Maternal, Newborn and Infant Clinical Outcome Review Programme

MBRRACE-UK
Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK

MBRRACE-UK
Perinatal Confidential Enquiry

Term, singleton, intrapartum stillbirth and intrapartum-related neonatal death

November 2017

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Editors: Elizabeth S Draper, Jennifer J Kurinczuk, Sara Kenyon

on behalf of the MBRRACE-UK collaboration

November, 2017

Department of Health Sciences
University of Leicester
Centre for Medicine
University Road
Leicester LE1 7RH

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Foreword

For the vast majority of women and their babies, the UK is a safe place to give birth. This is thanks to the hard work and dedication of maternity and neonatal staff, medical advances and, importantly, the lessons we have learned from initiatives such as the national perinatal mortality enquiries, first established in 1993. Since then, the overall perinatal mortality rate has fallen as has the proportion of intrapartum deaths in term babies which now accounts for approximately 5% of all perinatal deaths.

However, the death of any woman or baby during pregnancy is a tragedy, and this latest report from the national perinatal mortality enquiry highlights that there is still much more to be done. Despite the fall in mortality rate, these deaths remain a major cause for concern, particularly as the vast majority of the women were receiving direct maternity care when their baby died or when the event in labour or delivery occurred which led to this tragic outcome. For nearly 80%, it was identified that different care might have made a difference, echoing the findings of the Each Baby Counts programme.

The findings of this report demonstrate the complexity and interdependency of the contributory factors, which include both antenatal care and care during labour, with the majority of deaths being attributable to multiple factors rather than a single cause. The link between antenatal care and intrapartum outcomes emphasises the need to improve the identification of reduced fetal growth, the management of reduced fetal movements and maternal diabetes, and efforts to support women to stop smoking. There also need to be improvements in how maternity teams monitor the progress of labour and fetal wellbeing.

However, the underlying issues – an overstretched and under-resourced maternity and neonatal workforce, and changing population demographics – also need to be understood. This report outlines how heavy workload and staff capacity issues can affect the care provided, leading to delays in transfer to the obstetric unit, plans for induction of labour being postponed and difficulty in providing some elements of advanced life support when a baby requires resuscitation after being born. There are many reasons for the increased demand on maternity services, including the changing characteristics of women receiving care. There has been a rise in the number of older women and women with obesity giving birth, and also greater ethnic diversity within the UK population. All these factors are associated with an increased risk of perinatal death, and the needs of this changing population must be reflected in the healthcare services that are delivered.

This is not to excuse poor care, nor the failure to learn the lessons from each death. Again echoing the Each Baby Counts findings, this report emphasises the need to improve the quality of local reviews, always offering the parents the opportunity to be involved, to ensure clinical staff understand what they could have done differently and make the necessary changes in future. The national Perinatal Mortality Review Tool will support staff to undertake meaningful multi-disciplinary reviews and develop action plans to ensure lessons learnt are translated into actual clinical practice.

Every midwife, obstetrician, neonatologist and neonatal nurse should read this report and ensure that, where changes are needed to their practice, these are put in place. Policy-makers, commissioners and health service providers should likewise note where system- or organisation-level change is needed to ensure front-line staff have the support and resources they need. Only with this holistic collaborative approach will women and babies across the UK receive the safe, high-quality care they deserve.

Lesley Regan
President, Royal College of Obstetricians and Gynaecologists

Kathryn Gutteridge
President, Royal College of Midwives

Neena Modi
President, Royal College of Paediatrics and Child Health

Executive summary

Background

This report represents the findings of the third perinatal confidential enquiry carried out as part of the MBRRACE-UK programme of work and focuses on term, singleton, intrapartum stillbirths and intrapartum-related neonatal deaths. This topic was selected as part of the standard process for the selection of topics for the Clinical Outcome Review Programme.

Since the last confidential enquiry into intrapartum stillbirths and intrapartum-related deaths in 1993-1995, overall stillbirth rates have reduced by just over a fifth and neonatal death rates by over a third. Nevertheless the UK rates are still high compared with other European and other high income countries. Whilst term intrapartum stillbirths and intrapartum-related neonatal deaths account for only a small proportion of extended perinatal mortality rates, improvements in care during labour, delivery and immediately following birth should reduce such cases apart from those that are inevitable. This enquiry focuses on intrapartum-related deaths, specifically those born at term, excluding major congenital anomalies but including those anomalies where the cause of death was felt to be related to the intrapartum period rather than the anomaly. The premise of the enquiry was if a baby was determined to be alive at the onset of labour at term then the expected outcome would be a healthy infant.

The group selected for enquiry constituted around only one in twenty of the extended perinatal deaths (225 out of 4392 (5.1%) in the UK in 2015). The enquiry aimed to identify potentially preventable failures of care along the whole care pathway, but with a particular focus on care during labour, delivery and any resuscitation, which might have contributed to the death. The findings from the enquiry will have identified areas of care for improvement in the future.

The intrapartum stillbirth and intrapartum-related death at term enquiry

The development of the enquiry followed the standard methodology used by MBRRACE-UK for perinatal confidential enquiries. Firstly, a multidisciplinary topic expert group (TEG) was established and one face-to-face meeting was held where a series of questions and potential checklists were developed (using the relevant guidance from the Royal College of Obstetricians and Gynaecologists, the Royal College of Anaesthetists, the Royal College of Pathologists, the National Institute for Health and Care Excellence (NICE), Resuscitation Council (UK), and Sands) to facilitate the evaluation of the quality of care provision for each step of the care pathway:

- Antenatal care
- Care during labour
- Care at birth
- Resuscitation care
- Neonatal care
- Postnatal and bereavement care
- Follow-up visit and review of care
- Post-mortem and placental histology

As the previous MBRRACE-UK confidential enquiry was focused on antepartum stillbirth, the guidance for a number of areas of the care pathway had already been identified, notably antenatal care, post-natal and bereavement care, follow-up, review and pathology. The main remit of the TEG was therefore focused on care during labour and at birth, resuscitation care and neonatal care.

The MBRRACE-UK perinatal mortality surveillance system provided a sampling frame for the selection of a random sample of term, intrapartum stillbirths and intrapartum-related neonatal deaths stratified by UK country for review by multidisciplinary enquiry panels. An initial sample of 104 out of a potential 225 cases was selected in June 2016 and submitted for review by confidential enquiry until saturation of themes was achieved and no new lessons for future care were emerging: 78 cases (40 intrapartum stillbirths and 38 intrapartum-related neonatal deaths). These 78 cases were discussed at ten separate multidisciplinary confidential enquiry panels.

Representativeness of the sample

Given the availability of the total sample of potential cases for any enquiry being available from the MBRRACE-UK perinatal mortality surveillance data, a random sample of eligible cases can be selected for the enquiry. Therefore, as in the previous antepartum stillbirth enquiry, we have been able to generate results from the enquiry which are not only rich in depth following the review of the individual case notes, but are also generalisable despite the relatively small sample. This enabled us to produce both quantitative and qualitative results, thus maximising our understanding of how care was provided at all points on the care pathway for all intrapartum cases as well as to individual women and their families.

Study findings

Intrapartum death rates

The definition of intrapartum death used in the Confidential Enquiry into Stillbirths and Deaths in Infancy (CESDI) enquiry in 1993 was normally formed babies of 2.5 kg or more who were stillborn or died within the first week of life where the death was related to problems during labour for England, Wales and Northern Ireland [1]. Applying this definition to the perinatal surveillance data for 2015 births shows that over the period 1993 to 2015 the rate of intrapartum deaths reduced by over 50% from 0.62 per 1,000 total births to 0.28 per 1,000 total births, which represents a reduction of around 220 intrapartum deaths per year.

Maternal characteristics

Since the last confidential enquiry into term intrapartum deaths there has been an increase in the proportion of births to mothers who have risk factors associated with an increased risk of perinatal loss. Maternal age has increased over time with the highest proportion of births in the 1970s being to women aged between 25 and 29 years whereas, by 2000, the largest proportion of births was to women aged between 30 and 34 [2]. By 2014 the average age of first-time mothers was 30.2 years with 21.5% of mothers giving birth at 35+ years [3]. There has also been a steady increase in the percentage of births to mothers in England and Wales born outside of the UK from 11.6% in 1990 to 27.0% in 2014. [4].The prevalence of obesity in pregnancy has also increased, from around 10% in the early 1990s to up to 19% in the early 2000s [5,6]. These changes have also meant that there are increasing numbers of pregnant women with diabetes and other conditions associated with higher risk and requiring a more complex package of care and interventions [7].

Consensus findings from the enquiry panels

The overall findings from the enquiry panels are provided in the table below, which indicates both the quality of care provision for the outcome of the baby and the mother across all aspects of the care pathway. In terms of the baby the panels broadly interpreted ‘outcome’ to represent whether the care provision may have contributed to the death. From the mother’s perspective outcome was interpreted as the care the mother received after delivery including her physical and psychological wellbeing and full consideration of her future fertility.

Overall, in terms of the outcome for the baby, the panel consensus was that in nearly 80% of deaths improvements in care were identified which may have made a difference to the outcome of the baby. This may represent a single issue at one point in the care pathway with all remaining care being considered appropriate or multiple issues at one or more points on the care pathway. Although this finding is similar to the previous confidential enquiry carried out for term intrapartum deaths it should be considered in the context of the growth in the amount of guidance that has been produced since the mid-1990s which has increased the rigour with which these deaths are reviewed at the enquiry panels.

Confidential enquiry summary grading of quality of care

Overall quality of care	Stillbirth				Neonatal death			
	Baby		Mother		Baby		Mother	
	n	%	n	%	n	%	n	%
Good care; no improvements identified	3	*8*	12	*30*	2	*5*	10	*26*
Improvements in care identified which would have made no difference to outcome	6	*15*	10	*25*	6	*16*	9	*24*
Improvements in care identified which may have made a difference to outcome	31	*78*	18	*45*	30	*79*	19	*50*
TOTAL	**40**	***100***	**40**	***100***	**38**	***100***	**38**	***100***

In terms of the care after delivery, physical and psychological outcome and/or future fertility for the mother, in just under half of intrapartum stillbirths (45%) and half of intrapartum-related neonatal deaths the consensus of the panels was that improvements in care may have made a difference.

Just over 10% of the mothers included in this enquiry were vulnerable women with major social and/or mental health problems where there were examples of both excellent and poor care provision. In these difficult situations there was evidence of midwifery staff making every effort to help these women comply with their care and appointments. However, there was also evidence of a few situations where the problems of women were inadequately responded to and misrepresented in the medical notes. Dealing with the complexity of these situations adds to the daily challenges and pressures faced by health professionals.

Capacity Issues

Capacity issues were identified as a problem in just over a quarter of the cases undergoing panel review (n=21) and, in a further seven cases, the notes identified issues that could be related to problems with staffing / capacity: a potential 28 cases (35.9%). Most issues were identified during the intrapartum period (n=17 +7) with a further four cases relating to the neonatal period and involving problems with transport (n=2), a referral of one baby outside of the network and a reported paediatrician shortage in one further case.

In ten of the 17 cases identified during the intrapartum period the panel felt that the capacity issue played a contributory role to the outcome. Ten cases involved delays in transferring the mother from either an antenatal setting or a midwifery-led unit to the delivery suite, due to either lack of a room or increased activity levels and a lack of staff. In a further four cases there were delays in induction of labour or in performing an artificial rupture of the membranes because of increased activity of the unit. Such delays suggest that during periods of high activity the ability of the wider maternity service to cope with the demand for one-to-one care and/or timely review by obstetric or medical staff is sometimes compromised.

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Key findings

Key findings from the Confidential Review Panels

- The rate of term, singleton, intrapartum stillbirth and intrapartum-related neonatal death has more than halved since 1993 from 0.62 to 0.28 per 1,000 total births which represents a reduction of around 220 intrapartum deaths per year.
- Capacity issues were identified as a problem in over a quarter of the cases undergoing panel review (n=21). The majority of staffing and capacity problems were related to delivery suite (n=17) with the remaining issues relating to neonatal care provision.
- The panel consensus was that in nearly 80% of deaths improvements in care were identified which may have made a difference to the outcome of the baby
- There is an increasing proportion of births to mothers who have risk factors associated with an increased risk of perinatal death. This has resulted in increasing numbers of pregnant women with conditions who require a more complex package of care and interventions.

Key findings for the provision of antenatal care

- Screening for fetal growth disorders was not performed according to national evidence-based guidance in a quarter of cases.
- For those women who attended with reduced fetal movements, management did not follow national guidance in a third of cases.
- While screening for diabetes appeared to be undertaken according to national guidance for all but one case, ongoing care for women with diabetes appeared not to be in a joint clinic for half of the women with the condition.
- Evidence that women with a history of prior caesarean section were counselled or that a management plan for labour had been documented was present in a fifth of cases with this history.
- Two-thirds of women were not screened for smoking in pregnancy according to national evidence-based guidance.

Key findings for care before labour is established

- There was a failure to recognise the transition from the latent to the active phase of labour and to institute appropriate monitoring in an eighth of cases.
- There were problems for a third of women who required induction of labour:
    - delays in starting or continuing induction or both;
    - a lack of fetal monitoring during the induction process;
    - heavy workload contributed to a number of cases.
- Errors with cardiotocography (CTG) monitoring before labour was established were identified in a tenth of cases, involving incorrect use of the intrapartum classification for pre-labour CTGs and/or a failure to respond appropriately to an abnormal pre-labour CTG.
- Difficulties were identified with the ultrasound diagnosis of intrauterine death, if suspected on commencement of monitoring, in a third of cases where the baby died before established labour.

Key findings for maternal and fetal monitoring during established labour

- For those women who had a partogram, only a third were fully completed.
- The method of fetal monitoring was assessed as being correct for the level of risk in 80% of cases.
- There were errors in the method, interpretation, escalation and response to fetal monitoring:
    - for the two-fifths of babies where intermittent auscultation was undertaken the frequency was not compliant with national guidance in a third of cases in the first stage of labour and a quarter in the second stage;
    - in the cases where abnormalities were detected by intermittent auscultation, continuous electronic fetal monitoring was not commenced in a quarter of cases;
    - where electronic fetal monitoring was undertaken, hourly review was not documented in half of cases;
    - there were delays in referral to medical staff by midwives in nearly half of cases where that was required.
- There was evidence of lack of situational awareness in many of the cases.

Key findings for intrapartum care and communication

- Service capacity issues during intrapartum care affected over a fifth of the deaths reviewed, with more than half of these situations being considered to have contributed to the poor outcome.
- More than three-quarters of the deaths had quality of care issues identified during labour that potentially affected the outcome.
- In around one in ten women requiring caesarean section the category of urgency was either incorrectly applied or not applied when birth required expediting.
- There was a significant delay in both the decision to expedite the birth and in actually achieving birth in approximately a third of the deaths reviewed.
- In over three-quarters of deaths there was effective communication between the multidisciplinary team during labour and medical staff attended promptly when required to do so.
- There was a failure to identify signs of uterine rupture in four out of the five women who experienced uterine rupture.
- Failure to recognise an evolving problem, or the transition from normal to abnormal, was a common theme. It was rarely due to a single issue, more commonly appearing to arise from a more complex failure of situational awareness and ability to maintain an objective overview of a changing situation.

Key findings for resuscitation and neonatal care

- In general, resuscitation was delivered effectively by clinical staff present at the delivery, based on the Newborn Life Support programme. There was, however, evidence of significant failings in the approach to resuscitation adopted in a small number of cases.
- All of the cases reviewed required extensive resuscitation and the involvement of senior staff to assist. Access to such assistance was sometimes delayed because staff were working elsewhere in the hospital.
- In some instances poor record-keeping prevented a clear picture emerging of events at resuscitation.
- Deaths of the type reviewed by the enquiry are rare within any one service. In the absence of

immediate senior support there was some evidence of confusion regarding: a) the need for intubation; b) the use of blood; c) any decision to stop resuscitation; and d) actions to be taken following a home birth needing advanced resuscitation.

- Of those babies admitted to neonatal care the vast majority were well managed in terms of the risk of hypoxic ischaemic encephalopathy and associated risk of multiple organ failure.
- Local mortality reviews typically did not consider the neonatal aspects of care.

Key findings for care after birth

The quality of bereavement care was variable, with a lack of joint obstetric and neonatal input seen. This was demonstrated by the following:

- The quality of bereavement care was assessed as good for nearly a half of the parents, satisfactory for nearly a third, and either poor or with insufficient information in the notes in the remaining instances.
- A bereavement checklist was present in the majority of notes; however, this was more likely to be in the notes of those mothers who had experienced a stillbirth than in the notes of those who had experienced a neonatal death.
- It was not clearly documented that all relevant healthcare professionals had been informed of the stillbirth or neonatal death.
- Continuing midwifery involvement after discharge home was not documented for all women. For those for whom continuing midwifery support was documented, the number of postnatal contacts varied, with those women who had experienced a stillbirth having the highest numbers of visits.
- The obstetric team almost always provided the bereavement care when intrapartum stillbirths occurred. When intrapartum-related neonatal deaths occurred both teams were involved in over half of deaths and just the neonatal team in a quarter.
- Written information to support the offer of a post-mortem was apparent in half the deaths. However, this represents around three-quarters of stillbirths and a quarter of neonatal deaths. This may reflect that non-medicolegal post-mortems are conducted with less frequency following neonatal death.
- Follow-up meetings with parents were documented as taking place in just over half of stillbirths and two-thirds of neonatal deaths. Where no follow-up visit took place the reasons were not documented in half the cases.
- Follow-up meetings were documented as having been conducted by a consultant obstetrician or neonatologist in about two-thirds of cases and a third took place over 12 weeks after the death. Plans for any future pregnancy were documented as having been discussed in just over half of cases.
- A letter summarising the discussion, results of investigations / post-mortem findings and plans for any future pregnancy were only sent to just over a third of parents. While half of those letters sent were of good quality, a further third were considered adequate and the remainder were felt to be poor.

Key findings for post-mortem examination and reporting

- Almost all of the intrapartum stillbirths and three-quarters of the intrapartum-related neonatal deaths selected for the confidential enquiry underwent some form of formal pathological examination, although a quarter of both groups only had placental examination. Almost a third of the neonatal deaths had neither post-mortem nor placental histology carried out.
- Placental histology reports were evaluated according to a pre-defined checklist based upon guidelines from the Royal College of Pathologists. Although many of these reports were regarded

as excellent or good, a substantial number were considered poor or unsatisfactory.

- Almost three-quarters of the reports contained a specific clinico-pathological correlation and/or interpretation of histological findings as recommended by the Royal College of Pathologists.
- Post-mortem reports were evaluated by trained perinatal pathologists and were found, with few exceptions, to be of good quality.

