

Summary and Implications

Improving public health will depend on building up a body of knowledge about what works. Delivering the largest possible improvement in public health within finite resources depends on building a body of knowledge about which interventions are the most cost-effective.

The economic evaluation of interventions in public health does not differ conceptually from the evaluation of other health care interventions. Nevertheless, the body of economic evidence relating to public health interventions is small in comparison to that related to treatment.

There are often significant practical difficulties associated with designing rigorous evaluations of public health interventions. However, decisions need to be taken about the allocation of public funds and these need to be informed by the best available evidence, even if “gold standard” evidence is not available. It is quite possible to overcome, or at least minimise, these practical difficulties in order to produce high quality, convincing economic evaluations of public health interventions.

While different methods of economic evaluation may be appropriate for different circumstances, making efficient allocations of NHS resources between prevention and clinical interventions requires a similar method of cost utility analysis to be applied to both, such as the one employed by NICE. This offers a practical solution to applying rigorous economic evaluation to public health interventions that could be applied consistently across the health sector. It would demonstrate the respective merits of investment in public health measures compared to clinical services, and so enable policymakers and practitioners to prioritise the use of scarce resources.

This chapter also includes a case study of Type 2 diabetes. This has been diagnosed in 1.1 million people in England with around another million thought to remain undiagnosed. The case study presents an opportunity to assess the effectiveness and cost-effectiveness of intervening at each stage of the disease pathway so that health outcomes can be maximised and the financial and human costs of the disease minimised.

Using a framework based on current cost-effectiveness evidence, a number of interventions can be shown to be cost-effective, at less than £20,000 per Quality Adjusted Life Year (QALY). Many of these interventions are already being implemented through NSFs and NICE recommendations.

Economic Evaluation

6.1 Economic evaluation is becoming established globally as one of the tools for decision-making in health care, given that resources are scarce and should be used as effectively as possible. Economic evaluation links costs and outcomes to provide an indication of the benefits of alternative interventions and the scope for improved use of resources.

6.2 Economic evaluations of health interventions are usually expressed as £ per unit of effect or ‘utility’, and value for money is then assessed on the basis of an explicit or implicit threshold or by comparing a “league table” of new and existing interventions. However, decision rules based upon thresholds or league tables do not always inherently incorporate equity considerations.

6.3 Health care and public health are concerned with outcomes such as deaths and illnesses prevented, accidents avoided, cases detected and improved well-being. These are all potential measures of the effectiveness of interventions and they can form the basis of comparative evaluations. The value of health benefits is for society to determine, though economic analysis can provide technical assistance with this. Similarly, it is for society to determine what it considers an equitable distribution of health gains between different groups in society.

6.4 Public health interventions may have different effects on different groups in society, due to their levels of knowledge or their resources. Some public health interventions are concerned with a reduction in consumption, so aspects of a healthy lifestyle might well offer savings rather than costs. However, for other reasons some groups may be more responsive than others. This in turn means that some public health programmes may improve general health, but also increase the gap between the health of the better off and the worse off. This may also be true of health care interventions that may have differential take up by different social class groups.

Box 6.1 Types of Economic Evaluation

Cost of illness – these studies attempt to assess the costs of all the consequences of a particular disease and, as such, are not evaluation studies. They are of limited value, beyond highlighting a problem, as they say nothing about the best way to resolve it, and so do not aid resource allocation;

Cost Minimisation – these studies evaluate different ways of achieving a given health outcome. The outcome is assumed to be the same for all interventions and worth achieving and is not separately assessed. This type of study concentrates on the costs of achieving the same outcome by different means;

Cost-Consequence Analysis (CCA) – these studies evaluate interventions using more than one outcome (consequence) measure. Interventions are evaluated by calculating the total costs for each intervention, and then comparing the differences between each of the relevant outcome measures. However, it cannot be used for prioritising different interventions unless there is a common outcome;

Cost-Effectiveness Analysis (CEA) – these studies use some measure of outcome (a life year saved, a death averted, a patient-year free of symptoms) and assesses the cost per unit of achieving this outcome by different means. The outcome is not separately valued, only quantified, so the study takes no view on whether the cost is worth incurring, only focussing on the cost of different methods of achieving units of outcome;

Cost-Utility Analysis (CUA) – these studies use a measure of outcomes, based on the utility or well-being of patients, and are a type of CEA. The Quality Adjusted Life Year (QALY) is a standard utility-based measure, using both length of life extension and a measure of the well-being associated with a given state of health. Studies of this kind assess the cost of achieving health gains, which can be compared between different populations and disease areas, assuming the outcomes are appropriately measured. As such, they have wider applicability to decisions on resource use than the other studies;

Cost-Benefit Analysis (CBA) – these studies are similar to CUA studies, but use a money value of benefits, rather than a measure of well-being. This can raise ethical tensions, as some critics argue that health gain should not be valued in money directly. However, economic analysis argues that any decision on how to use resources implies a monetary value on the outcomes even if it is not explicit.

6.5 Within the health sector, CUA studies are becoming more commonly used as their generic measures of health outcomes allow a much wider range of programmes and interventions to be compared. In addition, once a number of high quality cost utility studies have been published on a disease area, they can provide a source of valuations of health states for use in other research areas which cannot, or have not, measured health outcomes. Though cost-effectiveness and cost-utility measures are often easier to calculate than cost-benefit ratios, they are also more difficult to interpret and their implied welfare effects are often ambiguous.

6.6 Alternatively, the use of a money value means that CBA can be used by government to compare interventions across different sectors, such as transport, housing and education, where non-health outcomes are also important.

Study perspective

6.7 An economic study needs to determine, at the outset, the perspective it will adopt. The perspective can be that of the patient, the health care system, the government and public sector, or society as a whole.

6.8 Economic analysis is interested in all costs and outcomes, and so should favour studies that show the costs and outcomes for society as a whole. However, the public sector or the health system may limit studies to their costs only, since these sectors are concerned with allocating resources within specific budgets.

Valuing outcomes

6.9 Valuing outcomes raises two issues for economic evaluation:

- who values the different outcomes?
- what valuation methods are used?

6.10 Health outcomes can be valued by patients, doctors and other health professionals, non-clinical experts or the public. Health is not valued for its own sake, but for what it allows us to do. Therefore it is common to derive values from aspects of activity and functioning by patients.

6.11 The advantage of seeking values from patients is that they have direct experience of a health state and can therefore indicate its effects on them. A common approach, with many variants, is to assess the activities of daily living that can or cannot be carried out, and their link to the disease state. This can be linked to wider assessments of the value of different activities of normal life, typically obtained from samples of the general population. These have the advantage of providing a value for activities, independent of any one particular disease, which can be used generically to value changes in activities for a range of different patient types. As such, they provide a plausible basis for valuing health outcomes in publicly funded health care systems – the public or taxpayer determines the value of different health outcomes.

6.12 There are a number of different valuation methods in use in health economics. There is continuing methodological debate about them, particularly around the context for a valuation; the value placed on a health state may be highly dependent on other factors, such as income, housing or personal circumstances. Quality Adjusted Life Years (QALYs) are the most commonly used measure of health state utility, but several other approaches can also be used, including disability-adjusted life years (DALYs), healthy-year equivalents (HYEs), and saved young life equivalents (SAVEs). See box 6.2 for a description of QALYs.

