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# Value for Money in the English NHS: Summary of the Evidence

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# Contents

## Abstract

The extent to which the English National Health Service secures value for money for taxpayers has become a central issue of political and public debate. Questions include: how much expenditure growth has been made available to the NHS? on what has that money been spent? what improvements in the volume and quality of health care have been secured? and what are the implications for productivity? There has been a flurry of research activity designed to address these and similar questions. This 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, this has not in general kept pace with the growth in expenditure. On most measures, therefore, NHS productivity is either static or declining. However, the report highlights a large number of unresolved methodological issues that make it hard to draw any definitive conclusions. We conclude that the measurement of NHS productivity change makes an important contribution to national debate. However, there remains considerable scope for improving both the data and the methods underlying current estimates.

## 1. Introduction

In 1997-98 the Labour Government set out to "modernise the NHS" (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 health care 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 health care. At that time the UK spent 7.3% of GDP on health care. By 2008 this proportion is set to reach 9.4% and this is expected to be broadly comparable with other European countries (Oliver, 2005, pS80). Between 2000 and 2008, NHS expenditure is set to increase by over 10% 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% (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 and 2000b). Several studies have sought to evaluate whether these funding increases have delivered the expected gains in the form of 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 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.

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 2 provides some conventionally reported metrics of recent trends in NHS expenditure, labour and capital inputs, and activity levels. Section 3 presents some details about where the extra NHS funding has been spent and, in particular, partitions the extra funding between that used to: (a) meet increased costs for existing employees and NHS wage rates; (b) fund additional ( newly hired) NHS staff; and (c) 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 4 summarises several recent studies that have sought to incorporate the information presented in sections 2 and 3 – together with a much wider body of material on NHS inputs and outputs – into a study of NHS productivity. In theory, a productivity measure will provide a single number estimate of the performance 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. 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 currently is a popular topic for study, so we shall be covering some ground that others have already visited (for example, King's Fund (2005)). Where applicable, we have noted 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 2.

## 2. NHS expenditure, inputs and activity levels

This section provides an overview of recent changes in NHS expenditure, input, and activity levels. It is not intended to be comprehensive but rather to illuminate some recent developments in the NHS and provide some context for policy debates.

### 2.1 How much expenditure growth?

Table 1 shows net NHS expenditure at current prices, constant 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 Table 1. 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% but the NHS pay and price index rose by 70%. 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 by 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 annum between 1991/92 and 1999/00 and is planned to increase by about 10% 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 1999/00 was 2% per annum, and is planned to be about 7% 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 3.

**Table 1 NHS expenditure in current and constant prices, 1991/92 - 2007/08, England. Current prices reflect the cash paid in the year in question, constant prices show the expenditure adjusted by an index of price change.**

| Year | NHS spend, current prices, £ million | GDP deflator index 1991/92=100 | NHS spend, constant GDP prices, £ million | NHS Pay and prices index 1991/92=100 | NHS spend, constant NHS prices, £ million |
|---|---|---|---|---|---|
| 1991/92 | 26317 | 100 | 26317 | 100 | 26317 |
| 1992/93 | 29072 | 104 | 27955 | 107 | 27066 |
| 1993/94 | 30082 | 107 | 28159 | 111 | 27054 |
| 1994/95 | 31774 | 109 | 29283 | 114 | 27833 |
| 1995/96 | 33245 | 111 | 29859 | 119 | 27957 |
| 1996/97 | 34297 | 115 | 29837 | 122 | 28045 |
| 1997/98 | 36029 | 118 | 30456 | 124 | 28961 |
| 1998/99 | 38050 | 122 | 31278 | 130 | 29362 |
| 1999/00 | 41452 | 124 | 33333 | 136 | 30547 |
| 2000/01 | 45299 | 126 | 35943 | 142 | 31980 |
| 2001/02 | 50547 | 129 | 39224 | 149 | 33865 |
| 2002/03 | 55724 | 133 | 41901 | 155 | 35990 |
| 2003/04 | 63001 | 137 | 45905 | 164 | 38452 |
| 2004/05 | 69710 | 140 | 49729 | 170 | 41036 |
| 2005/06 | 76388 | 144 | 53059 | 177 | 43154 |
| 2006/07 | 84324 | 148 | 56875 | 185 | 45619 |
| 2007/08 | 92643 | 152 | 60929 | 193 | 47909 |

Sources: OHE Compendium of Health Statistics for UK GDP and NHS deflators; DH annual Departmental Report, various issues,for NHS expenditure.[1] Figures for 2005/06 onwards are based on estimates/plans.

