

Preventing type 2 diabetes: risk
identification and interventions
for individuals at high risk

Costing report

Implementing NICE guidance

July 2012

This costing report accompanies the public health guidance: 'Preventing type 2 diabetes: risk identification and interventions for individuals at high risk' (available online at www.nice.org.uk/guidance/PH38).

Issue date: July 2012

This report is written in the following context

This report represents the view of NICE, which was arrived at after careful consideration of the available data and through consulting with professionals. It should be read in conjunction with the NICE guidance. The report and template are implementation tools and focus on the recommendations that were considered to have a significant impact on national resource utilisation.

The cost and activity assessments in the report are estimates based on a number of assumptions. They provide an indication of the likely impact and are not absolute figures. Assumptions used in the report are based on assessment of the national average. Local practice may be different from this, and the template can be amended to reflect local practice.

Implementation of this guidance is the responsibility of local commissioners and/or providers. Commissioners and providers are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity. Nothing in this costing tool should be interpreted in a way that would be inconsistent with compliance with those duties.

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Contents

Executive summary.....	4
<i>Significant resource-impact recommendations</i>	4
<i>Costing template</i>	8
1 Introduction.....	9
1.1 <i>Supporting implementation</i>	9
1.2 <i>What is the aim of this report?</i>	9
1.3 <i>Background to type 2 diabetes</i>	10
2 Costing methodology.....	11
2.1 <i>Process</i>	11
2.2 <i>Scope of the cost-impact analysis</i>	11
3 Significant resource-impact recommendations.....	15
3.1 <i>Offering intensive lifestyle-change programmes to people aged 40–74 years</i>	18
3.2 <i>Preventing progression to type 2 diabetes for people aged 25–39 of South Asian or Chinese descent</i>	19
3.3 <i>Local costing templates for local use</i>	24
3.4 <i>Potential savings</i>	25
4 Sensitivity analysis.....	29
4.1 <i>Methodology</i>	29
4.2 <i>Impact of sensitivity analysis on costs</i>	29
5 Impact of guidance for commissioners.....	32
6 Conclusion.....	32
6.1 <i>Total national cost for England</i>	32
6.2 <i>Next steps</i>	33
Appendix A. Approach to costing guidance.....	34
Appendix B. Results of sensitivity analysis.....	35

Executive summary

This costing report looks at the resource impact of implementing the NICE guidance on risk identification and interventions for individuals at high risk of type 2 diabetes in England.

The costing method adopted is outlined in appendix A; it uses the most accurate data available, was produced in conjunction with professionals working in the field, and reviewed by financial professionals.

Significant¹ resource-impact recommendations

This report focuses on the recommendations that are considered to have the greatest resource impact and therefore require the most additional resources to implement or can potentially generate the biggest savings.

The guidance splits the population into 3 categories

- people aged 40 – 74 (except pregnant women)
- people aged 75 or over
- high risk groups (except pregnant women)

Risk assessments, testing and interventions for people aged 40–74 would be expected to result in the largest resource-impact. As the public health guidance can be used alongside the existing NHS Health Check programme for those people aged 40–74, some of the costs for this group have already been acknowledged in the health system. The main difference is considered to be the recommendation in the guidance to offer intensive lifestyle-change programmes to those at high risk of developing type 2 diabetes.

¹ The following impacts have been defined as significant:

- where the number of people affected by the guidance recommendations is estimated to be over 300 (equivalent to 1 patient per 170,000; in practice, smaller populations may have no patients or possibly more than one, particularly if it is a disease that runs in families and there is a cluster in one area)
- where initial costing work indicates that the national cost is more than £1 million (equivalent to £2000 per 100,000 population).

The public health guidance recommends that people are not excluded on the grounds of age. However, it is not advocated that people aged 75 and over should be assessed routinely. There is limited evidence for those people aged 75 and over, and uncertainty around how many would already have been identified during existing GP contacts. A local costing template has been developed for local use.

The guidance also recommends offering risk assessments, blood testing and interventions to:

- people aged 25-39 years of South Asian and Chinese descent, African-Caribbean, black African and other high-risk black and minority ethnic groups
- people with conditions that increase the risk of type 2 diabetes.

Risk assessments, blood testing and interventions for people aged 25-39 years of South Asian and Chinese descents have been estimated and would give a cost impact. A national costing template has been developed that can be amended for local use. There is limited data for people from African-Caribbean, black African and other high-risk black and minority ethnic groups. A local costing template has been developed for local use assuming estimates for people of South Asian and Chinese descent. These estimates can be modified in the template locally.

In summary, the costing model has focused on the national resource–impact associated with:

- offering intensive lifestyle–change programmes to people aged 40-74 years who are at highest risk of developing type 2 diabetes
- offering risk assessments, blood testing and interventions to people of South Asian or Chinese descent aged 25-39.

Please see section 2.2 of this report ‘Scope of the cost-impact analysis’ for more information about what is included in the costing model.

Costs

As NHS organisations budget 3–5 years ahead, costing work focuses on the potential costs in the first 5 years of implementation.

The costs associated with this guidance over a 5 year period are estimated to be £170 million in total, or an average of £34 million per year for the next 5 years. Table 1 provides a summary of the estimated cost impact.

Table 1 Cost impact over 5 years

	Total Cost over 5 years (£m)	Average annual impact over 5 years (£m)
Intensive lifestyle – change programmes for people aged 40 - 74	147.5	29.5
Assessments, testing and interventions for people aged 25 – 39 of South Asian and Chinese descent	22.3	4.5
Total	169.8	34.0

Section 3.1 of this report provides details of the cost impact for the intensive lifestyle – change programmes for people aged 40 – 74. Section 3.2 of this report provides details of the cost impact for the assessments, testing and interventions for people aged 25 – 39 of South Asian and Chinese descent.

Short-term savings have been estimated to be £13 million over a period of 5 years, or an average of £2.6 million per year for 5 years. It has not been possible to estimate the long-term savings for this guidance but it is anticipated that successful implementation of the recommendations would result in savings in the long term. Details of savings are provided in section 3.4 of this report.