Key findings for local review of intrapartum death

- Although the majority (95%) of intrapartum-related deaths were reviewed, many of the reviews were lacking in quality. Review should be undertaken using the 'Serious Incident Framework' which should include review of contributory factors / root causes.
- While root cause analysis was documented in around two-thirds of reviews, consideration of the nine contributory factors (as recommended by the National Patient Safety Agency) was documented in only 11% of all reviews.
- Multidisciplinary panels reviewed 86% of deaths. For those babies whose care included care from the neonatal team (for whom resuscitation failed or who died in the neonatal unit) only just over a tenth included input from the neonatal team. A pathologist was only documented as present for two reviews.
- Parents were documented as being involved in only five of the reviews and an external person in nine of them.
- Actions were recommended in the majority of reviews. Individual actions were recommended in over two-thirds of reviews and institutional actions in over three-quarters. Audit was planned or undertaken for less than a fifth of cases.
- The quality of the reviews was assessed by the multidisciplinary confidential enquiry panels and judged to be good for around a quarter, adequate for a further quarter and poor for just under half, with two not assessed.

Recommendations, initiatives and quality improvements

Key recommendations to reduce intrapartum death

1. Concerns identified in this confidential enquiry about staffing and capacity issues in maternity services, particularly around the issues of induction of labour and timely transfer to delivery suite, need to be addressed.

   ACTION: Policy makers, service planners / commissioners, clinical directors, heads of midwifery

2. Multidisciplinary training in situational awareness and human factors should be undertaken by all staff who care for women in labour.

   ACTION: Professional organisations, clinical directors, heads of midwifery, health professionals

3. Adequate resource and training should be given to enable all intrapartum deaths to be systematically reviewed to facilitate organisational learning:

   a) using a standardised tool / methodology and following the relevant national Serious Incident Frameworks, including review of the contributory factors;

   b) by an appropriate multidisciplinary panel including obstetricians, midwives and pathologists and, as appropriate, a neonatologist and anaesthetist. Opportunity for the parents' perspectives of their care to be included in the review. Consideration should be given to including an independent external assessor on the panel.

   c) Opportunity for the parents' perspectives of their care to be included in the review. Consideration should be given to including an independent external assessor on the panel.

ACTION: Service planners / commissioners, professional organisations, clinical directors, heads of midwifery, health professionals

New initiatives to reduce intrapartum death

1. There should be national development of a standardised risk assessment tool for determining a woman's risk status on admission in presumed labour, or prior to induction, and regularly throughout labour.

   ACTION: Professional organisations, NICE, research funders

2. National guidance should be developed for care during the latent phase of labour once a mother accesses maternity services and this should take account of her risk status. This should include frequency, nature (intermittent auscultation or cardiotocography), and interpretation of fetal heart rate assessment.

   ACTION: Professional organisations, NICE

3. There should be a national discussion about the content of fetal monitoring training (both intermittent auscultation and continuous electronic fetal monitoring) and agreement over the content, duration and frequency of training as well as whether competency should be formally assessed for healthcare professionals caring for women in labour.

   ACTION: Professional organisations, clinical directors, heads of midwifery, health professionals

4. Research into how best to assess the baby's wellbeing during labour should be prioritised.

   ACTION: Research funders

5. Due to differing local circumstances maternity services should develop local guidance that clarifies the actions that should be undertaken when serious problems arise in a home birth, either planned or unplanned..

   ACTION: Clinical directors, heads of midwifery, health professionals

6. Local guidance should be developed to cover the particular circumstance of resuscitation of a baby born in extremis and out of hours in their service. This guidance should be practical and include issues around the use of volume expanders and the use of neonatal intubation.

   ACTION: Clinical directors, heads of midwifery, health professionals

7. National guidance is needed regarding the principles that should guide decisions to stop resuscitation and/or re-orientate care. Further research is also needed to guide practice in this area.

   ACTION: Professional organisations, NICE, research funders

8. National guidance should consider the approach to the resuscitation of a baby with prolonged bradycardia following delivery after lung aeration is confirmed.

   ACTION: Professional organisations, NICE

9. A co-ordinated approach should be adopted for care following all intrapartum related deaths with good communication between maternity and neonatal care providers as relevant to ensure seamless care for parents. This should include:

   - the development and implementation of a bereavement checklist for all intrapartum related deaths irrespective of the place of death;
   - follow-up with input from all relevant professional groups who have been involved in the care.

   ACTION: Professional organisations, clinical directors, heads of midwifery, health professionals

Quality improvement programmes to reduce intrapartum death

National quality improvement and training programmes should be implemented to improve compliance with national guidance.

In the antenatal period

- monitoring growth in pregnancy;
- management of reduced fetal movements;
- care of women with diabetes in a combined clinic;
- documentation of discussion and the agreed management plan for labour and birth following previous caesarean section;
- the offer of carbon monoxide breath testing at booking and referral to smoking cessation services.

In labour

- intermittent auscultation during the first and second stage of labour;
- real time ultrasound scanning should there be difficulty in detecting the fetal heart rate.

At resuscitation

- all health care professionals who are routinely present at births should undertake regular Newborn Life Support training. This includes all new starters and ambulance staff.

After birth

- Trusts and Health Boards should work to improve the bereavement care for parents;
- all maternity units should adopt the national tool for perinatal death review (Perinatal Mortality Review Tool) when it is available.

  ACTION: clinical directors, heads of midwifery, health professionals

Contents

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Vignettes

Abbreviations

AMU	Alongside Midwifery-led birth Unit
ARM	Artificial Rupture of Membranes
ARNI	Advanced Resuscitation of the Newborn
BMI	Body Mass Index
CEFM	Continuous Electronic Fetal Monitoring
CESDI	Confidential Enquiry into Stillbirth and Deaths in Infancy
CODAC	Cause Of Death & Associated Conditions
CTG	Cardiotocography
DCAU	Day Care Assessment Unit
ERCS	Elective Repeat Caesarean Section
FMU	Freestanding Midwifery-led birth Unit
HQIP	Healthcare Quality Improvement Partnership
HIE	Hypoxic Ischaemic Encephalopathy
IA	Intermittent Auscultation
MBRRACE-UK	Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK
MNI-CORP	Maternal, Newborn and Infant Clinical Outcome Review Programme
NICE	National Institute for Health and Care Excellence
NLS	Newborn Life Support
NPSA	National Patient Safety Agency
RCA	Root Cause Analysis
RCOG	Royal College of Obstetricians and Gynaecologists
SFH	Symphysis-Fundal Height
TEG	Topic Expert Group
VBAC	Vaginal Birth After Caesarean Section

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Members of the MBRRACE-UK collaboration

Jenny Kurinczuk, Professor of Perinatal Epidemiology, Director, National Perinatal Epidemiology Unit, National Programme Lead for MBRRACE-UK, University of Oxford

Elizabeth Draper, Professor of Perinatal and Paediatric Epidemiology, Perinatal Programme Co-lead for MBBRACE-UK, University of Leicester

David Field, Professor of Neonatal Medicine, Perinatal Programme Co-lead for MBBRACE-UK, University of Leicester

Marian Knight, Professor of Maternal and Child Population Health, NIHR Research Professor and Honorary Consultant in Public Health, Maternal Programme Lead for MBBRACE-UK, University of Oxford

Charlotte Bevan, Senior Research and Prevention Officer, Sands

Peter Brocklehurst, Professor of Women's Health, Director Birmingham Clinical Trials Unit, Institute of Applied Health Research, University of Birmingham

Ron Gray, Associate Professor, National Perinatal Epidemiology Unit, University of Oxford

Sara Kenyon, Professor of Evidence-based Maternity Care, University of Birmingham

Bradley Manktelow, Associate Professor, University of Leicester

Maggie Redshaw, Associate Professor and Senior Social Scientist, National Perinatal Epidemiology Unit, University of Oxford

Janet Scott, Head of Research and Prevention, Sands

Judy Shakespeare, Retired General Practitioner, Oxford

Lucy Smith, Senior Research Fellow, University of Leicester

Derek Tuffnell, Professor of Obstetrics and Gynaecology, Bradford Hospitals NHS Foundation Trust (from 2015)

Members of the Leicester based MBRRACE-UK team

Sophie Almond, Administrative Support

Jo Dickens, Clinical Midwifery Advisor

Caroline Ellershaw, Administrative Support

Ian Gallimore, Project Team Leader

Pauline Hyman-Taylor, Programme Manager/Research Fellow

Frances Mielewczyk, Administrative Support

Members of the Oxford based MBRRACE-UK team

Kate de Blanger, Events Coordinator

Thomas Boby, Senior Programmer

Xuejuan Fan, Database Manager

Jane Forrester-Barker, Data Coordinator

Dagmar Hutt, Interim Events Coordinator

Oliver Shaw, Administrator

Peter Smith, Senior Programmer

Rachel Smith, Programme Manager

Brenda Strohm, Acting Programme Manager

MBRRACE-UK Term, Singleton, Intrapartum Stillbirth and Intrapartum-related Neonatal Death Topic Expert Group Members

Srinivas Annavarapu, Consultant Paediatric and Perinatal Pathologist, The Newcastle Upon Tyne Hospitals NHS Foundation Trust

Charlotte Bevan, Senior Research and Prevention Advisor, Sands

Pamela Boyd, Clinical Teacher/Sister, Aneurin Bevan University Health Board

Mai Buckley, Deputy Director of Nursing & Midwifery, Royal Free London NHS Foundation Trust

Zoe Chivers, Head of Services, Bliss

Jo Dickens, Clinical Midwifery Advisor, MBRRACE-UK

Elizabeth Draper, Professor of Perinatal and Paediatric Epidemiology, Joint Perinatal Programme Lead, MBRRACE-UK

Margaret Evans, Consultant Perinatal Pathologist, NHS Lothian

David Field, Professor of Neonatal Medicine, Joint Perinatal Programme Lead, MBRRACE-UK

Jane Hawdon, Consultant Neonatologist, Royal Free London NHS Foundation Trust

Alex Heazell, Professor of Obstetrics, Maternal and Fetal Health Research Centre, University of Manchester

Jen Hollowell, Associate Professor, National Perinatal Epidemiology Unit, University of Oxford

Pauline Hyman-Taylor, Perinatal Programme Manager/Research Fellow, MBRRACE-UK

Tracey Johnston, Consultant Obstetrician, Birmingham Women's and Children's NHS Foundation Trust

Sara Kenyon, Professor in Evidence-based Maternity Care, University of Birmingham

Jenny Kurinczuk, Professor of Perinatal Epidemiology, National Programme Lead, MBRRACE-UK, University of Oxford

Helen McElroy, Consultant Neonatologist, Medway NHS Foundation Trust

John McIntyre, Lead for Neonatal Medicine, Derby Teaching Hospitals NHS Foundation Trust

Zoe Mead, Consultant Perinatal Pathologist, Cambridge University Hospital NHS Foundation Trust

Upma Misra, Consultant Anaesthetist, City Hospitals Sunderland NHS Trust

Coralie Rogers, Midwife, Blackpool Teaching Hospitals NHS Foundation Trust

Julia Sanders, Consultant Midwife, Cardiff and Vale University Health Board

Derek Tuffnell, Consultant Obstetrician, Bradford Teaching Hospitals NHS Foundation Trust

MBRRACE-UK Term, Singleton, Intrapartum Stillbirth and Intrapartum-related Neonatal Death Panel Members

Roshan Adappa, Consultant Neonatologist, Cardiff and Vale University Health Board

Srinivas Annavarapu, Consultant Paediatric and Perinatal Pathologist, The Newcastle upon Tyne Hospitals NHS Foundation Trust

Joseph Aquilina, Consultant Obstetrician and Gynaecologist, Lead Clinician Fetal Medicine, Barts Health NHS Trust

Sybil Barr, Consultant Neonatologist, Cardiff and Vale University Health Board

Tanneke Berwick, Bereavement Midwife, Abertawe Bro Morgannwg University Health Board

Lydia Bowden, Consultant Neonatologist, The Pennine Acute Hospitals NHS Trust

Debbie Bridgewater, Matron EPU/GAMBU, The Princess Alexandra Hospital NHS Trust

Sue Calder, Maternity Education Team Lead, Barking Havering & Redbridge University Hospitals NHS Trust

Shereen Cameron, Head of Midwifery, King's College Hospital NHS Foundation Trust

Morag Campbell, Consultant Neonatologist / Clinical Director, NHS Greater Glasgow and Clyde

Melanie Carpenter, Advanced Neonatal Nurse Practitioner, University Hospitals Coventry and Warwickshire NHS Trust

Maxine Chong, Head of Midwifery & Nursing, Wye Valley NHS Trust

Marta Cohen, Consultant Paediatric Pathologist, Sheffield Children's Hospital NHS Trust

Christine Conner, Consultant in Fetal and Maternal Medicine and Obstetrics, Cardiff and Vale University Health Board

Fiona Cross-Sudworth, Home Birth Team Leader, Birmingham Women's and Children's NHS Foundation Trust

Ngozi Edi-Osagie, Consultant Neonatologist, Central Manchester University Hospitals NHS Foundation Trust

Margaret Evans, Consultant Perinatal Pathologist, NHS Lothian

Katy Evans, Women and Children's Directorate Governance Lead, Taunton and Somerset NHS Foundation Trust

Claire Francis, Consultant Obstetrician, Cardiff and Vale University Health Board

Julie Gardner, Specialist Bereavement Midwife, University of Leicester Hospitals NHS Trust

Charlotte Gibson, Consultant Midwife, King's College Hospital NHS Foundation Trust

Tracey Glanville, Consultant in Fetal and Maternal Medicine, Leeds Teaching Hospitals NHS Trust

Ann Goodwin, Women's and Children's Health Governance Manager, Warrington and Halton Hospitals NHS Foundation Trust

Janine Grayson, Maternity Public Health Matron, The Mid Yorkshire Hospitals NHS Trust

Cath Harrison, Consultant Neonatologist, The Leeds Teaching Hospitals NHS Trust

Kate Harrison, Senior Midwifery Manager/Matron, Gloucestershire Hospitals NHS Foundation Trust

Jane Hawdon, Consultant Neonatologist, Royal Free London NHS Foundation Trust

Alexander Heazell, Professor of Obstetrics, Maternal and Fetal Health Research Centre, University of Manchester

Samantha Holden, Perinatal Pathologist, University Hospital Southampton NHS Foundation Trust

David Howe, Consultant and Honorary Senior Lecturer in Feto-Maternal Medicine, University Hospital Southampton NHS Foundation Trust

Jacqui Hylton, Bereavement Support Midwife, East and North Hertfordshire NHS Trust

Robert Ironton, Consultant Neonatologist, University Hospital Southampton NHS Foundation Trust

Susan Jackson, delivery suite Manager, York Teaching Hospitals NHS Foundation Trust

Ewen Johnston, Consultant Neonatologist, NHS Lothian

Tracey Jones, Lecturer in Neonatal Nursing, University of Manchester

Gitika Joshi, Consultant Paediatrician and Neonatologist, Derby Teaching Hospitals NHS Foundation Trust

Claire Keegan, Deputy Regional Maternity Lead, NHS England (North)

Teresa Kelly, Consultant Obstetrician, Deputy Clinical Head of Division, Central Manchester University Hospitals NHS Foundation Trust

Dawn Kernaghan, Consultant Obstetrician, NHS Greater Glasgow and Clyde

Emma Kyte, Quality Improvement Lead Nurse, North West Neonatal Operational delivery Network, Alder Hey Children's NHS Foundation Trust

Jan Latham, Specialist Bereavement Midwife, Shrewsbury and Telford Hospitals NHS Trust

Hannah Leonard, Consultant Midwife, Poole Hospitals NHS Foundation Trust

Lisa Leppard, Family Care Sister NNU, University Hospital Southampton NHS Foundation Trust

Dawn Lewis, Head of Midwifery, The Dudley Group NHS Foundation Trust

Renton L'Heureux, Consultant Paediatrician, West Hertfordshire Hospitals NHS Trust

Michelle Lynch, Bereavement Midwife, North Middlesex University Hospital NHS Trust

Bill Martin, Consultant Obstetrician, Birmingham Women's and Children's NHS Foundation Trust

Tamás Marton, Consultant Perinatal Pathologist, Birmingham Women's and Children's NHS Foundation Trust

Helen McElroy, Consultant Neonatologist, Medway NHS Foundation Trust

Moira McLean, Senior Lecturer Midwifery, De Montfort University

Penny McParland, Consultant Obstetrician, University of Leicester Hospitals NHS Trust

Zoe Mead, Consultant Paediatric and Perinatal Pathologist, Cambridge University Hospitals NHS Foundation Trust

Shona Montgomery, Programme Leader BM/MM , Midwifery Lecturer, Edinburgh Napier University

Rachael Moss, Bereavement Support and Antenatal Screening Midwife., Northampton General Hospital NHS Trust

Ann Muir, Senior Staff Midwife - NNU, NHS Greater Glasgow and Clyde

Wendy Oakley, Consultant Obstetrician and Gynaecologist, Burton Hospitals NHS Foundation Trust

Raji Parasuraman, Consultant in Fetal Medicine and Obstetrics, University Hospital Southampton NHS Foundation Trust

Shalini Patni, Consultant in Obstetrics and Fetomaternal Medicine, Heart of England NHS Foundation Trust

Ruth Paul, Bereavement Support Midwife, Maidstone & Tunbridge Wells NHS Trust

Julie Popplewell, Advanced Neonatal Nurse Practitioner, The Leeds Teaching Hospitals NHS Trust

Tracy Rea, Bereavement Midwife, Milton Keynes University Hospital NHS Foundation Trust

Caroline Rice, Consultant in Obstetrics and Gynaecology, Pennine Acute Hospitals NHS Trust

Nicola Robinson, Risk & Governance Lead Midwife, Sandwell & West Birmingham Hospitals NHS Trust

Katy Ruggeri, Clinical Manager, Community Midwifery and Outpatient Services, NHS Lothian

Irene Scheimberg, Consultant Paediatric and Perinatal Pathologist, Barts Health NHS Trust

Chitra Sethuraman, Consultant Paediatric and Perinatal Histopathology, Central Manchester University Hospitals NHS Foundation Trust

Devi Subramanian, Consultant Obstetrics & Fetal Medicine, King's College Hospital NHS Foundation Trust

Fiona Tait, Network Manager - West of Scotland, NHS Forth Valley

Stephen Wardle, Consultant Neonatologist, Nottingham University Hospitals NHS Trust

Timothy Watts, Consultant Neonatologist, Guy's and St Thomas' NHS Foundation Trust

Helen Whapshott, Delivery Suite Matron, Frimley Health NHS Foundation Trust

Office for National Statistics

Karen J Williams, Joanne Copsey, Vasita Patel

NHS Digital

Frances Perry, Oliver Smith

National Records of Scotland

Julie Ramsay, Maria Kay, Eileen Crichton

Information Services Division Scotland, NHS National Services Scotland

Rachael Wood, Kirsten Monteath, Carole Morris, Susan Frame

Northern Ireland Maternal and Child Health, NSC Public Health Agency

Heather Reid, Joanne Gluck, Sinead Magill

The Maternal, Newborn and Infant Clinical Outcome Review Independent Advisory Group

Matthew Jolly, National Clinical Director for Maternity Review and Women's Health, NHS England and National Maternity Safety Champion for the Department of Health (Chair of the IAG)

Janice Allister, General Practitioner & Chair of the Primary Care Safeguarding Children Forum

Philip Cox, Consultant Perinatal Pathologist, Birmingham Women's and Children's Hospital

Jacqueline Dunkley-Bent, Head of Maternity, Children and Young People at NHS England and National Maternity Safety Champion for the Department of Health.