[1] More precisely, current expenditure on Stage 2 resource budgeting terms from 2002/03, on Stage 1 terms from 1999/00 to 2002/03, and cash from 1991/92 to 1999/00 with the latter two grossed-up to Stage 2 RB terms for pre-2002/03.

## 2.2 Input growth

There are various ways of looking at how these funds have been spent. Table 2 presents 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% between 1991/92 and 2004/05, 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% over this period and has even recorded a small increase since 1999/00. Day only beds have increased dramatically by 170%, 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.

**Table 2 Average daily available NHS beds, 1991/92 - 2004/05, England**

| Year | All specialties | Acute | Geriatric | Mental illness | Learning disability | Maternity | Day only |
|---|---|---|---|---|---|---|---|
| 1991-92 | 242,677 | 115,140 | 42,107 | 50,278 | 21,383 | 13,770 | 3,399 |
| 1992-93 | 232,201 | 112,862 | 40,346 | 47,308 | 18,519 | 13,167 | 3,972 |
| 1993-94 | 219,476 | 109,713 | 37,440 | 43,532 | 16,269 | 12,521 | 4,908 |
| 1994-95 | 211,812 | 108,008 | 36,795 | 41,827 | 13,211 | 11,971 | 5,699 |
| 1995-96 | 206,136 | 108,296 | 34,328 | 39,477 | 12,676 | 11,358 | 6,541 |
| 1996-97 | 198,848 | 108,869 | 31,646 | 37,640 | 9,693 | 11,000 | 6,766 |
| 1997-98 | 193,625 | 107,807 | 30,240 | 36,601 | 8,197 | 10,781 | 7,125 |
| 1998-99 | 190,006 | 107,729 | 28,697 | 35,692 | 7,491 | 10,398 | 7,568 |
| 1999-00 | 186,290 | 107,218 | 27,862 | 34,173 | 6,834 | 10,203 | 7,938 |
| 2000-01 | 186,091 | 107,956 | 27,838 | 34,214 | 6,316 | 9,767 | 8,155 |
| 2001-02 | 184,871 | 108,535 | 28,047 | 32,783 | 5,694 | 9,812 | 8,036 |
| 2002-03 | 183,826 | 108,706 | 27,973 | 32,753 | 5,038 | 9,356 | 8,544 |
| 2003-04 | 184,019 | 109,793 | 27,454 | 32,252 | 5,212 | 9,309 | 8,813 |
| 2004-05 | 181,784 | 109,505 | 26,619 | 31,667 | 4,899 | 9,095 | 9,160 |

NB The all specialty total excludes day only beds.
Source: Department of Health (see http://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%, from 2,240 in March 1999 to 3,233 in January 2006

Table 3 reports the number of directly employed full-time equivalent NHS staff. Between 1992/93 and 1999/00 the total number of staff increased by less than 1% but the number of doctors rose by almost 20% as did the number of qualified scientific, technical and therapeutic (STT) staff. Between 1999/00 and 2004/05, staff numbers increased by 23% 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.[2]

Table 4 provides a breakdown of the 'all doctors' total in Table 3. It shows that between 1999/00 and 2004/05 the number of full-time equivalent doctors increased by 23% while the number of consultants increased by 31% but the number of General Medical Practitioners rose by less than 10%.

[2] In 2004-05 the NHS spent just under £1.45 billion on agency staff, which accounted for 5 per cent of the total NHS spend on pay in England.

