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# Birthplace cost-effectiveness analysis of planned place of birth: individual level analysis Birthplace in England research programme: final report part 5

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# Glossary of terms/abbreviations

| | |
|---|---|
| BMI | Body mass index |
| CEA | Cost effectiveness analysis |
| CEMACE | Centre for maternal and child enquiries |
| CPAP | Continuous positive airway pressure |
| CS | Caesarean section |
| DAM | Decision analytic modelling |
| FMU | Freestanding midwifery unit |
| HB | Homebirth |
| HDU | High dependency unit |
| ICER | Incremental cost effectiveness ratio |
| ICU | Intensive care unit |
| MOB | Mode of birth |
| NB | Net benefit |
| NHS | National Health Service |
| NICE | National Institute for Health and Clinical Excellence |
| NPEU | National Perinatal Epidemiology Unit |
| OPCS | Office of Population, Censuses and Surveys |
| OU | Obstetric unit |
| PSSRU | Personal Social Services Research Unit |
| QALY | Quality adjusted life year |
| RLM | Regional Lead Midwife (Birthplace) |
| SCBU | Special Care Baby Unit |
| SVB | Spontaneous vertex birth |
| TC | Total cost |
| UC | Unit cost |

# Acknowledgements

## *Authors' contributions*

Liz Schroeder undertook all the analyses and wrote the report. Nishma Patel collected the unit cost data. Stavros Petrou contributed to the study design and edited the different versions of the report. Jennifer Hollowell led the NPEU research team and contributed to the design, writing and collation of the report. Jennifer Hollowell and David Puddicombe were involved in the design, management, and analyses of the effectiveness data and edited the different versions of the report. Louise Linsell prepared the templates for the analyses of the bootstrapped data. Professor Peter Brocklehurst was the chief investigator and supervised the project. All members of the Collaborator Group contributed to revisions of the report. Members of the Birthplace Co-investigators Group were involved in the conception and design of the study. The members of the Co-investigator Group are Professor Alison Macfarlane, Professor of Perinatal Health, City University London; Professor Neil Marlow, Professor of Neonatal Medicine, University College London; Professor Rona McCandlish, Midwifery Professional Advisor, Chief Nursing Officer's Professional Leadership Team, Department of Health (on secondment from NPEU); Professor Christine McCourt, Professor of Maternal and Child Health, City University London; Alison Miller, Programme Director and Midwifery Lead, CMACE; Mary Newburn, Head of Research and Information, NCT; Professor Stavros Petrou, Professor of Health Economics, The University of Warwick; Dr Maggie Redshaw, Social Scientist, NPEU; Professor Jane Sandall, Programme Director (Innovations), NIHR King's Patient Safety and Service Quality Research Centre, King's College, London; Louise Silverton, Deputy General Secretary, Royal College of Midwives.

# Executive Summary

## *Background*

The National Institute for Health and Clinical Excellence's (NICE) Intrapartum Care Guidelines included a review of the relevant cost-effectiveness literature in relation to planned place of birth and concluded that '*the poor quality of the UK data on health outcomes by place of birth makes it extremely difficult to make meaningful comparisons across different birth settings at the current time. These limitations in the data mean that good evidence-based conclusions about the relative cost-effectiveness of different birth settings in the UK cannot be made…'(2007)*

## *Aims*

The study aim was to estimate the cost-effectiveness of births planned in different settings: home, FMU, AMU and OU, for women and babies at 'low risk' of complications prior to the onset of labour. As a first step in this process, we have assessed the cost-effectiveness of births planned in the different settings using individual level data collected from the Birthplace prospective cohort study for both the mother and the baby. A second report, to follow, will use a decision-analytic modelling approach to synthesise these data from Birthplace with published clinical, epidemiological and economic evidence within a cost-effectiveness modelling framework.

## *Methods*

### Economic evaluation perspective and time horizon

The study population included all women in the Birthplace prospective cohort study at 'low risk' of complications prior to the onset of labour where the primary outcome and potential confounders were not missing. The economic evaluation was conducted from a health system perspective and consequently only direct costs to the NHS are included. The time horizon primarily mirrored the duration of follow-up of the Birthplace prospective cohort study, which identified women at the start of their care in labour and was completed when the intrapartum and related postnatal care for both mother and baby ended, be it at home or discharge from an FMU, AMU or OU. Typically, this might be anytime between a few hours or a few days after the birth of the baby. If higher level care following the birth was required for either the mother or the baby, or both, this was included.

## Data collection

Individual data collection forms, including relevant resource use variables, were designed as part of the Birthplace prospective cohort study and were completed by the attending midwife at the time of each woman's labour episode. In addition, maternal and neonatal morbidity forms were completed during or after maternal or neonatal discharge from a higher level of care in hospital.

'Top-down' costing methods were used to contribute to the estimation of a total cost per woman. Finance managers were contacted in each trust where a regional co-ordinating midwife was working for Birthplace to obtain details of unit overheads and costs involved in running the unit. Incomplete data were supplemented with costs modelled from data available from the Health Care Commission survey of maternity units (2007). Relevant 'bottom up' unit costs were informed by data collected from the participating Birthplace regional lead midwives. Staff costs for midwives and clinicians who had direct contact with women during their episode of labour care were separately attributed, as were Clinical Negligence Scheme for Trust (CNST) contributions. Costs were supplemented using data from secondary sources where necessary, and these included medication costs from the British National Formulary and costs for medical supplies from the NHS Supply Chain Catalogue. The PSSRU compendium of Unit Costs of Health and Social Care and the NHS reference costs provided some unit cost data for the study.

## Representation of cost-effectiveness

Three sets of cost-effectiveness analyses were conducted; for the baby, the mother and for the outcome of 'normal birth'.

For the baby, cost-effectiveness was expressed in terms of incremental cost per adverse perinatal outcome avoided. Adverse perinatal outcome was defined as 'intrapartum stillbirth, early neonatal mortality and specific neonatal morbidity', which is a composite measure and was the primary outcome in the prospective cohort study. Additional subgroup analyses by parity were also undertaken for this cost-effectiveness outcome.

For the mother, cost-effectiveness was expressed in terms of incremental cost per adverse maternal morbidity avoided. 'Maternal morbidity avoided' included the avoidance of at least one of the following: general anaesthetic; instrumental birth; caesarean section; third or fourth degree perineal trauma; blood transfusion; admission to an intensive therapy unit, high dependency unit or specialist unit; and maternal death (within 42 days of giving birth). This 'maternal morbidity avoided' outcome was a composite of secondary outcomes included in the prospective cohort study.

For 'normal birth', cost-effectiveness was expressed in terms of incremental cost per additional 'normal birth'. 'Normal birth' was defined by the

Maternity Care Working Party as birth without any of the following interventions: induction of labour; epidural or spinal analgesia; general anaesthetic; episiotomy; forceps, ventouse or caesarean section.

All the above analyses were repeated for women without complicating conditions at the start of care in labour.

Differences in resource use estimates and costs were tested using t tests and differences in effects were tested using the statistical tests from the prospective cohort study. Non-parametric bootstrapping was used to generate 1,000 bias-corrected replications of each of the incremental cost-effectiveness ratios (ICERs) and scatterplots of these were represented in four quadrant cost-effectiveness planes.

A series of sensitivity analyses was undertaken to explore the implications of uncertainty surrounding the base-case ICERs. This included varying the key cost-drivers in intrapartum care and the variables where there was the most uncertainty surrounding cost estimation. They included varying the overheads, occupancy rates and staffing costs linked to the duration of labour care in order to determine the effects of such changes on the total mean cost of planned place of birth, as well as ICER estimates.

# *Results*

## Socio-demographic characteristics

A total of 62,036 women at 'low risk' of complications prior to the onset of labour were included in these analyses. Of these, 18,847 planned to give birth in an OU, 16,187 planned to give birth at home, 10,971 planned to give birth in a freestanding midwifery unit and 16,031 planned to give birth in an alongside midwifery unit.

The socio-demographic characteristics of women planning a birth at home were more similar to those planning birth in an FMU. The characteristics of women planning birth in an AMU were generally more similar to those of the planned OU group. The most marked contrast between the planned home birth group and the three other planned groups was in the distribution of parity: 27% of women planning a birth at home were nulliparous compared to 46%, 50% and 54%, respectively, in the planned FMU, AMU and OU groups.

## Costs

Total costs captured all the resource use and the unit costs associated with intrapartum care and the immediate postnatal period after birth, including any higher level care for the mother or baby. The total unadjusted mean costs per woman at 'low risk' of complications prior to the onset of labour planning a birth in each setting were as follows: OU £1,631.2, AMU

£1,461.2, FMU £1,434.9 and home £1,066.5. The total unadjusted mean costs per 'low risk' woman without complicating conditions at the start of care in labour were: OU £1,510.6, AMU £1,426.4, FMU £1,405.0 and home £1,026.9.

Adjusted cost differences were calculated for planned place of birth with birth in an OU as the reference group. The estimates were cost saving for all births planned in non-OU settings and this was statistically significant. The adjusted cost savings averaged £310.0 (home), £130.1 (FMU) and £134.4 (AMU). Adjusting for parity in a regression analysis on total cost resulted in sizable and significant cost differences, which overshadowed all other adjustments for confounding. The mean costs of care were substantially reduced for women who were parous compared to nulliparous. This cost-saving was accentuated for each previous pregnancy. The costs of care increased for a baby born above forty weeks gestation, representing a cost increment per additional week of gestation. A maternal age of thirty years and above was associated with an increase in the costs of care, and this was more apparent in women aged over forty years.

Mean differences in costs per woman for planned OU and non-OU births were weighted, adjusted and bootstrapped in an additional analysis. All means costs of births in planned non-OU settings were cost-saving when compared with the mean cost of births planned in OUs, and the cost savings were as follows: £366.8 (home), £182.1 (FMU), £129.3 (AMU).

Additional subgroup analyses by parity were conducted. These identified that the total bootstrapped weighted mean costs per 'low risk' nulliparous woman was £2075.2 (OU), £1,983.1 (AMU), £1,912.5 (FMU) and £1,793.7 (home). In contrast, the total bootstrapped weighted mean costs per 'low risk' multiparous woman was: £1,142.4 (OU), £991.3 (AMU), £968.9 (FMU) and £780.4 (home).

## Cost-effectiveness

The incidence of adverse perinatal outcomes was low in all settings. The ICERs showed that, on average, births planned in non-OU settings would be cost saving when compared with births planned in an OU, and would lead to improved perinatal outcomes on average for births planned in the midwifery units, although considerable uncertainty surrounded the latter. Although the cohort study found no significant differences in the primary outcome by planned place of birth for 'low risk' women, analyses stratified by parity identified a significantly increased odds of an adverse perinatal outcome for 'low risk' nulliparous women in the planned home birth group. A cost-effectiveness analysis performed on nulliparous women who planned a birth at home resulted in a less-costly intrapartum maternity option but with increased adverse perinatal outcomes. This finding was repeated for nulliparous 'low risk' women without complicating conditions at the start of

care in labour where the economic evaluation showed planned home birth to be less costly but with statistically significant worse perinatal outcomes. For multiparous women, there were no statistically significant differences between births planned in the different settings in rates of adverse perinatal outcome. For all bootstrapped replicates of the primary cost-effectiveness outcome for multiparous women, the scatterplots of mean ICERs fell across the south east and south west quadrants of the cost-effectiveness plane, reflecting lower costs in planned non-OU settings accompanied by uncertainty surrounding changes to perinatal outcomes when compared to planned births in an OU.

The cost-effectiveness analyses conducted for maternal outcomes showed that planned births in non-OU unit settings led to reductions in costs and improvements in maternal outcomes when compared to planned birth in an OU. All bootstrapped ICERs fell within the south east quadrant of the cost-effectiveness plane, confirming that births in planned non-OU settings would generate less costly care and positive maternal health effects.

All planned births in non-OU settings led to significant reductions in costs and significant increases in 'normal birth' when compared to planned birth in an OU.

## Sensitivity analyses

Uncertainty surrounded the modelled overhead costs and the midwifery costs, which included CNST contributions. These were also seen to be generic cost drivers relevant to all settings of birth. We compared the effects of variations in these costs on all three incremental cost effectiveness measures. Results from the sensitivity analyses showed that the study findings were generally robust and the ICERs responded to changes in the cost variables in a manner consistent with expectations.

# *Conclusions*

There are cost differences between planned births in different settings for women at 'low risk' of complications prior to the onset of labour and these influence cost-effectiveness. With regards to the baby, a change from planned place of birth in an OU to a non-OU setting will generate lower costs, but this is accompanied by uncertainty surrounding effects on adverse perinatal outcomes. With regards to the mother, a change from planned place of birth in an OU to a non-OU setting will generate incremental cost savings and improved health outcomes. Planned birth at home reflects reduced medical intervention and a higher incidence of 'normal birth'. When compared to women planning to give birth in an OU, however, women planning a birth at home or in an FMU were more likely to be multiparous, white and have a fluent understanding of English, be married or living with a partner and to be living in a more socioeconomically

advantaged area. Each of the above characteristics is associated with cost-savings. A regression analysis conducted on average total cost, adjusting for these confounders, found that planned births in non-OU settings were still cost saving compared with planned birth in an OU. However, the prospective cohort study found a significant interaction effect by parity. Costs and effects differ by parity. The costs of providing intrapartum maternity care for nulliparous women were higher than for multiparous women and the cost differences between the different settings for birth for this group of women substantially narrowed. When women without complicating conditions were excluded the cost differences narrowed even further. The cost-effectiveness analyses described in this report will be investigated further in a second report, to follow, and will use a decision-analytic modelling approach to synthesise these perinatal and maternal cost-effectiveness results in one analysis.

# 1 Introduction

Maternity care for women who are at 'low risk' of complications prior to the onset of labour is currently provided for in four settings in the NHS. These include care in an obstetric unit or a midwifery unit, on the same site or geographically separate from the hospital obstetric unit, or at home. The National Institute for Health and Clinical Excellence's (NICE) Intrapartum Care Guidelines review of economic evidence related to care in each of these settings led to inconclusive results.(1) This gap in evidence is important as reliable evidence is needed by service commissioners and clinical managers, policy makers and parent representatives for planning maternity services; health professionals for guiding practice; and women and their families for making informed decisions about their planned place of birth.

## *1.1 Aims and objectives*

This study aims to estimate the cost-effectiveness of the different planned settings for birth: home, FMU, AMU and OU, for women and babies at 'low risk' of complications prior to the onset of labour. In the original proposal this component of Birthplace was specified as a review of economic evidence captured in a decision-analytic model. However the National Institute for Health and Clinical Excellence's (NICE) Intrapartum Care Guidelines attempted to populate a decision-analytic model for place of birth with a very similar design and concluded that '*the poor quality of the UK data on health outcomes by place of birth makes it extremely difficult to make meaningful comparisons across different birth settings at the current time. These limitations in the data mean that good evidence-based conclusions about the relative cost-effectiveness of different birth settings in the UK cannot be made…The main conclusion to be drawn is that there is a need for better data.*' (1) As a first step in this process, we have assessed the cost-effectiveness of the different settings of planned place of birth using individual level data collected from the Birthplace prospective cohort study for both the mother and the baby. A second report, to follow, will use a decision-analytic modelling approach to synthesise these data from Birthplace with published clinical, epidemiological and economic evidence within a cost-effectiveness modelling framework. Evidence from this individual level analysis (part 1) will be directly incorporated into the decision-analytic model because the perinatal and maternal outcomes estimated in this report will be combined together in a composite outcome measure, and cost-effectiveness expressed in the model in terms of an incremental cost per healthy woman and baby at hospital discharge. Many of the model's parameters will be populated with data from the Birthplace prospective cohort study and more specifically from this cost-effectiveness

analysis. Decision analytic modelling is a robust method which enables the integration of all relevant sources of evidence within one model. The use of a decision tree as the basis for this model will enable a detailed description of the pathways of care that women engage with during labour. Associated costs, effects and weighting probability parameter values may be synthesized from many relevant sources. If robustly designed, a decision-analytic model is a valuable source of information because it can be responsive to changes in the parameter values, generating plausible cost-effectiveness scenarios within a broader framework of uncertainty.

### 1.1.1 Aims

To determine the cost-effectiveness of planned place of birth in the following settings: home, FMU, AMU and OU, for women and babies at 'low risk' of complications prior to the onset of labour, based on individual level data collected in the prospective cohort study within Birthplace.

### 1.1.2 Objectives

1. To estimate the cost-effectiveness of births planned at home, in FMUs and in AMUs, in comparison with births planned in OUs, in terms of incremental cost per adverse perinatal outcome avoided for babies of women judged to be at 'low risk' of complications prior to the onset of labour.

The composite measure of adverse perinatal outcome used for the economic evaluation was defined as 'intrapartum stillbirth, early neonatal mortality and specific neonatal morbidities', the primary effectiveness measure in the Birthplace prospective cohort study. This composite measure is described in more detail in the prospective cohort study report.

2. To estimate the cost-effectiveness of births planned at home, in FMUs and in AMUs, in comparison with births planned in OUs, in terms of incremental cost per maternal morbidity avoided for women judged to be at 'low risk' of complications prior to the onset of labour.

The composite measure of maternal morbidity used for the economic evaluation represented a subset of secondary outcomes in the prospective cohort study and included at least one of the following: general anaesthetic; instrumental birth or intrapartum caesarean section; third or fourth degree perineal trauma; blood transfusion; admission to an intensive therapy unit, high dependency unit or specialist unit; and maternal death (within 42 days of giving birth).

3. To estimate the cost-effectiveness of births planned at home, in FMUs and in AMUs, in comparison with births planned in OUs, in terms of incremental cost per additional 'normal birth' for women judged to be at 'low risk' of complications prior to the onset of labour.

'Normal birth' was defined by the Maternity Care Working Party as birth without any of the following interventions: induction of labour; epidural or spinal analgesia; general anaesthetic; episiotomy; forceps, ventouse or caesarean section.(2)

# 2 Methods

## *2.1 Principles of cost-effectiveness analysis with individual level data*

Cost-effectiveness analysis (CEA) is a form of economic evaluation that compares the relative costs and outcomes (effects) of two or more courses of action, using a common outcome measure. In cost-effectiveness analyses, the costs are expressed in monetary units, while benefits are expressed in natural or physical units, such as years of life gained, hospital episodes or clinical events avoided.

CEA involves calculating the difference in costs and difference in outcomes between the health care interventions or courses of action being compared, and then expressing these as a ratio. The denominator of the ratio usually represents a measure of health gain and the numerator usually represents an incremental cost associated with the health gained. Cost-effectiveness is expressed as an incremental cost-effectiveness ratio (ICER), which is simply the difference in costs divided by the difference in effects:

ICER = (change in costs) / (change in effects)

ICER = (cost of scenario A – cost of scenario B) / (effectiveness of scenario A - effectiveness of scenario B)

The ICER represents the additional cost of achieving an additional unit of outcome through a healthcare intervention or course of action, when compared to the next best alternative, mutually exclusive intervention or strategy.

A CEA requires detailed data about both resources used and unit costs associated with alternative interventions or courses of action. A unit cost is the cost per standard unit applied to each resource item. Resource use and unit cost values may be deterministic if they are the same for every individual, for example, the unit cost of a syntometrine injection. Alternatively, they may be stochastic if they are likely to vary between individuals, for example the duration of midwifery care per home birth. Total cost for an individual is a combination of the quantity of each resource item they use and the unit cost of each item.

Broadly speaking, there are two different methods for measuring cost data. 'Top-down' costing involves the estimation of the total cost of care in an organisation, for example a birth centre, to estimate the unit cost (in this case per woman); the total cost is simply divided by the number of women receiving the service provided. 'Bottom-up costing' (micro-costing) involves

measuring each resource component used by the individual before placing an economic value on each resource component used.

## 2.2 Economic evaluation perspective and time horizon

In this study, the incremental costs and incremental effectiveness of planned birth at home, in an AMU or in a FMU for women at 'low risk' of complications prior to the onset of labour were compared with a reference birth setting, namely an OU. The OU group contains the largest number of eligible births so using it as a reference group maximised statistical efficiency. We do not imply that OUs should be the standard or optimal place of birth. All four planned places of birth were additionally compared in one analysis and the differences between them expressed as ICERs.

The economic evaluation was conducted from a health system perspective and consequently only direct costs to the NHS were included. The time horizon primarily mirrored the duration of follow-up of the Birthplace prospective cohort study, which identified women at the start of their care in labour and was completed when the intrapartum and related postnatal care for both mother and baby ended, be it at home or discharge from a midwifery unit or hospital. Typically, this might be anytime between a few hours or a few days after the birth of the baby. If higher level care following the birth was required for either the mother or the baby, or both, this was included in the economic evaluation.

## 2.3 Study population

A detailed overview of the Birthplace prospective cohort study design and study population may be seen in the prospective cohort study report. It includes a description of the participating trusts, selection of OUs, study eligibility criteria, sample size calculations, derivation of risk status and potential confounders, derivation of denominator data, and the analyses and sensitivity analyses undertaken.

The study population for the economic evaluation included all women where the primary outcome and potential confounders were not missing. This was for women who were defined as being of 'low risk' of complications prior to the onset of labour.

## 2.4 Resource use data collection

### 2.4.1 Measurement of resource use data

Individual data collection forms were designed as part of the Birthplace prospective cohort study and were completed by the attending midwife at

the time of each woman's labour episode. In addition, maternal and neonatal morbidity forms were completed during or after maternal or neonatal discharge from a higher level of care in hospital. Appendix 1 identifies the resource use data collected from these Birthplace data collection forms.

### 2.4.2 Additional resource use data collection to supplement the Birthplace data collection forms

The brevity of the Birthplace data collection forms meant that additional data were required to identify and quantify the resource use variables more thoroughly. The additional resource use variables are shown in columns 4 & 5 in Appendix 1. Five informal focus groups were held with Birthplace local coordinating midwives who attended Birthplace meetings at several time points, early in the project timeline. The optimal ways of obtaining resource use data, to capture variation in the data, and to collect related 'top down' and 'bottom up' cost data were discussed in these meetings. Following the focus group meetings, structured resource use data collection forms were designed (Appendices 2, 3, 4 and 5). They represent a detailed approach to capturing all possible NHS resources used in the care of the mother and baby during the period between admission and discharge in midwifery units and hospitals. Appendix 2 shows this supplemental data collection form for birth in a FMU and an AMU; and Appendix 3 for birth in an OU.

In developing these supplemental data collection forms, Birthplace was able to draw on the work done in one of its linked adjunct studies. This compared the costs of care in the Barkantine Birth Centre (a FMU) with care in the Royal London Hospital, an OU in the Barts and London Trust. Data collection forms were designed for the adjunct study, which acted as a pilot for Birthplace as well as being a distinct small study in its own right. Anonymised data collected retrospectively from 167 maternity notes in the Barkantine Birth Centre and 164 maternity notes in the Royal London Hospital were analysed. The data were collected by midwives who worked in both settings and therefore had access to the data; they were extracted directly from women's notes. The adjunct study thus enabled the identification of detailed resource use which would otherwise not have been obtained. This included staffing patterns under different scenarios of care, e.g. continuous and intermittent midwifery care during the successive stages of labour. Information was also obtained about the numbers of women using alternative forms of pain relief. In the OU, the profiles of the complications experienced by mothers and babies, the types and quantities of treatments, surgeries, diagnostic imaging tests, scans and medications administered and ambulance transfers undertaken for both mothers and babies (if provided separately) were documented.

The supplemental data collection forms were designed to capture the 'pathway of care' experienced by a woman progressing through the stages

of labour according to a planned place of birth. This reflected the design of the Birthplace data collection forms more broadly. Having been piloted in the Barkantine study, they were then reviewed individually in a structured interview with each of the four Birthplace appointed regional lead midwives, to take account of differences in maternity care practices nationally. Appendix 4 was generated to be a working document for the interviews, intended to capture the generalisability and variability in the process management of labour and birth. For each scenario the regional lead midwife was asked to describe in detail the 'standard procedures' that would be undertaken for labour and birth events and, where possible, the typical ratios of 'staff to woman' care. Scenarios were then varied to the least and then most complex with a description of the change in practice, and related resource items. The interviews included approximately one and a half hours of structured, recorded time plus an additional one and a half to two hours of discussion and clarification.

The interviews with the Birthplace appointed regional lead midwives were undertaken at Liverpool Women's Hospital NHS Foundation Trust, Taunton and Somerset NHS Trust, the Oxford Radcliffe Hospitals NHS Trust and Kings College Hospital NHS Foundation Trust, and the data were collected from these trusts. The trusts represented contrasting geographical regions of England (north, south west, central and London), as well as providing different configurations of maternity services, and were chosen so that the variations in regionality and service configuration could be captured in the unit cost estimations for this report. Further details of the interviews can be seen in Appendix 4. The interviews were recorded and then transcribed. The data were then compiled into comparative resource use spreadsheets and cross-referenced.

## *2.5 Unit cost data collection*

The research for the costing component of this economic evaluation used both 'top down' and 'bottom up' methods to identify costs relevant to Birthplace. All unit costs in this study were expressed in pounds sterling and valued at 2009-10 prices.

### 2.5.1 'Bottom up' unit cost data

Prior to interview the regional lead midwives were sent a lengthy cost sheet (Appendix 5), which listed every item identified in an action, event or procedure from the structured questionnaires (Appendix 4) and the data collection forms from the adjunct study (Appendices 2 and 3). Midwives documented the staffing, medications and equipment that might be required for birth related procedures such as augmentation, different modes of delivery or perineal repair. They were asked to update the sheet to specify their own resource components according to their trust or unit protocols and policies. This captured all resource components that might be used in any

labour, birth or after birth event. The regional lead midwives were asked to supply the contact details for the person who could be contacted to price each resource component or to supply it themselves.

The following procedures were microcosted using 'bottom up' methods (see Appendix 6 for details):

- Homebirth delivery pack
- NHS re-imbursement for midwifery travel costs to attend a birth at home
- NHS re-imbursement for midwifery travel costs to attend a transfer from a planned birth at home
- Entonox for a home-birth
- Augmentation of labour with syntocinon
- Epidural and spinal analgesia
- General anaesthetic
- Spontaneous vertex birth
- Ventouse birth
- Forceps delivery
- Caesarean section
- Active management of the third stage of labour
- Suturing episiotomy
- Suturing third and fourth degree perineal tear
- Manual removal of the placenta
- Blood transfusion
- Care following a stillbirth or neonatal death

### 2.5.2 'Top down' cost data

This research aimed to collect all other cost data that could contribute to a total cost per woman for the individual level cost effectiveness analysis. Finance managers were contacted in each trust where there was a regional co-ordinating midwife working for Birthplace to obtain details of unit overheads and all other costs involved in running the unit. These included management and administrative costs, operational costs (including heating and lighting, training, building maintenance), indirect overheads including the personnel and finance functions, and capital costs based on the new build and land requirements of NHS facilities. They also included the proportional use of other hospital services such as screening, haematology and pathology and followed the costing guidelines detailed in the NHS

costing manual. (3) Contact with finance managers was often difficult to attain and patchy. Finance staff changes, work commitments and a lack of comparable data collection methodology in the finance departments resulted in inadequate responses and incomplete data returns. As a consequence, the data that were received were included in a purpose designed model to calculate trust overheads apportioned to intrapartum care. The model used data from the Healthcare Commission's review of maternity services (published January 2008, which was mandatory and captured unit data from every trust in England) to generate running costs, bed days and occupancy rates adjusted for unit operational days per year, numbers of women delivering and intrapartum transfers. The overheads data that were received from trust finance departments were subsequently included in the model, and the disaggregated costs were modelled into a generic 'overheads cost per place of birth per hour' variable. This cost was then varied in a sensitivity analysis.

Staff costs for midwives and clinicians who have direct contact with women during their episode of labour care were excluded from the overheads calculations, because they were separately attributed to each individual woman's duration of labour care. Firstly, midwifery staff time which is considered to be the main cost driver generalisable across all settings for birth, was allocated directly to the duration (hours) of the labour episode per woman. This duration variable was calculated directly from the Birthplace data collection forms. The midwifery staff cost was calculated using data from the Unit Costs of Health and Social Care 2010 compendium, developed by the Personal Social Services Research Unit (PSSRU). (4) This unit cost therefore included the midpoint salary for both a Band 6 and 7 midwife, including salary oncosts, indirect and direct overheads and contribution to qualifications adjusted for working hours per week, study and leave days. The cost of administration of the birth at home service within the community was captured by the 'overheads' cost within the midwifery staffing variable, as apportioned direct and indirect overheads are included in cost calculations for midwifery staff in the PSSRU compendium. Midwifery staff time was considered to approximate continuous care in the non-OU settings and was calculated to approximate 65% intermittent care in the OU setting. If a woman was transferred into an OU, then her midwifery staffing and overheads costs changed accordingly. These costs were varied in a sensitivity analysis.

The Clinical Negligence Scheme for Trust (CNST) contributions per staff member (per hour) were added to the cost of direct maternity contact time documented for midwifery staff. The actual value of the CNST contribution was developed through primary data collection, in conjunction with the NHS Litigation Authority and was calculated using the contributions to CNST by the trust finance managers we had contacted. Although paid for by the trust as part of overheads, CNST contributions are calculated per whole time equivalent (WTE) staff member using a trust apportioned risk formula,

which is measured in terms of clinical specialty, staff grade, proportional WTEs, the numbers of registered births in the trust and a pooled relative risk rating. (5) It was allocated directly to the staffing component to capture the real cost of staffing across all settings for birth.

Medical staffing costs were calculated in a similar way, using the costs allocated to direct person contact from data in the PSSRU compendium with the addition of the CNST contribution. Medical staffing (consultant obstetrician, paediatrician, neonatologist, anaesthetist, obstetric registrar and foundation year doctor [including senior house officers]) costs were allocated per patient contact hour and were calculated in this study within labour related events or procedures. Medical staff time was included in events such as the augmentation of labour, administration of an epidural, a general anaesthetic or perineal repair. All unit costs calculated for maternity staffing can be viewed in Appendix 6.

Medication costs were supplemented with data from the British National Formulary, version 61. (6) Pharmacy departments had initially been contacted in the hope of capturing variation in medication costs. The response to numerous follow up contacts was minimal with incomplete data returns. Similarly, the NHS Supply Chain Catalogue version April 2009 was used to capture the costs of resource items such as medical supplies as it was not possible to comprehensively collect these from maternity units. (7)

The PSSRU compendium of Unit Costs of Health and Social Care and the DH reference costs both include detailed 'bottom up' costing of emergency and non-emergency transfers, including obstetric and neonatal ambulance transfers. Time-weighted cost variables were created from these two sources. (4, 8) Primary data collection was required for the calculation of other modes of transfer, such as transfer in a helicopter. Only medical staff time was attributed to helicopter transfer as the cost of the service is not funded by the NHS.

The most recently published Department of Health reference costs (2008/9) capture per diem costs for admissions to a neonatal intensive care unit, high dependency care unit or special care baby unit. A per diem cost is also available for adult intensive and high dependency admissions, and for admissions to a specialist ward. The cost of higher level care provided within the labour ward immediately after labour is also included. All Department of Health NHS reference costs used in this study were taken from the reference costs appendix NSRC4: Trust and PCT combined reference cost schedules. (8)

### 2.5.3 Quality of the data

Data management procedures for the Birthplace prospective cohort study are described in the cohort study report.(9)

The additional resource use and unit cost data collected directly from regional lead midwives were single entered at the NPEU. The data were compiled into comparative resource use spread sheets and cross-referenced between the four trusts. It was then checked for face-validity with an obstetrician at the NPEU and presented to the Birthplace Co-investigator Group in December 2010 and the Birthplace Advisory Group in March 2011.

## *2.6 Representation of cost-effectiveness*

Differences in resource use and costs were tested using t tests and differences in effects were tested using the odds ratios from the prospective cohort study data. Cost effectiveness was expressed as incremental cost per (i) adverse perinatal outcome averted, (ii) maternal morbidity avoided and (iii) additional 'normal birth'. All of these analyses were repeated for women without complicating conditions at the start of care in labour. Nonparametric bootstrapping was used to calculate uncertainty around all cost-effectiveness estimates. [9, 10] Non-parametric bootstrapping is a statistical method that estimates measures of distribution for the variables of interest; it is based on repeated sampling (with replacement) from the dataset. This is used to establish confidence intervals for any test statistic and allows for tests of statistical significance.(10, 11) Non-parametric bootstrapping was used to generate 1,000 bias-corrected replications of each of the ICERs, which were represented on four quadrant cost-effectiveness planes. An ICER represents the additional cost of achieving an additional unit of outcome through a course of action, when compared to the next best alternative, mutually exclusive intervention or strategy. The cost-effectiveness results reflected in the ICER scatterplots reflect data that were weighted for each unit's duration of study participation and takes into account the clustered nature of the data within the prospective cohort study. Probability weights were incorporated in the analysis to adjust for the probability of selection of each woman. The weight applied to each observation was inversely proportional to the probability of selection of the unit and the duration of data collection in that unit. The weights were re-calculated for each bootstrapped sample. All ICERs express bootstrapped weighted data using 1,000 replications with resampling. Decision uncertainty was addressed by estimating net benefit statistics and constructing cost-effectiveness acceptability curves across cost-effectiveness threshold values of between £0 and £100,000 for the outcomes of interest. This range of cost-effectiveness threshold values includes the thresholds implicitly used by NICE for broader cost-effectiveness purposes. Although this study was not able to estimate a cost per quality-adjusted life year (QALY) gained attributable to alternative planned places of birth, the cost-effectiveness thresholds used more broadly by NICE seemed appropriate for the primary outcome measure.

A series of sub-group analyses repeated all analyses by parity sub-group for the primary cost-effectiveness outcome, namely incremental cost per adverse perinatal outcome avoided. In addition, a series of sensitivity analyses was undertaken to explore the implications of uncertainty surrounding the key cost-drivers in intrapartum care and the variables where there was the most uncertainty surrounding the resource use parameters. These included varying the overheads, occupancy rates and staffing costs attributed to the duration of labour care. The ICERs were re-calculated following these sensitivity analyses.

Multivariable analyses of the outcomes data are reported in the prospective cohort study report. Multiple regression was used to estimate the differences in total cost between the settings for birth and to adjust for potential confounders such as maternal age, parity, ethnicity, understanding of English, marital status, BMI, index of multiple deprivation score, parity and gestation, which may each be associated with planned place of birth and with adverse outcomes. For the generalized linear model (GLM) on costs, a gamma distribution and identity link function was selected in preference to alternative distributional forms and link functions on the basis of its low Akaike's Information Criterion (AIC) statistic. The GLM approximates linear regression by allowing the linear model to be related to the response variable via a link function and by allowing the magnitude of the variance of each measurement to be a function of its predicted value. GLM has the ability to predict confidence bounds. In addition to predicting a best estimate and a probability for each row, GLM identifies an interval wherein the prediction (regression) will lie.

The data were originally entered into Microsoft Access software. All analyses were performed using Stata version 11, SPSS (the Statistical Package for the Social Science) version 17 (SPSS, Chicago, IL) and Microsoft Excel (Microsoft, Seattle, WA) 2010 software.

# 3 Results

## *3.1 Study population*

A total of 62,036 women at 'low risk' of complications prior to the onset of labour, where the primary outcome data and potential confounders were not missing, were included in this analysis. This corresponds to the population used for the adjusted analyses in the prospective cohort study.(9) Of these, 18,847 planned to give birth in an OU, 16,187 planned to give birth at home, 10,971 planned to give birth in a freestanding midwifery unit and 16,031 planned to give birth in an alongside midwifery unit. The socio-demographic and clinical effectiveness differences between the birth settings are presented in detail in the prospective cohort study report. (9)

In brief, compared to women planning to give birth in an obstetric unit, women planning a birth at home tended to be older (28% aged 35 or over at home compared with 16% aged 35 or over in OUs), were more likely to be white and have a fluent understanding of English, be married or living with a partner, to be living in a more socioeconomically advantaged area, and were markedly more likely to have had one or more previous pregnancies.

The characteristics of women planning a birth in an FMU or AMU tended to lie between those of the OU and home birth groups, with the characteristics of women in the AMU group generally more similar to that of the OU group, and the characteristics of women planning a birth in a FMU more similar to those planning a birth at home. Relative to women planning a birth in an OU or AMU, women planning a birth in an FMU were more likely to be white, have a fluent understanding of English and to live in a more socioeconomically advantaged area.

There were marked differences between planned places of birth in the proportion of women at 'low risk' with complicating conditions identified by the attending midwife at the start of care in labour. Almost 20% of women whose planned place of birth was an obstetric unit had at least one complicating condition noted at the start of care in labour compared with fewer than 7% for all other planned places of birth. The most common complicating conditions noted by the attending midwife at the start of care in labour were prolonged rupture of membranes and meconium stained liquor. The prevalence of proteinuria was similar for OUs and AMUs, but for all other complicating conditions, rates were higher in the women planning birth in an OU and similar in the three other settings (home, FMU, AMU).

The higher prevalence of women with complicating conditions at start of care in labour in the planned obstetric unit group was unexpected in this 'low risk' group. Possible reasons are discussed in the prospective cohort study report. The higher prevalence of complicating conditions at the start of care in labour was noted and discussed by the co-investigators and the independent Advisory Group prior to the analysis of the primary outcome; it was agreed to modify the analysis plan to include additional analyses of outcomes by planned place of birth, restricted to women without complicating conditions at the start of labour care.

This was replicated in the cost-effectiveness analyses and separate cost-effectiveness results were generated for women without complicating conditions for each measure of outcome.

## *3.2 Resource use*

Appendix 7 shows the resource use values from the start to end of the episode of labour care, including post-natal, neonatal and maternal higher level admissions for each planned place of birth. The values are given as means (standard deviations).

The mean duration (hours) of labour care for all women who were not transferred from their initial planned place of birth differ within a range of approximately 2.4 hours. It was longest in the OU (9.01), then similar in the AMU (7.92) and FMU (7.49), and shortest for home (6.61). For the planned non-OU births where a transfer did occur, the duration of labour care prior to transfer was longest in the FMU (6.68), similar in the AMU (6.5), and shortest at home (5.71). For women who were transferred, the duration of transfer (hours) was longer from the FMU compared with home (0.59 versus 0.48) and substantially longer than transfer from the AMU (0.17); this translates to 29 minutes (home), 35 minutes (FMU) and 10 minutes (AMU), respectively. As expected, the predominant mode of transport for transfer from FMU or home was via ambulance or a private car. In contrast, transfer from an AMU was most commonly via a wheelchair or trolley and then a bed. The average duration of labour care (hours) from arrival in the OU after transfer was similar for all women; home (6.8), FMU (6.6) and AMU (6.8).

The highest rates of spontaneous vertex birth occurred for planned birth at home (0.93), then in FMUs (0.91), AMUs (0.86) and lastly in the OUs (0.74). A much higher assisted delivery rate (with ventouse, forceps or a caesarean) occurred for women who had planned their birth in an OU. The intrapartum caesarean section rate was highest in the OU (11%) compared with home (3%), FMU (4%) and AMU (4%). The assisted delivery rate was lowest in the planned home birth group. Differences in mode of birth and receipt of intervention are described in more detail in the prospective cohort study report. These differences affect costs.

A higher proportion of women who planned their birth in the OU had their labour augmented with syntocinon. In the OU, this decreased when women with complicating conditions at the start of care in labour were removed from the analysis, though there was little change in the other settings for birth when this adjustment was done. Proportionately more women who planned their birth in an OU received an epidural (0.31 compared with 0.08 (home), 0.11 (FMU) and 0.15 (AMU)). Similarly, a higher proportion of women who planned their birth in the OU had active management of the third stage of labour and an episiotomy. The proportion of women with perineal trauma ranged between 0.032 (OU) and 0.019 (home).

A higher proportion of women who planned birth in the OU received high dependency care (increased observation) within the labour ward immediately after birth compared with women with a planned non-OU birth. Most of these cases involved increased care for women following an operative delivery (0.18 compared with 0.05 (home), 0.07 (FMU) and 0.09 (AMU)). There were very small absolute numbers of women admitted to higher level care (intensive or high dependency care) after the birth, although more women were admitted from planned OU and AMU settings. Substantially more babies were admitted to neonatal care from the planned OU group, compared with other settings. Very few babies received ECMO or total body cooling. Very few babies died (either as a stillbirth or early neonatal death). Additional reference to the weighted event rates of the primary or secondary outcomes or interventions can be viewed in greater detail in the prospective cohort study report.

