHS wage rates
- fund additional (newly hired) NHS staff
- to buy extra activity.

Although this split makes apparent sense, attaching an interpretation to, say, the extra cash allocated to the NHS wage bill is not straightforward: for example, is the infusion of funds attracting and retaining a more highly skilled workforce or is it merely an unproductive outflow of funds to employees?

Section 3 summarises several recent studies that have sought to incorporate the information presented in Sections 1 and 2 – together with a much wider body of material on NHS inputs and outputs – into a single measure of NHS productivity. The productivity measures under development seek to provide a single number estimate of the cost-effectiveness of the NHS. Recent work in estimating system productivity has developed innovative approaches, such as seeking to incorporate measures of quality alongside measures of inputs and activity. In the context of Figure 1, this implies a desire to incorporate measures of effectiveness into the value for money analysis. However, because of the difficulties associated with defining and measuring quality, little consensus has yet to emerge as to the 'correct' or most appropriate approach. The ONS has presented a range of estimates that reflect different assumptions and different methods, and their relative merits are discussed.

Value for money has recently become a popular topic for study, so we shall be covering some ground that others have visited already (for example, King's Fund, 2005). Where applicable, this paper notes the conclusions reached by other studies. It should also be noted that, in addition to the single number NHS productivity measure of performance, several studies have employed a variety of performance indicators – such as waiting times, mortality rates and patient satisfaction surveys – to assess the recent performance of the NHS. These performance indicators are not considered in any depth here, although they are mentioned briefly when discussing NHS activity levels in Section 1.

1. NHS expenditure, inputs and activity levels

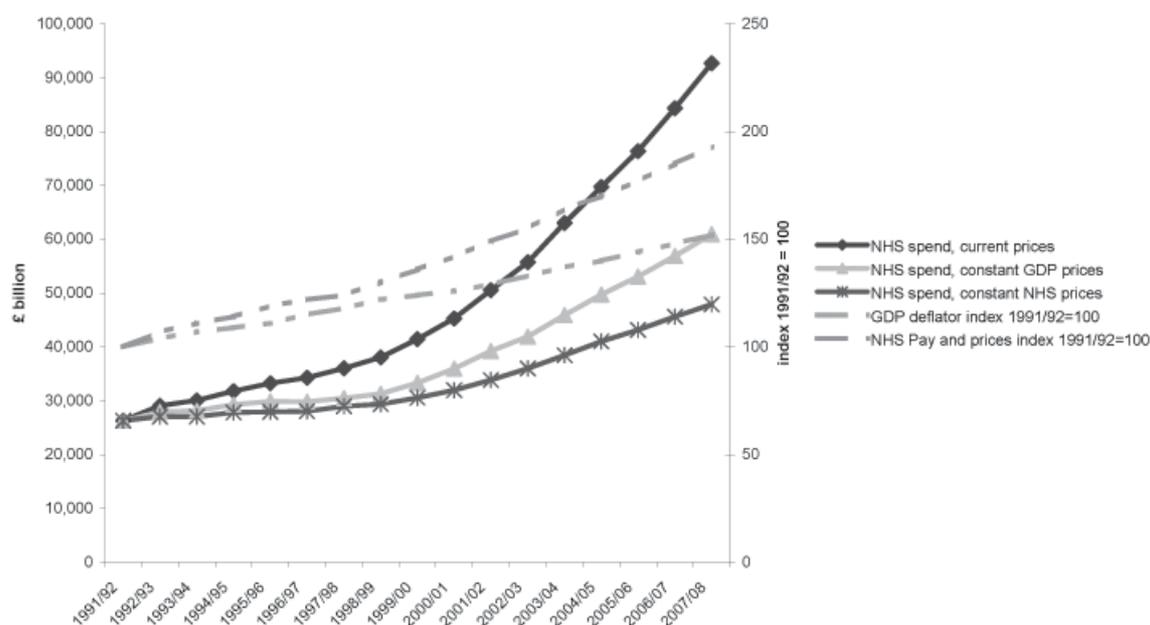
This section provides an overview of recent changes in National Health Service (NHS) expenditure, input, activities and outcomes. It is not intended to be comprehensive but it does illustrate the scope of data availability, illuminate some recent developments in the NHS and provide some context for policy debates.

1.1 How much expenditure growth?

Figure 2 shows net NHS expenditure at current prices, constant gross domestic product (GDP) prices and constant NHS prices. At current prices, expenditure is planned to increase from over £26 billion in 1991/92 to just under £93 billion in 2007/08. This current price expenditure series can be deflated to a constant price basis by using an appropriate price index. Two such indices are shown in Figure 2. One price index – the GDP deflator – reflects the price of goods and services throughout the entire UK economy, while the other – the NHS pay and prices index – reflects the cost of goods and services purchased by the NHS. Between 1991 and 2004 the GDP deflator increased by 40 per cent but the NHS pay and price index rose by 70 per cent. In other words, the cost of goods and services purchased by the NHS increased by considerably more than the price of goods and services across the entire UK economy. One implication of this divergence between the GDP deflator and the NHS pay and prices index is that deflation of the cash sum available to the NHS recorded the GDP deflator will exaggerate the real volume of resources available to the NHS.

At constant GDP prices, NHS expenditure increased by about 3 per cent per annum between 1991/92 and 1999/2000, and is planned to increase by about 10 per cent annually thereafter until 2007/08. However, deflating NHS expenditure by the NHS pay and prices index reveals that the real terms increase between 1991/92 and 1999/2000 was 2 per cent per annum, and is planned to be about 7 per cent per annum thereafter until 2007/08. The NHS pay and prices index will reflect NHS pay bargaining over which the NHS has considerable control, and so there is some question as to whether it is entirely appropriate as a measure of the inescapable price rises experienced by the NHS. This issue is discussed further in Section 2.

Figure 2: NHS expenditure in current and constant prices, 1991/92 to 2007/08



NB: Current prices reflect the cash paid in the year in question, constant prices show the expenditure adjusted by an index of price change.

Sources: Office of Health Economics (2005); DH annual departmental report, various issues, for NHS expenditure. More precisely, current expenditure on Stage 2 resource budgeting terms from 2002/03, on Stage 1 terms from 1999/2000 to 2002/03, and cash from 1991/92 to 1999/2000 with the latter two grossed-up to Stage 2 resource budgeting terms for pre-2002/03. Figures for 2005/06 onwards are based on estimates/plans.

1.2 Input growth

Although the range of NHS data available are somewhat limited, there are various ways of looking at how these funds have been used to purchase physical inputs. Figure 3a and 3b present data on the average number of daily available NHS beds from 1991/92 to 2004/05. The number of all specialty beds fell by 25 per cent during this period, mostly in those specialties – geriatric, mental illness and learning disability – that have experienced a policy shift designed to move patients out of hospital and back into the community. In contrast, the number of acute beds fell by just 5 per cent over this period and has even recorded a small increase since 1999/2000. Day-only beds have increased dramatically by 170 per cent, from 3,400 in 1991/92 to 9,160 in 2004/05, reflecting the move away from overnight stays in hospital to day case admissions.

Figure 3a: Average daily available NHS beds, 1991/92 to 2004/05

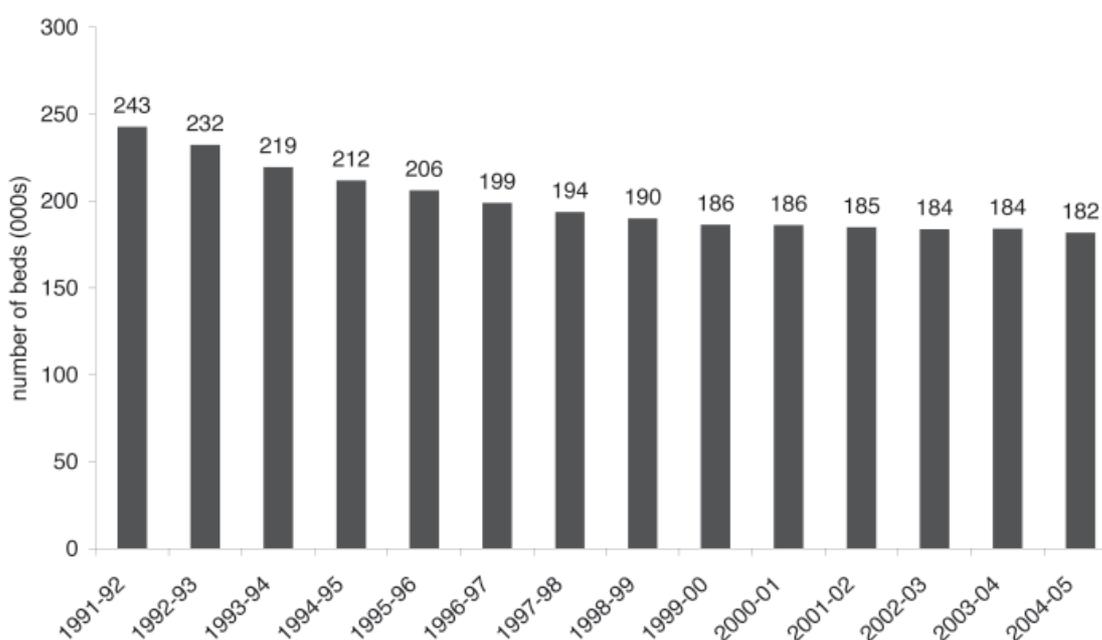
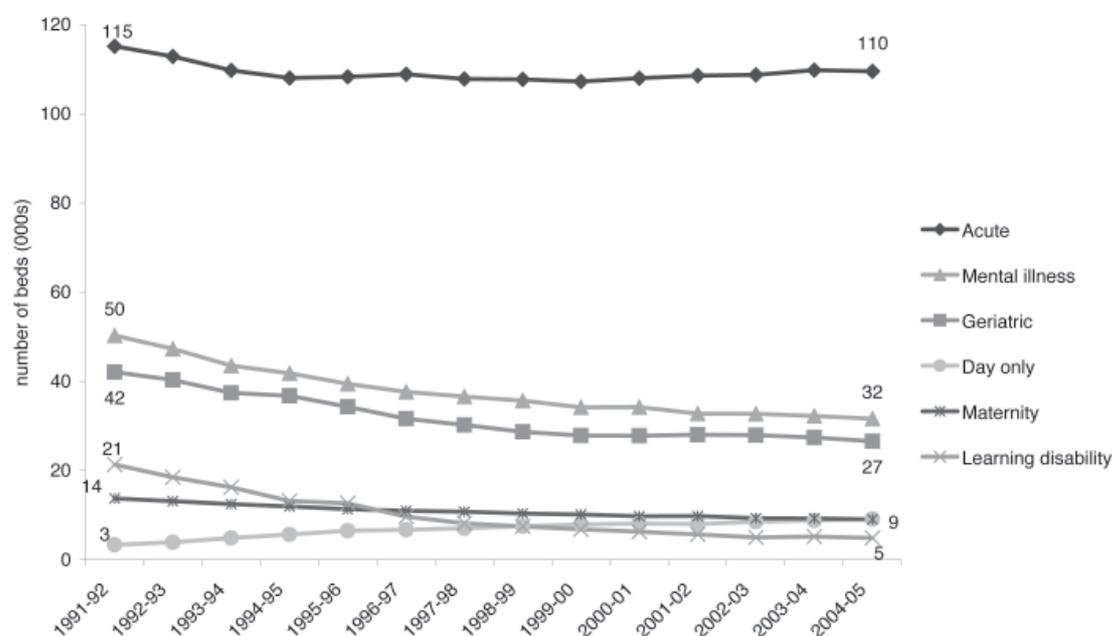


Figure 3b: Average daily available beds, by sector, England 1991/92 to 2004/05

NB: The 'all specialties' total excludes day-only beds.