Heather Payne, Senior Medical Officer for Maternal and Child Health, Welsh Government

Mervi Jokinen, Practice and Standards Development Adviser, Royal College of Midwives

Dr Nigel Kennea, Consultant Neonatologist and Associate Medical Director for Governance and Quality, St George's Hospital, London

Dr Corrine Love, Consultant Obstetrician, NHS Lothian and Senior Medical Officer (Obstetrics), Scottish Government

Kate McBrian, Chair of the RCOG Women's Network

Dr Eddie Morris, Consultant, Obstetrics and Gynaecology, Norfolk and Norwich University Hospital, Vice President of Clinical Quality, RCOG

Karen Todd, Resolution, Patient Experience and Maternity, Department of Health

Michele Upton, Head of Maternity and Neonatal Transformation Programmes, NHS Improvement

Dr Jason Waugh, Clinical Director Women's Services, Consultant Obstetrics and Maternal Medicine, The Newcastle Upon Tyne Hospitals

Dr David Williams, Consultant Obstetric Physician, University College Hospital, London

Dr Verena Wallace, Midwifery Officer, Nursing, Midwifery & AHP Directorate, Northern Ireland

Healthcare Quality Improvement Partnership

Tina Strack, Associate Director for Quality and Development, National Clinical Audit and Patient Outcomes Programme

Vivien Seagrove, Project Manager

MBRRACE-UK Third Sector Stakeholder Group Representatives

Francine Bates, Lullaby Trust (formerly FSID)

Beverley Beech, AIMS

Charlotte Bevan, Sands

Jane Brewin, Tommy’s

Ann Chalmers, Child Bereavement UK

Jenny Chambers, ICP Support

Debbie Chippington Derrick, AIMS

Caroline Davey, Bliss

Jane Denton, Multiple Birth Foundation

Jane Fisher, ARC

Sarah Fitzgerald, Miscarriage Association

Marcus Green, APEC

Clea Harmer, Sands

Penny Kerry, Miscarriage Association

Helen Kiranne, Bliss

Beckie Lang, Health Campaigns Tommy’s

Amy McCarthy, TAMBA

Sarah McMullen, NCT

Jane Plumb, Group B Strep Support

Niluskha Perera, Best Beginnings

Keith Reed, TAMBA

Janet Scott, Sands

Jean Robinson, AIMS

Jacqui Scott, Child Bereavement UK

Caroline Stickland, Bliss

Claire Storey, International Stillbirth Alliance

Liz Thomas, AVMA

Maureen Treadwell, Birth Trauma Association

MBRRACE-UK Royal College and Professional Association Stakeholder Group and Representatives

Sarah Armstrong, Obstetric Anaesthetist Association and Royal College of Anaesthetists

Carmel Bagness, Royal College of Nursing

Sanjeev Deshpande, British Association of Perinatal Medicine

Denise Evans, Neonatal Nurses Association

Roshan Fernando, Obstetric Anaesthetists Association & Royal College of Anaesthetists

Jacque Gerrard, Royal College of Midwives

Mark Hannigan, Royal College of Paediatrics and Child Health

Diane Hulbert, College of Emergency Medicine

Flora Jessop, British and Irish Paediatric Pathology Association

Hannah Knight, Royal College of Obstetricians and Gynaecologists

Lucy Mackillop, Royal College of Physicians

Catherine Nelson-Piercy, Royal College of Physicians

Tim Overton, British Maternal Fetal Medicine Society

Lesley Page, Royal College of Midwives

Neil Sebire, Royal College of Pathologists

Trudi Seneviratne, Royal College of Psychiatrists

Lorraine Tinker, Royal College of Nursing

1. Enquiry development and overall findings

Elizabeth S Draper

1.1 Background

National confidential enquiries into perinatal deaths have been carried out in the UK for over twenty years to monitor quality of care provision and to address the consistently high rates of perinatal mortality compared to many of our European partners. The present programme of maternal and perinatal enquiries is run by the MBRRACE-UK collaboration as part of one of the four Clinical Outcome Review Programmes overseen by the Healthcare Quality Improvement Partnership (HQIP) on behalf of the NHS organisations and governments of the UK. The confidential enquiry methodology is used to investigate the quality of care provided to a selected group of women and babies where the baby died (or cases of perinatal morbidity) to identify areas where improvements of care are required in order to reduce perinatal mortality and/or morbidity.

This report presents the findings of the third perinatal confidential enquiry carried out as part of the MBRRACE-UK programme of work and focusses on intrapartum stillbirths and intrapartum-related neonatal deaths at term.

The group selected for enquiry constitutes around one in twenty of the extended perinatal deaths: 225 out of 4392 (5.1%) in the UK in 2015. The enquiry aimed to identify potentially preventable failures of care along the whole care pathway, but with a particular focus on care during labour, delivery and resuscitation where attempted, which might have contributed to the death. The findings from the enquiry identify areas of care for improvement in the future.

1.2 Topic choice

There is a standard process in place for the selection of topics for the Clinical Outcome Review Programme. For this enquiry a call for topic proposals was sent out via email and the MBRRACE-UK website in September 2013 inviting proposals from any potential stakeholders including individuals, charities and professional organisations. 12 topic proposals were submitted for consideration and following this three-stage selection process the Maternal Newborn and Infant Clinical Outcome Review Programme Independent Advisory Group selected topics for both this enquiry (2016/17) and for the enquiry to be carried out in 2018/19. The topics selected were term intrapartum stillbirths and intrapartum-related neonatal deaths for the 2016/17 enquiry and multiple births for the next enquiry in 2018/19.

1.3 Term, singleton, intrapartum stillbirth and intrapartum-related neonatal deaths

The first perinatal confidential enquiry carried out in the UK in 1993 reviewed normally formed babies, weighing 2.5kg or more, whose deaths up to the end of six completed days were possibly related to problems during labour (intrapartum-related deaths) [1]. The birthweight criteria was expanded for 1994 and 1995 to include all intrapartum-related mortality for babies from 1.5kg or more and cases of late neonatal mortality, i.e. up to 28 completed days of life. The expectation was that this group of relatively mature babies who are alive at the onset of labour but die either during or as a consequence of something that occurred during the intrapartum period, would yield a high proportion of cases where care could be improved with major lessons to be learned. Findings from the enquiry confirmed that over three-quarters of these intrapartum-related cases (674 of 873 cases, 77.2%) included care factors which, if avoided, “might have led to a different outcome” [2]. Almost all of the identified factors related to failures to recognise problems or act appropriately or issues around effective communication.

Term intrapartum stillbirths and intrapartum-related neonatal deaths remain an important group for Trusts and Health Boards in terms of evaluating their quality of care provision. Direct comparisons of the proportion of all perinatal deaths attributable to intrapartum-related causes over time are difficult due to the use of different classifications systems for the deaths. However, there is evidence of a reduction in the number of such deaths over time. Overall stillbirth rates in England and Wales reduced by over a fifth between 1993 and 2015, from 5.7 to 4.5 per 1,000 total births, and neonatal mortality rates decreased by more than a third over the same period, from 3.2 to 2.1 per 1,000 live births [3]. Over the first fifteen years of this period the proportion of cases of perinatal mortality attributed to intrapartum-related causes using the Wigglesworth and extended Wigglesworth classifications of death [4,5] reduced from 10.9% to 6.4% (from 1993 to 2007) [6]. As a result of both falling overall mortality rates and a reduction in the proportion of intrapartum-related cases of perinatal mortality, there are now significantly fewer of these deaths occurring.

1.4 Aims

The aims of the term, singleton, intrapartum stillbirth and intrapartum-related neonatal deaths enquiry were to assess:

- adherence to clinical guidelines (Royal College of Obstetricians and Gynaecologists Green-top, Royal College of Anaesthetists, Royal College of Pathologists, National Institute for Health and Care Excellence and Sands) (see Appendix A.1);
- the standard of care provision throughout the care pathway encompassing all relevant specialties (obstetrics, midwifery, neonatal, anaesthetics and pathology), with a particular emphasis on the intrapartum period;
- the role, availability and multidisciplinary working of bereavement teams;
- the role of placental pathology review and post-mortem.

1.5 The confidential enquiry process

As detailed in previous MBRRACE-UK reports [7,8] a confidential enquiry is a process of systematic, multidisciplinary, anonymous cases review where a consensus opinion is reached about the quality of care provision for all cases undergoing review. Experience from previous enquiries highlighted the limitation of the anonymisation of the place of care in terms of the contextual setting of each case as well as the burden associated with the preparation of the notes for enquiry panels within the resource of the MBRRACE-UK perinatal programme. Prior to this enquiry meetings were therefore held with both professional and lay stakeholder group to assess the acceptability of limiting the anonymisation to the identifiers for the family and baby. The consensus of these stakeholder groups was that it was appropriate for a more limited anonymisation process to be applied and thus Section 251 approvals were obtained from the Confidentiality Advisory Group for this amendment to the enquiry protocol.

A total of 225 cases were identified as fulfilling the enquiry criteria from the MBRRACE-UK perinatal surveillance database for 2015. From these a random sample of 104 potential cases was produced, stratified by UK country, for review by enquiry panels. Following validity checks of all cases and exclusion of those cases from Northern Ireland where consent for inclusion was declined, 80 sets of notes were prepared for the enquiry panels of which 78 underwent full discussion and consensus in ten separate panel meetings. A flow chart describing the selection process is provided in Figure 1.

The focus of the enquiry was on both good and poor quality care in order to both identify examples of evidence-based practice and of care where improvements are required. The standard Maternal, Newborn and Infant Clinical Outcome Review Programme (MNI-CORP) criteria adopted by all enquiries for the programme were used to summarise the assessment of the overall quality of care for each case:

- good care, no improvements identified;
- improvements in care* identified which would have made no difference to outcome;
- improvements in care* identified which may have made a difference to outcome.

(*Improvements in care should be interpreted to include adherence to guidelines and standards, where these exist and have not been followed, as well as other improvements which would normally be considered part of good care where no formal guidelines exist.)

A summary assessment was provided separately for the baby and the mother about the quality of care provision for each case, identifying whether factors could have affected the outcome for the baby and also those factors that could potentially affect the future health and wellbeing of the mother (see Appendix A.1). In addition to the overall assessments, each aspect of care along each point of the care pathway was evaluated with respect to the quality of care provision as follows:

- none - good quality care identified;
- minor - minor issues with the quality of care identified;
- significant - significant issues with the quality of care identified;
- major - major issues with the quality of care identified.

The confidential enquiry method has been criticised for being overly negative, focusing on only those aspects of care where improvements are required. Every effort was made in this enquiry to identify good practice and to provide examples of excellent working by all members of the multidisciplinary team across the care pathway.

In all enquiries reviewers are also asked specifically to flag immediately any cases which meet the HQIP ”Cause for Concern” criteria (see Appendix A.1).

1.6 Topic Expert Group – development of panel guidance documents

Each confidential enquiry developed for the MBRRACE-UK perinatal programme convenes a Topic Expert Group (TEG) to inform the development of the enquiry and guide the process. Professional bodies were approached to ask for nominations of members with appropriate expertise and interest in intrapartum events and the care provision for women and their babies. Interested health professionals and lay stakeholders were asked to submit a curriculum vitae and to outline any relevant experience as well as evidence of their interest in intrapartum stillbirth and intrapartum-related neonatal deaths. Review of these documents was carried out to check their background and standing with their relevant professional organisation and a multidisciplinary group was then selected. All accepted members of the TEG were asked to sign a confidentiality agreement prior to attendance at the TEG confidential enquiry development meeting (see Appendix A.1).

The membership of the TEG included: fetal medicine and obstetric clinicians; hospital, bereavement and community midwives; neonatologists; neonatal nurses; obstetric anaesthetists; perinatal pathologists; and lay representatives from Sands and Bliss. The group identified the appropriate standards of care and guidance against which intrapartum care should be assessed and modified the assessment tool for the topic. A panel guidance document providing electronic links to the relevant guidance and standards was developed for panel members to consult during their preparation for panel meetings. This encompassed Royal College of Obstetricians and Gynaecologists (RCOG) Standards and Green-top guidelines, National Institute for Health and Care Excellence (NICE) Quality Standards and Guidelines as well as guidelines from the Royal College of Pathologists, the Human Tissue Authority, Research Councils UK, Sands and the British Association of Perinatal Medicine service standards for neonatal care (see Appendix A.1).

Additional supporting information based on the National Patient Safety Agency (NPSA) review of intrapartum-related perinatal deaths and details from the NICE Intrapartum Guideline (2014) was developed to highlight risk factors and medical conditions of particular note for this enquiry (see Appendix A.1)

The points on the care pathway for evaluation at panel meetings were identified as follows:

- antenatal care;
- care during labour;
- care at birth;
- resuscitation care;
- neonatal care;
- postnatal and bereavement care;
- follow-up visit and review of care;
- post-mortem / placental histology.

1.7 Development of enquiry-specific checklists

In the term antepartum stillbirth enquiry [8] a series of checklists were developed with the support of the TEG to facilitate a description of the risk factors present in the enquiry cases and to identify measurable aspects of the quality of care provided. This additional information facilitated the writing of the report, providing contextual data along the care pathway. For this enquiry the decision was made to produce one overarching checklist with a particular emphasis on care during labour, delivery, resuscitation and early neonatal care. Building on our work from the last report, details of the local review process were also included. Checklists were developed to support discussion at panel meeting and not to restrict it. Their use facilitated the discussion around emerging themes.

The structure and content of the checklist was based on the aspects of care for which guidance and standards were available at the time of care in 2015. They were developed to collect information about the aspects of care which should routinely be recorded in the medical case notes. All notes were requested for each case and, following detailed checks, any missing notes were chased to ensure all available information was available to the enquiry. Where there was no written information about an aspect of care, it was reported as *not recorded in the case notes*. As in legal cases we followed the principle that if there was nothing written in the notes then, in effect, it did not occur.

1.8 Eligible deaths

Deaths eligible for inclusion in this enquiry were defined as term (≥37 weeks completed gestational age), singleton, intrapartum stillbirths and intrapartum-related neonatal deaths in 2015. Intrapartum stillbirths were selected from the MBRRACE-UK perinatal surveillance system if they were known to be alive at the onset of care in labour and/or the primary cause of death was from intrapartum causes. Intrapartum-related neonatal deaths were identified from a first level CODAC (Cause Of Death & Associated Conditions) cause of death of 2xx and/or a textual description of the death including hypoxic ischaemic encephalopathy (HIE) or an intrapartum death.

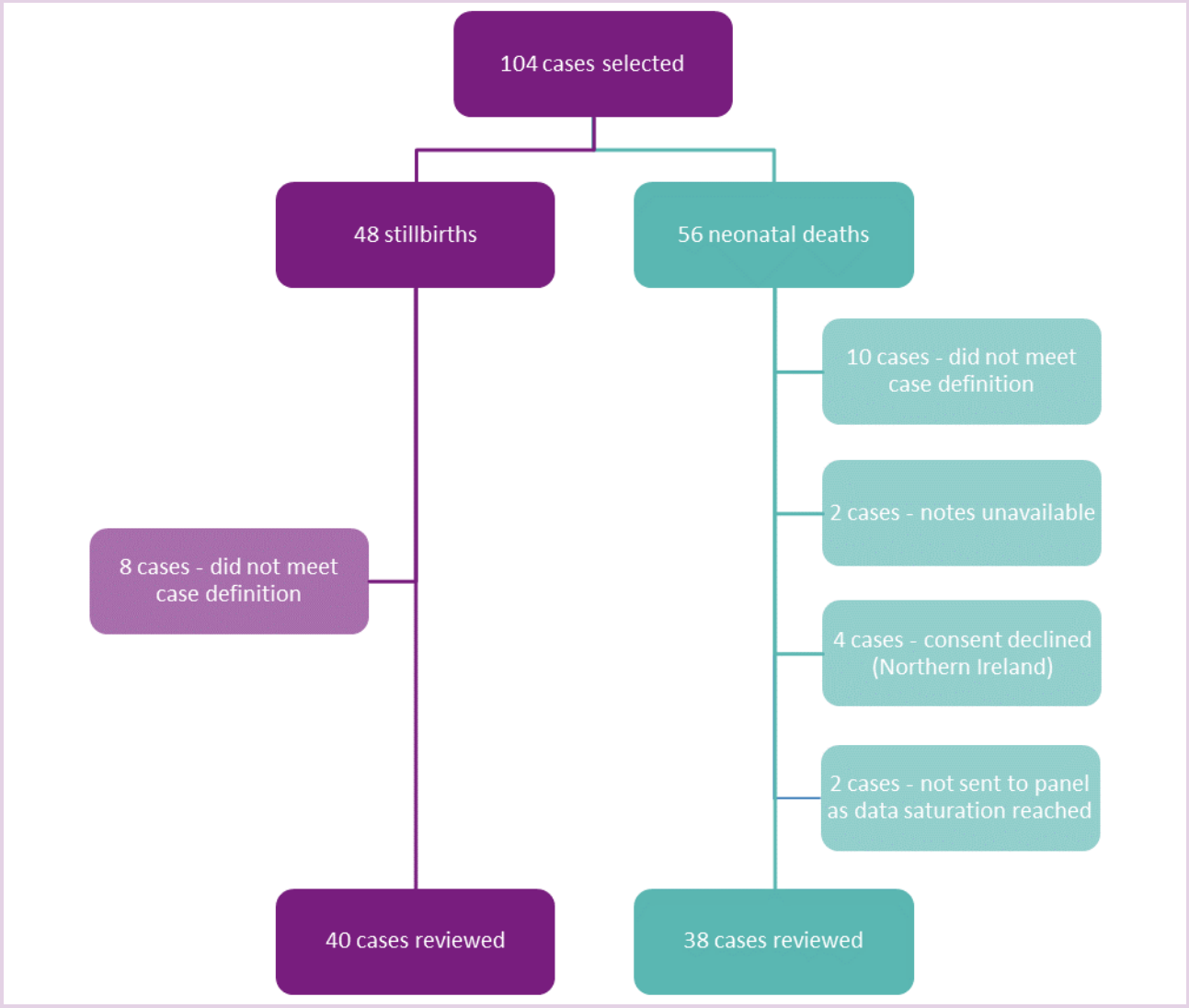
As in previous enquiries, the MBRRACE-UK perinatal mortality surveillance system provided the sampling frame for the selection of a random sample of term, intrapartum stillbirths and intrapartum-related neonatal deaths stratified by UK country. An initial sample of 104 out of a potential 225 cases fulfilling the inclusion criteria was selected in June 2016 and submitted for review by confidential enquiry until saturation of themes was achieved and no new lessons for future care were emerging: 78 cases (40 intrapartum stillbirths and 38 intrapartum-related neonatal deaths) were reviewed (Figure 1).

