NHS
National Institute for
Health and Clinical Excellence

Caesarean section (update)

Costing report

Implementing NICE guidance

November 2011

NICE clinical guideline 132

This costing report accompanies the clinical guideline: 'Caesarean section (partial update of NICE clinical guideline 13)' (available online at www.nice.org.uk/guidance/CG132).

Issue date: November 2011

This guidance 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 healthcare professionals. It should be read in conjunction with the NICE guideline. The report and templates are implementation tools and focus on those areas that were considered to have significant impact on national resource utilisation.

The cost and activity assessments in the reports 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

This costing report looks at the resource impact of implementing the NICE guideline 'Caesarean section (partial update of NICE clinical guideline 13)' in England.

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

Supporting implementation

The NICE clinical guideline on Caesarean section (update) is supported by a range of implementation tools available on our website http://www.nice.org.uk/guidance/CG132 and detailed in the main body of this report.

Significant resource-impact recommendations

Because of the breadth and complexity of the guideline, this report focuses on recommendations that are considered to have the greatest resource impact and therefore require the most additional resources to implement or can potentially generate savings. They are:

- If a colour-flow doppler ultrasound scan result suggests morbidly adherent placenta:
  - discuss with the woman the improved accuracy of magnetic resonance imaging (MRI) in addition to ultrasound to help diagnose morbidly adherent placenta and clarify the degree of invasion
  - explain what to expect during an MRI procedure
  - inform the woman that current experience suggests MRI is safe, but that there is a lack of evidence about any long-term risks to the baby
  - offer MRI if acceptable to the woman. **[1.2.6.2]**
- Do not offer a caesarean section (CS) on the grounds of HIV status to prevent mother-to-child transmission of HIV to:

- women on highly active anti-retroviral therapy (HAART) with a viral load of less than 400 copies per ml **or**
- women on any anti-retroviral therapy with a viral load of less than 50 copies per ml.

Inform women that in these circumstances the risk of HIV transmission is the same for a CS and a vaginal birth. **[1.2.8.2]**

- When a woman requests a CS because she has anxiety about childbirth, offer referral to a healthcare professional with expertise in providing perinatal mental health support to help her address her anxiety in a supportive manner. **[1.2.9.3]**

National resource impact

The annual changes in revenue costs arising from fully implementing the guideline nationally are summarised in the table below.

Area costed	**Cost impact for England (£000s)**
Reduction in caesarean sections in women with HIV	−754.7
Diagnosis and preparation costs relating to morbidly adherent placenta	39.7
Mental health support for women with anxiety about childbirth	1,053.0
Total national resource impact	**338.0**

Benefits and savings

Implementing the clinical guideline will bring the following benefits:

- enabling healthcare professionals to give appropriate research-based advice to women and their families, enabling women to make properly informed decisions
- improved psychological outcomes for women with anxiety about childbirth
- a reduction in the number of caesarean sections carried out unnecessarily for women with HIV
- more cost-effective spending on care following a suspected diagnosis of morbidly adherent placenta.

Local costing template

The costing template produced to support this guideline enables organisations in England, Wales and Northern Ireland to estimate the impact locally and replace variables with ones that depict the current local position. A sample calculation using this template showed that a cost of £1k could be incurred for a population of 100,000.

1 Introduction

1.1 Supporting implementation

1.1.1 The NICE clinical guideline on caesarean section (update) is supported by the following implementation tools available on our website www.nice.org.uk/guidance/CG132:

- costing tools
  - a national costing report; this document
  - a local costing template; a simple spreadsheet that can be used to estimate the local cost of implementation.
- a slide set; key messages for local discussion
- clinical case scenarios
- audit support.

1.1.2 A practical guide to implementation, 'How to put NICE guidance into practice: a guide to implementation for organisations' is also available to download from the NICE website. It includes advice on establishing organisational level implementation processes as well as detailed steps for people working to implement different types of guidance on the ground.

1.2 What is the aim of this report?

1.2.1 This report provides estimates of the national cost impact arising from implementing guidance on caesarean section in England. These estimates are based on assumptions about current practice and predictions of how current practice might change following implementation.

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

1.2.3 This report does not reproduce the NICE guideline on caesarean section and should be read in conjunction with it (see www.nice.org.uk/guidance/CG132).

1.2.4 NICE clinical guideline CG132 updates NICE clinical guideline 13; this report assumes the cost impact of the earlier guideline has already been incurred.

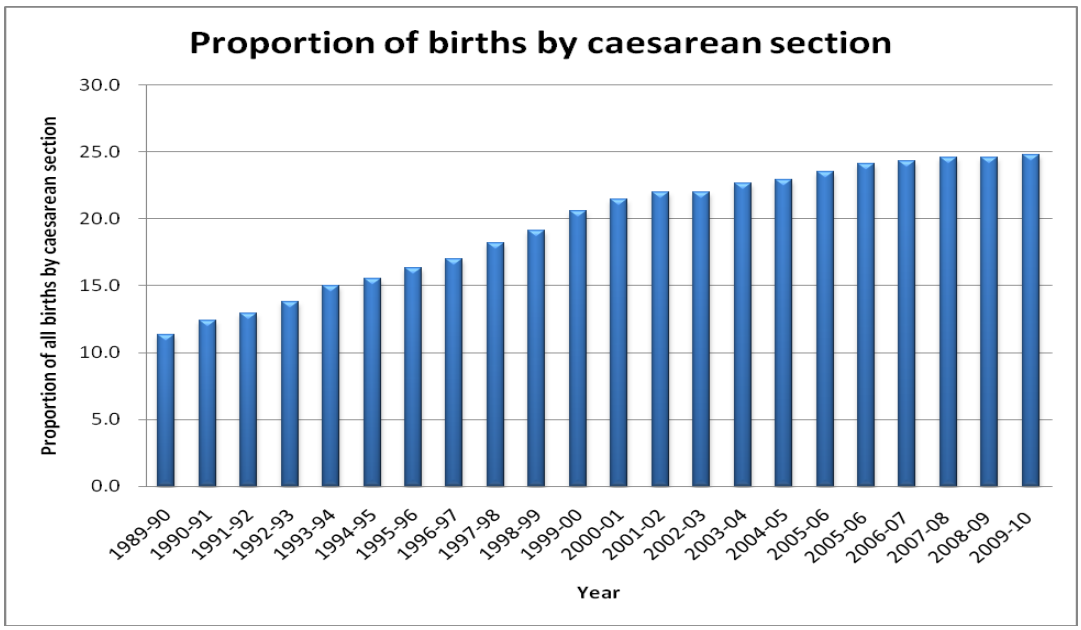
1.2.5 The costing template that accompanies this report is designed to help those assessing the resource impact at a local level in England, Wales or Northern Ireland. The costing template may help inform local action plans demonstrating how implementation of the guideline will be achieved.