A number of assumptions have been made to calculate the estimated cost impact. The assumptions used in the baseline estimate are based on expert opinion. Section 4 of this report provides details of the effect of varying 3 key assumptions

- the cost of the intensive lifestyle intervention

- the proportion of those assessed
- the proportion of those taking up the offer of an intensive lifestyle-change programme
- the cost of a brief intervention

The base case assumptions are that an intensive lifestyle intervention costs £305, the proportion assessed is 85%, the proportion accepting the offer of an intensive lifestyle-change programme is 32% and the cost of a brief intervention is £25.50; this establishes the estimates of £170 million over a 5 year period, or £34 million per year for 5 years. The sensitivity analysis in section 4 identifies that the highest cost impact occurs if the cost of an intensive lifestyle intervention is actually £500 (all other assumption are maintained as in the base case), then the cost impact is £267 million over a 5 year period, or £53 million per year for 5 years. The lowest cost impact occurs if the cost of an intensive lifestyle intervention is actually £100 (all other assumption are maintained as in the base case), then the cost impact is £67 million over a 5 year period, or £13.4 million per year for 5 years. Changing the other assumptions generates estimates between these two scenarios.

Users are encouraged to enter local estimates throughout the model.

Benefits and savings

Implementing the public health guidance may bring the following benefits:

- a focus on those people who are at particularly high risk of developing type 2 diabetes
- a reduction or delay in the number of people progressing to type 2 diabetes
- earlier diagnosis and management of type 2 diabetes leading to reduction or delay in the development of complications
- an increase in public awareness of the risks of developing type 2 diabetes and the implications of living with the condition.

Some of the incremental costs of implementing the recommendations may be offset by potential savings from delaying or preventing people from developing type 2 diabetes. In addition, earlier diagnosis may lead to better management of the condition and a reduction in the associated complications.

The timing of when savings will be received is dependent locally on the roll out of the recommendations. The extent of the savings is dependent on the local costs and rates at which benefits are achieved. There is a lack of certainty over these factors.

As noted above, short - term savings have been estimated to be £13 million over a period of 5 years, or an average of £2.6 million per year for 5 years. It has not been possible to estimate the long-term savings for this guidance but it is anticipated that successful implementation of the recommendations would result in savings in the long term. Details of savings are provided in section 3.4 of this report.

Costing template

Both the national costing templates and the local costing templates produced to support this guidance enable organisations in England to estimate the impact locally and replace assumptions with ones that depict the current local position.

A sample calculation using the national costing template worksheet for people aged 40-74 years showed that additional costs of £288,000, or £58,000 a year over 5 years, could be incurred for a population of 100,000.

1 Introduction

1.1 *Supporting implementation*

1.1.1 The guidance on risk identification and interventions for individuals at high risk of type 2 diabetes is supported by the following implementation tools, available on our website www.nice.org.uk/guidance/PH38:

- costing tools
 - a national costing report; this document
 - national costing templates and local costing templates; simple spreadsheets that can be used to estimate the local cost of implementation
- shared learning examples; example cases designed to improve and assess the users' knowledge of the guidance.

1.2 *What is the aim of this report?*

1.2.1 This report provides estimates of the national cost impact arising from implementing the guidance on risk identification and interventions for individuals at high risk of type 2 diabetes in England. These estimates are based on assumptions made about current practice and predictions of how current practice might change after implementation.

1.2.2 This report aims to help organisations in England plan for the financial implications of implementing NICE guidance.

1.2.3 This report does not reproduce the NICE guidance on risk identification and interventions for individuals at high risk of type 2 diabetes and should be read in conjunction with it (see www.nice.org.uk/guidance/PH38).

1.2.4 The costing template that accompanies this report is designed to help those assessing the resource impact at a local level in England.

1.3 *Background to type 2 diabetes*

- 1.3.1 Diabetes mellitus is among the most common chronic illnesses in the UK. Its prevalence is increasing and it has significant economic importance. As well as the direct costs of treating the illness and its associated complications, diabetes also has a number of indirect social and productivity costs, including those related to increased mortality and morbidity and the need for informal care and sickness absence (Hex et al. 2012).
- 1.3.2 Previously type 2 diabetes usually occurred in people over the age of 40 with the highest prevalence being among those aged 75 and over. It is now increasingly being diagnosed in younger overweight people (Diabetes UK 2012).
- 1.3.3 In the UK, type 2 diabetes is more prevalent among people of South Asian and Chinese descent than among the white population. It is up to six times more common among people of South Asian descent (Department of Health 2006). Type 2 diabetes affects people of South Asian, African–Caribbean, Chinese or black African descent up to a decade or more earlier than white Europeans (NICE guidance). They also tend to progress from impaired glucose tolerance to diabetes much more quickly (more than twice the rate of white populations) (Webb et al. 2011).
- 1.3.4 Obesity is the most potent risk factor, accounting for 80–85% of the overall risk of developing Type 2 diabetes and it underlies the current global spread of the condition (Diabetes UK 2012). Being more physically active, achieving and maintaining a healthy weight, eating less fat and eating more dietary fibre may prevent or delay the onset of the condition.
- 1.3.5 When diabetes is not well managed, it is associated with serious complications including heart disease, stroke, blindness, kidney disease and amputations, leading to disability and premature

death. Good diabetes management has been shown to reduce the risk of complications. (Diabetes UK 2012).

1.3.6 In 2010/2011, approximately 10% of total NHS expenditure went on treating diabetes. If no changes are made, by 2035/2036 this is predicted to rise to around 17% of NHS expenditure. Type 2 diabetes accounts for approximately 90% of cases of diabetes (Hex et al. 2012).

1.3.7 In 2010/2011, the direct cost of treating people with type 2 diabetes in the UK was estimated at £8.8 bn, with indirect costs of £13 bn. In real terms, the direct cost in 2035/2036 is predicted to reach around £15.1 bn, with indirect costs of £20.5 bn. Treating the related complications will account for a substantial proportion of the direct health costs, if current care regimes are maintained (Hex et al. 2012).

2 Costing methodology

2.1 Process

2.1.1 A structured approach for costing guidance has been followed (see appendix A).

2.1.2 Assumptions are made in the costing model. These are tested for reasonableness with the Centre for Public Health Excellence, and professionals in the relevant fields.

2.1.3 Local users can assess local cost impact, using the costing template as a starting point, and update assumptions to reflect local circumstances.

2.2 Scope of the cost-impact analysis

2.2.1 The guidance offers best practice advice on preventing the progression to type 2 diabetes. The guidance focuses on identifying people aged 18 years and over at high risk of type 2 diabetes, and

offering them risk identification and effective lifestyle-change programmes to prevent or delay the condition.