6.13 Maximising total QALYs across the population, while providing the most utility from health, may not necessarily lead to a distribution of health outcomes between

people that the public finds acceptable. Many may feel that a more equitable distribution of health would be preferable, even though the total health (i.e. QALYs) might not be maximised.

Box 6.2 Quality-Adjusted Life Years (QALYs)

It is often difficult to apply CEA consistently across health interventions, as health outcomes are not easy to express in a single effectiveness unit, since apart from affecting survival, health interventions may also affect health status, which would not be captured if an outcome measure such as life-years gained is used. Consequently, there was a need to develop a single outcome measure that incorporated both quality and quantity of life. Quality-adjusted life years (QALYs), where each year of life is multiplied by a weight reflecting quality of life, have been developed¹.

QALYs are estimated by assigning every life-year a weight between 0 and 1, where a weight of zero reflects a status that is valued as equal to the worst health state, usually being dead and 1 reflects full health. The most common methods of determining the utility values for health benefits, to weight QALYs are:

- the standard gamble (SG): An individual is asked what risk of death would be acceptable for a treatment fully curing a specified illness;
- the time trade-off (TTO): An individual is asked what length of life in a given state would be equivalent to, say, five years in full health;
- the visual analogue scale (VAS): A thermometer-type scale, where full health is shown at the highest point, and death is shown at the lowest point. Individuals simply indicate where on the scale they feel that the health state is located; and
- the person trade-off (PTO): Individuals are asked what number of people being cured from one particular state is equal to, say, ten people being saved from death.

Valuing costs 6.14 Many of the costs of health care interventions can be valued from a market price. However, economic analysis attempts, wherever possible, to identify the marginal and opportunity cost of resources:

- the marginal cost is the cost of an extra unit of outcome. For example, once a facility has been constructed, extra use may impose little or no cost. This should be reflected in the costing of the extra intervention under evaluation; and
- the opportunity cost is the lost opportunity that is given up in order to use resources for a particular intervention. For example, the opportunity cost of an emergency stand-by team for surgery may be the lost opportunity to treat a number of routine cases.

6.15 Health service and other care costs are typically measured by wages and prices, with some reality check on whether these should be adjusted for the marginal case. An example of the difficulties in this area are patient travel costs, which can be measured using standard costs per mile, however, the valuation of patients' time is also important and more problematic to measure.

¹ *Outcome Measurement in Economic Evaluation*. M. Johannesson et al., 1996

6.16 A particular issue of costs falling on patients may arise in public health interventions. Usually it can be argued that changes to diet, smoking and drinking have no direct financial costs to consumers, as they involve reduced consumption, although this is not always true since a healthy diet could be more expensive. Theoretically, an economic argument can be developed around the opportunity costs; the costs of the lost opportunity for a preferred form of consumption. If the money saved is not enough to encourage a change in behaviour, and if there are significant costs to the health care system in the future, this raises the question of whether those who change their behaviour should be paid some compensation for the lost well-being derived from their foregone consumption. While this would be politically controversial, it remains a legitimate approach if the logic of economics is followed.

Timing of cost and outcome **6.17** Economics also has a clear theoretical basis for valuing costs and outcomes, depending on when they will occur. Essentially, because consumers tend to value current over future consumption, and because foregoing consumption to save attracts a positive rate of interest, the value of future costs and outcomes is usually seen as lower than the value of current costs and outcomes. For each year into the future that a cost or outcome is delayed, a discount rate is applied, reducing its value by a percentage of the total remaining value. Savings in health service costs that would occur in the distant future are also seen as less valuable, therefore studies of long-term public health interventions may be dealing with both cost savings and health outcomes with relatively lower values than might be expected. This need not mean that it is not efficient to adopt them, see Chapter 7.

Output of an economic evaluation **6.18** Ideally, a cost-utility study will generate Incremental Cost-effectiveness Ratios (ICERs), showing the effects of adding one intervention and treatment after another, with or without removal of the first intervention. This allows the choice of the best mix of interventions to be made. The ICERs for a study of public health programmes would allow the interventions to be compared incrementally, to determine not the single most cost-effective intervention, but the overall most cost-effective intervention strategy.

6.19 Good practice in the economic evaluation of health care interventions is now well developed and broadly agreed in the field (see box 6.3), although not consistently applied within health economic evaluation.

Box 6.3 “Drummonds Top Ten”

Drummond et al² give ten elements of a “sound economic evaluation” that could be used as a standard checklist, and developed to aid policymakers who might use the results of economic analysis in public health:

1. Was a well-defined question posed in answerable form?
2. Was a comprehensive description of the competing alternatives given?
3. Was there evidence that the programmes effectiveness had been established?
4. Were all the important and relevant costs and consequences for each alternative identified?
5. Were costs and consequences measured accurately in appropriate physical units?
6. Were costs and consequences valued credibly?
7. Were costs and consequences adjusted for differential timing?
8. Was an incremental analysis of costs and consequences of alternatives performed?
9. Was allowance made for uncertainty in the estimates of costs and consequences?
10. Did the presentation and discussion of study results include all issues of concern to users?

NATIONAL INSTITUTE OF CLINICAL EXCELLENCE (NICE) METHODOLOGY

6.20 The National Institute for Clinical Excellence (NICE) was established to provide the NHS (patients, health professionals and the public) in England & Wales with authoritative, robust and reliable guidance on current “best practice”, particularly to:

- encourage faster uptake of clinically and cost-effective new treatments;
- promote more equitable access to treatments (new or existing) of proven clinical and cost-effectiveness;
- promote the better use of resources in the NHS, by focussing resources on treatments which achieve most health gain in relation to the NHS and Personal Social Services (PSS) resources expended; and
- promote the longer-term interest of the NHS in the development of innovative treatments for the future.

² *Methods for the Economic Evaluation of Health Care Programmes*, M Drummond et al, 2001.

Analytic framework 6.21 NICE has developed a framework for making decisions across different technologies and disease areas. The most important features of which are:

- consistency between submissions to allow comparison between appraisals of different technologies and over time;
- all relevant comparators for the technology being appraised need to be included in the analysis;
- all relevant evidence needs to be assembled systematically and synthesised in a transparent and reproducible manner;
- the costs that are most relevant are those of the NHS and PSS;
- measures of health-related benefits used should be comparable;
- the time horizon should be sufficient to reflect important cost and benefit differences between the technologies being compared; and
- the uncertainty surrounding the estimates of cost-effectiveness needs to be explored.

6.22 To facilitate the use of this framework, NICE has defined a ‘reference case’ consistent with an NHS objective of maximising health gain from limited resources. It sets out the parameters for a consistent method for the evaluation of cost-effectiveness, such as the type of evaluation, the perspective and the measure of health benefit (see table 6.1).

6.23 In terms of valuing outcomes, in addition to the view of clinical specialists, patient views are gathered. These patients have experience of the use of the technology and the condition either personally or as part of a representative group. Their evidence provides:

- an individual view of the risks and benefits of the technology based on personal experience as a patient or carer; and
- an understanding of the wider range of patient or carer views.

