

## INTRODUCTION

- 4.1 The Review has developed a detailed model to project expenditure. It is designed to estimate the resource requirements over the next 20 years of the high quality health service set out in Chapter 2 under each of the three scenarios set out in Chapter 3. The factors identified in those chapters influence the amount of activity undertaken by the health service (for example, the number of GP visits in a year or the number of day case attendances) and the unit cost of delivering a particular type of activity. In order to achieve separation of activity and unit costs, data from a number of disparate sources had to be brought together: from the Department of Health; the Office for National Statistics; NHS Scotland; and the Personal Social Services Research Unit (PSSRU) at the Universities of Kent and Manchester and the London School of Economics and Political Science.
- 4.2 The vast and complex range of activity within the health and social services makes constructing such a model of expenditure a difficult task. This year, for example, in England there are expected to be nearly 250 million GP visits and over 500 million GP prescriptions. There are expected to be 2 million elective inpatient admissions, 5<sup>1</sup>/<sub>2</sub> million non-elective inpatient admissions, nearly 40 million outpatient appointments, 3<sup>1</sup>/<sub>2</sub> million day cases and over 12 million A&E attendances.
- 4.3 The health and social care asset base is huge: there are over 1,600 NHS hospitals in the UK. There are around 10,500 primary care premises.<sup>1</sup> The combined value of this asset base in England is estimated to be over £25 billion; the value of the social care asset base in England is estimated to be around £13.3 billion<sup>2</sup>.
- 4.4 These figures underline the challenge of attempting to estimate not only how health and social care may change over the next 20 years, but also the challenge of attempting to project the resources required as a result of these changes.

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<sup>1</sup> Source: Department of Health.

<sup>2</sup> Source: Department of Health. Estimated net book value (NBV) of Health Authorities and Trusts (approximately £23 billion) and primary care (approximately £2.2billion). £10 billion of the social care base is in the private and voluntary sector. [www.doh.gov.uk/dis](http://www.doh.gov.uk/dis)

## THE MODEL

4.5 This chapter briefly describes the Review's model. As outlined in Chapter 1, the Review built up baseline data on the NHS in England and around 60 per cent of English PSS expenditure. These were projected forward on the basis of assumptions about:

- demographic change;
- the costs of the five NSFs for specific diseases and then generalisations made from these;
- changes in the age-specific use of care; and
- other factors impacting on expenditure, such as reducing waiting times, technological development and productivity.

## BASELINE

4.6 The Review first established a baseline level of spending for health and social care. The baseline for the Review is spending in 2002-03. However, in many cases the latest comprehensive data was for 1998-99. That year's data therefore needed to be used to build up the baseline; it was extrapolated to the planned figure for expenditure in 2002-03 based on the best available information about activity, inflation and spending in the intervening period.

4.7 Over 80 per cent of total NHS spending was accounted for in the model through information on activity data which, when multiplied by information on the cost of delivering a unit of activity, provides details of the expenditure. The remaining 20 per cent of expenditure was broken down only by type of expenditure. Table 4.1 sets out the data that could be broken down and Table 4.2 lists those that could not.

**Table 4.1: How health and social care was broken down to build up an accurate baseline cost**

Data with a breakdown by activity and unit cost

Type of care		Further breakdown of activity or unit cost data				
Health Care	Hospital care	Elective inpatients	Age <sup>3</sup> and Sex	Disease <sup>4</sup>	Decedent and Survivor Status <sup>5</sup>	
		Non-elective inpatients				
		Elective day cases				
		Outpatients				
		Accident and emergency attendances				
	General medical services	GP visits	Age and Sex	Disease <sup>6</sup>		
		Prescribed items				
	Care in the community	District nursing visits		Age and Sex		
		Learning disability nursing				
		Psychiatric nursing				
Chiropodist visits (65+ only)						
NHS Direct						
Dental services						
General optical services						
Social Care	Long term for 65s+	Meals on wheels			Age and Sex	
		Home help				
		Day centre attendances				
		Residential care				
		Nursing home care				
		Respite care				
	Care for 18-64s with physical disabilities, learning disabilities or mental health problems	Day centre placements	Age and Sex			
		Home help				
		Meals				
		Residential and nursing home care				

<sup>3</sup> Age groups were: births, 0-4, 5-9 and five year age groups up to 95+ (except for long-term care for the over 65s which was grouped for 65-69, 70-74, 75-79, 80-84 and 85+.)