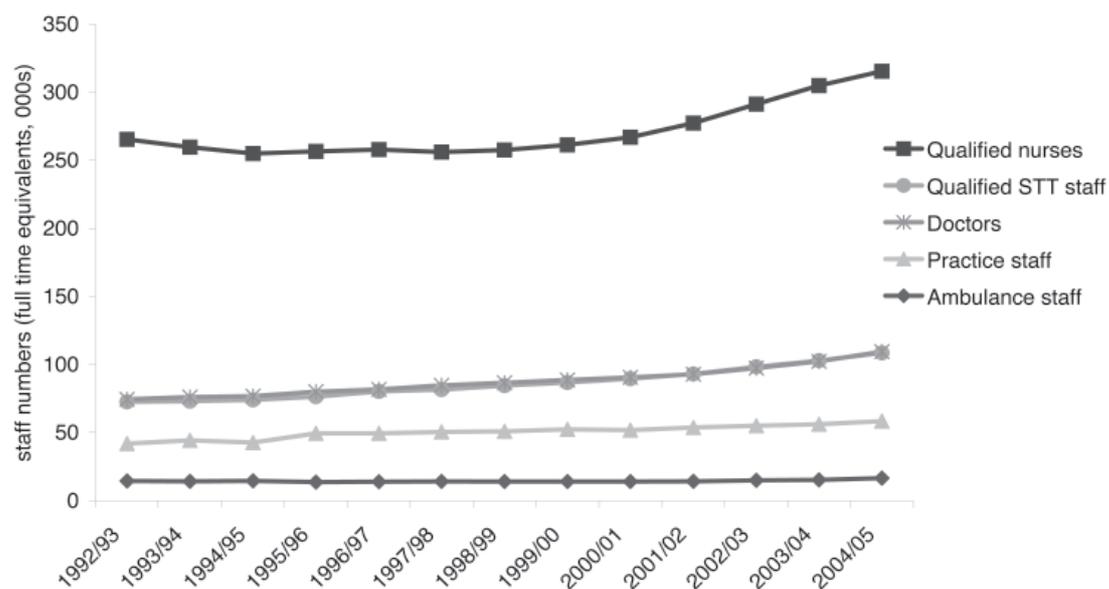
Source: DH (see www.performance.doh.gov.uk/hospitalactivity/data_requests/beds_open_overnight.htm)

One cause of cancelled operations in the NHS is the sudden non-availability of a bed in a high dependency unit for a patient who needs one (King's Fund, 2005). The shortage of adult critical care beds – which are intensively staffed and expensive to maintain – has been an important bottleneck in the NHS. However, the number of such beds – both intensive care and high dependency – has increased by 44 per cent, from 2,240 in March 1999 to 3,233 in January 2006. The supply of critical care beds illustrates a crucial issue in much healthcare: how much slack should exist in an 'efficient' healthcare system? Slack in the supply of such beds may be needed to create capacity for uncertain demand, and an absence of slack can lead to adverse outcomes. However, creating too much slack can divert money that could have been spent more effectively elsewhere in the system. This is one of the problems at the heart of the management of the healthcare system, and also illustrates the caution needed in interpreting partial value for money measures in a piecemeal fashion.

Staff costs account for about two-thirds of all NHS operating expenses and Figure 4 reports the number of directly employed full-time equivalent NHS staff. Between 1992/93 and 1999/2000 the total number of staff increased by less than 1 per cent but the number of doctors rose by almost 20 per cent as did the number of qualified scientific, technical and therapeutic (STT) staff. Between 1999/2000 and 2004/05, staff numbers increased by 23 per cent with the number of doctors and STT staff increasing by a similar amount. However, these figures underestimate the number of people providing NHS services, as they exclude agency staff and staff employed by the private sector to provide contracted out services.

Figure 5 provides a breakdown of the 'all doctors' total in Figure 4. It shows that between 1999/2000 and 2004/05 the number of full-time equivalent doctors increased by 23 per cent while the number of consultants increased by 31 per cent, but the number of General Medical Practitioners rose by less than 10 per cent. Figure 5 also reveals the recent sharp increase in the number of doctors in training, with a 15 per cent increase in registrars in 2004/05, and a 27 per cent increase in 'others training' between 2001/02 and 2004/05.

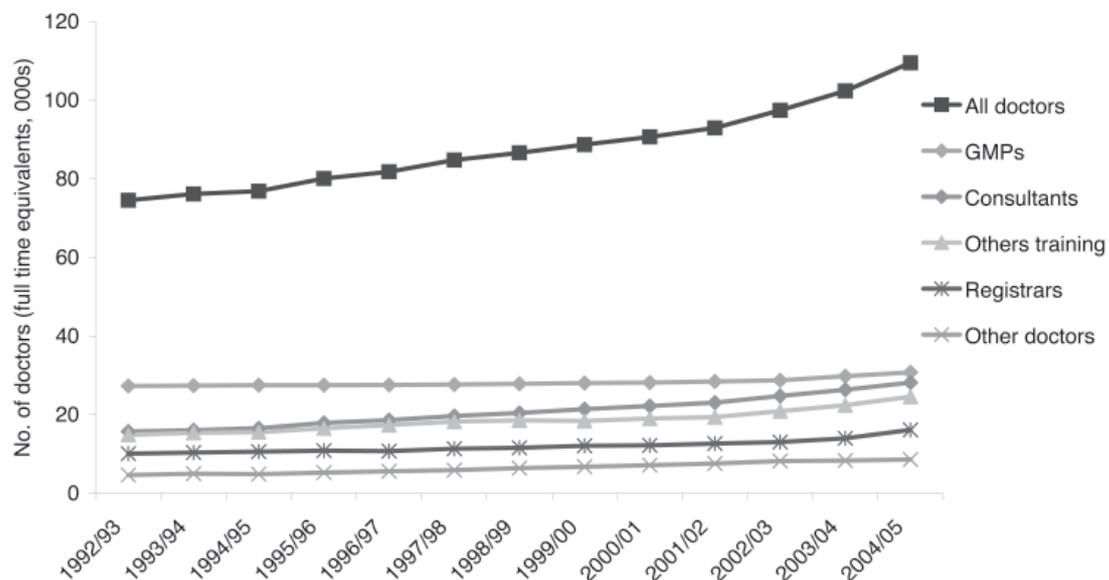
Figure 4: NHS staff, by category, full-time equivalents, 1992/93 to 2004/05



NB: Clinical support includes assistants, administrative staff working in clinical areas (eg medical records), and porters. NHS infrastructure staff includes central (personnel, finance, IT, legal); hotel, property and estates; managers; and some General Practitioner (GP) practice staff (physiotherapists, practice managers).

Source: DH (www.dh.gov.uk/PublicationsAndStatistics/Statistics/StatisticalWorkAreas/StatisticalWorkforce/fs/en)

Figure 5: Number of doctors (full-time equivalents), by category, 1992/93 to 2004/05



NB: Other doctors includes equivalent grades in the community and in public health.

Source: DH (www.dh.gov.uk/PublicationsAndStatistics/Statistics/StatisticalWorkAreas/StatisticalWorkforce/fs/en)

Figure 6a and 6b provide details of the number of imaging and radio-diagnostic tests undertaken by the NHS in England. There have been marked increases in the number of computerised tomography (CT) and magnetic resonance imaging (MRI) scans – 57 per cent and 61 per cent respectively between 1999/2000 and 2004/05 although there were also substantial increases between 1995/96 and 1999/2000 (28 per cent and 62 per cent respectively).

Figure 6a: Number of imaging and radio-diagnostic tests by type of test, 1995/96 to 2004/05

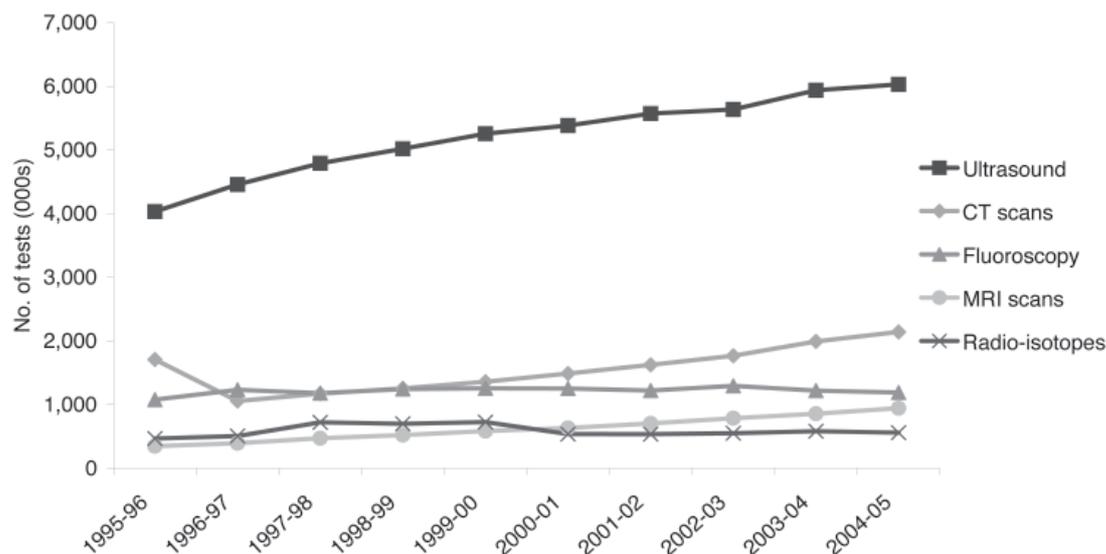
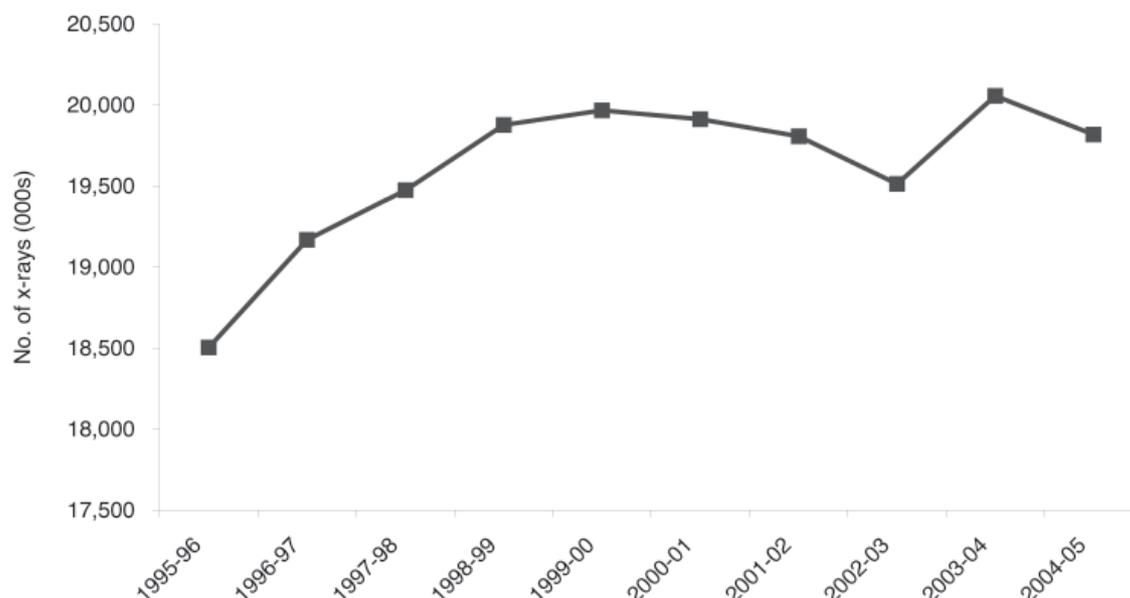