- 2.2.2 The guidance does not cover treatment and management of type 2 diabetes, gestational diabetes or any other form of diabetes. Therefore, these issues are outside the scope of the costing work.
- 2.2.3 The Centre for Public Health Excellence project team and professionals working in this field provided their expertise to identify the recommendations that would have the most significant resource-impact.
- 2.2.4 Risk assessments, blood testing and interventions for people aged 40-74 would be expected to result in the largest resource-impact. However as the public health guidance can be used alongside the existing NHS Health Check programme for eligible people aged 40-74 years, some of the costs for this group have already been acknowledged in the health system.
- 2.2.5 The main difference is considered to be the recommendation in the guidance to offer intensive lifestyle-change programmes to those identified at high risk of developing type 2 diabetes. As the NHS Health Check programme is already being established, the costing model excludes all other costs to avoid double counting.
- 2.2.6 There will be a significant cost impact in areas where the NHS Health Check programme has not already been budgeted for. Commissioners are encouraged to assess the cost impact locally.
- 2.2.7 As a guide the Economic Modelling for Vascular Checks (now known as the NHS Health Check programme) estimates that the overall cost of the programme could range between £180m and £243m per year² at full implementation (Department of Health 2008). This includes costs for a range of long term conditions

² The cost estimates are based on scenarios which are fed into the model and should not be taken as final estimates of the cost of the policy. The true costs will depend significantly on the delivery route for the programme and roll-out plans. National costing report: Preventing type 2 diabetes: risk identification and interventions for individuals at high risk (July 2012)

including diabetes. A large proportion of the cost relates to interventions, but the intensive lifestyle interventions proposed in this guidance are in addition to those proposed in the Health Check programme.

- 2.2.8 The guidance recommends extending the offer of risk assessments, blood testing and interventions to people from high-risk black and minority ethnic groups aged 25-39 years.
- 2.2.9 The aim is to offer assessment to people who may be at particularly high risk to try and prevent future diabetes. Type 2 diabetes affects people of South Asian, African–Caribbean, Chinese or black African descent up to a decade or more earlier than white Europeans. However the prevalence of impaired glucose regulation and undiagnosed type 2 diabetes among people aged 25–39 years of black African or African–Caribbean descent in the UK was not known. Therefore, the Programme Development Group (PDG) was unable to estimate cost-effectiveness and make specific recommendations for this population sub-group. A local costing template for these groups has been developed for local use.
- 2.2.10 The public health guidance recommends that people are not excluded on the grounds of age. However, it is not advocated that people aged 75 and over should be assessed routinely. There is limited evidence for those people aged 75 and over, and uncertainty around how many would already have been identified through existing GP contacts. A local costing template covering people aged 75 and over has been developed for local use.
- 2.2.11 In summary, the costing model has focused on the national resource–impact associated with:
- extending the offer of blood testing and interventions to people of South Asian or Chinese descent aged 25-39 years.

- offering intensive lifestyle–change programmes to people aged 40-74 years who are identified at high risk of developing type 2 diabetes.

3 Significant resource-impact recommendations

Risk assessment and identification

- Encourage people aged 25–39 of South Asian, Chinese, African – Caribbean, black African and other high – risk black and minority ethnic groups to have a risk assessment (recommendation 2).
- GPs and other primary healthcare professionals should not exclude people from assessment, investigation or intervention on the basis of age, as everyone can reduce their risk, including people aged 75 years and over (recommendation 3).

People assessed as being at low risk (those who have a low or intermediate risk score) of progressing to type 2 diabetes

- Tell the person that they are currently at low risk, which does not mean they are not at risk – or that their risk will not increase in the future. Offer them brief advice (recommendation 5).
- Offer to reassess them at least every 5 years to match the timescales used by the NHS Health Check programme. Use a validated risk-assessment tool (recommendation 6).

People assessed as being at high risk of progressing to type 2 diabetes

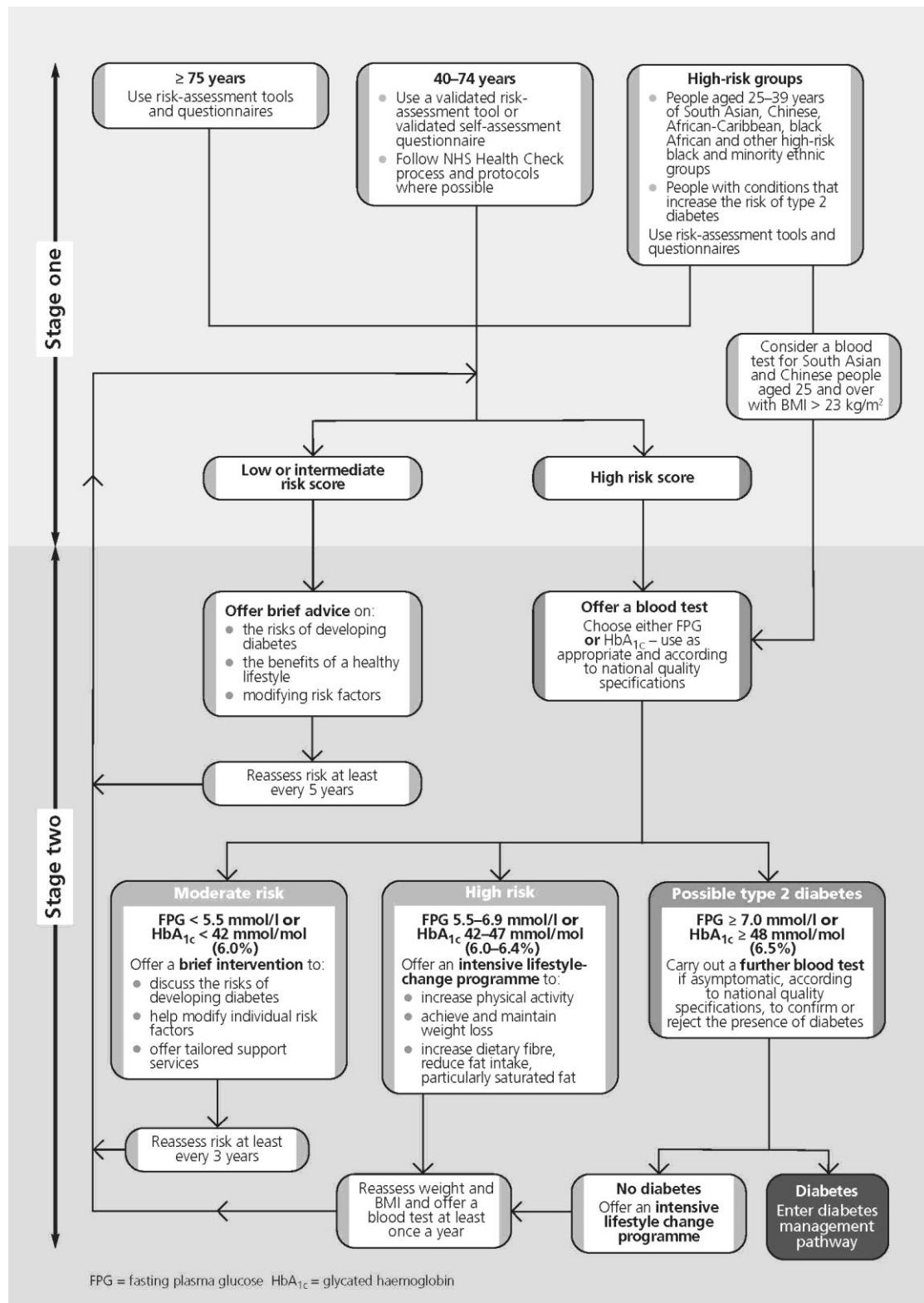
- Trained healthcare professionals should consider a blood test for those aged 25 and over of South Asian or Chinese descent whose body mass index (BMI) is greater than 23 kg/m² (recommendation 4).
- Offer those people with a moderate risk (a high risk score but with a fasting plasma glucose less than 5.5 mmol/l or HbA_{1c} less than 42 mmol/mol) advice and a brief intervention to help them change their lifestyle (recommendation 5).
- Offer those people with a high risk (fasting plasma glucose of 5.5–6.9 mmol/l or HbA_{1c} of 42–47 mmol/mol) advice and offer them a referral to