**Table 3 NHS staff, by category, full-time equivalents, 1992/93 - 2004/05**

| Year | Total staff | Doctors | Qualified nurses | Qualified STT staff | Ambulance staff | Clinical support | NHS infra-structure | Practice staff nes |
|---|---|---|---|---|---|---|---|---|
| 1992/93 | 866606 | 74521 | 265382 | 72649 | 14509 | n/a | n/a | 41899 |
| 1993/94 | 848053 | 76124 | 259645 | 73092 | 14248 | n/a | n/a | 44347 |
| 1994/95 | 835034 | 76840 | 255037 | 74050 | 14560 | n/a | n/a | 42734 |
| 1995/96 | 842310 | 80064 | 256567 | 76394 | 13728 | 211395 | 150207 | 49510 |
| 1996/97 | 848104 | 81783 | 257891 | 80273 | 13942 | 215122 | 144450 | 49497 |
| 1997/98 | 846298 | 84758 | 256093 | 81601 | 14193 | 215129 | 141637 | 50497 |
| 1998/99 | 855129 | 86594 | 257597 | 84560 | 14116 | 220331 | 139469 | 50973 |
| 1999/00 | 873547 | 88693 | 261340 | 86837 | 14129 | 226585 | 142071 | 52398 |
| 2000/01 | 892620 | 90638 | 266987 | 89632 | 14104 | 234683 | 144048 | 51872 |
| 2001/02 | 931048 | 92910 | 277334 | 93085 | 14255 | 249198 | 149598 | 53835 |
| 2002/03 | 978376 | 97415 | 291285 | 98397 | 14978 | 262671 | 158026 | 55110 |
| 2003/04 | 1027284 | 102344 | 304892 | 102912 | 15355 | 277178 | 167916 | 56173 |
| 2004/05 | 1071462 | 109483 | 315440 | 108585 | 16587 | 284394 | 178098 | 58443 |

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 GP practice staff (physiotherapists, practice managers).
Source: Department of Health (see http://www.dh.gov.uk/PublicationsAndStatistics/Statistics/StatisticalWorkAreas/StatisticalWorkforce/fs/en).

**Table 4 Number of doctors (full-time equivalents), by category, 1992/93 - 2004/05**

| Year | Consultants | Registrars | Others training | Other doctors | GMPs | All doctors |
|---|---|---|---|---|---|---|
| 1992/93 | 15696 | 10077 | 14857 | 4625 | 27299 | 74521 |
| 1993/94 | 16044 | 10357 | 15375 | 4973 | 27387 | 76124 |
| 1994/95 | 16537 | 10592 | 15546 | 4864 | 27495 | 76840 |
| 1995/96 | 17900 | 10842 | 16523 | 5267 | 27489 | 80064 |
| 1996/97 | 18603 | 10717 | 17348 | 5590 | 27550 | 81783 |
| 1997/98 | 19661 | 11336 | 18251 | 5882 | 27660 | 84758 |
| 1998/99 | 20432 | 11559 | 18532 | 6399 | 27848 | 86594 |
| 1999/00 | 21410 | 12085 | 18414 | 6736 | 28033 | 88693 |
| 2000/01 | 22186 | 12199 | 19006 | 7134 | 28154 | 90638 |
| 2001/02 | 23064 | 12629 | 19376 | 7560 | 28439 | 92910 |
| 2002/03 | 24756 | 13031 | 20901 | 8183 | 28740 | 97415 |
| 2003/04 | 26341 | 13989 | 22413 | 8337 | 29777 | 102344 |
| 2004/05 | 28141 | 16112 | 24542 | 8596 | 30762 | 109483 |

NB Other doctors includes equivalent grades in the community and in public health.
Source: Department of Health (see http://www.dh.gov.uk/PublicationsAndStatistics/Statistics/StatisticalWorkAreas/StatisticalWorkforce/fs/en).

Table 5 provides 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 CT and MRI scans: these have increased by 57% and 61% respectively between 1999/00 and 2004/05 although there were also substantial increases between 1995/96 and 1999/00 (of 28% and 62% respectively).

**Table 5 Number of imaging and radio-diagnostic tests by type of test, 1995/96 - 2004/05**

| Year | X-Rays | CT scans | MRI scans | Ultrasound | Radio-isotopes | Fluoroscopy | Total |
|---|---|---|---|---|---|---|---|
| 1995-96 | 18,503,844 | 1,709,244 | 347,817 | 4,031,292 | 467,916 | 1,077,914 | 26,138,027 |
| 1996-97 | 19,167,629 | 1,056,365 | 394,940 | 4,456,816 | 506,412 | 1,232,795 | 26,814,957 |
| 1997-98 | 19,474,590 | 1,172,656 | 473,074 | 4,790,532 | 722,096 | 1,179,979 | 27,812,927 |
| 1998-99 | 19,876,933 | 1,254,474 | 522,138 | 5,018,434 | 699,654 | 1,244,632 | 28,616,265 |
| 1999-00 | 19,967,296 | 1,359,852 | 585,797 | 5,255,330 | 727,255 | 1,256,965 | 29,152,499 |
| 2000-01 | 19,913,022 | 1,488,752 | 632,594 | 5,382,582 | 539,141 | 1,253,847 | 29,209,938 |
| 2001-02 | 19,806,876 | 1,625,304 | 705,706 | 5,571,979 | 537,653 | 1,222,296 | 29,469,814 |
| 2002-03 | 19,512,924 | 1,767,791 | 786,646 | 5,635,358 | 551,423 | 1,295,639 | 29,549,781 |
| 2003-04 | 20,056,669 | 1,992,826 | 857,550 | 5,937,383 | 582,742 | 1,221,102 | 30,648,272 |
| 2004-05 | 19,818,330 | 2,141,652 | 944,935 | 6,029,104 | 560,337 | 1,190,487 | 30,684,845 |