Figure 6b: Number of X-ray tests, England 1995/96 to 2004/05



Source: DH (see www.performance.doh.gov.uk/hospitalactivity/data_requests/imaging_and_radiodiagnostics.htm)

Figure 7a: Hospital attendances and admissions, England 1991/92 to 2004/05

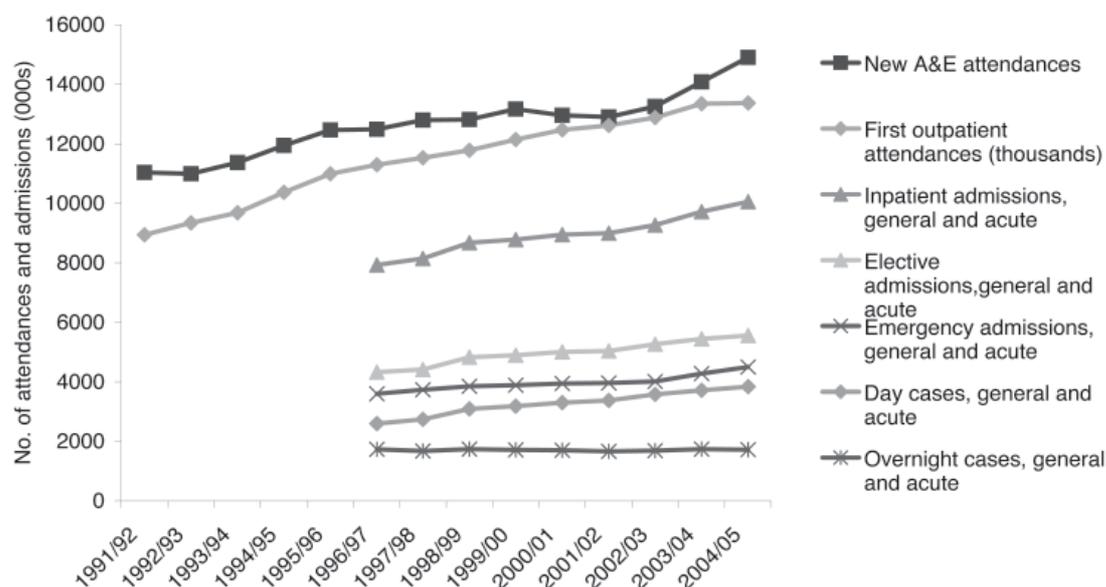
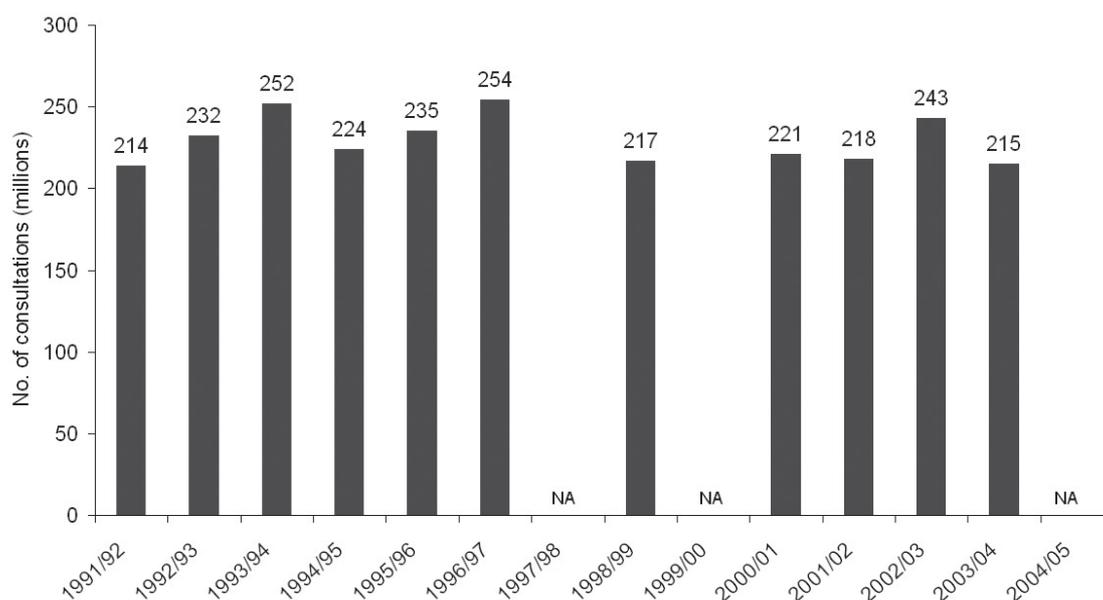


Figure 7b: Number of GP consultations, England 1991/92 to 2004/05 (millions)



NB: The GP consultation data refer to calendar years. Inpatient admissions are first finished consultant episodes and are on a consistent commissioner basis.

Source: DH, annual departmental report (various issues)

1.3 Activity growth

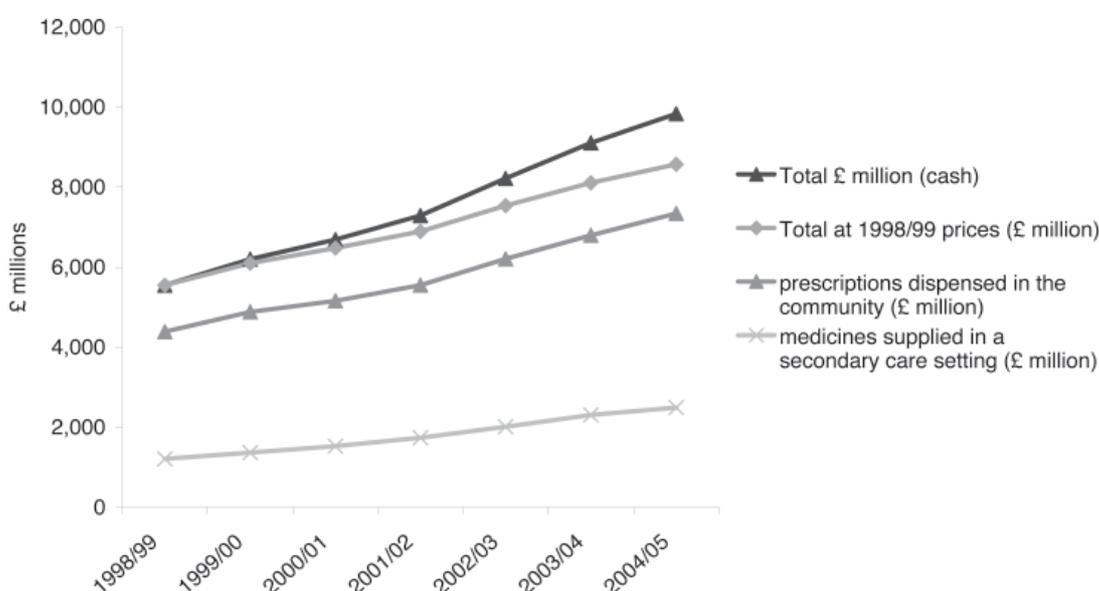
1.3.1 Units of service

Figure 7a and 7b report the annual number of GP consultations, new A&E and first outpatient attendances, and inpatient admissions from 1991/92 to 2004/05. Although the number of GP consultations fluctuates considerably, there is no discernible trend, with the number of consultations in 2003 being virtually the same as in 1991. New A&E attendances have increased by 13 per cent since 1999/2000 with first outpatient appointments (10 per cent) and inpatient admissions (15 per cent) recording similar increases. The only dramatic change revealed in Figure 7a is the relative shift towards day cases (up 21 per cent since 1999/2000) and away from overnight stays in hospital (no increase since 1999/2000).

1.3.2 Drug spending

Apart from staff, the other major item of NHS expenditure is drugs, both in the community and in a secondary care (hospital) setting. Figure 8 reports the net annual NHS drugs bill from 1998/99 to 2004/05. In 2004/05 the net total bill was just under £10 billion, which is an increase of just over 40 per cent since 1999/2000 at constant GDP prices.

Figure 8: NHS Drugs bill expenditure, 1998/99 to 2004/05



* The figure for medicines supplied in a secondary care setting for 2004/05 is an estimate. It is assumed to be the same proportion of total drugs expenditure as it was in 2003/04.

Source: Health Select Committee (2005, p 113)

Figure 9a shows that between 1998/99 and 2004/05 the number of prescription items dispensed in the community increased by 35 per cent, while the average cost per prescription has remained reasonably stable (at about £8.50). The considerable growth in the number of statin prescriptions dispensed in the community (see Figure 9b) reflects rapid changes in practice driven by emerging evidence and government targets. It illustrates how dramatic changes can occur within fairly short time periods.

The drugs bill for both community and secondary care combined has consumed between 13 per cent and 14 per cent of the NHS budget since 1991 (OHE, 2005, p 233).