1.3 Epidemiology of caesarean section

1.3.1 Between 20–25% of births in the UK are carried out by caesarean section. In 2009/10, 24.8% of births in England were carried out by caesarean section[1]. There are a number of different indications for the procedure, and there is local variation in caesarean section rates. See section 2.3.4 of this report for more information about the variation in rates across England.

1.3.2 The graph below shows the annual proportion of births carried out by caesarean section in NHS hospitals in England since 1989–90 [2]. From this graph it is clear that there has been a large increase in the proportion of births by caesarean section in the last 20 years, and that this increase has 'tailed off' in the last 4 to 5 years.

[1] From NHS Maternity Statistics 2009/10, The NHS Information Centre, 2010: http://www.hesonline.nhs.uk/Ease/servlet/ContentServer?siteID=1937&categoryID=1475
[2] Also based on NHS Maternity Statistics 2009/10, as above.



1.3.3 Similar increases in caesarean section rates have been seen in all developed countries, though the absolute rates vary. Rates are about 14% in the Nordic countries and over 40% in Italy[3]. The reverse is seen in developing countries, where caesarean section rates are generally less than 5% (Buekens et al. 2003). There are a number of possible reasons for the increased rates in developed countries including changes in socio-demographic factors, differences in clinical practice, and the attitudes of healthcare professionals and women to the procedure. Many of the factors contributing to caesarean section rates are often poorly understood.

1.3.4 The NICE guideline has not sought to define acceptable caesarean section rates. Rather the purpose of the guideline is to enable healthcare professionals to give appropriate research-based advice to women and their families. This will enable women to make properly informed decisions.

1.3.5 The NICE guideline has been developed to help ensure consistent quality care for women who:

[3] Statistics taken from the full guideline, available from www.nice.org.uk/CG132

- have had a caesarean section in the past and are now pregnant again or
- have a clinical indication for a caesarean section or
- are considering a caesarean section when there is no other indication.

It provides evidence-based information for healthcare professionals and women about:

- the risks and benefits of both planned and unplanned caesarean section
- specific indications for caesarean section
- effective management strategies to avoid caesarean section
- anaesthetic and surgical aspects of care
- interventions to reduce morbidity from caesarean section
- organisational and environmental factors that affect caesarean section rates.

1.4 Models of care

1.4.1 Maternity services are generally provided in a secondary care setting, therefore it is organisations such as NHS trusts that will experience the greatest impact from implementation of this guideline.

1.4.2 The guideline covers a range of factors and issues that affect caesarean section rates. Areas that will have a resource impact are outlined in the following sections.

1.4.3 Implementing recommendations about imaging (colour-flow ultrasound and MRI) to diagnose morbidly adherent placenta in women with a low-lying placenta who have had a previous caesarean section could lead to an increase in imaging carried out in secondary care (and in specialist tertiary care in localities where such imaging is referred to specialist centres).

1.4.4 The recommendations about when to offer planned caesarean section to reduce the risk of mother-to-child transmission of HIV are likely to lead to a decrease in the number of caesarean sections carried out. Current guidance is that caesarean section is offered to all women with HIV, but this guideline update recommends that caesarean section is offered solely to prevent HIV transmission only for some of these women, depending on their viral load and current drug treatment.

1.4.5 The care of women who request a caesarean section, including the provision of mental health support for women with anxiety about childbirth, is likely to lead to a resource impact for many NHS organisations. The overall impact on the number of maternal requests for caesarean section is not expected to be substantial, although the provision of mental health support to women with anxiety about childbirth is not currently routine. This recommendation is therefore likely to lead to a resource impact for the NHS.

2 Costing methodology

2.1 Process

2.1.1 We use a structured approach for costing clinical guidelines (see appendix A).

2.1.2 Although information has been systematically collected about caesarean section some details could not be obtained, and this has led to problems in building a comprehensive bottom-up model for costing (a costing methodology where the unit cost of individual elements and number of units are estimated and added together to provide a total cost). In these cases, we had to make assumptions in the costing model. We developed these assumptions and tested them for reasonableness with members of the Guideline

Development Group (GDG) and key clinical practitioners in the NHS.

2.2 Scope of the cost-impact analysis

2.2.1 The guideline offers best practice advice regarding caesarean section.

2.2.2 The guidance does not cover pregnant women or babies with rare conditions or with complex or unusual comorbidities, such as maternal congenital heart disease, who require specialist care. Therefore, these issues are outside the scope of the costing work.

2.2.3 Because of the breadth and complexity of the guideline, we worked with the GDG and other professionals to identify the recommendations that would have the most significant resource impact (see table 1). Costing work has focused on these recommendations.