A request for copies of all relevant notes for each case was sent to the local Trust or Health Board teams with a detailed list of all the sections of notes required for the enquiry. Trusts and Health Boards were asked to

provide details concerning any sections of the notes that were unavailable and any helpful information about who might be able to locate them. Copies of the notes were supplied to the MBRRACE-UK office in Leicester. Northern Ireland has different data protection arrangements from the rest of the UK and there is no mechanism for the export out of Northern Ireland of identifiable data without consent. As a consequence, the Northern Ireland Maternal and Child Health office within the Health and Social Care Public Health Agency were responsible for redacting the records of identified cases and facilitating individual parental consent; consent was declined in four cases.

After checking that cases fulfilled the relevant criteria for the confidential enquiry and that the office had received all available notes the MBRRACE-UK research midwife prepared the notes for the enquiry panels, organising the notes into a logical order, carrying out further checks of completion, removing any irrelevant documentation and writing a summary of each case as a starting point for the lead presenter at the panel meetings.

Figure 1: Flow chart for cases selected for confidential enquiry



1.9 Panel members

In order to ensure comprehensive review of all cases, panel members were selected from the multidisciplinary team providing the care for the mothers and their babies across all points of the care pathway. Panel members therefore included: tertiary and district general hospital obstetricians; hospital, community and bereavement midwives; neonatologists; neonatal nurses; anaesthetists; and perinatal pathologists. The selection of this group was carried out alongside the selection of TEG members.

Selected members who had not previously participated in an MBRRACE-UK perinatal confidential enquiry had one-to-one telephone training with an MBRRACE-UK team member to provide information about confidentiality issues, how to register and use the web-based notes review system and an overview of the confidential enquiry process. They were also provided with the documentation for the enquiry panels including a summary outcome form, a checklist, a list of, and electronic link to, the standards and guidance being used to assess the quality of care provided for the cases and a document detailing issues around intrapartum care and resuscitation from the NPSA, NICE Intrapartum Guideline 2014 and Newborn Life Support (NLS) from the Resuscitation Council (UK) (see Appendix A.1).

1.10 Case review panel meetings

Between November 2016 and May 2017, ten panel meetings were held in a central location to allow for attendance by panel members from all four countries of the UK. Eight cases were originally planned to be discussed at each panel. However, due to the excessive length of some cases, two of the panels only discussed seven cases; therefore, a total of 78 cases were discussed (40 intrapartum stillbirths and 38 intrapartum-related neonatal deaths) at which point saturation of the themes emerging from the enquiry panel had been achieved.

Three weeks prior to each panel meeting the anonymised notes for each case were uploaded and made available for review via the secure MBRRACE-UK web-based notes viewing system. Panel members were sent an email to alert them that the cases were ready for review, allowing them to access the specific case notes they had been allocated for their panel meeting. Although a lead presenter was identified for each case at each panel, panel members were asked to review all cases ahead of the meeting so that they were prepared for an informed consensus discussion.

Panel meetings were chaired by one of three neutral chairs: Professor Elizabeth Draper, Professor Sara Kenyon or Professor David Field. To ensure standardisation of the process all three chairs attended the first meeting and shared the chairing of the case reviews. The remaining panel meetings were split equally between the chairs. The composition of the panel depended upon the type of cases being discussed (stillbirth, with or without resuscitation, or neonatal death) and whether a post-mortem had been performed. There were two obstetricians (tertiary and district general hospital) and two midwives (unit, community or bereavement) at all panels, along with the Chair and a panel facilitator. In addition, where necessary, two neonatologists, a neonatal nurse, an anaesthetist and a perinatal pathologist attended the panel meeting. Each case was discussed in turn, commencing with an overview by a panel member who had been allocated as lead for the case in advance and who was designated to complete the checklist for the case. This was followed by a general discussion leading to a consensus opinion on the checklist data as well as the quality of care provision for the case, with any aspects of poor care or particularly good care identified being recorded and any particular themes noted. A summary form was then completed by the Chair, recording the consensus opinion reached by the panel. All documentation prepared for panel meetings by all members was collected to ensure that all relevant issues had been recorded.

In order to ensure there were no conflicts of interest, panel members were selected to review cases where they had no personal involvement. However, in situations where there had been a change in circumstances (e.g. staff changes) panel members were asked to notify the Chair so they could be excluded from the discussions. Panel members were instructed to follow strict confidentiality guidelines for all cases.

1.11 Representativeness of the sample

Using the MBRRACE-UK perinatal mortality surveillance for 2015 as a sampling frame for the enquiry a random sample of eligible term, intrapartum stillbirths and intrapartum-related neonatal deaths was selected stratified by UK country and by case type; i.e. stillbirth or neonatal death. Using a random sample allows for the generation of results that are representative of all term intrapartum deaths and thus allows for both the quantitative analysis of the data and a qualitative investigation of how care was provided to women and their families. Socio-demographic, behavioural and care characteristics of all term, singleton, intrapartum deaths are presented in Table 1, comparing the 78 cases selected for enquiry with the 147 cases who were not.

There were no significant differences between the selected and non-selected intrapartum deaths in any of the characteristics presented in Table 1 and thus we concluded that the results from this enquiry are representative of all term, singleton, intrapartum deaths in the UK. It should be noted that given the lower numbers of intrapartum stillbirths fulfilling the enquiry criteria the proportion of stillbirths undergoing the enquiry process was far greater than for the neonatal deaths. The sample was stratified by type of death to ensure that a sufficient number of each type of case was reviewed enabling the saturation of emerging themes to be achieved.

Table 1: Characteristics of all term, singleton, intrapartum stillbirths and intrapartum-related neonatal deaths for 2015 compared with those selected for enquiry

Characteristic	Not selected (n=147)		Selected (n=78)		p-value*
	n	%	n	%	
Maternal age (years)					0.138
<20	5	*3*	5	*6*	
20-24	28	*19*	5	*6*	
25-29	36	*24*	21	*27*	
30-34	45	*31*	31	*40*	
35-39	27	*18*	12	*15*	
40+	6	*4*	4	*5*	
Missing	2	*1*	1	*1*	
Baby's ethnicity					0.627
White	112	*76*	58	*74*	
Mixed	4	*3*	3	*4*	
Asian	20	*14*	10	*13*	
Black	4	*3*	5	*6*	
Other	1	*1*	1	*1*	
Not known	6	*4*	1	*1*	
Deprivation quintile					0.671
Least deprived	26	*18*	14	*18*	
2	28	*19*	20	*26*	
3	28	*19*	14	*18*	
4	33	*22*	15	*19*	
Most deprived	31	*21*	13	*17*	
Missing	1	*1*	2	*3*	
Country of residence					0.806
England	124	*84*	68	*87*	
Northern Ireland	4	*3*	3	*4*	
Scotland	9	*6*	3	*4*	
Wales	10	*7*	4	*5*	
Post-mortem					0.182
Full	53	*36*	34	*44*	
Limited	2	*1*	4	*5*	
None	77	*52*	35	*45*	
Not known	15	*10*	5	*6*	
Maternal body mass index (BMI)					0.277
<18.5	3	*2*			
18.5-29.9	90	*61*	55	*71*	
30+	34	*23*	17	*22*	
Missing	20	*14*	6	*8*	
Smoking status					0.726
Never smoked/Gave up before pregnancy	110	*75*	62	*79*	
Gave up during pregnancy/smoker	24	*16*	10	*13*	
Not known	13	*9*	6	*8*	
Employment status					0.060
Employed or self-employed	89	*61*	46	*59*	
Unemployed (looking for work)	7	*5*	11	*14*	
Student	2	*1*	2	*3*	
Looking after home/family/other	30	*20*	15	*19*	
Not known	19	*13*	4	*5*	
Support during pregnancy					0.632
Partner, cohabiting	125	*85*	71	*91*	
Partner, not cohabiting	10	*7*	3	*4*	
Family/friend	8	*5*	3	*4*	
Not known	4	*3*	1	*1*	

Characteristic	Not selected (n=147)		Selected (n=78)		p-value*
	n	%	n	%	
Gestation at first booking					0.613
Before 10^{+0} weeks	59	*40*	27	*35*	
At or after 10^{+0} weeks	69	*47*	42	*54*	
Not known	19	*13*	9	*12*	
Sex					0.755
Male	75	*51*	41	*53*	
Female	71	*48*	37	*47*	
Not known	1	*1*	-	-	
Mode of delivery					0.770
Spontaneous vaginal	55	*37*	26	*33*	
Assisted	18	*12*	11	*14*	
Pre-labour caesarean section	42	*29*	20	*26*	
Caesarean section after onset of labour	31	*21*	21	*27*	
Not known	1	*1*			
Type of care at birth					0.290
Obstetric unit	127	*86*	70	*90*	
Alongside midwifery-led unit	13	*9*	3	*4*	
Freestanding midwifery-led unit	-	*0*	1	*1*	
Home/born before arrival/unknown	7	*5*	4	*5*	
Multiplicity					0.301
Singleton	145	*99*	78	*100*	
Twin	2	*1*	-	-	
Outcome					<0.001
Stillbirth	27	*18*	40	*51*	
Neonatal death	120	*82*	38	*49*	
ALL	**147**		**78**		

*p-value for Chi-square test: selected versus non-selected

1.12 Key findings from the Confidential Review Panels

- **The rate of term, singleton, intrapartum stillbirth and intrapartum-related neonatal death has more than halved since 1993 from 0.62 to 0.28 per 1,000 total births which represents a reduction of around 220 intrapartum deaths per year.**
- **Capacity issues were identified as a problem in over a quarter of the cases undergoing panel review (n=21). The majority of staffing and capacity problems were related to delivery suite (n=17) with the remaining issues relating to neonatal care provision.**
- **The panel consensus was that in nearly 80% of deaths improvements in care were identified which may have made a difference to the outcome of the baby**
- **There is an increasing proportion of births to mothers who have risk factors associated with an increased risk of perinatal death. This has resulted in increasing numbers of pregnant women with conditions who require a more complex package of care and interventions.**

1.13 Intrapartum death rates over time

The definition of intrapartum death used in the Confidential Enquiry into Stillbirth and Deaths in Infancy (CESDI) enquiry in 1993 was normally formed babies of 2.5 kg or more who were stillborn or died within the first week of life where the death was related to problems during labour for England, Wales and Northern Ireland. Applying this definition to the perinatal surveillance data for 2015 births shows that over the period 1993 to 2015 the rate of intrapartum deaths reduced by over 50% from 0.62 per 1,000 total births to 0.28 per 1,000 total births: this represents a reduction of around 220 intrapartum deaths per year.

1.14 Key findings from the enquiry panels

A summary of the consensus findings of the panel reviews is provided in Table 2, indicating the quality of care provision for the outcome of both the baby and the mother across all aspects of the care pathway. Following the terms of the previous enquiry, from the point of view of the baby the panels broadly interpreted 'outcome' to represent whether the care provision may have contributed to the death. From the mother's perspective 'outcome' was interpreted as her physical and psychological wellbeing and full consideration of her future fertility.

Table 2: Confidential enquiry summary of grading of quality of care

	Stillbirth				Neonatal death			
	Baby		Mother		Baby		Mother	
Overall quality of care	n	%	n	%	n	%	n	%
Good care; no improvements identified	3	*8*	12	*30*	2	*5*	10	*26*
Improvements in care identified which would have made no difference to outcome	6	*15*	10	*25*	6	*16*	9	*24*
Improvements in care identified which may have made a difference to outcome	31	*78*	18	*45*	30	*79*	19	*50*
TOTAL	**40**	***100***	**40**	***100***	**38**	***100***	**38**	***100***

The table has been split for intrapartum stillbirths and intrapartum-related neonatal deaths. Overall, in terms of the outcome for the baby, the panel consensus was that in 78% (n=31) of intrapartum stillbirths and 79% (n=30) of intrapartum-related neonatal deaths improvements in care were identified which may have made a difference to the outcome for the baby. In terms of the mother's physical and psychological outcome and/or future fertility, in around half of the cases (18 of 40 stillbirths and 19 of 38 neonatal deaths) the consensus of the panels was that improvements in care may have made a difference. Our previous confidential enquiries have shown that reducing such complex cases to a single number (or two in this case) is limited and does not provide a complete picture of the entire pathway of care provision. The basis of the allocation of the grade of quality of care may be based on one aspect alone so an improvement in care might be identified for a case which had excellent care throughout the whole of the care pathway except for one element. Alternatively, a case may have had poor care throughout the care pathway affecting both the ultimate outcome for the baby and the future health and wellbeing of the mother. In contrast, a case may have had several aspects of care quality that did not affect the ultimate outcome for the baby but which may well have resulted in care that may have made a difference in terms of the mother's experience and future health and fertility.

Table 3 provides information, about the poorest grading of quality of care affecting the outcome for the baby at each relevant point along the care pathway separately for the stillbirths and neonatal deaths. For stillbirths significant or major quality of care issues were identified during the antenatal period for almost two-thirds of babies, for over three-quarters of babies during care in labour, for just over two-fifths of babies during care at birth and for a fifth of babies requiring resuscitation. For the neonatal deaths significant or major quality of care issues were identified during the antenatal period for two-fifths of babies, for over three-quarters of babies during care in labour, for a fifth of babies during care at birth, for a third of babies requiring resuscitation and for a fifth of babies receiving neonatal care.

Table 3: Confidential enquiry poorest grading of quality of care by point on the care pathway affecting the outcome for the baby

Quality of care issues		Point on the care pathway									
		Antenatal		Care in labour		Care at birth		Resuscitation		Neonatal care	
		n	%	n	%	n	%	n	%	n	%
Intrapartum stillbirths											
	None	13	*32.5*	9	*22.5*	23	*57.5*	21	*70.0*	N/A	
	Minor	2	*5.0*	0	-	0	-	3	*10.0*	N/A	
	Significant	6	*15.0*	5	*12.5*	5	*12.5*	5	*16.7*	N/A	
	Major	19	*47.5*	26	*65.0*	12	*30.0*	1	*3.3*	N/A	
	TOTAL	**40**	***100***	**40**	***100***	**40**	***100***	**30***	***100***	**N/A**	
Intrapartum-related neonatal deaths											
	None	19	*50.0*	8	*21.0*	30	*78.9*	20	*52.6*	20	*69.0*
	Minor	4	*10.5*	0	-	0	-	5	*13.2*	3	*10.3*
	Significant	8	*21.0*	4	*10.5*	2	*5.3*	6	*15.8*	2	*6.9*
	Major	7	*18.4*	26	*68.4*	6	*15.8*	7	*18.4*	4	*13.8*
	TOTAL	**38**	***100***	**38**	***100***	**38**	***100***	**38**	***100***	**29***	***100***

*Denominator reflects applicable deaths at this point in the care pathway

In terms of the physical and psychological outcomes for the mother and/or her future fertility, Table 4 presents the poorest grading of quality of care at each relevant point of the care pathway, once again presented for stillbirths and neonatal deaths separately. For stillbirths significant or major quality of care issues were identified during the postnatal and bereavement care for almost a third of mothers, for just over half of mothers at follow-up and review, for almost a quarter of mothers whose baby underwent post-mortem and for around a sixth of cases where placental histology was undertaken. For the neonatal deaths significant or major quality of care issues were identified during the postnatal and bereavement period and during follow-up and review for almost half of mothers, for almost a quarter of mothers whose baby underwent post-mortem and for around 30% of cases where placental histology was undertaken.

Table 4: Confidential enquiry poorest grading of quality of care by point on the care pathway affecting the future health and wellbeing for the mother

Quality of care issues		Point on the care pathway							
		Postnatal & bereavement		Follow-up & review		Post-mortem		Placental histology	
		n	%	n	%	n	%	n	%
Intrapartum stillbirths									
	None	25	*62.5*	16	*40.0*	17	*65.4*	28	*77.8*
	Minor	2	*5.0*	2	*5.0*	3	*11.5*	2	*5.6*
	Significant	6	*15.0*	6	*15.0*	4	*15.4*	2	*5.6*
	Major	7	*17.5*	16	*40.0*	2	*7.7*	4	*11.1*
	TOTAL	**40**	***100***	**40**	***100***	**26***	***100***	**36***	***100***
Intrapartum-related neonatal deaths									
	None	19	*50.0*	19	*50.0*	9	*52.9*	14	*58.3*
	Minor	2	*5.3*	2	*5.3*	2	*11.8*	2	*8.3*
	Significant	9	*23.7*	8	*21.0*	1	*5.9*	5	*20.8*
	Major	8	*21.0*	9	*23.7*	3	*17.6*	2	*8.3*
	TOTAL	***38***	***100***	**38**	***100***	**17***	***100***	**24***	***100***

*Denominator reflects applicable deaths at this point in the care pathway

1.15 Maternal Characteristics

Since the last confidential enquiry into term intrapartum deaths there has been an increase in the proportion of births to mothers who have risk factors associated with an increased risk of perinatal loss. Maternal age has increased over time with the highest proportion of births in the 1970s being to women aged between 25 and 29 years whereas, by 2000, the largest proportion of births was to women aged between 30 and 34 [9]. By 2014 the average age of first-time mothers was 30.2 years with 21.5% of mothers giving birth at 35+ years [10]. There has also been a steady increase in the percentage of births to mothers in England and Wales born outside of the UK from 11.6% in 1990 to 27.0% in 2014. [11].The prevalence of obesity in pregnancy has also increased, from around 10% in the early 1990s to up to 19% in the early 2000s [12,13]. These changes have also meant that there are increasing numbers of pregnant women with diabetes and other conditions associated with higher risk and requiring a more complex package of care and interventions [14].

Just over 10% of the mothers included in this enquiry were vulnerable women with major social and/or mental health problems where there were examples of both excellent and poor care provision. In these difficult situations there was evidence of midwifery staff making every effort to help these women comply with their care and appointments. However, there was also evidence of a few situations where the problems of women were inadequately responded to and misrepresented in the medical notes. Dealing with the complexity of these situations adds to the daily challenges and pressures faced by health professionals.

1.16 Capacity issues

Capacity issues were identified as a problem in just over a quarter of the cases undergoing panel review (n=21) and, in a further seven cases, the notes identified issues that could be related to problems with staffing / capacity: a potential 28 cases (35.9%). Most issues were identified during the intrapartum period (n=17+7) with a further four cases relating to the neonatal period and involving problems with transport (n=2), a referral of one baby outside of the network and a reported paediatrician shortage in one further case.