Figure 9a: Average cost and number of prescriptions, England 1995 to 2005

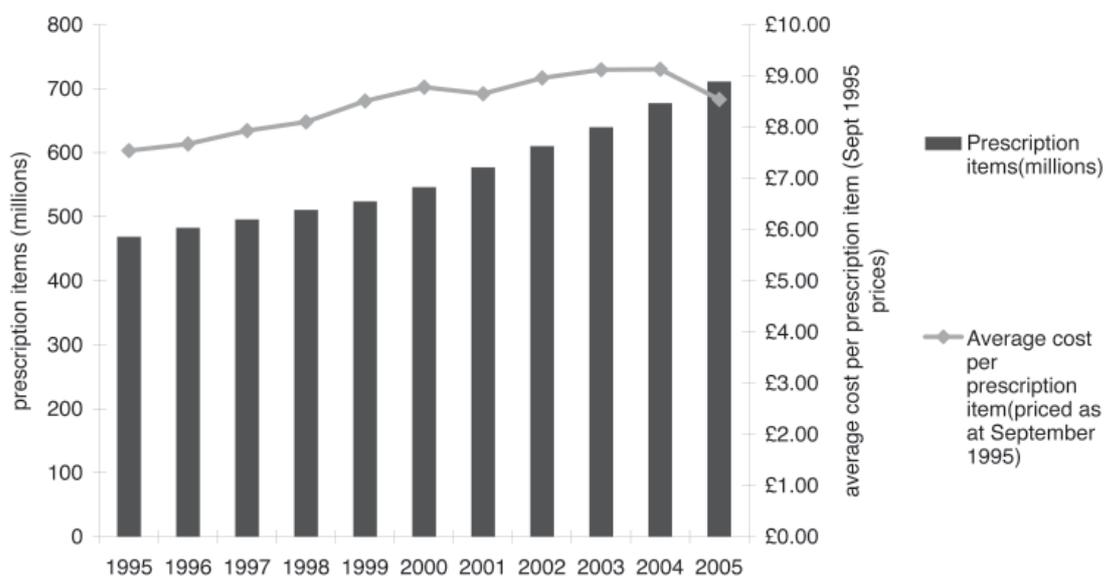
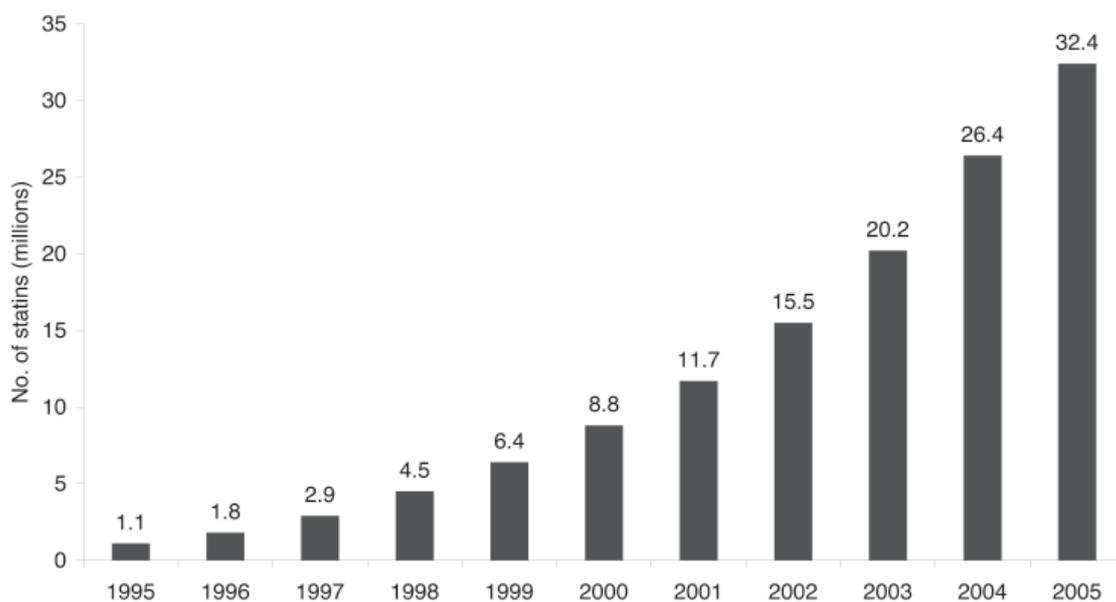


Figure 9b: Number of statins dispensed in the community (millions), England 1995 to 2005



Source: DH (2005c, pp 7–8)

1.4 Outcomes

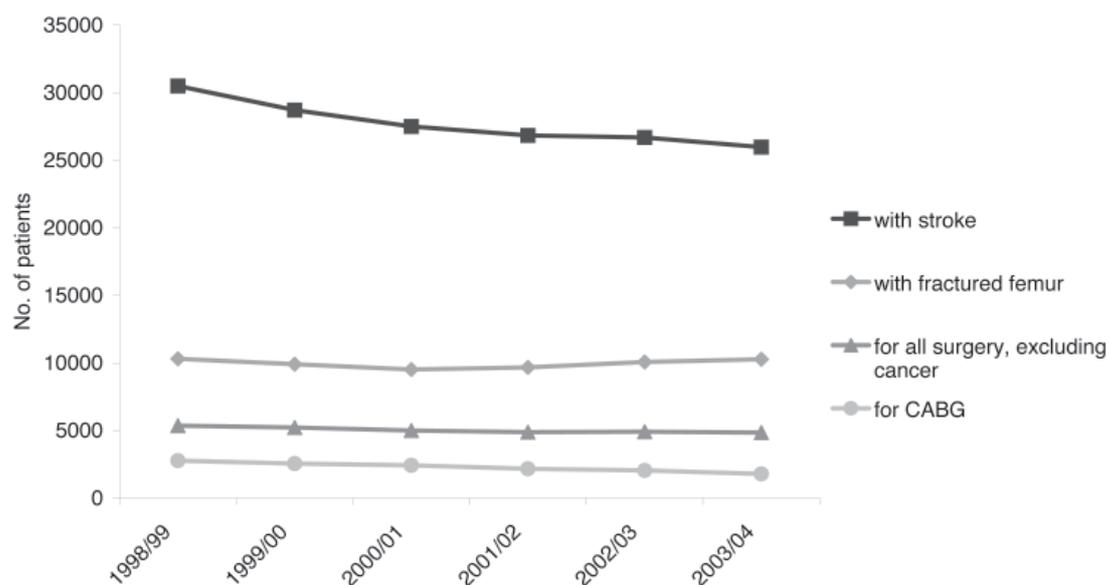
Any assessment of a health service ought to examine indicators of the value of the 'output' it creates. Traditionally, two classes of outcome are considered important in healthcare: clinical outcomes expressed in terms of the health gains created by the system, and the quality of the patient experience, independent of health outcomes, expressed in concepts such as ease of access to care and responsiveness.

1.4.1 Clinical outcomes

Some health outcomes indicators – such as life expectancy rates, infant mortality rates and cancer mortality rates – are available. However, improvements in these are a function of many factors over which the NHS often has little influence. The relative scarcity of readily accessible outcome data specific to the NHS forces any analysis to rely heavily on process indicators, on the assumption that they provide a reasonable proxy for health outcomes. This complicates any interpretation of improvements in outcomes (Le Grand, 2002).

In some areas the NHS has a more direct influence over hospital death rates, and post-admission and post-operative death rates. Figure 10 reports on four selected conditions/procedures. These rates reflect deaths recorded within 30 days of admission or operation (death might occur either in hospital or after discharge). They are indirectly age and sex standardised but are not otherwise adjusted for severity. Since 1998/99 the 30-day death rate following non-elective surgery has declined by 10 per cent while the death rate following a first coronary artery bypass graft (CABG) has fallen by one-third. The death rate following admission with a stroke is down by 15 per cent, but the death rate following admission with a fractured femur has increased since 2000/01 after declining in 1999/2000 and 2000/01.

Figure 10: Post-operative death rates within 30 days of emergency admission to hospital, 1998/99 to 2003/04



NB: Unit of analysis is a continuous in-patient spell.

(a) deaths within 30 days of surgery, non-elective admissions (for list of eligible operation codes see www.nchod.nhs.uk/)

(b) deaths within 30 days of admission with fractured proximal femur (comprises ICD 10 codes: S72.0, S72.1, S72.2)

(c) deaths within 30 days of a first coronary artery bypass graft (OPCS-4 codes: K40-K46)

(d) deaths within 30 days of admission with diagnosis of stroke (comprises ICD 10 codes: I61-I64)

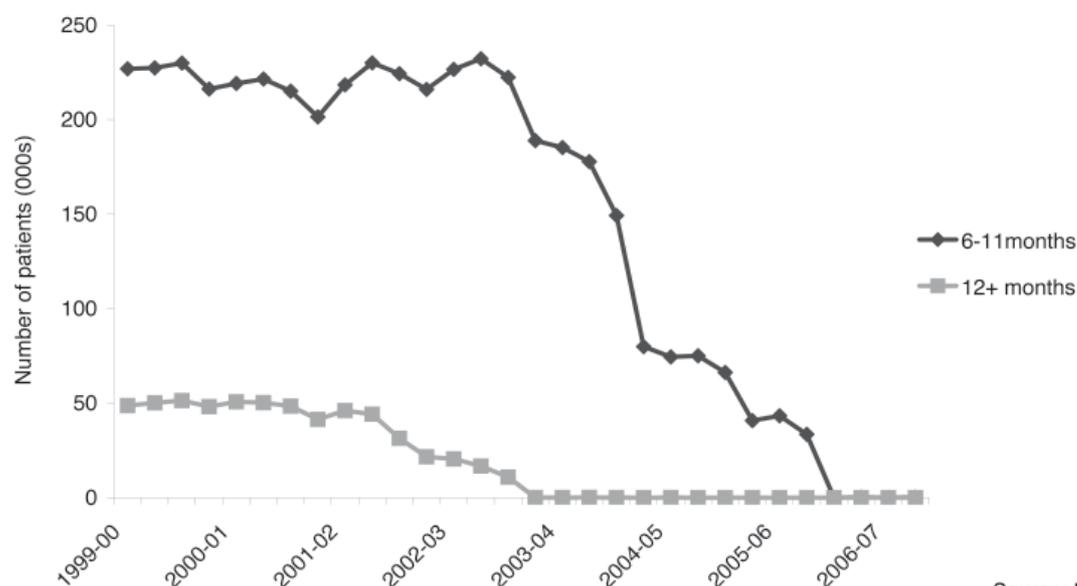
Source: National Centre for Health Outcomes Development website (see www.nchod.nhs.uk/)

1.4.2 Access

Another dimension of NHS performance which is of central policy concern is how long patients have to wait to secure access to the NHS. At its foundation in 1948 the NHS inherited a waiting list of just under 500,000 patients and this queue reached a high of 1.3 million patients in 1998. In early 2000 the Prime Minister committed the Government to matching European levels of spending on healthcare and, later that year, the Department of Health (DH) published the NHS Plan (DH, 2000a and 2000b). This specified several ambitious targets. First, the 100,000 reduction in the size of the list was to be maintained, but this was to be supplemented by a target for maximum inpatient waiting times. A maximum waiting time of 15 months was to be implemented by March 2002, with further reductions to 12 months by March 2003, to 9 months by March 2004, and to 6 months by December 2005.

Figure 11a reports the number of patients awaiting admission at various census dates and how long these patients have waited to date. The figures show that – on this particular measure – NHS Plan targets have indeed been met: for example, there are fewer than 1,000 patients still awaiting admission as at 31 December 2005 who had already waited more than six months. Less than three years earlier, over 192,000 patients were waiting longer than six months for admission.

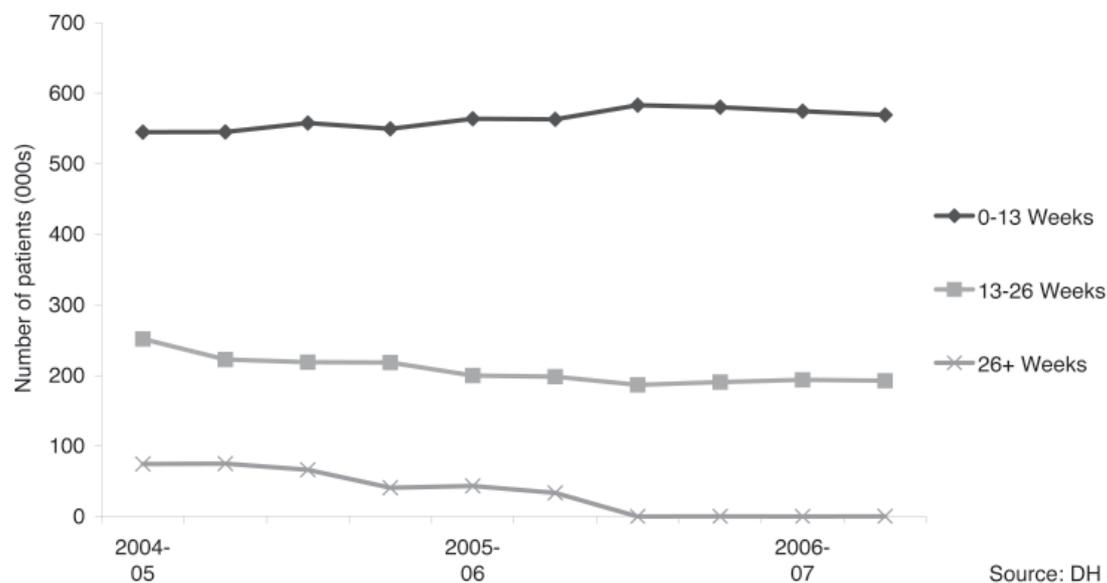
Figure 11a: Number of patients waiting 6-11 months and >12 months, England 1999/2000 to 2006/07



Source: DH

Source: DH (www.performance.doh.gov.uk/waitingtimes/index.htm)

Figure 11b: Number of patients waiting <13 weeks; 13-<26 weeks; and 26+ weeks, England 2004/05 to 2006/07



The NHS Plan also set ambitious targets for first outpatient appointments. A maximum waiting time of 26 weeks was to be implemented by March 2002 for all first outpatient appointments, with further reductions to 21 months by March 2003, to 17 months by March 2004, and to 13 weeks by December 2005. And, as Figure 11b shows, these targets have indeed been met.