Table 1 Recommendations with a significant resource impact

High-cost recommendations	Recommendation number	Key priority?
If low-lying placenta is confirmed at 32–34 weeks in women who have had a previous CS, offer colour-flow doppler ultrasound as the first diagnostic test for morbidly adherent placenta. **[new 2011]**	1.2.6.1	
If a colour-flow doppler ultrasound scan result suggests morbidly adherent placenta: • discuss with the woman the improved accuracy of magnetic resonance imaging (MRI) in addition to ultrasound to help diagnose morbidly adherent placenta and clarify the degree of invasion • explain what to expect during an MRI procedure • inform the woman that current experience suggests that MRI is safe, but that there is a lack of evidence about any long-term risks to the baby • offer MRI if acceptable to the woman. **[new 2011]**	1.2.6.2	✓
Do not offer a CS on the grounds of HIV status to prevent mother-to-child transmission of HIV to: • women on highly active anti-retroviral therapy (HAART) with a viral load of less than 400 copies per ml **or** • women on any anti-retroviral therapy with a viral load of less than 50 copies per ml. Inform women that in these circumstances the risk of HIV transmission is the same for a CS and a vaginal birth. **[new 2011]**	1.2.8.2	✓
When a woman requests a CS because she has anxiety about childbirth, offer referral to a healthcare professional with expertise in providing perinatal mental health support to help her address her anxiety in a supportive manner. **[new 2011]**	1.2.9.3	✓

2.2.4 Eleven of the recommendations in the guideline have been identified as key priorities for implementation, and three of these are also among the four recommendations considered to have significant resource impact. One of the remaining eight key

priorities for implementation (1.4.6.20) is from the original guideline, but has been amended to remove references to specific antibiotics including first-generation cephalosporins, which are no longer routinely available on the NHS. Therefore any costing issues arising are assumed to have already been dealt with.

2.2.5 Table 2 below outlines the reasons that the remaining seven key priorities for implementation are not considered to have a significant resource impact.

Table 2 Key priorities for implementation not considered to have a significant resource impact

Key priorities for implementation not considered to have significant resource impact	Comment
Maternal request for CS: For women requesting a CS, if after discussion and offer of support (including perinatal mental health support for women with anxiety about childbirth), a vaginal birth is still not an acceptable option, offer a planned CS. **[new 2011] [1.2.9.5]** An obstetrician unwilling to perform a CS should refer the woman to an obstetrician who will carry out the CS. **[new 2011] [1.2.9.6]**	Expert clinical opinion suggests that the overall number of caesarean sections is not expected to alter significantly because of a change in practice regarding maternal request. Any changes are also likely to vary widely around the country (see section 3.4).
Decision-to-delivery interval for unplanned CS: Use the following decision-to-delivery intervals to measure the overall performance of an obstetric unit: − 30 minutes for category 1 CS[4] − both 30 and 75 minutes for category 2 CS. Use these as audit standards only and not to judge multidisciplinary team performance for any individual CS. **[new 2011] [1.4.3.4]**	These recommendations are about the timing of the decision-to-delivery interval, rather than changing overall resource use. Therefore no significant resource impact is expected.
Timing of antibiotic administration: Offer women prophylactic antibiotics at CS before skin incision. Inform them that this reduces the risk of maternal infection more than prophylactic antibiotics given after skin incision, and that no effect on the baby has been demonstrated. **[new 2011] [1.4.6.19]** Do not use co-amoxiclav when giving antibiotics before skin incision. **[new 2011] [1.4.6.21]**	These recommendations are about the timing of antibiotic administration, rather than the number of women who receive antibiotics. Therefore no significant resource impact is expected.
Recovery following CS: While women are in hospital after having a CS, give them the opportunity to discuss with healthcare professionals the reasons for the CS and provide both verbal and printed information about birth options for any future pregnancies. If the woman prefers, provide this at a later date. **[new 2011] [1.7.1.9]**	Offering verbal and printed information to women in hospital who are recovering from a caesarean section is unlikely to represent a large investment of resources, and the impact on future caesarean section is not possible to quantify.
Pregnancy and childbirth after CS Inform women who have had up to and including four CS that the risk of fever, bladder injuries and surgical injuries does not vary with	Expert clinical opinion suggests that the overall number of caesarean sections is not expected to alter significantly

[4] Category 1 CS is when there is immediate threat to the life of the woman or fetus, and category 2 CS is when there is maternal or fetal compromise which is not immediately life-threatening.

planned mode of birth and that the risk of uterine rupture, although higher for planned vaginal birth, is rare. **[new 2011] [1.8.2]**	because of a change in practice regarding pregnancy and childbirth after CS. Any changes are difficult to quantify with certainty and are likely to vary widely around the country (see section 3.4).

2.2.6 We have limited the consideration of costs and savings to direct costs to the NHS that will arise from implementation. We have not included consequences for the woman, the private sector or the not-for-profit sector. Where applicable, any realisable cost savings arising from a change in practice have been offset against the cost of implementing the change.

2.3 General assumptions made

2.3.1 The total number of births in England in 2009/10 was 652,377. Of these, 10% (65,238) are planned caesarean sections, 14.8% (96,552) are unplanned/other caesarean sections, and 75.2% (490,588) are vaginal births[5].

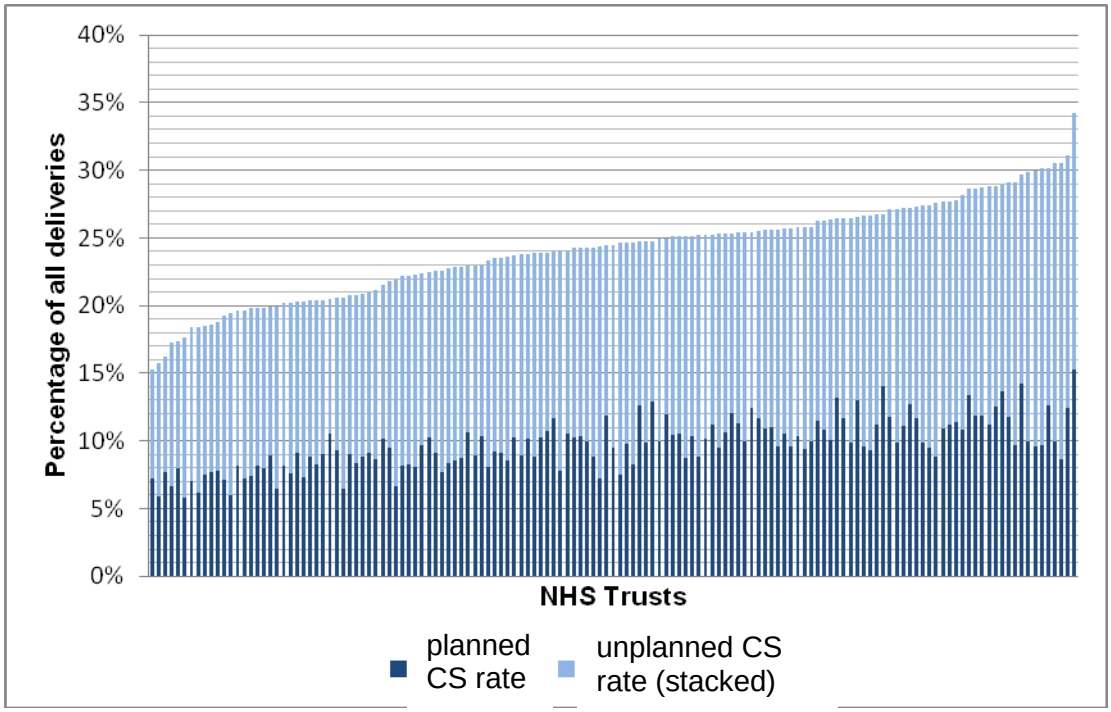
2.3.2 Caesarean section because of maternal request does not have an International Classification of Diseases (ICD-10) code[6], meaning that accurate data on the number of such caesarean sections for this reason is not available.