In ten of the 17 cases identified during the intrapartum period the panel felt that the capacity issue played a contributory role to the outcome. Details of these issues are provided in Chapter 5.

1.17 Comparison with findings of other confidential enquiries

Comparison of the findings of the current confidential enquiry to the review of intrapartum deaths of babies weighing ≥1.5kg in 1994/5 [15] indicate that sub-optimal antenatal care was found in 44.9% of cases of the earlier enquiry compared to 58.9% in the current enquiry. The proportion of the cases with sub-optimal antenatal care where it was felt that appropriate management would have been likely to lead to a different outcome was very similar between the two enquiries at around two-thirds of cases (66% in 1994/5 compared with 63% in 2015). In both confidential enquiries antenatal problems were identified in: i) the management of risk factors including diabetes and hypertension; ii) the assessment of fetal growth; iii) the planning and mode of delivery; and iv) the interpretation of antepartum cardiotocography (CTG) recordings. In a regional confidential enquiry of 25 cases in the West Midlands in 2008 to 2009 [16] similar issues were found, with 36% of cases demonstrating problems with screening for fetal growth restriction or inadequate management when problems such as maternal perception of reduced fetal movements had been identified.

Sub-optimal intrapartum care was found in 75.6% of the cases reviewed for the 1994/95 enquiry [15] compared with 78.2% in 2015. The proportion of the cases with sub-optimal intrapartum care where it was felt that appropriate management would have been likely to lead to a different outcome was, once again, very similar between the enquiries: 88.3% in 1994/5 and 90.0% in 2015. Both confidential enquiries identified problems with monitoring during labour, management of labour and delivery and failure to recognise evolving problems. However, although the findings from both enquiries are similar they should be considered in the context of the growth in the amount of guidance that has been produced since the mid 1990's which increased the rigour with which these deaths were reviewed at the enquiry panels.

Given the overlap in risk factors for antepartum and intrapartum stillbirth, it is not surprising that the findings of this confidential enquiry identified similar antenatal themes to the confidential enquiry into normally-formed, term antepartum stillbirths published in 2016 [8], although in the current cohort there was evidence suggesting better coverage of screening for gestational diabetes. It is unclear why there is persistent evidence of sub-optimal care in detection of fetal growth disorders and reduced fetal movements and this will be discussed further in Chapter 2. This may reflect the variation in local guidelines and tools in practice which are of lower quality than national evidence-based guidelines [17]. Quality improvement strategies, such as the NHS England 'Saving Babies Lives Care Bundle', represent efforts to improve care delivered in the antenatal and intrapartum period, with the aim of reducing stillbirths [18].

The remaining chapters in this report will describe in detail the findings from the confidential enquiry panels at each point along the care pathway.

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2. Antenatal Care

Alexander Heazell, Katy Evans

2.1 Key Findings

- **Screening for fetal growth disorders was not performed according to national evidence-based guidance in a quarter of cases.**
- **For those women who attended with reduced fetal movements, management did not follow national guidance in a third of cases.**
- **While screening for diabetes appeared to be undertaken according to national guidance for all but one case, ongoing care for women with diabetes appeared not to be in a joint clinic for half of the women with the condition.**
- **Evidence that women with a history of prior caesarean section were counselled or that a management plan for labour had been documented was present in a fifth of cases with this history.**
- **Two-thirds of women were not screened for smoking in pregnancy according to national evidence-based guidance.**

2.2 Introduction

Although an intrapartum-related perinatal death occurs due to events that take place in or around the time of labour, the events which culminate in the death of a baby may have their origins in the antenatal period. Studies have highlighted factors which are associated with intrapartum-related perinatal death, although most of the data has focused on intrapartum stillbirth. These factors can be grouped into maternal and fetal conditions (Table 5). Maternal demographic characteristics and medical conditions include cigarette smoking [1-3], maternal age >35 [4,5], prior caesarean section [6], diabetes [4] and hypertensive disorders [7]. Fetal conditions include a small for gestational age baby and infection [2,8].

Table 5: Maternal and fetal characteristics identifiable in the antenatal period associated with intrapartum stillbirth, neonatal death or intrapartum-related perinatal death.

Characteristic	Odds ratio / relative risk	Reference
Cigarette smoking	1.5	Aliyu, 2007
	2.1	Getahun 2007
	1.5	Bjornholt, 2016
Diabetes	2.4	Oster, 2015
Chronic hypertension	4.6	Ananth, 1995
Pregnancy-induced hypertension	1.9	Ananth, 1995
Maternal Age >35	2.3	Salihu, 2008
	1.4	Oster, 2015
Vaginal birth after prior caesarean section	1.7 for intrapartum-related perinatal death	Smith, 2002
Infection/inflammation	6.7 for intrapartum stillbirth	McIntyre, 2013
	4.6 for neonatal death	
Small for gestational age baby	1.9	Getahun, 2007
	5.0 for intrapartum stillbirth	McIntyre, 2013
	7.7 for neonatal death	

Since the majority of term intrapartum-related deaths are related to intrapartum hypoxia it is not surprising that consistency is seen between the risk factors for deaths and those for neonatal encephalopathy and HIE [10]. These factors are also similar to those for antepartum stillbirth and likely to represent fetal vulnerability to further stressful stimuli. It is important to acknowledge that the chance of adverse outcome for an individual pregnant woman is dynamic and may change as pregnancy progresses, with the development of, for example, reduced fetal movements or antepartum haemorrhage.

2.3 Summary of antenatal risk factors present in the cases

Of the 78 mothers who had an intrapartum-related perinatal death just over a third (n=28) had at least one of the significant risk-factors described in Table 5. In terms of maternal conditions, a quarter (n=18) had a weight issue (underweight, overweight or obesity), nine had hypertensive disease, eight had diabetes and 10 were cigarette smokers. In terms of fetal vulnerability, half of the mothers had an abnormality of fetal growth and just over a quarter of the mothers (n=22) attended with reduced fetal movements. A reduction in fetal movements was more common in cases of intrapartum stillbirth than neonatal death (17 stillbirths, 5 neonatal deaths) but there was little difference in the frequency of abnormalities of fetal growth. However, abnormalities of fetal growth were only responded to in a quarter of intrapartum stillbirths compared to three-quarters of babies who died neonatally. Reduced fetal movements were appropriately managed in two-thirds of all the cases.

2.4 Findings from the panels

Panel reviews found that around a third (n=29) of cases had factors relevant to care delivered before the onset of labour or the start of induction of labour (18 stillbirths and 11 neonatal deaths). Of these 29 cases, just over three-fifths (n=18) had at least one of the risk factors for intrapartum-related perinatal death described in Table 5. In almost all of these cases (n=26) there was evidence of sub-optimal antenatal care that the panels felt had had a bearing on the outcome. Emerging issues from the antenatal care provision reflected themes from the previous MBRRACE-UK confidential enquiry [9] and will now be considered in terms of fetal and maternal conditions. The two main fetal conditions were growth restriction and a reduction in movements, while the main maternal condition was diabetes. In addition, missed opportunities were identified in the antenatal period to address and discuss risk factors with women so that they could make informed choices about their care which may have affected the outcome.

2.5 Fetal growth restriction

Appropriate screening for fetal growth is a key aspect of antenatal care [10]. There was evidence of sub-optimal care in screening for fetal growth disorders in a quarter of cases (n=21) and for most this was considered by the panel to be major or significant. In four cases the consensus of the panel was that this was almost certainly relevant to the outcome. The most commonly reported problems were: that a growth chart was not present in the clinical records; that symphysis-fundal height (SFH) was not measured at an appropriate frequency or was measured but then not plotted on a suitable chart; and that women who were at increased-risk of fetal growth disorders did not have regular measurement of fetal growth by ultrasound scan. In three cases there was a failure to act upon reduced fetal growth rate on ultrasound scan; in two of these cases this was felt to have had a significant or major impact on the outcome, as the risk of fetal compromise was not fully appreciated (see Vignette 1).

Vignette 1: Fetal growth restriction

A woman with a previous vaginal delivery at 41 weeks was referred for midwifery-led care having had her initial visit at 17 weeks gestation. She was seen at appropriate intervals during her pregnancy, but the SFH was static from 36 weeks through to 40 weeks gestation and was not plotted on a growth chart. A referral for ultrasound scan was not made. At 40 weeks gestation, the woman presented with reduced fetal movements but assessment of the fetal heart rate was normal and she was not referred for ultrasound scan. At 41 weeks, she presented with signs of labour and an antepartum haemorrhage, and there was a prolonged fetal bradycardia shortly after her admission. Following medical review, artificial rupture of membranes (ARM) was performed. Shortly afterwards there was a further prolonged bradycardia. The baby was born with fetal growth restriction and no signs of life.

2.6 Reduced fetal movements

Presentation with reduced fetal movements in late pregnancy was more frequent in the intrapartum-related perinatal deaths considered in this enquiry than that reported in the general obstetric population (28% compared with 6-15% in the literature [11,12]). Of the 22 women who attended with reduced fetal movements in late pregnancy, antenatal management was inappropriate in a third of cases [13]. Problems with management included: inaccurate advice about reduced fetal movements (<10 movements in 12 hours); not assessing fetal heart rate by CTG; and not performing an ultrasound scan when indicated by the presence of additional risk factors or multiple presentations with reduced fetal movements. Following panel review, management of reduced fetal movements was assessed as representing significant or major sub-optimal care in four cases. In three of these cases this was probably or almost certainly relevant to the intrapartum-related death. Problems with management included a failure to recognise recurrent reduced fetal movements (see Vignette 2) and a failure to make an appropriate plan of care following multiple attendances with reduced fetal movements. Another factor common to these cases was a failure to escalate concerns regarding fetal wellbeing to senior obstetric staff.

Vignette 2: Impact of not recognising recurrent reduced fetal movements

A woman with a previous vaginal delivery at 41 weeks was referred for midwifery-led care having had her initial visit at 12 weeks gestation. She was seen at appropriate intervals during her pregnancy. At 36 weeks gestation, she presented with reduced fetal movements. Assessment of the fetal heart rate was normal and the woman was not referred for ultrasound scan. She presented with a further episode of reduced fetal movement at 36^{+5} weeks. The estimated fetal weight by ultrasound scan was on the 10th centile, liquor volume and umbilical artery Doppler were normal. The woman presented with absent fetal movements at 38 weeks gestation. The CTG was pathological and a decision was made to induce labour by ARM. Following ARM there was prolonged fetal bradycardia. The baby was born by caesarean section with no signs of life with a birthweight on the third centile. Placental histology revealed a small placenta with evidence of restricted fetal blood flow.

2.7 Diabetes

The previous confidential enquiry into term, singleton, normally-formed antepartum stillbirths identified evidence of failure to identify women with risk factors for gestational diabetes [9]. In this enquiry just under half of the women (n=34) had risk factors for diabetes, and a welcome finding was that a glucose tolerance test was offered in over 90% of cases. However, of the eight women with pre-existing or gestational diabetes, half were not managed in a joint diabetes and antenatal clinic in accordance with NICE guidance for the management of diabetes in pregnancy [14]. The diabetes team, obstetric and midwifery team are a coordinated team of individuals and those women who receive care in the joint diabetes and obstetric clinic reap the benefits of both insights from different professionals and their wide ranging skills. Pre-pregnancy care and close attention to the optimisation of glycaemic control during pregnancy are critical to reducing the risk of stillbirth, with recognition that, because of the increased likelihood of stillbirth, neonatal death and other adverse outcomes of pregnancy

in women with pre-existing diabetes [15], there must be a lower threshold for increased maternal and fetal monitoring, intervention and expedited delivery.

The panel reviews found that in two cases of women with diabetes, their pregnancies were not appropriately managed and this was viewed as a significant contributing factor to the outcome. The following vignette (Vignette 3), highlights a case where the high risk nature of a diabetic pregnancy was not appreciated. It also highlights the failure to properly plan care for a woman at risk of an adverse outcome..

Vignette 3: Management of diabetes

A woman with pre-existing, poorly controlled type 2 diabetes booked at 8 weeks of pregnancy. She had previously had a termination of pregnancy for fetal abnormalities and a pre-term delivery by caesarean section. She was referred to a joint antenatal and diabetes clinic, but coordinated working to improve control of her diabetes was not evident. An elective repeat caesarean section (ERCS) was booked for 38 weeks gestation. The woman reported reduced fetal movements on two occasions, at 34^{+3} and 35^{+3} weeks. She was admitted at 37^{+2} weeks with mild contractions which stopped four hours later. Her CTG showed some abnormal features and a decision was taken four hours after that to perform a caesarean section. However the consultant later took the decision, in view of an improved, reassuring CTG, to delay the caesarean section, to administer steroids and to request a repeat CTG. Later that evening, a CTG was undertaken which showed unprovoked decelerations and was classified as suspicious but which was discontinued by a senior midwife with no review, escalation or plan. Overnight there was no monitoring of the baby or the mother's diabetes. In the morning the fetal heart could not be obtained by CTG and fetal death was confirmed by ultrasound.

2.8 Information and decision-making after previous caesarean section

Decision-making in pregnancy is particularly complex because women must consider not only their own health and wellbeing but also that of their unborn child. Good communication with women includes providing them with the opportunity for informed decision-making on the mode of birth after a caesarean section. Prior caesarean section is an associated risk factor for intrapartum-related perinatal death and, of the 34 woman who were multiparous, 14 (40%) had had a previous caesarean section. In 2015, the RCOG recommended the routine use of checklists during antenatal counselling about vaginal birth after caesarean section (VBAC) to facilitate best practice, shared decision-making and documentation [16]. Only one of the cases reviewed had a completed checklist in the notes. Nine women elected VBAC and five women chose to have an ERCS. In six of the women who opted for VBAC there was no documented plan regarding care in labour and for the five women who chose to have an ERCS, none had a plan documented in the event that labour started spontaneously before the scheduled date of the ERCS (Vignette 4). In four of the 14 cases with a history of caesarean section there was a uterine rupture which was the cause of death. Four of the five women who had planned to have ERCS went into spontaneous labour before the date of their planned operation and progressed to try and deliver their baby vaginally even when, in some cases, other risk factors were also present (Vignette 4). The consensus of the panel was that there was a lack of documentation of a plan for care in labour. This did not take into account the full clinical situation, including changed antenatal risk factors that had a bearing on the outcome in two of the cases who had had a previous caesarean section.

Vignette 4: Lack of a management plan for labour and birth following previous caesarean section

A woman had one previous live child, delivered by caesarean section. She was seen at appropriate intervals through pregnancy. At booking it was noted that she preferred to have an ERCS. During this pregnancy the woman developed obstetric cholestasis, there were concerns about reduced fetal growth on ultrasound scan and at 34 weeks the woman repeated her desire for an ERCS. A caesarean section was booked for 39^{+5} weeks but there was no documentation of the risks or benefits of ERCS or VBAC. The woman was seen at 36 weeks with a third episode of reduced fetal movements and the ERCS was brought forward by a week. At 37 weeks of pregnancy the woman was admitted in spontaneous labour. The unit was busy and documentation indicates that, although the woman was now keen for a VBAC, there was no documentation that the risk factors that had developed in pregnancy were considered when the discussion of the risks and benefits of VBAC took place. There was also no documentation to suggest that an admission plan or management plan for labour was made by the obstetric team. The woman was reviewed by the obstetrician when concerns were raised about the fetal heart rate trace and an emergency caesarean section was performed, at 8cm dilatation, six hours after her arrival on the unit. A baby weighing 2.5kg was born in poor condition and died the following day.

2.9 Missed opportunities to identify women who smoke during pregnancy

Clinical guidance [17] recommends that all women are offered a carbon monoxide breath test both at their first booking and at subsequent appointments, as women may find it difficult to disclose smoking due to the pressure not to smoke during pregnancy being so intense. Of the 78 cases reviewed, 10 women admitted to smoking cigarettes, of which four had had a carbon monoxide breath test. However, only a third of the women in the review had a carbon monoxide breath test at booking and testing was never refused. All women who smoke or who have only stopped smoking within the previous two weeks and all women with a raised carbon monoxide reading should be referred to smoking cessation services [17]. Of the 10 women who reported smoking and/or had a positive carbon monoxide breath test, all but one were referred to a smoking cessation service, although whether they attended was not recorded in the notes.

Failure to adequately screen for smoking in over half of the deaths considered here represents a potential lost opportunity to intervene to improve outcomes. If women who smoke are not identified they are deprived of information about the risks of stillbirth from smoking when pregnant and the health benefits of stopping smoking. This, in turn, makes it difficult to ensure that appropriate fetal surveillance is in place in pregnancy and that women have appropriate support to quit.

2.10 Communication

Women should be able to make informed choices about their care based on the information they are given; thus, women who have difficulty speaking or understanding English should be provided with an interpreter who can communicate with them in their preferred language. This may be a link worker or advocate but should not be a member of the woman's family, her legal guardian or her partner. Of the cases reviewed, it was documented that English was not the mother's first language in 16 cases (21%). In 11 cases (14%) there was evidence that the woman had been asked if she understood written and spoken English. Six of these women needed an interpreter and, in four cases, a professional interpreter was used at least once during the pregnancy. In one case a family member was recorded as being used as an interpreter at each antenatal contact (see Vignette 5) and in a second case there was no evidence that an interpreter was used at any stage of the pregnancy. In these two cases the panel consensus was that communication failures impacted upon the outcome. Arranging an interpreter and using one in a three-way conversation takes two or three times longer, requiring resources that are frequently limited. When women attend for a non-scheduled appointment accessing interpreting service can be challenging. Nevertheless, an independent interpreter is needed to ensure that the woman can communicate directly and relay her concerns and questions without potential interference.

Vignette 5: Communication

A 21-year-old woman, recently arrived from India and speaking only limited English was booked for midwifery-led care at 9 weeks of pregnancy. She was seen regularly and attended all her scheduled appointments. Telephone contact was also made at various stages of her pregnancy. It was documented that translators were available but these were never used and on no occasion during the course of antenatal care was a professional translator used. Family members were used to translate or were spoken to on the telephone; these included the woman's mother-in-law, sister-in-law and husband.

2.11 Conclusions

Care in the antenatal period needs to reflect the probability of complications which may change as pregnancy progresses, such as when a woman develops gestational diabetes, and the risk of maternal and fetal complications should be reassessed at each antenatal visit and the care for individual women appraised. It is important to recognise that antenatal care should be delivered for all women, some of whom have complex psychological and social needs. In some cases, panel review identified that this had been done extremely well.