## *3.3 Costs*

Table 1 shows the unit costs for key resource items, episodes or procedures. Unit overheads and midwifery staffing were apportioned to each woman according to her actual place of labour and birth, and the duration in hours that they spent there. If a woman was transferred then her overheads and staffing costs were adjusted accordingly. Analyses wereby 'intention to treat', so the final costs incurred were attributed to the setting where the woman planned to give birth at the start of care in labour and included costs when she transferred care. Medical staff time was incorporated into specific intrapartum care procedures. The detailed bottom up costing results can be viewed in Appendix 6.

**Table 1. Unit costs per resource item (£ sterling, 2009/10 prices)**

| Resource item (unit) | Unit cost or range | Source of unit cost |
|---|---|---|
| **GENERIC COSTS APPLIED TO DURATION VARIABLES** | | |
| **Unit financial overheads (hour)** | | |
| OU | 63.7 (50.9 – 76.4) | Primary cost data collection |
| Home | 0.0 | Primary cost data collection |
| FMU | 55.4 (44.3 – 66.5) | Primary cost data collection |
| AMU | 54.4 (43.5 – 65.3) | Primary cost data collection |
| **Midwifery staffing (hour)** | | |
| OU | 81.3<br>Intermittent care 65% | PSSRU Unit Costs of Health and Social care 2010<br>Primary cost data collection for CNST |
| Home | 81.3<br>Continuous care plus one extra midwife for an hour at birth | PSSRU Unit Costs of Health and Social care 2010<br>Primary cost data collection for CNST |
| FMU | 81.3<br>Continuous care 100% | PSSRU Unit Costs of Health and Social care 2010<br>Primary cost data collection for CNST |
| AMU | 81.3<br>Continuous care | PSSRU Unit Costs of Health and Social care 2010<br>Primary cost data collection for CNST |
| Medical Consultant (hour) | 389.4 | PSSRU Unit Costs of Health and Social care 2010<br>Primary cost data collection for CNST |
| Registrar (hour) | 179.5 | PSSRU Unit Costs of Health and Social care 2010<br>Primary cost data collection for CNST |
| Foundation House Officer (F2) (hour)<br>Senior House Officer/ Specialty or Core Training year 1 | 141.8 | PSSRU Unit Costs of Health and Social care 2010<br>Primary cost data collection for CNST |
| **COSTS INCURRED FOR A PLANNED BIRTH AT HOME** | | |
| Homebirth packs | 34.3 | Primary cost data collection |
| Staff travel to homebirth – distance 23 miles return trip | 23.2 | Primary cost data collection |

| | | |
|---|---|---|
| **COSTS INCURRED FOR PLANNED 'NON-OU BIRTHS' IF TRANSFERRED TO AN OU** | | |
| ***Mode of transfer (per hour)*** | | |
| Ambulance | 402.0 | PSSRU Unit Costs of Health and Social care 2010<br>DH reference costs |
| Private car | 0.0 | Cost not attributed to NHS |
| Wheelchair or trolley | 0.01 | PSSRU Unit Costs of Health and Social care 2010 |
| Bed | 0.01 | PSSRU Unit Costs of Health and Social care 2010 |
| Rapid response ambulance car | 214 | PSSRU Unit Costs of Health and Social care 2010<br>DH reference costs |
| Helicopter | 144.5 | Primary data collection (NHS staff costs only) |
| Taxi | 0.0 | Cost not attributed to NHS |
| No physical transfer | 0.0 | Cost not attributed to NHS |
| **COSTS INCURRED FOR CARE DURING LABOUR AND BIRTH** | | |
| ***Mode of birth*** | | |
| Spontaneous vertex birth | | |
| OU | 26.3 | Primary cost data collection |
| Home | 28.5 | Primary cost data collection |
| FMU | 29.3 | Primary cost data collection |
| AMU | 29.3 | Primary cost data collection |
| Vaginal breech birth | 99.1 | Primary cost data collection |
| Ventouse | 429.2 | Primary cost data collection |
| Forceps | 569.9 | Primary cost data collection |
| Caesarean section | 1052.6 | Primary cost data collection |
| ***Procedures related to intrapartum care*** | | |
| Augmentation | 159.1 | Primary cost data collection |
| Epidural/Spinal | 311.1 | Primary cost data collection |
| General Anaesthetic | 846.5 | Primary cost data collection |
| Active Management of the third stage of labour | 4.1 | Primary cost data collection |
| Episiotomy | 24.6 | Primary cost data collection |
| Perineal trauma | 595.3 | Primary cost data collection |
| ECMO | 1651.0 | Primary cost data |

| | | |
|---|---|---|
| | | collection |
| Total body cooling | 2110.0 | Primary cost data collection |
| Care following a stillbirth | 644 | Primary cost data collection |
| Care following a neonatal death | 644 | Primary cost data collection |
| **POST NATAL AND HIGHER LEVEL CARE FOR THE MOTHER** | | |
| Postnatal care (days) | 95 | DH reference costs |
| High dependency care following birth provided within the labour ward (per 4 hours) | 80 | DH reference costs |
| Admission to intensive care unit (days) | 560 | DH reference costs |
| Admission to high dependency unit (days) | 1525 | DH reference costs |
| Admission to specialist care (days) | 400 | DH reference costs |
| **HIGHER LEVEL OF CARE FOR THE BABY** | | |
| Admission to neonatal intensive care unit (days) | 1081 | DH reference costs |
| Admission to neonatal high dependency unit (days) | 759 | DH reference costs |
| Admission to neonatal specialist care (days) | 429 | DH reference costs |

Table 2 combines resource items and their associated unit costs to generate costs per woman according to planned place of birth. These are shown as means and standard errors. The bootstrap mean differences between the comparison groups for each cost category and 95% bootstrap confidence intervals are also shown in the table.

Unit overheads and staffing costs are shown to be the key cost drivers in the study. The average cost attributed to unit overheads was highest in the planned OU setting (£569.4 compared with £426.1 (FMU), £450.6 (AMU) and £93.1 (home), $p<0.001$). Unit overheads are not directly attributed to women who plan birth at home, but these accrue when the woman is transferred for care in an OU. Thus unit overheads and midwifery staff costs capture both directly apportioned overheads and staffing, but also capture the adjusted overheads and staff costs following a transfer from any non-OU setting into an OU.

Midwifery staffing, although attributed the same unit cost per hour in all birth settings, was highest in the planned AMU group, reflecting a longer duration of labour care in comparison with the other non-OU settings (£611.0 (AMU) compared with £580.5 (home), £577.9 (FMU) and £472.4 (OU) $p<0.001$). Planned births at home were attributed a second midwife for an hour during the birth of the baby and this is captured in the staffing cost. The calculation of this additional staffing measure was made with reference to interviews about staff to woman ratios from data collection

meetings with the Birthplace regional lead midwives. The midwifery staff cost in the OU is the lowest, most likely reflecting the 65% intermittent support during labour allocated there.

**Table 2. Mean cost per woman according to planned place of birth for all 'low risk' women**

| Cost category | OU | | Home | | FMU | | AMU | | P value | Bootstrap mean difference (95% CI) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | (SE) | Mean | (SE) | Mean | (SE) | Mean | (SE) | | OU-Home | OU-FMU | OU-AMU |
| Overheads | 569.4 | (2.9) | 92.6 | (1.9) | 426.1 | (3.1) | 450.6 | (2.8) | p<0.001 | -475.6 (-482.0, -468.8) | -143.3 (-152.2, -134.9) | -118.7 (-126.9, -110.6) |
| Midwifery staffing | 472.4 | (2.4) | 580.5 | (2.8) | 577.9 | (3.8) | 611.1 | (3.4) | p<0.001 | 108.1 (100.2, 116.4) | 105.2 (95.9, 114.4) | 138.7 (130.4, 147.2) |
| Homebirth resources | 0.0 | (0.0) | 111.8 | (0.2) | 0.0 | (0.0) | 0.0 | (0.0) | p<0.001 | 111.7 (111.2, 112.1) | 0.0 (0.0, 0.0) | 0.0 (0.0, 0.0) |
| Transfer | 0.0 | (0.0) | 33.9 | (0.7) | 49.3 | (1.0) | 0.003 | (0.0) | p<0.001 | 33.7 (32.4, 35.1) | 49.1 (46.9, 51.2) | 0.0036 (0.0034, 0.0037) |
| Procedures after transfer | 0.0 | (0.0) | 53.1 | (0.9) | 36.4 | (0.7) | 43.0 | (0.6) | p<0.001 | 53.0 (51.2, 54.8) | 36.4 (34.9, 37.8) | 42.9 (41.8, 44.2) |
| Birth | 207.0 | (2.5) | 76.5 | (1.5) | 93.9 | (2.1) | 114.1 | (1.9) | p<0.001 | -130.1 (-135.8, -124.7) | -113.4 (-119.9, -107.2) | -92.9 (-99.2, -86.6) |
| Procedures during labour care | 174.1 | (1.9) | 49.9 | (1.3) | 64.9 | (1.7) | 83.9 | (1.5) | p<0.001 | -122.8 (-127.1, -118.2) | -109.3 (-114.2, -104.4) | -89.9 (-94.9, -85.1) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Postnatal care | 122.0 | (0.6) | 17.7 | (0.4) | 127.2 | (0.9) | 101.9 | (0.6) | p<0.001 | 104.3(-105.9,-102.5) | 5.1 (2.7, 7.6) | -20.1 (-22.1, -18.3) |
| Higher care – mother | 21.7 | (0.9) | 7.9 | (0.8) | 9.3 | (0.9) | 11.8 | (0.6) | p<0.001 | -13.2 (-15.5, -10.8) | -11.9 (-14.3, -9.8) | -9.6 (-11.8, -7.6) |
| Admission to higher care – baby | 64.2 | (5.2) | 42.1 | (4.3) | 49.6 | (7.5) | 44.7 | (6.2) | 0.037 | -21.9 (-36.6, -9.4) | -15.0 (-32.8, -3.7) | -19.6 (-35.6, -1.9) |
| **Total cost** | **1631.2** | **(10.1)** | **1066.5** | **(8.9)** | **1434.9** | **(13.5)** | **1461.2** | **(11.1)** | **p<0.001** | **-564.6 (-591.7, -533.9)** | **-195.4 (129.1, -157.4)** | **-169.5 (-199.7, -137.4)** |

**Table 3. Mean cost per woman according to planned place of birth for women at 'low risk' without complicating conditions at the start of care in labour**

| **Cost category** | **OU** | | **Home** | | **FMU** | | **AMU** | | **P value** | **Bootstrap mean difference (95% CI)** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Mean** | **(SE)** | **Mean** | **(SE)** | **Mean** | **(SE)** | **Mean** | **(SE)** | | **OU-Home** | **OU-FMU** | **OU-AMU** |
| Overheads | 544.5 | (3.1) | 81.3 | (1.8) | 419.7 | (3.2) | 441.5 | (2.8) | p<0.001 | -463.2 (-473.6, -453.8) | -125.2 (-138.8, -111.5) | -103.2 (-115.7, -90.2) |
| Midwifery staffing | 451.7 | (2.6) | 573.6 | (2.9) | 572.6 | (3.9) | 602.9 | (3.5) | p<0.001 | 121.9.0 (109.8, 133.3) | -120.9 (107.7, 137.6) | 151.1 (136.9, 165.2) |
| Homebirth resources | 0.0 | (0.0) | 112.0 | (0.2) | 0.0 | (0.0) | 0.0 | (0.0) | p<0.001 | 111.7 (111.2, 112.1) | 0.0 (0.0, 0.0) | 0.0 (0.0, 0.0) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Transfer | 0.0 | (0.0) | 31.6 | (0.7) | 46.3 | (1.0) | 0.003 | (0.0) | p<0.001 | 31.6 (29.1, 33.8) | 46.2 (42.2, 49.2) | 0.0036 (0.0034, 0.0037) |
| Procedures after transfer | 0.0 | (0.0) | 49.4 | (0.9) | 34.0 | (0.7) | 40.3 | (0.6) | p<0.001 | 49.4 (47.6, 51.2) | 33.9 (32.5, 35.4) | 40.2 (38.9, 41.5) |
| Birth | 175.4 | (2.5) | 71.1 | (1.5) | 89.2 | (2.1) | 108.2 | (1.9) | p<0.001 | -104.4 (-113.3, -95.8) | -86.2 (-95.9, -76.2) | -67.4 (-76.1, -56.1) |
| Procedures during labour care | 151.5 | (2.0) | 46.1 | (1.2) | 61.5 | (1.7) | 79.6 | (1.5) | p<0.001 | -105.3 (-112.7, -96.1) | -90.1 (-98.2, -82.4) | -71.8 (-78.9, -63.3) |
| Postnatal care | 114.2 | (0.7) | 15.5 | (0.4) | 125.7 | (0.9) | 100.0 | (0.6) | p<0.001 | -98.8 (-101.3, -96.1) | 11.5 (7.63, 14.9) | -14.23 (-17.7, -11.7) |
| Admission to higher care – mother | 18.5 | (0.9) | 7.3 | (0.8) | 8.9 | (0.9) | 11.0 | (0.6) | p<0.001 | -11.3 (-15.3, -7.6) | -9.6 (-15.4, -5.1) | -7.6 (-10.8, -4.5) |
| Admission to higher care – baby | 54.4 | (5.8) | 37.6 | (4.3) | 47.3 | (7.8) | 42.6 | (6.4) | 0.037 | -16.9 (-39.5, 5.5) | -7.02 (-38.9, -35.1) | -11.7 (-27.1, 20.3) |
| **Total cost** | **1510.6** | **(10.1)** | **1026.9** | **(8.8)** | **1405.0** | **(13.7)** | **1426.4** | **(11.3)** | **p<0.001** | **-483.8 (-537.5, -435.6)** | **-105.1 (-165.4, -45.6)** | **-84.0 (-114.4, -55.2)** |

The mean cost of transfer per woman was highest for the FMU group compared with the other planned places of birth, though a small absolute cost, which reflected the slightly greater use of ambulance services and the comparatively longer distances travelled from FMUs.

The mean cost of procedures during labour care included the costs of augmentation of labour, epidural or spinal analgesia, general anaesthesia, episiotomy, active management of the third stage of labour, repair of perineal trauma and the cost of blood transfusion. It was substantially higher in the women who planned to give birth in the OU (£174.1) compared with the planned non-OU settings; £64.9 (FMU), £83.9 (AMU) and £49.9 (home), $p<0.001$.

Although the absolute costs for higher level post-natal and neonatal care were small, and few mothers or babies were admitted, the costs were still significantly higher in the planned OU birth setting, ($p<0.05$).

'Normal birth' is that defined by the Maternity Care Working Party as birth with none of the following interventions: induction of labour, epidural or spinal analgesia; general anaesthetic; episiotomy; forceps, ventouse or caesarean section. Women with an induction of labour were excluded from the 'low risk' cohort included in this study. The following average costs were generated for women in all planned settings for birth; the average cost of 'normal birth' was £938; the average cost of a spontaneous vaginal birth without complications was £947, which is similar to the HRG code for 'NZ11B normal delivery no clinical complications' estimated at £976. 'NZ11A' is the HRG code for 'normal delivery with clinical complications' costing £1,711; we calculated the average cost of spontaneous vaginal birth with clinical complications to be £2,081. Our results tended to show similar costs when compared to the HRG code estimates for straightforward uncomplicated births. Our estimates were slightly lower, possibly because women with high risk of complications at the start of care in labour were excluded from our analysis. Our cost estimates tended to be elevated compared with HRG costs for deliveries with clinical complications, for example, we estimated the average cost of a spontaneous vaginal birth with an epidural and with complications to be £2,448, compared with the HRG code NZ11C, which estimated 'normal delivery with epidural with clinical complications' at £1,868.

Total costs capture the resource use and the unit costs associated with them. The total mean costs per 'low risk' woman planning a birth in the alternative settings at the start of care in labour were as follows: OU £1,631.2, AMU £1,461.2, FMU £1,434.9 and home £1,066.5.

When women with complicating conditions at the start of care in labour were excluded from the analysis of mean cost per women, the average costs generally reduced, although the patterns of resource use and average costs that were estimated for the planned OU and non-OU settings remained similar to those shown in table 2.

Health care cost data tend to be highly skewed. This can only be partly addressed using parametric methods because the arithmetic mean is the informative instrument, providing information about the cost of treating all patients, which is required for healthcare policy decisions. (10) In order to fully address the skewed nature of the data we performed additional non-parametric analyses on the cost differences between the planned settings for birth. Initially, we conducted a bootstrap (using 1,000 replications with resampling) of the mean cost differences for each cost category within this dataset, for women both with and without complicating conditions at the start of care in labour as shown in tables 2 and 3.

The bootstrapped mean differences in total cost between the planned OU and non-OU settings for all 'low risk' women are: -£564.6 (reflecting the average cost saving of planned birth at home compared with an OU), -£195.4 (reflecting the average cost saving of planned birth in a FMU compared with an OU) and -£169.5 (reflecting the average cost saving of planned birth in an AMU compared with an OU).

This was repeated for women at 'low risk' without complicating conditions at the start of care in labour. Total mean costs decreased across all planned settings for birth, but this reduction was substantial for births planned in an OU and relatively small for births planned in non-OU settings. Total mean costs for women without complicating conditions at the start of care in labour approximated as follows: OU £1,510.6, AMU £1,426.4, FMU £1,405.0 and home £1,026.9. It was found that the bootstrapped mean cost differences were: -£483.8 (reflecting the average cost saving of planned birth at home compared with an OU), -£105 (reflecting the average cost saving of planned birth in a FMU compared with an OU) and -£84 (reflecting the average cost saving of planned birth in an AMU compared with the OU). The mean cost differences between the OU and non-OU settings decreased and this is due to the reduction in costs borne by the OU when women without complicating conditions at the start of care in labour were excluded.

Furthermore, an additional adjustment of this cost data was performed using a bootstrap (1,000 replications with resampling) of the data adjusted for the same confounders as in the multiple regression on clinical outcomes. Mean cost differences and standard errors were generated for these estimates. They are shown in section 3.4.

## *3.4 Generalised linear regression on cost*

Table 4 shows the results of a generalised linear regression on total cost. Planned place of birth acted as the main exposure. Included as potential confounders in the analysis were parity, completed weeks of gestation, BMI, ethnicity, maternal age, IMD quintiles and mother's understanding of English. The following variables acted as referents; planned place of birth (OU), parity(nulliparous), gestational age at birth (40 weeks), marital status

(married), BMI (19-24 kg/$m^2$), ethnic group (white British), maternal age (25-29 years), IMD score (least deprived quintile) and mother's understanding of English (fluent). When compared with planned place of birth in an OU, this regression shows that planned place of birth in non-OU settings are cost saving. This finding is statistically significant. Planned birth at home reduces costs the most, followed by approximately similar cost-savings for planned birth in a FMU and then an AMU. The estimates produced from this regression were -£310 (the average cost saving of planned birth at home compared with an OU), -£130 (the average cost saving of planned birth in a FMU compared with an OU) and £-134 (the average cost saving of planned birth in an AMU compared with an OU). Adjusting for parity resulted in sizable and significant cost differences, which overshadowed all other adjustments for confounding and the mean costs of care were substantially reduced for women who were parous compared to nulliparous. This cost-saving was accentuated for each previous pregnancy.

The costs of care increased above 40 weeks gestation at birth; for example, birth at 42-44 weeks gestation reflected a much higher cost increase (£462) than birth at 41 weeks gestation (£112.2).

A maternal age of 35 – 39 years and above increased the mean costs of care, and this was even more apparent in women aged over 40 years.

Being married (referent) seemed to be associated with being cost-saving when compared with being single or unsupported by a partner.

A BMI below the referent (19-24 kg/$m^2$) seemed to be cost saving, and a greater BMI than the referent more costly in terms of the provision of maternity care. A BMI that was 'not recorded' was associated with the highest cost increment in this category, and might have reflected a higher BMI score on average that was not recorded prior to the start of care in labour.

IMD score and women's understanding of English did not have significant effects on total cost.

An additional bootstrapped analysis was performed on the adjusted weighted cost data. It generated the following cost differences between births planned in the different settings: average cost difference between planned births in an OU and at home -£366.8 (SE 38.1); average cost difference between planned birth in an OU and a FMU -£182.1, (SE 44.0); and average cost difference between planned birth in an OU and an AMU -£129.3, (SE 59.2). All these cost figures are negative reflecting the cost-saving effect of planned birth in a non-OU setting compared with planned birth in an OU setting.

**Table 4. Cost per woman adjusted for socio-demographic and other factors: generalised linear regression***

| Covariate | Coef. | Std. Err. | p value | [95% CI] | |
|---|---|---|---|---|---|
| Planned place birth OU (referent) | - | | | | |
| Planned place birth: home | -310.0 | 11.2 | 0.000 | -332.05 | -287.9 |
| Planned place birth: FMU | -130.1 | 13.4 | 0.000 | -156.5 | -103.7 |
| Planned place birth: AMU | -134.4 | 12.2 | 0.000 | -158.5 | -110.4 |
| Parity: 0 prev pregnancy (referent) | - | | | | |
| Parity: 1 prev pregnancy | -917.7 | 11.9 | 0.000 | -941.1 | -894.5 |
| Parity: 2 prev pregnancies | -1037.7 | 13.3 | 0.000 | -1063.8 | -1011.6 |
| Parity: 3+ prev pregnancies | -1058.3 | 15.4 | 0.000 | -1088.5 | -1028.2 |
| 37 weeks gestation | 54.7 | 25.4 | 0.031 | 4.9 | 104.5 |
| 38 weeks gestation | -56.1 | 13.3 | 0.000 | -82.2 | -30.0 |
| 39 weeks gestation | -72.4 | 9.5 | 0.000 | -91.2 | -53.7 |
| 40 weeks gestation (referent) | - | | | | |
| 41 weeks gestation | 112.2 | 11.3 | 0.000 | 89.9 | 134.6 |
| 42-44 weeks gestation | 462.5 | 48.6 | 0.000 | 367.2 | 557.9 |
| Married (referent) | - | | | | |
| Single/unsupported partner | 45.7 | 17.1 | 0.008 | 12.1 | 79.2 |
| BMI not recorded | 50.1 | 10.9 | 0.000 | 28.6 | 71.6 |
| BMI 10-18 | -19.2 | 24.7 | 0.438 | -67.6 | 29.3 |
| BMI 19-24 (referent) | - | | | | |
| BMI 25-29 | 35.9 | 9.9 | 0.000 | 16.4 | 55.4 |
| BMI 30-35 | 33.1 | 14.7 | 0.024 | 4.3 | 61.8 |
| White British (referent) | - | | | | |
| Indian/Bangladeshi | 42.0 | 27.9 | 0.131 | -12.5 | 96.7 |
| Pakistani | 56.3 | 30.3 | 0.063 | -3.1 | 115.8 |
| Black Caribbean | -62.9 | 36.3 | 0.083 | -134.1 | 8.2 |

| | | | | | |
|---|---|---|---|---|---|
| Black African | 59.2 | 30.3 | 0.051 | -0.2 | 118.8 |
| Mixed | 27.0 | 32.1 | 0.400 | -35.8 | 89.9 |
| Other | 29.4 | 24.1 | 0.223 | -17.9 | 76.7 |
| Maternal age <20 | -159.8 | 22.7 | 0.000 | -204.5 | -115.2 |
| Maternal age 20-24 | -44.8 | 12.1 | 0.000 | -68.7 | -20.9 |
| Maternal age 25-29 (referent) | - | | | | |
| Maternal age 30-34 | 37.6 | 10.3 | 0.000 | 17.3 | 57.9 |
| Maternal age 35-39 | 58.5 | 11.8 | 0.000 | 35.2 | 81.8 |
| Maternal age 40-60 | 151.3 | 24.8 | 0.000 | 102.7 | 199.9 |
| IMD 0.37-8.31 (least deprived - referent) | - | | | | |
| IMD 8.32-13.73 | 15.4 | 13.0 | 0.234 | -10.0 | 40.9 |
| IMD 13.74-21.21 | 30.6 | 12.8 | 0.017 | 5.4 | 55.8 |
| IMD 21.22-34.41 | 33.9 | 12.4 | 0.007 | 9.4 | 58.3 |
| IMD 34.42-85.46 (most deprived) | 24.0 | 12.0 | 0.047 | 0.3 | 47.7 |
| Fluent in English (referent) | - | | | | |
| Some English | 19.2 | 24.6 | 0.435 | -29.0 | 67.4 |
| No English | -39.9 | 40.2 | 0.322 | -118.8 | 39.0 |
| Constant | 2004.7 | 17.7 | 0.000 | 1969.9 | 2039.5 |

**UK Sterling (2009/10 prices), estimated using a gamma distribution and an identity link function*

*n= 62036 AIC = 16.26562*

## *3.5 Additional analyses of costs by parity sub-group*

Additional subgroup analyses of total mean costs were conducted by parity. These found the total bootstrapped weighted mean cost per 'low risk' nulliparous woman to be £2075.2 for a planned OU birth, £1,983.1 for a planned AMU birth, £1,912.5 for a planned FMU birth and £1,793.7 for a planned home birth. This compared to total bootstrapped weighted mean costs per 'low risk' multiparous woman of £1,142.4, 991.3, £968.9 and £780.4 for a planned OU birth, a planned AMU birth, a planned FMU birth and a planned home birth, respectively.

The total bootstrapped weighted mean cost per 'low risk' nulliparous woman without complicating conditions at the start of care in labour was £1,940.4

for a planned OU birth, £1932.5 for a planned AMU birth, £1,880.7 for a planned FMU birth and £1,719.0 for a planned home birth. In contrast, the total bootstrapped weighted mean costs per 'low risk' multiparous woman without complicating conditions at the start of care in labour was £1076.9 for a planned OU birth, £978.3 for a planned AMU birth, £953.7 for a planned FMU birth and £765.8 for a planned home birth.

## *3.6 Cost effectiveness*

Three sets of cost-effectiveness analyses were conducted; for adverse perinatal outcome averted, maternal morbidity avoided and additional 'normal birth'. These three measures enable a comprehensive analysis of cost-effectiveness of planned place of birth for women at 'low risk' of complications prior to the onset of labour both the baby and mother.

The ICERs that were generated in these analyses are shown in Tables 5-17 and weighted bootstrapped scatterplots are represented graphically in cost-effectiveness planes in Figures 1-30. ICER estimates were recalculated for women without complicating conditions at the start of care in labour, and subgroup analyses by parity were conducted for the estimates of incremental cost per adverse perinatal outcome averted.

All sets of ICERs were bootstrapped. The origin of the cost-effectiveness planes represents the average cost and average effect for the reference group, in this case planned birth in an OU. The point estimates of mean ICERs therefore represent the incremental changes in costs and effects generated by the differences between the OU and the alternative planned places of birth. In each analysis, 1,000 bootstrapped mean ICERs were plotted on the cost effectiveness plane. They show the uncertainty around the mean reported ICERs. An attempt was made to fit all the vertical and horizontal axes to the same scale (x axis: +/-0.4, y axis: +/-£600), but this caused several ICER scatterplots to shrink into near point estimates, so the axes were individually adjusted to maximise the scatterplot presentation. They have been standardised to common scales for each outcome measure; 'perinatal' outcome (x axis: +/- 0.009, y axis: +/- £700), maternal outcome (x axis: +/- 0.02, y axis: +/- £600), 'normal birth' (x axis: +/- 0.03, y axis: +/- £600).

### 3.6.1 Cost-effectiveness analyses for the primary outcome

The primary outcome measure was defined as a case of 'intrapartum stillbirth and early neonatal mortality and specific neonatal morbidity'.

**Table 5. Incremental cost effectiveness ratios and net benefit statistics for the primary outcome**

| | **Incremental cost per additional case of intrapartum stillbirth and early neonatal mortality and specific neonatal morbidity avoided** | | |
|---|---|---|---|
| **Baseline** | **(OU ) → (Home)** | **(OU ) → (FMU)** | **(OU ) → (AMU)** |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -565 (-591, -538) | -196 (-229, -163) | -170 (-199, -141) |
| Difference in adverse perinatal outcome (95% CI) | -0.00007 (-0.0014, 0.0013) | +0.0004 (-0.0010, 0.0019) | +0.0005 (-0.0007, 0.0019) |
| for **Mean ICER**† | **7 950 356** | **-431 873** | **-296 400** |
| Quadrant on the cost-effectiveness plane | south west | south east | south east |
| Mean net benefit (95% CI)* | 591.8 (547.1, 638.6) | 263.3 (210.9, 314.8) | 167.2 (111.4, 223.7) |

†*95% CI surrounding the ICERs are not provided because bootstrapped replicates of the ICERs fall across more than one quadrant of the cost-effectiveness plane*

*Estimated at a £20,000 cost-effectiveness threshold*

Table 5 shows the estimate of the ICER using differences in costs divided by differences in effects between planned place of birth and using the OU as the reference group.

Differences in effects are calculated as the change in adverse perinatal outcome (a measure of negative outcome), by subtracting adverse perinatal outcome for planned birth in an OU from adverse perinatal outcome for planned birth in a non-OU setting.

Differences in costs are calculated by subtracting mean costs for planned birth in an OU setting from mean costs in a non-OU setting. Thus the changes incosts for planned places of birth from an OU to non-OU settings are reflected as negative values in the table above, because they are cost-saving. This is true for all the cost changes for the planned places of birth shown above in table 5.

The incidence of adverse perinatal outcomes (intrapartum stillbirth, early neonatal death, neonatal encephalopathy, meconium aspiration and specified birth related injuries including brachial plexus injury) was low in all settings. However, when differences in effects were measured, asmall increase in adverse perinatal outcome was identified in the planned home birth group, explaining the negative summary statistic as shown in the table. We know from the prospective cohort study that a significantly increased odds of an adverse perinatal outcome for 'low risk' nulliparous women was identified in the planned home birth group. For multiparous women, there were no statistically significant differences between birth

settings in rates of adverse perinatal outcome. The ICER measure shown in the table is, on average, positive for the cost-effectiveness analysis of switching from planned birth in an OU to home, being both cost saving but with a small increase in adverse perinatal outcome. It is, on average, negative for the switches to planned birth in midwifery units reflecting both cost-savings and positive perinatal effects. The differences in effects are very small; however these are magnified in the ICER calculations, as the mean differences in effects are used as the denominators of the ICER statistics. Thus the ICER estimates range from -£296,400 to £7,950,356, reflecting sizable reductions in cost and small changes in perinatal outcome when measuring differences between planned birth in an OU and non-OU settings. These estimates have very wide confidence intervals. 1,000 bootstrapped weighted estimates for each of the ICERs are presented on cost-effectiveness planes in figures 1-3 below.

**Figure 1. Cost effectiveness plane: planned birth at home compared with OU for all 'low risk' women**

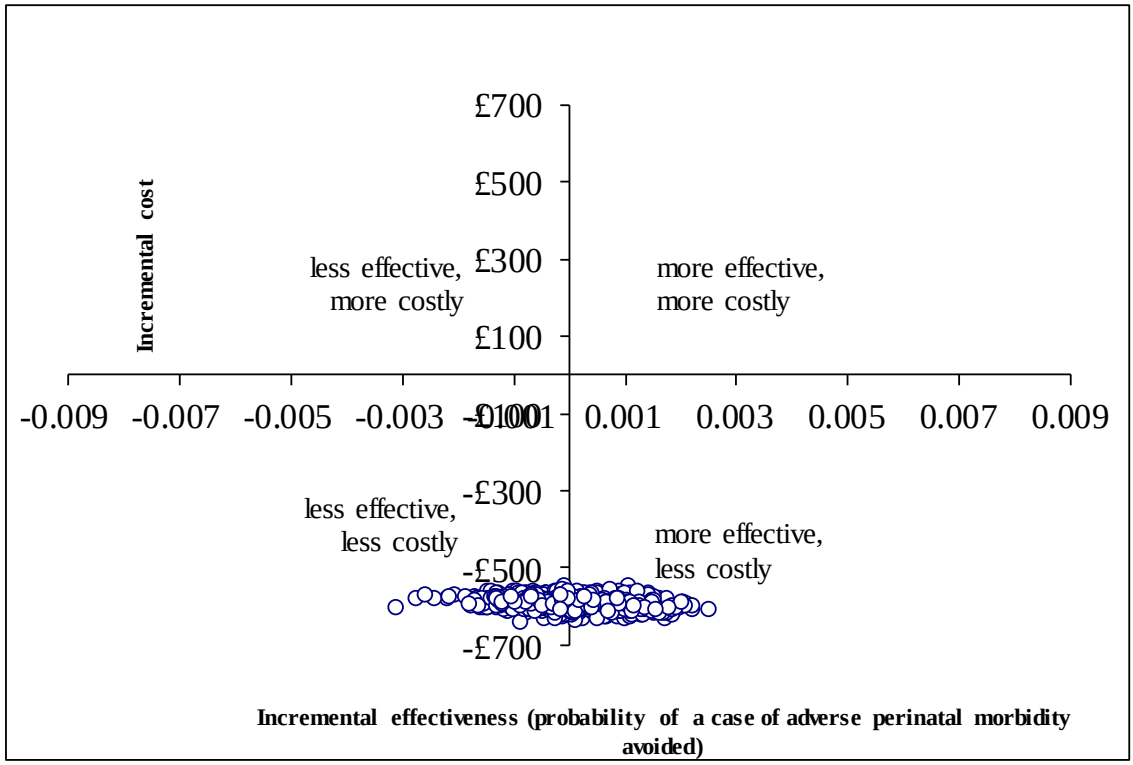



**Figure 2. Cost effectiveness plane: planned birth in a FMU compared with OU for all 'low risk' women**

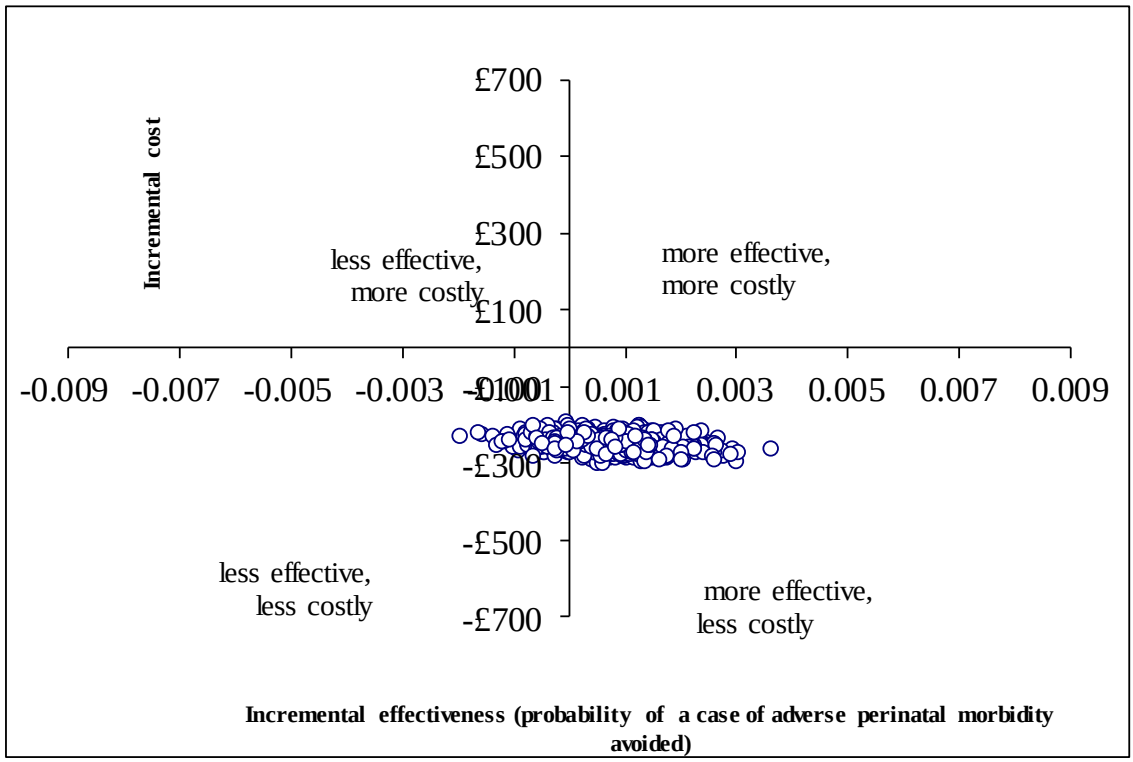
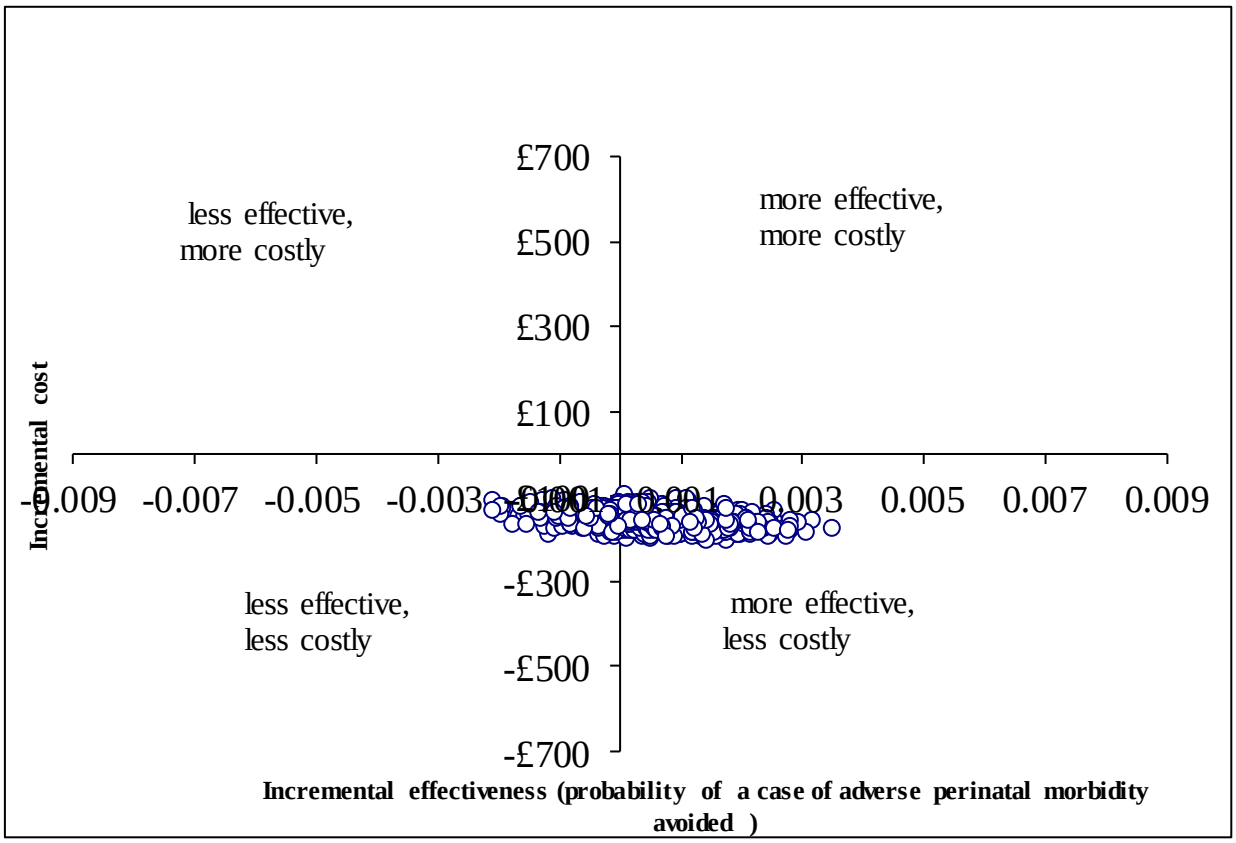


**Figure 3. Cost effectiveness plane: planned birth in an AMU compared with OU for all 'low risk' women**




The scatterplots of bootstrapped ICERs fall across the south west and south east quadrants of the cost-effectiveness planes (Figures 1-3). This represents a lower cost attributable to births in planned non-OU settings, but also represents considerable uncertainty about any difference in the primary clinical outcome for the groups of women who planned their birth in non-OU settings. The south east quadrant represents improved outcomes and the south west quadrant worse outcomes, though they both represent lower cost.