2.3.3 Expert opinion was that implementation of the recommendations about maternal request for caesarean section and vaginal birth following a previous caesarean section would not result in a significant change in the number of planned caesarean sections carried out nationally. Caesarean section rates vary widely throughout the country, and the potential impact on caesarean

[5] From NHS Maternity Statistics 2009/10, The NHS Information Centre, 2010: http://www.hesonline.nhs.uk/Ease/servlet/ContentServer?siteID=1937&categoryID=1475
[6] See World Health Organisation website on ICD-10: http://www.who.int/classifications/icd/en/

section rates should be investigated locally (see section 3.4 for more details).

2.3.4 The graph below[7] shows the proportion of all caesarean sections that are planned, or are unplanned, to indicate the variation around the country. Overall rates of caesarean section vary from approximately 15% to 34%, and rates of planned caesarean section vary from 6% to 15% of all births.



2.4 Basis of unit costs

2.4.1 The way the NHS is funded has undergone reform with the introduction of 'payment by results' based on a national tariff. The national tariff will be applied to all activity for which healthcare resource groups (HRGs) or other appropriate case-mix measures are available. If a national tariff price or indicative price exists for an activity this has been used as the unit cost where possible.

[7] Based on NHS Maternity Statistics 2009/10, The NHS Information Centre, 2010: http://www.hesonline.nhs.uk/Ease/servlet/ContentServer?siteID=1937&categoryID=1475 Trusts with patient identifiable levels of data are excluded.

2.4.2 Using these prices ensures that the costs in the report are the cost to the primary care trust (PCT) of commissioning predicted changes in activity at the tariff price, but may not represent the actual cost to individual trusts of delivering the activity.

2.4.3 The costs of planned caesarean section and vaginal birth are based on NHS reference costs 2009/10. These figures are calculated as weighted average costs for the range of relevant reference cost codes, using the activity data collected alongside reference costs. This is as described in the health economics data included in the full guideline[8]. These costs include the costs relating to actual mode of delivery varying from planned mode of delivery. Reference costs have been used in place of national tariff figures because of the detailed availability of activity as well as cost information across a range of cost codes to give the most accurate weighted average cost possible.

2.4.4 There is no tariff for caesarean section on maternal request. The unit cost for these is assumed to be as for planned caesarean section.

2.4.5 Adverse events costs relating to planned caesarean section and vaginal birth are also based on the health economics calculations in the full guideline.[8]

2.4.6 Table 3 below summarises the unit costs of planned caesarean section and vaginal birth used in the costing template.

[8] Available from www.nice.org.uk/CG132

Table 3 Unit cost summary

Delivery type	Average unit cost (£)	Average adverse events cost (£)
Planned caesarean section	2369	299
Planned vaginal birth	1665	212

3 Cost of significant resource-impact recommendations

3.1 Diagnostic imaging and morbidly adherent placenta

Background

3.1.1 After one previous caesarean section women have a 0.6–1.3% risk of developing placenta praevia in a subsequent pregnancy and of these, between 11 and 14% will have a morbidly adherent placenta. With two previous caesarean sections, there is a 1.1–2.3% risk of placenta praevia in a subsequent pregnancy and of these, between 23 and 40% will have a morbidly adherent placenta (Guise et al. 2010). With three or more previous caesarean sections, there is a 1.8–3.7% risk of placenta praevia in a subsequent pregnancy and of these, between 35 and 67% will have a morbidly adherent placenta (Guise et al. 2010).

3.1.2 Against this backdrop of incremental risk, caesarean section has become an increasingly common mode of delivery in the UK, both as a primary and as a repeat procedure. Therefore, clinicians can expect to see a gradual increase in the number of women presenting with a morbidly adherent placenta.

3.1.3 Morbidly adherent placenta is associated with serious maternal morbidity including major obstetric haemorrhage, transfusion of large quantities of blood, hysterectomy and admission to an intensive care unit. However, maternal death from heavy blood loss

caused by morbidly adherent placenta is now rare in the UK (Cantwell R et al. 2011). It is hoped that improved prenatal diagnosis has contributed to this.

3.1.4 Recommendations 1.2.6.1 and 1.2.6.2 state the following respectively:

- If low-lying placenta is confirmed at 32–34 weeks in women who have had a previous CS, offer colour-flow doppler ultrasound as the first diagnostic test for morbidly adherent placenta. **[new 2011]**
- If a colour-flow doppler ultrasound scan result suggests morbidly adherent placenta:
  - discuss with the woman the improved accuracy of magnetic resonance imaging (MRI) in addition to ultrasound to help diagnose morbidly adherent placenta and clarify the degree of invasion
  - explain what to expect during an MRI procedure
  - inform the woman that current experience suggests that MRI is safe, but that there is a lack of evidence about any long-term risks to the baby
  - offer MRI if acceptable to the woman. **[new 2011]**

Assumptions made

3.1.5 It is assumed that 50% (326,189) of all births are not the first delivery for the mother, and 22% (71,761) of women who have given birth before have had a caesarean section (Bragg et al. 2010).