Source: Department of Health (see http://www.performance.doh.gov.uk/hospitalactivity/data_requests/imaging_and_radiodiagnostics.htm).

**Table 6 GP consultations, A&E and outpatient attendances, and inpatient admissions, 1991/92 - 2004/05**

| Year | GP consultations (millions) | New A&E attendances (thousands) | First outpatient attendances (thousands) | Inpatient admissions, general and acute (thousands) | Emergency admissions, general and acute (thousands) | Elective admissions, general and acute (thousands) | Overnight cases, general and acute (thousands) | Day cases, general and acute (thousands) |
|---|---|---|---|---|---|---|---|---|
| 1991/92 | 214 | 11035 | 8942 | | | | | |
| 1992/93 | 232 | 10993 | 9342 | | | | | |
| 1993/94 | 252 | 11365 | 9681 | | | | | |
| 1994/95 | 224 | 11943 | 10363 | | | | | |
| 1995/96 | 235 | 12462 | 10989 | | | | | |
| 1996/97 | 254 | 12484 | 11294 | 7924 | 3598 | 4327 | 1731 | 2596 |
| 1997/98 | n/a | 12794 | 11529 | 8141 | 3729 | 4412 | 1677 | 2735 |
| 1998/99 | 217 | 12811 | 11778 | 8676 | 3849 | 4827 | 1738 | 3089 |
| 1999/00 | n/a | 13167 | 12136 | 8778 | 3887 | 4891 | 1712 | 3179 |
| 2000/01 | 221 | 12953 | 12466 | 8944 | 3943 | 5001 | 1700 | 3301 |
| 2001/02 | 218 | 12901 | 12613 | 8997 | 3961 | 5036 | 1662 | 3374 |
| 2002/03 | 243 | 13253 | 12879 | 9269 | 4007 | 5262 | 1684 | 3578 |
| 2003/04 | 215 | 14080 | 13341 | 9719 | 4274 | 5445 | 1734 | 3711 |
| 2004/05 | n/a | 14903 | 13370 | 10050 | 4497 | 5554 | 1718 | 3835 |

NB The GP consultation data refer to calendar years. Inpatient admissions are first finished consultant episodes and are on a consistent commissioner basis. Source: Departmental of Health, annual Departmental Report (various issues).

## 2.3 Activity growth

### *2.3.1 Units of service*

Table 6 reports 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: the number of consultations in 2003 being virtually the same as in 1991. New A&E attendances have increased by 13% since 1999/00 with first outpatient appointments (10%) and inpatient admissions (15%) recording similar increases. The only dramatic change revealed in Table 6 is the relative shift towards day cases (up 21% since 1999/00) and away from overnight stays in hospital (no increase since 1999/00).

### *2.3.2 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. Table 7 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, an increase of just over 40% since 1999/00 at constant GDP prices.

**Table 7 NHS Drugs bill expenditure, 1998/99 - 2004/05, (£million)**

| Year | NHS net cash expenditure relating to: | | | |
|---|---|---|---|---|
| | prescriptions dispensed in the community (£ million) | medicines supplied in a secondary care setting (£ million) | total (£ million) cash | at 1998/99 prices |
| 1998/99 | 4,389 | 1,211 | 5,550 | 5,550 |
| 1999/00 | 4,883 | 1,369 | 6,202 | 6,102 |
| 2000/01 | 5,161 | 1,530 | 6,691 | 6,479 |
| 2001/02 | 5,552 | 1,740 | 7,292 | 6,896 |
| 2002/03 | 6,209 | 2,013 | 8,222 | 7,542 |
| 2003/04 | 6,799 | 2,308 | 9,107 | 8,110 |
| 2004/05 | 7,344 | 2,493e | 9,837e | 8,572e |

NB 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: HC 736-iii (2005, p113)

Table 8 shows that between 1999 and 2005 the number of prescription items dispensed in the community increased by 35%, that 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 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% and 14% of the NHS budget since 1991 (OHE, 2005, p233).