### 3.6.2 Cost-effectiveness analyses for the primary outcome for 'low risk' women without complicating conditions at the start of care in labour

The primary outcome is defined as a case of 'intrapartum and early neonatal mortality and specific neonatal morbidity'. The analyses were repeated for women without complicating conditions at the start of labour care.

Table 6 reflects very small differences in effectiveness between the planned places of birth. The mean ICER statistics is positive for the cost-effectiveness analyses assessing changes from planned birth in an OU to

non-OU settings, being on average both cost-saving but with a small increase in adverse perinatal outcome. Asin table 5, the differences in effects are small; however these are magnified in the ICER calculations, as the mean differences in effectiveness are used as the denominators of the ICER statistics. Thus the mean ICER estimates range from £143,382 (AMU) to £497,595 (home), reflecting, on average, sizable reductions in costs and small changes in perinatal outcomes. These changes in adverse perinatal outcome were not significant for planned births in midwifery units.

The cost differences between planned birth in the OU and non-OU settings were smaller in this set of analyses. This is due to the reduction in the total cost following the exclusion of women at 'low risk' who had complicating conditions at the start of care in labour. A disproportionate number of women with complicating conditions noted at the start of labour care were observed in the planned OU group. When excluded, summary statistics show a narrowing of the cost differences between the OU and the other birth settings. Consequently, in these additional analyses, reductions in the OU-related costs are captured by the decreased mean ICER statistics. The cost differences here are closer to the costs reflected in the adjusted costs shown in the multiple regression, which were -£310 (home compared with OU), -£130.1 (FMU compared with OU) and -£134 (AMU compared with the OU) (table 4). They are also similar to the cost differences calculated in the adjusted bootstrapped analysis (OU and home:-£366.8 OU and FMU -£182.1, OU and AMU -£129.3), and are therefore possibly more representative of the true cost differences for outcomes of women at 'low risk' prior to the onset of labour.Figures 4-6 show scatterplots of the 1,000 bootstrapped ICER estimates for the analyses shown in table 6.

**Table 6. Incremental cost effectiveness ratios and net benefit statistics for the primary outcome for women without complicating conditions at the start of care in labour**

| | **Incremental cost per additional case of intrapartum stillbirth and early neonatal mortality and specific neonatal morbidity avoided** | | |
|---|---|---|---|
| **Baseline** | **(OU ) → (Home)** | **(OU ) → (FMU)** | **(OU ) → (AMU)** |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -484 (-511, -456) | -105 (-139, -71) | -84 (-115, -53) |
| Difference in adverse perinatal outcome (95% CI) | -0.0009 (-0.0023, -0.0003) | -0.0003 (-0.0017, 0.0011) | -0.0005 (-0.0019, 0.0007) |
| **Mean ICER†** | **497 595** | **313 886** | **143 382** |
| Quadrant on the cost-effectiveness plane | south west | south west | south west |
| Mean net benefit (95% CI)* | 482.8 (434.3, 534.4) | 142.6 (91.8, 192.5) | 58.3 (4.5, 113.6) |

†*95% CI surrounding the ICERs are not provided because bootstrapped replicates of the ICERs fall across more than one quadrant of the cost-effectiveness plane*

*Estimated at a £20 000 cost-effectiveness threshold*

**Figure 4. Cost effectiveness plane: planned birth at home compared with OU for 'low risk' women without complicating conditions at the start of care in labour**

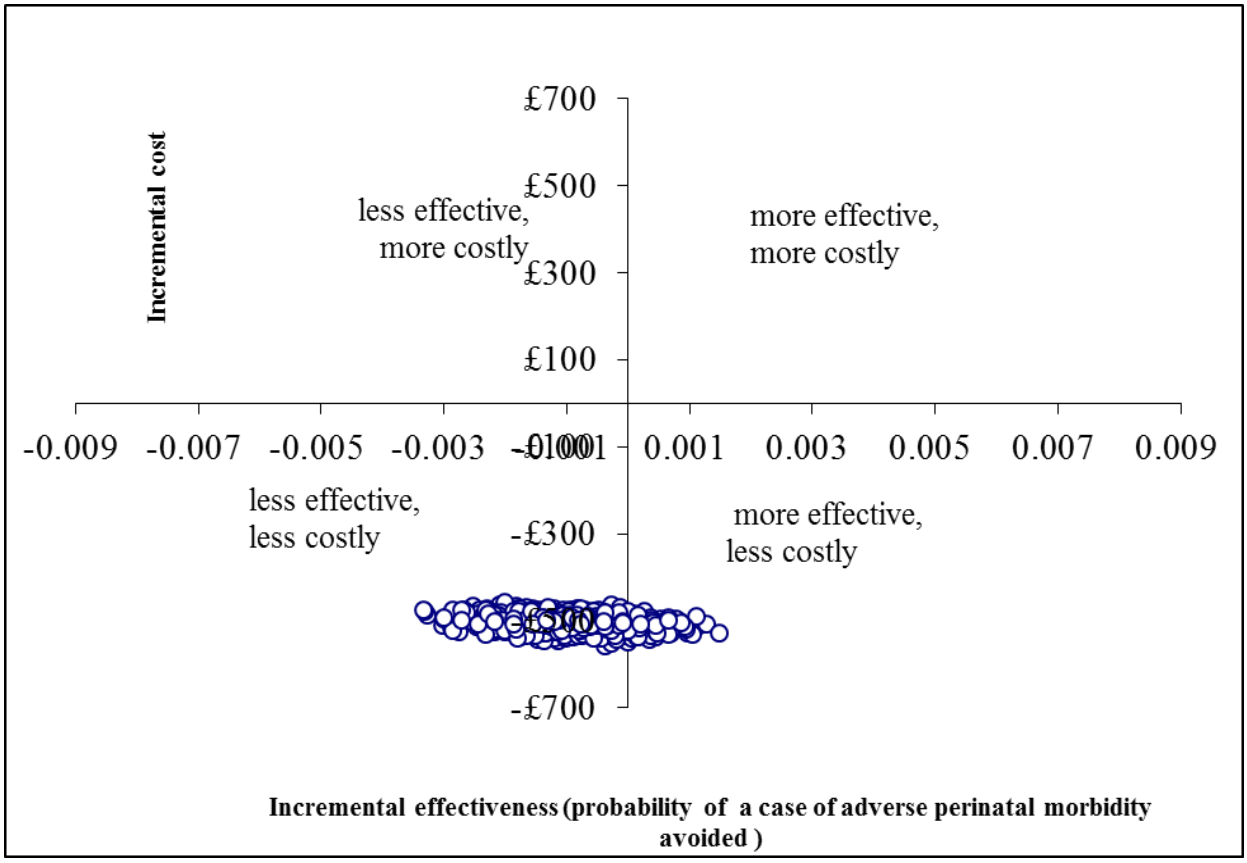
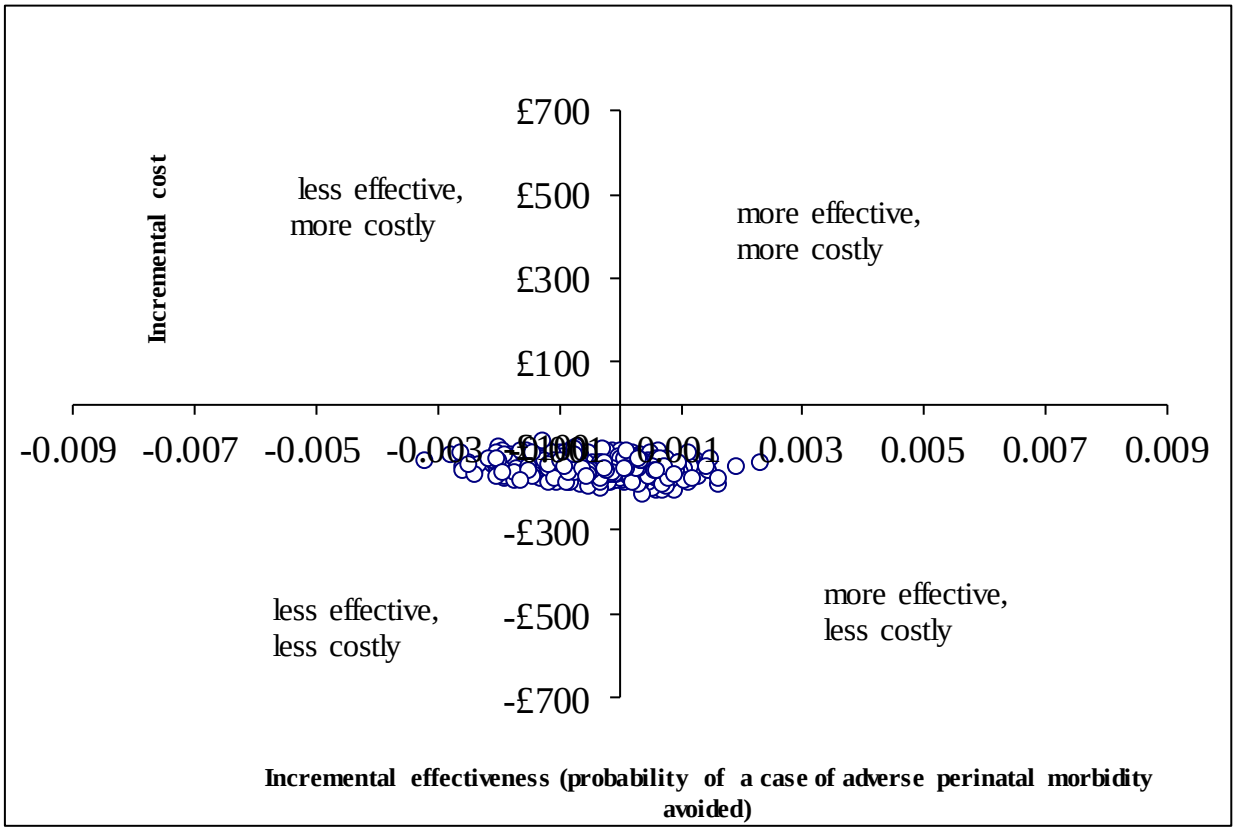


**Figure 5. Cost effectiveness plane: planned birth in a FMU compared with OU for all 'low risk' women without complicating conditions at the start of care in labour**



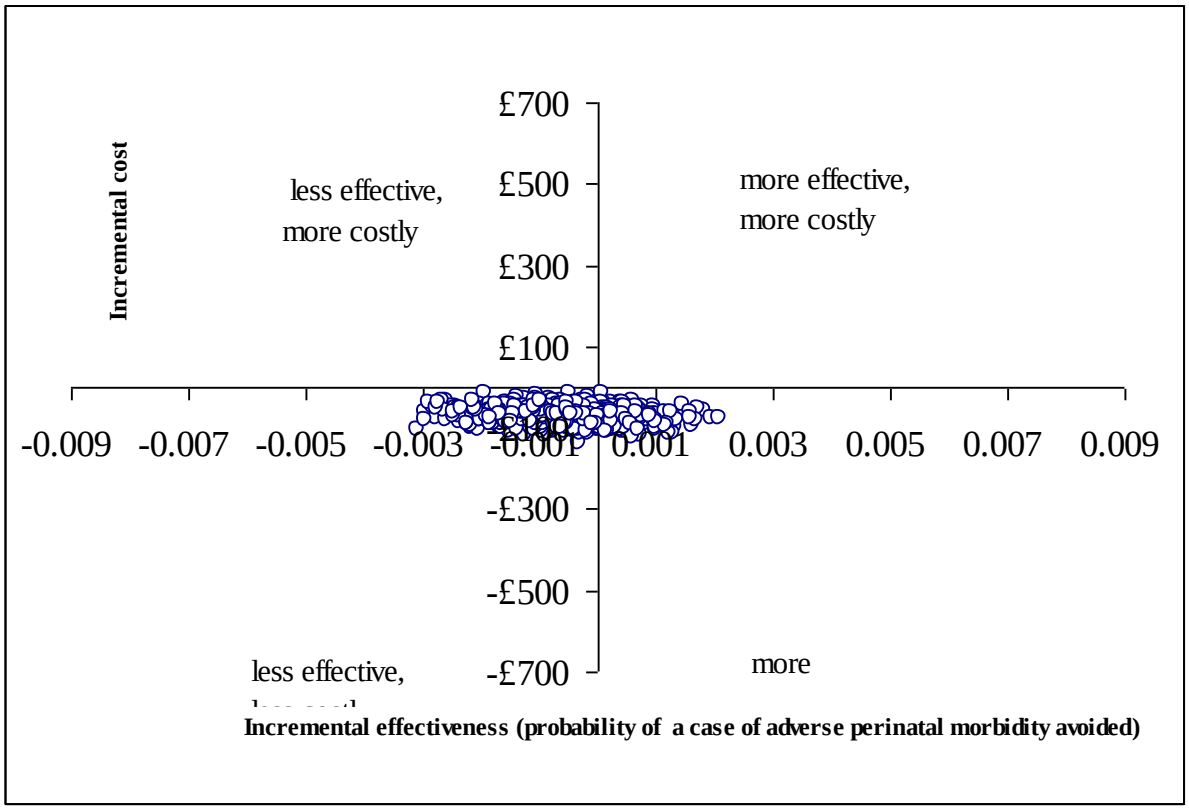

When women with complicating conditions at the start of labour care were excluded from these analyses (see figures 4-6), then we observed cost savings but with an associated small increase in adverse perinatal outcomes that was not statistically significant in the midwifery units. The cost savings were smaller than in the previous analyses. Although all the scatterplots fell within the south west and south east quadrants, their position changed reflecting reduced cost savings though similar levels of uncertainty surrounding the changes in adverse perinatal outcomes.

### 3.6.3 Sensitivity analyses performed on the primary cost-effectiveness outcome for all 'low risk' women

Sensitivity analyses were performed on key cost variables. Uncertainty remained about the modelled overheads costs and the midwifery costs, which included CNST contributions. These were also seen to be generic cost drivers relevant to all settings of birth. Estimates of effects (adverse perinatal outcome) were not changed for these analyses.

**Figure 6. Cost effectiveness plane: planned birth in an AMU compared with OU for all 'low risk' women without complicating conditions at the start of care in labour**




When overheads for all birth settings (excluding home) were recoded to be 20% greater than their original unit cost, the mean cost differences between planned birth at home and planned birth in an OU increased as would be expected, and narrowed between the planned OU and midwifery settings, reflecting the increased costs experienced by all units. When overheads were reduced by 20%, the mean cost differences narrowed. This shows that the OU has a higher overhead cost per labour episode per woman, and consequently carries more of the 'burden' of the overhead costs when compared with care in midwifery units.

Occupancy rates in FMUs and AMUs were then increased to 50% greater than baseline, and for the OU up to full capacity (100% occupancy), which was less than the 50% increase for FMUs and AMUs. The cost differences between planned place of birth in an OU and at home narrow, as would be expected. Cost differences between all units increase as the FMUs and AMUs become more 'efficient' due to a higher throughput. The cost-savings increased and, as a result of higher occupancy rates, planned place of birth in non-OU midwifery units will become even more cost-effective.

In this study, assumptions based on primary research had been made about midwifery staff to woman ratios during labour across different settings. This

was recorded as either intermittent or continuous support that midwifery staff were able to offer in different birth settings. Planned FMU and AMU births had all been attributed continuous midwifery support and this was reduced to 80% in a sensitivity analysis, with a consequent increase in the mean ICERs. Similarly, the midwifery staff to woman ratio during labour in OU settings had been set at 65% in the baseline analysis and this was subsequently varied to between 50% and 90%. As would be expected, the cost differences narrowed between settings when midwifery support during labour decreased in OU settings, and increased when midwifery support during labour increased in OU settings. It is impossible to comment on the 'quality of care' impact that these proportional changes in dedicated staff time could have, but this would be valuable to ascertain in future research.

The findings were generally robust to the sensitivity analyses that shed more light on the nature of the main cost drivers: overheads, occupancy rates and midwifery support during labour, and indicate that the cost-effectiveness results depicted as ICERs respond to changes in these variables in a manner consistent with our expectations.

**Table 7. Sensitivity analyses performed on cost variables for the primary cost-effectiveness outcome**

| **Sensitivity analyses** | | | |
|---|---|---|---|
| | **Incremental cost per additional case of intrapartum stillbirth and early neonatal mortality and specific neonatal morbidity avoided** | | |
| **1) Overheads 20% greater than baseline** | | | |
| | **(OU ) → (Home)** | **(OU ) → (FMU)** | **(OU ) → (AMU)** |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -616 (-744, -588) | -160 (-196, -125) | -133 (-164, -101) |
| Difference in adverse perinatal outcome (95% CI) | -0.00007 (-0.0014, 0.0013) | +0.0004 (-0.0010, 0.0019) | +0.0005 (-0.0007, 0.0019) |
| **Mean ICER†** | **8 669 940** | **-352 975** | **-231 449** |
| Quadrant on the cost-effectiveness plane | south west | south east | south east |
| **2) Overheads 20% lower than baseline** | | | |
| | **(OU ) → (Home)** | **(OU ) → (FMU)** | **(OU ) → (AMU)** |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -469 (-495, -444) | -168 (-199, -136) | -146 (-175, -118) |
| Difference in adverse perinatal outcome (95% CI) | -0.00007 (-0.0014, 0.0013) | +0.0004 (-0.0010, 0.0019) | +0.0005 (-0.0007, 0.0019) |
| **Mean ICER†** | **6 607 830** | **-368 790** | **-255 019** |

| | | | |
|---|---|---|---|
| Quadrant on the cost-effectiveness plane | south west | south east | south east |
| **3) Occupancy rates 50% greater than baseline** | | | |
| | **(OU ) → (Home)** | **(OU ) → (FMU)** | **(OU ) → (AMU)** |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -488<br>(-514.-463) | -234<br>(-266, -202) | -208<br>(-236, -179) |
| Difference in adverse perinatal outcome (95% CI) | -0.00007<br>(-0.0014, 0.0013) | +0.0004<br>(-0.0010, 0.0019) | +0.0005<br>(-0.0007, 0.0019) |
| **Mean ICER†** | **6 875 502** | **-514 135** | **-361 770** |
| Quadrant on the cost-effectiveness plane | south west | south east | south east |
| **4) Midwifery staffing in the AMU and FMU 20% less than baseline (80% intermittent care)** | | | |
| | **(OU ) → (Home)** | **(OU ) → (FMU)** | **(OU ) → (AMU)** |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -565<br>(-591, -538) | -294<br>(-327, -261) | -270<br>(-299, -241) |
| Difference in adverse perinatal outcome (95% CI) | -0.00007<br>(-0.0014, 0.0013) | +0.0004<br>(-0.0010, 0.0019) | +0.0005<br>(-0.0007, 0.0019) |
| **Mean ICER†** | **7 950 355** | **-647 054** | **-470 778** |
| Quadrant on the cost-effectiveness plane | south west | south east | south east |
| **5) Midwifery staffing in the OU 15% less than baseline (50% intermittent care)** | | | |
| | **(OU ) → (Home)** | **(OU ) → (FMU)** | **(OU ) → (AMU)** |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -456<br>(-482, -430) | -87<br>(-120, -55) | -61<br>(-90, -32) |
| Difference in adverse perinatal outcome (95% CI) | -0.00007<br>(-0.0014, 0.0013) | +0.0004<br>(-0.0010, 0.0019) | +0.0005<br>(-0.0007, 0.0019) |
| **Mean ICER†** | **6 415 591** | **-192 025** | **-106 363** |
| Quadrant on the cost-effectiveness plane | south west | south east | south east |
| **6) Midwifery staffing in the OU 25% greater than baseline (90% intermittent care)** | | | |
| | **(OU ) → (Home)** | **(OU ) → (FMU)** | **(OU ) → (AMU)** |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -746<br>(-774, -719) | -378<br>(-412, -344) | -352<br>(-382, -321) |
| Difference in adverse perinatal outcome (95% CI) | -0.00007<br>(-0.0014, 0.0013) | +0.0004<br>(-0.0010, 0.0019) | +0.0005<br>(-0.0007, 0.0019) |

| | | | |
|---|---|---|---|
| **Mean ICER†** | **10 508 297** | **-831 620** | **-613 129** |
| Quadrant on the cost-effectiveness plane | south west | south east | south east |

†*95% CI surrounding the ICERs are not provided because bootstrapped replicates of the ICERs fall across more than one quadrant of the cost-effectiveness plane*

### 3.6.4 Cost-effectiveness analyses for the primary outcome for 'low risk' nulliparous women

Table 8 captures the cost and effect differences between the planned OU and non-OU settings for 'low risk' nulliparous women. The mean ICER for planned birth at home lies in the south west quadrant of the cost-effectiveness plane (figure 7), reflecting on average both a less effective and less-costly maternity option than planned birth in an OU. The differences in effects were calculated in the prospective cohort study and were found to be significant (0.05 level of statistical significance). The mean ICERs for planned birth in an FMU or an AMU did not reflect significant differences in effects and lay in the south east quadrants of the cost-effectiveness plane (figures 8-9), reflecting, on average, reduced costs and improved outcomes but with substantial uncertainty surrounding the latter.

The cost differences between planned OU and non-OU settings narrowed in comparison to the cost differences between the settings for all 'low risk' women. The costs of intrapartum maternity care in all settings was higher for nulliparous low risk women when compared with all 'low risk' women.

**Table 8. Incremental cost effectiveness ratios and net benefit statistics for the primary outcome for 'low risk' nulliparous women**

| | **Incremental cost per additional case of intrapartum stillbirth and early neonatal mortality and specific neonatal morbidity avoided** | | |
|---|---|---|---|
| **Baseline** | **(OU ) → (Home)** | **(OU ) → (FMU)** | **(OU ) → (AMU)** |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -281 (-342.6, -217.2) | -163 (-216.5, -108.3) | -92 (-142.4, -33.4) |
| Difference in adverse perinatal outcome (95% CI) | -0.004 (-0.008, -0.00001) | 0.0008 (-0.002, 0.003) | 0.0005 (-0.003, 0.003) |
| **Mean ICER†** | **69761.23** | **-98135.8** | **-47994.9** |
| Quadrant on the cost-effectiveness plane | south west | south east | south east |
| Mean net benefit (95% CI)* | 203.8 (77.4, 319.2) | 179.2 (97.8, 259.3) | 103.3 (9.2, 188.6) |

†*95% CI surrounding the ICERs are not provided because bootstrapped replicates of the ICERs fall across more than one quadrant of the cost-effectiveness plane*

**Estimated at a £20 000 cost-effectiveness threshold*

**Figure 7. Cost effectiveness plane: planned birth at home compared with OU for 'low risk' nulliparous women**

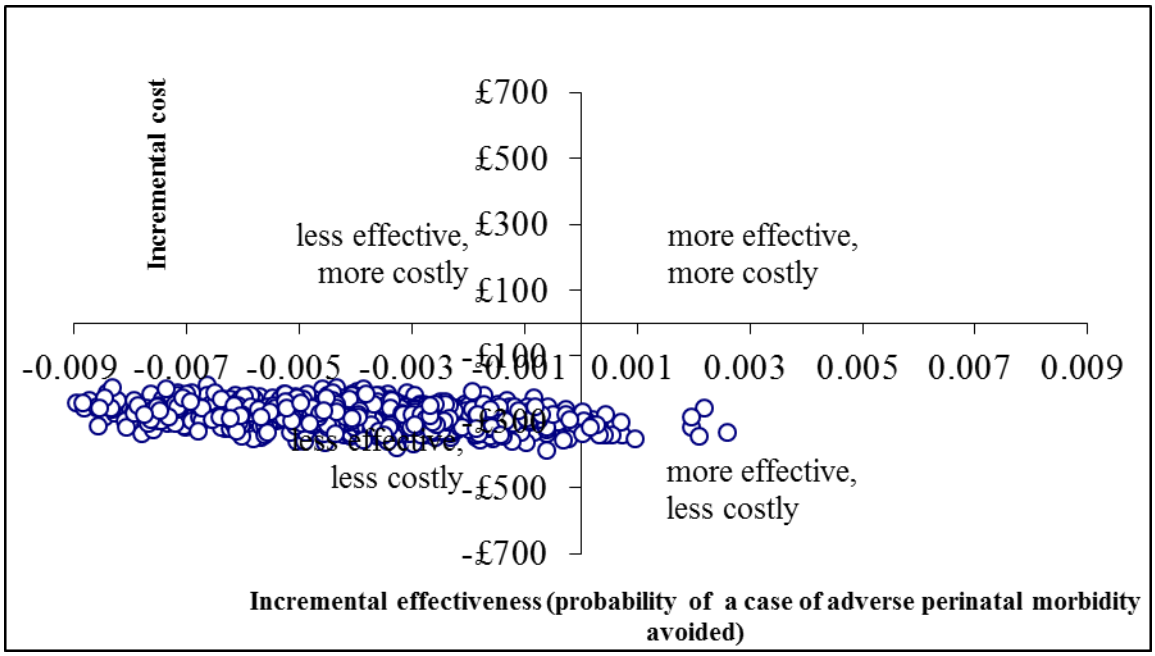



**Figure 8. Cost effectiveness plane: planned birth in a FMU compared with OU for 'low risk' nulliparous women**

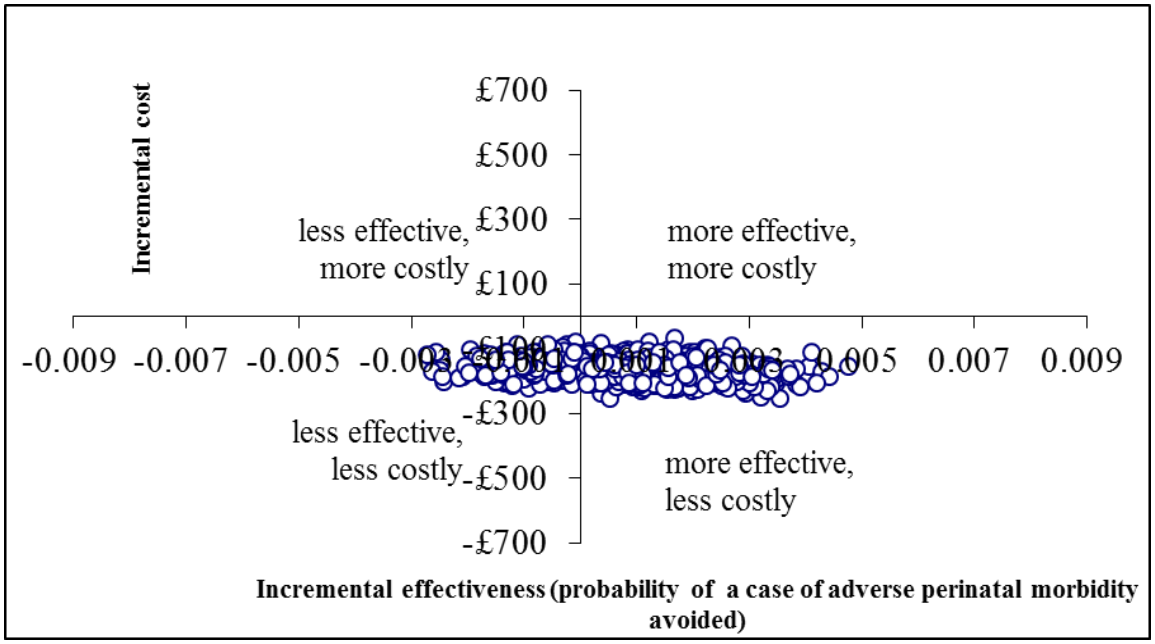
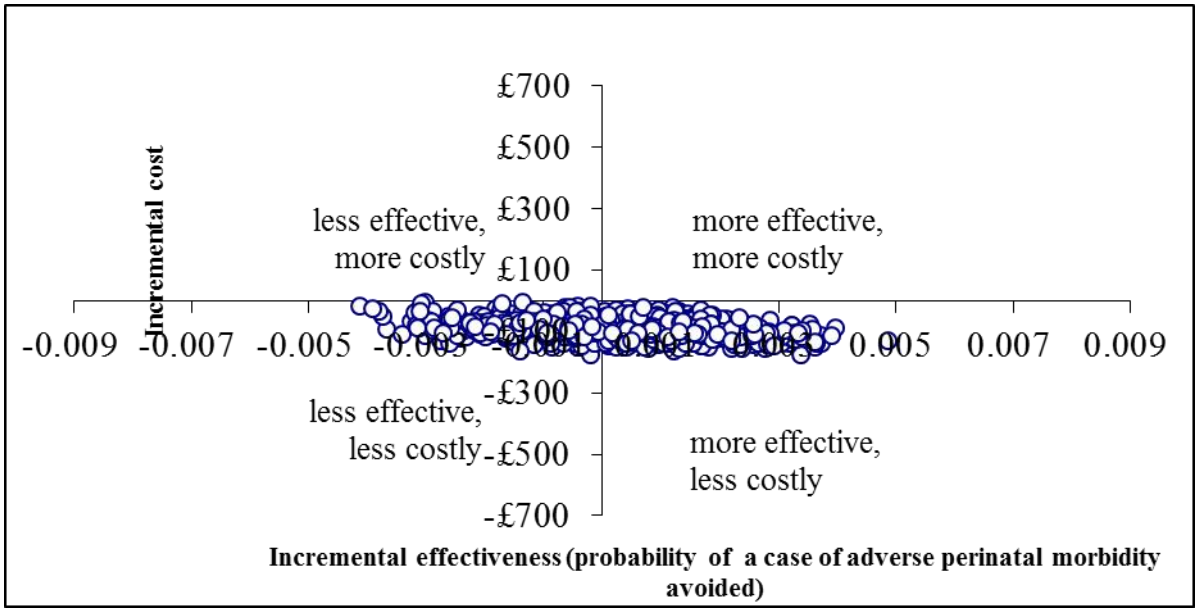


**Figure 9. Cost effectiveness plane: planned birth in an AMU compared with OU for 'low risk' nulliparous women**




### 3.6.5 Cost-effectiveness analyses for the primary outcome for 'low risk' nulliparous women without complicating conditions at the start of care in labour

When the data were analysed for low risk nulliparous women without complicating conditions at the start of care in labour, the ICER scatterplot for planned birth at home lay entirely within the south west quadrant of the cost-effectiveness plane (figure 10). This reflects both a less costly and less effective option for intrapartum maternity care than planned birth in an OU. The differences in effects were calculated in the prospective cohort study and were found to be significant (0.05 level of statistical significance). ICERs for this comparison are shown in Table 9. The differences in adverse perinatal outcomes generated by planned birth in a FMU or an AMU were not statistically significant (table 9). The cost differences between these settings and the OU setting narrow as shown in table 9 and the ICER scatterplots (figures 11-12).

**Table 9. Incremental cost effectiveness ratios and net benefit statistics for the primary outcome for 'low risk' nulliparous women without complicating conditions at the start of care in labour**

| | **Incremental cost per additional case of intrapartum stillbirth and early neonatal mortality and specific neonatal morbidity avoided** | | |
|---|---|---|---|
| **Baseline** | **(OU ) → (Home)** | **(OU ) → (FMU)** | **(OU ) → (AMU)** |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -222.4 (-281.4, -157.3) | -58.8 (-117.1, -2.9) | -8.04 (-61.1, 48.1) |
| Difference in adverse perinatal outcome (95% CI) | -0.006 (-0.011, -0.002) | -0.001 (-0.004, 0.0012) | -0.00099 (-0.0041, 0.0013) |
| **Mean ICER†** (95% CI) | **39177.6 (16734, 103511)** | **30168.8** | **1630.8** |
| Quadrant on the cost-effectiveness plane | south west | south west | south west |
| Mean net benefit (95% CI)* | 98.1 (-34.5, 210.3) | 34.9 (-34.4, 126.7) | -12.7 (-99.2, 63.5) |

†*95% CI surrounding the ICERs are not provided because bootstrapped replicates of the ICERs fall across more than one quadrant of the cost-effectiveness plane*

**Estimated at a £20 000 cost-effectiveness threshold*

**Figure 10. Cost effectiveness plane: planned birth at home compared with OU for 'low risk' nulliparous women without complicating conditions at the start of care in labour**

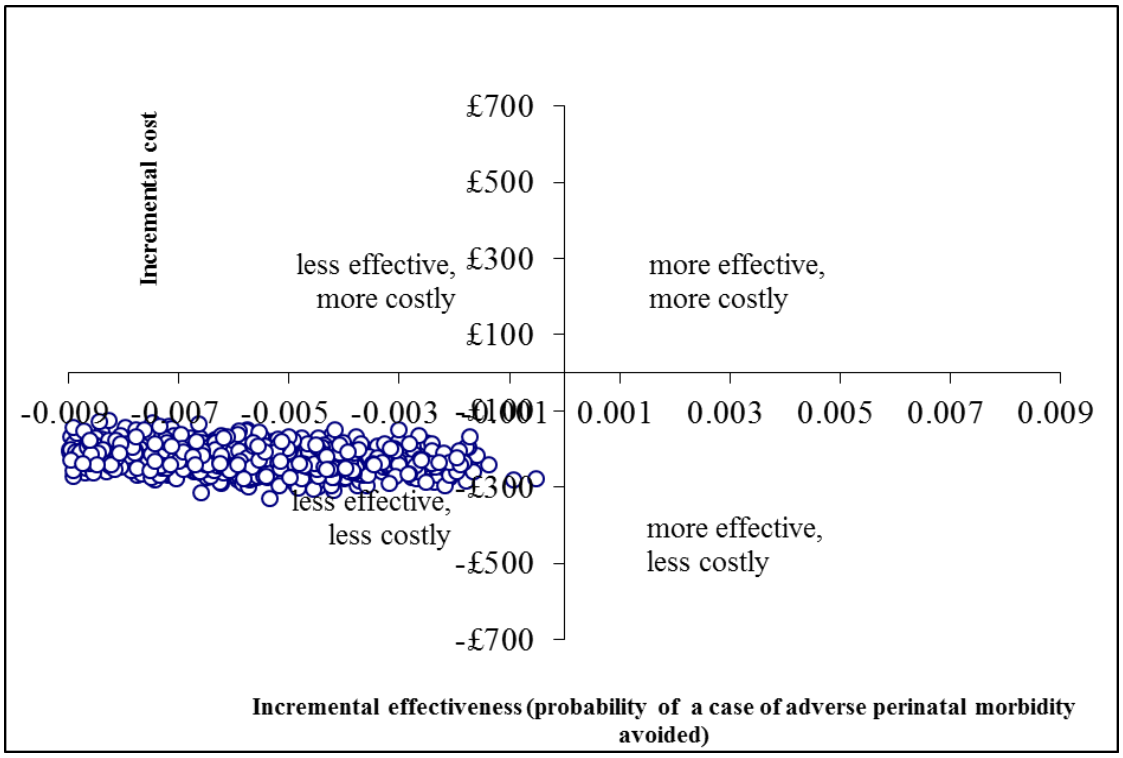


**Figure 11. Cost effectiveness plane: planned birth in a FMU compared with OU for 'low risk' nulliparous women without complicating conditions at the start of care in labour**

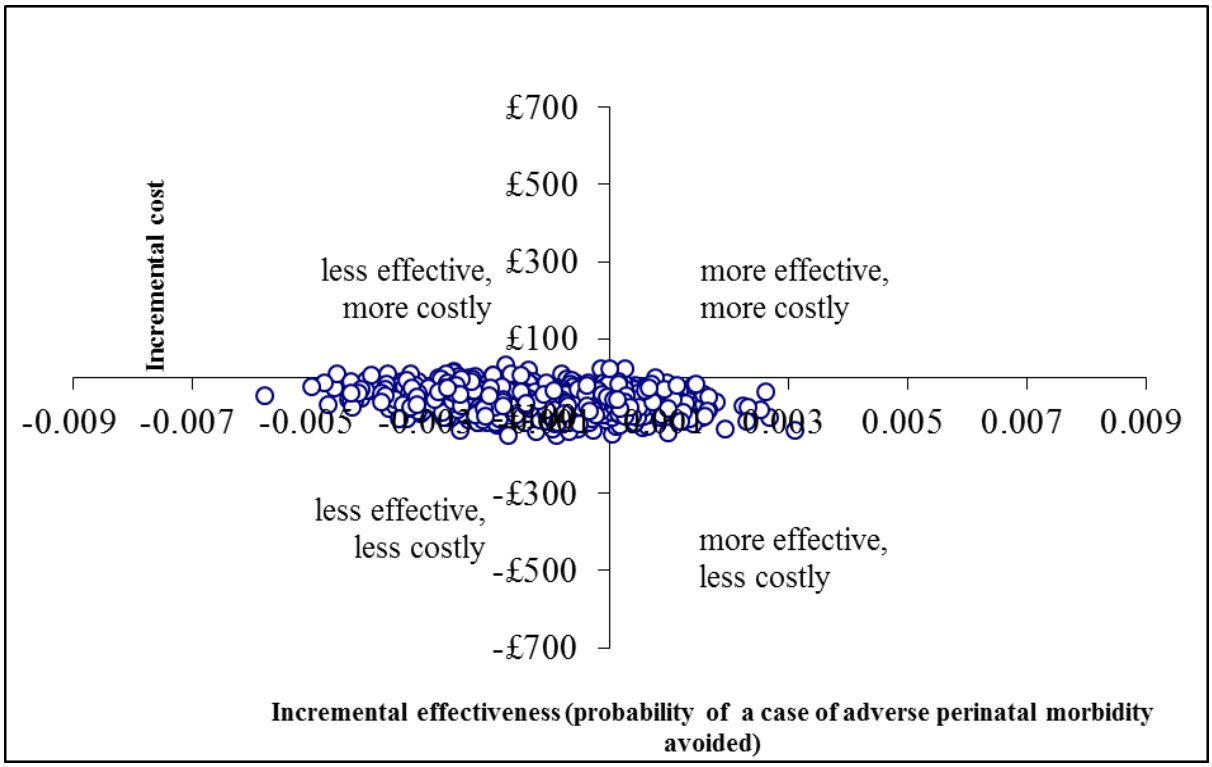
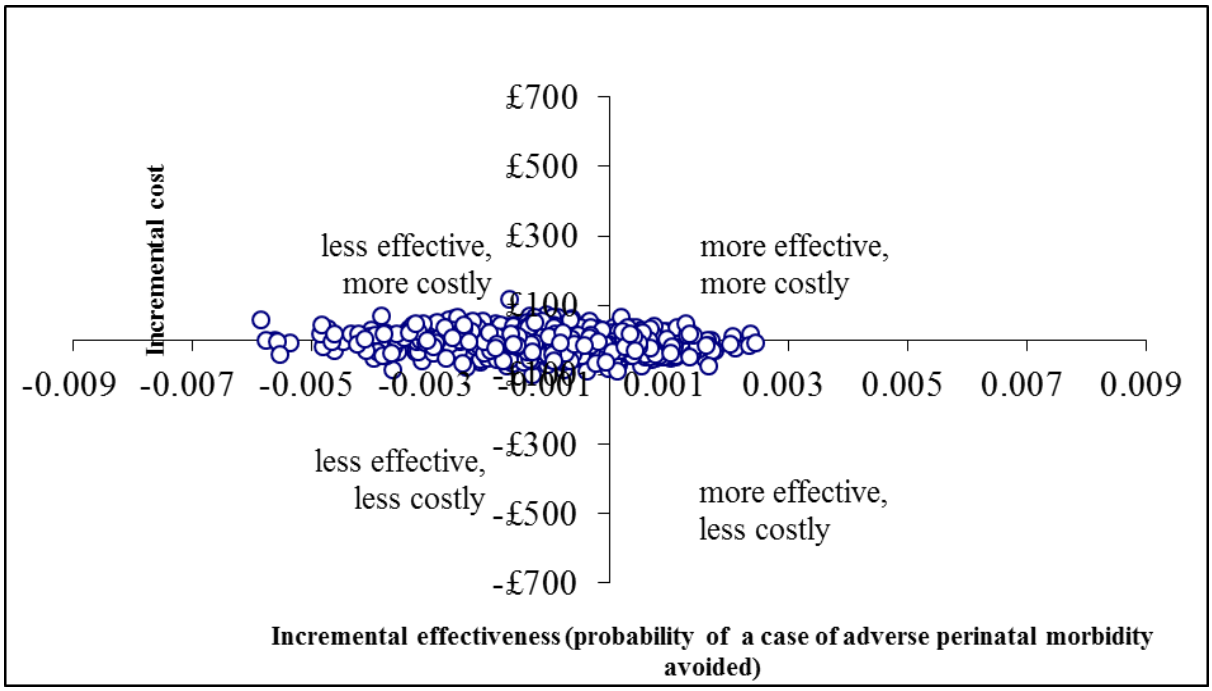



**Figure 12. Cost effectiveness plane: planned birth in an AMU compared with OU for 'low risk' nulliparous women without complicating conditions at the start of care in labour**



### 3.6.6 Cost-effectiveness analyses for the primary outcome for 'low risk' multiparous women

When the cost-effectiveness analyses for the primary outcome were replicated for low risk multiparous women, all mean ICER statistics lay in the south east quadrant of the cost-effectiveness plane (Table 10), reflecting on average, reduced costs and improved perinatal outcomes in the planned non-OU settings, though considerable uncertainty surrounded the effects on perinatal outcomes (figures 13-15).