a local, evidence-based, quality-assured intensive lifestyle-change programme (recommendation 5).

- For people with possible type 2 diabetes (fasting plasma glucose of, or greater than, 7.0 mmol/l, or HbA_{1c} of, or greater than, 48 mmol/mol, but no symptoms of type 2 diabetes) carry out a second blood test. If type 2 diabetes is confirmed, treat this in accordance with NICE guidance on type 2 diabetes. If type 2 diabetes is not confirmed, offer them a referral to a local, quality-assured, intensive lifestyle-change programme (recommendation 5).
- For people at moderate risk, offer to reassess them at least every 3 years (recommendation 6).
- For people at high risk, offer a blood test at least once a year (recommendation 6).

Figure 1 provides a flowchart of the recommendations.

Figure 1 Flowchart of the recommendations



3.1 *Offering intensive lifestyle-change programmes to people aged 40–74 years*

Assumptions

- 3.1.1 It is estimated that there are around 21 million people aged 40–74 years in England (Office for National Statistics 2012). It is assumed that those already diagnosed with type 2 diabetes (approximately 1.4 million people) will not be eligible for assessment (The NHS Information Centre 2011). This leaves a target population for assessment of around 19.6 million.
- 3.1.2 It is estimated that 85% (16.6 million) would be assessed. It is assumed that the top 50% (8.3 million) would be considered as potentially high risk (expert advice on consultation).
- 3.1.3 It is estimated that 78% (6.5 million) of people assessed as high risk will take up the offer of a blood test (please refer to the costing template to see how this has been calculated).
- 3.1.4 It is estimated that around 68% (4.4 million) of people tested will have an HbA_{1c} of less than 42 mmol/mol, 23% (1.5 million) will have an HbA_{1c} of 42–47 mmol/mol, and the remaining 8% (0.5 million) will have HbA_{1c} of 48 mmol/mol or more (expert advice on consultation).
- 3.1.5 It is assumed that people with an HbA_{1c} 42–47 mmol/mol (1.5 million) are offered an intensive lifestyle-change programme.
- 3.1.6 It is estimated that 32% (0.5 million) of people would take up the offer of an intensive lifestyle-change programme. This is based on expert opinion at a Programme Development Group meeting.

Cost summary

- 3.1.7 An indicative cost of an intensive lifestyle-change management programme has been taken from the health economic modelling that accompanies the guidance (Gillett et al. 2012). Of the initial National costing report: Preventing type 2 diabetes: risk identification and interventions for individuals at high risk (July 2012)

interventions, the most intensive scenario costs £150 in its first year. Of the maintenance scenarios, the most intensive scenario costs £60 per year for years 2 to 4. This gives a total cost per person of £330. However, the cost of local interventions will vary.

3.1.8 It is assumed that people covered by NHS Health Checks are already being given brief interventions. It is difficult to estimate the cost to the NHS of a brief intervention as the cost will vary locally depending on the type of intervention given. In the template it is assumed that a brief intervention involves a nurse spending 15 minutes giving someone advice on diet and exercise. This would cost £25.50³. This results in an additional cost of £305 per person, the cost of the intensive lifestyle-change management programme less the cost of a brief intervention.

3.1.9 The cost impact over 5 years for people aged 40 – 74 for an intensive lifestyle – change programme is shown in table 2.

Table 2 Cost impact over 5 years for people aged 40–74 years

	Unit cost £	Individuals	Cost (£m)
Intensive lifestyle-change programme	305	484,318	147.5
Total			147.5
Average annual impact over 5 years			29.5

3.2 Preventing progression to type 2 diabetes for people aged 25–39 of South Asian or Chinese descent

Assumptions

Risk assessment

3.2.1 It is estimated that there are around 852,000 people of South Asian descent aged 25–39 years in England (Office for National Statistics

³ This estimate is based on the fact that an hour of face to face contact with a qualified nurse in a GP practice costs £102 (Personal Social Services Research Unit 2011).
National costing report: Preventing type 2 diabetes: risk identification and interventions for individuals at high risk (July 2012)

2012)⁴. It is assumed that those already diagnosed with type 2 diabetes (approximately 10,700 people) will not be eligible for assessment (Information Centre: unpublished data 2010).