3.1.6 The prevalence of low-lying placenta among women who have had a previous caesarean section is assumed to be approximately 2.4% (1722). This is based on the data from Silver et al. 2006, where 723 of 30,132 women who had a caesarean section before had low-lying placenta in a subsequent pregnancy.

3.1.7 The proportions of women with low-lying placenta who have had a previous caesarean section and are currently offered a colour-flow doppler ultrasound (75%, that is 1291) and a subsequent MRI scan following a positive result (50%, that is 861) are based on clinical expert opinion. No source of these data was identified during production of the costing template.

3.1.8 The proportion of women with a low-lying placenta who have had a previous caesarean section and who are diagnosed with morbidly adherent placenta is assumed to be approximately 20% (341). This is based on data from Silver et al. 2006, in which 723 women were diagnosed with placenta praevia, and 143 of these women were diagnosed with placenta accreta.

3.1.9 The unit cost of the additional preparations required at caesarean section in women suspected to have morbidly adherent placenta is assumed to be £800. This is based on 2 hours of consultant anaesthetist's time (at £166 per hour), and £468 for 4 units of blood and matching costs, as described in the health economics in the full guideline[9].

3.1.10 Good quality data about the number and type of significant adverse events occurring in women with a morbidly adherent placenta were not identified during production of the costing template.

3.1.11 The unit cost of adverse events for women with morbidly adherent placenta is also not clear. The GDG considered evidence about a range of adverse events, but was unable to say definitively how much a diagnosis of morbidly adherent placenta leads to improved outcomes, because of a lack of quality evidence.

3.1.12 It is therefore difficult to form a national cost model for these adverse events, and users of the costing template are encouraged

[9] Available from www.nice.org.uk/CG132

to investigate local protocols when calculating a local cost impact of implementing the recommendations.

3.1.13 The sensitivity and specificity of colour-flow Doppler ultrasound scans and MRI scans are assumed to be 98% and 68%, and 100% and 100% respectively. This is based on assumptions used in the health economics in the full guideline. It is assumed that a saving will be made because of a reduction in false positive diagnoses of morbidly adherent placenta, leading to a reduction in the costs of unnecessary preparation of blood and anaesthetist's time. The number of women for whom this additional preparation is required is assumed to fall from 378 to 314 per year in England, because of more accurate diagnosis.

3.1.14 The unit costs of imaging for diagnosis of morbidly adherent placenta are from the NHS national tariff 2011/12, non-mandatory prices. These are summarised in table 4, below.

Table 4 Unit cost summary for diagnostic imaging

Scan	Unit cost (£)	Source details
MRI	185	HRG codes RA01Z, 'Magnetic resonance imaging scan, one area, no contrast' NHS National Tariff 2011/12, non-mandatory tariff.
Colour-flow doppler ultrasound	49	HRG codes RA23Z, 'Ultrasound scan less than 20 minutes' NHS National Tariff 2011/12, non-mandatory tariff.

Cost summary

3.1.15 The net cost of diagnostic imaging and the additional preparations required at caesarean section for women with morbidly adherent placenta is summarised in table 5.

Table 5 National net cost of diagnostic imaging and preparations for morbidly adherent placenta

	Current cost (£000s)	Predicted cost (£000s)	Change in cost (£000s)
Ultrasound scans	63.3	84.4	21.1
MRI scans	69.9	139.8	69.9
Additional preparations	302.2	250.9	−51.3
Net cost/saving (−)			**39.7**

Other considerations

3.1.16 The views of the experts involved in the production of this report and the associated costing template was that this issue was of a high importance. This is why it is costed here and in the costing template despite not expecting to carry a significant cost to implement.

3.2 Planned method of delivery in HIV-positive women

Background

3.2.1 The current NICE guideline for antenatal care (NICE clinical guideline 62) recommends that screening for HIV should be offered to all pregnant women in the UK because various interventions can decrease mother-to-child transmission of the virus. The previous version of the caesarean section guideline recommended that 'HIV-positive women who are pregnant should be offered a planned caesarean section because it reduces the risk of mother-to-child transmission of HIV'. However, since publication of the original guideline there has been a growing body of evidence suggesting that for some women taking anti-retroviral therapy (ART) or highly active anti-retroviral therapy (HAART), the risk of mother-to-child transmission is comparable with vaginal birth, even in the presence of a detectable viral load.

3.2.2 Recommendation 1.2.8.2 states:

- Do not offer a CS on the grounds of HIV status to prevent mother-to-child transmission of HIV to:
  - women on highly active anti-retroviral therapy (HAART) with a viral load of less than 400 copies per ml **or**
  - women on any anti-retroviral therapy with a viral load of less than 50 copies per ml.

Inform women that in these circumstances the risk of HIV transmission is the same for a CS and a vaginal birth. **[new 2011]**

Assumptions made

3.2.3 Of all women giving birth in England, 1 in 449 (0.22%, 1453) are assumed to be HIV-positive, and at least 88% (1279) of these women are diagnosed[10]. Data from the Health Protection Agency on the HIV status of women giving birth shows wide variation in the prevalence of HIV in pregnant women. The prevalence is estimated as 0.39% in London, where there is a larger proportion of women from sub-Saharan Africa.

3.2.4 It is assumed that the number of diagnosed HIV-positive women having a planned birth by caesarean section will reduce by 75% nationally on implementation of the guideline, from approximately 1279 to 320. Current levels of caesarean section for women diagnosed with HIV are assumed to be approximately 100%, in line with previous NICE guidance.

3.2.5 For planned vaginal births, it is assumed that 85% of women will go on to have a vaginal birth, and 15% will require an unplanned caesarean section. This assumption is taken from the health economics in the full guideline[11], and is included in the weighted average unit costs used for planned vaginal births.