Table 6.1: Summary of NICE reference case

Element of health technology assessment	Reference case
Defining the decision problem	The scope developed by NICE
Comparator	Alternative therapies routinely used in the NHS
Perspective on costs	NHS and PSS
Perspective on outcomes	All health effects on individuals
Type of economic evaluation	Cost-effectiveness analysis
Synthesis of evidence on outcomes	Based on a systematic review
Measure of health benefits	Quality-adjusted life-years (QALYs)
Description of health states for calculation of QALYs	Health states described using a standardised and validated generic instrument
Method of preference elicitation for health state valuation	Choice-based method (for example, time trade-off; standard gamble, not rating scale)
Source of preference data	Representative sample of the public
Discount rate	An annual rate of 3.5 per cent on both costs and health effects
Equity position	An additional QALY has the same weight regardless of the other characteristics of the individuals receiving the health benefit

6.24 Despite deficiencies in the evidence base, decisions still have to be made. Therefore, NICE advocates that analyses should use the best evidence available, but should be explicit about data limitations, any attempts to overcome these, and to quantify as fully as possible how the limitations of the data are reflected in the uncertainty of the results of the analysis.

Time horizon 6.25 NICE dictates that the time horizon for estimating clinical and cost-effectiveness should be sufficiently long to reflect any differences in costs or outcomes between the technologies being compared, and realises that many technologies have impacts on costs and outcomes over a patient's lifetime, particularly with chronic diseases. A lifetime time horizon may be required to quantify the implications of any differential mortality effect between alternative technologies.

Modelling long-term outcomes 6.26 For a lifetime time horizon, NICE uses extrapolation modelling. The modelling framework needs to be based on a comparison of several alternative scenarios reflecting different assumptions about future treatment effects (including the limiting assumption of no further benefit).

6.27 NICE also advocates the use of modelling which synthesises available evidence to generate estimates of clinical and cost-effectiveness, particularly where:

- patients participating in trials are not typical of patients likely to use the technology within the NHS;
- intermediate outcomes measures are used rather than effect on health-related quality of life (HRQL) and survival;
- relevant comparators have not been used or trials do not include evidence on relevant subgroups; and
- the long-term costs and benefits of the technologies extend beyond trial follow-up.

6.28 These factors are particularly relevant to the evaluation of the effectiveness and cost-effectiveness of public health interventions.

6.29 NICE requires strong evidence that one clinical strategy dominates the alternatives (i.e. it is both more effective and less costly) for a strategy to be recommended. However, if one strategy is more effective, but also more costly, then the magnitude of the Incremental Cost-effectiveness Ratio (ICER) should be considered.

6.30 NICE does not use a “pass or fail” incremental cost-effectiveness threshold above which a clinical strategy would automatically be defined as not cost-effective. But it does advocate that below a most plausible ICER of £20,000 per QALY, judgements about the acceptability of a clinical strategy as an effective use of NHS resources are based primarily on the cost-effectiveness estimate. Above a most plausible ICER of £20,000 per QALY, judgements are more likely to make more explicit reference to such factors as the degree of uncertainty surrounding the calculation of ICERs, the innovative nature of the intervention, the particular features of the condition and the population receiving it, and the judgements made in previous appraisals on related technologies. Finally, above an ICER of £30,000 per QALY, the case for supporting the intervention on these factors has to be increasingly strong.

6.31 While the NICE framework has not been applied to non-pharmacological public health interventions, public health measures, such as support and advice on diet and exercise and smoking have been included in assessment of interventions. Furthermore, NICE and the HDA are to work collaboratively to develop guidance on the identification, prevention and management of obesity and maintenance of weight reduction.

Box 6.4 Issues and Learning Points: NICE appraisal of nicotine replacement therapy and bupropion for smoking cessation**Issues considered during the appraisal:**

- Motivation of smokers to quit is key to the success of any intervention. It was important that this was borne in mind when the results of the clinical trials were assessed, in order not to overstate the results. It was not clear whether the people in the trials, although properly conducted, were representative of the population of potential quitters as a whole. However, because these interventions are so cost-effective, this uncertainty was not material in the judgement about the cost-effectiveness of the interventions.
- It was not possible or probably appropriate to set criteria for assessing motivation. A simple stated intention to try to stop smoking was deemed sufficient. However, it was felt reasonable to place a limit on the frequency of attempts at stopping using NRT therapy or Bupropion.
- The six-month interval between attempts to stop smoking was an example of the value judgements that the Institute's advisory committees have to make from time to time. In this example it was a way of testing the motivation and resolve of smokers to quit.
- It was difficult, given the available evidence, for the advisory committee to assess the effectiveness of the different forms of advisory and counselling interventions and the extent and nature of their interaction with NRT and drug therapy.
- Despite the large range of products and the claims made for them, there was insufficient evidence to distinguish between different forms of NRT.
- Access to these interventions through prescriptions uses general practitioner time. Innovative approaches, such as patient group directions, in which a cohort of potential patients is identified and 'authorised' in advance, and nurse prescribing, could usefully be explored.
- Although cost-effective, these interventions are associated with a low rate of quitting success.

Learning Points:

- This is an example of an appraisal where a wide perspective, taking into account broader economic considerations, could have been considered although such an approach would not have altered the outcome.
- It was important to highlight that prevention should be the primary intervention and that it should be brought together in an integrated approach to reducing the burden of disease associated with smoking.

Box 6.5 NICE appraisal of nicotine replacement therapy and bupropion for smoking cessation: Recommendations.

The appraisal looked at the use of nicotine replacement therapy (NRT), in the form of patches, lozenges, tablets, nasal sprays and gums and a new drug called bupropion.

Recommendations:

Nicotine replacement therapy (NRT) and bupropion are recommended for smokers who have expressed a desire to quit smoking.

NRT or bupropion should normally only be prescribed as part of an abstinence-contingent treatment (ACT), in which the smoker makes a commitment to stop smoking on or before a particular date (target stop date). Smokers should be offered advice and encouragement to aid their attempt to quit. Ideally, initial prescription of NRT or bupropion should be sufficient to last only until 2 weeks after the target stop date. Normally, this will be after 2 weeks of NRT therapy, and 3-4 weeks for bupropion, to allow for the different methods of administration and mode of action. Second prescriptions should be given only to people who have demonstrated that their quit attempt is continuing on reassessment.

It is recommended that smokers who are under the age of 18 years, who are pregnant or breastfeeding, or who have unstable cardiovascular disorders, should discuss the use of NRT with a relevant health-care professional before it is prescribed.

Bupropion is not recommended for smokers under the age of 18 years, as its safety and efficacy have not been evaluated for this group. Women who are pregnant or breastfeeding should not use bupropion.

If a smoker's attempt to quit is unsuccessful with treatment using either NRT or bupropion, the NHS should normally fund no further attempts within 6 months. However, if external factors interfere with an individual's initial attempt to stop smoking, it may be reasonable to try again sooner.

There is currently insufficient evidence to recommend the use of an NRT and bupropion in combination.

In deciding which of the available therapies to use and in which order they should be prescribed, practitioners should take into account:

- intention and motivation to quit, and likelihood of compliance;
- the availability of counselling or support;
- previous usage of smoking cessation aids;
- contraindications and potential for adverse effects; and
- personal preferences of the smoker.