<sup>4</sup> Heart disease, stroke, cancer, respiratory, renal, injuries and poisoning, mental health and other.

<sup>5</sup> Decedents are classified as people in their last year of life, survivors are people not in their last year of life.

<sup>6</sup> GP visits were broken down into CHD, stroke, hypertension, raised blood pressure, schizophrenia, depression, anxiety, diabetes, asthma and other. GP prescriptions were broken down into: gastro-intestinal; cardiovascular; respiratory; central nervous system; infectious; endocrine; obstetrics, gynaecological and urinary; malignant diseases and immunosuppression; nutrition and blood; musculoskeletal; eye; ear, nose and oropharynx; skin and other.

**Table 4.2: How health and social care was broken down to build up an accurate baseline cost**

**Data with no breakdown by activity and unit cost**

<b>Hospital, community and family health services</b>		
Ambulances	Obstetric outpatients	Professional advice and support
Community maternity	Other care in the community	Personal dental services
Family planning	Other hospital services	Screening
Health promotion	Other learning disability related care	Services to GPs (open access)
HQ administration		Personal medical services
Immunisation and surveillance	Other mental health related care	

4.8 In addition to the data in Table 4.2, capital charges, central health and miscellaneous services (CHMS), departmental administration, capital expenditure, cost of capital, depreciation and impairments, and provisions feature as aggregate expenditure lines.

4.9 In summary, the majority of expenditure was broken down by activity and unit cost. The activity data were, where possible, further broken down by age, sex and disease (between 10 and 13 disease areas depending on the type of care). The choice of disease categories was based on a combination of available information, information required for the disease-specific NSF model impacts, and a desire to have a disease breakdown for a reasonable proportion of activity.

4.10 Also, as noted in Chapter 3, in order to take into account the impact of proximity to death, activity rates for ordinary inpatients and day cases were further split by decedents (people who would die during the year) and survivors (people who would survive to the next year). The split was achieved using Scottish data that links records of hospital use with death records. Scottish hospital activity rates (activity per head) are available separately for people of a particular age/sex group in their last year of life (decedents) compared to people (of the same age/sex group) who are not in their last year of life (survivors)<sup>7</sup>. Achieving a separation of English total hospital activity for each age/sex group (i.e. decedents and survivors together) involved adjusting the Scottish decedent-specific and survivor-specific activity rates to reflect the average activity rates in England.

4.11 Unit costs for inpatient admissions were broken down by age, disease and decedent/survivor status, based on data on the average length of stay and an assumption about the average cost per day<sup>8</sup>. Box 4.1 provides an example of the disaggregated baseline data.

4.12 Adding together each of the areas gave an initial total baseline spend for health and social care in England in 1998-99. In order to complete the baseline, two adjustments needed to be made. First, reconciling the Review's model data with the data for 1998-99 in the Department of Health's Annual Report. Second, up-lifting the reconciled 1998-99 data to 2002-03, the baseline year for this Review. For the latter adjustment, spending on health

<sup>7</sup> The Scottish linked data was provided by the Information and Statistics Division, NHS Scotland.

<sup>8</sup> This involved the assumption that hospital costs are evenly distributed across a hospital stay.

and social care is increasing substantially up to 2002-03, as noted in Chapter 1. To account for this increase, the spending for each area in 1998-99 was uplifted taking account of spending plans, past trends and partial information about activity levels since 1998-99 to reach the 2002-03 projected level.