- 3.2.2 An estimated 179,000 people of Chinese descent aged 25–39 years live in England (Office for National Statistics 2012). Just over 200 of them are estimated to have been diagnosed with type 2 diabetes (Information Centre: unpublished data 2010).
- 3.2.3 This leaves a target population for assessment of around 1 million people.
- 3.2.4 It is assumed that 85% of these would be identified by searching GP databases. It is assumed that the remaining 15% would not be identified. People should have their body mass index (BMI) calculated. The template assumes that this would be 2 minutes of a healthcare assistant's time.

Initial blood test

- 3.2.5 Of those who are identified, it is estimated that around 71% (615,000) of people aged 25–39 years of South Asian or Chinese descent would have a BMI over 23 and be classified as being at potentially high risk (Mostafa et al. 2010). For those with a BMI of greater than 23 it is recommended that a risk assessment is not necessary prior to being made the offer of a blood test. (Please note that some of those people with a BMI of less than 23 will still be assessed as being at high risk and offered a blood test. It is not possible to quantify how many people this would apply to, however in terms of cost impact we anticipate that it would be a small number of people.)
- 3.2.6 It is assumed that everyone found to be at high risk would be offered a blood test. The type of test used would be based on local practice and the person's needs. It is anticipated that more people

⁴ The number of people of Pakistani, Indian or Bangladeshi descent has been used as a proxy for people of South Asian descent.

would be given an HbA_{1c} test as there is no need for fasting or early morning appointments. (Department of Health suggestion on consultation: unpublished data). The template assumes a 75:25 split, with 75% offered an HbA_{1c} test and 25% offered a fasting plasma glucose (FPG) test. It is estimated that 70% of those offered a FPG test, and 80% of those offered an HbA_{1c} test will take-up the offer (Gillett et al. 2012).

- 3.2.7 It is estimated that around 86% (410,000) of people tested will have an HbA_{1c} of less than 42 mmol/mol, 10% (50,000) will have an HbA_{1c} of between 42–47 mmol/mol, and the remaining 4% (17,000) will have HbA_{1c} of 48 mmol/mol or more (Mostafa et al. 2010).

Confirmatory blood test

- 3.2.8 It is estimated that everyone with an HbA_{1c} of 48 mmol/mol or more will be offered a second blood test to confirm or reject the presence of diabetes. Again, a 75:25 split has been assumed for the type of blood test used. However, uptake for a confirmatory blood test is assumed to be 90% (Gillett et al. 2012).
- 3.2.9 It is estimated that 90% (14,000) of people given a confirmatory blood test will be diagnosed with type 2 diabetes and enter the diabetes management pathway.

Interventions

- 3.2.10 It is assumed that people with an HbA_{1c} of less than 42 mmol/mol (410,000) are offered a brief intervention and those with an HbA_{1c} of 42–47 mmol/mol (50,000) are offered an intensive lifestyle-change programme.
- 3.2.11 It is estimated that 70% of people of South Asian and Chinese descent aged 25–39 would take up the offer of a brief intervention (expert advice during consultation).

- 3.2.12 It is estimated that 32% of people would take up the offer of an intensive lifestyle-change programme. This is based on discussion at a Programme Development Group meeting.
- 3.2.13 As NHS organisations budget for 3–5 years ahead, the costing model focuses on the potential costs in the first 5 years of implementation of the guidance.
- 3.2.14 The template assumes that implementation will be rolled out over 5 years. For simplification purposes, it is assumed that, on average, the number of people of South Asian or Chinese descent turning 25 each year is equal to the number turning 40 each year (the latter are covered by the NHS Health Check programme). Therefore it has been assumed that the total cost in the first 5 years will be for providing initial risk assessments, blood testing and interventions for all those aged 25–39 years. The average annual cost would depend on the number of people actually seen each year (the template assumes an equal number are assessed over the 5 years). From year 6 onwards, only those turning 25 in that year would be assessed.

Reassessments

- 3.2.15 The main cost associated with reassessments is assumed to be the cost of annual blood testing for people with an HbA_{1c} of 42–47mmol/mol and those people with HbA_{1c} ≥ 48 mmol/mol who are not diagnosed with type 2 diabetes on initial assessment.
- 3.2.16 For simplification purposes it is assumed that, on average, someone's risk of developing type 2 diabetes and their blood glucose level will stay the same each time they are assessed. It is acknowledged that blood glucose will rise year on year but this assumption has been made to allow reassessment costs to be estimated.

- 3.2.17 It is assumed that people would be offered an intervention only once, however many times they are reassessed. It is also assumed that the proportion of people attending for a reassessment will be the same as that estimated for blood tests.
- 3.2.18 Only reassessments that would occur in the 4 years following initial assessment have been included in the calculations. The number of reassessments per person will depend on their age at initial assessment. For example, someone who is 25 will be reassessed on an annual basis for the following 4 years. This equates to five assessments in total. Whereas, someone who is 38 will only be reassessed once before they are eligible for the NHS Health Checks programme. It is assumed that each risk group has a uniform age distribution.

Cost summary

- 3.2.19 The cost of identification using a GP database will have a minimal cost (estimated to be 24p per person). The cost of calculating BMI is estimated to be 80p⁵.
- 3.2.20 A fasting plasma glucose test is estimated to cost £11.50. An HbA_{1c} test is estimated to cost £14 (Gillett et al. 2012). If these tests are used more frequently, then the cost is likely to fall. The actual cost is likely to vary, please enter local estimates.
- 3.2.21 It is difficult to estimate the cost to the NHS of a brief intervention as the cost will vary locally depending on the type of intervention given. In the template it is assumed that a brief intervention involves a nurse spending 15 minutes giving someone advice on diet and exercise. This would cost £25.50⁶. Please enter local estimates.

⁵ The cost per hour for a healthcare assistant is assumed to be £24 (Personal Social Services Research Unit 2011).

⁶ This estimate is based on the fact that an hour of face to face contact with a qualified nurse in a GP practice costs £102 (Personal Social Services Research Unit 2011).

3.2.22 An indicative cost of an intensive lifestyle-change management programme has been taken from the health economic modelling that accompanies the guidance (Gillett et al. 2012). Of the initial interventions, the most intensive scenario costs £150 in its first year. Of the maintenance scenarios, the most intensive scenario costs £60 per year for years 2 to 4. This gives a total cost per person of £330. However, as above, the cost of local interventions will vary. Please enter local estimates.

3.2.23 The cost impact over 5 years for people of South Asian or Chinese descent aged 25 – 39 years being assessed, tested and offered interventions is shown in table 3.