[10] Health Protection Agency, see http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/HIVAndSTIs/PreventionGroups/PregnantWomen/

[11] Available from www.nice.org.uk/CG132

Cost summary

3.2.6 The net cost of planned method of delivery in HIV-positive women is summarised in table 6.

Table 6 National net cost of planned method of delivery in HIV-positive women

	Current cost (£000s)	Predicted cost (£000s)	Change in cost (£000s)
Planned caesarean section	3406.2	851.5	−2554.7
Planned vaginal birth	0	1800.0	1800.0
Net cost/saving (−)			**−754.7**

3.3 Mental health support for women with anxiety about childbirth

Background

3.3.1 Recommendation 1.2.9.3 states:

- When a woman requests a CS because she has anxiety about childbirth, offer referral to a healthcare professional with expertise in providing perinatal mental health support to help her address her anxiety in a supportive manner. **[new 2011]**

Assumptions made

3.3.2 The number of caesarean sections carried out due to maternal request only is approximately 7% of all caesareans performed, and approximately half of such requests are approved[12]. On this basis, the number of women assumed to have an anxiety of childbirth causing them to request a caesarean section is assumed to be approximately equal to 14% (22,651) of the total number of caesarean sections carried out each year. This equates to approximately 3.5% of all pregnancies.

[12] From the Royal College of Obstetricians and Gynaecologists (RCOG) National Sentinel Audit, see: http://www.rcog.org.uk/news/national-sentinel-caesarean-section-audit-published

3.3.3 The proportion of pregnant women who experience anxiety about childbirth who are currently offered mental health support is based on expert clinical opinion. Estimations of women offered appropriate support ranged from 0–5%, and a mid-point of 2.5% (566) is assumed. It is also assumed that this support will be offered to all of these women in the future as recommended in the guideline. Of women offered mental health support, 50% are assumed to accept it (283 currently, rising to 11,325 following implementation of the guideline).

3.3.4 Costs for providing mental health support to women with anxiety about childbirth are based on the assumption (from a range of clinical opinions) that 92% of women with anxiety about childbirth have low-level anxiety and will receive one or two hour-long sessions with a midwife, costing £52 per hour[13] (1.5 hours assumed). It is assumed that the remaining 8% will have higher-level anxiety and will receive one hour-long session with a midwife, and a further three hour-long sessions with a clinical psychologist, costing £81 per hour[14] .

Cost summary

3.3.5 The cost of offering mental health support to women with anxiety about childbirth is summarised in table 7.

[13] From Unit Costs of Health and Social Care 2010, Personal and Social Services Research Unit (PSSRU). Cost of 1 hour of patient contact with a nurse, 24-hour ward (includes staff nurse, registered nurse, registered practitioner).
[14] From Unit Costs of Health and Social Care 2010, PSSRU. Cost of 1 hour of patient contact with a clinical psychologist.

Table 7 National cost of offering mental health support to women with anxiety about childbirth

	Current cost (£000s)	Predicted cost (£000s)	Change in cost (£000s)
Cost of offering mental health support to women with anxiety about childbirth	27.0	1080.0	1053.0

Other considerations

3.3.6 The number of women receiving mental health support is expected to increase from 283 per year currently, to 11,325 following implementation of the guideline. Local commissioners should investigate local capacity to offer relevant mental health support, and model any expected costs of additional training of staff, or extra facilities required.

3.3.7 After mental health support for women with anxiety about childbirth, it is possible that more women will plan a vaginal birth. Clinical expert opinion suggested that this decrease in caesarean section was unlikely to be significant on a national level. Users of the costing template are encouraged to amend the assumptions about the proportion of caesarean sections performed, if appropriate for their locality.

3.4 Maternal request and vaginal birth after previous caesarean section

Background

3.4.1 The guideline contains a number of recommendations which could have an effect on the number of caesarean sections carried out in individual NHS trusts.

3.4.2 The guideline has not sought to define acceptable caesarean section rates. Rather the purpose of the guideline is to enable healthcare professionals to give appropriate research-based advice

to women and their families. This will enable women to make properly informed decisions.

3.4.3 The two distinct issues of maternal request and vaginal birth after caesarean section are grouped here because of the expected nature of their resource and activity impact upon implementation of the recommendations, as outlined below.

Assumptions made

3.4.4 The view of clinical experts was that the net national effect of the recommendations in the guideline about maternal request and vaginal birth after caesarean section (VBAC) is not likely to be a significant increase or decrease in the proportion of births by caesarean section.

3.4.5 The recommendations about pregnancy and childbirth after caesarean section (1.8.1–1.8.5) could potentially lead to a small increase in the number of vaginal births. This effect is expected to be small because it only relates to a small subset of births, and the number of women who prefer, or for whom a vaginal delivery is suitable, after a previous caesarean section is expected to be small.

Cost summary

3.4.6 The effect on the number of caesarean sections from implementing recommendations on maternal request and VBAC is assumed to be negligible on a national level in the costing template. As seen in section 2.3, the proportions of all births by caesarean section vary widely from trust to trust. The numbers of planned and unplanned caesarean sections carried out at a local level are estimated in the costing template, and users are advised to amend the future rates of caesarean section if a net change is expected in their area, to make the calculated cost impact applicable to local circumstances.

Other considerations

3.4.7 Any assumed increase in the number of planned vaginal births could also potentially lead to an increase in the number of unplanned caesarean sections carried out. Therefore if an increase in the number of planned vaginal births is expected, an increase in the number of unplanned caesarean sections should also be anticipated.

3.4.8 The health economics in the guideline suggests that approximately 15% of births planned as vaginal births actually require an unplanned caesarean section. This will have the effect of dampening any expected decrease in the number of caesarean sections planned, and therefore any expected cost savings. This effect is taken into account in the costing template where a reduction in planned caesarean sections is expected for women who are HIV positive (see section 3.2.5).