1.4.3 Patient experience

More generally, various performance indicators can be constructed from population and patient surveys of satisfaction with the NHS. For example, the regular British Social Attitudes Survey provides information on the degree of public satisfaction with various aspects of the NHS. This is usually an annual survey of between 1,700 and 3,500 British adults.

Table 1 reports net satisfaction levels (that is, the percentage of respondents who are satisfied less the percentage who are dissatisfied) with five NHS services: GPs, dentists, A&E, outpatients and inpatients. Of the five services, local GPs are rated the most highly with a net satisfaction rating of over 50 percentage points in 2004. However, this is a marked decline from over 70 percentage points in the early 1990s. Net satisfaction with dentists was just under 60 percentage points in the early 1990s. However, it has been at about 30 per cent since then and plummeted to just 4 per cent in 2004, possibly due to the well-publicised difficulty of finding an NHS dentist (Appleby and Rosete, 2003; 2005). Satisfaction ratings for A&E are only available since 1999 and these – like those for outpatients – declined by about 15 per cent by 2001. However, since then satisfaction levels for both A&E and outpatients have improved.

The ratings for inpatients mirror those for the NHS as a whole, declining in the 1990s, rising with the election of the Labour Government in 1997, but declining after 1999. Unlike the overall NHS ratings, however, there is little sign of an improvement in satisfaction after 2002, with inpatient satisfaction reaching an all-time low of just 24 per cent in 2004.

The net satisfaction ratings for outpatients were some 25 points below those for inpatients in the early 1990s. However, with the exception of 2004, these are now only a few points below those for inpatients: ratings for the latter have fallen much faster than those for the former. The net satisfaction ratings for individual services exceed those for the NHS as a whole (shown in the final column of Table 1) suggesting that respondents answer the two set of questions on a different basis. For example, it may be the case that responses to the question about the NHS as a whole are influenced by broader public concerns about government performance.

Table 1: Public net satisfaction with various NHS services, 1989 to 2004

Year	Net satisfaction: % satisfied minus % dissatisfied					
	GP services	Dentists	A&E	Outpatients	Inpatients	Entire NHS
1989	68	59	n/a	23	50	-10
1990	69	58	n/a	23	48	-10
1991	73	56	n/a	25	51	-1
1992	n/a	n/a	n/a	n/a	n/a	n/a
1993	73	38	n/a	34	50	6
1994	69	35	n/a	35	42	6
1995	68	32	n/a	33	40	-8
1996	65	27	n/a	27	31	-14
1997	n/a	n/a	n/a	n/a	n/a	-16
1998	62	30	n/a	31	37	4
1999	61	29	28	35	40	13
2000	61	43	23	34	37	4
2001	54	29	11	23	27	-2
2002	54	32	11	26	28	-1
2003	56	27	13	30	31	7
2004	54	4	16	32	24	7

Sources: Exley and Jarvis (2003); Appleby and Rosete (2005)

2. Where is the expenditure growth going?

2.1 Main categories of growth

Since 1999/2000 National Health Service (NHS) spending (in current prices) has increased annually by between about £5 billion and £7 billion. However, the increased spending has not translated into a corresponding increase in activity. Of multiple contributors to increased spending, key factors are: workforce pay, escalation of prices in drugs and services, and the impact of National Institute for Health and Clinical Excellence (NICE) guidance. Unless they stimulate extra productivity from existing resources, these cost pressures reduce the amount of the budget increase that is available for additional activity.

Alongside this extra expenditure, a large programme of reform has been implemented, not least in working patterns and contracts for NHS employees. Relevant employment reforms include:

- the introduction of the junior doctors' contract (from December 2000) and compliance with the European Working Time Directive (EWTD) by August 2004
- the re-negotiation of the consultant contract (from November 2003)
- the re-negotiation of the General Medical Services contract (from April 2004)
- the application of Agenda for Change to all directly employed NHS staff, except those covered by the Doctors' and Dentists' Pay Review Body (from December 2004).

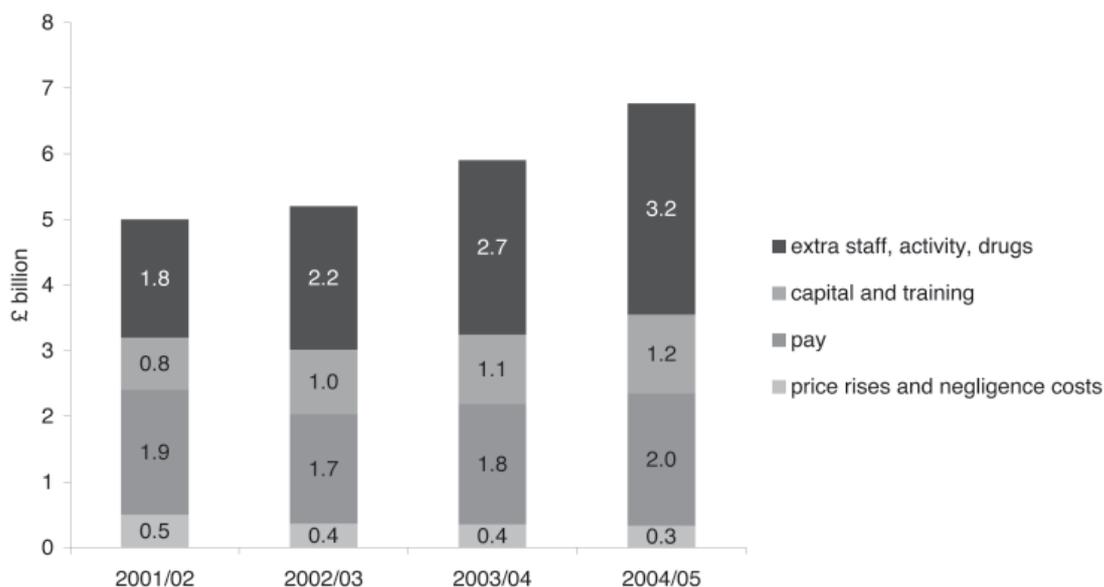
In addition to these employment reforms, which have substantially increased NHS costs, some of the increase in NHS resources has been consumed by annual pay awards to staff and by increased employer pension contributions.

The price of goods and services purchased by the NHS has also been increasing as has the cost of drugs. On top of these cost pressures, NICE has been preoccupied principally with improving the clinical and cost-effectiveness of drugs and medical procedures employed in the NHS, and its recommendations have generally increased costs to the NHS (Oliver, 2005).

2.2 Department of Health estimates

The Department of Health (DH) provides its own estimate of the extent of the cost pressures, and how much funding has been available for additional activity, in the form of a 'high-level breakdown' of how the extra funding for the NHS has been spent, as summarised in Figure 12. Additional resources over the four year period have totalled almost £23 billion, at an average of £5.7 billion per year, with on average about:

- 7 per cent consumed by increased prices and negligence costs
- 33 per cent spent on pay
- 18 per cent used to fund additional capital expenditure and staff training
- 43 per cent for extra staff, activity and drugs.

Figure 12: High-level expenditure breakdown of the additional NHS funding, 2001/02 to 2004/05

Sources: DH, 2002a, p 7; 2003, p 19; 2004a, p 35; 2005a, p 44

Taking 2004/05 as an example, of the extra £6.7 billion:

- £2 billion (30 per cent) was spent on pay rises for existing staff
- £1.15 billion (18 per cent) was spent on training (increasing the medical school intake) and capital (building new hospitals)
- £335 million (5 per cent) was used to meet the increased cost of goods and services
- £3.2 billion (48 per cent) went on extra staff, activity and drugs.

Given the relatively large size of the 'extra staff, activity and drugs' category, it is useful to examine separate figures for each of the three component categories, which are available for 2004/05 (DH, 2005a, p 45). The split is:

- £1.4 billion on additional staff (21 per cent)
- £0.8 billion on increased prescribing (12 per cent).

This leaves just £1 billion out of the additional £6.7 billion (15 per cent) for additional activity (DH, 2005a, p 45).

2.3 Interpretation of expenditure growth

However, even with this additional breakdown it is not clear how these figures should be interpreted. First, the categories presented in Figure 12 are a mix of inputs and outputs (for example, extra staff and activity) and this will lead to double counting as the extra staff will be responsible for some extra output. It is not clear how the 'extra activity' component of 'extra staff, activity and drugs' has been calculated and whether it is a residual after all other cost pressures have been met.

Second, the interpretation of the additional resources allocated to the pay category is unclear. In the case of goods and services purchased by the NHS, it is possible to argue that the NHS is forced to pay the market rate for the items it buys and has little influence over the prices it pays; according to Figure 2 these prices have increased by about 7 per cent on average per year. However, for many categories of staff employed by the NHS (doctors, nurses, scientific and therapeutic staff) the NHS is a virtual monopsony buyer and therefore, at least to some extent, able to control the 'price' it pays for labour. With pay levels absorbing one-third of the increase in additional funding – and directly controlled by the NHS – is it appropriate to subtract this amount from the total available to obtain an estimate of the amount available for extra activity? Some argue that the whole point of the additional pay made available to fund Agenda for Change and the new consultant/General Practitioner (GP) contracts is to re-structure employment practice within the NHS to facilitate increased activity. In this scenario, it is less obvious that all of the additional costs of these employment reforms detract from the resources available for extra activity. Indeed, the employment reforms described at the start of this section were in part designed precisely to secure productivity gains.

A similar interpretation is offered by the NHS Confederation. It argues that the additional expenditure on pay is:

...a crucial part of the NHS reform programme. High quality patient care can only be delivered by valued and motivated staff who are paid a decent wage. Savings are made in the long term as recruiting and retaining skilled staff becomes easier... The reform of contracts and pay for NHS staff has increased costs but has been a key step to creating a modern flexible workforce.

(NHS Confederation, 2005, p 2)

The argument is that pay reforms have a direct impact on patient care:

- more patients are treated more quickly because the new contracts require staff to have more flexible working patterns so that increased availability and more highly skilled staff can offer prompt diagnosis and treatment
- patients receive higher quality care as the pay reforms should lead to higher average knowledge and skill levels and a reduction in both adverse incidents and patient complaints due to poor standards of service.