**Table 10. Incremental cost effectiveness ratios and net benefit statistics for the primary outcome for 'low risk' multiparous women**

| | Incremental cost per additional case of intrapartum stillbirth and early neonatal mortality and specific neonatal morbidity avoided | | |
|---|---|---|---|
| | | | |
| **Baseline** | **(OU ) → (Home)** | **(OU ) → (FMU)** | **(OU ) → (AMU)** |
| | | | |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -362 (-389.7, -335.2) | -173 (-207.8, -138.6) | -151 (-183.7, -117.0) |
| Difference in adverse perinatal outcome (95% CI) | 0.001 (-0.0004, 0.0025) | 0.0005 (-0.0015, 0.0024) | 0.0007 (-0.001, 0.003) |
| **Mean ICER†** | **-323037.4** | **-128133.8** | **-119618.4** |
| Quadrant on the cost-effectiveness plane | south east | south east | south east |
| Mean net benefit (95% CI)* | 381.7 (336.1, 426.9) | 182.4 (119.8, 244.0) | 164.6 (114.6, 222.0) |

†*95% CI surrounding the ICERs are not provided because bootstrapped replicates of the ICERs fall across more than one quadrant of the cost-effectiveness plane*

**Estimated at a £20 000 cost-effectiveness threshold*

**Figure 13. Cost effectiveness plane: planned birth at home compared with OU for 'low risk' multiparous women**

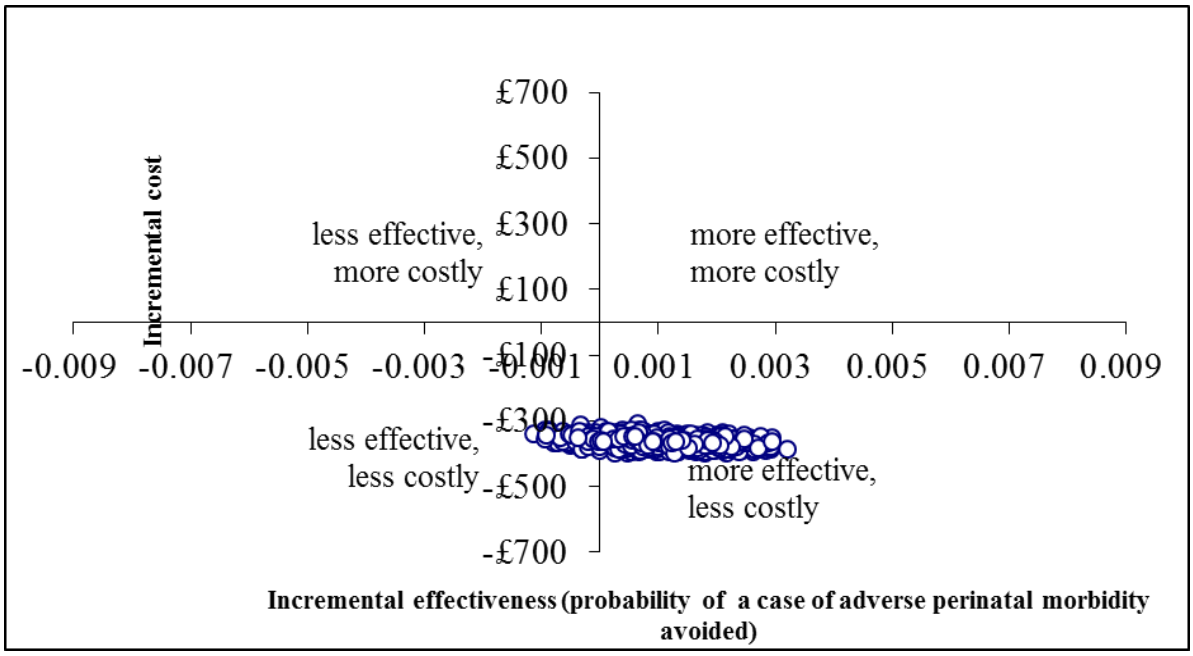



**Figure 14. Cost effectiveness plane: planned birth in a FMU compared with OU for 'low risk' multiparous women**

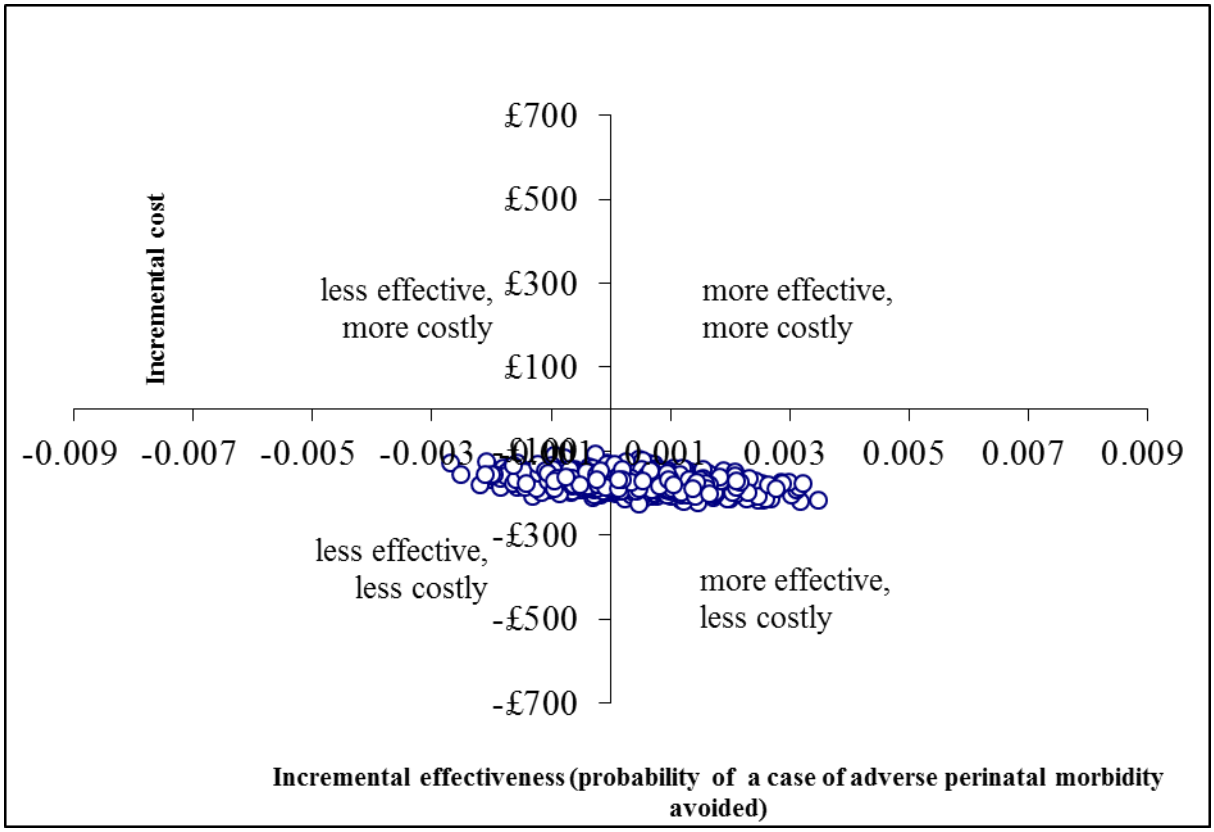
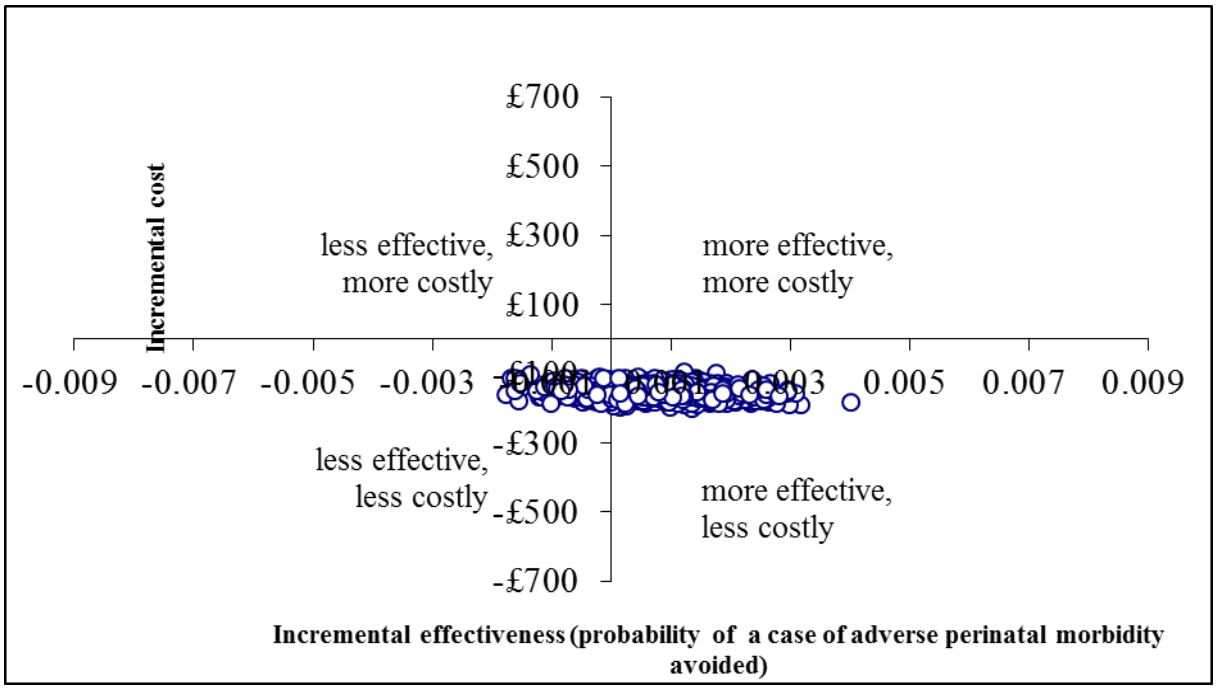


**Figure 15. Cost effectiveness plane: planned birth in an AMU compared with OU for 'low risk' multiparous women**




### 3.6.7 Cost-effectiveness analyses for the primary outcome for 'low risk' multiparous women without complicating conditions at the start of care in labour

When the cost-effectiveness analyses for the primary outcome were replicated for low risk multiparous women without complicating conditions at the start of care in labour, the mean ICER statistics for planned birth in a FMU and at home lay in the south east quadrant of the cost-effectiveness plane (table 11), reflecting, on average reduced costs and improved perinatal outcomes in these settings. In contrast, the mean ICER statistic for planned birth in an AMU lay in the south west quadrant of the cost-effectiveness plane (table 11), reflecting, on average reduced costs and worst outcomes in this setting. Considerable uncertainty surrounded the effects on perinatal outcomes in all three comparisons (figures 16-18).

**Table 11. Incremental cost effectiveness ratios and net benefit statistics for the primary outcome for 'low risk' multiparous women without complicating conditions at the start of care in labour**

| | **Incremental cost per additional case of intrapartum stillbirth and early neonatal mortality and specific neonatal morbidity avoided** | | |
|---|---|---|---|
| **Baseline** | **(OU ) → (Home)** | **(OU ) → (FMU)** | **(OU ) → (AMU)** |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -311.2 (-340.4, -284.7) | -123.6 (-158.4, -87.7) | -98.3 (-64.01, -131.97) |
| Difference in adverse perinatal outcome (95% CI) | 0.0005 (-0.0008, 0.0019) | 0.0003 (-0.0015, -0.0020) | -0.00009 (-0.00196, 0.00162) |
| **Mean ICER†** | **-315419.8** | **-92180.1** | **47221.6** |
| Quadrant on the cost-effectiveness plane | south east | south east | south west |
| Mean net benefit (95% CI)* | 321.2 (270.7, 367.3) | 128.4 (71.2, 183.2) | 97.8 (40.7, 150.7) |

†*95% CI surrounding the ICERs are not provided because bootstrapped replicates of the ICERs fall across more than one quadrant of the cost-effectiveness plane*

**Estimated at a £20 000 cost-effectiveness threshold*

**Figure 16. Cost effectiveness plane: planned birth at home compared with OU for 'low risk' multiparous women without complicating conditions at the start of care in labour**

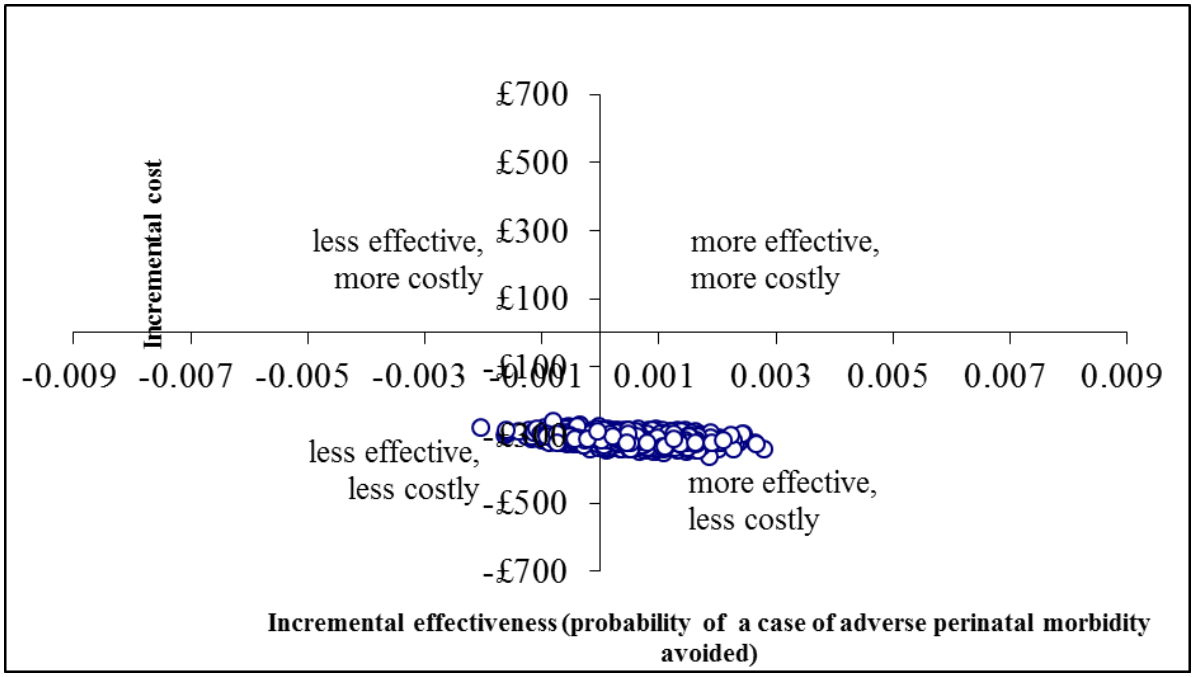


**Figure 17. Cost effectiveness plane: planned birth in a FMU compared with OU for 'low risk' multiparous women without complications at the start of care in labour**

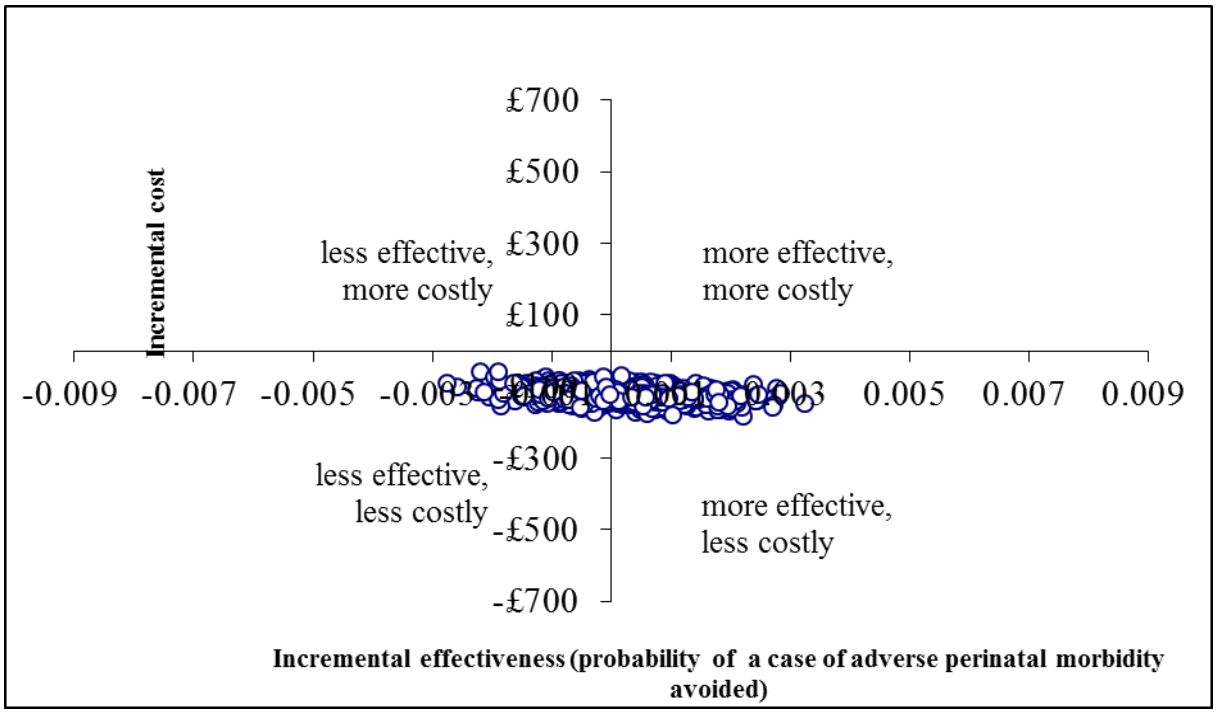
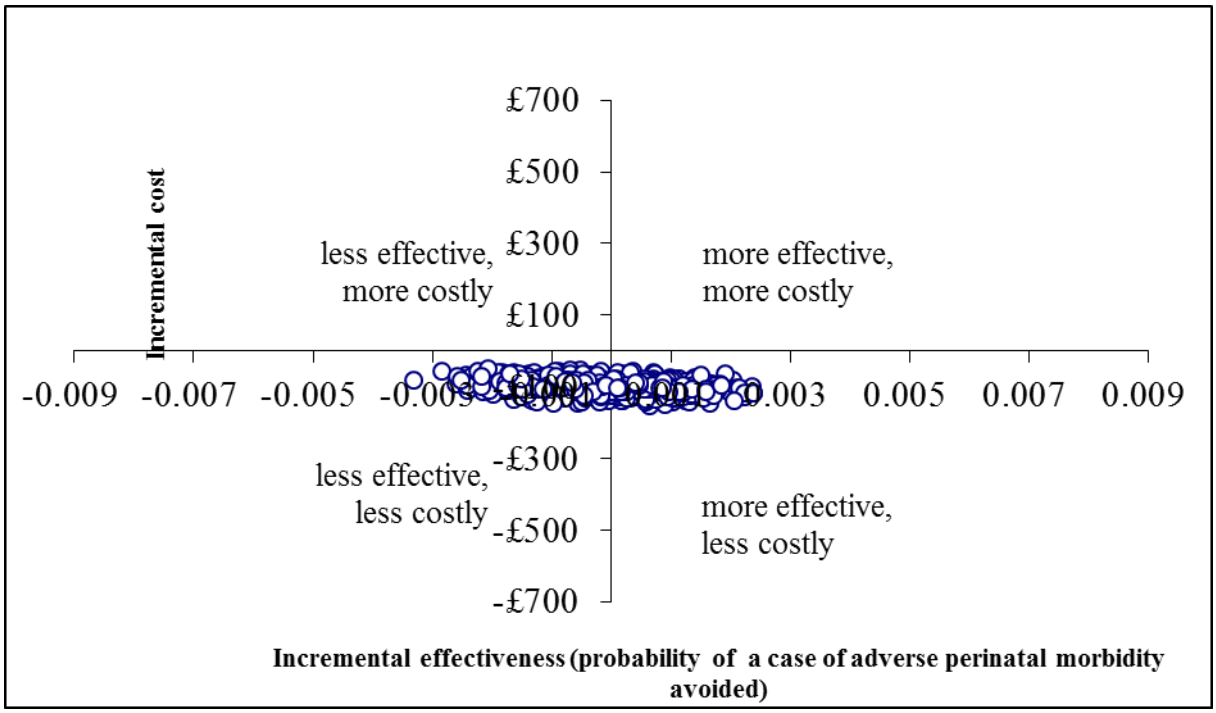



**Figure 18. Cost effectiveness plane: planned birth in an AMU compared with OU for 'low risk' multiparous women without complicating conditions at the start of care in labour**



### 3.6.8 Cost-effectiveness analyses for maternal morbidity outcome for all 'low risk' women

All three planned non-OU settings for birth led to increases in positive maternal outcomes and reductions in costs to the NHS when compared to planned birth in an OU (see table 12 and figures 19-21). In this analysis the negative ICER summary statistic reflects a cost saving (negative estimate) combined with a positive change in outcome (maternal morbidity avoided).

The change in maternal morbidity avoided shown in table 12 is calculated as the estimate of maternal morbidity avoided for planned birth in an OU subtracted from planned birth at home, FMU or an AMU. The mean estimates of women without a maternal morbidity were generated using 1,000 bootstrapped replications of weighted data. Table 12 reflects the differences in these outcome measures.

**Table 12. Incremental cost effectiveness ratios and net benefit statistics for the maternal outcome**

| | **Incremental cost per additional case of maternal morbidity avoided‡** | | |
|---|---|---|---|
| **Baseline** | **(OU ) → (Home)** | **(OU ) → (FMU)** | **(OU ) → (AMU)** |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -590 (-618, -563) | -247 (-280, -211) | -154 (-190, -118) |
| Differences in maternal morbidity avoided (95% CI) | +0.195 (+0.187, +0.204) | +0.172 (+0.168, +0.182) | +0.116 (+0.106, +0.126) |
| **Mean ICER** | **-3024** | **-1442** | **-1322** |
| **95% CI** | **(-3138, -2912)** | **(-1600, -1284)** | **(-1572, -1049)** |
| Quadrant on the cost-effectiveness plane | south east | south east | south east |
| Mean net benefit (95% CI)* | 4497.7 (4305.5, 4669.3) | 3683.1 (3451.0, 3904.3) | 2486.1 (2259.4, 2691.6) |

‡*Avoidance of at least one of the following: general anaesthetic; instrumental birth; caesarean section, third or fourth degree perineal trauma; blood transfusion; admission to an intensive therapy unit, high dependency unit or specialist unit; and maternal death (within 42 days of giving birth). This is a composite measure and was also the secondary outcome of interest in the Birthplace prospective cohort study.*

**Estimated at a £20 000 cost-effectiveness threshold*

Figures 19-21 show cost-effectiveness scatterplots of the 1,000 bootstrapped ICER estimates for the analyses summarised in table 12.

**Figure 19. Cost effectiveness plane: planned birth at home compared with an OU for all 'low risk' women**

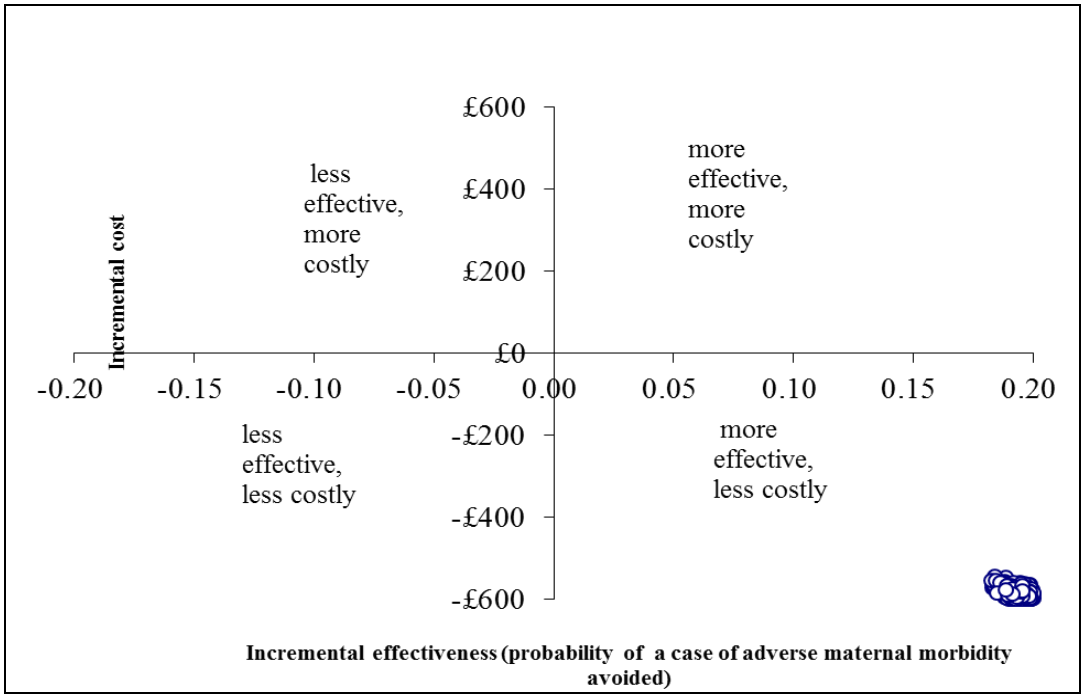



**Figure 20. Cost effectiveness plane: planned birth in a FMU compared with an OU for all 'low risk' women**

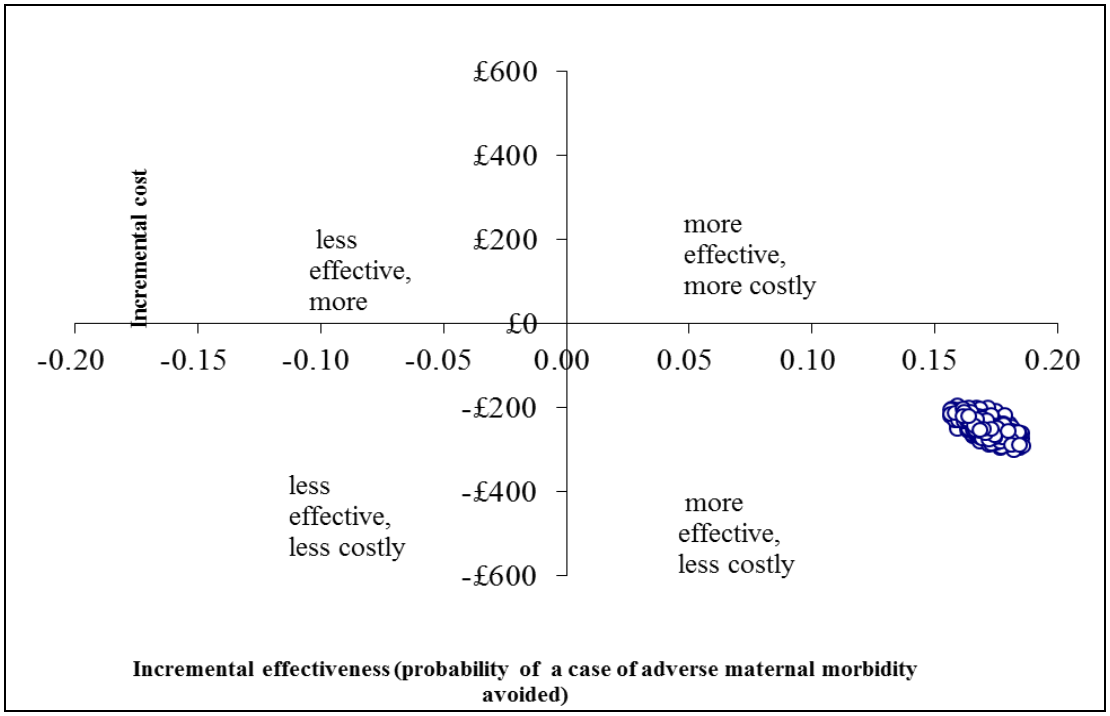
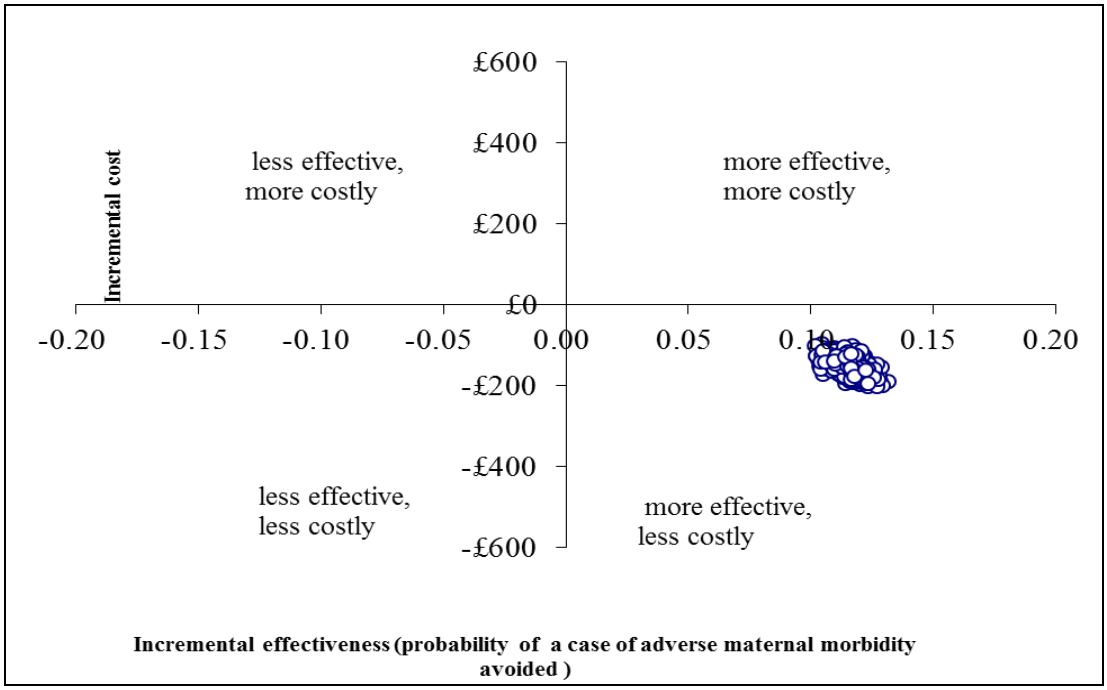


**Figure 21. Cost effectiveness plane: planned birth in an AMU compared with an OU for all 'low risk' women**




All bootstrapped ICERs fell within the south east quadrant of the cost-effectiveness planes (figures 19-21), suggesting that planned non-OU births for 'low risk' women will generate positive maternal outcomes and less costly care when compared with planned birth in an OU.

### 3.6.9 Cost-effectiveness analyses for maternal morbidity outcome for 'low risk' women without complicating conditions at the start of care in labour

When women with complicating conditions at the start of labour care were removed from these analyses, similar results were obtained, though the absolute cost savings were smaller (see table 13 and figures 22-24). These reductions in cost differences do not affect the uncertainty around the estimates reflected by the bootstrapped ICER scatterplots. They all fall within the south east quadrant of the cost-effectiveness plane, suggesting that planned place of birth in non-OU settings still generates positive effects in maternal morbidity avoided and less costly care, compared with planned birth in an OU. When planned birth in an AMU is compared with planned birth in an OU, the scatterplot falls very close to the x-axis, between the south east quadrant, which reflects reduced costs, and the north east quadrant, which reflects increased costs, though they both represent improved outcomes. Patterns of resource use in the AMU tend to reflect similarities with the OU, with a consequent converging of their total mean costs per woman.

**Table 13. Incremental cost effectiveness ratios and net benefit statistics for the maternal outcome for women without complicating conditions at the start of care in labour**

| | **Incremental cost per additional case of maternal morbidity avoided‡** | | |
|---|---|---|---|
| **Baseline** | **(OU ) → (Home)** | **(OU ) → (FMU)** | **(OU ) → (AMU)** |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -504 (-535, -474) | -150 (-186, -115) | -69 (-105, -36) |
| Differences in maternal morbidity avoided (95% CI) | +0.165 (0.156, 0.174) | +0.139 (+0.131, +0.149) | +0.088 (0.078, 0.098) |
| **Mean ICER** | **-3052** | **-1075** | **-782** |
| **95% CI** | **(-3215, -2902)** | **(-1285, -843)** | **(-1130, -431)** |
| Quadrant on the cost-effectiveness plane | south east | south east | south east |
| Mean net benefit (95% CI)* | 3807.7 (3619.6, 4011.7) | 2941.9 (2742.7, 3165.9) | 1827.9 (1605.3, 2058.9) |

‡*Avoidance of at least one of: general anaesthetic; instrumental birth; caesarean section; third or fourth degree perineal trauma; blood transfusion; admission to an intensive therapy unit, high dependency unit or specialist unit; and maternal death (within 42 days of giving birth). This is a composite measure and was also the secondary outcome of interest in the Birthplace prospective cohort study.*

**Estimated at a £20 000 cost-effectiveness threshold*

**Figure 22. Cost effectiveness plane: planned birth at home compared with an OU for women without complicating conditions at the start of care in labour**

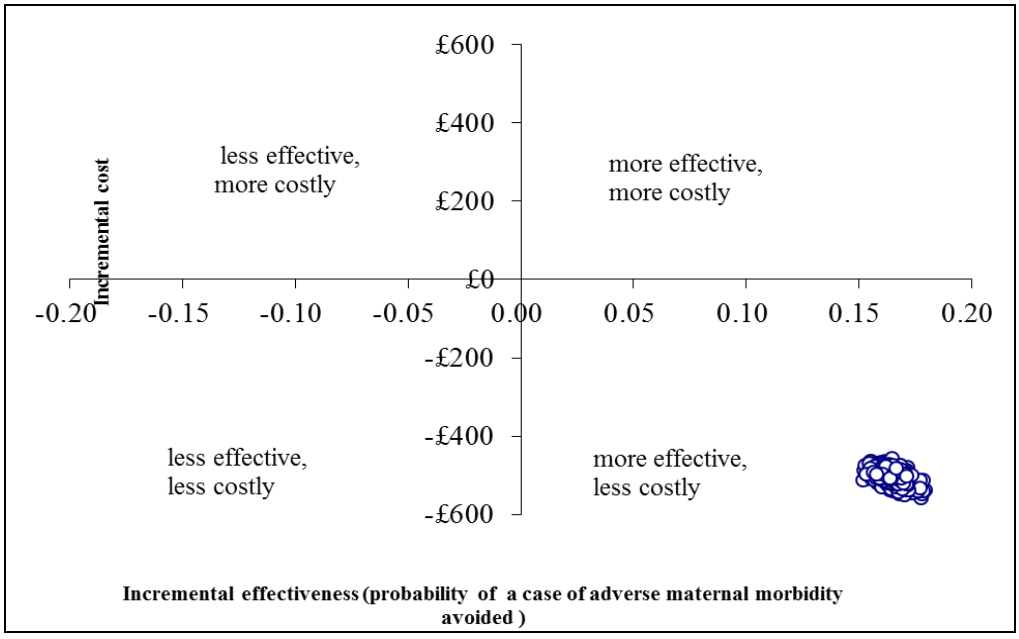


**Figure 23. Cost effectiveness plane: planned birth in a FMU compared with an OU for women without complicating conditions at the start of care in labour**

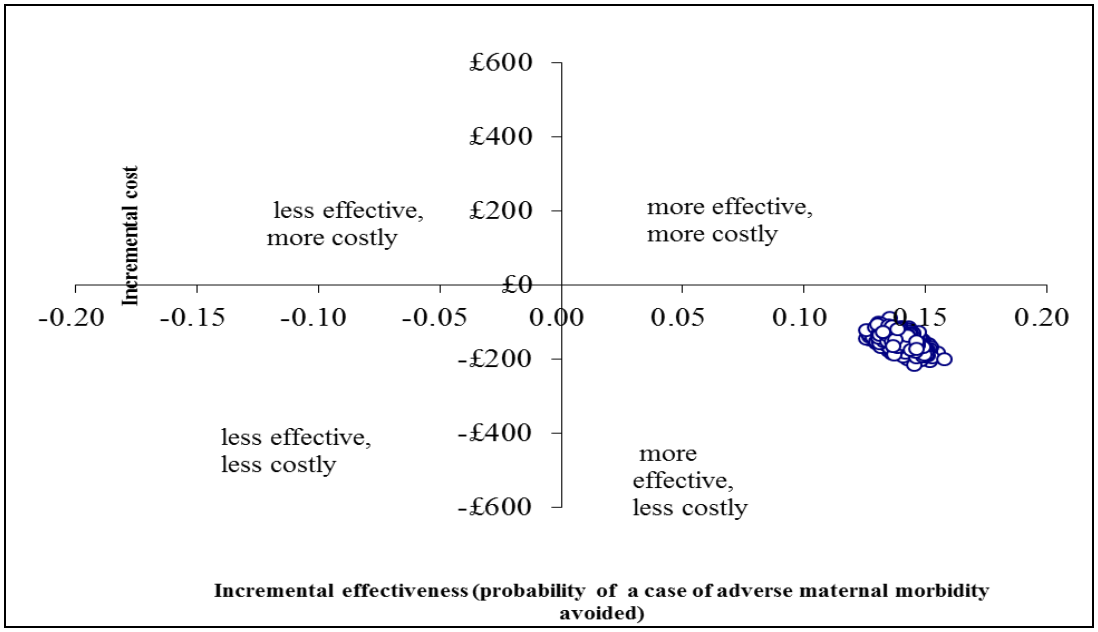
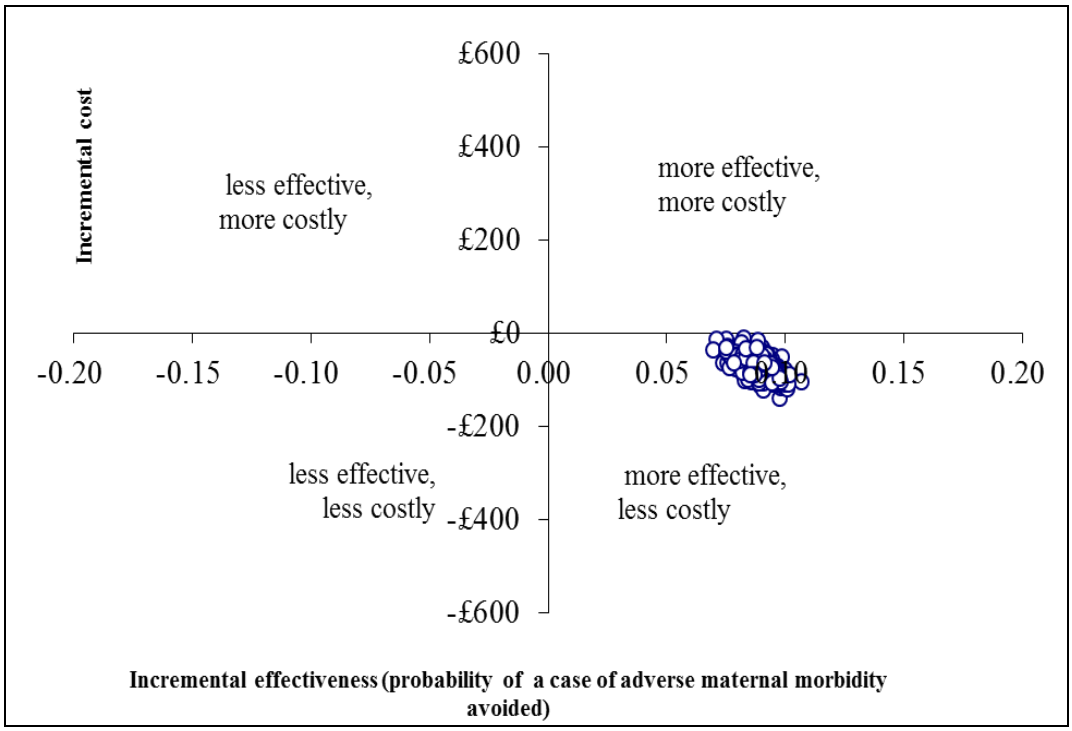



**Figure 24. Cost effectiveness plane: planned birth in an AMU compared with an OU for women without complicating conditions at the start of care in labour**



### 3.6.10 Sensitivity analyses performed on maternal morbidity outcome for all 'low risk' women

Sensitivity analyses were performed on key cost variables and the resulting impacts on the ICER statistics for the maternal morbidity outcome were estimated (table 14). The modelled overheads costs and the midwifery costs, which included CNST contributions, were varied. When overheads for all birth settings (excluding home) were recoded to be 20% greater than their original unit cost, the mean cost differences between planned birth at home and the OU increased, as would be expected, whilst they narrowed between the planned OU and midwifery settings, reflecting the increased costs experienced by all units. When overheads were reduced by 20%, the mean cost differences narrowed. This shows that the OU has a higher mean overhead cost per labour episode per woman, and consequently carries more of the 'burden' of the overhead costs when compared with care in midwifery units.