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3. Care before labour is established

Wendy Oakley, Charlotte Gibson and Derek Tuffnell

3.1 Key findings

- **There was a failure to recognise the transition from the latent to the active phase of labour and to institute appropriate monitoring in an eighth of cases.**
- **There were problems for a third of women who required induction of labour:**
  - **delays in starting or continuing induction or both;**
  - **a lack of fetal monitoring during the induction process;**
  - **heavy workload contributed to a number of cases.**
- **Errors with cardiotocography (CTG) monitoring before labour was established were identified in a tenth of cases, involving incorrect use of the intrapartum classification for pre-labour CTGs and/or a failure to respond appropriately to an abnormal pre-labour CTG.**
- **Difficulties were identified with the ultrasound diagnosis of intrauterine death, if suspected on commencement of monitoring, in a third of cases where the baby died before established labour.**

3.2 Introduction

This chapter considers the care of women who had either reported the onset of contractions and/or rupture of membranes or were inpatients with a specific plan to expedite birth by induction of labour or caesarean section.

For the majority of women the onset of labour is spontaneous. However, in 2015-16 almost 28% of births in the UK resulted from induced labours [1]. The most common reasons for induction of labour at term are prolonged pregnancy, pre-labour rupture of membranes and concerns about the wellbeing of mother or baby.

Active or established labour has been defined by NICE [2] as regular, painful contractions and progressive cervical dilatation from 4cm. The period of time before this is described as the latent phase of labour when, although contractions can be both regular and painful and there is some cervical change, the dilatation of the cervix is less than 4cm.

There is some evidence to suggest that women who remain at home during the latent phase have a lower rate of obstetric intervention [3]. However, women may be in hospital because they chose to remain in a hospital setting, are at increased risk of complications or are having labour induced. The requirements for maternal and fetal monitoring in these cases are not as clear as for established labour and this can lead to problems in the delivery of care.

Enquiry panels were asked to review care against the standards and guidelines available in 2015 (see Appendix A.1), and at this point on the care pathway to specifically consider: i) if labour was induced was the indication for, and place of, induction appropriate and were there any delays in the induction of labour process; and ii) whether there were any issues that arose in the transition from the latent phase to established stage of both spontaneous and induced labour.

3.3 Findings from the enquiry panels

In almost a quarter of the enquiry cases (n=17) the death of the baby resulted from events that occurred before established labour was confirmed. The majority of these babies (n=13) were stillborn, with death confirmed in a small number in utero (n=4). A further nine deaths occurred following unsuccessful resuscitation when delivery was undertaken by caesarean section prior to established labour. Four babies were born in poor condition at caesarean section and died shortly afterwards.

In over half of these cases (n=9) the enquiry panels identified areas of major sub-optimal care that was likely to be relevant to the outcome in the latent phase of labour or once the decision had been made to induce labour. However, by contrast, the panels found examples of good practice in three-quarters of the cases where a caesarean section was performed in relation to the decision to birth interval; for example, in two cases birth was achieved within 15-20 minutes, despite the need to simultaneously open a third emergency theatre and call a consultant obstetrician to attend from the antenatal clinic.

As well as the cases where babies died as a result of events before labour was established, aspects of care where improvements were needed were identified in the latent phase of both spontaneous and induced labour which then progressed into active labour. Recurring themes included issues with recognising the transition from the latent to active phase of labour, delays in the induction process, variations in practice in relation to induction of labour, delays in assessing and monitoring fetal wellbeing, the incorrect classification of CTGs, VBAC, and care at the time of intrauterine death being diagnosed. In many cases there were multiple areas of concern.

3.4 Latent phase and transition to active labour

The latent phase of labour poses specific challenges to women and their caregivers. Women experience the onset and progress of labour in a variety of ways, which makes timely diagnosis difficult [3]. Often the diagnosis of active labour is made in retrospect. Although there is a national definition of established labour this cannot be applied rigidly to all women as there is variation both in women's experience and in practice. Despite this difficulty it is essential to ensure the prompt and accurate diagnosis of the active phase of labour due to the impact it can have on maternal and neonatal health outcomes and on a woman's experience. In five cases there were delays in recognition of the transition of latent to active labour which was likely to have contributed to the outcome.

There is an absence of national guidance for women in the latent phase of labour once they access maternity services, irrespective of their risk status, as to the frequency and duration of assessing maternal and fetal wellbeing when under the care of a health professional during this phase.

In addition, there is a lack of consensus regarding where assessment should take place and where continued care should be provided, in particular for women who remain in hospital during this time.

The panels recognised that the concerns they identified with respect to care in the latent phase are both complex and commonly encountered by maternity services in the UK. It is uncommon for them to result in a poor outcome for mother or baby but they undoubtedly have an impact on the experience of women and their birth companions, their caregivers and maternity service providers.

The solutions are not straightforward; risk assessments and plans of care need to be standardised for particular situations to minimise adverse health outcomes and to be reviewed regularly to ensure they are still relevant and responsive to any changes in the clinical picture.

3.5 Induction of labour

Induction of labour was attempted or undertaken in just over a quarter of all the cases reviewed (n=21). In almost a quarter of these (n=5) there was major substandard care relating to induction itself, with minor or moderate substandard care in a further third (n=7). It was the consensus of the panels that the indication for induction was appropriate in all but one case. In that case an amniotomy was carried out prior to the onset of

established labour within the context of a significantly abnormal CTG which was not recognised as abnormal, and high presenting part (Vignette 6).

Vignette 6: Inappropriate decision for induction when a plan to expedite birth would have been more appropriate

A parous woman attended at 38 weeks gestation with no fetal movements for 24 hours. Medical review was delayed for 90 minutes as the obstetric registrar was in theatre. The CTG was noted to show reduced variability, no accelerations and unprovoked decelerations. Consultant review occurred an hour later – the fetal head was free on examination and the CTG remained abnormal. Although the woman was not in labour or hypotensive, a plan was made to give intravenous fluids and review after a further 30 minutes. 70 minutes later the CTG was essentially unchanged but was documented as normal. ARM was undertaken at 2cm dilatation revealing copious amounts of clear liquor. The CTG continued to have deep decelerations, and 35 minutes after ARM a decision was made to transfer to theatre for caesarean section. No grade urgency for the section was recorded, fetal bradycardia ensued 20 minutes later, and a small for gestational age baby was delivered after a further 20 minutes with no signs of life, almost 5 hours after admission. Resuscitation was unsuccessful.

Pre-labour rupture of membranes and prolonged pregnancy (including one case where induction was booked for 40^{+15} weeks) together accounted for half of the indications for induction. Recommended practice is to offer induction within 24 hours of pre-labour rupture of the membranes at term or after 41 weeks gestation, with additional monitoring if induction is delayed beyond 42 weeks [4].

There was wide variation in the practice of induction, in terms of both the timing and preparation of prostaglandin, and the Bishop score at which amniotomy was deemed appropriate. The NICE guidance in place in 2015 recommended the use of one cycle of vaginal PGE2 tablets or gel, consisting of one dose followed by a second dose after six hours if labour is not established (up to a maximum of two doses), or one dose of vaginal PGE2 controlled-release pessary [4]. This guidance on methods for induction in labour is currently being updated.

Delays were identified in a third of cases, affecting either the decision to induce, the start or continuation of the process, or both. In some sets of notes the reasons for delays were unclear but, in others, it was apparent to the panels that heavy workload was a significant factor. In one case induction of labour was planned for reduced fetal movements but, when the unit had to close, this plan was changed to daily CTGs and a scan four days later. The woman attended in the meantime with a further episode of reduced fetal movements and, although induction was expedited, there was a further delay of several hours before admission to the delivery suite, which was noted to be due to staff and bed shortages. In another case there were delays at all stages of the process (Vignette 7) and no evidence that an independent interpreter was provided to enable the woman to make a fully informed choice about her options.

Vignette 7: Delay in induction

A primigravid woman whose first language was not English reported her second episode of reduced movements at 40^{+0} weeks gestation. She was booked for induction of labour the following day but attended with her husband, who interpreted for her, and declined the induction as she was apparently worried about the risk of needing a caesarean section. Ultrasound scan at 40^{+2} weeks, when fetal movements were still reduced, showed an estimated fetal weight significantly above 90th centile. Again induction was declined, and the woman was advised to return if she had no movements. At 40^{+3} she attended again with reduced fetal movements and agreed to induction, but this was postponed for a further 2 days. ARM was carried out at 40^{+8} which revealed thick meconium. This was 48 hours after her cervix was 1-2cm dilated and following both a Prostin pessary and Propess. It was noted on at least two occasions that the unit was very busy. After 10 hours a category 1 caesarean section was performed, delivering a stillborn baby who did not respond to resuscitation. Consent for the caesarean section was given without the services of an interpreter. The local case review focused on the intrapartum care in the hours immediately prior to delivery and made no mention of the multiple delays prior to and during induction of labour.

Over the last decade the rate of induction of labour in the UK has risen from 20% in 2005-6 [5] to 28% in 2015-16, with a 3% rise since 2013-14 [6]. Obstetric concerns driving this rise include the risks posed by reduced fetal movements and sub-optimal fetal growth, both of which are core components of the Saving Babies Lives Care Bundle [7]. However, the increase creates organisational problems with capacity in relation to commencing induction and arranging transfer to the delivery suite to continue the process of induction of labour. The findings of this enquiry suggest that this change in induction rate may have had some negative consequences.

3.6 Fetal monitoring

Panels highlighted fetal monitoring before the onset of labour as being problematic, due to delays in initiating or continuing fetal monitoring or the incorrect interpretation and management of abnormal CTGs.

While there is national guidance for fetal monitoring by either intermittent auscultation or continuous electronic monitoring (CEFM) in established labour, guidance to inform practice in the latent phase of labour or the early stages of induction is lacking. NICE recommends that the fetal heart is auscultated at first contact with a woman in suspected labour with no risk factors and at each further assessment, but without defining the frequency of those assessments [2]. Women in spontaneous labour with risk factors for fetal compromise, and those who have started induction of labour with PGE2, are advised to have continuous CTG but, if initial monitoring is normal and it is several hours before labour becomes established, the timing of further monitoring is not specified.

In a number of cases the enquiry panels found evidence of significant periods of time elapsing between first assessment and subsequent monitoring, and these included women with risk factors such as reduced fetal movements in the previous 24 hours, vaginal bleeding and meconium stained liquor. In these cases the risk of hypoxia is probably higher but the lack of specific guidance makes criticism subjective. In addition, inadequate fetal monitoring during the transition from latent to established labour was evident in three women aiming for VBAC (Vignette 8). One woman was admitted to the antenatal ward contracting 2 in 10, at 1-2cm cervical dilatation and, despite instructions for more frequent fetal heart rate checks, only had auscultation of the fetal heart once in seven hours. An SBAR (Situation, Background, Assessment and Recommendations) communication form was in the notes but had not been completed. Another woman was seen by a doctor but then left unattended in the waiting room with no monitoring for three hours before transfer to the delivery suite.

Vignette 8: Delay in initiating fetal monitoring

A multiparous woman with a history of precipitate vaginal births and a previous caesarean section was taken by relatives to the local freestanding birth centre. After assessment, prompt transfer by ambulance was arranged to the consultant-led unit. On arrival, the woman was distressed with pain which had changed in nature and intensity on the journey and, as cervical dilatation was only 2-3cm on examination, analgesia was provided immediately. There was a delay in initiating monitoring as the CTG machines were all in use and the key to the locked cupboard containing the Doppler machines could not be found. A fetal bradycardia was detected when monitoring commenced 30 minutes after arrival. At caesarean section the baby was delivered from the abdomen as the uterus had ruptured and the placenta had already separated.

Another area of concern identified in several cases was the incorrect classification of CTGs (an issue also noted in the 2015 MBRRACE-UK enquiry into term antepartum stillbirth [8]). The absence of accelerations in an intrapartum CTG is not considered to be suspicious or pathological but accelerations must be present for a pre-labour CTG to be classified as normal. Similarly, whilst an isolated deceleration in an otherwise normal trace is not usually sinister, repeated or prolonged decelerations are abnormal however they are described. Panels noted several cases where the NICE classification of intrapartum CTGs [1] was used incorrectly to interpret abnormal pre-labour/antenatal CTGs as normal or suspicious, leading to inappropriate actions being taken. Prior to labour, unless there has been vomiting, it is unlikely that fluids will improve a CTG of concern. It is not appropriate to give intravenous fluids when there is a concern about an antenatal CTG (as seen in Vignette 9).

As well as incorrect interpretation of CTGs, there were cases where the CTG abnormality was correctly recognised but there was either a failure to escalate to medical staff or a failure by medical staff to appropriately expedite the birth (Vignette 10).

Vignette 9: Failure to act on abnormal pre-labour cardiotocography

A primigravid woman who was initially categorised as a low risk pregnancy attended at 41 weeks gestation with reduced fetal movements and a watery green vaginal discharge which was diagnosed as candida. Decelerations were noted on the CTG on admission and again on repeat six hours later. The next morning fetal movements had improved and she was discharged home with a date for induction four days later. She returned 24 hours later with contractions and reduced movements, with a cervical dilatation of 1cm on examination. CTG was commenced and showed a fetal bradycardia – the doctors were busy in the operating theatre so the CTG was taken across to the delivery suite to show to staff there. The woman was transferred to the delivery suite, where a category 1 caesarean section was called, with delivery occurring an hour after monitoring was first started. The baby was born in poor condition and died within four hours of delivery. Findings at post-mortem were of meconium aspiration with evidence of chorioamnionitis and funisitis.

It is incumbent on healthcare professionals to ensure their focus of care remains on the woman rather than the CTG trace – the same abnormality that might warrant conservative measures during labour can be an indication for immediate birth when the woman is not in established labour.

Vignette 10: Failure to expedite the birth

A woman with pre-pregnancy diabetes who was planned for ERCS at 38 weeks gestation attended a week earlier with reduced fetal movements and an abnormal CTG. The obstetric registrar correctly assessed and decided that birth was indicated that afternoon but, at consultant review, concern about the risk of transient tachypnoea of the newborn was raised and delivery was postponed to allow for the administration of steroids. Fetal monitoring was discontinued overnight and the fetal heartbeat could not be found the next morning.

The risk of neonatal respiratory morbidity is increased in babies born by caesarean section pre-labour. This risk decreases significantly after 39 weeks gestation and NICE advises that planned caesarean section should not routinely be carried out before 39 weeks [9]. The balance of risk is different when fetal compromise in utero is suspected or labour has started spontaneously. Concern about potential neonatal respiratory morbidity should not lead to delay in expediting the birth of a potentially compromised baby.

3.7 Diagnosis of intrauterine death before established labour

Panels identified a number of cases where the management of suspected intrauterine death required improvement. If there is concern about the presence of the fetal heart rate, NICE and the RCOG both advise the use of real time ultrasonography to diagnose intrauterine death [1,10]. In two cases an absent fetal heartbeat was confirmed on scan in theatre prior to the start of caesarean section, but the caesarean section went ahead anyway without adequate consideration of the future implications for that women. One baby was stillborn; the other had no heartbeat until 15 minutes into the resuscitation and died 2 days later. In another case, the fetal heart rate was thought to be 60 beats per minute on ultrasound scan on admission in the latent phase of labour, but the baby was stillborn following a category 1 caesarean section and there was evidence on post-mortem of pre-labour fetal demise.

In the following vignette (Vignette 11) delay in diagnosis of intrauterine death compounded the distress experienced by the woman and her partner.

Vignette 11: Delay in diagnosis of intrauterine death

A parous woman was admitted to hospital in the latent phase. Two hours later, when her contractions became more painful, the fetal heart could not be auscultated. After 20 minutes of trying unsuccessfully, a portable ultrasound machine was used and there was uncertainty between different members of staff as to whether heart activity was seen. Amniotomy was undertaken to apply a fetal scalp electrode. A consultant attended to scan, could see no fetal heartbeat and documented diagnosis of an intrauterine death, but left the room without talking to the woman in order to seek a third opinion from a sonographer. The sonographer came within 10 minutes but, by now, labour was progressing quickly, the vertex was visible and a stillborn baby was delivered. The neonatal team was called after delivery despite evidence that the baby had died some time earlier. The woman and her partner had no time to prepare themselves for the outcome, which added to their distress.

In all of these cases it appeared that the doctors were anxious and unsure about making the diagnosis of intrauterine death. To facilitate the expectation that ultrasonography will be available on the delivery suite at all times, for the last decade basic obstetric ultrasound training has been a mandatory part of the RCOG curriculum. However, there is a difference between attaining competency in identification of the fetal heartbeat in a calm antenatal setting and having the confidence to apply this in a situation where the woman may be unable to lie still due to pain and distress, often using a unit's poorest quality scan machine which has been handed down to the delivery suite.

3.8 Conclusions

Whilst the deaths reviewed occurred intrapartum or soon afterwards it is apparent that events prior to established labour can influence the outcome, and cases reviewed by panels have demonstrated that problems with care provided before women get to the delivery suite can be factors in the death of some babies. Comprehensive pre-labour assessment of risk, and re-assessment when admitted in labour, is vital.

The enquiry identified delays at all stages of the pathway for women prior to arrival on the delivery suite. There were delays in admission for induction of labour, in commencement of induction of labour and in transfer to the delivery suite to continue the process of induction of labour. The rising induction rate will only increase the likelihood of these problems occurring in the future.

Decisions around induction of labour need to be discussed with women, highlighting the risks and benefits. Antenatal monitoring has to be considered differently to monitoring in labour and whilst acute change is less common than during labour there should not be delays in responding to an abnormal antenatal CTG or in arranging action such as caesarean section. Guidance on the frequency and nature of monitoring (intermittent or continuous monitoring) needs to be standardised for women who are in hospital either for observation in the latent phase or during the process of induction of labour, and national guidance is required. The trigger for further monitoring should be clear in each case. The likely timeframes for achieving birth and the potential for delays in the process should also be considered.

Women undergoing induction should have regular review by obstetric staff, perhaps as part of delivery suite rounds, with a clear plan for progress at each review. Senior medical and midwifery staff on duty need an overarching view of activity across the whole unit as well as an understanding for each woman of the individual factors that will affect care.

Staffing levels in units will need to reflect changes in the patterns of care. A rising intervention rate will require greater levels of staffing and resources, which should be addressed in the annual review of activity [11]. Facilities need to be appropriate for these patterns of care and the physical relationship between the space for induction of labour and that for established labour will need to be considered. Ultrasound is increasingly used to manage other obstetric situations on the delivery suite as well as for the diagnosis of fetal death. Units should consider the quality of equipment in acute areas as well as staff training in intrapartum ultrasound.