**Table 8 Average cost, number of prescriptions, number of statin prescriptions**

| Year to September | Prescription items(millions) | Average cost per prescription item(priced as at September 1995) | Number of statins dispensed in the community (millions) |
|---|---|---|---|
| 1995 | 468.3 | £7.54 | 1.1 |
| 1996 | 482.3 | £7.67 | 1.8 |
| 1997 | 495.5 | £7.93 | 2.9 |
| 1998 | 510.5 | £8.10 | 4.5 |
| 1999 | 523.7 | £8.51 | 6.4 |
| 2000 | 546.0 | £8.78 | 8.8 |
| 2001 | 576.9 | £8.65 | 11.7 |
| 2002 | 610.2 | £8.96 | 15.5 |
| 2003 | 639.8 | £9.12 | 20.2 |
| 2004 | 677.5 | £9.13 | 26.4 |
| 2005 | 711.2 | £8.54 | 32.4 |

Source: DH (2005c, p7-8).

### *2.3.3 Clinical outcomes*

Of course, any assessment of a health service ought to examine indicators of the *value* of its 'output', pre-eminently the improvement in health outcomes that result from its activities. Some health outcomes indicators are available – such as life expectancy rates, infant mortality rates, and cancer mortality rates. 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. Four selected conditions/procedures are reported in Table 9. 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% (see column 'a' of Table 9) while the death rate following a first CABG has fallen by one-third (see column 'c').

The death rate following admission with a stroke is down by 15% (see column 'd' of Table 9) but the death rate following admission with a fractured femur has increased since 2000/01 after declining in 1999/00 and 2000/01.

**Table 9 Post-operative death rates within 30 days of emergency admission to hospital**

| Year | Age-sex standardised 30 day death rate per 100,000 admissions: | | | |
|---|---|---|---|---|
| | for all surgery, excluding cancer<br>a | with fractured femur<br>b | for CABG<br>c | with stroke<br>d |
| 1998/99 | 5364 | 10307 | 2775 | 30497 |
| 1999/00 | 5224 | 9908 | 2553 | 28712 |
| 2000/01 | 5003 | 9522 | 2427 | 27500 |
| 2001/02 | 4879 | 9674 | 2168 | 26842 |
| 2002/03 | 4917 | 10073 | 2046 | 26684 |
| 2003/04 | 4850 | 10275 | 1792 | 25974 |

Notes: 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 http://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: NCHOD website (see http://www.nchod.nhs.uk/)

### *2.3.4 Access*

Another dimension of NHS performance concerns how long patients have to wait to access the NHS. At its birth in 1948 the NHS inherited a waiting list of just under 500,000 patients and this queue reached an all-time high of 1.3 million patients in 1998. In early 2000 the Prime Minister committed the Government to matching European levels of spending on health care and, later that year, the *NHS Plan* was published (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.

Table 10 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 and having already waited more than six months. Less than three years earlier, over 192,000 patients were waiting longer than 6 months for admission.

**Table 10 Patients awaiting admission to hospital**

| Census date | Number of patients (000s) awaiting admission having waited: | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 0 - < 3 months | 0 - < 3 months | 6 - < 9 months | 9 - < 12 months | 12 -<15 months | 15-<18 months | 18+ months | Total (000s) |
| 2001 | 521 | 240 | ----------204 ---------- | | ----------42 ---------- | | 0 | 1 007 |
| 2002 | 532 | 262 | ----------219---------- | | 22 | 0 | 0 | 1 035 |
| 2003 | 542 | 258 | 138 | 54 | 0 | 0 | 0 | 992 |
| 2004 | 577 | 247 | 81 | 0 | 0 | 0 | 0 | 906 |
| 2005 | 593 | 190 | 1 | 0 | 0 | 0 | 0 | 784 |

NB The census date is 31 March except for 2005 when it is 31 December.
Source: Department of Health (http://www.performance.doh.gov.uk/waitingtimes/index.htm).

The *NHS Plan* also set similar 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 these targets have indeed been met.