The cost-savings increased with higher occupancy rates; consequently, the non-OU settings become even more cost-effective.

Planned birth in FMUs and AMUs had all been attributed continuous support during labour and this was reduced to 80% in a sensitivity analysis, with a consequent increase in the mean ICER statistics. Similarly, the midwifery staff to woman ratio during labour in OU settings had been set at 65% in the baseline analyses, and this was subsequently varied between 50% and 90% care. As would be expected, the cost differences narrowed between all settings midwifery support during labour in OU settings decreased, and increased when midwifery support during labour in OU settings was set at 90% direct contact time. The findings were generally robust to changes in the sensitivity analyses and indicate that the cost-effectiveness results depicted as ICERs respond to changes in key cost variables in a manner consistent with our expectations.

**Table 14. Sensitivity analyses performed on cost variables for the maternal morbidity cost-effectiveness outcome**

| | **Incremental cost per additional case of maternal morbidity avoided** | | |
|---|---|---|---|
| | **(OU ) → (Home)** | **(OU ) → (FMU)** | **(OU ) → (AMU)** |
| **1) Overheads 20% greater than baseline** | | | |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -686 (-715, -658) | -278 (-312, -240) | -176 (-213, -138) |
| Differences in maternal morbidity avoided (95% CI) | 0.195 (0.187, 0.204) | +0.171 (0.162, 0.181) | +0.116 (0.106, 0.125) |
| **Mean ICER 95% CI** | **-3528 (-3644, -3395)** | **-1620 (-1784, -1457)** | **-1511 (-1771, -1229)** |
| Quadrant on the cost-effectiveness plane | south east | south east | south east |
| **2) Overheads 20% lower than baseline** | | | |

| | | | |
|---|---|---|---|
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -346 (-374, -320) | -165 (-197, -131) | -61 (-96, -28) |
| Differences in maternal morbidity avoided (95% CI) | 0.195 (0.187, 0.204) | +0.171 (0.161, 0.182) | +0.116 (0.107, 0.126) |
| **Mean ICER 95% CI** | **-1773 (-1873, -1661)** | **-960 (-1119, -792)** | **-519 (-778, -289)** |
| Quadrant on the cost-effectiveness plane | south east | south east | south east |
| **3) Occupancy rates 50% greater than baseline** | | | |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -512 (-540.-485) | -282 (-314, -248) | -194 (-228, -160) |
| Differences in maternal morbidity avoided (95% CI) | 0.195 (0.186, 0.204) | +0.171 (0.162, 0.181) | +0.116 (0.106, 0.125) |
| **Mean ICER 95% CI** | **-2628 (-2736, -2528)** | **-1648 (-1796, -1505)** | **-1666 (-1901, -1407)** |
| Quadrant on the cost-effectiveness plane | south east | south east | south east |
| **4) Midwifery staffing in the AMU and FMU 20% less than baseline (80% intermittent care)** | | | |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -590 (-618, -562) | -344 (-376, -309) | -256 (-292, -221) |
| Differences in maternal morbidity avoided (95% CI) | 0.195 (0.187, 0.204) | +0.171 (0.162, 0.181) | +0.116 (0.106, 0.125) |
| **Mean ICER 95% CI** | **-3024 (-3381, -2912)** | **-2008 (-2138, -1879)** | **-2201 (-2447, -1941)** |
| Quadrant on the cost-effectiveness plane | south east | south east | south east |
| **5) Midwifery staffing in the OU 15% less than baseline (50% intermittent care)** | | | |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -480 (-503, -453) | -137 (-170, -102) | -44 (-79, -9) |
| Differences in maternal morbidity avoided (95% CI) | 0.195 (0.187, 0.204) | +0.171 (0.162, 0.181) | +0.116 (0.106, 0.125) |
| **Mean ICER 95% CI** | **-2461 (-2550, -2374)** | **-801 (-942, -650)** | **-377 (-656, -88)** |
| Quadrant on the cost-effectiveness plane | south east | south east | south east |
| **6) Midwifery staffing in the OU 25% greater than baseline (90% intermittent care)** | | | |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -773 (-802, -744) | -430 (-465, -393) | -337 (-367, -307) |
| Differences in maternal morbidity avoided (95% CI) | 0.195 (0.187, 0.204) | +0.171 (0.162, 0.181) | +0.116 (0.106, 0.125) |
| **Mean ICER 95% CI** | **-3926 (-4096, -3824)** | **-2509 (-2676, 2355)** | **-2896 (-3115, -2670)** |
| Quadrant on the cost-effectiveness plane | south east | south east | south east |

### 3.6.11 Cost-effectiveness analyses for 'normal birth' outcome for all 'low risk' women

In the third set of cost-effectiveness analyses, 'normal birth' was the effectiveness measure (see table 15 and figures 25-27). The incidence of 'normal births' was highest for planned births at home, then planned births in a FMU, then planned births in an AMU and lowest in planned births in an OU. The results of the cost-effectiveness analyses were almost identical to those generated for the maternal morbidity outcome; all ICERs reflected both cost-savings and improved outcomes in 'normal birth' when planned place of birth changed from an OU to a non-OU setting. Planned birth at home generated both the greatest cost-savings and the highest proportion of 'normal births' when compared with the other non-OU settings, and consequently the largest (negative) mean ICER statistic (table 15).

**Table 15. Incremental cost effectiveness ratios and net benefit statistics for 'normal birth'**

| | **Incremental cost per additional case of 'normal birth'** | | |
|---|---|---|---|
| **Baseline** | **(OU ) → (Home)** | **(OU ) → (FMU)** | **(OU ) → (AMU)** |
| Cost differences between planned births in an OU and non-OU setting (95% CI) | -590 (-618, -563) | -247 (-280, -211) | -154 (-190, -118) |
| Differences in 'normal birth' (95% CI) | +0.30 (+0.29,+0.31) | +0.256 (+0.245, +0.268) | +0.184 (+0.173, +0.194) |
| **Mean ICER** | **-1960** | **-956** | **-836** |
| **(95% CI)** | **(-2034, -1890)** | **(-1076, -847)** | **(-1002, -664)** |
| Quadrant on the cost-effectiveness plane | south east | south east | south east |
| Mean net benefit (95% CI)* | 6608.9 (6411.2, 6809.7) | 5376.5 (5132.8, 5618.4) | 3828.4 (3599.9, 4051.9) |

**Estimated at a £20 000 cost-effectiveness threshold*

**Figure 25. Cost effectiveness plane: planned birth at home compared with an OU**

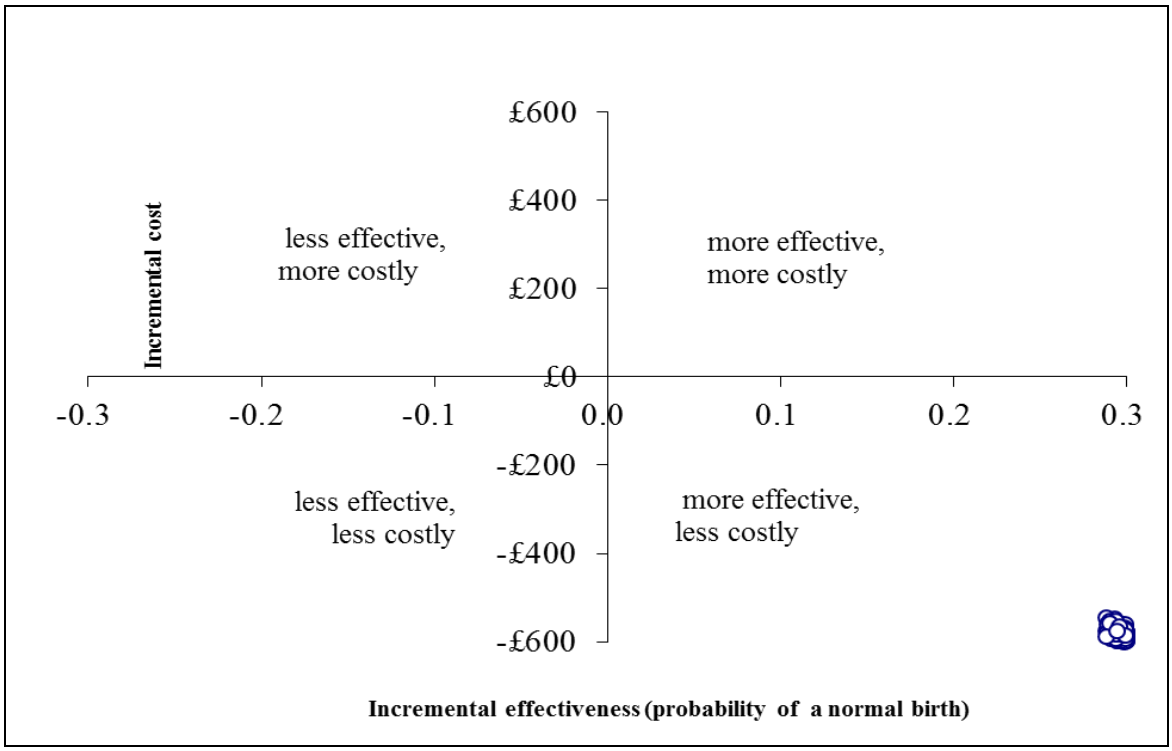



**Figure 26. Cost effectiveness plane: planned birth in a FMU compared with an OU**

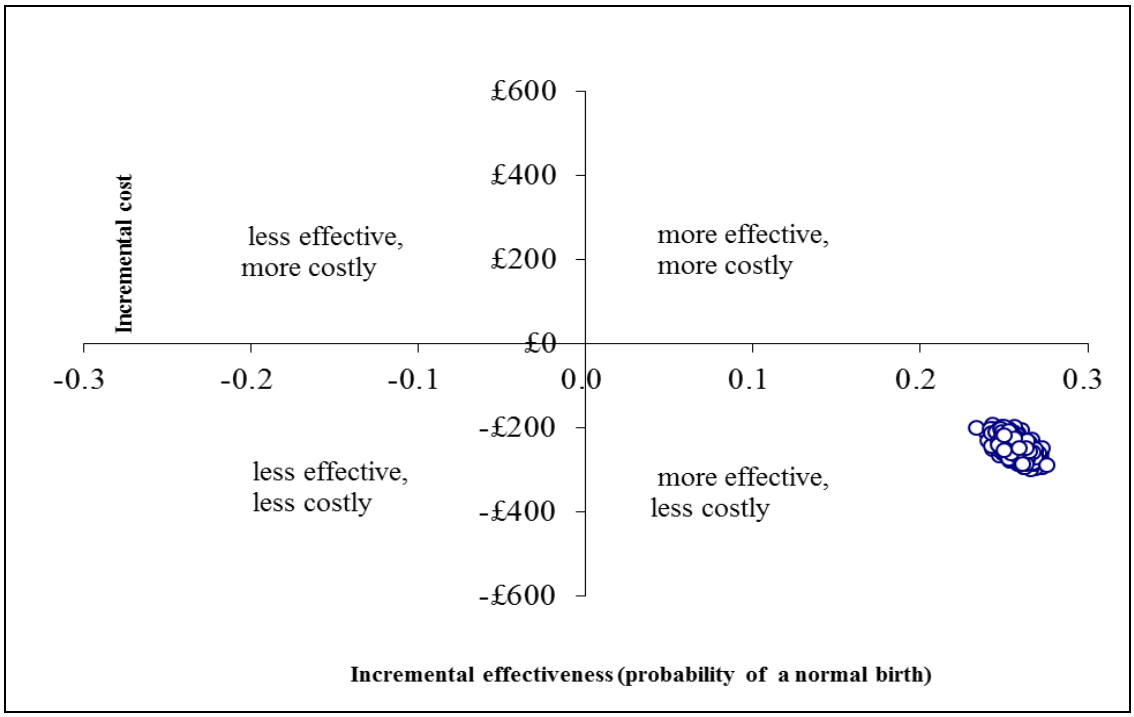
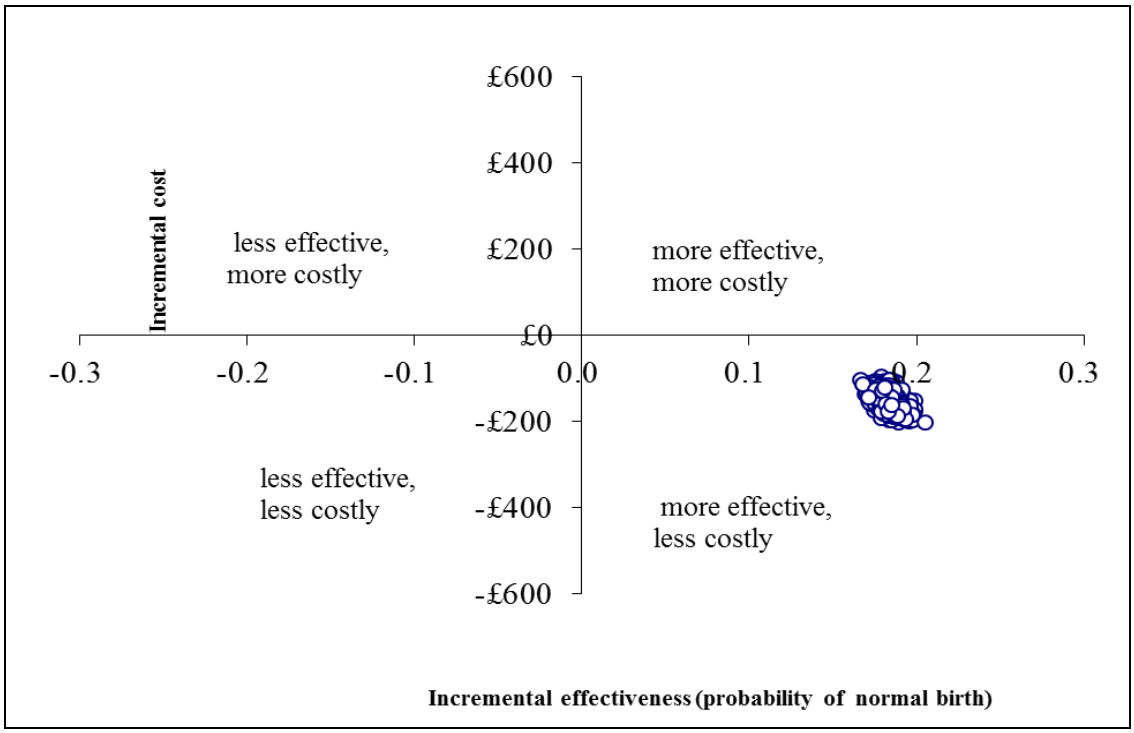


**Figure 27. Cost effectiveness plane: planned birth in an AMU compared with an OU**




## 3.6.12 Cost-effectiveness analyses for 'normal birth' outcome for women without complicating conditions at the start of care in labour

When women with complicating conditions identified at the start of care in labour were removed from these analyses, the findings broadly replicated those for the 'normal birth' cost-effectiveness outcome for all 'low risk' women (see table 16 and figures 28-30). We know from the prospective cohort study that for planned OU births, there appeared to be an association between complicating conditions at the start of care in labour and 'normal birth': 40% of women with complicating conditions at the start of care in labour had a 'normal birth' compared with 63% of women without complicating conditions at the start of care in labour.(9) Planned birth at home or in a FMU generates positive normal birth health effects and less costly care. Planned birth in an AMU generate cost savings though the bootstrap scatterplot approaches the x-axis of the cost-effectiveness plane.

**Table 16. Incremental cost effectiveness ratios and net benefit statistics for 'normal birth' for women without complicating conditions at the start of care in labour**

| | **Incremental cost per additional case of 'normal birth'** | | |
|---|---|---|---|
| | **(OU ) → (Home)** | **(OU ) → (FMU)** | **(OU ) → (AMU)** |
| Cost differences between planned births in an OU and non-OU setting (95% CI) | -504 (-535, -474) | -150 (-187, -116) | -69 (-105, -36) |
| Differences in 'normal birth' (95% CI) | +0.266 (+0.256, 0.275) | +0.218 (0.207, 0.229) | +0.149 (+0.138, 0.160) |
| Mean ICER | -1897 | -689 | -464 |
| (95% CI) | (-1985, -1812) | (-823, -538) | (-685, -254) |
| Quadrant on the cost-effectiveness plane | south east | south east | south east |
| Mean net benefit (95% CI)* | 5822.4 (5611.7, 6036.1) | 4507.4 (4284.6, 4766.0) | 3041.7 (2811.6, 3307.1) |

**Estimated at a £20 000 cost-effectiveness threshold*

**Figure 28. Cost effectiveness plane: planned birth at home compared with an OU for women without complicating conditions at the start of care in labour**

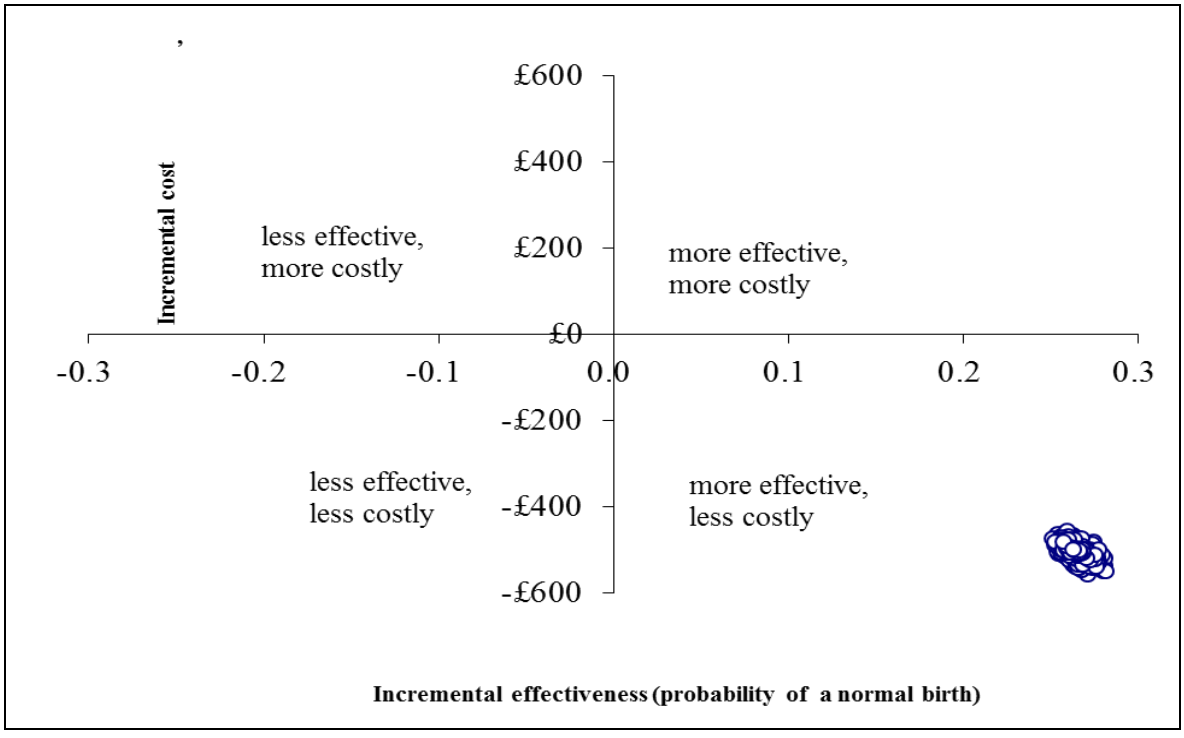


**Figure 29. Cost effectiveness plane: planned birth in a FMU compared with an OU for women without complicating conditions at the start of care in labour**

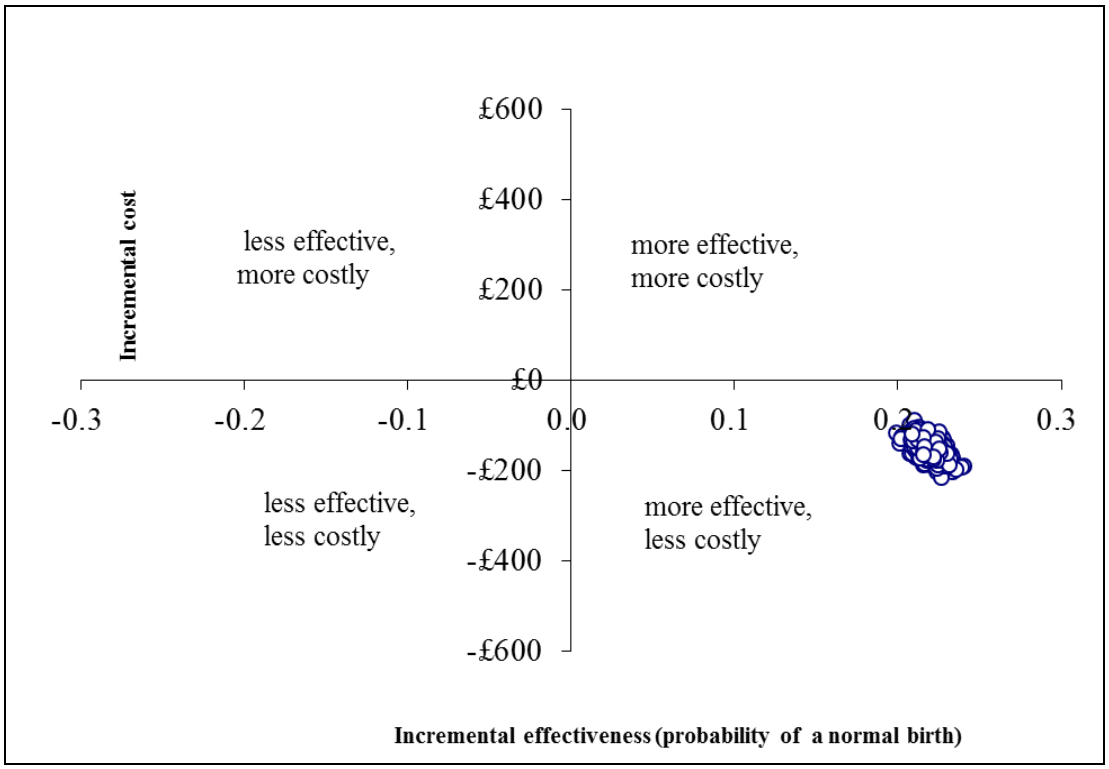
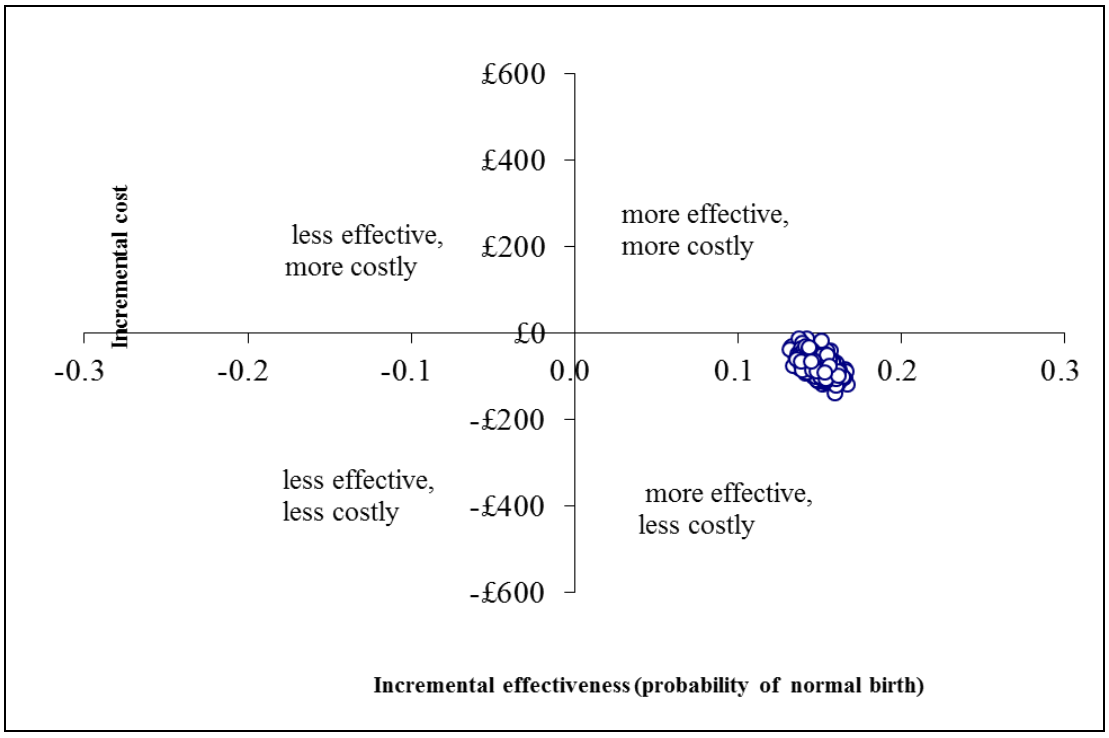



**Figure 30. Cost effectiveness plane: planned birth in a AMU compared with an OU for women without complicating conditions at the start of care in labour**



### 3.6.13 Sensitivity analyses performed on cost variables for the 'normal birth' cost-effectiveness outcome for all 'low risk' women

The ICER estimates in table 17 reflect variations in the cost estimates for key cost drivers, and their impacts on the cost-effectiveness estimates for the normal birth outcome for all low risk women. Once again, the findings were generally robust to the sensitivity analyses performed and indicate that the cost-effectiveness results depicted as ICERs respond in a manner consistent with our expectations.

**Table 17. Sensitivity analyses performed for the 'normal birth' outcome**

| Sensitivity analyses | | | |
|---|---|---|---|
| | Incremental cost per additional case of 'normal birth'. | | |
| | (OU ) → (Home) | (OU ) → (FMU) | (OU ) → (AMU) |
| **1) Overheads 20% greater than baseline** | | | |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -686 (-715, -658) | -278 (-312, -240) | -176 (-213, -138) |
| Change in 'normal birth' (95% CI) | 0.301 (0.292, 0.310) | 0.256 (0.247, 0.265) | 0.183 (0.172, 0.194) |
| **Mean ICER (95% CI)** | **-2281 (-2360, -2208)** | **-1084 (-1198, -964)** | **-956 (-1125, -779)** |
| Quadrant on the cost-effectiveness plane | south east | south east | south east |
| **2) Overheads 20% lower than baseline** | | | |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -346 (-370, -323) | -165 (-196, -131) | -61 (-95, -28) |
| Change in 'normal birth' (95% CI) | 0.301 (0.292, 0.310) | 0.256 (0.247, 0.265) | 0.183 (0.173, 0.194) |
| **Mean ICER (95% CI)** | **-1150 (-1214, -1091)** | **-642 (-752, -521)** | **-329 (-513, -158)** |
| Quadrant on the cost-effectiveness plane | south east | south east | south east |
| **3) Occupancy rates 50% greater than baseline** | | | |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -512 (-541.-486) | -282 (-314, -249) | -194 (-228, -160) |
| Change in 'normal birth' (95% CI) | 0.301 (0.293, 0.308) | 0.256 (0.245, 0.268) | 0.183 (0.172, 0.194) |
| **Mean ICER (95% CI)** | **-1703 (-1775, -1634)** | **-1103 (-1206, -996)** | **-1054 (-1211, -889)** |
| Quadrant on the cost-effectiveness plane | south east | south east | south east |
| **4) Midwifery staffing in the AMU and FMU 20% less than baseline (80% intermittent care)** | | | |

| | | | |
|---|---|---|---|
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -590 (-618, -563) | -344 (-377, -309) | -256 (-292, -221) |
| Change in 'normal birth' (95% CI) | 0.301 (0.293, 0.308) | 0.256 (0.247, 0.265) | 0.183 (0.175, 0.192) |
| **Mean ICER (95% CI)** | **-1960 (-2034, -1890)** | **-536 (-634, -429)** | **-1392 (-1530, -1261)** |
| Quadrant on the cost-effectiveness plane | south east | south east | south east |
| **5) Midwifery staffing in the OU 15% less than baseline (50% intermittent care)** | | | |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -480 (-508, -453) | -137 (-170, -102) | -44 (-79, -9) |
| Change in 'normal birth' (95% CI) | 0.301 (0.292, 0.308) | 0.256 (0.245, 0.267) | 0.183 (0.172, 0.194) |
| **Mean ICER (95% CI)** | **-1595 (-1670, -1526)** | **-536 (-651, -412)** | **-239 (-419, -53)** |
| Quadrant on the cost-effectiveness plane | south east | south east | south east |
| **6) Midwifery staffing in the OU 25% greater than baseline (90% intermittent care)** | | | |
| Cost differences between planned birth in an OU and non-OU setting (95% CI) | -773 (-802, -744) | -430 (-465, -393) | -337 (-374, -301) |
| Change in 'normal birth' (95% CI) | 0.301 (0.293, 0.308) | 0.256 (0.245, 0.265) | 0.183 (0.175, 0.192) |
| **Mean ICER (95% CI)** | **-2568 (-2648, -2494)** | **-1679 (-1784, -1571)** | **-1832 (-1972, -1963)** |
| Quadrant on the cost-effectiveness plane | south east | south east | south east |

### 3.6.14 Cost effectiveness acceptability curves

Cost-effectiveness acceptability curves (CEACs) were generated to show the probability of each planned birth setting being optimal in terms of cost-effectiveness at alternative cost-effectiveness thresholds held by decision-makers. These were generated for each of the outcome measures explored, for both women with and without complicating conditions at the start of labour care, and for each parity sub-group. Cost-effectiveness thresholds were varied from £0 to £100,000, with £20 000 considered to be the most intuitive threshold for the primary outcome. For all analyses with the exception of two, birth at home generated the greatest mean net benefit, with a 100% probability of being the optimal setting across all cost-effectiveness thresholds. However, for 'low risk' nulliparous women, planned place of birth in a FMU had a 0.35 probability of being the most cost-effective option at a £20,000 cost-effectiveness threshold for the primary outcome (figure 31). This probability increased to 0.59 when the cost-effectiveness threshold for the primary outcome increased to £30,000. Similarly, for 'low risk' nulliparous women without complicating conditions at

the start of care in labour, planned place of birth in a FMU had a 0.16 probability of being the most cost-effective option at a £20,000 cost-effectiveness threshold for the primary outcome (figure 32). This probability increased to 0.35 when the cost-effectiveness threshold for the primary outcome increased to £30,000.

**Figure 31. Cost effectiveness acceptability curves for planned place of birth for 'low risk' nulliparous women for adverse perinatal outcome avoided**

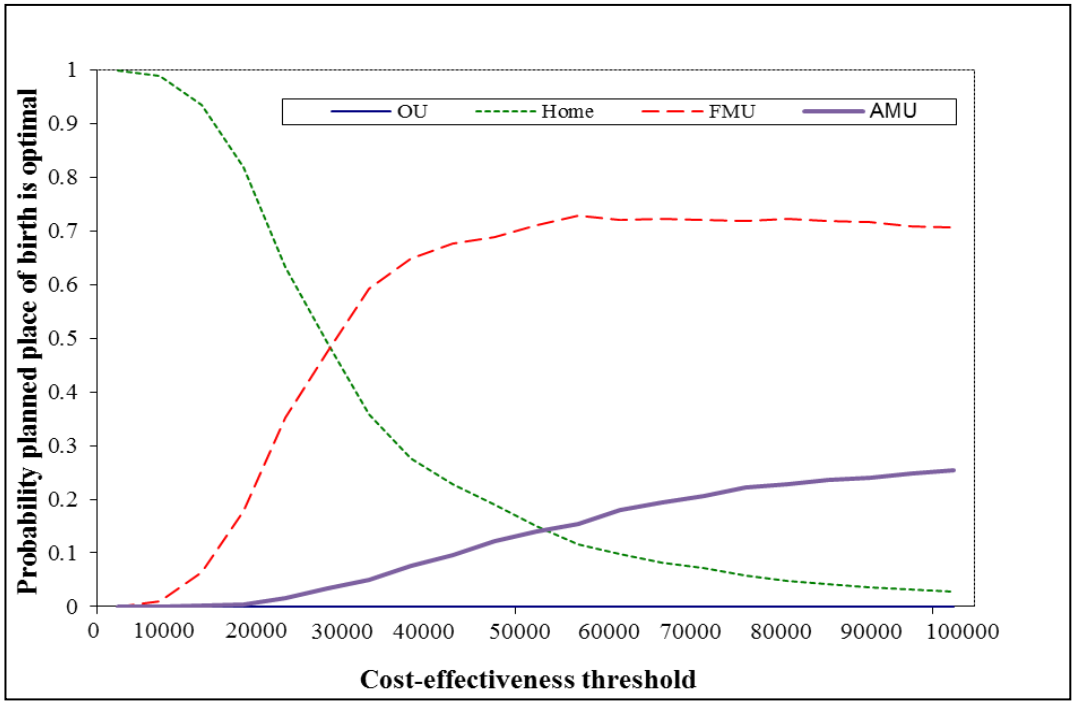
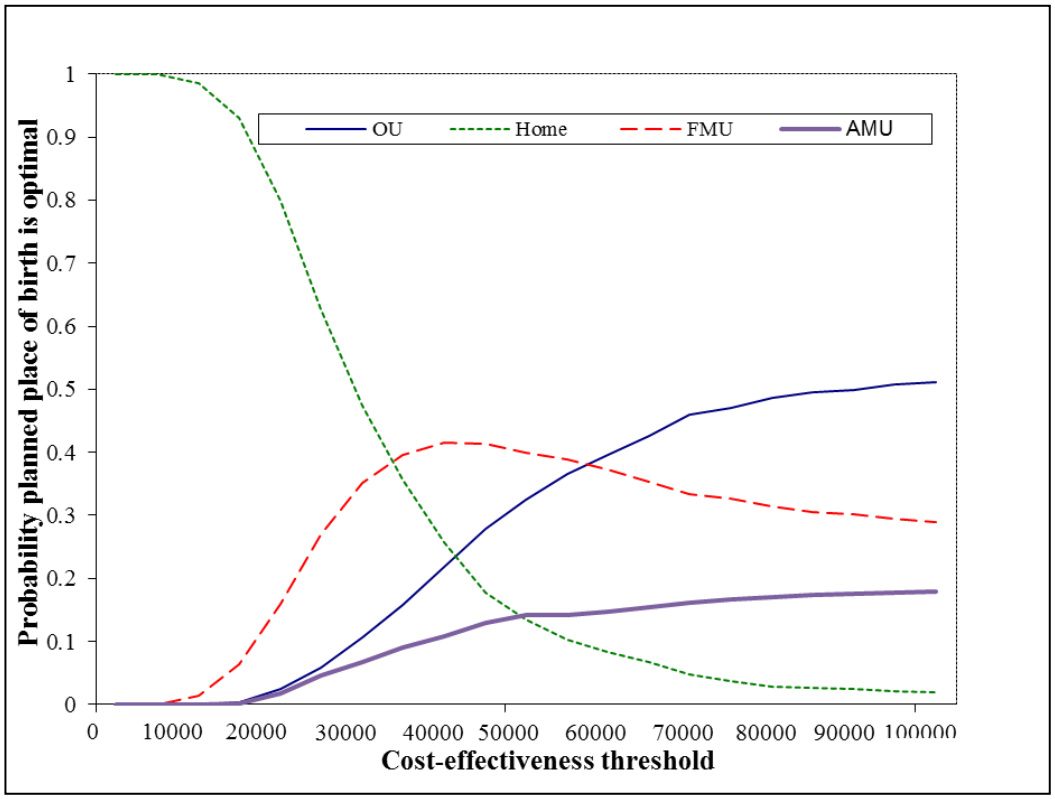



**Figure 32. Cost effectiveness acceptability curves for planned place of birth for 'low risk' nulliparous women without complicating conditions at the start of care in labour for adverse perinatal outcome avoided**



# 4 Discussion and conclusions

## *4.1 Summary of main findings*

This study aimed to determine the cost-effectiveness of different settings for birth; at home, in freestanding midwifery units, in alongside midwifery units and in obstetric units for women and babies at 'low risk' of complications prior to the onset of labour, based on individual level data collected in the prospective cohort study within Birthplace. The three effectiveness measures used were 'intrapartum stillbirth, early neonatal mortality and specific neonatal morbidity' avoided (a composite measure of perinatal mortality and intrapartum related morbidity and the primary outcome in the Birthplace prospective cohort study), 'maternal morbidity avoided' (a composite of some of the secondary outcomes in the Birthplace prospective cohort study) and 'normal birth'.

With regards to the baby; the incidence of adverse perinatal outcomes was low in all settings. The results of the cost-effectiveness analyses show that a change from planned place of birth in an OU to a FMU or AMU will generate incremental cost savings with uncertainty around the cases of adverse perinatal outcome averted. In all bootstrapped samples, for these comparisons, the scatterplots of mean ICERs fell across both the south west and south east quadrants of the cost-effectiveness planes. This implies a lower cost attributable to a non-OU midwifery setting planned place of birth, but represents uncertainty surrounding the impact on perinatal outcomes. For births planned at home for nulliparous 'low risk' women, the cost-effectiveness analyses reflected a less effective and less-costly option for intrapartum care than birth planned in an OU. For births planned at home for multiparous low risk women, the cost-effectiveness analyses reflected lower costs and considerable uncertainty surrounding the impact on perinatal outcomes.

With regards to the mother, planned place of birth in all non-OU settings generated incremental cost savings and improved maternal outcomes. There is uncertainty around the cost savings for planned birth in an AMU, but planned birth in an AMU still showed cost savings and more positive maternal outcomes.

Planned births in an OU had a longer duration of labour per episode, as well as higher rates of epidural use, general anaesthesia, augmentation of labour and instrumental delivery. In addition to the greater burden of overheads for the OU, these interventions for women are costly and would have increased the mean total cost per woman planning a birth in an OU. The costs and outcomes for the AMU seemed to lie between those for the OU and FMU/home. Some of the characteristics of the women who had planned a birth in an AMU were similar to the planned OU birth group and these included higher rates of epidural use, augmentation of labour and active

management of labour and a longer total duration of labour.. They were more similar to the FMU and home groups in their mode of birth, use of a general anaesthetic, and rates of perineal trauma. Planned birth at home or in a FMU generates more effective and less costly maternal outcomes. This finding was repeated for the analysis of incremental cost per additional 'normal birth'.