- 4.13 The expenditure figures have all been produced on a resource basis, consistent with the implementation of Resource Accounting and Budgeting in government from April 2001<sup>9</sup>.
- 4.14 As noted in Chapter 1, the Review's detailed modelling relates to England. The information which would have enabled the Review to build up a similarly detailed picture for the UK as a whole was not available. Therefore, in order to produce projections for the UK as a whole – in line with its Terms of Reference – the Review has applied a simple population factor adjustment to the projections for England taking into account of the baseline level of spending in the UK for 2002–03. This is a simple assumption which is not based on an assessment of existing levels of provision or health status, which vary across the UK.

#### **Box 4.1: An example of disease-specific baseline data**

An example of the most detailed breakdown of information in the Review's baseline is non-elective inpatient admissions for heart disease.

Total non-elective inpatient admissions for heart disease in 1998–99 were provided by the Department of Health (Hospital Episode Statistics). These data were available in 21 age groups and for males and females separately, i.e. 42 groups in total. Each age/sex group (for example females aged 50-54) was further split into decedents and survivors using adjusted activity rates from Scottish data. This resulted in 84 separate entries for ordinary non-elective inpatient admissions for heart disease.

Each age/sex/decedent-survivor group for inpatient admissions for heart disease had a unit cost linked to it. The unit cost was based on the average cost per admission across all age/sex/decedent-survivor groups provided by the Department of Health.

These unit costs were multiplied by total admissions to give total costs in each age/decedent-survivor group and then divided by the average length of stay for each of these groups to produce an age and decedent/survivor-specific unit cost for each disease group. The unit costs were not split by sex. So 84 activity entries for inpatient admissions for heart disease were linked to 42 unit costs to produce 84 expenditure figures which, when totalled, produced an estimate of baseline spending on ordinary non-elective inpatient admissions for heart disease.

<sup>9</sup> See Department of Health (2001) Departmental Report, Cm 5103, The Stationery Office.

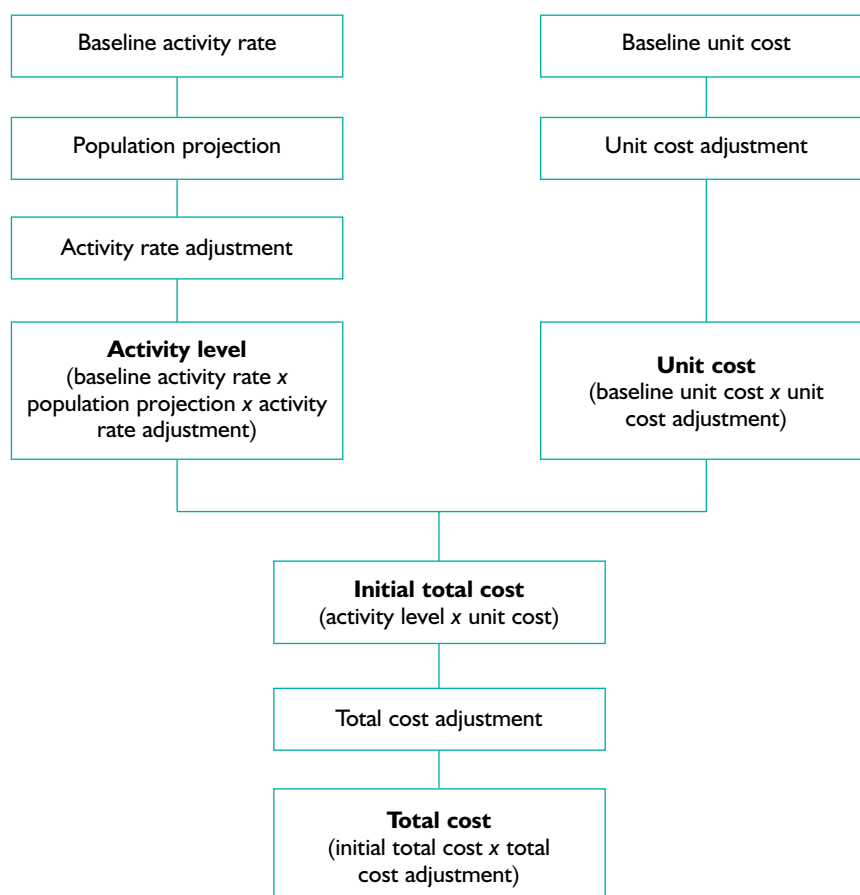
## PROJECTIONS

4.15 Using this baseline, the Review then projected forward the cost of health and social care over the 20 year period. This was done by inputting into the model the various factors set out in detail in Chapters 2 and 3 that the Review had identified as affecting the activity levels, unit costs or total costs of health and social care.