The data in Figure 12 relate to all NHS expenditure. Similar information on where extra future funding is expected to go is available for the hospital and community health services (HCHS) budget, which accounts for about two-thirds of the total NHS budget. DH guidance (2005d) reports the inflation uplift applied to those patients whose care is priced according to the Payment by Results national tariff for 2004/05, while the same guidance for 2006 contains similar information for 2005/06 and 2006/07. These publications indicate the additional costs imposed by Agenda for Change, NICE guidance, and the new consultant contract, as summarised in Table 2. The single most costly item has been Agenda for Change, which is imposing average annual additional costs of over £500 million.

Table 2: Additional costs imposed by various policy initiatives, 2004/05 to 2006/07

Estimated cost increase over previous year's baseline (£ million)			
	2004/05	2005/06	2006/07
Agenda for Change	490	460	635
NICE appraisals	304	389	291
Consultant contract	49	140	50

Sources: DH (2005d; 2006)

Table 3 presents summary data for all HCCHS cost pressures. This shows that, in 2004/05, the baseline allocation for HCCHS increased from 2003/04 by £5.085 billion, from £41.077 billion to £46.162 billion. Most of this increase (almost 80 per cent) was allocated to meet various cost pressures, such as increased pay and new employment contracts for consultants and other NHS staff. More precisely, pay and pensions absorbed 56 per cent of the extra £5.085 billion allocation with drugs' costs, NICE recommendations, intended to stimulate better health outcomes, absorbed a further 10 per cent.

With unit cost pressures absorbing £3.991 billion, this left £1.094 billion in cash for extra services. Unspecified 'efficiency savings' were assumed to generate a further £411 million so that, assuming that all the anticipated efficiency savings were forthcoming, £1.505 billion was available for additional services. This is a real increase of 3.7 per cent over the 2003/04 baseline allocation of £41.077 billion.

Table 3: HCCHS baseline allocations and inflation uplifts, 2004/05 to 2006/07

Financial item	2004/05 (£ billion)	2005/06 (£ billion)	2006/07 (£ billion)
HCCHS baseline	46.162	49.806	54.289*
HCCHS baseline increase over previous year	5.085	4.592	4.483
for cost pressures			
pay (and pensions)	2.872	1.860	1.763
non-pay inflation (prices)	0.219	0.209	0.253
clinical negligence costs	0.183	0.135	0.141
drugs and NICE	0.494	0.602	0.578
capital costs	0.223	0.363	0.484
Total	3.991	3.169	3.219
for other developments (cash)	1.094	1.423	1.264
for other developments (efficiency savings)	0.411	0.769	1.245

NB: The 2004/05 data are taken from DH (2005d, p 35) while the 2005/06 and 2006/07 data are extracted from DH (2006, p 22). The HCCHS baseline figure for 2004/05 in DH (2006) is £45.214 billion and this has been used to calculate the HCCHS baseline increase over previous year for 2005/06.

* The HCCHS baseline figure for 2006/07 has been estimated as generating a 9 per cent increase on the 2005/06 figure (see King's Fund, 2006).

Sources: DH (2005d; 2006)

The situation is similar in 2005/06. Of the £4.592 billion (10.16 per cent) increase in the baseline HCHS allocation, about 69 per cent is expected to be consumed by cost increases, with pay accounting for 41 per cent and drugs/NICE absorbing 13 per cent. This leaves £1.423 billion for extra services, together with an additional £0.769 million expected to be generated from efficiency savings. Thus, of the £4.592 billion (10.16 per cent) increase, £2.192 billion is available for additional services. This is a real increase of 4.8 per cent over the 2004/05 baseline of £45.214 billion (assuming that all the efficiency gains are realised).

Following the King's Fund (2006), this paper assumes a 9 per cent increase in the HCHS baseline allocation for 2006/07. After all cost pressures have been deducted, this leaves £1.264 billion for additional services, together with assumed efficiency gains of £1.245 billion. This is a real increase of 5 per cent (again, assuming that all the efficiency gains are realised).

Overall, the baseline increase for additional HCHS activity ranges from:

- 2.7 per cent (with no efficiency gains) to 3.7 per cent (all gains realised) in 2004/05
- 3.1 per cent (with no efficiency gains) to 4.8 per cent (all gains realised) in 2005/06
- 2.5 per cent (with no efficiency gains) to 5.0 per cent (all gains realised) in 2006/07.

These increases, averaging between 2.8 per cent and 4.5 per cent, are considerably less than the real terms increase in NHS expenditure shown in Figure 2 which averages 5.9 per cent over this three year period. This illustrates how substantial cash increases can be associated with quantitatively less dramatic increases in activity levels and offers one explanation for a puzzle that has exercised many commentators on the NHS (Le Grand, 2002, p 142).

Another explanation has been put forward by the NHS Confederation (2005). It argues that the NHS had very tight financial settlements for much of the 1980s and 1990s and that expenditure growth was often less than healthcare pay and price inflation. The interim Wanless Report stated that 'the cumulative underspend between 1972 and 1998 has been calculated as £220 billion in 1998 prices. Relative to EU average spending on an income weighted basis, the cumulative underspend is £267 billion' (Wanless, 2001, p 37). The NHS Confederation (2005) argues that this explains the shortage of many types of staff, the poor condition of many buildings and the low level of investment in equipment. The Confederation argues that by 2000 the NHS was running at high rates of activity, beyond what was affordable or sustainable, and that a culture had developed in which NHS organisations were expected to report that they had 'broken even'. This, combined with sustained underfunding, led to many key developments being put on hold or scaled back, including:

- the prescription of new (more expensive) drugs
- the maintenance of buildings and infrastructure (so that by 2001 the NHS had a maintenance backlog of £3.1 billion)
- the appointment of new consultants
- the appointment of additional staff to meet growing demand
- staff training and medical education
- the purchase of new equipment
- improvements to buildings.

Consequently recent funding increases, initially earmarked for new projects, have sometimes been required to deal with the results of previous under-investment (NHS Confederation, 2005, p 5).

3. NHS productivity change

Productivity measures, at least in theory, allow organisational performance to be tracked over time and provide insight into the central question of whether or not we are getting value for money.

Productivity is a very general term, suggesting the ratio of one or more outputs to one or more inputs. There are therefore numerous partial indicators of productivity available within the National Health Service (NHS), such as average length of stay. However, recent efforts have sought to develop a more comprehensive measure of productivity, defined as the volume of all outputs divided by the volume of all inputs. Considerable research effort has been devoted over the past two years to improving the measurement of this concept of NHS productivity (Dawson et al, 2005; ONS, 2006a). On the output side, attention has focused on incorporating appropriate adjustments for the changing quality of NHS outputs (moving towards capture of some elements of outcomes). On the input side, the focus has been on the construction of appropriate price indices to deflate NHS expenditure on inputs to a constant price basis. To date, the emphasis has been on creating time series of productivity growth for the NHS rather than creating contemporaneous comparisons across countries or across sectors of the economy.

Because varying assumptions and different methods lead to different estimates of output and input growth, and hence to different estimates of productivity growth, the Office for National Statistics (ONS) has published two reports which show how estimated NHS productivity growth varies according to the assumptions made and methods used (ONS, 2004; 2006a). Before outlining these latest figures, this section first illustrates how the Department of Health (DH) calculated NHS productivity before June 2004. This establishes the context for the more recent work.

3.1 Productivity measurement before June 2004

Before June 2004, NHS productivity was measured in a rather crude fashion. The measure of outputs was based on a cost weighted activity index (CWAI) as explained below, with inputs equal to NHS expenditure deflated by an index of NHS costs and prices. The ratio yields a cost weighted efficiency index, a proxy for NHS productivity (Pritchard, 2004). The main interest is in the change in this ratio over time.

Table 4: Components of the HCHS/FMS Cost Weighted Activity Index pre-June 2004

Category of activity	Activities (number) 2000/01	Expenditure 2000/01 £ million	Spend as a percentage of total expenditure (%)
(a) HCHS activity			
Inpatient and day case episodes	11,872	15,455.1	64.1
Outpatient, A&E and ward attenders	58,940	4,710.0	19.5
Regular day patients	5,631	454.0	1.9
Chiropody	2,248	106.4	0.4
Family planning	1,273	70.5	0.3
Screening	4,089	64.4	0.3
Health visiting	3,298	324.9	1.4
District nursing	2,505	1,001.3	4.2
Community psychiatric nursing	564	644.5	2.7
Community learning disability nursing	56	473.9	2.0
Dental episodes of care (part)	747	83.5	0.4
Ambulances	18,790	711.4	3.0
Total HCHS expenditure		24,100	100
b) Family medical services activity			
GP consultations	358	3,152.0	21.5
GP prescribing	108	6,733.0	45.8
Dental services (part)	31	4,445.0	30.3
Ophthalmic services	11	357.0	2.4
Total FMS expenditure		14,687	100

NB: Activities are generally measured in terms of episodes, client contacts, and so on, and are measured in various units (1,000s etc). The precise unit of measurement is not specified in the original source.

Source: Pritchard (2004)

Table 4 shows the activity groups employed in the pre-June 2004 CWAI together with their output levels and expenditure weights in 2000/01. The CWAI was calculated as a weighted average of the percentage change in the level of each activity. As Table 4 shows, this CWAI only distinguished a very small number of activities and the coarseness of these activity groups – such as all inpatient and day case episodes – meant that some very expensive procedures (such as coronary artery bypass graft or CABGs) were attributed the same weight as other much less expensive operations (such as cataract removals). Moreover, with a single series (the total number of inpatient and day cases) accounting for just under two-thirds of all hospital and community health services (HCHS) expenditure, the HCHS activity index was heavily influenced by movements in the count of inpatients and day cases.

Although the calculation of this CWAI is relatively straightforward, the literature can be a little confusing because some authors report a CWAI for HCHS alone (that is, for the first 12 activities listed in Table 4) whereas others report a CWAI for all NHS expenditure (that is, for the first 12 activities listed in part (a) of Table 4 together with the four family medical services (FMS) activities listed in part (b) of Table 4).

For example, Oliver (2005) reports a CWAI on an annual basis from 1979/80 to 2000/01 and figures for 1991/92 to 2000/01 are shown in the first column of Table 5. In addition, the second column presents an expenditure index. This serves as an indicator of the volume of HCHS resource use. It reflects the value of HCHS expenditure adjusted for both NHS pay inflation and the price of goods and services purchased by the NHS. Dividing the CWAI by the expenditures index reveals the amount of HCHS activity per unit of expenditure (this is the so-called cost weighted efficiency index: see the third column of Table 5).

Table 5: Trends in HCHS activity per unit of cost index (% growth), 1991/92 to 2000/01

Year	CWAI (% growth)	Expenditure index (% growth)	Activity per unit of cost index (% growth)
1991/92	5.23	2.60	2.6
1992/93	3.10	3.10	0.0
1993/94	3.99	1.59	2.4
1994/95	4.18	1.39	2.8
1995/96	3.95	1.76	2.2
1996/97	1.66	1.47	0.2
1997/98	1.80	2.21	-0.4
1998/99	2.06	2.95	-0.9
1999/2000	1.08	3.72	-2.5
2000/01	0.00	4.54	-4.3

Source: DH cited in Oliver (2005)

Until 1995/96, output – measured using the CWAI – grew at over 4 per cent per annum and, with annual expenditure growth of 2 per cent, this generated an average annual improvement in the efficiency index of 2 per cent per year. From 1996/97, output growth slowed and reached zero in 2000/01. Input growth, however, increased and reached over 4 per cent in 2000/01. Together, these two developments generated small falls in the efficiency index in 1997/98 and 1998/99, with more substantial falls in 1999/2000 and 2000/01 (of 2.5 per cent and 4.3 per cent respectively).