## *4.2 Strengths and weaknesses*

This study provides evidence for the cost-effectiveness of planned place of birth in four different settings. 'Bottom up' and 'top down' cost data were applied to resource use estimation which included all significant resource items collected from a health service perspective. All unit costs employed followed guidelines on costing health services as part of economic evaluation, including the calculation of these costs being underpinned by the concept of opportunity cost, which can be defined as the value of the next best alternative for using these resources (12-14). A comprehensive strategy for handling uncertainty surrounding individual parameters and the value of the cost-effectiveness threshold was conducted.

Robust and detailed collection of effectiveness data was conducted through the prospective cohort study. An integrated programme of research of this size and design has not been undertaken before. The prospective cohort study identified maternal, intrapartum and neonatal outcomes for the different settings of planned place of birth, including the proportion of mothers and babies requiring transfer and the duration of transfer. The cost-effectiveness analysis was made possible by this rigorously designed and conducted observational study.

The cost-effectiveness analysis was mainly designed to capture costs and outcomes attributed to intrapartum care. This was difficult to undertake because it required the disaggregation of trust based maternity service data as well as 'within hospital/unit' maternity data for both cost and resource use analyses. The collection of robust intrapartum cost data was limited by patchy and incomplete data returns from finance and other maternity service managers. Consequently, some of the cost data inputs were modelled from other sources. Although varied in sensitivity analyses, one should be cautious when interpreting these cost data. Routinely collected clinical and cost data should be available in a disaggregated form so that trusts can access their data and so that comprehensive national research and audit can be conducted.

Low throughput has tended to cause health professionals to assume that FMUs might be less cost-effective than OUs. This study used occupancy rates which were modelled from data from the Healthcare Commission survey of maternity units and primary sources collected from finance managers. On average, FMUs did have a much lower occupancy rate than AMUs and OUs. The average occupancy rates used in the model for this analysis were: OUs (65.1%), FMUs (30.4%) and AMUs (56.5%). The

occupancy rates were then varied in sensitivity analyses, which included an increase of 50% occupancy rates for the AMUs and FMUs. Median, minimum and maximum occupancy rates were also calculated for the units. Irrespective, the OUs tended to carry a higher burden of overheads than FMUs once non-pay inputs and indirect costs were included (theatre, pathology etc). Should occupancy rates rise in FMUs they would become an increasingly cost-effective source of provision of maternity care. The cost calculations in this analysis are susceptible to changes in occupancy rates and relative cost-effectiveness will adjust accordingly. A key cost driver will be the overheads apportioned across the unit for intrapartum care. Fixed costs will include estate and capital investment costs and variable costs will include midwifery staffing directly apportioned to each intrapartum episode. Should changes to maternity service configuration be planned for cost-effectiveness purposes, then commissioners would have to consider the resource use and related cost implications on the maternity service as a whole. This would require economic modelling and forecasting of occupancy rates, overheads, patient safety and transfer in view of fixed and variable costs, and the relative disinvestment in one form of maternity service provision in preference for another. The cost-effectiveness analysis presented here is most relevant for the duration of data collection of the Birthplace prospective cohort study and the context of the NHS maternity service for that time period.

The limited time horizon of the study meant that the follow up of outcomes for both mother and the baby did not extend beyond the time period of labour care, or higher level postnatal or neonatal care when this was received. Serious adverse outcomes can result in associated life-long health and societal costs, as shown by the size of damages paid in obstetric litigation cases, which represent a substantial cost to the NHS. Less serious, but more frequent, morbidities associated with labour and birth and its management affect women and babies. Follow up over weeks or longer to monitor recovery, or a future assessment of the outcomes for mothers and babies at a later date, would shed more light on long term cost-effectiveness.

The effectiveness data used in the cost-effectiveness analysis are composites of perinatal and maternal outcomes. Although necessary for this study, the use of a composite measure does not capture the complexities of weighting for individual components. The methods of analysis employed in this cost-effectiveness analysis could not explore these complexities further. This is a particular weakness in this study. Furthermore, the study has an innate tension in holding the outcomes for both the mother and the baby in synergy as the cost-effectiveness analysis is limited by its inability to link the effectiveness outcomes together. In keeping with the prospective cohort study report, the results show cost-effectiveness for only the baby or only the mother separately according to planned place of birth, but not both together in the same analysis. This might be counter-intuitive because it would be invidious to 'trade' the outcomes for the mother with the outcomes for the baby. A decision analytic model has therefore been

designed to synthesise available published data with data collected from Birthplace to look at combined outcomes for both the mother and baby in a single analysis. This will be undertaken following this report.

Assumptions based on primary research were made about midwifery 'staff to woman' ratios during labour. This was recorded asintermittent or continuous support that midwifery staff were able to offer women in different birth settings. The assumptions were generated from primary research conducted as part of the costing study. Birth at home, and in a FMU and AMU were attributed continuous midwifery care during labour, with 65% intermittent midwifery support attributed to OUs. These were varied in the sensitivity analyses, but for cost-effectiveness purposes only. In this report, it is impossible to comment on the 'quality of care' consequences from these proportional changes in dedicated staff time, but this is noted by others, such as the HealthCare Commission who identified the need for adequate staffing levels, continuity of care for women during labour and support for women after the birth of their baby. Clearly, 1:1 continuous midwifery care is an additional benefit for women in the planned home, FMU and AMU groups.

Furthermore, this study only used clinically defined outcomes to determine the cost-effectiveness of planned place of birth. Although these outcomes were rigorously collected and reviewed, outcomes which are also of importance to women and decision-makers, such as the quality of care offered, women's experiences and support with breastfeeding were not addressed in the analysis. A broader economic approach to the measurement of outcomes, such as stated preference discrete choice modelling might have provided more information to decision makers, but this had not been practically possible given the size and anonymity of the study design. Within Birthplace, however, separate research was undertaken which aimed to describe women's experiences of care, management and experiences of transfer between services, and organisational and workforce issues, which may each impact on the quality of care in different locations.

Although represented as costs, the findings shown here reflect the duration of labour, proportion of women and babies requiring transfer, mode of birth, levels of intervention required and admissions to postnatal and neonatal care according to their planned place of birth. Planned birth at home is shown to be the most cost-saving option, reflecting reduced medical intervention and a higher incidence of 'normal birth'. This requires deeper analysis. When compared to women planning to give birth in an OU, women planning a birth at home were more likely to be white and have a fluent understanding of English, be married or living with a partner, to be living in a more socioeconomically advantaged area, and were markedly more likely to have had one or more previous pregnancies. Each of the above characteristics are associated with being cost-saving. The most marked contrast between the home birth group and the three other groups was in the distribution of parity, as far more women planning a birth at home were

multiparous compared to the FMU, AMU and OU groups. The regression on cost showed that being multiparous was associated with a significant and substantial cost-saving effect, and that this was apparent for each additional previous pregnancy. Analyses conducted in the prospective cohort study adjusting for differences in the characteristics of women planning birth in different settings, showed significantly increased odds of an adverse perinatal outcome for 'low' risk' nulliparous women in the planned home birth group. For births planned at home in nulliparous 'low risk' women, the cost-effectiveness analyses reflected a less effective and less-costly option, on average, for maternity care than birth planned in an OU. For multiparous women, the cost-effectiveness analyses reflect lower costs and improved perinatal outcomes, on average, in the planned non-OU settings, though with considerable uncertainty around the latter. Overall for the baby, planned place of birth in FMU and AMU settings generate cost savings with uncertainty around the cases of adverse perinatal outcome averted. For the mother, planned place of birth in all non-OU settings generated cost savings and improved maternal outcomes. Future research will combine outcomes for both the mother and baby using decision-analytic modelling and will explore these complexities further.

## *4.3 Conclusions*

The study found that planned births in non-OU settings were less costly and more cost-effective than births planned in an OU. There was no uncertainty in this finding for maternal outcomes and 'normal birth', though considerable uncertainty surrounded this finding for perinatal outcomes.

The analyses generated by this study and the subsequent decision-analytic modelling attempt to make the costs and outcomes of planned place of birth explicit and to link these together within an evaluative framework. The decision analytic model will attempt to combine perinatal and maternal outcomes, and to synthesise the data from Birthplace with published clinical, epidemiological and economic evidence. The purpose of the modelling study will be to provide service commissioners and clinical managers, policy makers and parent representatives with robust information in order to to develop policy and to plan maternity services using relevant evidence.

## *4.4 Key messages*

This study was conducted for women at 'low risk' of complications prior to the onset of labour.

### 4.4.1 Costs

- The average cost of 'normal birth' was £938. The average cost of a spontaneous vaginal birth without complications was £947.
- Key cost drivers are overheads and staffing.

- Occupancy rates affect the cost of providing maternity care in different settings. There is substantial variability in the overheads costs and occupancy rates in all settings for birth, and for FMUs in particular.

- It was found that the cost of intrapartum care and any costs associated with intrapartum related complications is less for birth planned at home, in an FMU and in an AMU compared with planned OU births.
- The total mean costs per 'low risk' woman prior to the onset of labour were as follows: OU £1,631, AMU £1,461, FMU £1,435 and home £1,066.5.

Total cost for women without complicating conditions at the start of care in labour approximated: OU £1,511, AMU £1,427, FMU £1,405 and home £1,027.

- Costs were adjusted for confounders, skewness and weighting in the dataset. When these were accounted for, the differences in mean costs for planned births approximated: -£367(OU to home), -£182 (OU to FMU), -£129 (OU to AMU). All the cost differences are negative reflecting the cost-saving effect of birth planned in a non-OU setting.
- Being multiparous was associated with a cost-saving effect, and this was accentuated for each previous pregnancy.
- For nulliparous women, the cost differences between alternative birth settings narrowed:

    - Total mean costs per 'low risk' nulliparous woman were: OU £2075.2, AMU £1,983.1, FMU £1,912.5 and home £1,793.7.

    - Total mean costs per 'low risk' nulliparous woman without complicating conditions at the start of care in labour were: OU £1,940.4, AMU £1932.5, FMU £1,880.7 and home £1,719.0.

    - Total mean costs per 'low risk' multiparous woman were: OU £1,142.4, AMU £991.3, FMU £968.9 and home £780.4.

    - Total mean costs per 'low risk' multiparous woman without complicating conditions at the start of care in labour were: OU £1076.9, AMU £978.3, FMU £953.7 and home £765.8.
- Primary data was collected wherever possible, but costs were modelled if not available and interpretation of these costing results should be made with caution.

### 4.4.2 Effectiveness

- The Birthplace national prospective cohort study showed that:
  - Overall, there were no differences in adverse perinatal outcomes between settings
  - Perinatal outcomes differ by planned place of birth in nulliparous women
  - Maternal outcomes were 'better' in the three non-OU settings

### 4.4.3 Cost-effectiveness

- When compared to planned births in an OU:
  - planned birth at home, in a FMU and an AMU generated incremental cost savings but uncertaintysurrounded adverse perinatal outcomes avoided
    - planned births at home for nulliparous 'low risk' women generated incremental cost savings but increased adverse perinatal outcomes
    - planned births at home for multiparous 'low risk' women generated incremental cost savings but uncertainty surrounded adverse perinatal outcomes avoided
  - planned birth at home, in a FMU and an AMU generated incremental cost savings per adverse maternal morbidity avoided
  - planned birth at home, in a FMU and an AMU generated incremental cost savings per additional 'normal birth'
- Overall, planned place of birth at home was found to be the most cost-saving option; however, more women planning a birth at home were multiparous compared to the planned FMU, AMU and OU groups.

### 4.4.4 Other

- Routinely collected clinical and cost data should be available in a disaggregated form so that trusts can access their data and so that comprehensive national research and audit can be conducted.

## *4.5 Future research questions*

Further research exploring the cost-effectiveness of planned place of birth will be presented in a final report to follow. This individual level cost-effectiveness analysis will inform a decision-analytic model where the perinatal and maternal outcomes will be combined in a composite measure, and expressed as an incremental cost per healthy woman and baby at hospital discharge.

Current findings suggest that the following research questions will be important:

- What would be the financial impact on maternity services if more non-OU settings were utilised for intrapartum care?

- How might the intervention rates and outcomes for mothers and babies in OU settings differ if they were to receive continuous support (which tends to be more consistently provided in the non-OU settings) rather than intermittent midwifery support?
- Less serious but more frequent morbidities associated with labour and birth and its management may affect women and babies. What is the long term cost-effectiveness for mothers and babies who are followed up over weeks or longer to monitor recovery?
- How would the results of this study change when outcomes that are also of importance to women and decision-makers, such as the quality of care offered, women's experience and support with breastfeeding are reflected in a broader economic evaluation framework?

Recommendations for research will be made in view of the findings of the decision-analytic model to follow.

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# Appendix 1 Additional resource use data

**Table 18. Resource use data identified as part of the Birthplace prospective cohort study**

| Birthplace DCF section | Questions asked in the Birthplace data collection forms | Resource variable identified | Data collected in addition to the Birthplace DCFs | Source of additional data collection for detailed resource use |
|---|---|---|---|---|
| ***Prospective Cohort Study Data Collection forms from OUs, AMUs FMUs and homebirth*** | | | | |
| **Section B and C:** Mother's details and pregnancy history | Age<br>Ethnic group<br>Fluency<br>Marital status<br>BMI at booking (if recorded)<br>Pregnancy history<br>Medical conditions | Demographic information | | |
| **Section D:** Labour and birth | Date and time midwife started/finished labour care | 'episode of care' to which a staff time cost will be attributed | More midwifery or other health professional time to be included | Structured questionnaire for OU, AMU, FMU and HB in the 4 regional Birthplace centres with the 4 RLMs.<br>See Appendices 9 and 10 |
| **Section D:** Maternal Transfer | Mode of transfer, date and time of transfer | | Duration of transfer: miles; minutes; networks<br><br>Extra staff required for transfer | Structured questionnaire with paramedic services in the 4 regional Birthplace centres.<br>Appendix 9 |
| **Section D:** Maternal Transfer | Date and time midwife started/finishes labour care in OU | Change to staffing<br><br>Start of midwifery and additional care in the OU | Care continuous or intermittent<br>Numbers of health professionals in attendance | Structured questionnaire for OU in the 4 regional Birthplace centres with the 4 RLMs.<br>Appendix 9 |

 

| Birthplace DCF section | Questions asked in the Birthplace data collection forms | Resource variable identified | Data collected in addition to the Birthplace DCFs | Source of additional data collection for detailed resource use |
|---|---|---|---|---|
| **Section D:** Maternal Transfer | Date and time women receives first clinical assessment – | Start of (possibly) clinical care in OU | Care continuous or intermittent<br>Numbers of health professionals in attendance | Structured questionnaire for OU in the 4 regional Birthplace centres with the 4 RLMs.<br>Appendix 9 |
| **Section D:** Maternal Transfer | Meconium staining<br><br>Postpartum haemorrhage<br><br>Epidural<br><br>Spinal<br><br>General Anaesthetic<br><br>Repair of perineal trauma | | Costing of each clinical event – detailed bottom up costing | Structured questionnaire for OU in the 4 regional Birthplace centres with the 4 RLMs.<br>Appendix 9 |
| **Section D:** Labour and birth | Mode of delivery | | We anticipated attributing a cost to each mode of birth which would reflect the resource use and staffing requirements throughout the labour, based on primary costing | Structured questionnaire for OU, AMU, FMU and HB in the 4 regional Birthplace centres with the 4 RLMs.<br>Appendices 9 and 10 |
| **Section D:** Labour and birth | Active management of the third stage of labour | | | |
| **Section D:** Labour and birth | Episiotomy | | | |
| **Section D:** Labour and birth | Perineal Trauma involving the anal sphincter | | | |

 

| Birthplace DCF section | Questions asked in the Birthplace data collection forms | Resource variable identified | Data collected in addition to the Birthplace DCFs | Source of additional data collection for detailed resource use |
|---|---|---|---|---|
| **Section D:** Labour and birth and **Section D:** Maternal Morbidity Data Collection Form | Stillbirth | Time of stillbirth<br>Stage of labour<br>Post-mortem details | | |
| **Section E: After Birth and Section A: Maternal Morbidity Data Collection Form** | Mother received blood transfusion within 48 hours after birth | Units of blood or packed cells given, cell saver used | | |
| **Section E:** After Birth and **Section B:** Maternal Morbidity Data Collection Form | Mother admitted to high dependency area within 48 hours after birth | Date of admission, time of admission, date of discharge, treatment received | | |
| **Section E:** After Birth and **Section B:** Maternal Morbidity Data Collection Form | Mother admitted to ITU within 48 hours after birth | Date of admission, time of admission, date of discharge, treatment received | | |
| **Section E:** After Birth and **Section B:** Maternal Morbidity Data Collection Form | Mother admitted to Specialist care within 48 hours after birth | Date of admission, time of admission, date of discharge, treatment received | | |
| **Section E:** After Birth and **Section A:** Neonatal Morbidity Mortality Follow up Form | Baby receiving special care | Date of admission, time of admission, date of discharge, days of/and treatment received including method of feeding | | |

 

| Birthplace DCF section | Questions asked in the Birthplace data collection forms | Resource variable identified | Data collected in addition to the Birthplace DCFs | Source of additional data collection for detailed resource use |
|---|---|---|---|---|
| **Section E:** After Birth and **Section A:** Neonatal Morbidity /Mortality Follow up Form | Baby receiving high dependency care | Date of admission, time of admission, date of discharge, days of/and treatment received, respiratory support (ventilator or CPAP) | | |
| **Section E:** After Birth and **Section A:** Neonatal Morbidity /Mortality Follow up Form | Baby receiving intensive care | Date of admission, time of admission, date of discharge, days of/and treatment received, respiratory support (ventilator or CPAP) | | |
| **Section E:** After Birth and **Section K:** Neonatal Morbidity Mortality Follow up Form | Baby died | | | |
| ***Maternal Morbidity / Mortality Follow-up Data Collection forms*** | | | | |
| **Section C:** Maternal Mortality | Date and time of death, place of death, cause of death | | | |
| ***Neonatal Morbidity / Mortality Follow-up Data Collection forms*** | | | | |
| **Section B:** Meconium Aspiration | Baby receiving ECMO | No of days of treatment / medication | | |
| **Section C:** Encephalopathy | Baby having seizures requiring cooling treatment | No of days of treatment / medication | | |

 

# Appendix 2 Data collection form for a FMU/AMU

**Table 19. Example of a detailed data collection form for a FMU/AMU**

| DATA COLLECTION FORM<br>FREE STANDING MIDWIFERY UNIT or ALONGSIDE MIDWIFERY UNIT<br>(ALL QUESTIONS) | |
|---|---|
| **Date form completed** | |

**Demographic data**

**Q1** **Woman's age at delivery:** ***(years)***

**Q2** **Woman's ethnic group:** ***(as recorded in her maternity notes)***

**Q3** **Father's occupation OPCS code**

**Q4** **Mother's occupation OPCS code**

**Q5** **Woman's understanding of English language - if a problem:**

- Mother tongue ☐
- Good English ☐
- Medium English ☐
- Minimal English ☐
- None ☐

**Q6** **Woman's marital / partner status:**

- Husband ☐
- Partner ☐
- Single ☐

**Q7** **Woman's BMI at any time in pregnancy *or height/weight***

**Q8** **Woman's full postcode:**

## Current Pregnancy

**Q9** **Expected date of delivery**

 

## Admission to AMU / FMU for purpose of labour and delivery

**Q11** **Woman self-reported reason for arrival at FMU/AMU**

Antenatal in labour ☐

Antenatal not in labour ☐

**Q12** **Did the patient give birth in the same episode of care?**

No ☐ ***Go to Q13***

Yes ☐ ***Go to Q14 – Q18***

**Q13** **If no, please give reason and do not continue with the form**

Delivered already ☐

In labour ☐

Returned home ☐

Other ☐

If other, specify

**Q14** **If Yes, date of admission**

**Q15** **Time of admission *(using 24 hour clock)***

 

**Q16** **Place admitted to**

| |
|---|
| |

**Q17** **Date of first cervical assessment if done**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

**Time *(using 24 hour clock)***

| |
|---|
| |

**Q18** **Other procedures performed after admission and before 'establishment of labour' (EOL)? (e.g. EOL as marked by moving from a/n assessment to labour ward or receiving 1:1 care)**[1]

Yes ☐

No ☐

**If Yes, please report procedures**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

1 Guidance: EOL is hereby defined as moving from a/n assessment to labour ward in preparation for the delivery of the baby - or when a woman begins to receive 1:1 care

 

## Augmentation

**Q19** **Was an ARM performed?**

Yes ☐

No ☐

**Q20** **Date**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

**Q21** **Time *(using 24 hour clock)***

**Q22** **Was labour augmented in any other way?**

Spontaneous ☐

Induced ☐

## Pain relief

**Q23** **Water**

Yes ☐

No ☐

**Q24** **Massage (by midwife)**

Yes ☐

No ☐

**Q25** **Tens machine**

 

Yes ☐

No ☐

**Q26** **Entonox**

Yes ☐

No ☐

**Q27** **Opiates**

Yes ☐

No ☐

If Yes, total dose of opiates

## Midwifery support

**Q28** 1. Did the woman receive continuous or intermittent midwifery support during established labour?

Continuous ☐

Intermittent ☐ If intermittent, proportion for midwifery time allocated to the mother during established labour

☐ 0-20%

 

| | |
|---|---|
| ☐ | 21-40% |
| ☐ | 41-60% |
| ☐ | 61-80% |
| ☐ | 81-100% |

**Q29** **Number of midwives / midwifery support workers in total caring for woman in established labour?**

| Midwives | | Midwifery support workers | |
|---|---|---|---|
| 1 | ☐ | 1 | ☐ |
| 2 | ☐ | 2 | ☐ |
| 3 | ☐ | 3 | ☐ |
| 4 | ☐ | 4 | ☐ |
| ≥ 5 | ☐ | ≥ 5 | ☐ |

## Duration of first stage of labour

**Q30** **Duration first stage labour (minutes)**

| |
|---|
| |

## Date, time and duration of second stage of labour- Delivery of the baby

**Q31** **Date**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

 

**Q32** **Time *(using 24 hour clock)***

**Q33** **Mode of delivery**

| | |
|---|---|
| Ventouse | ☐ |
| Forceps | ☐ |
| Water birth | ☐ |
| SVD | ☐ |
| CS | ☐ |

**Q34** **Where did the birth take place?**

| | |
|---|---|
| On the bed | ☐ |
| On the mat | ☐ |
| On the birth stool | ☐ |
| In the pool | ☐ |
| Other | ☐ |

 

**Q35 Birth position**

| | |
|---|---|
| Sitting supported by pillows | ☐ |
| On the side | ☐ |
| Standing | ☐ |
| Squatting | ☐ |
| All fours | ☐ |
| Laying down | ☐ |
| Laying with legs supported in stirrups | ☐ |

**Q36 Total number of vaginal examinations performed during labour?**

| | |
|---|---|
| 1 | ☐ |
| 2 | ☐ |
| 3 | ☐ |
| 4 | ☐ |
| 5 | ☐ |
| **6** | ☐ |
| **≥7** | ☐ |

**Q37 Number of babies delivered**

| | |
|---|---|
| 1 | ☐ |
| 2 | ☐ |
| 3 | ☐ |

 

**Q38** **Type of presentation of the baby**

Vertex ☐

Breech ☐

Oblique ☐

Transfers ☐

Face ☐

**Q39** **Duration second stage of labour *( minutes)***

## The third stage of labour

**Q40** **Was syntometrine/syntocinon used for the third stage of labour?**

Yes ☐ No ☐

Syntometrine (ampules) ☐

Syntocinon (I.U) ☐

If Yes, total dose _____

**Q41** **Duration of third stage of labour *(minutes)***

## Baby Outcome: Vital statistics

**Q42** **Birth outcome**

 

Live birth ☐

Still birth ☐

**Q43** **Sex of baby**

Male ☐

Female ☐

**Q44** **Birthweight**

| | | | | |
|---|---|---|---|---|
| | | | | g |

**Q45** **Apgar at 5 minutes**

| | |
|---|---|
| | |

**Q46** **Apgar at 10 minutes**

| | |
|---|---|
| | |

**Q47** **Time when this episode of care was completed** [2] (see footnote)

| | | | |
|---|---|---|---|
| | *Hours* | | *Minutes* |

## Fetal outcome: Breastfeeding

2 Guidance: the episode of labour care is completed when the woman and baby are discharged from the delivery room or when the midwife begins to complete the post-natal notes, whichever occurs first

 

**Q48** **Intended feeding**

Breast ☐

Bottle ☐

Mixed feeding ☐

**Q49** **Was the baby breastfed for the first feed?**

Yes ☐

No ☐

**Q50** **Date of first feed**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

**Q51** **Time of first feed *(using 24 hour clock)***

**Q52** **Type of feeding established**

Breast ☐

Bottle ☐

Mixed feeding ☐

**Q53** **Did the mother receive health care support for breastfeeding ?**

Yes ☐ If so by whom

No ☐

**Q54** **Did the baby have skin to skin contact at delivery?**

Yes ☐

No ☐

 

## Discharge

**Q55** **Date and time of discharge from AMU/FMU for mother**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Date: | | | | | | | |
| Time: | | (Using 24 hour clock) | | | | | |

**Q56** **Estimated total length of stay for mother**

*Length of stay* _____ *Days* _____ *Hours*

**Q57** **Destination on discharge from OU**

Usual residence ☐

Other residence ☐

Other ☐

**Q58** **Date and time of discharge of baby from the AMU/ FMU**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Date: | | | | | | | |
| Time: | | (Using 24 hour clock) | | | | | |

 

## Maternal Transfers

**Q59. Date and time of decision to transfer:** :

**Q60. Primary reason for transfer:** *Please write in one code from list*

01 Failure to progress (1st stage)
02 Fetal distress (1st stage)
03 Meconium staining
04 Epidural request
05 Hypertension
06 Malposition
07 Antepartum haemorrhage
08 Failure to progress (2nd stage) *Please specify* _____
09 Fetal distress (2nd stage)
10 Postpartum haemorrhage
11 Retained placenta
12 Repair of perineal trauma
13 Other maternal indication
*Please specify* _____
14 Other fetal indication

**Q61. Date and time of start of transfer:**

**Q62. Mode of transfer:**

Private car Ambulance Wheelchair/Trolley/Bed Walking Other

*If Other, please specify* _____

**Q63. Full name of unit woman transferred to:** _____

**Q64. Date and time of start of midwifery care in obstetric unit:**

**Q65. Date and time of first clinical assessment by obstetrician:**

Or tick if not assessed by an obstetrician

**Q66. Was labour augmented with syntocinon?** Yes No

 

**Q67. Did this woman have an epidural or spinal?** Yes No

**Q68. Did this woman have a general anaesthetic?** Yes No

## Maternal Outcome: Postpartum Complications In Hospital

**Q69** **Did the women have episiotomy?**

Yes ☐

No ☐

**Q70** **Was there perineal trauma involving the anal sphincter (3th/ 4th degree tear)**

Yes ☐

No ☐

**Q71** **Did the woman receive perineal suturing after delivery?**

No ☐

Yes ☐ If yes,

☐ Suturing episiotomy

☐ Suturing first degree tear

☐ Suturing second degree tear

☐ Suturing third degree tear

☐ Suturing fourth degree tear

 

**Q72** **Maternal complication 1**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**Q73** **Maternal complication 2**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**Q74** **Maternal complication 3**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**Q75** **Maternal complication 4**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

 

**Q76** **Other maternal injury**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**Q77** **Estimate blood loss (mls)**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

**Q78** **Did the woman have a blood transfusion?**

No ☐

Yes ☐ If yes, complete medication form

**Q79** **Did the woman receive antibiotics after delivery?**

No ☐

Yes ☐ If yes, complete medication form

**Q80** **Was a surgical procedure performed as a result of a complication?**

No ☐

Yes ☐ If yes, specify _____

 

**Q81** **Were diagnostic imaging tests performed as a result of a complication?**

No ☐

Yes ☐ If yes,

Type: _____ Number of examinations: _____

Type: _____ Number of examinations: _____

**Q82** **Were additional consultants seen as a result of a complication?**

No ☐

Yes ☐ If yes,

Specify: _____ Number of visits: _____

Specify: _____ Number of visits: _____

## Postnatal care - mother in hospital

**Q83** **Admission to postnatal care in hospital**

Yes ☐ *If Yes, length of stay* ☐ *Days* ☐ *Hours*

No ☐

**Q84** **Admission to ICU**

Yes ☐ *If Yes, length of stay* ☐ *Days* ☐ *Hours*

No ☐

 

**Q85** **Admission to HDU**

Yes ☐ *If Yes, length of stay* ____ *Days* ____ *Hours*
No ☐

**Q86** **Admission to Specialist Unit**

Yes ☐ *If Yes, length of stay* ____ *Days* ____ *Hours*
No ☐

**Q87** **Did the women stay in any other ward other than those above after labour?**

Yes ☐ *If Yes, length of stay* ____ *Days* ____ *Hours*
No ☐

## Infant complications in hospital

**Q88** **Resuscitation using bag and mask**

Yes ☐
No ☐

**Q89** **Resuscitation using endotrachael tube**

Yes ☐
No ☐

**Q90** **Drugs used during resuscitation**

No ☐

 

Yes ☐ If yes, complete medication form

**Q91** **Neonatal complication 1**

| | | | | | |
|---|---|---|---|---|---|
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**Q92** **Neonatal complication 2**

| | | | | | |
|---|---|---|---|---|---|
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**Q93** **Neonatal complication 3**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
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**Q94** **Congenital malformation observed in baby 1**

Yes ☐

No ☐

**Q95** **Congenital malformation observed in baby 2**

Yes ☐

No ☐

 

**Q96** **Congenital malformation observed in baby 3**

Yes ☐

No ☐

**Q97** **Congenital malformation observed in baby 4**

Yes ☐

No ☐

## Postnatal care – baby in hospital

**Q98** **Admission to NICU**

Yes ☐ *If Yes, length of stay* ____ *Days* ____ *Hours*

No ☐

**Q99** **Admission to SCBU**

Yes ☐ *If Yes, length of stay* ____ *Days* ____ *Hours*

No ☐

**Q100** **Date and time of infant death**

Date: | | | | | | |

Time: | | (Using 24 hour clock)

 

**MEDICATION FORM**

| Check recipient | | Medication used | Route | Dose given | Total number of doses administered |
|---|---|---|---|---|---|
| Mother | Baby | | | | |
| | | | | | |
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# Appendix 3 Data collection form for an OU

**Table 20. Example of a detailed data collection form for an OU**

| DATA COLLECTION FORM<br>OBSTETRIC UNIT | |
|---|---|
| **Date form completed** | |

**Demographic data**

| | |
|---|---|
| **Q1** | **Woman's age at delivery:** ***(years)*** |
| **Q2** | **Woman's ethnic group:** ***(as recorded in her maternity notes)*** |
| **Q3** | **Father's occupation OPCS code** |
| **Q4** | **Mother's occupation OPCS code** |

**Q5** **Woman's understanding of English language - if a problem:**

Mother tongue ☐?

Good English ☐?

Medium English ☐?

Minimal English ☐?

None ☐?

**Q6** **Woman's marital / partner status:**

Husband ☐?

Partner ☐?

Single ☐?

**Q7** **Woman's BMI at any time in pregnancy**

**Q8** **Woman's full postcode:**

**Q9** **Expected date of delivery**

## Woman history / Previous pregnancy

**Q10** **Number of pregnancies of ≥ 24 weeks, prior to this pregnancy:** *If none, write 0*

 

## Admission for purpose of labour and delivery

**Q11** **Woman self-reported reason for arrival**

Antenatal in labour ☐

Antenatal not in labour ☐

**Q12** **Did the woman give birth in the same episode of care?**

No ☐ *Go to Q13*

Yes ☐ *Go to Q14 – Q21*

**Q13** **If No, please give reason and do not continue with the form**

·eady ☐

In labour ☐

Returned home ☐

☐

If other, specify

**Q14** **If Yes, date of admission**

**Q15** **Time of admission *(using 24 hour clock)***

 

**Q16** **Place admitted to *(e.g. triage /antenatal assessment/ delivery ward/birthing room/theatre)***

**Q17** **Date of first cervical assessment if done**

**Q18** **Time *(using 24 hour clock)***

**Q19** **Cardiotocography on admission**

☐

No ☐

**Q20** **Other procedures performed after admission and before 'establishment of labour' (EOL)? (e.g. EOL as marked by moving from a/n assessment to labour ward or receiving 1:1 care)[3]**

☐

No ☐

3 Guidance: EOL is hereby defined as moving from a/n assessment to labour ward in preparation for the delivery of the baby - or when a woman begins to receive 1:1 care

 

**If Yes, please report procedures**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
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| | | | | | |
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**Q21** **Number of tests**

1 ☐

2 ☐

3 ☐

4 ☐

≥ 5 ☐

## Induction/ Augmentation

**Q22** **Was an ARM performed?**

Yes ☐

No ☐

**Q23** **Date of establishment of labour**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

 

**Q24** **Time *(using 24 hour clock)***

**Q25** **Mode of onset of labour**

Spontaneous ?

Induced ?

## Pain relief

**Q26** **Water**

Yes ?

No ?

**Q27** **Massage (by midwife)**

Yes ?

No ?

**Q28** **Tens machine**

Yes ?

No ?

**Q29** **Entonox**

 

Yes ☐

No ☐

**Q30** **Opiates**

Yes ☐

No ☐

If Yes, total dose of opiates ☐ ☐

**Q31** **Epidural/ Spinal**

Yes ☐

No ☐

**Q32** **General Anaesthetic**

Yes ☐

No ☐

**Q33** **Other**

Yes ☐

No ☐

If other, specify

## MIDWIFERY SUPPORT

Q34 Did the woman receive continuous or intermittent midwifery support during established labour?

Continuous ☐

 

| | | |
|---|---|---|
| Intermittent | | If intermittent, proportion for midwifery time allocated to the mother during established labour |
| | ☐ | 0-20% |
| | ☐ | 21-40% |
| | ☐ | 41-60% |
| | ☐ | 61-80% |
| | ☐ | 81-100% |

**Q35** **Number of midwives / midwifery support workers in total caring for woman in established labour?**

| **Midwives** | | ıpport workers | |
|---|---|---|---|
| | ☐ | | ☐ |
| 2 | ☐ | 2 | ☐ |
| 3 | ☐ | 3 | ☐ |
| 4 | ☐ | 4 | ☐ |
| ≥ 5 | ☐ | ≥ 5 | ☐ |

## DURATION OF FIRST STAGE OF LABOUR

**Q36** **Duration first stage labour (minutes)**

**Q37** **Other medical procedures performed during first stage of labour?**

Yes ☐

 

No ☐

If yes, specify

## DATE, TIME AND DURATION OF SECOND STAGE OF LABOUR- DELIVERY OF THE BABY

**Q38** **Date**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

**Q39** **Time *(using 24 hour clock)***

**Q40** **Mode of delivery**

Ventouse ☐

Forceps ☐

Water birth ☐

SVD ☐

CS ☐

 

**Q41** **Where did the birth take place?**

| | |
|---|---|
| On the bed | ? |
| On the mat | ? |
| On the birth stool | ? |
| In the pool | ? |
| Other | ? |

**Q42** **Birth position**

| | |
|---|---|
| Sitting supported by pillows | ? |
| On the side | ? |
| Standing | ? |
| Squatting | ? |
| All fours | ? |
| Laying down | ? |
| Laying with legs supported in stirrups | ? |

 

**Q43** **Total number of vaginal examinations performed during labour?**

| | |
|---|---|
| | ☐ |
| | ☐ |
| | ☐ |
| | ☐ |
| | ☐ |
| **6** | ☐ |
| **≥7** | ☐ |

**Q44** **Number of babies delivered**

| | |
|---|---|
| 1 | ☐ |
| 2 | ☐ |
| 3 | ☐ |

**Q45** **Type of presentation of the baby**

| | |
|---|---|
| Vertex | ☐ |
| Breech | ☐ |
| Oblique | ☐ |
| Transfers | ☐ |
| Face | ☐ |

 

**Q46** **Reason for emergency CS 1**

| | | | | | |
|---|---|---|---|---|---|
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**Q47** **Reason for emergency CS 2**

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|---|---|---|---|---|---|
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**Q48** **Duration *(hours, minutes)***

| |
|---|
| |

**THE THIRD STAGE OF LABOUR:**

**Q49** **Date**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

**Q50** **Time *(using 24 hour clock)***

| |
|---|
| |

 

**Q51** **Was syntometrine/ syntocinon used for the third stage of labour?**

? No ?

e (amples)

Syntocinon (I.U) ?

If Yes, total dose _____

**Q52** **Did the woman have a manual removal of the placenta following vaginal delivery?**

No ?

Yes ?

**Q53** **Duration *(minutes)***

## Maternal Outcome: Postpartum Complications

**Q54** **Did the women have episiotomy?**

Yes ?

No ?

**Q55** **Was there perineal trauma involving the anal sphincter (3th/ 4th degree tear)**

Yes ?

No ?