### *2.3.5 Patient experience*

Finally, 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 11 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 points 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 and 2005). Satisfaction ratings for A&E are only available since 1999 and these – like those for outpatients – declined by about 15 points 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 4% in 2004.

The net satisfaction ratings for outpatients were some 25 points below those for inpatients in the early 1990s but – with the exception of 2004 – 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 11) 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 11 Public net satisfaction with various NHS services**

| 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 |

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

# 3. Where is the expenditure growth going?

## 3.1 Main categories of growth

Since 1999/00 NHS spending (in current prices) has increased annually by between about £5-7 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 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 GMS 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, the National Institute for Health and Clinical Excellence (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 been largely cost increasing (Oliver, 2005).

## 3.2 Department of Health estimates

The DH provides its own estimate of the extent of the cost pressures and how much 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 Table 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% consumed by increased prices and negligence costs
- 33% spent on pay
- 18% used to fund additional capital expenditure and staff training, and
- 43% for extra staff, activity and drugs.

**Table 12 High-level expenditure breakdown of the additional NHS funding**

| | **2001/02** | **2002/03** | **2003/04** | **2004/05** |
|---|---|---|---|---|
| Additional NHS resources | £5 bn | £5.2 bn | £5.9 bn | £6.7 bn |
| *spent on:* | | | | |
| price rises and negligence costs | 10% | 7% | 6% | 5% |
| pay | 38% | 32% | 31% | 30% |
| capital and training | 16% | 19% | 18% | 18% |
| extra staff, activity, drugs | 36% | 42% | 45% | 48% |

Sources: DH, 2002a, p7; DH, 2003, p19; DH, 2004a, p35; DH, 2005a, p44.

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, p45). Of the extra £6.7 billion:

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

The £3.2 billion on extra staff, activity and drugs can be broken down as follows:

- £1.4 billion on additional staff ( calculate % of total0and,
- £0.8 billion on increased prescribing. ( s/a)

This leaves just £1 billion out of the additional £6.7 billion for additional activity (DH, 2005a, p45).

### 3.3 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 Table 12 are a mix of inputs and outputs (e.g., 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 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; and according to Table 9 these prices have increased by about 7% 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/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, p2). 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 Table 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 alone, which accounts for about two-thirds of the total NHS budget. DH (2005d) reports the inflation uplift applied to those patients whose care is priced according to the *Payment by Results* national tariff for

2004-05 and DH (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 13. The single most costly item has been *Agenda for Change*, which is imposing average annual additional costs of over £500 million.

**Table 13 Additional costs imposed by various policy initiatives**

| | 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), DH (2006)

Summary data for all HCHS cost pressures are presented in Table 14. This shows that, in 2004-05, the baseline allocation for HCHS increased from 2003-04 by £5.085 billion, from £41.077 billion to £46.162 billion. Most of this increase (almost 80%) 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% of the extra £5.085 billion allocation with drugs' costs. NICE recommendations, intended to stimulate better health outcomes, absorbed a further 10%.

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% over the 2003-04 baseline allocation of £41.077 billion.

**Table 14 HCHS baseline allocations and inflation uplifts, 2004/05 - 2006/07**

| **Financial item** | **2004-05 (£ billions)** | **2005-06 (£ billions)** | **2006-07 (£ billions)** |
|---|---|---|---|
| HCHS baseline | £46.162 | £49.806 | £54 289e |
| HCHS 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 |

Sources: DH (2005d); DH (2006)

NB 1. The 2004-05 data are taken from DH (2005d, p35) while the 2005-06 and 2006-07 data are extracted from DH (2006, p22). The HCHS baseline figure for 2004-05 in DH (2006) is £45.214 billion and this has been used to calculate the HCHS baseline increase over previous year for 2005-06. 2. The HCHS baseline figure for 2006/07 has been estimated as generating a 9% increase on the 2005/06 figure (see King's Fund, 2006).

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

Following the King's Fund (King's Fund, 2006), we assume a 9% 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 5.0% (again, assuming that all the efficiency gains are realised).

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

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

These increases, averaging between 2.8% and 4.5%, are considerably less than the real terms increase in NHS expenditure shown in Table 1 which averages 5.9% 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, p142).

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 health care 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, p37). 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 under-funding, 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, p5).