4.16 Chart 4.1 summarises how the factors were incorporated into the model to produce a projected total cost. The factors can impact on the model in three ways:

- factors which affect the **activity rate** or **total activity** – principally, although not exclusively, these are factors related to the demand for care;
- factors which affect the **unit cost** – principally, although not exclusively, these are factors related to the quality of care; and
- factors which affect the **total cost** – principally, although not exclusively, these are factors where there was no clear information on the separate impacts on activity and unit costs, such as some aspects of technological uptake.

**Chart 4.1: Projection method for each area – broken down by care type, and then where applicable by disease area, age, sex and decedent/survivor (see Table 4.1)**



4.17 In summary the Review's approach was to:

- multiply the baseline activity rate by the projected population to give a new activity level;
- incorporate additional activity impacts;
- multiply new activity levels by an adjusted unit cost to give an initial total cost; and
- multiply that by total cost adjustments to give the final total cost for the care area.

### *Demographic change*

4.18 Baseline activity rates (for example, the number of GP visits for a specific age/sex group in 2002-03 divided by the number of people in that age/sex group in 2002-03) were projected forward using different population projections for each scenario, assuming that age-specific use and unit costs of care remain constant. These results formed the base case projections.

4.19 As discussed, in order to account for the effect of proximity to death on acute health care costs, mortality rates were used to separate demographic projections into projections of decedents and survivors. These population projections were then multiplied by activity rates for decedents and survivors separately, where this breakdown was available.

### *Clinical quality - National Service Frameworks (NSFs)*

4.20 The changes as a result of adopting the existing and future NSFs have been modelled as changes in:

- activity (e.g. improved diagnosis of diabetes resulting in greater use of care);
- unit cost (e.g. improving the quality of revascularisation); and
- expenditure (e.g. increased spending on screening for which there is no activity/unit cost data split in the model).

4.21 For example, modelling the impacts of the coronary heart disease (CHD) NSF involved:

- increases in the activity and unit costs for GP prescriptions to reflect take up of NICE guidelines and greater use of statins<sup>10</sup>;
- increases in outpatient activity and unit costs due to, among other things, rapid access chest pain clinics; and
- increases in district nursing and GP visits activity because of higher levels of monitoring and diagnosis.

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<sup>10</sup> This incorporates variations around compliance and when statins come out of patent and the impact on price.

### *Changes in health care needs*

- 4.22 Changes in health status and health seeking behaviour have direct impacts on the demand for care. The assumptions for the demand factors outlined in Chapter 3 have been incorporated as activity impacts in the model. The specific ways in which the demand factors will impact on particular types of activity, age groups and disease areas were estimated and modelled.

### *Other impacts on the quality and configuration of supply*

- 4.23 Additional factors related to the quality and configuration of the supply of care were included in the projections as either changes in the level of activity, changes in the unit costs of a particular activity or changes in the total cost of one or more types of care. For example:
- reducing waiting times was modelled as an increase in the relevant activity areas;
  - productivity gains were modelled as reductions in each activity's unit cost and total cost where unit costs were not available; and
  - improving accommodation services and other non-clinical quality impacts were modelled as unit cost uplifts.

### *Workforce*

- 4.24 The Review's projected activity assumptions for each scenario were then fed into a workforce model developed in conjunction with the Department of Health to estimate the staff implications. These results were then considered against planned increases in the number of staff.

## **CONCLUSION**

- 4.25 The Review's model can therefore generate activity, unit cost and total cost projections for each year between the 2002-03 baseline and 2022-23. The results can be broken down by type of care (e.g. inpatient admissions and GP visits) and for the majority of expenditure there can be further disaggregation by age, sex, disease and decedent/survivor status. The following chapter sets out the Review's projections.