 

**Q56** **Did the woman have perineal suturing after delivery?**

No ☐

Yes

If yes,

☐ Suturing episiotomy

☐ Suturing first degree tear

☐ Suturing second degree tear

☐ Suturing third degree tear

☐ Suturing fourth degree tear

**Q57** **Maternal complication 1**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

**Q58** **Maternal complication 2**

| | | | | | |
|---|---|---|---|---|---|
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| | | | | | |
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**Q59** **Maternal complication 3**

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|---|---|---|---|---|---|
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**Q60** **Maternal complication 4**

| | | | | | |
|---|---|---|---|---|---|
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**Q61** **Other maternal injury**

| | | | | | |
|---|---|---|---|---|---|
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**Q62** **Estimate blood loss (mls)**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

**Q63** **Did the woman have a blood transfusion?**

No ☐

Yes ☐ If yes, complete medication form

**Q64** **Did the woman receive antibiotics after delivery?**

No ☐

Yes ☐ If yes, complete medication form

**Q65** **Was a surgical procedure performed as a result of a complication?**

No ☐

 

Yes ☐ If yes, specify _____

**Q66** **Were diagnostic imaging tests performed as a result of a complication?**

No ☐

Yes If yes,

Type: _____ Number of examinations: _____

Type: _____ Number of examinations: _____

**Q67** **Were additional consultants seen as a result of a complication?**

No ☐

Yes If yes,

Specify: _____ Number of visits: ___

Specify: _____ Number of visits: ___

## Postnatal care - mother

**Q68** **Admission to postnatal care**

Yes ☐ *If Yes, length of stay* ☐☐

No ☐

 

**Q69** **Date when postnatal care started**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

**Q70** **Time *(using 24 hour clock)***

| |
|---|
| |

**Q71** **Admission to ICU**

Yes ☐ *If Yes, length of stay* ☐ ☐

No ☐

**Q72** **Admission to HDU**

Yes ☐ *If Yes, length of stay* ☐ ☐

No ☐

**Q73** **Admission to Specialist care**

Yes ☐ *If Yes, length of stay* ☐ ☐

No ☐

**Q74** **Did the women stay in any other ward other than those above after labour?**

Yes ☐ *If Yes, length of stay* ☐ ☐

No ☐

## Maternal discharge

**Q75** **Date and time of discharge from hospital**

Date:

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

 

Time: [ ] (Using 24 hour clock)

**Q76** **Estimated total length of stay**

*Length of stay* [ ] [ ]

**Q77** **Destination on discharge from RLH**

Usual residence ☐

Other residence ☐

Other ☐

## Baby outcome: Vital statistics

**Q78** **Birth outcome**

Live birth ☐

Still birth ☐

**Q79** **Sex of baby**

Male ☐

Female ☐

**Q80** **Birthweight**

[ ][ ][ ][ ] g

**Q81** **Apgar at 5 minutes**

[ ][ ]

 

**Q82** **Apgar at 10 minutes**

| | |
|---|---|
| | |

**Q83** **Resuscitation using bag and mask**

Yes ☐

No ☐

**Q84** **Resuscitation using endotrachael tube**

Yes ☐

No ☐

**Q85** **Drugs used during resuscitation**

No ☐

Yes ☐ If yes, complete medication form

**Q86** **Neonatal complication 1**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
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**Q87** **Neonatal complication 2**

| | | | | | |
|---|---|---|---|---|---|
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**Q88** **Neonatal complication 3**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
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**Q89** **malformation observed in baby 1**

Yes ☐

No ☐

**Q90** **malformation observed in baby 2**

Yes ☐

No ☐

**Q91** **malformation observed in baby 3**

Yes ☐

No ☐

 

**Q92** **Time when this episode of care was completed**[4] (see footnote)

## FETAL OUTCOME: BREASTFEEDING

**Q93** **Intended feeding**

Breast ☐

Bottle ☐

Mixed feeding ☐

**Q94** **Was the baby breastfed for the first feed?**

Yes ☐

No ☐

**Q95** **Date of first feed**

**Q96** **Time of first feed *(using 24 hour clock)***

**Q97** **Type of feeding established**

Breast ☐

Bottle ☐

Mixed feeding ☐

4 Guidance: the episode of labour care is completed when the woman and baby are discharged from the delivery room or when the midwife begins to complete the post-natal notes, whichever occurs first

 

**Q98** **Did the mother receive health care support for breastfeeding?**

Yes ☐ If so by whom

No ☐

**Q99** **Did the baby have skin to skin contact at delivery?**

Yes ☐

No ☐

## Postnatal care - baby

**Q100** **Admission to NICU**

Yes ☐ *If Yes, length of stay* ____ ____

No ☐

**Q101** **Admission to SCBU**

Yes ☐ *If Yes, length of stay* ____ ____

No ☐

**Q102** **Date and time of discharge of baby**

Date: ____ ____ ____ ____ ____ ____

Time: ____ (Using 24 hour clock)

**Q103** **Date and time of infant death**

Date: ____ ____ ____ ____ ____ ____

time: ____ (Using 24 hour clock)

 

**MEDICATION FORM**

| Check recipient | | Medication used | Route | Dose given | Total number of doses administered |
|---|---|---|---|---|---|
| Mother | Baby | | | | |
| | | | | | |
| | | | | | |
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# Appendix 4 Structured questionnaire

**Table 21. Unit Cost and Resource Use Structured Questionnaire**

Top Down Costing
Unit Cost and Resource Use Structured Questionnaire for design of unit cost database and related unit cost sensitivity analysis

Interviews conducted with:

| Trust | Unit names | Units within trust | Geographic location in England | RLCM | Place of Interview | Dates of interviews |
|---|---|---|---|---|---|---|
| Liverpool Women's Hospital NHS Foundation Trust | Liverpool Women's NHS Foundation Trust<br>Liverpool Women's NHS Foundation Trust | OU<br>AMU | North | Chelsea McDonough | Liverpool | Tuesday 24th March |
| Oxford Radcliffe Hospitals NHS Trust | Horton Hospital<br>Chipping Norton Hospital<br>Wallingford Hospital<br>Wantage Hospital | OU<br>FMU<br>FMU<br>FMU | South east | Laura Stewart-Maunder | University of Oxford Richards building, DPHPC | Wednesday 29th April and Wednesday 20th May |
| Taunton and Somerset NHS Trust | Mary Stanley Wing Bridgewater<br>Bracken Birthing Centre | FMU<br>AMU | South west | Carol Puckett | Musgrove Park Hospital, Taunton | Wednesday 16th April |
| Kings College Hospital NHS Foundation Trust | Kings College Hospital | OU | London | June Grant | Kings College London | Friday 6th March 2009 and Friday 30th April 2009 |
| Barts and the London Trust | Royal London Hospital<br>Barkantine Birth centre | OU<br>FMU | London | Ali Herron<br>Jude Piper | Royal London Hospital or Barkantine Birth Centre | Numerous meetings between Jan 2008 and Dec 2009. Monthly structured meetings and informal meetings one-on-one with members of the team. |

**Unit Cost and Resource Use Structured Questionnaire for design of unit cost database**

We'd like to have a discussion about the way the OU, AMU and FMU manage the following scenario's (i.e. what happens - usually / least complex scenario / most complex scenario)

Where applicable we need to know about the ratio of staff to women

**Transfer: questions to FMU and AMU**

***In utero transfer of mother***

What are the typical least complex and then most complex scenarios that lead to a decision to transfer a mother?

 

When this happens what do you do, what processes do you follow?
Could you talk us through the whole process from start to when you would consider an 'in-utero transfer' to be finished?

(Extra Q – are these covered in what they describe?)

Who do you contact? (Name, contact details)
What does the person you called do?
Who else do you contact if you can't get through the person? *(Name, contact details)*
Are additional nurses or other health care professionals called in? *(Grade)*
If assistance is requested who is contacted? *(Name, contact details)*
Who is in the assistance team?
Does the woman's partner/next of kin ever use their own transport?
In the first instance which hospital is the woman normally transferred to?
Does the midwife accompany the woman to hospital?
When is there a handover of care in the OU?

***After birth: transfer of mother and /or baby***

**after birth: if you need to transfer the mother what happens:** Could you talk us through the whole process from start to when you would consider a 'post-natal maternal transfer' to be completed:

**after birth: if you need to transfer the baby what happens:** Could you talk us through the whole process from start to when you would consider a 'post-natal baby transfer' to be completed:

**after birth: if you need to transfer the mother and baby what happens:** Could you talk us through the whole process from start to when you would consider a 'post-natal baby transfer' to be completed:

(Extra Q – are these covered in what they describe?)

What are the typical least complex scenario/ most complex scenarios that lead to transfers?
When something goes wrong what do you do?
Who do you call? (Name, contact details)
What does the person you called do?
Who else do you contact if you can't get through the person? *(Name, contact details)*
Are additional nurses or other health care professionals called in? *(Grade)*
If assistance is requested who is contacted? *(Name, contact details)*
Who is in the assistance team?
Does the woman's partner/next of kin ever use their own transport?
In the first instance which hospital is the woman normally transferred to?
Does the midwife accompany the woman to hospital?

**-Other**
Can you think of other scenarios that take place not discussed here and lead to transferring women?
What are the typical least complex scenario/most complex scenarios?
When something goes wrong what do you do?
Who do you call? (Name, contact details)

 

What does the person you called do?
Who else do you contact if you can't get through the person? *(Name, contact details)*
Are additional nurses or other health care professionals called in? *(Grade)*
If assistance is requested who is contacted? *(Name, contact details)*
Who is in the assistance team?
Does the woman's partner/next of kin ever use their own transport?
In the first instance which hospital is the woman normally transferred to?
Does the midwife accompany the woman to hospital? Does anyone else? When is care and handover completed?

**Financial structure of OU, AMU, FMU**

***AMU / FMU:***

Who manages the finances at the unit? *(Name and contact details)*

***How do they do this:***

What needs to be done to financially run the unit?
What do they do to financially oversee the unit?
Who assists them? *(Name and contact details*)
Who manages the finances in their absence? *(Name and contact details*)
What expenses are attributed to the unit?
What expenses /running costs are not attributed to the unit?

***OU:***

Who manages the finances at the unit? *(Name and contact details)*

***How do they do this:***

What do they do to financially oversee the unit?
Who assists them? *(Name and contact details*)
Who manages the finances in their absence? *(Name and contact details*)
What expenses are attributed separately to the OU maternity and neonatal departments?
What expenses /running costs are not attributed to the OU maternity and neonatal departments?

**Please could you complete an overview of the running costs for this unit (OU/AMU/FMU) to include the following:**

A. Wages/salary

B. Salary on-costs employer's contribution to superannuation.

C. Qualifications

D. Training

E. Management and administrative costs, operational costs (e.g. vehicle running costs) and overheads (including heating and lighting, training, building maintenance and so on).

 

Direct overheads: Includes mobile phones, uniform replacement, stationery, thermometers, energy.

Indirect overheads £ per year
Include the personnel and finance functions. Costs need to be uprated by the HCHS Pay and Prices Inflator.

G. Capital overheads
£ per year Based on the new build and land requirements of NHS facilities.
Office size. Capital to be annuitised at 3.5 per cent.

Buildings and land
*Capital costs associated with the buildings and land*

H. Equipment costs

**Pharmacy and Drug Costs for the OU, FMU and AMU**

***FMU/AMU/OU***

Do you have your own pharmacy for drugs that are used in the unit?
What happens when you run low on drugs and don't have certain drugs available?
Where do you go? *(Name and contact details)*

***Pharmacy Drugs***

Who manages the drugs? *(Name and contact details)*
How do they manage the drugs / What do they do to manage the drugs?

**Equipment**

Who manages the maintenance of the equipment? *(Name and contact details)*
How do they manage it?
What do they do?
Who manages the replacing equipment? *(Name and contact details)*
How do they manage it?
What do they do?
In a worst case scenario what do you do in event of equipment not suddenly working? *(Details if possible)*
Who would manage the situation?
How do they manage it? *(Name and contact details)*
*Any charity sponsored pieces that might not be included?*

**Other activities the OU/FMU offer to the community (in addition to intrapartum and p/n care)**

What other activities are offered by FMU / AMU in addition to intrapartum and p/n care?

What other activities are offered by the OU maternity and neonatal section in addition to intrapartum and p/n care?

 

(Extra Q – are these covered in what they describe?)

What other activities are offered to the community?
Who organises these activities *(Name and contact details)*
How do they manage it?
What do they do?
Is additional staff required? Who are they?
What type external training is provided to staff for these activities?
If so, by who?
Who are the external health care professionals that participate in activates? *(Name and contact details)*
How do they participate?

 

# Appendix 5 Design of micro-costing spreadsheet

### Table 22. Example of micro-costing of labour and post-natal care

**Place admitted to**

What happens in the following places as a general description - from our perspective of needing to cost staff (numbers and staff time commitment to this place)

Triage

| Staff title and grade | Length of time with staff | Cost (£) of staffing | comments/ assumptions for costing | Equipment | Cost (£) | comments/ assumptions for costing | Drug | Dose | Mode of administration | Cost (£) | comments/ assumptions for costing | Length of time of procedure | Cost (£) | comments/ assumptions for costing | Total Cost (£) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | |

Antenatal assessment

| Staff title and grade | Length of time with staff | Cost (£) of staffing | comments/ assumptions for costing | Equipment | Cost (£) | comments/ assumptions for costing | Drug (come from pharmacist) | Dose | Mode of administration | Cost (£) | comments/ assumptions for costing | Length of time of procedure | Cost (£) | | Total Cost (£) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | |

Birthing room

| Staff title and grade | Length of time with staff | Cost (£) of staffing | comments/ assumptions for costing | Equipment | Cost (£) | comments/ assumptions for costing | Drug | Dose | Mode of administration | Cost (£) | comments/ assumptions for costing | Length of time of procedure | Cost (£) | Length of time of procedure | Total Cost (£) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | |

Theatre

| Staff title and grade | Length of time with staff | Cost (£) of staffing | comments/ assumptions for costing | Equipment | Cost (£) | comments/ assumptions for costing | Drug | Dose | Mode of administration | Cost (£) | comments/ assumptions for costing | Length of time of procedure | Cost (£) | | Total Cost (£) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | |

# Appendix 6 Micro-costing of resource use variables

**Table 23. Micro-costing of resource variables for labour and post-natal care**

| **Staffing : Midwives** | | | | | | |
|---|---|---|---|---|---|---|
| **Resource Use Variable** | **Cost calculation: salary** | **RLM interview** | **Assumption made** | **Unit cost** | **Total** | **Source of Unit cost** |
| | | | | | | |
| Staffing: first midwife | Band 6/7 mid-point =£32704, Base year 2009/2010 Agenda for change | B6 & 7 mw: tends to be 1 for labour duration with second arrival for baby's birth for a homebirth | Time spent with woman = duration of labour | £63 (£70) per hour of patient contact.<br><br>£11.31 CNST contribution | variable depending on duration of labour: hourly cost attributed to labour duration | PSSRU: Unit costs of Health and Social care 2010<br><br>Primary cost data collection for CNST contributions |
| | Salary on-costs: £7523 per annum (Employer's NI plus 14% superannuation) | | | | | |
| | Qualifications: £4801 per annum Education investment cost annuitied over working life | | | | | |
| | Overheads: £3130 per annum Indirect staffing overheads | | | | | |
| | Working time: 41.4 weeks per annum 37.5 hours per week. Includes: 29 days A/L. 8 days statutory leave. 5 study days. 12 days sick leave. Hours per annum: 1547 | | | | | |

| Homebirth | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| Resource Use Variable | Cost calculation: salary | RLM interview | Assumption made | Unit cost | Total | Source of Unit cost |
| | | | | | | |
| Staffing: first midwife | Band 6/7 mid point =£32704, Base year 2009/2010 Agenda for change | B6 & 7 mw: tends to be 1 for labour duration with second arrival for baby's birth | Time spent with woman = duration of labour | £81.31 per hour | variable depending on duration of labour: hourly cost attributed to labour duration | PSSRU: Unit costs of Health and Social care 2010 |
| | Salary oncosts: £7523 per annum (Employer's NI plus 14% superannuation) | | | | | Primary cost data collection for CNST |
| | Qualifications: £4801 per annum Education investment cost annuitied over working life | | | | | |
| | Overheads: £3130 per annum Indirect staffing overheads | | | | | |
| | Working time: 41.4 weeks per annum 37.5 hours per week. Includes: 29 days A/L. 8 days statutory leave. 5 study days. 12 days sick leave. Hours per annum: 1547 | | | | | |
| | | | | | | |
| Staffing: second midwife | as above | time spent 1 hour approx | Time spent with woman = 1 extra hour to cover birth of baby and intial support and clean up | £81.31 per hour | variable depending on duration of labour: hourly cost attributed to labour duration | PSSRU: Unit costs of Health and Social care 2010 |
| | | | | | | |

 

| Homebirth Delivery pack: relevant resource items : given to woman at 38 weeks | | | |
|---|---|---|---|
| sterile single use instrument delivery pack: | 1 8" lotion bowl, 5 xrd swabs 10 10 cm , 1 trolley cover, 2 artery forceps, 1 mayo scissors, 1 umbilical scissors | £9.14 | Taken from NHS supply chain catalogue 2009, page 322 code EVX111 |
| sterile delivery pack: | 1 placenta dish, 2 pulp kidney dishes, cord clamp, 2 wound pads, quilted baby wrap, 2 dressing towels crepe white sterile filed, 1 60ml galipot, 1 underbuttock drape, 1 120ml galipot, 2 polybowls 500ml, 1 yellow poly bag | £7.01 | Taken from NHS supply chain catalogue 2009, page 322 code EVC019 and code EVI010 |
| surgical gloves | | £0.41 | Taken from NHS supply chain catalogue 2009, page 195 code FTE883 |
| lidocaine hydrochloride | | £0.88 | BNF 60: lidocaine hydrochloride 5%, net price 15 g = 88p |
| vitamin k injection | | £0.95 | Konakion® MM Paediatric (Roche) Injection, phytomenadione 10 mg/mL in a mixed micelles vehicle, net price 0.2-mL amp = 95p |
| gas and air mouthpiece | | £2.05 | Taken from NHS supply chain catalogue 2009, page 698 code FDQ501 |
| sharps box | | £0.76 | Taken from NHS supply chain catalogue 2009, page 179 codeFSL493 |
| amnihook | | £0.86 | Taken from NHS supply chain catalogue 2009, page 961 code FFY007 |
| Perineal suture pack: | 3 drapes 75*90 com, instrument table cover, 5 gauze 22.5 ply xray, 1 needle 21g green, 1 gown standard, 2 leggings 75*114cm blue absorbant impervious materieal, 1 xtray, jwire, 1 maternity pad looped | £12.26 | Taken from NHS supply chain catalogue 2009, page 319 code EVX122 |

 

| | | | | | | |
|---|---|---|---|---|---|---|
| Total cost of pack: | | | | £34.32 | | |
| The homebirth pack itself consists of : | | | | | | |
| | | | | | | |
| sterile delivery pack | Sterile single use instrument delivery pack: 1 8" lotion bowl, 5 xrd swabs, 10 10 cm, 1 trolley cover, 2 artery forceps, 1 mayo scissors, 1 umbillical scissors | | | | | |
| | Pack sterile delivery: 1 placenta dish, 2 pulp kidney dishes, cord clamp, 2 wound pads, quilted baby wrap, 2 dressing towels crepe white sterile field, 1* 60 ml galipot, 1 underbuttock drape | | | | | |
| | Pack sterile delivery: 1* 120 ml galipot, 2 poly bowls 500ml, 1 yellow poly bag | | | | | |
| surgical gloves | | | | | | |
| lydocaine hydochloride | | | | | | |
| plastic aprons | | | | | | |
| vitamin k injection | | | | | | |
| gas and air mouthpiece | | | | | | |
| clinical waste bags | | | | | | |
| sharps box | | | | | | |
| 'detectable' guaze swabs (blue | | | | | | |
| amniotomy hook | | | | | | |
| bowl | | | | | | |
| forceps scissors | | | | | | |
| maternity pads | | | | | | |

 

| | |
|---|---|
| sterile perinial suture pack | 3 drapes 75 * 90cm, instrument table cover, 5 gauze 22.5*22.5 12 ply xray, 1 needle 21g green, 1 gown large standard, 2 leggings 75*114cm blue absorbant impervious material, 1 xtray, jwire, 1 maternity pad looped |
| disposable stitches | |
| materity mats | |

| Resource Variable | Unit cost | Unit cost range | Explanation | Source of Unit Cost | Total cost applied to travel to and from homebirth | |
|---|---|---|---|---|---|---|
| | | | | | | |
| NHS reimbursement of homebirth travel costs for midwife | | | | | | |
| | | | | | | |
| Cost of collection of car after a transfer and homebound journey | 50.41 pence per mile | 36.09-110.35 pence per mile | Standing charges and running costs per mile (pence) Used 23 miles as the distance mw had to travel to homebirths. Used the average distance between homebirth and Ous from Birthplace data equating to about 42. This is similar to the PSSRU ave ambulance journey (38 minutes)minutes. | AA Petrol car running costs – basic guide for 2010 http://www.theaa.com/allaboutcars/advice/advice_rcosts_petrol_table.jsp Accessed 22 March 2010 | 23.1886 | |

 

| *Resource Variable* | *Unit cost* | *Unit cost range* | *Explanation* | *Source of Unit Cost* |
|---|---|---|---|---|
| ***Transfer*** | | | | |
| intrapartum and neonatal ambulance transfers | £6,7 per minute | £257~38 minute journey~£6.7 per minute | A successful vehicle journey is equivalent to transporting a single patient for A&E services.<br><br>Included in the costs are:<br>Overheads and management: management and administrative costs, operational costs (e.g. vehicle running costs) and overheads (including heating and lighting, training, building maintenance and so on).<br><br>Buildings and land: Capital costs associated with the buildings and land invested in the ambulance service were estimated by discounting their capital value over 60 years at 3.5 per cent.<br><br>Ambulances and equipment: Paramedic Units (PU) and Emergency Ambulances (EA) use exactly the same type of vehicle with similar equipment on board. The ambulances cost £47,297 new and standard equipment including defibrillators costs £11,824 per vehicle. Vehicles and the equipment are expected to last five years. Discounting at 3.5 per cent the annual cost of an EA is £13,095. The average number of journeys per emergency ambulance was 1,152.<br><br>Crew salaries and wages: A crucial distinguishing characteristic of the different services is the type of crew. A PU carries one paramedic (average salary £31,926 pa) and one technician (average salary £29,945). An EA is crewed by two technicians and a PTS by two care assistants (average salary £16,354). Once national insurance and pension payments are included the average annual crew cost is £67,077 for a PU; £69,173 for an EA; and £36,632 for a PTS. The average number of journeys per EA and PU crew is 480 per year, PTS crews provides an average of 339 journeys per PTS crew. | averaged costs using PSSRU 2007 and DH reference costs |

 

| *Resource Variable* | *Unit cost* | *Unit cost range* | *Explanation* | *Source of Unit Cost* |
|---|---|---|---|---|
| ***Transfer*** | per journey | interquartile range (per journey) | | |
| | | | | |
| Paramedic Services per journey for Pregnancy / Childbirth / Miscarriage/ Gynaecological (rural) | 184 | 150- 169.5 | | DH Reference Costs |
| Paramedic Services per journey for Pregnancy / Childbirth / Miscarriage/ Gynaecological (urban) | 194 | 136-153 | | DH Reference Costs |
| Emergency transfers | 240 | 206-362 | | DH Reference Costs |
| ***Resource Variable*** | ***Unit cost per hour*** | ***Unit cost range*** | ***Explanation*** | ***Source of Unit Cost*** |
| | | | | |
| Private car | 0 | | cost not attributed to the NHS | |
| Walking | 0 | | | |
| Wheelchair / trolley / bed | 0.01 | | £170 per active user per chair per year | PSSRU |
| Rapid response ambulance car | 214 | 214 -241 | lower interquartile range for ambulance transfer | |
| Helicopter | 144.5 | 83-206 per hour | Between £60 000 per month and £1.8 million per year to run, but NHS do not pay running costs - only the cost of consultants. Rest raised by donations. | http://www.emas.nhs.uk/our-services/air-ambulances/ or http://news.bbc.co.uk/1/hi/england/oxfordshire/7907106.stm |
| Taxi | 0 | | cost not attributed to the NHS | |
| Not physically transferred from the AMU | 0 | | no cost attributed to mode and duration of transfer | |

 

| *Resource Variable* | *Unit cost* | *Unit cost range* | *Explanation* | *Source of Unit Cost* |
|---|---|---|---|---|
| | | | | |
| ***NHS reimbursement of homebirth transfer costs for midwife*** | | | | |
| | | | | |
| Cost of collection of car after a transfer and homebound journey | 50.41 per mile | 36.09-110.35 | Standing charges and running costs per mile (pence) | AA Petrol car running costs – basic guide for 2010 http://www.theaa.com/allaboutcars/advice/advice_rcosts_petrol_table.jsp Accessed 22 March 2010 |
| | | | | |
| | | | | |

 

| AUGMENTATION | | comments/ assumptions and source of cost data | Cost (£) |
|---|---|---|---|
| **1 hour of FS doctor** | | PSSRU adjusted for direct patient time and CNST contributions | £141.78 |
| ALARIS PUMP + cannulae equipment (8 hour duration) | | primary cost data - Kings £2015 new | £0.40 |
| Imed or Ivac titration machine | | | |
| Appropriate giving set | | Taken from NHS supply chain catalogue 2009, page 843 code FFSC087 | £3.05 |
| Venflon cannula | | Taken from NHS supply chain catalogue 2009, page 59 code FSP033 | £0.83 |
| Syringe and needle | | Taken from NHS supply chain catalogue 2009, page 352 code FWC032 | £0.05 |
| Swabs | | Taken from NHS supply chain catalogue 2009, page 769 code HHD090 | £0.06 |
| Sterile dressing | | Taken from NHS supply chain catalogue 2009, page 736 code EKG035 | £2.48 |
| Syntocinon | | oxytocin, net price 5 units/mL, 1-mL amp = 76p; 10 units/mL, 1-mL amp = 86p | £0.86 |
| Bag of fluid (dextrosaline) | | Intravenous infusion, usual strength sodium chloride 0.9% (9 g, 150 mmol each of Na+ and Cl-/litre), this strength being supplied when normal saline for injection is requested. Net price 2-mL amp = 35p; 5-mL amp = 42p; 10-mL amp = 57p; 20-mL amp = £1.04; 50-mL amp = £2.01 | £2.01 |
| Local anaesthetic | | Taken from BNF 59, 26/04/10 Naropin, injection (2mg/mL= £1.78) | £1.78 |
| Monitors and graph paper | | Taken from NHS supply chain catalogue 2009, page 242 code FDI058 | £0.07 |
| | | | |
| top up: | | as above | £0.86 |
| top up: | | as above | £2.01 |
| | | | |
| top up: | | as above | £0.86 |
| top up: | | as above | £2.01 |
| **TOTAL** | | | **£159.11** |

 

| ENTONOX | | comments/ assumptions and source of cost data | Cost (£) |
|---|---|---|---|
| | | | |
| 2.5 cylinders for homebirth | | Scottish data: Cylinder size DD 460 litres (portable oxygen) http://www.lothianrespiratorymcn.scot.nhs.uk/wp-content/uploads/2010/01/Lothian-Guideline-for-the-Domiciliary-Oxygen-Therapy-Service-for-COPD.pdf Accessed 18 March | £57.45 |
| Mobile equipment with mask, mouth piece | | Taken from NHS supply chain catalogue 2009, page 621 code FDC115 (ENTONOX KIT) AND delivery circuit mask code FDC346 | £ 10.53 |
| filter or tubing | | Taken from NHS supply chain catalogue 2009, page 677 CODE FDD254, FDE101, FDD148, FDD954 | £ 0.47 |
| rubber gloves | | Taken from NHS supply chain catalogue 2009, page 195 code FTE883 | £ 0.20 |
| **Total** | | | **68.65** |

 

| EPIDURAL | | | | | | |
|---|---|---|---|---|---|---|
| **Staff title and grade** | **Cost (£) of staffing** | **comments/ assumptions and source of cost data** | **Equipment** | | **Comments/ assumptions and source of cost data** | **Total** |
| | | | Epidural pack | | Taken from NHS supply chain catalogue 2009, page 328 code FYB062 | £32.10 |
| **Anaesthetist** | 194.68 | PSSRU 2010, page 218 (medical consultant), Assumption- time spent 30 MINUTES | Inco pad | | Taken from NHS supply chain catalogue 2009, page 961 code EAO500 | £0.09 |
| **extra midwife** | 40.65 | Band 7 mid-point =£32704, Base year 2007/2008, Assumption- time spent 30 minutes | Gloves | | Taken from NHS supply chain catalogue 2009, page 200 code FTE888 | £4.68 |
| | | | chlorhexodine 0.5% | | BNF: methyl salicylate 0.5 mL, diethyl phthalate 2%, castor oil 2.5%, in industrial methylated spirit, net price 100 mL = 20p. Label: 15 | £0.02 |
| | | | Syringe 10ml (1) | | Taken from NHS supply chain catalogue 2009, page 352 code FWC031 | £0.05 |
| | | | Ampoule 10 ml local anaesthetic | | Taken from BNF 59, 26/04/10 Naropin, injection (10mg/mL= £3.20) | £3.20 |
| | | | Syringe 2ml | | Taken from NHS supply chain catalogue 2009, page 352 code FWC032 | £0.05 |
| | | | Ampoule 2ml local anaesthetic | | Taken from BNF 59, 26/04/10 Naropin, injection (2mg/mL= £1.78) | £1.78 |
| | | | Drugs - marcaine 10ml | | Taken from BNF 59, 26/04/10 injection (10-mL= £1.21) | £1.21 |
| | | | | | Taken from NHS supply chain catalogue 2009, page 764 code EHH027 | £1.90 |
| | | | Hyperfix tape | | Taken from NHS supply chain catalogue 2009, page 764 code EHH028 | £1.57 |
| | | | Blenderm tape | | Taken from NHS supply chain catalogue 2009, page 766 code ECH011 | £0.36 |
| | | | Transpore tape | | Taken from NHS supply chain catalogue 2009, page 764 code EHU009 | £0.28 |
| | | | Opcite spray | | Xylocaine® (AstraZeneca) Spray (= pump spray), lidocaine 10% (100 mg/g) supplying 10 mg lidocaine/spray; 500 spray doses per container. Net price 50-mL bottle = £3.13 | £0.06 |
| | | | Mask (2 or 3) | | Taken from NHS supply chain catalogue 2009, page 479 code BWM042 | £0.05 |

 

| | | | | | | |
|---|---|---|---|---|---|---|
| **EPIDURAL CONT……/2** | | | Hats (2 or 3) | | Taken from NHS supply chain catalogue 2009, page 479 code BWF036 | £0.02 |
| | | | Gowns | | Taken from NHS supply chain catalogue 2009, page 410 code BWK201 | £1.36 |
| | | | IV form | | Taken from NHS supply chain catalogue 2009, page 293 code FFF171 | £1.04 |
| | | | Povidine iodine spray | | Taken from BNF 59, 21/04/10 spray (150g= £2.63) | £2.63 |
| | | | Paper tray | | Taken from NHS supply chain catalogue 2009, page 162 code FWK121 | £0.27 |
| | | | Water 10ml | | | £0.00 |
| | | | Syringe label | | | £0.00 |
| | | | Ephedrine 5ml ampoule | | Ephedrine Hydrochloride (Non-proprietary) Injection, ephedrine hydrochloride 3 mg/mL, net price 10-mL amp = £2.83; 30 mg/mL, net price 1-mL amp = 50p | £0.50 |
| | | | Needles: including filter needles | | Taken from NHS supply chain catalogue 2009, page 332 code FTR394 | £4.07 |
| | | | | | | |
| | | | **If women does not have IV drip:** | | | |
| | | | Fluid - Hartmans Solution | | Intravenous infusion, usual strength sodium chloride 0.9% (9 g, 150 mmol each of Na+ and Cl-/litre), this strength being supplied when normal saline for injection is requested. Net price 2-mL amp = 35p; 5-mL amp = 42p; 10-mL amp = 57p; 20-mL amp = £1.04; 50-mL amp = £2.01 | £0.35 |
| | | | Giving set | | Taken from NHS supply chain catalogue 2009, page 843 code FSC090 | £3.05 |
| | | | Venflon | | Taken from NHS supply chain catalogue 2009, page 59 code FSP033 | £0.83 |
| | | | Local anaesthetic | | Taken from BNF 59, 26/04/10 Naropin, injection (2mg/mL= £1.78) | £1.78 |
| | | | Syringe and needle | | Taken from NHS supply chain catalogue 2009, page 352 code FWC032 | £0.05 |
| | | | Swabs | | Taken from NHS supply chain catalogue 2009, page 769 code HHD090 | £0.06 |

 

| | | | | | | |
|---|---|---|---|---|---|---|
| **EPIDURAL CONT……/3** | | | sterile dressing | | Taken from NHS supply chain catalogue 2009, page 736 code EKG035 | £2.48 |
| | | | | | | |
| | | | **If not already monitored:** | | | |
| | | | Electronic fetal monitor | | Primary data collection Fin Mger Kings £13500 per CTG | £2.88 |
| | | | Fetal scalp electrodes | | Taken from NHS supply chain catalogue 2009, page 960 code FDK314: £106.71 FOR BOX 25 | £4.27 |
| | | | Monitor graph paper | | Taken from NHS supply chain catalogue 2009, page 242 code FDI058 | £0.07 |
| | | | | | | |
| | | | **Patient controlled Epidural Analgesia** | | Taken from NHS supply chain catalogue 2009, page 410 code BWK201 | £1.36 |
| | | | PCEA pump | | Injection, prefilled disposable syringe, atropine sulphate 200 micrograms/mL, net price 5 mL = £5.90; 300 micrograms/mL, 10 mL = £5.91; 600 micrograms/mL, 1 mL = £5.91 | £5.91 |
| | | | syringe 10 mls | | | |
| | | | | | | £0.08 |
| | | | 1% Bupiricaine | | Taken from BNF 59, 26/04/10 injection (10-mL= £1.21) | £1.21 |
| | | | 2mcg Fenlanys | | Fentanyl (Non-proprietary) Injection, fentanyl (as citrate) 50 micrograms/mL, net price 2-mL amp = 30p, 10-mL amp = 64p | £0.64 |
| | | | Top ups: | | | |
| | | | 1% Bupiricaine | | Taken from BNF 59, 26/04/10 injection (10-mL= £1.21) | £1.21 |
| | | | 2mcg Fenlanys | | Fentanyl (Non-proprietary) Injection, fentanyl (as citrate) 50 micrograms/mL, net price 2-mL amp = 30p, 10-mL amp = 64p | £0.64 |
| **Total** | | | | | | **£319.49** |

 

| SPINAL Staff title and grade | Length of time with staff | comments/ assumptions for costing | Cost (£) of staffing | Equipment | Comments/ assumptions and source of cost data | Total Cost (£) |
|---|---|---|---|---|---|---|
| | | | | 1 dressing | Taken from NHS supply chain catalogue 2009, page 736 code EKG035 | £ 2.48 |
| **Anaesthetist** | 20-30 mins | PSSRU 2010, page 218 (medical consultant), Assumption- time spent 30 MINUTES | £194.68 | Sleek tape | Taken from NHS supply chain catalogue 2009, page 764 code EHH027 | £ 1.90 |
| **ODA** | 20-30 mins | Band 7 mid-point =£32704, Base year 2007/2008, Assumption- time spent 30 minutes | £40.65 | Hyperfix tape | Taken from NHS supply chain catalogue 2009, page 764 code EHH028 | £ 1.57 |
| | | | | Blenderm tape | Taken from NHS supply chain catalogue 2009, page 766 code ECH011 | £ 0.36 |
| | | | | Transpore tape | Taken from NHS supply chain catalogue 2009, page 764 code EHU009 | £ 0.28 |
| | | | | Epidural pack | Taken from NHS supply chain catalogue 2009, page 328 code FYB062 | £ 32.10 |
| | | | | Inco pad | Taken from NHS supply chain catalogue 2009, page 961 code EAO500 | £ 0.09 |
| | | | | Gloves | Taken from NHS supply chain catalogue 2009, page 200 code FTE888 | £ 4.68 |
| | | | | Spirit solution - chlorhexidine 0.5% | BNF: methyl salicylate 0.5 mL, diethyl phthalate 2%, castor oil 2.5%, in industrial methylated spirit, net price 100 mL = 20p. Label: 15 | £ 0.02 |
| | | | | Syringe 10ml (1) | Taken from NHS supply chain catalogue 2009, page 352 code FWC031 | £ 0.05 |
| | | | | Ampoule 10 ml local anaesthetic | Taken from BNF 59, 26/04/10 Naropin, injection (10mg/mL= £3.20) | £ 3.20 |
| | | | | Syringe 2ml | Taken from NHS supply chain catalogue 2009, page 352 code FWC032 | £ 0.05 |
| | | | | Ampule 2ml local anaesthetic | Taken from BNF 59, 26/04/10 Naropin, injection (2mg/mL= £1.78) | £ 1.78 |
| | | | | Drugs - marcaine 10ml | Taken from BNF 59, 26/04/10 injection (10-mL= £1.21) | £ 1.21 |
| | | | | Opcite spray | Xylocaine® (AstraZeneca) Spray (= pump spray), lidocaine 10% (100 mg/g) supplying 10 mg lidocaine/spray; 500 spray doses per container. Net price 50-mL bottle = £3.13 | £ 0.06 |
| | | | | Mask (2 or 3) | Taken from NHS supply chain catalogue 2009, page 479 code BWM042 | £ 0.05 |
| | | | | Hats (2 or 3) | Taken from NHS supply chain catalogue 2009, page 479 code BWF036 | £ 0.02 |
| | | | | Gowns | Taken from NHS supply chain catalogue 2009, page 410 code BWK201 | £ 1.36 |
| | | | | IV form | Taken from NHS supply chain catalogue 2009, page 293 code FFF171 | £ 1.04 |
| | | | | Povidine iodine spray | Taken from BNF 59, 21/04/10 spray (150g= £2.63) | £ 2.63 |
| | | | | Paper tray | Taken from NHS supply chain catalogue 2009, page 162 code FWK121 | £ 0.27 |
| | | | | Water 10ml | | 0 |
| | | | | Ephedrine 5ml ampoule | Ephedrine Hydrochloride (Non-proprietary) Injection, ephedrine hydrochloride 3 mg/mL, net price 10-mL amp = £2.83; 30 mg/mL, net price 1-mL amp = 50p | £ 0.50 |

 

| | | | | | | |
|---|---|---|---|---|---|---|
| **SPINAL CONT..** | | | | | Injection, phenylephrine hydrochloride 10 mg/mL (1%), net price 1-mL amp = £5.50 | £ 5.50 |
| | | | | marcaine (for top ups) | Taken from BNF 59, 26/04/10 injection (10-mL= £1.21) | £ 6.05 |
| | | | | | Injection, powder for reconstitution, ceftriaxone (as sodium salt), net price 1-g vial = £10.17; 2-g vial = £20.36times 5 - many top ups: Ceftrioxone | £ 0.17 |
| **Total Cost** | | | **235.33** | | | **302.75** |

| **ACTIVE MANAGEMENT OF THE THIRD STAGE OF LABOUR** | | | |
|---|---|---|---|
| **Equipment** | **Cost (£)** | **Comments/ assumptions and source of cost data** | **Total Cost (£)** |
| Ampoule of Syntometrine *2 | 2.70 | Injection, ergometrine maleate 500 micrograms, oxytocin 5 units/mL, net price 1-mL amp = £1.35 | £2.70 |
| Ampoule of Syntocinon | 1.35 | Injection, ergometrine maleate 500 micrograms, oxytocin 5 units/mL, net price 1-mL amp = £1.35 | £1.35 |
| **TOTAL** | | | **£4.05** |

 

| GENERAL ANAESTHETIC | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Staff title and grade** | **Length of time with staff** | **Cost (£) of staffing** | **comments/ assumptions for costing** | **Equipment** | | **Source** | **Cost** |
| **Scrub midwife band 6 or 7 *1** | | £ 8.13 | Band 7 mid-point =£32704. Base year 2007/2008, Assumption- time spent 10 MINUTES | CTG in OU (per 8 hour Birthplace average labour duration) | | Primary data collection Fin Mger Kings £13500 per CTG | £ 2.88 |
| **HCA *1** | | £ 3.36 | Band 6 mid-point =£27388, Base year 2007/2008, Assumption- time spent 10 MINUTES | Thiopentone | | Injection, powder for reconstitution, thiopental sodium, net price 500-mg vial = £3.06 | £ 3.06 |
| **Obstetrician *2** | | £ 648.98 | PSSRU 2010, page 218 (medical consultant). Assumption 50 minutes CNST added to calculation | N/Saline | | intravenous infusion, usual strength sodium chloride 0.9% (9 g, 150 mmol each of Na+ and Cl-/litre), this strength being supplied when normal saline for injection is requested. Net price 2-mL amp = 35p; 5-mL amp = 42p; 10-mL amp = 57p; 20-mL amp = £1.04; 50-mL amp = £2.01 | £ 2.01 |
| **Anaesthetist *1** | | £ 38.94 | PSSRU 2010, page 218 (medical consultant),, Assumption- time spent 10 MINUTES | Vecuronium | | Injection, powder for reconstitution, vecuronium bromide, net price 10-mg vial = £3.38 (with water for injections) | £ 3.38 |
| **ODA *1 (assists anaesthetist)** | | £ 36.50 | PSSRU 2010, page 218 (medical consultant), | Syntocinon | | oxytocin, net price 5 units/mL, 1-mL amp = 76p; 10 units/mL, 1-mL amp = 86p | £ 0.86 |
| **Pediatrician *1** | | £ 38.94 | PSSRU 2010, page 218 (medical consultant), ),, Assumption- time spent 10 MINUTES | Suxamenthonium | | injection, suxamethonium chloride 50 mg/mL, net price 2-mL amp = 71p | £ 0.71 |
| | | | | Atropine | | Injection, atropine sulphate 600 micrograms/mL, net price 1-mL amp = 68p | £ 0.68 |
| | | | | Pain relief: | | Injection, fentanyl (as citrate) 50 micrograms/mL, net price 2-mL amp = 30p, 10-mL amp = 64p | £ 0.30 |
| | | | | Morphine | | Intravenous infusion, morphine sulphate 1 mg/mL, net price 50-mL vial = £5.00; 2 mg/mL, 50-mL vial = £5.89 | £ 5.00 |
| | | | | Lignocaine for insertion of IVI | | Injection 2%, lidocaine hydrochloride 20 mg/mL, net price 2-mL amp = 31p; 5-mL amp = 31p; 10-mL amp = 60p; 20-mL amp = 80p | £ 0.31 |
| | | | | Neostigmine and atrophine or | | Injection, neostigmine metilsulfate 2.5 mg/mL, net price 1-mL amp = 58p | £ 0.58 |
| | | | | Hartmann's 500ml | | Intravenous infusion, usual strength sodium chloride 0.9% (9 g, 150 mmol each of Na+ and Cl-/litre), this strength being supplied when normal saline for injection is requested. Net price 2-mL amp = 35p; 5-mL amp = 42p; 10-mL amp = 57p; 20-mL amp = £1.04; 50-mL amp = £2.01 | £ 0.35 |
| | | | | | | | |