ECONOMIC EVALUATION IN PUBLIC HEALTH

6.32 The economic evaluation of interventions in public health does not conceptually differ from the evaluation of other health care interventions. Nevertheless, the body of economic evidence relating to public health interventions is small in comparison to that related to health care, although where it exists it does suggest that the former can be more cost-effective than the latter, even along the same disease pathway (for example, smoking cessation versus medical and surgical interventions to treat cardiovascular disease). In addition, given the importance of health inequalities to policymakers, the lack of assessment in research of the differential impact of public health programmes across the social gradient needs to be urgently addressed.

6.33 The NICE methodology is well respected internationally³. The consistency of NICE appraisal techniques, their transparency and rigorousness would be beneficial attributes to apply more widely to other interventions, such as in the area of public health.

Overcoming practical difficulties

6.34 There are some practical issues which can make it more difficult or more costly to perform convincing economic evaluations of preventative interventions and there is little incentive for private funding of research into many forms of preventative and public health interventions.

6.35 Although public health interventions can differ from some curative health interventions since they incur an opportunity cost associated with behavioural change, many curative interventions also have similar costs - for example the pain, anxiety and inconvenience associated with having an operation. That non-medical costs exist and that economic evaluations often do not adequately take account of them is not a special feature of preventative interventions.

6.36 In addition, in some instances, many of the payoffs from preventative interventions may accrue further in the future than the benefits of some curative interventions. This can make it more difficult and costly to run robust trials that can fully identify and measure the stream of costs and benefits of a particular intervention. However, this is a practical difficulty, not a conceptual one, as virtually all trials of either curative or preventative interventions do not follow participants until death.

6.37 One commonly used method of overcoming this shortcoming is to extrapolate or model health and cost effects beyond the life of the trial, drawing on epidemiological data, information from other trials and, where data are not available, plausible assumptions backed by appropriate sensitivity analysis. For example, a proportion of smokers who quit as a result of a smoking cessation intervention will relapse after the end of trial follow-up period. Therefore, extrapolating long-term benefits from short-term quit rates is likely to overestimate the benefits, and so data on relapse rates should be sought to model this effect. Sensitivity analysis can highlight whether the conclusions and recommendations reached would be materially altered if parameters used in the modelling were varied. This is the “decision modelling” approach often used by NICE.

³ *Technology Appraisal Programme of the National Institute of Clinical Excellence. A Review by WHO, World Health Organisation, 2003*

Discounting benefit **6.38** However, the usual discounting rates applied to clinical interventions may need to be reviewed for public health interventions. Discount rates are based on economic methods that aggregate individual utility to derive societal welfare functions, which may be appropriate for clinical interventions applied to individual patients. For public health interventions, from a wider societal perspective that may include an intergenerational perspective, future health gain could be valued highly, and therefore discounting these benefits at the same rate may be inappropriate.

6.39 Other difficulties in evaluating interventions such as randomisation, finding suitable control groups, avoiding self selection problems, controlling for other variables and separating treatment effects from counterfactual effects are not unique to public health evaluation.

6.40 Ideally, the desired framework would be able to be applied consistently by policymakers and practitioners for:

- comparing the cost-effectiveness of different public health interventions within and across both risk factors and disease areas;
- comparing the cost-effectiveness of public health interventions with screening and treatment interventions within and across disease areas; and
- comparing the cost-effectiveness of public health interventions with interventions directed towards the wider determinants of health.

Box 6.6 International comparisons of public health policy

A review was commissioned⁴ to investigate the ways in which other countries organise their public health function and how public health issues are prioritised, examining the experiences of Australia, Canada, Denmark, Finland, France, Germany, The Netherlands and Sweden.

Analysis found that the evaluation of interventions was seen as critical to policy-making, as was research to develop an evidence base for public health initiatives. It can be largely concluded, however, that there is still much that needs to be improved in evaluating public health interventions and making decisions to implement based on evidence of effectiveness. The extent of monitoring and evaluation of public health policies appears to be quite limited in the countries examined. This is perhaps one of the weakest areas of public health, requiring the most attention and investment.

Australia and the Netherlands are increasingly utilising economic evaluation and evidence of interventions effectiveness to guide decision-making. In this way, they are progressing more rapidly towards creating an evidence-based policy environment. Nevertheless, all the countries recognise that one of the major challenges facing public health is to develop a more systematic methodology of setting priorities and making decisions among different interventions.

However remarkably few policies have been subject to an evaluation of effectiveness and, with the notable exception of Australia, even fewer have been examined for cost-effectiveness.

6.41 However, international experience, see box 6.6, and existing methodologies for the evaluation of the effectiveness of public health interventions do not provide a framework for a consistent judgment of the effectiveness of interventions within or across topic areas, such as having a standard timeframe over which effectiveness is assessed. Consequently, it is currently difficult to comprehensively and objectively compare the relative effectiveness of different public health interventions.

6.42 A consistent framework (such as the methodology developed by NICE) should be used to evaluate the cost-effectiveness of interventions and initiatives across both health care and public health.

⁴ *Making Decision on Public Health: a review of eight countries*, produced by the London School of Economics and Political Science hub of the European Observatory on Health Care Systems for the Wanless Review.

Box 6.7 Case Study: A TV Campaign for Smoking Cessation

Consider the evaluation of a recent television anti-smoking campaign⁵. Four broadly similar television regions were selected; two regions received TV anti-smoking advertising, one region received advertising plus locally organised anti-smoking campaigning, while the fourth region acted as a control. Around 5,500 smokers and ex-smokers were randomly selected and interviewed before the campaign, six months after and 18 months after.

In a media intervention of this nature, individual randomisation to interventions is not possible; choosing broadly similar TV regions as intervention and control arms helped to reduce potential biases. This was further mitigated by controlling for 30 demographic and smoking history characteristics that might have caused differential effects that would otherwise have been spuriously attributed to the intervention. The study assumed, reasonably, that exogenous demand drivers such as the price of cigarettes (increased taxes led to price rises of 6.5 per cent over the study period) did not affect regions differentially.

The evaluation found that, after 18 months, the effect of TV media versus no intervention was to increase the probability of not smoking (combined between initial smokers and ex-smokers whose responses did not vary significantly) by 53 per cent. The effect was statistically significant. Additional local campaigns had no significant effect over and above TV advertising. It was calculated that, for England's population with around 28 per cent smokers and 28 per cent ex-smokers, the campaign might reduce smoking prevalence by 1.2 percentage points.

The evaluation did not consider cost-effectiveness. However, using reasonable extenders and modelling assumptions it is possible to work towards an assessment of value for money. Based upon the observed quit rates and the costs incurred, the estimated cost per quitter is around £85. It has been estimated that the average life gain per year of reduction in a smoking career is around 25 days. In order to estimate cost per life year gained it is necessary to estimate the average reduction in smoking career of each quitter. This is a function of (i) relapse rates beyond 18 months (ii) average number of years that quitters will remain smoke-free as a consequence of the intervention. These are key parameters in the cost-effectiveness modelling.