Table 3 Cost impact over 5 years for people of South Asian or Chinese descent aged 25–39 years

	Unit cost £	Individuals	Cost (£m)
Identification through GP database (85% of population group)	0.24	866,835	0.2
Body mass index (BMI) measurement	0.80	866,835	0.7
Initial blood test (FPG – fasting plasma glucose)	11.50	107,704	1.2
Initial blood test (HbA _{1c} –glycated haemoglobin)	14.00	369,272	5.2
Confirmatory blood test (FPG or HbA _{1c})	13.38	15,196	0.2
Brief intervention	25.50	287,240	7.3
Intensive lifestyle-change programme	330	16,406	5.4
Reassessments		46,141	2.1
Total			22.3
Average annual impact over 5 years			4.5

3.3 Local costing templates for local use

3.3.1 The public health guidance recommends that people are not excluded from having their risk of developing type 2 diabetes assessed on the grounds of age. However, it is not advocated that people aged 75 and over should be assessed routinely.

- 3.3.2 There is limited evidence for those people aged 75 and over, and uncertainty around how many would have been identified through existing GP contacts. A costing template has been developed for local use.
- 3.3.3 The public health guidance also recommends extending risk assessments, blood testing and interventions to people aged 25-39 years from African-Caribbean, black African and other high-risk black and minority ethnic groups. Again, there is limited data for this group. A costing template has been developed for local use.
- 3.3.4 The assumptions used in the local costing templates are mostly based on the estimates used in the national costing templates (please see sections 3.1 and 3.2 in this report and the local costing templates for more detail). Please enter local estimates.

3.4 *Potential savings*

- 3.4.1 Some and, in time, possibly all the costs of assessment and lifestyle interventions may be offset by delaying someone's progression to type 2 diabetes. In the short term, savings will relate mainly to the costs that would otherwise have been incurred in monitoring and treating people who have progressed to type 2 diabetes. Savings will increase in the longer term, as the number of complications and related medical conditions (such as stroke and heart disease) are reduced.
- 3.4.2 The main savings are anticipated to arise as a result of providing intensive lifestyle-change programmes.

Short-term savings

- 3.4.3 It is anticipated that 16,700 people of South Asian or Chinese descent aged 25–39 years (1.6%) will progress to diabetes in the next 10 years if they receive no intervention (The Information Centre 2011). From earlier calculations, it is estimated that 1.56% of these people will end up receiving an intensive lifestyle-change

management programme, following implementation of the guidance. (Please refer to the costing template to see how this has been calculated)

3.4.4 For people aged 40–74 years, it is estimated that around 0.9 million people (4.8%) will progress to diabetes in the next 10 years if they receive no intervention (The Information Centre 2011). From earlier calculations, it is estimated that 2.47% of these people will receive an intensive lifestyle-change management programme, following implementation of the guidance. (Please refer to the costing template to see how this has been calculated)

3.4.5 In the 10 years following the Diabetes Prevention Program in the United States, the incidence of diabetes was reduced by 34% in the lifestyle group compared with placebo (Diabetes Prevention Program Research Group 2009). Therefore, it is assumed that the progression to type 2 diabetes could be delayed for around 90 people of South Asian or Chinese descent aged 25–39 years and around 7,900 people aged 40–74 years.

3.4.6 The cost of treating complications will increase over time. Hex at al. (2012) estimated that the cost of treating and managing type 2 diabetes in the UK in 2010/11 was £1.8 billion. During that period, 3.4 million people in the UK were known to have the condition, so this equates to an average cost of £517 per person per year. (This does not include the cost of treating complications or related medical conditions.) Total direct costs (including the cost of complications) were estimated to be £8.8 billion. As it affects 3.4 million people in the UK, this equates to an average cost of £2588 per person per year including complications.

3.4.7 Based on expert opinion during consultation it is assumed that at diagnosis, 25% of the average cost of treating complications would apply. It is also assumed that the proportion of complication costs that can be attributed increases linearly until death, which is

assumed to be 30 years after diagnosis. Therefore the average cost of complications reported in Hex et al. (2012) will apply after 15 years.

3.4.8 The average cost of complications in the first 5 years after diagnosis is equal to the average cost of complications after 2.5 years (£777). Adding this to the average cost of monitoring/treating diabetes (£517) gives an estimated cost each year of £1,293.

Change in activity and associated cost impact

3.4.9 The potential savings in the first 5 years after diagnosis from preventing the progression to type 2 diabetes are summarised in table 4.

Table 4 Aggregate 5 year saving and average saving per year

	Average saving over 5 years £	Individuals	Savings (£m)
Reduction in incidence of type 2 diabetes - people of South Asian or Chinese descent aged 25–39 years	3,234	44	0.1
Reduction in incidence of type 2 diabetes - people aged 40-74 years (in those offered an intensive lifestyle - change programme)	3,234	3,938	12.7
Aggregate 5 year saving			12.8
Average saving per year			2.6

Long-term savings

3.4.10 Implementation of the recommendations should also result in the identification of people who have type 2 diabetes but are undiagnosed. In addition, others will be diagnosed earlier, as a result of regular assessment. This should result in better management of the condition and a reduction in the associated complications.

- 3.4.11 It has not been possible to estimate the long-term savings for this guidance, as it is not known how long a person's progression to type 2 diabetes would be delayed for, or how many people would be prevented from getting type 2 diabetes at all. However, it is anticipated that successful implementation of the recommendations would result in savings in the long term.
- 3.4.12 A US study (Zhou et al. 2012) projected long-term savings from implementing a community-based diabetes prevention programme nationwide. The modelling in this study identified that the net cost of the programme would continue to increase until after year 3 but after this point would generate an increasing level of in year savings. It further identified that a cumulative breakeven point would be achieved in year 13.

Other considerations

- 3.4.13 The cost impact will vary due to local demographics and variations in the type of intervention used. Therefore users are encouraged to enter local estimates in the costing template.
- 3.4.14 The timing of reassessments is dependent on someone's risk of developing type 2 diabetes and their blood glucose levels. If their risk or blood glucose level were to change between assessments then they would be reassessed at a different interval going forward. Therefore, it is difficult to accurately estimate the cost of reassessment.
- 3.4.15 As with all guidance of this type, people's behaviour must change if there is to be a return on investment and estimated potential savings may not be realised.