# 4. 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 "are we getting value for money"?

Productivity, in essence is the volume of outputs divided by the volume of inputs. Considerable research effort has been devoted over the past two years to improving the measurement of NHS productivity. On the output side attention has focussed on incorporating appropriate adjustments for the changing quality of NHS outputs, while 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.

Because varying assumptions and different methods lead to different estimates of output and input growth, and hence to different estimates of productivity growth, the 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, the next section illustrates how the DH calculated NHS productivity before June 2004. This establishes the context for the more recent work.

## 4.1 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 15 Components of the HCHS/FHS 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 health 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 FHS 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 15 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 15 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 CBAGs) 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 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 hospital and community health services (HCHS) alone (that is, for the first twelve activities listed in Table 15) whereas others report a CWAI for all NHS expenditure (that is, for the first twelve activities listed in part (a) of Table 15 together with the four FMS activities listed in part (b) of Table 15).

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 column 'a' of Table 16. In addition, an expenditure index is presented in column 'b'. 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 column 'c' of Table 16).

**Table 16 Trends in HCHS activity per unit of cost index (% growth)**

| Year | Cost Weighted Activity Index (% growth) | Expenditure Index (% growth) | Activity per unit of cost index (CWEI) (% 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 |
| 1999/00 | 1.08 | 3.72 | -2.5 |
| 2000/01 | 0.00 | 4.54 | -4.3 |

Source: Department of Health cited in Oliver (2005)

Until 1995/96 output – measured using the CWAI – grows at over 4% per annum and, with annual expenditure growth of 2%, this generates an average annual improvement in the efficiency index of 2% per year. From 1996/97, output growth slows and reaches zero in 2000/01. Input growth, however, increases and reaches over 4% in 2000/01. Together, these two developments generate small falls in the efficiency index in 1997/98 and 1998/99, with more substantial falls in 1999/00 and 2000/01 (of 2.5% and 4.3% respectively).

## 4.2 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 from Sir Tony Atkinson a review of 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. The current state of productivity measurement is described in this section.

### *4.2.1 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; and
- a 'direct' approach which converts NHS staff numbers and earnings weights into a volume measure by adjusting for hours worked and taking account differences in earnings. The York/NIESR study adopted an alternative approach which incorporated information on skill mix but obtained similar results to those obtained by ONS (2006a, p29).

Here, we briefly outline the different ways in which the ONS has estimated the volume of inputs and then summarise 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% while the direct method suggested a slightly lower annual growth rate of 3.0%.

***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% and -0.8% 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). ONS (2006a) report an average annual growth in this price index of 0.7% 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%) is slightly less than the growth in capital services (4.3%).

***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 year and a highest growth rate of 4.6% per year (4.8% and 5.5% over the period 1999-2004). 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.

### *4.2.2 Output without quality adjustments*

Most research since 2004 has focused on output measurement. Table 17 summarises the CWAI for HCHS only (row 'a') as reported in Table 16 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 all NHS output growth rate.

**Table 17 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 |
|---|---|---|---|---|---|---|---|---|---|
| Until May 2004 | | | | | | | | | |
| 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 |
| | | | | | | | | | |
| June 2004 | | | | | | | | | |
| c HCHS&FMS | 3.9 | 1.3 | 1.8 | 3.1 | 3.0 | 4.2 | 4.1 | 4.1 | 28.5 |
| | | | | | | | | | |
| October 2004 | | | | | | | | | |
| d HCHS&FMS | 2.9 | 1.5 | 1.8 | 3.2 | 3.0 | 4.2 | 4.1 | 4.1 | 27.6 |
| | | | | | | | | | |
| February 2006 | | | | | | | | | |
| e HCHS&FMS | 3.3 | 1.5 | 1.8 | 3.2 | 3.0 | 4.3 | 3.7 | 3.7 | 27.3 |

Sources: for row 'a', Department of Health cited in Oliver (2005); for rows 'b/c/d', Atkinson Review, 2005, p108; for row 'e', ONS, 2006a, p15.
Note: 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.

The number of different activities separately identified has increased dramatically: first, 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 effect of increasing the number of categories is implicitly 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 17. 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%, which is 50% 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 17. They differ slightly from those presented in June 2004 but, overall, the cumulative change in NHS output over the period 1996-2003 remains at about 28%. 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%. Applying this new method, estimated output growth for 2004 is 4.8% (ONS, 2006a, p15).

One important point to note about the output growth estimates presented in Table 17 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 5 or 10 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.