It has been estimated elsewhere that relapse rates after 12 months are around 35 per cent so we use that as a base case for (i). Estimating (ii) is more difficult, since quitters are not likely to be representative of the sample of smokers as a whole – they are likely to be those who would be disproportionately likely to quit even without the intervention. As a conservative base case, we assume that the intervention hastened their quitting by an average of one year.

On the basis of these assumptions, the cost per life year gained is estimated to be roughly £1,900 and the cost per QALY perhaps around £2,500. Even on much more pessimistic assumptions (a relapse rate beyond 18 months of 70 per cent and an average quit hastening of half a year), the intervention can still buy QALYs for less than £10,000.

⁵ *Can anti-smoking television advertising affect smoking behaviour? Controlled trial of the Health Education Authority for England's anti-smoking TV campaign*, D. McVey et al., *Tobacco Control*, 2000

CASE STUDY: DIABETES TYPE 2

6.43 The aim of this case study of Type 2 diabetes is to assess the effectiveness and cost-effectiveness of intervening at each stage of the disease pathway so that health outcomes can be maximised and the financial and human costs of the disease minimised, as well as trying to model the long-term implications of these interventions. It also aims to draw out some generic lessons for chronic disease management and to suggest a framework for analysing the cost-effective management of other chronic conditions.

NSF for Diabetes 6.44 The National Service Framework (NSF) programme was established to improve services by setting national standards to drive up service quality and tackle variations in care. Each NSF sets national standards, identifies the interventions and actions that will help meet those standards and the milestones against which NHS performance will be measured. The primary goal of the Diabetes NSF was to enable people with diabetes, or at risk of developing diabetes, to manage their own lifestyle and diabetes, by providing support and structured education, as well as drugs and treatments⁶.

The disease 6.45 Diabetes mellitus is a chronic, progressive disease, which encompasses a group of disorders with many underlying causes, all of which are manifested in raised blood glucose levels. Diabetes is associated with significantly reduced life expectancy and various complications, including coronary heart disease, retinopathy and blindness, renal disease, and lower limb complications including amputation. Many of these can be prevented or delayed with tight control of blood glucose and blood pressure and high quality integrated care. The total cost of diabetes to the NHS is around £1.3 billion per year⁷. Total societal costs are much higher.

6.46 Onset of Type 1 diabetes typically occurs in childhood or early adulthood, with symptoms usually developing very rapidly, with little scope for prevention. Onset of Type 2 diabetes usually occurs very gradually and, often, visible symptoms take many years to manifest. There is good systematic evidence that the onset of Type 2 diabetes can be delayed and possibly prevented entirely through lifestyle modification and through preventative drugs. The two main modifiable lifestyle risk factors are obesity and physical inactivity, which account for 47 per cent and 13 per cent of Type 2 diabetes respectively⁸.

Trends 6.47 There are currently around 1.3 million people in England diagnosed with diabetes, around 85 per cent of whom have Type 2 diabetes. There are, additionally, perhaps as many as one million people with undiagnosed Type 2 diabetes. The incidence of diabetes is increasing in all age groups, particularly among younger people.

6.48 Prevalence of diagnosed Type 2 diabetes is expected to increase by 30 to 60 per cent over the next two decades, depending largely on future trends in obesity but also driven by demographic changes⁹. Growth will be higher still if the Diabetes NSF is successful in improving strategies to identify people who do not know they have diabetes, although many of these will have few or no symptoms.

⁶ *National Service Framework for Diabetes: Standards*, Department of Health, 2001

⁷ *Securing Our Future Health: Taking a Long-Term View*, Derek Wanless, 2002

⁸ *Tackling Obesity in England*, National Audit Office, 2001 and Department of Health analysis

⁹ Department of Health analysis

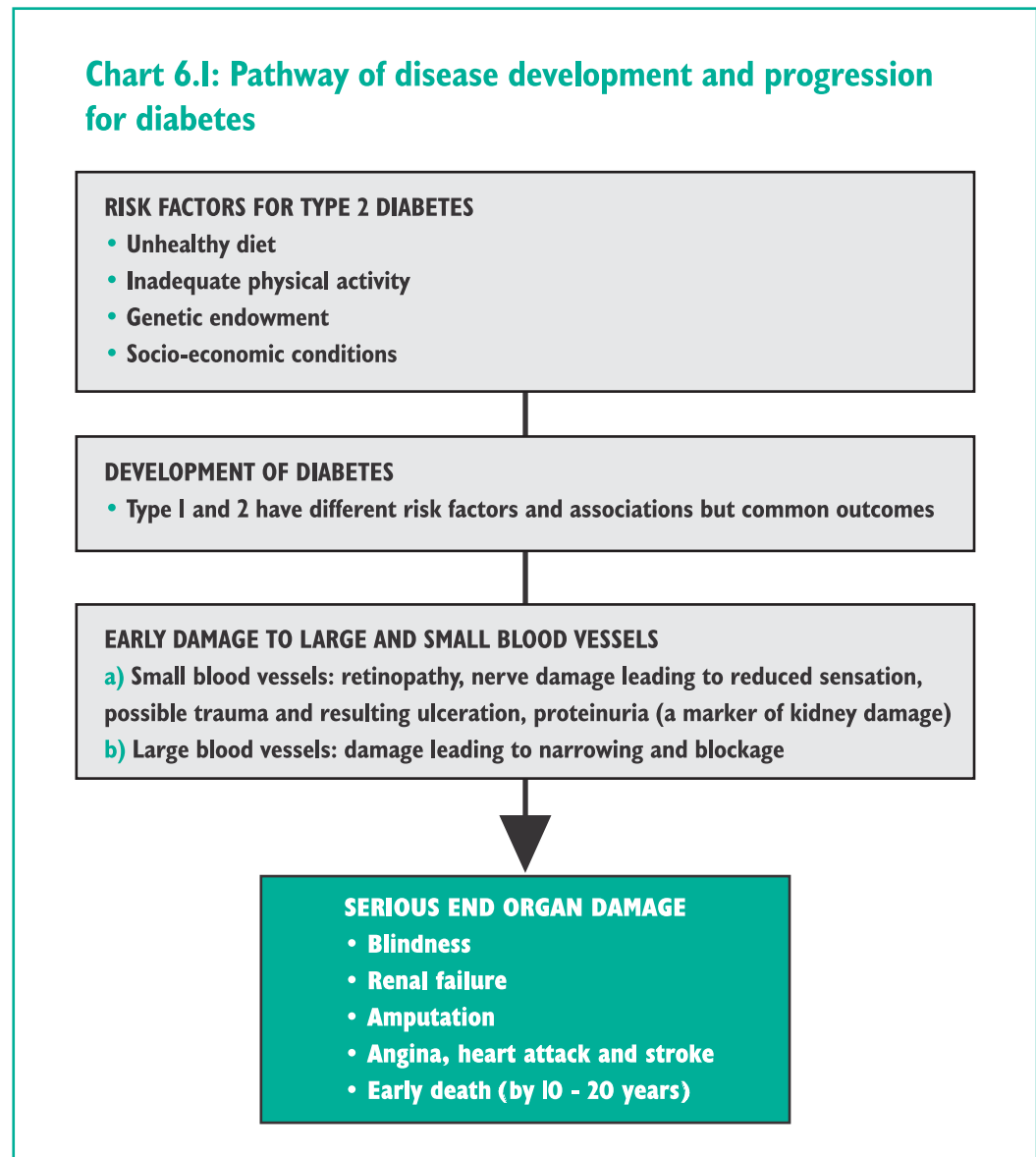
6.49 Type 2 diabetes does not affect different groups equally. Prevalence increases with age and socio-economic deprivation, and some ethnic minorities are at least three times as likely as Caucasian people to develop diabetes. Genetics are important, if one parent has diabetes the relative risk of developing diabetes is five times higher than the population on average¹⁰.