3.5 Benefits and savings

3.5.1 The overriding purpose of the guideline is to enable healthcare professionals to give appropriate research-based advice to women and their families. Many of the recommendations are about providing information and support to women, and taking into account women's needs and preferences. This should enable pregnant women to make informed decisions about their care and treatment.

3.5.2 More effective and regular diagnostic imaging for morbidly adherent placenta could lead to a reduction in adverse events such as hysterectomy and admission to intensive care.

3.5.3 An investment in more effective and regular diagnostic imaging for morbidly adherent placenta could be partially offset by savings in costs of units of blood and anaesthetist time associated with false positive diagnoses.

3.5.4 Improved provision of mental health support could lead to improved psychological outcomes for women with anxiety about childbirth, and a potential reduction in caesarean section rates for such women.

3.5.5 Current guidance is for women with HIV to have a caesarean section. Implementing this updated guideline is expected to lead to the elimination of unnecessary caesarean sections for women with HIV.

4 Sensitivity analysis

4.1 Methodology

4.1.1 There are a number of assumptions in the model for which no empirical evidence exists. Because of the limited data, the model developed is based mainly on discussions of typical values and predictions of how things might change as a result of implementing the guidance and is therefore subject to a degree of uncertainty.

4.1.2 As part of discussions with practitioners, we discussed possible minimum and maximum values of variables, and calculated their impact on costs across this range.

4.1.3 It is not possible to arrive at an overall range for total cost because the minimum or maximum of individual lines 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.

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 results from the sensitivity analysis show that of the 5 most sensitive parameters, 3 relate to the costing of mental health

support for women experiencing anxiety regarding childbirth. The other 2 parameters are the units costs of each planned delivery mode, i.e. planned caesarean section, and planned vaginal birth. These parameters are laid out in table 8 below in order of sensitivity, with a brief discussion of the potential reasons for the sensitivity.

Table 8 Most sensitive parameters

Parameter	Reasons for sensitivity
Number of hours contact with a midwife for women with a low-level anxiety	The standard assumption for this parameter is based on clinical expert opinion, which ranged from 1 to 2 hours, covering a 100% variation. Also, this group of women represents the largest group of women accepting support, and so any variation in costs is likely to have a larger impact on total costs than other parameters.
Unit cost of planned caesarean section	The standard assumptions in the template give a reduction in the number of caesarean sections carried out HIV positive women from 1279 to 320. The relatively high magnitude of these unit costs creates a larger impact on total deliveries costs for HIV positive women where these key unit costs are varied compared to other variables.
Unit cost of planned vaginal birth	
Number of hours contact with a clinical psychologist for women with a high-level anxiety	The standard assumption for this parameter is based on clinical expert opinion, which ranged from 3 to 5 hours, a 66% variation. Since an hour of a clinical psychologist's time is more costly than time with a midwife (£81 compared with £52), a variation in the number of women makes the overall costs expected sensitive to the number of women requiring clinical psychologist support.
% of all women requesting a caesarean section due to anxiety relating to childbirth	Since mental health support for women with an anxiety of childbirth and requesting a caesarean section is not currently widely offered, most of the costs relating to this service are incremental, and so the overall cost is sensitive to the number of women who are expected to receive mental health support.

5 Impact of guidance for commissioners

5.1.1 The cost of deliveries is covered by the payment by results tariff. Commissioners should monitor rates of caesarean section with local trusts to plan the impact on relevant budgets.

5.1.2 Costs are likely to fall in programme budgeting category 218X Maternity and reproductive health.

6 Conclusion

6.1 Total national cost for England

6.1.1 Using the significant resource-impact recommendations shown in table 1 and assumptions specified in section 3 we have estimated the annual cost impact of fully implementing the guideline in England to be £0.5m. Table 9 shows the breakdown of cost of each significant resource-impact recommendation area.

Table 9 Total cost summary

Area costed	**Cost impact for England (£000s)**
Reduction in caesarean sections in women with HIV	−754.7
Diagnosis and preparation costs relating to morbidly adherent placenta	39.7
Mental health support for women with anxiety about childbirth	1,053.0
Total national resource impact	**338.0**