4 Sensitivity analysis

4.1 Methodology

- 4.1.1 There are a number of assumptions in the model for which no empirical evidence exists; these are therefore subject to a degree of uncertainty.
- 4.1.2 Appropriate minimum and maximum values of variables were used in the sensitivity analysis to assess which variables have the largest impact on the net cost or saving. This enables users to identify the significant cost drivers.
- 4.1.3 It is not possible to arrive at an overall range for total cost because the minimum or maximum of individual lines are unlikely to occur simultaneously. We undertook one-way simple sensitivity analysis, altering each variable independently to identify those that have the greatest impact on the calculated total cost.
- 4.1.4 Appendix B contains a table detailing all variables modified, and the key conclusions drawn are discussed below.

4.2 Impact of sensitivity analysis on costs

4.2.1 The variables that are anticipated to have the most significant impact on the cost of implementing this guidance are

- the cost of the intensive lifestyle intervention
- the proportion of those assessed
- the proportion of those taking up the offer of an intensive lifestyle-change programme
- the cost of a brief intervention

Table 5 provides a summary of the changes to the estimated cost impact resulting from changing each of these assumptions in turn,

using a lower and a higher assumption than the base case. Only one assumption is changed in each scenario.

- 4.2.2 The cost of the intensive lifestyle intervention is the variable that the model is most sensitive to. The model assumes a cost of £305. The cost of this will be variable locally as different models of service delivery will be in place. The sensitivity analysis shows that if this unit cost is £100, the cost impact reduces from around £170 million to around £71 million. However, if the unit cost is £500, the cost impact increases to around £264 million.
- 4.2.3 The proportion of those assessed has a significant impact. The model assumes that 85% people will be assessed. This will vary depending on the extent to which the guidance is implemented locally. The sensitivity analysis shows that if 50% of people are assessed, the cost impact reduces from around £170 million to around £109 million. If this rate is 95%, the cost impact increases to around £187 million.
- 4.2.4 The proportion of people taking up the offer of an intensive lifestyle-change programme is the variable that the model has the third biggest level of sensitivity to. The model assumes an uptake rate of 32%. This will vary locally. The sensitivity analysis shows that if there is a 27% uptake, the cost impact reduces from around £170 million to around £147 Million. If the uptake is 37%, the cost impact increases to around £193 Million.
- 4.2.5 The cost of a brief intervention is the variable that the model has the fourth biggest level of sensitivity to. The model assumes a cost of £25.50. The cost of this will be variable locally as different models of service delivery will be in place. The sensitivity analysis shows that if this unit cost is £10, the cost impact reduces from around £170 million to around £165 million. However, if this unit cost is £100, the cost impact increases to around £191 million.

Table 5 Changes to the cost impact over 5 years based on changes to certain assumptions

	Base case assumptions	Intensive lifestyle intervention	Proportion assessed	Proportion taking up intensive lifestyle change	Brief intervention
Cost of lifestyle intervention	£305		£305	£305	£305
Lower assumption		£100			
Higher assumption		£500			
Proportion of those assessed	85%	85%		85%	85%
Lower assumption			50%		
Higher assumption			95%		
Cost of brief intervention	£25.50	£25.50	£25.50	£25.50	
Lower assumption					£10
Higher assumption					£100
Proportion taking up intensive lifestyle change	32%	32%	32%		32%
Lower assumption				27%	
Higher assumption				37%	
	Cost (£m)	Cost (£m)	Cost (£m)	Cost (£m)	Cost (£m)
Intensive lifestyle – change programmes for people aged 40 - 74	147.5				
Lower estimate		48.4	86.8	124.4	147.5
Higher estimate		242.2	164.8	170.5	147.5
Assessments, testing and interventions for people aged 25 – 39 of South Asian and Chinese descent	22.3				
Lower estimate		18.5	13.1	21.5	17.9
Higher estimate		25.0	24.9	23.2	43.7
Total	169.8				
Lower estimate		66.9	99.9	145.9	165.4
Higher estimate		267.2	189.8	193.7	191.2
Average annual impact over 5 years	34.0				
Lower estimate		13.4	20.0	29.2	33.1
Higher estimate		53.4	38.0	38.7	38.2

4.2.6 Users are encouraged to enter local estimates throughout the model.

5 Impact of guidance for commissioners

5.1.1 Implementation of the guidance will result in increased spending for commissioners in the short-term. In the longer-term successful intervention should result in a reduction in the number of people progressing to type 2 diabetes or a delay in progression. This should result in savings from a reduction in the cost of treating type 2 diabetes and related complications.

6 Conclusion

6.1 Total national cost for England

6.1.1 Using the significant resource-impact recommendations and assumptions specified in section 3, we have estimated the annual cost impact of implementing these recommendations in England.

6.1.2 The costs associated with this guidance over a 5 year period are estimated to be £170 million in total, or an average of £34m per year for the next 5 years. Table 6 provides a summary of the estimated cost impact.

Table 6 Cost impact over 5 years

	Total Cost over 5 years (£m)	Average annual impact over 5 years (£m)
Intensive lifestyle – change programmes for people aged 40 - 74	147.5	29.5
Assessments, testing and interventions for people aged 25 – 39 of South Asian and Chinese descent	22.3	4.5
Total	169.8	34.0