The pathway of the disease

6.50 Diabetes causes damage by a well-understood sequence of events, which can be modified at every stage. The key changes, or markers, at each stage are illustrated in chart 6.1 below.

6.51 Treating the end stage disorders of diabetes uses very high levels of health care resources, so preventing any or all of the progression of the disease may be cost-effective. The evidence in the literature for the efficacy and cost-effectiveness of interventions where this is available is presented here. From this it is possible to deduce savings that might be obtained, for example, from a reduction in blood glucose, or in blood pressure, or by screening for retinopathy.

Chart 6.1: Pathway of disease development and progression for diabetes



¹⁰ NSF for Diabetes and National Electronic Library for Health

Primary and screening prevention

6.52 Primary prevention strategies consist of:

- lifestyle interventions; and
- screening and early detection.

6.53 The main modifiable risk factors for Type 2 diabetes are obesity and physical inactivity, which together account for the majority of cases. Obesity in adults has tripled between 1980 and 2001 (from 8 per cent to 23.5 per cent in women and from 6 per cent to 21 per cent in men¹¹). Physical activity has also fallen in recent decades as lifestyles have become increasingly sedentary. Just 31 per cent of adults currently meet the recommended level of physical activity and around 38 per cent are sedentary (defined as engaging in less than 30 minutes of moderate physical activity per week). Around 50 per cent of children are also failing to meet Government recommended levels of physical activity¹².

Lifestyle interventions in high risk groups

6.54 A targeted approach to diabetes prevention is achievable through identifying and providing interventions for those at high risk of developing diabetes. Two recent major randomised controlled trials in the US and in Finland have focused on lifestyle and drug (metformin¹³) interventions aimed at those who are overweight and have impaired glucose tolerance¹⁴. The results suggest that both lifestyle interventions and metformin can be effective and cost-effective in reducing the risk of developing diabetes over relatively short periods of follow-up (3 to 4 years). Increasing physical activity was found to have an independent protective effect over and above obesity reduction¹⁵. However, the relationship of obesity and lack of physical activity is highly complex, with both leading to diabetes, while lack of physical activity contributes to obesity and management of obesity is assisted by physical activity.

6.55 The 3 to 4 year risk reduction of developing diabetes was found to be around 58 per cent for lifestyle interventions and around 31 per cent for metformin. Incremental costs per QALY of lifestyle interventions are around £11,600 to £22,100 and in the range £15,000 to £42,400 for metformin¹⁶. The lower bounds refer to likely cost-utility ratios for the intervention as it might be applied in standard practice, while the upper bounds refer to costs incurred under trial protocols. Lifestyle interventions appear most effective in older age groups and the less severely overweight, while metformin appears relatively most effective in younger cohorts and in the severely obese. There was also some evidence that lifestyle intervention might be more effective in ethnic minority groups.

¹¹ *Health Survey for England, 2001*

¹² *Health Survey for England, and Department of Health analysis*

¹³ Metformin is a drug used to treat type 2 diabetes by reducing blood sugar levels, which has also been found to be effective in delaying or preventing the onset of type 2 diabetes in some high risk groups.

¹⁴ Impaired Glucose Tolerance (IGT) sometimes known as “pre-diabetes” is a condition where blood sugar levels are higher than normal but not high enough to be classified as diabetes. IGT is a major risk factor for developing diabetes.

¹⁵ *Prevention of Type 2 diabetes mellitus by changes in lifestyle among subject with impaired glucose tolerance*, Tuomilehto et al., *New England Journal of Medicine*, 2001

¹⁶ Cost utility ratios were converted from \$US to £ by applying market exchange rates (average 2000-2003) and then applying health purchasing power parity adjustment of 1.52 (World Bank, *World Development Indicators 2000, 2001*).

Screening and early detection **6.56** It is estimated that there may be as many as 1 million people with undiagnosed Type 2 diabetes in the UK¹⁷. People on average have diabetes for 9 to 12 years before diagnosis¹⁸ and as many as 50 per cent of people have complications when diagnosed⁶. Currently screening is usually opportunistic and practice varies widely.

6.57 Despite the lack of conclusive evidence, there is widespread support for the view that untargeted screening would be both very costly and probably not cost-effective¹⁹, however much of this is still carried out at present. Population screening would be extremely costly, perhaps many hundreds of millions²⁰, and would entail significant workforce consequences.

6.58 There is some evidence that targeted screening might be cost-effective, though the degree of uncertainty remains high. There is also evidence to suggest that screening is relatively more cost-effective for younger people and for those from ethnic minorities. Logically, screening would also be of benefit to those with risk factors such as obesity, family history, history of cardiovascular disease (CVD) or glucose intolerance, though again there is no firm evidence to confirm this.

6.59 The main area of clinical uncertainty remains the issue of whether prevention and high-risk screening strategies prevent or delay the onset of diabetes. The main sources of practical uncertainty seem to be whether results in a trial setting with fairly short follow-up could be replicated in a population setting and whether results and adherence could be maintained over the longer term. At the very least, interventions need to be sustained to prevent deterioration. Strategies to identify those at risk are also crucial to success and should logically be linked to screening for diabetes.

Secondary Prevention

6.60 Type 2 diabetes is associated with many complications, including coronary heart disease, stroke, retinopathy (which can lead to blindness), renal disease and neuropathy, which can cause foot ulceration and ultimately lower limb amputations. These complications reduce life expectancy, can severely diminish quality of life and are responsible for the bulk of the financial burden of diabetes to the NHS.

6.61 Secondary prevention strategies are therefore vital. The evidence base of effectiveness and cost-effectiveness of secondary prevention interventions is, in many areas, very solid. Secondary prevention strategies consists of interventions such as:

- tight control of blood glucose control;
- tight control of blood pressure;
- tight control of blood lipids;
- retinopathy screening and treatment;
- renal disease screening and treatment; and
- diabetic foot complication screening and treatment.