3.2 Developments in NHS productivity measurement since June 2004

The inadequacies in productivity measures traditionally used in measuring the productivity of public services led the National Statistician to commission Sir Tony Atkinson to review methods of measuring government output and productivity. The Atkinson Report (2005) contains numerous recommendations for improvements, most of which have been accepted by the ONS, and many of which relate specifically to the NHS. The ONS has put in place a programme of work to implement the Atkinson recommendations, and has produced two

articles describing potential enhancements to measuring its productivity. This paper now describes the current state of productivity measurement.

3.2.1 Measuring the volume of NHS inputs

Research to improve the measurement of the volume of NHS inputs has focused on three different categories: labour, goods and services procured, and capital (ONS, 2004; 2006a). Two approaches to the conversion of expenditure on NHS inputs into volume measures have been adopted by the ONS (2006a):

- an 'indirect' approach deflates NHS expenditure by adjusting labour and procurement expenditure by pay and price indices respectively, and capital expenditure is adjusted for changes in the rental value of capital
- a 'direct' approach which converts NHS staff numbers and earnings weights into a volume measure by adjusting for hours worked and taking account of differences in earnings. The University of York/National Institute of Economic and Social Research (NIESR) study (Dawson et al, 2005, referred to here as the York/NIESR study) adopted an alternative approach which incorporated information on skill mix but obtained similar results to those obtained by ONS (2006a, p 29).

This section briefly outlines the different ways in which the ONS has estimated the volume of inputs and then summarises the impact that these different methods have on the estimated input growth rate.

Labour

The 'indirect' and 'direct' methods yielded very similar estimates of the average annual change in NHS labour inputs between 1995 and 2004: the indirect method resulted in an average annual growth rate of 3.4 per cent while the direct method suggested a slightly lower annual growth rate of 3 per cent.

Prescription drugs

The identification of a suitable price deflator for expenditure on drugs dispensed outside hospitals has been problematic. The DH now links the prices of branded and generic drugs so that, when branded drugs fall out of patent and much cheaper generic drugs become available, this fall in the cost of similar drugs is counted as part of the price change. This new analysis has only been undertaken for 2003 and 2004 so that, prior to 2003, two alternative deflators – the average cost per item and an unlinked Paasche price index separately accounting for branded and generic drugs – are employed, each registering very different average annual price changes between 1995 and 2002 (+5.2 per cent and -0.8 per cent respectively).

Goods and services purchased by HCHS

The DH constructs a HCHS Health Service Costs index. This measures the broad monthly price changes associated with its current expenditure on goods and services purchased by HCHS (DH, no date). The ONS (2006a) report an average annual growth in this price index of 0.7 per cent per year between 1995 and 2004.

Capital

ONS (2006a) presents volume indices for capital consumption (based on depreciation estimates) and for capital services provided (based on estimated rental prices for capital stock items). Between 1995 and 2004, the average annual growth in capital consumption (3.3 per cent) is slightly less than the growth in capital services (4.3 per cent).

Total NHS inputs

Using the most recent methods and selecting those estimates of the change in the volume of inputs which generate the highest and lowest growth rates over the period 1995 to 2004 yields a lowest growth rate of 3.9 per cent per year and a highest growth rate of 4.6 per cent per year (4.8 per cent and 5.5 per cent over the period 1999 to 2004). The former is based on the drugs bill deflated using an average cost of all items, a capital input measure based on an estimate of capital consumption and the direct labour (counting staff) method to estimate the growth in the volume of labour. The latter estimate is based on the drugs bill deflated by a Paasche price index, a capital input measure based on an estimate of capital services and the indirect labour method (deflating expenditure on labour using price indices) to estimate the volume growth in labour.

3.2.2 Output without quality adjustments

Most research since 2004 has focused on NHS output measurement. Table 6 summarises the CWAI for HCHS only (row 'a') as reported in Table 5 and compares it with a number of series of HCHS and FMS combined produced by Atkinson and the ONS. The first series (row 'b'), produced pre-June 2004, shows that the total NHS growth exceeds HCHS growth, implying that the FMS output growth rate exceeds that of HCHS. Reporting the HCHS growth rate alone may therefore understate the apparent total NHS output growth rate.

Table 6: Estimated NHS output growth rates without any quality adjustments (% per annum)

Output estimation method and service coverage	Year	1996	1997	1998	1999	2000	2001	2002	2003	Cumulative total 1996-2003
<i>Until May 2004</i>										
a. HCHS only		1.7	1.8	2.1	1.0	0.0	n/a	n/a	n/a	n/a
b. HCHS&FMS		2.6	2.3	2.6	2.1	0.9	1.9	2.6	2.6	19.0
<i>June 2004</i>										
c. HCHS&FMS		3.9	1.3	1.8	3.1	3.0	4.2	4.1	4.1	28.5
<i>October 2004</i>										
d. HCHS&FMS		2.9	1.5	1.8	3.2	3.0	4.2	4.1	4.1	27.6
<i>February 2006</i>										
e. HCHS&FMS		3.3	1.5	1.8	3.2	3.0	4.3	3.7	3.7	27.3

NB: The average of the annual growth rates will fall slightly short of the cumulative total divided by the number of years. Although Atkinson's (2005) focus is the UK, the above figures are virtually all for England.

Sources: For row 'a', DH cited in Oliver (2005); for rows 'b/c/d', Atkinson Review (2005, p 108); for row 'e' (ONS, 2006a, p 15)

The number of different activities separately identified has increased dramatically: from 16 to 1,300, and then to 1,600, and now to almost 1,900 different activities (ONS, 2006a). Instead of a single activity category for all inpatient admissions, the new measure distinguishes over 600 elective and 600 emergency inpatient categories, with each admission allocated to one of about 600 different healthcare resource groups (HRGs). Each admission within a given HRG is expected to consume approximately the same volume of resources.

The overall growth rate of any category will reflect the growth in its component parts. The implicit effect of increasing the number of categories is to adjust in a much more refined

fashion for the relative difficulty of the tasks being undertaken by the NHS. With only 16 different components, the pre-June 2004 NHS output growth rate is shown in row 'b' of Table 6. The introduction of 1,300 different categories in June 2004 – leading to far more homogeneous activity categories – generates the output growth estimates shown in row 'c'. The cumulative total growth between 1996 and 2003 using this new method is 28.5 per cent, which is 50 per cent greater than the cumulative total growth using the May 2004 (16 output categories) estimation method (shown in row 'b').

The new output estimation method was subject to some further small improvements and, in October 2004, the ONS published further output growth estimates. These estimates are presented in row 'd' of Table 6. They differ slightly from those presented in June 2004 but, overall, the cumulative change in NHS output over the period 1996 to 2003 remains at about 28 per cent. The DH estimated that around three-quarters by value of all NHS activity was covered by this much extended measure of NHS output (ONS, 2004).

In February 2006, the ONS published further revised growth estimates. These are based on 1,900 different types of NHS activity covering about four-fifths by value of all activity in England. These estimates also include about three-quarters by value of all activity in Northern Ireland and the intention is to improve the coverage of these estimates by incorporating data for Scotland and Wales when possible. Despite the refinements incorporated into these latest estimates, the cumulative growth total between 1996 and 2003 remains largely unchanged – down only 0.3 percentage points – at 27.3 per cent. Applying this new method, estimated output growth for 2004 was 4.8 per cent (ONS, 2006a, p 15).

One important point to note about the output growth estimates presented in Table 6 is that they incorporate no adjustments for improvements in the quality of output and implicitly assume that procedures adopted today offer the same health benefits as the same procedures undertaken five or ten years ago. This is unlikely to be the case and considerable research has recently been undertaken to incorporate such quality improvements into the output growth estimates.

3.2.3 *Output with quality adjustments*

The Atkinson Review (2005) noted that measuring NHS output simply on the basis of countable activities and cost-based weights ignores the quality of these activities and the contribution they make to valuable outcomes. Recent research – see the York/NIESR study (Dawson et al, 2005) and the DH response (DH, 2005e) – has identified several potential quality adjustment factors. In brief, the York/NIESR work recognises a cluster of interacting factors when arriving at an overall quality adjustment for the measurement of NHS output. These factors include:

- incorporating improved survival rates for patients
- incorporating improved health gains for patients (the 'before' and 'after' change in health status)
- adjusting the above factors for the life expectancy distribution of patients (younger patients will enjoy the benefits for longer than older ones)
- allowing for changes in waiting times (waits may reduce health gains and be stressful in their own right).

The York/NIESR study estimates that all these elements increase NHS output growth by an additional average of 0.17 percentage points per year over the period 1999/00 to 2003/04. (This time period was the longest for which the relevant data were available for quality adjustments.)

Following the Atkinson Review (2005) and the 2005 York/NIESR study, the DH (2005e) has proposed four further quality adjustments to the measurement of NHS output. These factors include:

- using value weights rather than cost weights where these are very different. For example, the DH estimates that each statin prescription has a marginal benefit of £115 (in terms of life years saved) but costs £27. Using £115 instead of £27 as the weight for each statin prescription increases overall NHS output growth by, on average, 0.81 per cent a year between 1999 and 2004.
- incorporating improved outcomes from primary medical care. Data for a full quality adjustment based on primary medical care outcomes are still developing. Meanwhile, the DH uses data on improvements in blood pressure and cholesterol control to estimate that quality adjustments based on currently available data for primary medical care increase overall NHS output growth by 0.16 percentage points per year for the two years for which data are available (2002/03 and 2003/04).
- incorporating improved survival rates from myocardial infarction. Using data available on hospital episodes for patients admitted to hospital with myocardial infarction, the DH estimates that, between 1998/99 and 2003/04, the decline in the mortality rate for myocardial infarction acute admissions within one year of admission adds 0.01 percentage points to the annual output growth measure.
- the suggestion, articulated by the Atkinson Review, that the ONS and DH should explore whether measures of quality change over time could be based on the national patient survey programme which measures aspects of patient experience. Hitherto, there have been two surveys in four different areas of NHS activity: inpatients, Accident and Emergency (A&E), outpatients and primary care. The DH estimates that the quality adjustment for patient experience increases total NHS output growth by 0.17 percentage points per year during 2002/03 and 2003/04. When averaged over a five year period – 1999/2000 to 2003/04 – this figure becomes 0.07 percentage points, assuming that there is no change in patient experience for the first three years (ONS, 2006a, p 25).

The DH (2005e) has also proposed a 'value of health' adjustment based on the annual real growth in average earnings. The Atkinson Review noted that rising real wage rates means that a higher valuation should be attached to days lost through sickness and absence today than 40 years ago, and that account might need to be taken of the increased real value of public services in an economy with a rising real gross domestic product (GDP). Gravelle and Smith (2001) argue that the financial value attached to a quality adjusted life year should grow at 1.5 per cent per year in real terms to reflect this annual growth in real earnings. Taken together, the addition of the quality adjustments outlined above (but excluding the value of health adjustment) increases the average output growth rate for the NHS by an additional 1.18 percentage points per annum over the five year period 1999/2000 to 2003/04. The value of health adjustment adds a further 1.5 points per year so that the overall quality adjustment effect adds 2.68 percentage points to the average annual output growth rate. The value of health adjustment therefore has a profound impact on productivity growth estimates. Its use is highly contentious and is currently the subject of an ONS consultation.