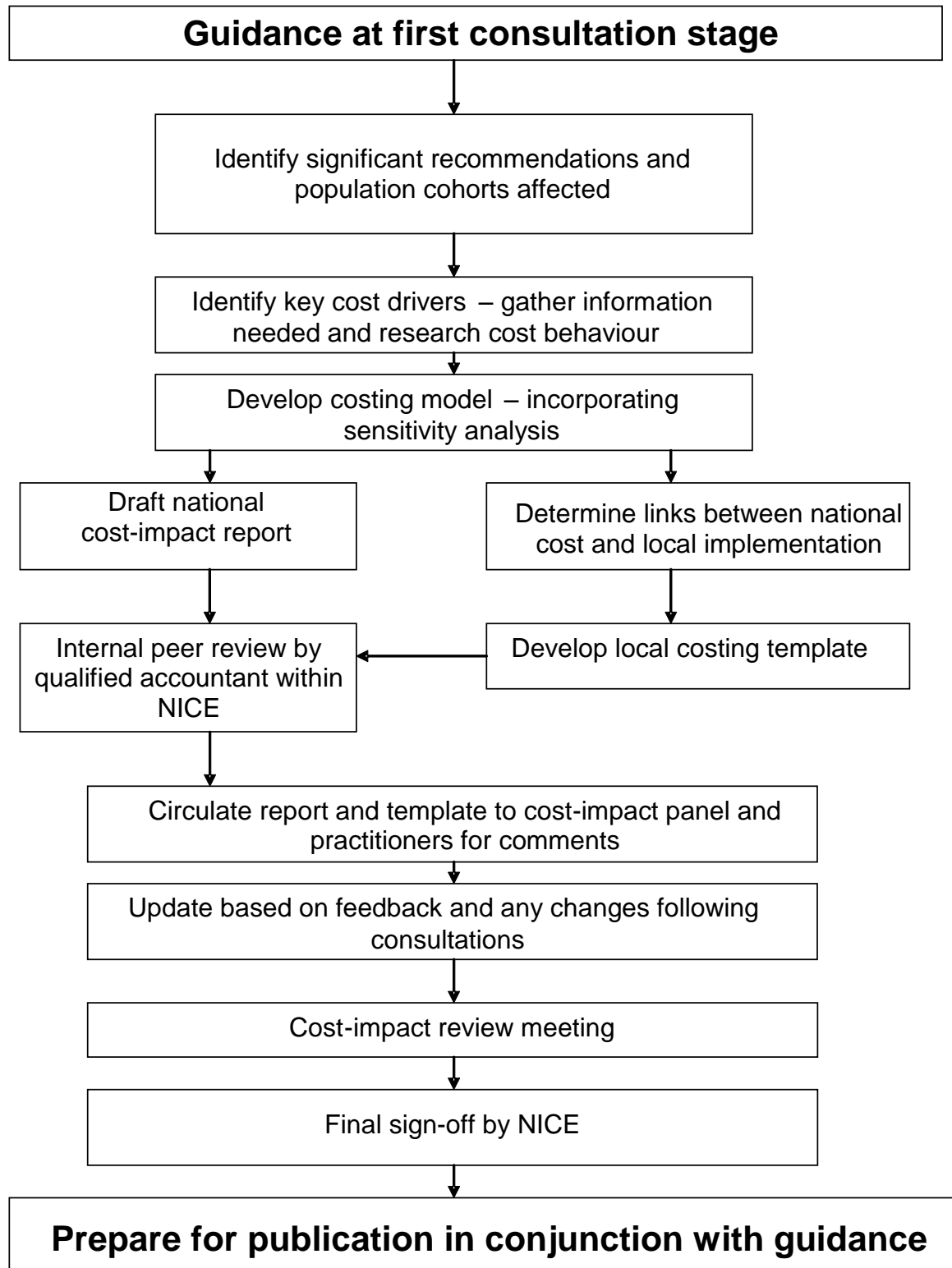
6.1.3 Section 3.1 of this report provides details of the cost impact for the intensive lifestyle – change programmes for people aged 40 – 74. Section 3.2 of this report provides details of the cost impact for the assessments, testing and interventions for people aged 25 – 39 of South Asian and Chinese descent.

- 6.1.4 Short-term savings have been estimated to be £13 million over a period of 5 years, or an average of £2.6 million per year for 5 years. It has not been possible to estimate the long-term savings for this guidance but it is anticipated that successful implementation of the recommendations would result in savings in the long term. Details of savings are provided in section 3.4 of this report.
- 6.1.5 The costs presented are estimates and should not be taken as the full cost of implementing the guidance.

6.2 *Next steps*

- 6.2.1 Both the national costing templates and the local costing templates produced to support this guidance enable organisations in England to estimate the impact locally and replace variables with ones that depict the current local position.
- 6.2.2 A sample calculation using the national costing template for people aged 40-74 years showed that additional costs of £288,000, or £58,000 a year over 5 years, could be incurred for a population of 100,000. Use the templates to calculate the cost of implementing this guidance in your area.

Appendix A. Approach to costing guidance



Appendix B. Results of sensitivity analysis

Impact of sensitivity analysis on costs

There are a number of assumptions in the model for which no empirical evidence exists. The model is subject to a degree of uncertainty because of limited data and uncertainty in predictions of how things might change as a result of the guidance. It is not possible to arrive at an overall range for total cost because the minimum or maximum values of individual variables would not occur simultaneously. We undertook one-way simple sensitivity analysis, altering each variable independently to identify those that have greatest impact on the calculated total cost. The results are shown in the table below and discussed in the costing report.

This table shows the sensitivity of the total cost of implementation to changes in each variable individually. (If there are two variables that make up 100% between them, they have been varied together to ensure the model remains realistic).

The sensitivity ratio allows comparison of the variables by analysing the percentage changes in the variables and outturn. The closer the ratio is to 1, the more sensitive the overall cost is to fluctuations in the variable.

	Baseline value	Minimum value	Maximum value	Recurrent costs			Change (£000's)	Sensitivity ratio
				Baseline costs (£000's)	Minimum costs (£000's)	Maximum costs (£000's)		
People of South Asian or Chinese descent aged 25-39 years								
Proportion that are assessed	85%	50%	95%	22,308	13,122	24,933	11,811	1.00
Number of people given an intensive lifestyle-change programme	51,268	40,000	60,000	22,308	20,666	23,581	2,915	0.33
Cost of an intensive lifestyle-change programme	330	100	500	22,308	18,536	25,098	6,562	0.24
Cost of a brief intervention	25.50	10	100	22,308	17,857	43,708	25,851	0.33
Uptake of intensive lifestyle-change programme	32%	27%	37%	22,308	21,463	23,155	1,692	0.24
Uptake of brief intervention	70%	60%	80%	22,308	21,262	23,355	2,093	0.33
Proportion offered HbA1c blood test (rather than FPG test)	75%	65%	85%	22,308	21,921	22,696	775	0.13
Uptake of subsequent blood tests	90%	85%	95%	22,308	22,195	22,423	228	0.09
People aged 40-74 years								
Proportion that are assessed	85%	50%	95%	147,475	86,750	164,825	78,075	1.00
Number of people given an intensive lifestyle-change programme	484,318	460,000	500,000	147,475	140,070	152,250	12,180	1.00
Cost of an intensive lifestyle-change programme	305	100	500	147,475	48,432	242,159	193,727	1.00
Uptake of intensive lifestyle-change programme	32%	27%	37%	147,475	124,432	170,518	46,086	1.00

Appendix C. References

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