¹⁷ *Diabetes in the United Kingdom*, British Diabetic Association Report, 1996

¹⁸ *United Kingdom Diabetes Information, Audit and Benchmarking Service (UKDIABS)*, Diabetes UK, 2000

¹⁹ See for example, *Diabetes UK Position Statement of Early Identification of People with type 2 Diabetes*, Diabetes UK, 2002

²⁰ Department of Health estimates

- Tight control of blood glucose** **6.62** High blood glucose levels are significantly correlated with increased risk of developing microvascular complications and possibly some macrovascular events such as acute myocardial infarction²¹. A major large-scale randomised controlled trial with around 10 years of follow-up – the United Kingdom Prospective Diabetes Study (UKPDS) – assessed the impact of tight blood glucose control and concluded that it is highly effective and cost-effective²².
- 6.63** Recent evidence from a 5 year post trial follow-up found that the reductions in risk from intensive blood glucose control were maintained when the intervention group reverted to loose control, though blood glucose levels of the previous intervention and control groups converged within 3 years²³. The cost per event-free life year gained was around £1200²⁴, or lower if treatment effects continue post-trial – a 10 per cent probability that the intervention will actually be cost saving over the longer term.
- Tight control of blood pressure** **6.64** Up to 70 per cent of those with Type 2 diabetes have high blood pressure, which is a significant risk factor for complications such as stroke, CHD and renal disease²⁵. Again, there is good evidence from the UKPDS that tight control of blood pressure is highly effective and cost-effective, possibly to a greater extent than blood glucose control²⁶.
- 6.65** Cost-effectiveness analysis showed tight blood pressure control to be extremely cost-effective. Central estimates of cost per life year gained are around £400²⁷, with a fair chance that intensive blood pressure control might actually be cost saving over the longer term, depending on the true profile of post-trial benefits. Here, recent 5 year post trial follow-up suggests that the relative risk reductions in the intervention group remained significant, though smaller, five years after the end of the trial. Blood pressure levels in the intervention and control groups converged within 2 years of the end of the trial²³.
- Tight control of blood lipids** **6.66** Over 70 per cent of people with Type 2 diabetes also have high cholesterol levels, a strong risk factor for cardiovascular disease⁶. The evidence base regarding the benefits of tight blood lipids control is less certain than for blood glucose and blood pressure control, but still promising.

²¹ Microvascular complications are diseases of the small blood vessels that lead to organ and nerve damage, including retinopathy and nephropathy. Macrovascular diseases affect the large blood vessels and include coronary heart disease and peripheral vascular disease.

²² *Cost-effectiveness of an intensive blood glucose control policy in patients with Type 2 diabetes: economic analysis alongside randomised control trial*, Gray et al., BMJ, 2000

²³ UKPDS website: <http://www.dtu.ox.ac.uk/index.html?maindoc=/ukpds/>

²⁴ Costs and effects were both discounted at 6%

²⁵ *Management of type 2 diabetes: management of blood glucose*, NICE Clinical Guidelines, NICE, 2002

²⁶ *Cost-effectiveness analysis of improved blood pressure control in hypertensive patients in type 2 diabetes*, UKPDS 40, 1998

²⁷ Costs and benefits both discounted at 3%

6.67 From the available evidence, it seems that tight control of blood lipids is probably cost-effective, especially if practiced together with blood glucose and blood pressure control. Emerging evidence suggests that multiple risk factor interventions may provide the greatest benefit^{28,29}. There seems little doubt that secondary prevention for those with a history of CHD is cost-effective. It is less certain, but still likely, that intensive blood lipids control for those with hyperlipidaemia but no history of CHD is cost-effective; available estimates of cost per QALY, based in large part upon data from the UKPDS, are around £22,200³⁰. Cost per QALY is lowest in the age range 55 to 74.

Retinopathy screening

6.68 Diabetic retinopathy is the leading cause of blindness in people aged under 60. More than 60 per cent of people with diabetes develop retinopathy within 20 years. Diabetic retinopathy can be delayed and possibly prevented by tight blood glucose control: UKPDS found a significant risk reduction of around 20 per cent of two-step retinopathy progression for those with tight blood glucose control compared to only loose control. Retinopathy can also be treated highly effectively with laser treatment, especially if caught at an early stage. Retinopathy screening for all with Type 2 diabetes is almost certainly very cost-effective, possibly as low as £1,400 per QALY, depending on modality and frequency of screening and on the baseline against which cost-utility is compared³¹.

6.69 Modelling work in the US has suggested that annual screening might be cost-effective for those at high risk of retinopathy, or every two years for those at a lower risk. It has been estimated that the marginal cost-effectiveness ratio of annual screening versus screening every two years is around £17,300 per QALY for those at high risk, but £90,500 per QALY for those at low risk³². Since annual screening for all would probably cost tens of millions of pounds more than bi-annual screening, the issue of targeting the frequency of retinopathy screening on the basis of risk seems important.

Renal disease

6.70 Type 2 diabetes is a major risk factor for renal disease. In addition to high blood glucose, renal disease is also associated with high blood pressure and high blood lipids. There is good evidence from UKPDS that tight blood glucose control and tight blood pressure control can reduce the risk of developing renal disease by significantly reducing rates of deterioration of renal function³³.

Diabetic foot complications

6.71 Around 20 to 40 per cent of people with diabetes have neuropathy, the most common manifestation of which is foot ulceration, which can ultimately lead to lower limb amputation if not adequately treated. There is randomised controlled trial evidence that screening and subsequent treatment for diabetic foot problems can significantly reduce the proportion of ulcers leading to amputation by over 50 per cent over 2 years and the total cumulative incidence of amputation by two thirds or more over 2 years³⁴.

²⁸ *Multifactorial Intervention and Cardiovascular Disease in Patients with Type 2 Diabetes*, P Gæde et al., 2003

²⁹ *Teaching patients to monitor their risk factors retards the progression of vascular complications in high-risk patients with Type 2 diabetes mellitus—a randomised prospective study*, R Rachmani et al., *Diabetic Medicine*, 2002

³⁰ *Cost-effectiveness of intensive glycaemic control, intensified hypertension control and serum cholesterol level reduction for Type 2 diabetes*, US CDC Diabetes Cost-Effectiveness Group, CDC, 2002

Cost utility ratio was converted from \$US to £ using the same method outlined above.

³¹ Department of Health analysis

³² *Cost-utility analysis of screening intervals for diabetic retinopathy in patients with Type 2 diabetes mellitus*, Vijan et al., *JAMA*, 2000

³³ *Intensive blood glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with Type 2 diabetes*, UKPDS 33, 1998

³⁴ *Evaluation of a diabetic foot screening and protection programme*, McCabe et al., *Diabetic Medicine*, 1998

6.72 Cost-effectiveness analysis by the Department of Health of the same trial suggests that screening and treatment might be highly cost-effective if targeted at those at high risk (around £4,000 per QALY gained, for a total net cost of only around £3m per year), but that an untargeted programme would be both much more costly – around £65 million and not cost-effective (cost per QALY of roughly £38,000).

Self-care

Patient education and self-management

6.73 Structured patient education and informed self-management is a cornerstone of the NHS Plan and of all NSFs, including the diabetes NSF. This is especially important in a chronic, long-term disease such as diabetes. Self-care is important at two levels, for the individual managing their own condition and for their overall capacity to ‘engage’ with wider health issues. At the individual level, every intervention quoted requires active involvement of the individual to be successful, including pharmacological as well as lifestyle interventions. At the population level, education for self-care is a necessary component of developing a ‘fully engaged’ population, and is important at every level of disease from prevention through to ‘end of life’ care.