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4. Maternal and fetal monitoring during established labour

Sara Kenyon, Tracey Johnston, Clare Keegan, Dawn Kernaghan, Charlotte Gibson and Derek Tuffnell

4.1 Key findings

- **For those women who had a partogram, only a third were fully completed.**
- **The method of fetal monitoring was assessed as being correct for the level of risk in 80% of cases.**
- **There were errors in the method, interpretation, escalation and response to fetal monitoring:**
  - **for the two-fifths of babies where intermittent auscultation was undertaken, the frequency was not compliant with national guidance in a third of cases in the first stage of labour and a quarter in the second stage;**
  - **in the cases where abnormalities were detected by intermittent auscultation, continuous electronic fetal monitoring was not commenced in a quarter of cases;**
  - **where electronic fetal monitoring was undertaken, hourly review was not documented in half of cases;**
  - **there were delays in referral to medical staff by midwives in nearly half of cases where that was required.**
- **There was evidence of lack of situational awareness in many of the cases.**

4.2 Introduction

The last national confidential enquiry into intrapartum-related deaths was carried out by CEDSI in 1993 [1] and problems with fetal monitoring were highlighted as the largest contributory factor in the management of these women and their babies. Many reports in the intervening period have highlighted problems with the interpretation of continuous electronic fetal monitoring (CEFM) and the failure to recognise and act upon abnormalities [2]. Whilst themes from the 1993 report are depressingly similar to this report it is important to note that the overall numbers and rates of death have fallen.

Care during labour and the national guidance that supports this [3] is aimed towards achieving the best possible physical, emotional and psychological outcome for the mother and baby. The guidance is intended for low risk women in spontaneous labour but includes standard care for all labouring women (frequency of assessments on mother and baby) and care when labour is not progressing normally.

Labour is a continuous process and the monitoring of both maternal and fetal wellbeing, with associated ongoing risk assessment, is an essential part of management and care planning. The frequency and duration of when maternal and fetal observations are undertaken during labour, irrespective of birth setting, is determined by national guidance [3]. These observations are undertaken to detect changes in maternal or fetal health and the progress of labour and should be recorded on the partogram. Partograms provide an important overview of the labour, enabling the early identification of any concerns and consideration of interventions to avoid adverse outcome.

Whether the fetal heart rate is monitored by either intermittent auscultation or CEFM is determined by the risk status of the woman, and national guidance is provided [3]. The frequency, strength and duration of the contractions, together with cervical dilation and descent and rotation of the presenting part, are also monitored.

Risk assessment at the initial attendance and/or the onset of established labour is essential to determine the appropriate method of fetal monitoring. The risk must be continually reassessed during labour where intermittent ausculation is being used in case new factors arise which would necessitate CEFM.

In addition to monitoring the maternal and fetal condition, an essential skill in the management of labour and birth is being able to assess the whole situation to ensure context is taken into account when interpreting monitoring – 'situational awareness'. This often comes with experience and reinforces the need for multidisciplinary working and good communication, with senior involvement – whether midwifery or medical.

4.3 Findings from the confidential enquiry

Of the 78 cases in the confidential enquiry, four started labour and gave birth at home (two of the babies were born before the arrival of healthcare professionals). Three cases started care in a freestanding midwife-led unit, with one woman giving birth there and the other two transferring to an obstetric unit. Seventeen women started care in an alongside midwife-led unit, with four giving birth there and thirteen transferring to an obstetric unit. The remaining 54 cases started and completed their care in an obstetric unit.

4.4 Maternal Monitoring

In just under half of the 78 cases considered (n=33) it was deemed by the panels that there was insufficient time to commence a partogram before birth. No partogram was available in the documentation provided for 11 of the remaining 45 cases (25%), leaving 34 cases where a partogram had been commenced. Of those, only 13 (38%) were completed fully, with the remaining 62% being incomplete. So, of the 45 for whom a partogram should have been completed only 13 (29%) had a fully completed one.

The omission of maternal observations on the partogram did not appear to have a significant direct impact on the outcome as far as the panels could assess, but much more common was the failure to appreciate the significance of the charted observations and to act. The main issues were a lack of recognition of deteriorating maternal wellbeing and the potential correlation with deteriorating fetal wellbeing, failure to act upon suspected or diagnosed delay in labour, and failure to recognise the significance of cessation of contractions in cases of uterine rupture.

Vignette 12: Lack of recognition of uterus rupturing during labour

A multiparous woman with a history of caesarean section had continuous abdominal pain throughout her pregnancy and eventually decided to attempt a VBAC. She was admitted in labour at 5cm dilatation and progressed well over the next two hours to 9cm when she had some vaginal bleeding and her contractions suddenly stopped. None of the team involved recognised the possible significance of this or that the uterus could have ruptured. The locum registrar reviewed the woman and, on the telephone advice of the resident consultant, commenced syntocinon infusion to increase the contractions. This continued for the next two hours with the contractions becoming more frequent and the fetal heart rate increasingly difficult to monitor. Following a rapid review by the consultant the woman was taken to theatre for caesarean section. The baby was stillborn and the mother was found to have a ruptured uterus and bladder. Her blood loss was between three and four litres and she was transferred for care on ITU. A full review was undertaken which identified the issues but included very limited actions (reflection / training / update guidance), with no timeline or person responsible.

The inappropriate use of syntocinon has been highlighted as a cause of poor outcome in labour in previous confidential enquiries [1]. In this confidential enquiry there were three cases where oxytocin was documented as being used: twice in the first stage of labour and once in the second stage. It was not felt to be problematic other than in the case above.

4.5 Fetal Monitoring

Of the 78 cases considered by the panels, in 19 intermittent auscultation alone was undertaken, in 11 intermittent auscultation was changed to CEFM and in 41 the baby was monitored using CEFM alone. In seven cases there was no evidence of fetal monitoring, either because there was no time before birth or because health care professionals were not present.

Assessment of risk at presentation / admission is a determinant of the method of fetal monitoring which should be undertaken, according to NICE guidance [3]. The method of monitoring was not correct in a fifth of cases. This can clearly have an impact on outcome.

Vignette 13: Failure to risk assess appropriately

A woman in her early thirties in her first pregnancy was admitted to a midwifery-led unit, following telephone discussion, with reports of increased vaginal bleeding. She was reviewed by the obstetric team and remained in hospital for two days with a 'small APH'. She was discharged home without a clear management plan for labour.

On admission to the midwifery-led unit in the latent phase of labour there was no recognition of the significance of the previous APH. The woman laboured in a birthing pool. There was poor documentation of management planning and gaps in care were evident from both maternal and fetal perspectives. She was cared for on a midwifery-led unit for 11 hours where there was considered to be a lack of progress in labour, following which there was a delay in transfer with no recording of the fetal heart during this period. On arrival on the consultant unit, CEFM monitoring commenced and abnormalities were recognised and escalated appropriately. The baby, born by emergency caesarean section after an interval of 15 minutes, made no respiratory effort and was white and floppy. Resuscitation was good but unfortunately 2 days later it was agreed that care should be re-orientated and the baby died.

Across the thirty cases where intermittent auscultation was undertaken, the frequency documented was not compliant with national guidance in a third of cases in the first stage of labour (n=10) and a quarter in the second stage (n=8).

In the cases where abnormalities were detected by intermittent auscultation, CEFM was not commenced in a quarter of cases (n=7).

The panels found the notes to lack documentation of hourly review of the CEFM in half the cases and there were delays in referral to medical staff by midwives in nearly half of cases where that was required (n=34). In about a quarter of cases (n=20) there were delays in the attendance of medical staff, in decision-making or in expediting birth.

4.6 Situational awareness

Situational awareness is the ability to stand back and see what's happening and respond appropriately. It is defined as 'the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and a projection of their status in the near future' [4]. It is also a field of study concerned with an understanding of the environment critical to decision-makers in complex, dynamic areas from aviation to military command and control, and in emergency services such as fire-fighting and policing. It is increasingly being acknowledged as important within maternity care [5].

Situational awareness is a skill which clinical staff require and which enables them to respond appropriately to any given situation. However, there were a number of occasions in the cases in the confidential enquiry when this was lacking. Sometimes an error occurred regarding an individual case where the issue was considered in isolation and did not take into consideration the overall case. For example, a CEFM may have been reviewed in isolation by either midwifery or medical staff who did not take into account other factors such as the risk status

of the woman, previous CEFMs and progress in labour. Problems from a lack of situational awareness were also seen in the cases where there was inadequate input from senior staff. This was seen particularly when they were involved in another case and failed to recognise / respond to other developments on the delivery suite. It is difficult to identify from individual cases how commonly the effect of workload and capacity on the delivery suite influenced delays in referring or making decisions about individual cases, but it was clear from the cases reviewed that this was an important issue.

Vignette 14: Lack of situational awareness

A 28 year old woman at 38 weeks gestation in her second pregnancy presented to maternity triage with a history of no fetal movement for 24 hours. She had presented the previous week with a history of reduced fetal movements.

A CEFM was commenced and continued for 90 minutes with reduced variability. At this point, it was reviewed by the obstetric registrar and the decision was made for induction of labour if normal; however, no alternative plan was made if it remained abnormal. The CEFM continued for a further two hours and remained abnormal with reduced variability. A change of medical staff occurred during this period with a further review of the CEFM and a reiteration of the plan for induction of labour once the CEFM was normal. Three and a half hours of continuous CEFM later an ARM was carried out. The CEFM continued to deteriorate, culminating in a terminal bradycardia. At this point a category 1 caesarean section was carried out, 4 hours and 49 minutes after the CEFM was first considered abnormal. A stillborn female infant was delivered and, despite best efforts, the baby could not be resuscitated.

4.7 Discussion and recommendations

CEFM is an assessment of the fetal heart rate: it is a screening test and not a diagnostic test. There is only limited evidence [6], that CEFM alone improves outcomes for the baby and it may increase maternal interventions. For this reason CEFM is used with fetal blood sampling to reduce the false positive rate, and thus the unnecessary intervention rate, but fetal blood sampling has its own limitations [7,8]. Assessment of the CEFM is only part of the assessment undertaken, which should also take into account the maternal condition and progress in labour. Intervention rates may be as high as 20% but damage from fetal hypoxia is very rare. Some clinical situations, especially sepsis, are associated with an increased risk of fetal hypoxic damage and cerebral palsy [9,10]. There have been a number of iterations of national guidelines for fetal monitoring, in 2001, 2007, 2014 and 2016, together with recent FIGO guidelines [11], and a suggestion that there should be a ‘physiological’ interpretation of the CEFM [12] which includes not recommending that fetal blood sampling is undertaken. These multiple interpretations of what is essentially the same evidence demonstrate the great difficulty in achieving a uniformity of approach to CEFM monitoring and deciding when intervention is required. However, a recent consensus statement by the Royal College of Midwives and the RCOG has recommended that NICE guidance is followed with regard to this [13].

Since the CESDI report in 1993, many have sought improvements in fetal monitoring techniques. These include monitoring the fetal electrocardiogram as opposed to the heart rate. STAN (ST waveform analysis) requires an internal electrode to be attached to the fetal scalp (so can only be employed following rupture of the membranes). A Cochrane review from 2015 [6] is unsupportive of its use due to lack of evidence of benefit and it is not recommended by NICE. Non-invasive fetal electrocardiogram monitoring remains in the research arena [14] but the issues with STAN remain. More recently the focus had turned to using computer assisted CEFM analysis, but the INFANT trial [15] failed to show any evidence of benefit. This demonstrates that it is not simply a failure of clinicians to recognise abnormal fetal heart rate patterns that is associated with adverse outcome.

The predominant purpose of CEFM is to identify signs of significant fetal hypoxia that may lead to fetal acidosis and subsequent hypotension and brain injury. However, there are two main patterns of hypoxic fetal brain injury following labour. CEFM can reasonably predict chronic partial hypoxia leading to watershed injury in the fetal brain. However, some babies are injured before presentation in labour with an abnormal CEFM from the outset [16]. Also, many babies injured in labour suffer an acute profound hypoxic injury, associated with a fetal

bradycardia of more than 10 minutes duration, and this is much more difficult to predict with a CEFM. Labour will always be associated with a small risk of a sudden acute event which is not predictable and, because of the short time period before injury and/or death occurs, is not amenable to timely intervention.

Recommendations commonly indicate a need for further training. However recent evidence has highlighted that there is no agreed, validated, reliable or national approved training programme for intrapartum CEFM interpretation [17]. Revisiting the issue of training in fetal monitoring (both intermittent auscultation and CEFM) would be appropriate as the same issues are present today as they were 25 years ago, despite the introduction of more formalised and mandatory training [1]. Training has commonly been provided on the basis of the provision of information but probably needs to involve a more structured assessment of the competency of individuals in the interpretation of the CEFM. However, it may be appropriate to recognise that, even perfectly applied, a CEFM is just a heart rate and so has limitations in terms of the avoidance of adverse outcomes. Further research into alternative methods of fetal monitoring in labour is needed to reduce adverse outcomes.

A recurrent theme is also the failure to take the whole picture into account. The importance of situational awareness and the influence of human factors needs to be understood in the management of individual cases but also of the whole delivery suite. Training clinicians about the factors that can influence decision-making and delays in decision-making may reduce errors leading to poor outcomes.

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5. Intrapartum care and communication

Penny McParland, Katy Evans, Maggie Redshaw, Elizabeth S Draper

This chapter focusses on the care provided to women during the intrapartum period (excluding the issue of fetal monitoring during labour which was presented in the previous chapter), identifying contributory factors associated with term intrapartum stillbirths and intrapartum-related neonatal deaths. The panel review's aim was to identify areas of care provision where improvements may have made a difference to the outcome as well as to share examples of exemplary care provision that were documented.

5.1 Key findings

- **Service capacity issues during intrapartum care affected over a fifth of the deaths reviewed, with more than half of these situations being considered to have contributed to the poor outcome.**
- **More than three-quarters of the deaths had quality of care issues identified during labour that potentially affected the outcome.**
- **In around one in ten women requiring caesarean section the category of urgency was either incorrectly applied or not applied when birth required expediting.**
- **There was a significant delay in both the decision to expedite the birth and in actually achieving birth in approximately a third of the deaths reviewed.**
- **In over three-quarters of deaths there was effective communication between the multidisciplinary team during labour and medical staff attended promptly when required to do so.**
- **There was a failure to identify signs of uterine rupture in four out of the five women who experienced uterine rupture.**
- **Failure to recognise an evolving problem, or the transition from normal to abnormal, was a common theme. It was rarely due to a single issue, more commonly appearing to arise from a more complex failure of situational awareness and ability to maintain an objective overview of a changing situation.**

5.2 Background

Women within the UK have a wide range of choices regarding place of birth. The actual place of birth depends not only on maternal choice but also on the recommendations of health professionals, depending upon the woman's medical, obstetric and social history. Recent data about place of birth indicate that the majority of women in the UK give birth in a consultant-led obstetric unit (83.7%). The remainder give birth in midwifery-led units (14%) or at home (2.3%) [1,2].

The intrapartum care of the women reviewed in the enquiry took place in all of these settings. Whilst the care provided can be measured against the standards and guidelines in place at the time (see Appendix A.1), the review panels also endeavoured to understand and assess where possible the many other factors that influence care during labour, and these are discussed in detail in this chapter. Sometimes the influence of these factors could only be inferred from the emerging picture of the care provision. At other times they were directly referred to within the maternity notes, particularly if the staff felt that the activity within the unit was adversely affecting the care they were able to provide to individual women. Most of the clinical notes provided were accompanied by the hospital's own internal report into the death, which further elucidated and expanded on these factors.

5.3 Summary of cases and findings

In total, there were 40 term intrapartum stillbirths and 38 term intrapartum-related neonatal deaths. Over three-quarters of both the stillbirths (n=31) and the neonatal deaths (n=30) had major or significant quality of care issues identified at the panel reviews in relation to care provision during labour (see Table 3). In addition, two-fifths of stillbirths (n=17) and a fifth (n=8) of neonatal deaths had quality of care issues identified in the care provision at birth. Themes identified at the review panels related to the categorisation of urgency of caesarean sections, capacity issues, delays in expediting birth, delays in transfer of the mother to an appropriate area, failures to escalate or act appropriately, the failure of medical staff to attend to reviewing a mother's progress and the absence of the neonatal team at birth, failure to recognise a problem, as well as issues around effective communication between members of the multidisciplinary team and with the mother and her family, supervision and leadership. Many of these complex cases had interrelated issues which overlap across the identified themes.

Table 6 provides additional information about the 78 reviewed cases of particular relevance to intrapartum care and delivery available from the MBRRACE-UK online perinatal surveillance data and the additional data collected for the enquiry from the checklist. Caesarean section was performed in over half of all cases with a further third of cases being delivered as a spontaneous vaginal birth (two of which were breech presentations). Almost a fifth of reviewed cases (n=15) were transferred during labour. Delays in expediting and achieving birth were each seen in around a third of cases.

Table 6: Intrapartum care factors for the reviewed term intrapartum stillbirths and intrapartum-related neonatal deaths

	Stillbirths (total=40)		Neonatal deaths (total=38)		All enquiry cases (n=78)	
Intrapartum care factors	**n**	**%**	**n**	**%**	**n**	**%**
Mode of delivery						
spontaneous vaginal birth	13	*32.5*	15	*39.5*	28 (35.9)	
caesarean section	21	*52.5*	21	*55.3*	42 (53.8)	
instrumental	6	*15.0*	2	*5.3*	8 (10.3)	
Place of birth						
home	1	*2.5*	3	*7.9*	4	*5.1*
FMU	1	*2.5*	0	-	1	*1.3*
AMU	3	*7.5*	1	*2.6*	4	*5.1*
obstetric unit	35	*87.5*	34	*89.5*	69	*88.5*
Transferred to obstetric unit during labour	7	*17.5*	8	*21.1*	15	*19.2*
Delays in deciding to expedite birth	17	*42.5*	12	*31.6*	29	*37.2*
Delays in achieving birth	15	*37.5*	10	*26.3*	25	*32.1*
Complications						
shoulder dystocia	4	*10.0*	2	*5.3*	6	*7.7*
cord prolapse	1	*2.5*	0	-	1	*1.3*
uterine rupture	2	*5.0*	3	*7.9*	5	*6.4*
antepartum haemorrhage	5	*12.5*	5	*13.2*	10	*12.8*
pyrexia	1	*2.5*	2	*5.3*	3	*3.8*
group B streptococcus	3	7.5	2	*5.3*	5	*6.5*
meconium	15	*37.5*	17	*44.7*	29	*37.2*
2nd stage of labour or birth in water	0	-	2	*5.3*	2	*2.6*
Documented capacity issues related to the death	12	*30.0*	6	*15.8*	18	*23.1*

5.4 Place of birth

For the vast majority of cases reviewed (n=69) the birth of the baby took place in an obstetric unit (Table 7); however, 15 of these women started care in labour in a freestanding (FMU) or an alongside (AMU) midwifery-led birth unit. Four women delivered at home, of which only one was a planned home birth with a midwife in attendance.