 

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **GENERAL ANAESTHETIC CONT..** | | | | Equipment: | | | |
| | | | | Oximeter for mother | | primary costing, minimal - set to 0.01 | £ 0.01 |
| | | | | ECG for mother | | Taken from NHS supply chain catalogue 2009, page 222 code FDK129 | £ 2.04 |
| | | | | Defibrilator | | primary costing, minimal - set to 0.01 | £ 0.01 |
| | | | | Datascope | | primary costing, Equipment worth £3000 new | £ 0.10 |
| | | | | Syringes: | | | |
| | | | | 20ml (1) | | Taken from NHS supply chain catalogue 2009, page 352 code FWC030 | £ 0.05 |
| | | | | 10ml (1) | | Taken from NHS supply chain catalogue 2009, page 352 code FWC031 | £ 0.05 |
| | | | | 5ml (1) | | Taken from NHS supply chain catalogue 2009, page 352 code FWD063 | 0.06 |
| | | | | 2ml (6) | | Taken from NHS supply chain catalogue 2009, page 352 code FWC032 | £ 0.31 |
| | | | | Needles: | | Taken from NHS supply chain catalogue 2009, page 764 code EHH028 | £ 1.57 |
| | | | | 21G | | Taken from NHS supply chain catalogue 2009, page 337 code FTR167 | £ 0.01 |
| | | | | 23G | | Taken from NHS supply chain catalogue 2009, page 337 code FTR163 | £ 0.01 |
| | | | | 27G | | Taken from NHS supply chain catalogue 2009, page 337 code FTR348 | £ 0.02 |
| | | | | | | | |
| | | | | Electronic fetal monitor | | Primary data collection Fin Mger Kings £13500 per CTG | £2.88 |
| | | | | Fetal scalp electrodes | | Taken from NHS supply chain catalogue 2009, page 960 code FDK314: £106.71 FOR BOX 25 | £4.27 |
| | | | | Monitor graph paper | | Taken from NHS supply chain catalogue 2009, page 242 code FDI058 | £ 0.07 |
| | | | | Antiseptic wipe | | Taken from NHS supply chain catalogue 2009, page 362 code VJT041 | £ 0.06 |
| | | | | Sticky tape and vetafix/micropore | | Taken from NHS supply chain catalogue 2009, page 764 code EHH028 | £ 1.57 |
| | | | | 14G or 16G Venflon | | Taken from NHS supply chain catalogue 2009, page 59 code FSP033 | £ 0.83 |

 

| GENERAL ANAESTHETIC CONT.. | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | Giving set(1) | | Taken from NHS supply chain catalogue 2009, page 843 code FSC090 | £ 3.05 |
| | | | | Endotracheal tube size 8.0 | | Taken from NHS supply chain catalogue 2009, page 646 code FDH745 | £ 1.36 |
| | | | | Connector/Catheter mount/Introducer | | Taken from NHS supply chain catalogue 2009, page 623 code FDB145 | £ 1.48 |
| | | | | Laryngoscope | | Taken from NHS supply chain catalogue 2009, page 236 code FSM109 | £ 12.10 |
| | | | | Dommete Bandage | | Taken from NHS supply chain catalogue 2009, page 711 code EBA075 | £ 3.04 |
| | | | | Oro gastric tube + litmus | | Taken from NHS supply chain catalogue 2009, page 353 code FWM871 | £ 3.15 |
| | | | | Suction liner | | Taken from NHS supply chain catalogue 2009, page code FDR447 | £ 2.07 |
| | | | | Urinary catheter/Bag/Catheter pack | | Taken from NHS supply chain catalogue 2009, page 1551 code FSS620, £44.67 for pack of 5 | £ 8.93 |
| | | | | Masks | | Taken from NHS supply chain catalogue 2009, page 479 code BWM042 | £ 0.05 |
| | | | | Gowns | | Taken from NHS supply chain catalogue 2009, page 479 code BWF036 | £ 0.02 |
| | | | | Shoes | | Taken from NHS supply chain catalogue 2009, page 293 code FFF171 | £ 1.04 |
| | | | | Hats | | Taken from NHS supply chain catalogue 2009, page 410 code BWK201 | £ 1.36 |
| **Total:** | | **£ 774.85** | | | | | **£ 846.54** |

| SPONTANEOUS VERTEX BIRTH |
|---|

 

| Equipment | | comments/ assumptions and source of cost data | Total Cost (£) |
|---|---|---|---|
| **OU:** | | | |
| Delivery pack | | Taken from NHS supply chain catalogue 2009, page 318 code EVX111 (sterile single use instrument delivery pack) + EVC019 (pack sterile delivery) + EVI010 (pack sterile delivery)<br>(pack 8=£73.09) AND page 317 code ECV019 (pack 20=£55.69) | £ 16.15 |
| Gloves | | Taken from NHS supply chain catalogue 2009, page 200 code FTE888 | £ 4.68 |
| Maternity pads | | Taken from NHS supply chain catalogue 2009, page 961 code EAO500 | in delivery pack |
| Inco pads | | Taken from NHS supply chain catalogue 2009, page 961 code EAO500 | £ 0.09 |
| Syringe Needle | | Taken from NHS supply chain catalogue 2009, page 352 code FWC032 | £ 0.05 |
| Plastic cord clamp | | Taken from NHS supply chain catalogue 2009, page 960 code FFK535 | in delivery pack |
| | | | £ 0.02 |
| | | primary data collection | £ 0.08 |
| | | Taken from NHS supply chain catalogue 2009, page 123 code FWC082 | £ 0.04 |
| Materials for cord blood gases | | Taken from NHS supply chain catalogue 2009, page 344 code FWC124 | £ 2.14 |
| Heparinised syringes x2 | | Taken from NHS supply chain catalogue 2009, page 136 code FSL491 | in delivery pack |
| 2 needles 1:10000 | | | in delivery pack |
| 2 wide syringes | | primary data collection | £ 0.10 |
| lydocaine hydochloride | | lidocaine hydrochloride 5%, net price 15 g = 88p | £ 0.88 |
| vitamin k injection | | phytomenadione 10 mg/mL in a mixed micelles vehicle, net price 0.2-mL amp = 95p | 0.95 |
| amniotomy hook | | Taken from NHS supply chain catalogue 2009, page 961 code FFY007 | £ 0.86 |
| | | | |
| **TOTAL:** | | | **£ 26.03** |

 

| **SVB CONT….** | | | |
|---|---|---|---|
| AMU AND FMU | | | |
| Delivery pack | | Taken from NHS supply chain catalogue 2009, page 318 code EVX111 (sterile single use instrument delivery pack) + EVC019 (pack sterile delivery) + EVI010 (pack sterile delivery)<br>(pack 8=£73.09) AND page 317 code ECV019 (pack 20=£55.69) | £ 16.15 |
| Gloves | | Taken from NHS supply chain catalogue 2009, page 200 code FTE888 | £ 4.68 |
| Maternity pads | | Taken from NHS supply chain catalogue 2009, page 961 code EAO500 | in delivery pack |
| Inco pads | | Taken from NHS supply chain catalogue 2009, page 961 code EAO500 | £ 0.09 |
| Syringe Needle: giving drugs + taking cord blood | | Taken from NHS supply chain catalogue 2009, page 352 code FWC032 | £ 0.05 |
| Plastic cord clamp | | | in delivery pack |
| Large disposal bag | | | in delivery pack |
| plastic draw sheet | | | in delivery pack |
| Catheter if required | | Taken from NHS supply chain catalogue 2009, page 1551 code FST248, £46.69 for pack of 10 | £ 4.69 |
| lydocaine hydochloride | | lidocaine hydrochloride 5%, net price 15 g = 88p | £ 0.88 |
| vitamin k injection | | phytomenadione 10 mg/mL in a mixed micelles vehicle, net price 0.2-mL amp = 95p | 0.95 |

 

| | | | |
|---|---|---|---|
| amniotomy hook | | Taken from NHS supply chain catalogue 2009, page 961 code FFY007 | £ 0.86 |
| **TOTAL** | | | **29.53** |

| | | | |
|---|---|---|---|
| SVB CONT… | | | |
| **HOMEBIRTH** | | | |
| Vaginal examination pack | | Taken from NHS supply chain catalogue 2009, page 324 code EVC011 | £0.41 |
| KY jelly | | Taken from NHS supply chain catalogue 2009, page 144 code FTM113 | £1.08 |
| handwash | | Taken from NHS supply chain catalogue 2009, page180 code MRB116, 75ml | £0.25 |
| Inco pads | | Taken from NHS supply chain catalogue 2009, page 961 code EAO500 | £0.09 |
| Paracetamol | | http://bnf.org/bnf/bnf/current/3470.htm#_3470: paracetamol 500 mg, net price 16-tab pack = 17p | £0.06 |
| Sociaide* hourly cost mulitplied by average duration labour | | Sonicaid: http://www.medisave.co.uk/sonicaid-one-p-8466.html: | £0.08 |
| Urine test | | Taken from NHS supply chain catalogue 2009, page 123 code KFK391 | £0.09 |
| Blood pressure monitor | | http://www.medisave.co.uk/blood-pressure-validated-c-50_366.html | £0.01 |
| placenta bag + transportation box | | Taken from NHS supply chain catalogue 2009, page 187 code FAL024 | £ 21.80 |

 

| | | | |
|---|---|---|---|
| Catheter if required | | Taken from NHS supply chain catalogue 2009, page 1551 code FST248, £46.69 for pack of 10 | £ 4.69 |
| TOTAL | | | **£28.55** |

| **ASSISTED DELIVERY: VENTOUSE** | | | | | | |
|---|---|---|---|---|---|---|
| **Staff title and grade** | **Cost (£) of staffing** | **comments/ assumptions and source of cost data** | **Equipment** | | **comments/ assumptions and source of cost data** | **Total Cost (£)** |
| | | | Assisted delivery pack | | Taken from NHS supply chain catalogue 2009, page 318 code EVX111 (sterile single use instrument delivery pack) + EVC019 (pack sterile delivery) + EVI010 (pack sterile delivery) (pack 8=£73.09) AND page 317 code ECV019 (pack 20=£55.69) | £ 16.15 |
| obstetrician | £ 97.34 | PSSRU 2008, page 160 (surgical consultant), Assumption- time spent 15 | | | | £ 97.34 |
| Pediatrician | £ 194.68 | PSSRU 2010, page 218 (medical consultant), Assumption- time spent 30 | | | | £ 194.68 |
| Registrar teaching a FS | £ 97.34 | PSSRU 2008, page 160 (surgical consultant), Assumption- time spent 15 MINUTES | Ventouse machine | | Primary costing, annuitized multiplied by average labour duration | £ 1.32 |
| | | | Inco pads | | Taken from NHS supply chain catalogue 2009, page 961 code EAO500 | £ 0.09 |
| | | | Urinary Catheter | | Taken from NHS supply chain catalogue 2009, page 1551 code FST248, £46.69 for pack of 10 | £ 4.69 |
| | | | Gloves | | Taken from NHS supply chain catalogue 2009, page 200 code FTE888 | £ 4.68 |
| | | | Obstetric cream | | http://www.shelfpharmacy.co.uk/products/more/KY-Jelly-82g/565.aspx: £3.25 for 82g, assumption one third of a tube used | £ 1.08 |
| | | | Swabbing solution | | BNF: methyl salicylate 0.5 mL, diethyl phthalate 2%, castor oil 2.5%, in industrial methylated spirit, net price 100 mL = 20p. Label: 15 | £ 0.02 |
| | | | Syringe 20ml (if not numbed) | | Taken from NHS supply chain catalogue 2009, page 352 code FWC032 | £ 0.10 |
| | | | Vial of lignocaine (1%) | | lidocaine hydrochloride 5%, net price 15 g = 88p | £ 0.88 |
| | | | Needle (green) | | Taken from NHS supply chain catalogue 2009, page 338 code FTR058 | £ 0.13 |
| | | | Pudendal needle (if no epidural) | | Taken from NHS supply chain catalogue 2009, page 339 code FTR016 | £ 4.58 |
| | | | Materials for cord blood gases: | | | |

 

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | Heparinised syringe*2 | | Taken from NHS supply chain catalogue 2009, page 109 code FWL061 | £ 5.67 |
| | | | Blood gas machine | | Primary costing - annuitized | £ 0.49 |
| **Total** | | | | | | **£ 429.23** |

 

| ASSISTED DELIVERY : FORCEPS | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Staff title and grade** | **Length of time with staff** | **Cost (£) of staffing** | **comments/ assumptions and source of cost data** | **Equipment** | | **comments/ assumptions and source of cost data** | **Total Cost (£)** |
| **obstetrician** | **30 mins** | £ 194.68 | PSSRU 2010, page 160 (surgical consultant) | Assisted delivery pack | | Taken from NHS supply chain catalogue 2009, page 318 code EVX111 (sterile single use instrument delivery pack) + EVC019 (pack sterile delivery) + EVI010 (pack sterile delivery) (pack 8=£73.09) AND page 317 code ECV019 (pack 20=£55.69) | £ 16.15 |
| **Pediatrician** | | £ 194.68 | PSSRU 2008, page 160 (surgical consultant) | Rotational, midcavity or wringley forceps | | Taken from NHS supply chain catalogue 2009, page 233 code FFI562+ FFI563 (pack 8=£73.09) AND page 317 code ECV019 (pack 20=£55.69) | £ 52.36 |
| **Registrar** | | £ 89.75 | PSSRU 2008,pg 159 | Inco pads | | Taken from NHS supply chain catalogue 2009, page 961 code EAO500 | £ 0.09 |
| | | | | Urinary catheter, not a retaining one | | Taken from NHS supply chain catalogue 2009, page 1551 code FST248, £46.69 for pack of 10 | £ 4.69 |
| | | | | Gloves | | Taken from NHS supply chain catalogue 2009, page 200 code FTE888 | £ 4.68 |
| | | | | ky jelly | | http://www.shelfpharmacy.co.uk/products/more/KY-Jelly-82g/565.aspx: £3.25 for 82g, assumption one third of a tube used | £ 1.08 |
| | | | | Swabbing solution | | BNF: methyl salicylate 0.5 mL, diethyl phthalate 2%, castor oil 2.5%, in industrial methylated spirit, net price 100 mL = 20p. Label: 15 | £ 0.02 |
| | | | | Heparinised syringe | | Taken from NHS supply chain catalogue 2009, page 352 code FWC032 | £ 0.10 |
| | | | | Syringe 20ml (if not numbed) + needle | | Taken from NHS supply chain catalogue 2009, page 352 code FWC032 | £ 0.05 |
| | | | | Vial of lignocaine (10%) | | lidocaine hydrochloride 5%, net price 15 g = 88p | £ 0.88 |
| | | | | Pudendal needle (if no epidural) | | Taken from NHS supply chain catalogue 2009, page 339 code FTR016 | £ 4.58 |
| | | | | Materials for cord blood gases: | | primary costing | £ 0.10 |
| | | | | Heparainised syringe | | Injection, prefilled disposable syringe, atropine sulphate 200 micrograms/mL, net price 5 mL = £5.90; 300 micrograms/mL, 10 mL = £5.91; 600 micrograms/mL, 1 mL = £5.91 | £5.91 |
| | | | | Blood gas machine | | primary costing | £ 0.10 |
| **Total:** | | **£ 479.11** | | | | | **£ 569.89** |

 

| | | | | | | |
|---|---|---|---|---|---|---|
| **CESEAREAN SECTION** | | | | | | |
| **Staff title and grade** | **Cost (£) of staffing** | **comments/ assumptions for costing** | **Equipment** | **Cost (£)** | **comments/ assumptions for costing** | **Total Cost (£)** |
| **HCA *1** | £ 14.05 | Band 6 mid-point =£27388, Base year 2010, Assumption- time spent 1 hour | Epidural: see previous | £ 84.15 | THIS EXCLUDES THE PREVIOUS STAFFING COST | £ 84.2 |
| **Obstetrician *2** | £ 389.36 | PSSRU 2010, page 218 (medical consultant), Assumption- time spent 30 minutes | Spinal needles | £ 5.91 | Injection, prefilled disposable syringe, atropine sulphate 200 micrograms/mL, net price 5 mL = £5.90; 300 micrograms/mL, 10 mL = £5.91; 600 micrograms/mL, 1 mL = £5.91 | £ 5.91 |
| **Anesthetist *1** | £ 198.68 | PSSRU 2010, page 218 (medical consultant), Assumption- time spent 30 MINUTES | Skin prep for surgeon and patient | £ 0.02 | BNF: methyl salicylate 0.5 mL, diethyl phthalate 2%, castor oil 2.5%, in industrial methylated spirit, net price 100 mL = 20p. Label: 15 | £ 0.02 |
| **ODA *1 (assists anaesthetist)** | £ 89.75 | PSSRU 2010, page 218 (medical consultant), Assumption- time spent 30 MINUTES | Caesarean section pack | £ 26.08 | Taken from NHS supply chain catalogue 2009, page 608 code EHC007 | £ 26.08 |
| **Pediatrician *1** | £ 198.68 | PSSRU 2010, page 218 (medical consultant), Assumption- time spent 30 MINUTES | Selection of needles | £ 0.10 | Taken from NHS supply chain catalogue 2009, page 337 code FTR167, FTR163 and FTR348 | £ 0.10 |
| | | | Suction machine, tubing and attachment | £ 2.07 | Taken from NHS supply chain catalogue 2009, page code FDR447 | £ 2.07 |
| ****only included medical staff (excluded runner/ porter)** | | | Diathermy sets +pad | £ 3.75 | Taken from NHS supply chain catalogue 2009, page 217 code FGP799 | £ 3.75 |
| | | | Betadine solution | £ 2.39 | povidone–iodine 1.14% in a pressurised aerosol unit, net price 50-mL unit = £2.39 | £ 2.39 |
| | | | Surgical spirits | £ 0.02 | BNF: methyl salicylate 0.5 mL, diethyl phthalate 2%, castor oil 2.5%, in industrial methylated spirit, net price 100 mL = 20p. Label: 15 | £ 0.02 |
| | | | Gloves | £ 4.68 | Taken from NHS supply chain catalogue 2009, page 200 code FTE888 | £ 4.68 |
| | | | Electronic Mucus extractor | £ 0.16 | | £ 0.16 |
| | | | Urinary catheter and bag | £ 8.93 | Taken from NHS supply chain catalogue 2009, page 1551 code FSS620, £44.67 for pack of 5 | £ 8.93 |
| | | | Vaginal examination pack | £ 0.41 | Taken from NHS supply chain catalogue 2009, page 324 code EVC011 | £ 0.41 |

 

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|---|---|---|---|---|---|---|
| | | | Obstetric cream | £ 1.08 | http://www.shelfpharmacy.co.uk/products/more/KY-Jelly-82g/565.aspx: £3.25 for 82g, assumption one third of a tube used | £ 1.08 |
| | | | Inco pads | £ 0.09 | Taken from NHS supply chain catalogue 2009, page 961 code EAO500 | £ 0.09 |
| **C/S CONT….** | | | | | | |
| | | | Sanitary towels | £ 0.09 | Taken from NHS supply chain catalogue 2009, page 961 code EAO500 | £ 0.09 |
| | | | Razor | £ 0.15 | Taken from NHS supply chain catalogue 2009, page 219 code MRA033 | £ 0.15 |
| | | | Tape, to go over jewellery | | | |
| | | | Hospital gown | £ 1.36 | Taken from NHS supply chain catalogue 2009, page 410 code BWK201 | £ 1.36 |
| | | | Support stockings | £ 1.04 | Taken from NHS supply chain catalogue 2009, page 293 code FFF171 | £ 1.04 |
| | | | | £ 5.44 | Taken from NHS supply chain catalogue 2009, page 410 code EGD192 | £ 5.44 |
| | | | Materials for cord blood gases: | £ 2.14 | Taken from NHS supply chain catalogue 2009, page 344 code FWC124 | £ 2.14 |
| | | | Heparainised syringe | £ 5.91 | Injection, prefilled disposable syringe, atropine sulphate 200 micrograms/mL, net price 5 mL = £5.90; 300 micrograms/mL, 10 mL = £5.91; 600 micrograms/mL, 1 mL = £5.91 | £ 5.91 |
| | | | Spencer Wells forceps | included in packs | | included in packs |
| | | | Blood gas machine | | | |
| | | | 4 sutures | £ 3.20 | Taken from Barkantine purchase report 24/11/09 | £ 3.20 |
| | | | needle protector pad | £ 0.33 | Taken from NHS supply chain catalogue 2009, page 122 code KFK310 | £ 0.33 |
| | | | sterile bed liner | £ 0.04 | Taken from NHS supply chain catalogue 2009, page 674 code FDE384 | £ 0.04 |
| | | | sterile water 1 litre | £ 2.55 | Taken from NHS supply chain catalogue 2009, page 674 code FDE384 | £ 2.55 |
| | | | | | | |
| **TOTAL** | **£ 890.52** | | | **£162.08** | | **£ 1052.60** |

 

| SUTURING EPISIOTOMY | | | | | |
|---|---|---|---|---|---|
| **Staff title and grade** | **Length of time with staff** | | **Cost (£)** | **Comments/ assumptions for costing** | **Total** |
| **MW, band 6 or 7 (NOT INCLUDED)** | **60 minutes** | Perineal suture pack | £ 12.26 | Taken from NHS supply chain catalogue 2009, page 319 code EVX122 | £ 12.26 |
| | | Selection of threads, vicryl sutures 2.0 rapide *2 | £ 3.20 | Taken from Barkantine purchase report 24/11/09 | £ 3.20 |
| | | Inco pads | £ 0.09 | Taken from NHS supply chain catalogue 2009, page 961 code EAO500 | £ 0.09 |
| | | Swabbing solution | £ 0.02 | BNF: methyl salicylate 0.5 mL, diethyl phthalate 2%, castor oil 2.5%, in industrial methylated spirit, net price 100 mL = 20p. Label: 15 | £ 0.02 |
| | | Gloves | £ 0.20 | Taken from NHS supply chain catalogue 2009, page 195 code FTE883 | £ 0.20 |
| | | Syringe 20ml if not numbed + needles | £ 0.05 | Taken from NHS supply chain catalogue 2009, page 352 code FWC031 | £ 0.05 |
| | | 1% 10 ml lignocaine | £ 0.88 | lidocaine hydrochloride 5%, net price 15 g = 88p | £ 0.88 |
| | | lighting source | | | |
| | | gown | £ 1.36 | Taken from NHS supply chain catalogue 2009, page 410 code BWK201 | £ 1.36 |
| | | Tray | £ 4.63 | Taken from NHS supply chain catalogue 2009, page 143 code ij3097 | £ 4.63 |
| | | lithohony set | £ 6.51 | Taken from NHS supply chain catalogue 2009, page 387 code VJD782 | £ 6.51 |
| **Total** | | | | | **£ 24.57** |

 

| SUTURING FIRST AND SECOND DEGREE TEAR | | | | | |
|---|---|---|---|---|---|
| **Staff title and grade** | **Length of time with staff** | **Equipment** | **Cost (£)** | **Comments/ assumptions for costing** | **Total** |
| MW, band 6 or 7 | 30 - 45 mins | | | | |
| | | delivery pack (PS pack FMU) | £ 12.26 | Taken from NHS supply chain catalogue 2009, page 319 code EVX122 | £ 12.26 |
| | | Selection of threads : Vicryl 2.0 | £ 3.20 | Taken from Barkantine purchase report 24/11/09 | £ 3.20 |
| | | 10 ml 1% lignocaine | £ 0.88 | lidocaine hydrochloride 5%, net price 15 g = 88p | £ 0.88 |
| | | Gloves | £ 0.20 | Taken from NHS supply chain catalogue 2009, page 195 code FTE883 | £ 0.20 |
| | | Syringe 20ml + needles | £ 0.05 | Taken from NHS supply chain catalogue 2009, page 352 code FWC031 | £ 0.05 |
| | | Tray | £ 4.63 | Taken from NHS supply chain catalogue 2009, page 143 code ilj3097 | £ 4.63 |
| | | Swabs | £ 0.06 | Taken from NHS supply chain catalogue 2009, page 769 code HHD090 | £ 0.06 |
| **TOTAL** | | | | | **£21.28** |

 

| SUTURING THIRD AND FOURTH DEGREE TEAR | | | | | | |
|---|---|---|---|---|---|---|
| **Staff title and grade** | **Length of time with staff** | **Cost** | **Equipment** | **Cost (£)** | **comments/ assumptions for costing** | **Total** |
| **Consultant obstetrician** | 45 mins | £ 175.21 | Perineal suture pack | £ 12.26 | Taken from NHS supply chain catalogue 2009, page 319 code EVX122 | £ 12.26 |
| **Registrar** | 45 mins | £ 134.61 | Selection of sutures: PDS + vicryl 2.0 | £ 3.20 | Taken from Barkantine purchase report 24/11/09 | £ 3.20 |
| **Anaesthetist** | 45 mins | £ 175.21 | SPINAL | £ 67.41 | | £ 67.41 |
| **scrub nurse** | 45 mins | £ 13.95 | urinary catheter (if needed) | £ 1.91 | Taken from NHS supply chain catalogue 2009, page 1551 code FSS394 | £ 1.91 |
| | | | Catheter bag | £ 8.93 | Taken from NHS supply chain catalogue 2009, page 1551 code FSS620, £44.67 for pack of 5 | £ 8.93 |
| | | | 10mls syringe | £ 0.05 | Taken from NHS supply chain catalogue 2009, page 352 code FWC031 | £ 0.05 |
| | | | Water | £ 2.55 | Taken from NHS supply chain catalogue 2009, page 134 code VMC019 | £ 2.55 |
| | | | | | | |
| **Total** | | £ 498.98 | | £ 96.31 | | **£595.30** |

 

| MANUAL REMOVAL OF THE PLACENTA | | | | | | |
|---|---|---|---|---|---|---|
| **Staff title and grade** | **Length of time with staff** | **Cost** | **Equipment** | **Cost (£)** | **Source** | **Total** |
| **Extra MW band 6 or 7** | 30 - 60 mins | £ 60.98 | Theatre greens and shoes | £ 0.09 | Taken from NHS supply chain catalogue 2009, page 479 code BWT028 | £ 0.09 |
| **Consultant obstetrician** | 45 mins | £ 175.21 | Sterile field/drapes | £ 3.93 | Taken from NHS supply chain catalogue 2009, page 479 code BWP053 | £ 3.93 |
| **Registrar** | 45 mins | £ 134.61 | MRP pack/uterine pack | £ 16.15 | Taken from NHS supply chain catalogue 2009, page 318 code EVX111 (sterile single use instrument delivery pack) + EVC019 (pack sterile delivery) + EVI010 (pack sterile delivery) (pack 8=£73.09) AND page 317 code ECV019 (pack 20=£55.69) | £ 16.15 |
| **Anaesthetist** | 45 mins | £ 175.21 | Urinary catheter | £ 8.93 | Taken from NHS supply chain catalogue 2009, page 1551 code FSS620, £44.67 for pack of 5 | £ 8.93 |
| **scrub nurse** | 45 mins | £ 13.95 | Perineal suture pack | £ 12.26 | Taken from NHS supply chain catalogue 2009, page 319 code EVX122 | £ 12.26 |
| | | | Long gloves | £ 4.68 | Taken from NHS supply chain catalogue 2009, page 200 code FTE888 | £ 4.68 |
| | | | Cleaning fluid | £ 0.02 | BNF: methyl salicylate 0.5 mL, diethyl phthalate 2%, castor oil 2.5%, in industrial methylated spirit, net price 100 mL = 20p. Label: 15 | £ 0.02 |
| | | | Antibiotics | £ 15.04 | Primary costing of AP | £ 15.04 |
| | | | Syntocinon Infusion | £ 0.86 | oxytocin, net price 5 units/mL, 1-mL amp = 76p; 10 units/mL, 1-mL amp = 86p | £ 0.86 |
| | | | SPINAL | £ 67.41 | | £ 67.41 |
| **Total:** | | **£ 559.96** | | **£ 129.36** | | **£ 689.32** |

 

| BLOOD TRANSFUSION | | | | | | |
|---|---|---|---|---|---|---|
| **Staff title and grade** | **Cost (£) of staffing** | **comments/ assumptions for costing** | **Equipment** | **Cost (£)** | | **Total** |
| **Obstetrician** | £ 38.94 | PSSRU 2010, page 218 (medical consultant),, Assumption- time spent 10 MINUTES | Cross matching at path lab | £ 43.34 | Primary Cost data collection: Pricing of blood and red blood cell for 2020 | £ 43.34 |
| **Anesthetist** | £ 38.94 | PSSRU 2010, page 218 (medical consultant),, Assumption- time spent 10 MINUTES | Blood tubes | £ 0.46 | Taken from NHS supply chain catalogue 2009, page 113 code KFK294 | £ 0.46 |
| | | | Blood bottles | £ 0.41 | Taken from NHS supply chain catalogue 2009, page 113 code KFK395 | £ 0.41 |
| | | | Syringe/needle | £ 0.05 | Taken from NHS supply chain catalogue 2009, page 352 code FWC032 | £ 0.05 |
| | | | Swabs | £ 0.06 | Taken from NHS supply chain catalogue 2009, page 769 code HHD090 | £ 0.06 |
| | | | Giving sets | £ 0.36 | Taken from NHS supply chain catalogue 2009, page 56 CODE FSB531 | £ 0.36 |
| | | | Filters | £ 4.62 | Taken from NHS supply chain catalogue 2009, page 142 CODE FTC235 | £ 4.62 |
| | | | Venflon | £ 0.83 | Taken from NHS supply chain catalogue 2009, page 59 code FSP033 | £ 0.83 |
| | | | Sterile dressing | £ 0.13 | Taken from NHS supply chain catalogue 2009, page 764 code EHU019 | £ 0.13 |
| | | | IV infusion | £ 15.04 | primary costing | £ 15.04 |
| | | | Fluids | £ 2.01 | intravenous infusion, usual strength sodium chloride 0.9% (9 g, 150 mmol each of Na+ and Cl-/litre), this strength being supplied when normal saline for injection is requested. Net price 2-mL amp = 35p; 5-mL amp = 42p; 10-mL amp = 57p; 20-mL amp = £1.04; 50-mL amp = £2.01 | £ 2.01 |
| | | | Blood packs | 167.31 for intra-uterine transfusion of red cells, £330.30 for platelets | Primary Cost data collection: Pricing of blood and red blood cell for 2020167.31 for intra-uterine transfusion of red cells, £330.30 for platelets | 167.31 for intra-uterine transfusion of red cells, £330.30 for platelets |
| **Total :** | **£ 77.87** | | | **£ 67.32** | | **£145.19 plus units of cells transfused** |

 

| STILLBIRTH AND NEONATAL DEATH | | | |
|---|---|---|---|
| **Procedures** | **Details** | **Cost (£)** | **Comments/ assumptions for costing** |
| | | | |
| Real time ultrasonography<br>Post-mortem / Autopsy | | | RCOG Greentop guidelines 55 |
| Real time ultrasonography<br>Post-mortem / Autopsy | "babygram by faxitron, genetic testing, micro, histo and placenta (usually around 30 blocks total for a SB+placenta), it's a consultant led service in most depts, so factor in the cost of a consultant-takes about 2-3 hours to do the PM, and about an hour to report, probably more, so that's one full session of consultant time. Cost of an MTO, cost of lab BMS processing..." | £600 | Primary costing from the Royal College of Pathologists |
| **Total** | | | |
| COUNSELLING ASSISTANCE | | | |
| **Hospital bereavement midwife or counsellor: salary** | **Assumption made** | **Unit cost** | **Source of Unit cost** |
| | Direct patient contact time of 1 hour | | SANDS: Stillbirth and Neonatal Death Charity: primary costing : discussion about the availability of bereavement care following a baby death<br><br>RCOG Greentop guidelines 55 |
| Band 7 mid at £35184, Base year 2009/2010 Agenda for change January to March 2010 NHS Staff Earnings estimates. | | £44 per hour direct contact | PSSRU: Unit costs of Health and Social care 2010 |
| Salary oncosts: £8698 per annum (Employer's NI plus 14% superannuation) | | | |
| Qualifications: £4801 per annum<br><br>Education investment cost annuitied over working life | | | |
| Overheads: £4388 per annum Indirect staffing /administration overheads | | | |
| Working time: 41.4 weeks per annum 37.5 hours per week.<br><br>Includes: 29 days A/L. 8 days statutory leave. 5 study days. 12 days sick leave. | | | |
| **TOTAL:** | | **£ 644** | |

 

# Appendix 7 Resource use measurement

**Table 24. Resource use during intrapartum care[e]**

| Resource use variable | OU<br>n=18847 | Home<br>n=16187 | FMU<br>n=10971 | AMU<br>n=16031 |
|---|---|---|---|---|
| *HOME* | | | | |
| Homebirth packs | 0.0 (0.0) | 1.0 | 0.0 (0.0) | 0.0 (0.0) |
| Staff travel to homebirth – distance 23 miles return trip | 0.0 (0.0) | 1.0 | 0.0 (0.0) | 0.0 (0.0) |
| | | | | |
| *ALL 'non-OU' units* | | | | |
| Duration of labour care prior to transfer (hours) | 0.0 (0.0) | 1.20[¥] ( 2.92) | 1.45[¥] (3.36 ) | 1.72[¥] (3.61) |
| Transfer duration (hours) | 0.0 (0.0) | 0.10[$] (0.24) | 0.13[$] (0.27) | 0.05[$] ( 0.12) |
| *Mode of transfer* | | | | |
| Ambulance | 0.0 (0.0) | 0.17 ( 0.38) | 0.21 (0.41) | 0.0 (0.0) |
| Private car | 0.0 (0.0) | 0.031 (0.17) | 0.005 (0.069) | 0.0013 (0.0036) |
| Wheelchair or trolley | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.21 (0.41) |
| Bed | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.021 0.143 |
| Rapid response ambulance car | 0.0 (0.0) | 0.00025 (0.016) | 0.0 (0.0) | 0 .0 (0.0) |
| Helicopter | 0.0 (0.0) | 0.00006 (0.008) | 0.0 (0.0) | 0.0 (0.0) |
| Taxi | 0.0 (0.0) | 0.0003 (0.019) | 0.00009 (0.0009) | 0.0 (0.0) |
| No physical transfer | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0011 (0.034) |
| | | | | |
| Duration of labour care after transfer (hours) | 0.0 (0.0) | 1.46 [€] (3.71) | 1.45[€] (3.58) | 1.81[€] (4.01) |
| | | | | |
| *ALL UNITS* | | | | |
| Duration of labour care from start to finish if no transfer (hours) | 9.01 (6.22) | 6.61 (5.31) | 7.49 (5.68) | 7.92 (5.92) |

| Resource use variable | OU<br>n=18847 | Home<br>n=16187 | FMU<br>n=10971 | AMU<br>n=16031 |
|---|---|---|---|---|
| *Mode of birth* | | | | |
| Spontaneous vertex birth | 0.738 (0 .49) | 0.928 (0.31) | 0.907 (0.29) | 0.859 (0.47) |
| Vaginal breech birth | 0.002 (0.04) | 0.004 ( 0.06) | 0.004 ( 0.058) | 0.002 ( 0.03) |
| Ventouse | 0.081 (0.26) | 0.021 ( 0.14) | 0.027 (0.16) | 0.048 (0.21) |
| Forceps | 0.068 (0.24) | 0.021 (0 .15) | 0.029 (0 .17) | 0.047 (0.20) |
| Caesarean section | 0.11.1 (0.31) | 0.028 (0 .16) | 0.035 ( 0.18) | 0.044 ( 0.36) |
| *Procedures related to intrapartum care* | | | | |
| Augmentation | 0.235 (0.42) | 0.054 (0 .23) | 0.071 ( 0 .26) | 0.103 (0 .30) |
| Epidural/Spinal | 0.307 ( 0.45) | 0.083 (0.27) | 0.106 (0.31) | 0.153 (0.35) |
| General Anaesthetic | 0.015 (1.12) | 0.005 (0.067) | 0.005 (0.073) | 0.006 (0.07) |
| Active Management of the third stage of labour | 0.939 (0.23) | 0.687 (0.46) | 0.779 (0.42) | 0.859 (0.46) |
| Episiotomy | 0.193 (0.39) | 0.054 (0.23) | 0.086 (0.28) | 0.131 (0.33) |
| Perineal trauma | 0.032 (0.17) | 0.19 (0.14) | 0.023 (0.14) | 0.032 (0.17) |
| ECMO | 0.0001 (0.014) | 0.00018 ( 0.002) | 0.00018 (0.19) | 0.00049 ( 0.04) |
| Total body cooling | 0.0005 (0.02) | 0.00045 (0.02) | 0.00032 ( 0.02) | 0.00031 ( 0.017) |
| Care for a stillbirth | 0.0002 (0.012) | 0.0003 (0.018) | 0.0004 (0.019) | 0.0001 ( 0.007) |
| Neonatal death | 0.0003 (0.017) | 0.0003 (0.027) | 0.0004 (0.02) | 0.0001 ( 0.0176) |

[e] *Values are given as means (standard deviations). Where numbers are extremely small they are shown to up to 5 decimal places, otherwise to three decimal places to reflect consistency in presentation of the results with the prospective cohort study. Includes all 'low risk' women where the primary outcome and potential confounders are not missing. n = 62036*

[¥] *when women who were not transferred from their planned place of birth were excluded from this analysis: duration of labour care (hours) prior to transfer was calculated as: 5.71 (home), 6.68 (FMU), 6.5 (AMU)*

[§] *when women who were not transferred from their planned place of birth were excluded from this analysis: duration of transfer (hours) was calculated as: 0.487 (home), 0.592 (FMU), 0.175 (AMU) which is 29 minutes (home), 35 minutes (FMU) and 10 minutes (AMU) respectively*

 

[€] *when women who were not transferred from their planned place of birth were excluded from this analysis: duration of labour care (hours) after transfer was calculated as: 6.8 (home), 6.6 (FMU), 6.89 (AMU)*

**Table 20 (cont). Resource use during intrapartum care**

| Resource use variable | OU<br>n=18847 | Home<br>n=16187 | FMU<br>n=10971 | AMU<br>n=16031 |
|---|---|---|---|---|
| ***HIGHER LEVEL OF POST NATAL CARE FOR MOTHER*** | | | | |
| Postnatal care (hours) | 30.8 (22.7) | 4.47 (14.4) | 32.11 (25.4) | 25.7 (20.3) |
| High dependency care following birth provided within the labour ward (days) | 0.18 (0.38) | 0.05 (0.23) | 0.07 (0.26) | 0.09 (0.29) |
| Admission to intensive care unit (days) | 0.002 (0.034) | 0.0009 (0.036) | 0.0007 (0.021) | 0.001 (0.023) |
| Admission to high dependency unit (days) | 0.0057 (0.09) | 0.003 (0.077) | 0.0035 (0.101) | 0.0038 (0.0062) |
| Admission to specialist care (days) | 0.002 (0.003) | 0.0009 (0.036) | 0.0007 (0.0021) | 0.0010 (0.0023) |
| | | | | |
| ***HIGHER LEVEL OF CARE FOR THE BABY*** | | | | |
| Admission to neonatal intensive care unit (days) | 0.01 (0.24) | 0.01 (0.246) | 0.007 (0.210) | 0.009 (0.329) |
| Admission to neonatal high dependency unit (days) | 0.01 (0.376) | 0.006 (0.229) | 0.012 (0.312 | 0.007 (0.209) |
| Admission to neonatal specialist care (days) | 0.094 (0.873) | 0.0537 (0.616) | 0.057 (0.785) | 0.058 (0.801) |

 

**Addendum**

The Birthplace in England Research Programme combines the Evaluation of Maternity Units in England (EMU) study funded in 2006 by the National Institute for Health Research Service Delivery and Organisation (NIHR SDO) programme, and the Birth at Home study in England, funded in 2007 by the Department of Health Policy Research Programme (DH PRP). This document is part of a suite of reports representing the combined output from this jointly funded research. Should you have any queries please contact Sdoedit@southampton.ac.uk

 