6.74 The drive towards patient education and self-management strategies is logically compelling, though not as yet evidence-based. There is very little evidence on efficacy and on cost-effectiveness. While NICE has highlighted the relative dearth of evidence so far in the area of patient education, it has nevertheless tentatively recommended that structured patient education is made available to all people with diabetes at the time of diagnosis and then as required³⁵. There was judged to be insufficient evidence to recommend a specific type, setting or frequency of education. However, whilst acknowledging that cost-effectiveness has not been established, NICE stresses that benefits would only need to be modest to justify relatively low costs, with education courses being relatively cheap interventions when compared with drugs.

Investing in diabetes care

6.75 The prevention and management of diabetes is a relatively well-researched area but all of this information needs to be put into a framework in order to assess how to effectively invest in managing diabetes, such as the described framework of NICE which uses a point (£20,000 per QALY) above which the tests applied in making a judgement of cost-effectiveness become progressively stricter.

6.76 Interventions that are cost-effective using a threshold of £20,000 per QALY are:

- tight control of blood glucose and blood pressure for all diabetics;
- ACE inhibitors for diabetics with one other risk factor not otherwise quantified (e.g. for tight control of blood pressure);
- retinopathy screening for all diabetics;
- foot screening for those at high risk;
- screening obese for IGT and relevant treatment;
- multiple risk factor management;
- self-care including patient education; and
- reduction of obesity and physical inactivity in high risk groups.

³⁵ *Guidance on the use of patient-education models for diabetes, NICE Technology Appraisal 60, NICE, 2003.*

6.77 Many of these interventions are already being implemented through NSFs and NICE recommendations. Patient education is also included, though there is some uncertainty around cost-effectiveness. It has been endorsed by NICE on the basis of the benefit being on a likely scale to justify the modest cost. However, due to the lack of cost-effectiveness evidence, other primary prevention interventions could not be analysed and compared, see box 6.8.

Box 6.8 NICE Guidelines for Type 2 Diabetics

- Management of blood pressure: at least annual blood pressure checking for all people with Type 2 diabetes and a sequential treatment protocol depending on individual history and/or risk of renal and cardiovascular disease. This is augmented by the NSF for diabetes;
- Tight blood lipids monitoring and control: for those with diabetes and a sequential protocol depending on blood lipid readings and history and risk of CVD³⁶;
- Annual retinopathy screening for all those with Type 2 diabetes³²;
- Annual screening for microalbuminuria in all people with diabetes, and treatment with ACE inhibitors to achieve tight blood pressure control in those found to have early renal disease³⁷;
- Prevention and management of foot problems: all people with diabetes should receive a foot examination as part of an annual review and be classified according to risk of foot ulcer and offered structured care dependent on the level of individual risk³⁸;
- Patient education: structured patient education is made available to all people with diabetes at the time of diagnosis and then as required^{39,35}.

6.78 This approach would need to be refined to conform to the NICE framework described earlier and so to allow a consistent comparisons across interventions, particularly with regard to complying with its “reference case”, in terms of such parameters as the perspective of cost and outcomes, calculation of QALYs, discounting and time horizons used.

Case study conclusions

6.79 Type 2 diabetes imposes a significant and growing burden on sufferers and on the health service. Without further intervention, this burden is set to increase in the coming decades as a result of unchangeable trends such as demography and modifiable risk factors such as obesity and physical inactivity. There is good evidence that interventions at most stages of the Type 2 diabetes pathway can be effective and cost-effective in reducing the burden of the disease. Many of these are already being implemented as part of the NSF. Intensive blood glucose and blood pressure control for all diabetics, retinopathy screening for all diabetics, targeted screening and better care for people with foot complications will all be implemented as part of the NSF and clear protocols have been (or, in the case of foot care, will soon be) set out by NICE. However, the weak evidence base for primary preventions means that comparisons of cost-effectiveness with other types of intervention are currently difficult to undertake.

³⁶ *Management of type 2 diabetes: management of blood lipids, NICE Clinical Guidelines, NICE, 2002.*

³⁷ *Management of type 2 diabetes: diabetic renal disease – prevention and early management, NICE Clinical Guidelines, NICE, 2002.*

³⁸ *Type 2 diabetes: prevention and management of foot problems, NICE Clinical Guidelines, NICE, 2004.*

³⁹ *Guidance on the use of patient-education models for diabetes, NICE Technology Appraisal 60, NICE, 2003.*

6.80 As recommended in *Securing Our Future Health*, future National Service Frameworks (NSFs) should be fully costed to incorporate detailed information about the cost-effectiveness of interventions. Where changes in lifestyle, or some other major determinant, have a potential impact across more than one NSF, these should be taken fully into account in assessing cost-effectiveness. Comprehensive research programmes should be established for future NSFs, which enable them to be reviewed and continually updated in the light of the emerging evidence.

6.81 Arresting trends in obesity and physical inactivity is absolutely vital if the government is to succeed in its stated aim of reducing the number of people who develop Type 2 diabetes. The evidence base regarding interventions to reduce obesity and physical inactivity in the population at large is thin, as it is for many public health interventions. But some interventions have been shown to be cost-effective and it is simply impossible to reduce significantly the burden of diabetes without intensive primary prevention efforts.

6.82 In addition to population primary prevention efforts, of those interventions currently not being funded or implemented, the most promising appears to be a combined programme of targeted identification and screening for those at high risk of either having undiagnosed diabetes or at high risk of developing diabetes. This is likely to identify hundreds of thousands of undiagnosed diabetics who would then benefit from earlier tight control of blood glucose and blood pressure. It would also identify a large pool of people at very high risk of developing diabetes (those with Impaired Glucose Tolerance (IGT) and who are overweight), to whom lifestyle and drug interventions could be offered. These have been demonstrated to be highly effective in at least delaying and possibly preventing the onset of diabetes and could, if fully implemented, make a significant dent in prevalence.

CONCLUSIONS

6.83 Economic evaluation of public health interventions is not inherently different from the evaluation of other health interventions. Standard principles of good practice are the same. It is true that the practical difficulties associated with designing rigorous and convincing evaluations of public health interventions are greater. These, coupled with expense, lack of incentives for funding and slower acceptance of economic perspectives within public health may help to explain the relative dearth of cost-effectiveness evidence in the public health sphere.

6.84 But it is not impossible to overcome, or at least minimise, these practical difficulties in order to produce high quality and convincing economic evaluations of public health interventions, although resolving issues around equity and discounting will be difficult. It may also be desirable to try to increase the focus on evaluation of systems, processes or management techniques. However, this is again not a challenge unique to public health. It applies equally to the systems, processes and management techniques that deliver curative care.

6.85 Different methods of economic evaluation may be appropriate at different levels of their application, for example cost benefit analysis may be the most appropriate method for informing Government's allocative decision making in relation to public spending. However, to achieve the objective of an efficient allocation of NHS funding between health care and public health, a similar method of cost-effectiveness analysis needs to be applied to public health and clinical interventions.

6.86 A framework based on cost-utility analysis, such as the one employed by NICE, could offer a practical solution to applying rigorous economic evaluation to public health interventions that could be applied consistently across the health sector. This would demonstrate the respective merits of investment in public health measures or in clinical services and enable policymakers and practitioners to prioritise the use of scarce resources.

6.87 However, this framework also requires a methodology for the consistent evaluation of the effectiveness of public health interventions within or across topic areas. In the absence of this framework, it is not currently possible to compare the relative effectiveness of different public health interventions.