The various adjustments can be added to the basic annual average output growth rate of 3.8 per cent per year from 1999/00 to 2003/04 as outlined in row 'e' of Table 6. For 1999/00 to 2003/04, this yields an average output growth rate of:

- 3.8 per cent without any quality and value of health adjustments

- 5.0 per cent with only quality adjustments
- 6.5 per cent with both quality and value of health adjustments.

The debates surrounding these adjustments are discussed further in section 3.3 below.

3.2.4 Post-June 2004 NHS productivity estimates

Productivity is defined as the ratio of NHS outputs to inputs and, clearly, productivity levels will depend on which methods are used to estimate the volume of inputs and outputs. ONS (2006a) presents various productivity estimates, reflecting the different measures of inputs and outputs available and these are summarised in Table 7 (see sections 3.2.1 to 3.2.3 above for further details of the various input and output estimation methods).

Table 7: Estimated NHS annual average output, input and productivity growth (%), 2004 to 2006

Study	Time period	Adjustments to output measure	Output growth (%)	Input growth (%)		Productivity growth	
				min	max	min	max
ONS (2004)	1995–2003	None	3.1	3.5	4.2	-1.1	-0.4
ONS (2006)	1995–2004	None	3.2	3.9	4.6	-1.3	-0.6
ONS (2006)	1999–2004	For quality only	5.0	4.8	5.5	-0.5	0.2
ONS (2006)	1999–2004	For quality and value of health	6.5	4.8	5.5	0.9	1.6

Source: ONS (2004; 2006a)

The first set of estimates in Table 7 are for the years 1995 to 2003. The output estimates are based on 1,600 different categories of activity but incorporate no quality adjustments (ONS, 2004). With output growth averaging 3.1 per cent and input growth varying between 3.5 and 4.2 per cent, NHS productivity growth falls between -0.4 per cent and -1.1 per cent per year.

The second set of estimates in Table 7, from ONS (2006a), are for the years 1995 to 2004. These incorporate various refinements to the measure of inputs and outputs over the first set of estimates, but no quality adjustment in the measure of output growth. The latest ONS estimate is that, for 1995 to 2004 (not taking account of quality change), NHS productivity fell by an average of between -0.6 per cent and -1.3 per cent per year.

The third set of estimates incorporate the quality adjustments proposed in the York/NIESR and DH studies, but with no allowance for the increasing value of health. These quality adjustments are not available for 1995 to 1998 so the figures reported in Table 7 are for the shorter (five year) period, 1999 to 2004. Over this period NHS productivity grew between -0.5 per cent and 0.2 per cent per year.

Adding the contentious adjustment for the increasing value of health boosts the estimated output growth rate to 6.5 per cent per year and, with an input growth rate of between 4.8 per cent and 5.5 per cent, this yields an NHS productivity growth rate of between 0.9 per cent and 1.6 per cent per year over the five year period, 1999 to 2004 (see the final set of estimates in Table 7).

3.3 Summary

Until recently, NHS productivity was calculated in a rather simplistic fashion. Output growth was estimated as a weighted average of the growth in 16 very broad categories (such as all inpatient admissions and all outpatient/A&E/ward attendances). This very coarse categorisation ignored the heterogeneity within each category, for example, the very large variations in costs and benefits among hospital inpatient admissions. Moreover, even if such heterogeneity could be accommodated, simply counting the numbers in each category creates an implicit assumption that quality remained unchanged across years.

Since June 2004 the number of separately identified activity categories has increased dramatically. Implicitly, this secures some adjustment for changes in case mix and reduces the importance of patient heterogeneity. It is likely to have secured a major improvement in the accuracy of output measures.

Furthermore, some attempt has been made to generate estimates of 'quality' change within categories. Quality in healthcare has two principal connotations: the extra length and quality of life secured by medical intervention, and the personal responsiveness of the health system, independent of any health gain it bestows. Although there has been some attention to reduced waiting times (assumed to be a major aspect of responsiveness in the UK), the main effort in productivity measurement to date has been on the 'health gain' element of NHS outputs. Attempts have been made to capture changes in the extra life years secured within each treatment category using two broad approaches: changes in the mortality associated with each intervention and changes in the age profile of patients. Improved post-treatment mortality secures self-evident health gains. However, it is also likely that health gains will increase as the age of patients decreases, as the gains will be spread over a longer lifetime. Recent methodological changes therefore seem reasonable in assuming that, other things being equal, productivity will decline if the age of patients increases.

However, much remains to be done to improve output and outcome measurement methodology. Most notably, the assumption that the health gains associated with each activity are proportionate to its average costs is manifestly wrong. Instead, it would seem more sensible in principle to weight each activity by the average health gain it bestows. The DH has recognised this by arguing for a much higher weight to be attached to statin prescriptions than their costs, reflecting the relatively high cost-effectiveness of the intervention. However, to be consistent, this principle should be applied to all interventions, including those that confer few health gains. In short, the statin methodology is a step in the right direction, but will offer a balanced view of productivity changes only if it is applied across all interventions.

Other criticisms of the quality adjustments have been made: for example, the use of value rather than cost weights for statin prescriptions attributes this benefit to the NHS whereas it could be argued that this should be attributed to the pharmaceutical industry.

The application of the 'value of health' adjustment has stimulated much debate and remains controversial. The annual 1.5 per cent value of health adjustment has a major impact on estimated productivity growth, and it has not been established that the NHS should be credited with this value of life adjustment. Indeed there are strong arguments against this approach, for example:

- the value of health adjustment reflects a price change whereas productivity measurement is usually based on the measurement of quantities (of inputs and outputs)

- the NHS is neither responsible for nor has any control over real earnings growth in the rest of the economy and therefore should not be credited with it.

The ONS consultation on this topic is unlikely to secure a consensus, and it is highly unlikely that the value of health adjustment will appear in national accounts in the foreseeable future.

On the responsiveness aspect of quality, some work has now been carried out to incorporate changes in waiting times into the output measure. This is exploratory, and has so far yielded little change to productivity estimates. This is not surprising, as waiting times apply to only a subset of NHS activity, and in any case until recently average waiting times have not changed markedly. Rather, the policy priority has been to focus on the relatively small number of very long NHS waits, the elimination of which is unlikely to affect productivity measures materially.

Alongside the developments on the output side, improvements have also been made to the calculation of the volume of NHS inputs. These are mainly technical in nature, but some quantitatively important issues remain unresolved, such as the method of deflating NHS expenditure on pharmaceuticals.

Between 1997/98 and 2000/01 the old cost weighted efficiency index declined by, on average, 2 per cent per annum. But the most recent estimates of productivity growth – incorporating quality and value of health adjustments – suggest an average annual improvement in productivity of between 0.9 per cent and 1.6 per cent since 1999/2000. There has been some criticism of the ONS for outlining the issues involved and encouraging public debate about the measurement of NHS productivity (see ‘Health service productivity’ in *The Economist*, 4 March 2006 and ‘Governing by numbers’ by Tony Travers in *Public Finance*, 20 October 2006). However, such criticism appears to miss the point. The debate is needed in order to address the currently unacceptable state of methodology and the consequence that public services cannot properly be held to account for their performance. For the moment we have to accept that there is no definitive measurement of NHS productivity and that, with various figures available, commentators will either acknowledge this uncertainty and cite the various estimates available or choose that measure which supports their argument and ignore the others. This paper argues that the appropriate way forward is to have a well-informed and wide-ranging debate on the topic in order to identify the main priorities for methodological clarification.

Conclusion

Since 1999/2000 the National Health Service (NHS) has enjoyed relatively large funding increases together with a reform programme – particularly in terms of staff contracts and working patterns – intended to create a more patient-led organisation capable of delivering a service that approaches the best in the world. In this context, it is important to remember that, for many years, the UK has spent far less on healthcare (as a proportion of its gross domestic product) than most of its European neighbours. This may well have contributed to poor UK health outcomes (for example, in terms of cancer survival rates) relative to comparable continental European performance levels (Wanless, 2001).

The period between 1999/2000 and 2004/05 has given rise to the following changes:

- annual real increases in NHS resources of about 7 per cent
- an increase in NHS staff numbers of 23 per cent, including a 31 per cent increase in consultants alongside an increase in the number of General Medical Practitioners of less than 10 per cent
- changes to inpatient hospital use:
 - the number of inpatients awaiting admission declined by over 300,000
 - inpatient admissions increased by between 10 per cent and 15 per cent
 - the number of all NHS specialty beds fell by almost 5,000 (largely in geriatrics, mental illness and learning disability), but the number of acute beds increased by over 2,000 and the number of critical care beds increased by almost 1,000.
- new Accident and Emergency (A&E) attendances and first outpatient appointments increased by between 10 per cent and 15 per cent
- the number of General Practitioner (GP) consultations remained largely unchanged
- there were marked increases in the number of computerised tomography (CT) scans (up 57 per cent) and magnetic resonance imaging (MRI) scans (up 61 per cent)
- drug spending increased by 40 per cent, with the number of prescriptions dispensed in the community up by 35 per cent
- changes in the quality of NHS care
 - post-admission and post-operative mortality rates have generally declined
 - emergency re-admission rates have risen over the past three years
- surveys of public opinion have provided a mixed picture of the performance of the NHS.

If Wanless' estimate of a cumulative underspend between 1972 and 1998 of £267 billion in 1998 prices is accurate, it is unlikely that an additional £6 billion per annum will transform the NHS in the space of five or six years. Some of the additional resources could be seen as investment in labour and capital needed to overcome the years of under-investment. Many view the recent major increases in pay levels in this light. On the capital side, the downward trend in the number of acute beds has been reversed and there has been dramatic growth in the number of day beds. Moreover, hospital activity levels are increasing, though not in proportion to the funding increases. One reason for this is that the new consultant and GMS contracts, as well as Agenda for Change, have consumed a significant percentage

of the funding increase. Various perspectives have emerged regarding the merits of these initiatives, ranging from the benign view that they are investments in human capital that will lead to future productivity gains, to the jaundiced view that the increased investment is failing to show commensurate benefits and was at unnecessarily high levels.

Additional cost pressures have also been imposed by National Institute for Health and Clinical Excellence (NICE) recommendations, the hospital building programme and a considerably increased intake in medical schools. Whether these will lead to measurable health gains is also a matter for debate. However, in the short term, once these cost pressures have been met, much less is available for increased activity, the prime driver of the NHS output measures.

Finally, this report has described the recent concerted attempts that have been made to refine the measurement of NHS productivity, especially on the output side. However, there remain many important unresolved issues, which include the proper treatment of both physical and human capital inputs, the measurement of healthcare quality, handling of 'hard to measure' areas (such as mental health) and the treatment of pharmaceutical price changes. These and other technical issues suggest a challenging agenda for analysts over the coming years. Yet it is becoming clear that the careful measurement of productivity growth plays a central role in deciding how much of taxpayers' money to spend on healthcare and in holding the NHS to account for its spending. The pursuit of better measurement of value for money therefore has a central role in informing public debate.

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