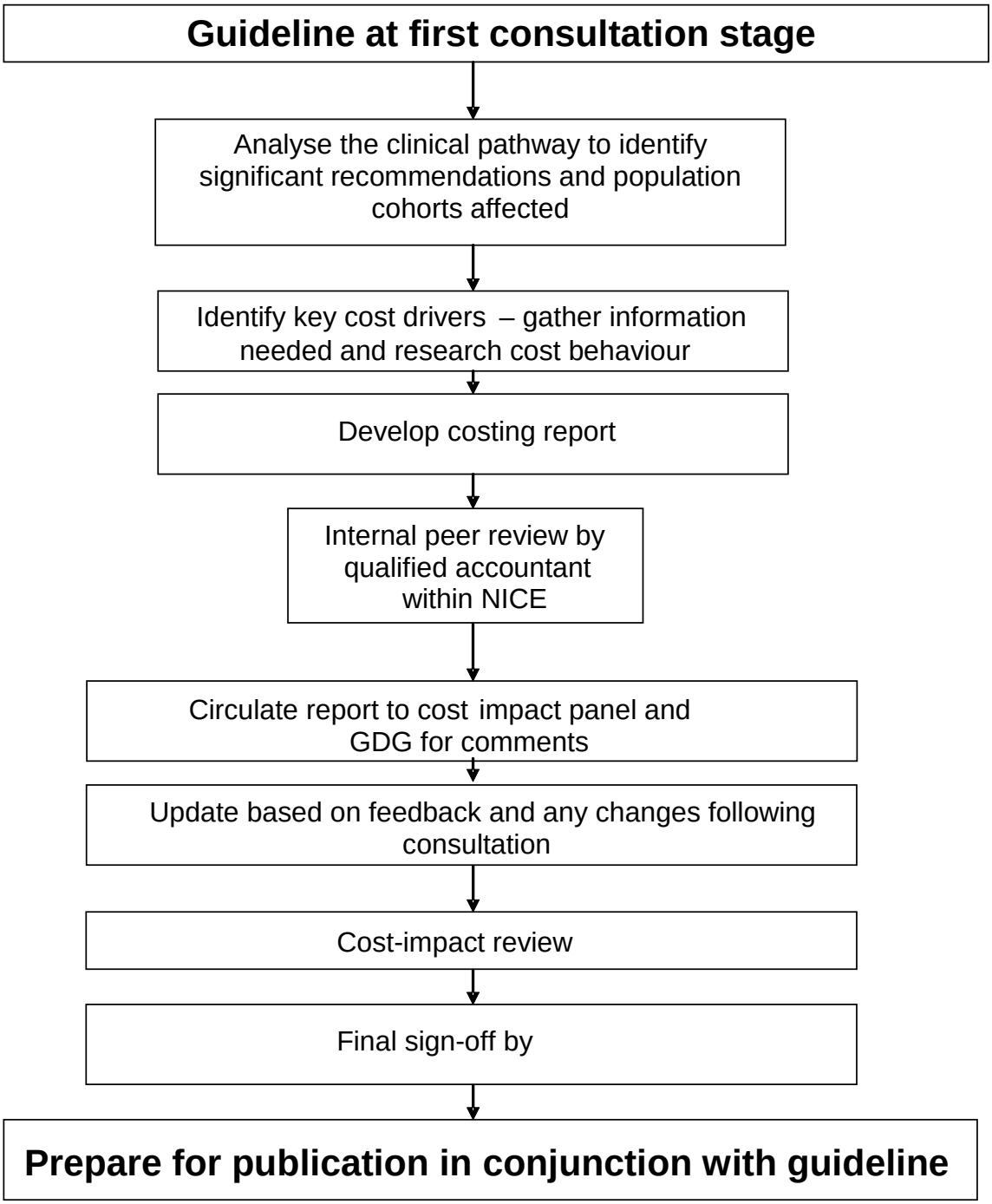
6.1.2 We applied reality tests against existing data wherever possible, but this was limited by the availability of detailed data. We consider this assessment to be reasonable, given the limited detailed data regarding diagnosis and treatment paths and the time available. However, the costs presented are estimates and should not be taken as the full cost of implementing the guideline.

6.2 Next steps

6.2.1 The local costing template produced to support this guideline enables organisations such as primary care trusts (PCTs) or health boards in Wales and Northern Ireland to estimate the impact locally and replace variables with ones that depict the current local position. A sample calculation using this template showed that a population of 100,000 could expect to incur an additional cost of

around £1k. Use this template to calculate the costs and savings of implementing this guidance in your area.

Appendix A. Approach to costing guidelines



Appendix B. Results of sensitivity analysis

Parameter varied	Baseline value	Minimum value	Maximum value	Baseline costs (£000s)	Minimum costs (£000s)	Maximum costs (£000s)	Change (£000s)
HIV-positive women							
HIV-positive women giving birth	0.22%	0.20%	0.24%	338.0	262.5	413.4	75
Current proportion of women known to be HIV positive having a planned caesarean section	100%	90%	100%	338.0	390.8	338.0	53
Reduction in planned caesarean sections carried out in HIV-positive women	75%	68%	83%	338.0	262.5	413.4	75
Morbidly adherent placenta							
Deliveries that are not first deliveries	50%	45%	55%	338.0	334.0	341.9	4
Of these, number of women with a previous caesarean section	22%	20%	24%	338.0	334.0	341.9	4
Women with morbidly adherent placenta with low-lying placenta and previous caesarean section	20%	18%	22%	338.0	319.2	359.8	22
Current proportion of women with low-lying placenta given a colour-flow Doppler ultrasound scan	75%	68%	83%	338.0	331.6	344.3	6
Future proportion of women with low-lying placenta given a colour-flow Doppler ultrasound scan	100%	90%	100%	338.0	329.5	338.0	8
Cost of colour-flow Doppler ultrasound scans	£49	£44	£54	338.0	335.9	340.1	2
Current proportion of women with low-lying placenta given a magnetic resonance imaging (MRI) scan following a positive ultrasound result	50%	45%	55%	338.0	300.8	375.2	37
Future proportion of women with low-lying placenta given a magnetic resonance imaging (MRI) scan following a positive ultrasound result	100%	90%	100%	338.0	324.0	351.9	14
Cost of MRI scans	£185	£167	£204	338.0	331.0	345.0	7
Cost of preparations following a positive diagnosis	£800	£720	£880	338.0	332.8	343.1	5

Mental health support							
Proportion of women requesting a caesarean section because of anxiety about childbirth	3.5%	3.1%	3.8%	338.0	232.7	443.3	105
Current number of these women offered mental health support	2.5%	0.0%	5.0%	338.0	311.0	365.0	27
Future number of these women offered mental health support	100%	90%	100%	338.0	230.0	338.0	108
Women who would accept mental health support	50%	45%	55%	338.0	232.7	443.3	105
Of these: Women with low-level anxiety about childbirth	92%	83%	100%	338.0	314.0	361.9	24
Women with high-level anxiety about childbirth	8%	7%	9%	338.0	314.0	361.9	24
Hourly cost of woman's contact with midwives for the provision of mental health support	£52	£47	£57	338.0	254.1	421.8	84
Hourly cost of woman's contact with clinical psychologists for the provision of mental health support	£81	£73	£89	338.0	316.5	359.4	21
Number of hours contact with a midwife for mental health support for women with low-level anxiety about childbirth	1.5	1.0	2.0	338.0	73.8	602.1	264
Number of hours contact with a clinical psychologist for mental health support for women with high-level anxiety about childbirth	3.0	2.7	5.0	338.0	316.5	481.1	143
Delivery unit costs by planned mode of delivery							
Caesarean section	£2,365	£2,129	£2,602	338.0	110.7	564.3	227
Vaginal	£1,665	£1,499	£1,832	338.0	178.8	498.1	160
Average adverse outcomes cost by planned mode of delivery:							
Caesarean section	£212	£191	£233	338.0	309.2	366.7	29
Vaginal	£298	£268	£328	338.0	317.8	358.1	20

Appendix C. References

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