### *4.2.3 Output with quality adjustments*

The Atkinson Review 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 York/NIESR (2005) 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, 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 1999/00 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, p25).
- a 'value of health' adjustment based on annual real earnings growth. The Atkinson Review noted that rising real wage rates means that we may attach a higher valuation to days lost through sickness and absence today than forty 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 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 life adjustment) increases the average output growth rate for the NHS by an additional 1.18 percentage points per annum over the five year period 1999/00 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.

These adjustments are 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 17.[3] For 1999/00 - 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; and
- 6.5 per cent with both quality and value of health adjustments.

Clearly some of the adjustments described above are experimental and contentious. They are discussed further in section 4.3 below.

### *4.2.4 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 18 (see sections 4.2.1 – 4.2.3 above for further details of the various input and output estimation methods).

**Table 18 Estimated NHS annual average output, input, and productivity growth (%)**

| 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 18 are for 1995-2003. 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% and input growth varying between 3.5 and 4.2%, NHS productivity growth falls between -0.4% and -1.1% per year.

The second set of estimates in Table 18, from ONS (2006a), are for 1995-2004. 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 1995-2004 (not taking account of quality change), NHS productivity fell by an average of between -0.6% and -1.3% 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 18 are for the shorter (five year) period, 1999 to 2004. Over this period NHS productivity grew between
-0.5% and 0.2% per year.

[3] Strictly speaking the average is 3.6 % but the use of a different baseline for unit costs and other minor changes increases this to 3.8% (ONS, 2006a, p16).

Adding an adjustment for the increasing value of health boosts the estimated output growth rate to 6.5% per year and, with an input growth rate of between 4.8% and 5.5%, this yields an NHS productivity growth rate of between 0.9% and 1.6% per year over the five year period, 1999 to 2004 (see the final set of estimates in Table 18).

## 4.3 Summary

Until recently, NHS productivity was calculated in a rather simplistic fashion. Output growth was estimated as a weighted average of the growth in sixteen 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 amongst hospital inpatient admissions. Moreover, even if such heterogeneity could be accommodated, simply counting the numbers in each category implicitly assumed that quality remained unchanged across years.

Since June 2004, the number of separately identified activity categories has increased dramatically. This implicitly 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 health care 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 equal, productivity will decline if the age of patients increases.

However, much remains to be done to improve output methodology. Most notably, the assumption that the health gains associated with each activity are proportionate to its average costs is manifestly wrong. Instead, in principle, each activity should be weighted by the average health gain it bestows. The Department of Health has recognized 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 life' adjustment has stimulated much debate and remains controversial. It should be noted that the annual 1.5% value of life adjustment has a major impact on estimated productivity growth. However, no consensus has yet emerged over whether the NHS should be credited with this value of life adjustment, and there are strong arguments against this approach, for example:

- the value of life 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 is currently initiating a debate on this topic.

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 average waiting times have until recently 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 annum but the most recent estimates of productivity growth - incorporating quality and value of life adjustments - suggest an average annual improvement in productivity of between 0.9% and 1.6% since 1999/00. However, to criticise the ONS for outlining the issues involved and encouraging public debate about the measurement of NHS productivity seems to miss the point (*The Economist*, 4 March 2006). 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. We feel 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.

## 5. Conclusion

Since 1999/00 the 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 health care (as a proportion of its GDP) than most of its European neighbours and that this may well have contributed to poor UK health outcomes (e.g., in terms of cancer survival rates) relative to comparable continental European performance levels (Wanless, 2001).

The period between 1999/00 and 2004/05 has given rise to the following changes:

- annual real increases in NHS resources of about 7%
- NHS staff numbers increased by 23%, including a 31% increase in consultants alongside an increase in the number of General Medical Practitioners of less than 10%.
- Changes to inpatient hospital use
    - the number of inpatients awaiting admission declined by over 300,000
    - inpatient admissions increased by between 10% and 15%
    - NHS bed distribution changed; the number of all 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 by almost 1,000.
- New A&E attendances and first outpatient appointments increased by between 10% and 15%
- The number of GP consultations remained largely unchanged
- There were marked increases in the number of CT scans (up 57%) and MRI scans (up 61%)
- Drug spending increased by 40%, with the number of prescriptions dispensed in the community up by 35%
- In terms of 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 provide 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. Varying 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 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, most 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 health care 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 health care, 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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