The NICE intrapartum guideline provides advice on suitability of planned place of birth [3]. The advice for low-risk nulliparous and multiparous women is that birth at home or in a midwifery-led unit is appropriate because the rate of interventions is lower. For multiparous women research suggests that the outcome for the baby is no different compared with an obstetric unit, although for nulliparous women it is associated with a higher chance of an adverse outcome for the baby (0.9% compared to 0.5% in an obstetric unit) [4]. The guidance highlights medical conditions or situations in which there is increased risk of adverse outcome for the woman or baby during or shortly after labour, where care in an obstetric unit would be expected to reduce this risk. In six women who started care in labour in an AMU or FMU there were missed opportunities to identify risk factors that had developed during pregnancy or that were present on initial assessment (see Vignette 15). These included failure to recognise a growth restricted baby (n=3), failure to recognise an abruption (n=2), failure to act following identification of sepsis (n=1), failure to provide prophylactic antibiotics (n=1), and recurrent problems with antenatal CTG monitoring (n=1). Such failures to assess risk and plan care resulted in women being inappropriately cared for in a 'low risk' setting. Had these risks been identified these women would have been admitted to an obstetric unit and not required transfer during the intrapartum period, potentially influencing the outcome. However, in four of these cases problems of unit staff capacity were indicated in the notes which may have prevented these women being admitted to a more appropriate setting.

Vignette 15: Missed diagnosis resulting in inappropriate assessment of risk

A nulliparous woman in her early thirties was appropriately booked for midwife-led care. She planned to give birth on the AMU. At 35^{+3} weeks gestation her SFH on the customised growth chart showed slow growth but an ultrasound was not requested. At 36^{+1} she was seen in the Day Care Assessment Unit (DCAU) with reduced fetal movements and, after a normal CTG and observations, sent home. Three days later she was seen again in DCAU with painful contractions and after a midwife and obstetric review, which included a speculum and high vaginal swab, was sent home in the latent phase of labour. At 37 weeks, in the morning, the laboratory contacted DCAU and informed a staff member the high vaginal swab was positive for Group B Streptococcus. At midnight the following day (over 36 hours later) the woman contacted the AMU contracting. The AMU was busy and she was thought to be suitable for the FMU. On admission to the FMU a risk assessment was undertaken and indicated she was suitable to birth there. At 5cm dilated she got into the birthing pool and progressed to full dilatation. During the second stage of labour a deceleration was heard. After getting out of the pool a CTG was commenced. The CTG was pathological, with a prolonged deceleration of over 3 minutes, but classified as normal. An ambulance was called and arrived 30 minutes later. The crew were asked to wait. A baby boy was born 54 minutes after the ambulance arrived showing no signs of life. He weighed 2.6kg. Neonatal resuscitation continued during his transfer to hospital but stopped soon after his arrival. His post-mortem diagnosed the cause of death as disseminated fetal infection, caused by Group B Streptococcus.

5.5 Capacity and equipment issues

In over a fifth of the cases reviewed (n=17) the panels identified delivery suite capacity issues, of which ten were considered by the panels to have played a contributory role to the outcome. There were seven additional cases where the notes identified issues that could be related to capacity problems, including a lack of one-to-one midwifery care, delays in administering syntocinon following ARM and problems with contacting 'on-call' consultants. In ten of the cases identified with capacity issues the mother was delayed in transferring from either an antenatal setting or a midwifery-led unit to the delivery suite, due to either the lack of a room or increased activity levels and a shortage of staff. Vignettes 16 and 17 illustrate these issues. In a further four cases induction

of labour was delayed for up to two days due to unit capacity issues and in one case a woman experienced a five-hour delay in performing an artificial rupture of the membranes because of increased activity of the unit. These delays suggest that during periods of high activity the ability of the wider maternity service to cope with the demand for one-to-one care and/or timely review by obstetric or medical staff is sometimes compromised.

Vignette 16: High risk woman not transferred to delivery suite as no room was available

A high risk multiparous woman was admitted with contractions following spontaneous rupture of her membranes at 39 weeks pregnant. The cervix was three centimetres dilated and she was contracting once every three minutes. There was no room on the delivery suite so she was admitted to the antenatal ward where she was intermittently monitored and given analgesia. Repeated requests were made to transfer her but a room was not available on the delivery suite for six hours. A baby boy was born two hours later in poor condition and died three days later.

Vignette 17: Baby born in operating theatre recovery room as no delivery suite rooms were available

A low risk nulliparous woman was admitted in labour and was cared for in the AMU, where she used the birthing pool. Her membranes ruptured and the midwives were not able to hear the baby's heart. They helped her out of the pool and called the doctor. The doctor had to come onto the AMU as there were no rooms on the delivery suite. She transferred the woman in a wheelchair to the operating theatre recovery room where she carried out a Kiwi forceps delivery of a stillborn baby girl. There is no pain relief, delivery pack or resuscitaire in the recovery room. The review identified that the unit was extremely busy and closed to admissions and recommended that the recovery room should have facilities for birth in the future.

Similar findings have been reported in the recent National Maternity and Perinatal Audit Report [5]. Vignette 7 (in Chapter 3) illustrates the impact of capacity issues in a woman where induction was delayed for two days due to the unit being extremely busy, followed by a further delay in her transfer to the delivery suite of 10 hours. The vignette below presents a case where there were repeated delays in induction.

Vignette 18: Repeated delays in induction of a high risk woman once the decision to induce had been made

A high risk woman having her second baby was under consultant care. She was admitted twice with reduced fetal movements at 37^{+4} and 37^{+5} and the decision made to induce labour. However, this could not be undertaken as the unit was too busy and she was monitored daily in the day assessment unit. She was admitted at 38^{+2} with reduced fetal movements and ruptured membranes but could not be induced as the unit was too busy. Induction was eventually started 34 hours after the decision had been made. There were delays in review of a suspicious CTG as the obstetric team were too busy to attend. The CTG deteriorated further and transfer to the delivery suite took place while the obstetric team were busy with another woman. During this time the CTG deteriorated further and the fetal heart was lost. Spontaneous vaginal birth of a stillborn baby girl took place six hours later.

In a tenth of cases (n=8) an absence or failure of equipment was highlighted, including broken ultrasound machines, a broken bed, faulty CTG equipment and the lack of a working fetal scalp electrode. In one case the mother was cared for in a recovery room without adequate equipment due to capacity issues while, in a further case, despite inadequate staffing levels, a third operating theatre was opened in an efficient and timely manner (Vignette 19).

Vignette 19: Staff working together to open a third theatre when extremely busy

A high risk woman having her first baby was admitted at 39^{+6} with contractions and reduced fetal movements. 15 minutes after admission the midwives could not locate the fetal heart rate and pulled the emergency buzzer. A placental abruption was diagnosed by the obstetric team and a decision taken that a category 1 caesarean section was required. Despite the fact that the two theatres were already in use and the unit was extremely busy the staff worked effectively together to open a third theatre and the woman was delivered 20 minutes later. The baby girl was resuscitated but did not survive.

5.6 Delay in expediting birth

Delay in expediting the birth was noted by the review panels in over a third of cases (17 stillbirths and 12 neonatal deaths). A similar proportion of cases were identified as being associated with a delay in achieving the birth (15 stillbirths and 10 neonatal deaths) (Table 6). The panels considered that there was delay in making the decision to expedite the birth. These issues represent multiple interrelated problems (many linked to monitoring issues and a lack of identification of pathological CTGs) that result from a range of underlying processes including failure to recognise the problem, staffing / capacity issues within the unit and failure to escalate the problem. Decisions to expedite birth require positive multi-professional team working and effective communication between team members. The following vignette presents an example of a lack of situational awareness [5] where a senior overview of the situation may have led to a different outcome.

Vignette 20: Failure to expedite delivery

A woman in her early thirties and on her fourth pregnancy, with three previous caesarean sections, presented to the maternity triage at 37 weeks gestation with a two-week history of reduced fetal movements. Her CTG was assessed as suspicious and she was transferred to the delivery suite. She was reviewed by a doctor 1 hour 15 minutes after transfer. She was experiencing three to four contractions every 10 minutes and using Entonox, but her cervix remained closed. A plan was made for her to remain nil by mouth, have an anaesthetic review, and to review the CTG 30 minutes later. The woman was reviewed on a further four occasions over the subsequent two hours. Although the CTG appeared 'pathological' (using the terminology in place at the time) on each occasion, the decision was repeatedly made to continue the CTG and review in 30 minutes. A decision was made for a category 2 caesarean section 3 hours 25 minutes after transfer to the delivery suite. In the operating theatre, the CTG was noted to be recording maternal pulse during the insertion of an epidural, and fetal monitoring was therefore discontinued. The baby was born 52 minutes after the decision to deliver. The 2.36kg female baby had Grade III HIE and died seven days later.

5.7 Failure to recognise a problem

Explanations where there has been catastrophic failure of some kind in healthcare and other areas commonly involve human factors, particularly where there has been failure to recognise a problem and to refer to more experienced and more knowledgeable individuals. Intrapartum care is often complex, requiring multidisciplinary team working, and recognition of the maternal and fetal conditions. The midwifery and medical staff will have varying levels of experience and training but should be working in a supported, equitable environment. The clinical picture of each labour will change and evolve over time, and is not fixed by the risk factors present at the time of admission. Many of the situations that the team encounter will be challenging and, at times, they may fail to recognise the evolving problem. In the cases reviewed there were a large number of potential underlying reasons why staff failed to recognise a developing problem and, for some, the panels were unable to clarify the situation due to limited information in the notes. There are many human factors that contribute to failures of critical problem recognition including training issues, fatigue, capacity issues within the unit, communication and team-working breakdown. Many of the panel findings reflect these human and systemic failures. The kind of scenario described by the human factors model (or 'Swiss Cheese Model') [6] – where a

series of seemingly minor events all happen consecutively and/or concurrently, resulting in all the 'holes' of the 'cheese' lining up, creating a major event – were evident within this enquiry.

The review panels noted twelve cases where there appeared to be a failure to recognise the problem that had developed. Often such failure appeared to relate to an inability to grasp the complete picture of what was occurring, i.e. a lack of situational awareness [7] of the overall obstetric history and progress in labour. In one such example (Vignette 21), a woman had a prolonged labour with failure to recognise uterine hyperstimulation and signs of abruption, with staff instead focusing on the potential for sepsis and treatment with antibiotics and fluids. Problems with the administration of oxytocin were identified in three cases from the enquiry; in two, overstimulation was identified while, in one further case, there was a prolonged delay between assisted rupture of the membranes and administration of oxytocin.

Vignette 21: Failure to diagnose uterine rupture

A multiparous woman with a history of caesarean section had continuous abdominal pain throughout her pregnancy and eventually decided to attempt a VBAC. She was admitted in labour at 5cm dilation and progressed well over the next two hours to 9cm when she had some vaginal bleeding and her contractions suddenly stopped. None of the team involved recognised the possible significance of this or that the uterus could have ruptured. The locum registrar reviewed the woman and, on the telephone advice of the resident consultant, commenced syntocinon infusion to increase the contractions. This continued for the next two hours with the contractions becoming more frequent and the fetal heart rate increasingly difficult to monitor. Following a rapid review by the consultant the woman was taken to the operating theatre for caesarean section. The baby was stillborn and the mother was found to have a ruptured uterus and bladder. Her blood loss was between three and four litres and she was transferred for care on ITU.

Most worryingly, in a small number of cases there was a failure to recognise the fetal death. High maternal BMI was not a major factor identified in the enquiry overall; however, in a small number of cases this was a contributory factor in the initial failure to monitor the fetal heartbeat, and prolonged attempts to change the monitor and use a fetal scalp electrode were then embarked upon. In other women, other possible reasons were considered before calling for medical help to identify the fetal heartbeat. In all of these cases the key feature appeared to be the lack of recognition that the heartbeat had, up to that point, been adequately monitored, but then had been lost.

Vignette 22: Fetal heart rate monitoring

A woman in her late twenties with a BMI >45 and a history of a previous uncomplicated term birth had an uneventful antenatal course. She presented at 38 weeks gestation with a history of ruptured membranes and reduced fetal movements. Her induction of labour was delayed for 14 hours due to capacity issues on the delivery suite. The fetal heart rate was being monitored satisfactorily by continuous CTG and she was noted to have a suspicious CTG in early labour. The midwife was then unable to locate the fetal heartbeat. Multiple attempts were made over the next 45 minutes, by both the midwife and medical staff, to monitor the fetal heart rate using both CTG and fetal scalp electrode. A decision was then made to try and locate the heartbeat using ultrasound. The fetal death was finally confirmed 70 minutes after the loss of the heartbeat on CTG. A vaginal delivery of a 2.8kg baby occurred approximately eight hours after the diagnosis of fetal death.

5.8 Uterine rupture

Out of the 78 cases reviewed in the enquiry, five involved rupture of the uterus. The caesarean section rate in the UK is currently in excess of 26% and is increasing [8]. Around half of women embark on VBAC in the pregnancy after their first caesarean section [9]. Thus, labour in women attempting VBAC is increasingly

common and is accompanied by a 0.5-1% risk of uterine rupture, dependent upon whether labour was spontaneous or induced.

Four of the uterine ruptures were in women with a previous caesarean section, one was in an unscarred uterus. All five cases had a spontaneous onset of labour. In four out of five cases, the review panel noted that there was failure to recognise the signs of uterine rupture. (Table 7).

Table 7: Description and panel comments for cases of uterine rupture

Case	Previous caesarean section	Augmentation of labour	Mode of delivery	Panel comments
1	Yes	No	LSCS	No clear plan made antenatally. Lack of clear planning in labour. Delay in calling for help with deteriorating CTG. Did not perform forceps at full dilatation when uterine rupture suspected.
2	Yes	No	LSCS	Language difficulties. Inadequate monitoring of contractions. Failure to recognise CTG changes and other signs of uterine rupture.
3	No	Yes	LSCS	Lack of senior involvement. Failure to recognise risks of prolonged attempt of augmentation of established labour in a parous woman.
4	Yes	Yes	Forceps	Oxytocin administered in second stage without thorough assessment. Failure to recognise signs of uterine rupture. Poor team communication regarding signs of rupture.
5	Yes	No	LSCS	Poor documentation antenatally regarding decision for VBAC. Delay in commencement of monitoring when admitted with severe pain. CTG equipment not available.

In the four cases delivered by caesarean section, the baby was delivered quickly once the decision for delivery was made. The woman delivered vaginally had her uterine rupture diagnosed at laparotomy; she also had a ruptured bladder and third degree perineal tear.

Although up to half of women with a ruptured uterus will not have any clinical signs, that was not the case on reviewing the notes of these women. The significance of the contractions stopping was not appreciated. Vigilance, along with maintaining an appropriate level of situational awareness at all stages of the labour, is required to identify the signs promptly and reduce the risk of both perinatal and maternal morbidity.

5.9 Categorisation of caesarean section

Categorisation of caesarean section was first proposed in 2000 [10] and subsequently modified [11,12]. The system is included in the NICE Clinical Guideline 132 on caesarean section [13]. Categorisation was adopted in order to refine the previously used categories of ‘emergency’ or ‘elective’ caesarean section, which cover a wide range of indications and levels of need to deliver. Effective communication using a universal categorisation permits the team to understand the urgency of the delivery and act accordingly. The system is outlined in Table 8:

Table 8: Categories of urgency of caesarean section

Category	Definition
1	Immediate threat to the life of the woman or fetus
2	Maternal or fetal compromise which was not immediately life threatening
3	No maternal or fetal compromise but needs early delivery
4	Delivery timed to suit woman or staff

Amongst the 78 cases reviewed in the enquiry, just over half of the babies were delivered by caesarean section (n=42). The review panels identified several cases in which the category of urgency was incorrectly applied. In four cases the caesarean section was incorrectly categorised, although this did not always mean that delivery was delayed. One further case was not categorised at all.

It is worth noting that in four-fifths of cases the categorisation of caesarean section was correct and permitted effective communication and timely delivery of the baby. This was particularly noted for three of the category 1 caesarean sections, highlighting the effectiveness of this tool in communicating the urgency of the situation to the team. However, in a number of cases, although the baby was delivered rapidly following the decision for a category 1 caesarean section, this level of urgency was only required because there had been problems or delays in the earlier management of the labour, as illustrated by Vignette 23. These delays then led to the critical situations that required delivery by category 1 caesarean section.

Vignette 23: Delayed management decisions and capacity issues leading to complications and caesarean section

A woman in her early thirties who gave a history of two previous vaginal births at booking had an uncomplicated antenatal course. She presented in spontaneous labour to an AMU at 39 weeks gestation. She was transferred to the consultant-led unit at 3cm dilatation due to lower abdominal pain. Continuous fetal monitoring was commenced and at further assessment the woman was found to be 5cm dilated. Epidural was used for pain relief. A decision was made for artificial rupture of the membranes but this was delayed for five hours due to the level of activity on the delivery suite. A further two hours after ARM the woman remained 5cm dilated and oxytocin infusion was commenced without senior review, despite the history of previous uncomplicated vaginal births. Two hours after commencement of oxytocin she was 7cm dilated. Three hours later the baby became progressively tachycardic, followed by a bradycardia. On vaginal examination, the head of the baby was no longer felt in the mother's pelvis, suggesting a diagnosis of uterine rupture. A decision was then made for delivery by category 1 caesarean section, and a 3.8kg female baby was delivered 16 minutes later. The baby was in the mother's abdominal cavity as a result of rupture of the posterior wall of the uterus. The mother had a haemorrhage of three litres and her uterus was repaired. The baby died of HIE at 18 hours of age. A history of a further previous vaginal birth overseas was disclosed postnatally.

5.10 Communication, leadership and supervision

Effective communication is an essential element of good care along all points of the care pathway and has already been mentioned in the antenatal care chapter. This is an issue that has been frequently raised in confidential enquiries [14,15,16] and encompasses both written and verbal communication between the members of the multi-disciplinary team and between health professionals and parents. It is of particular importance during episodes of rapidly changing circumstances, such as the intrapartum period, particularly when services are working to capacity.

Problems with communication during the intrapartum period were identified by the review panels in a just under a quarter of all cases (n=18). There was a lack of effective interaction and exchange of information between individual health professionals, and within the whole team, in eleven cases. In a further seven cases problems

with communication with parents were identified. In four of these the main issue was that there was no interpreter provided at this crucial point of care and the husband was used to provide a channel of communication between the health professionals and the mother. In one case, a mother who was unable to understand English was consented for caesarean section whilst alone without any interpreter and clearly unable to provide fully informed consent (see Vignette 7 in Chapter 3). The remaining three cases were specific instances of poor communication between the health professional and parents around decision-making and discussion of the possible demise of the baby. This is illustrated in Vignette 11.

Completion of partograms has been covered in the chapter on monitoring (Chapter 4). Over and above this issue, the panels noted five cases where the written documentation was very poor in terms of a lack of clear recording of care and information to parents, lack of an appropriate proforma to record a clinical problem, and notes discrepancies.

There were three examples of excellent communication. Vignette 24 provides an example of good communication and efficient interaction of the multi-disciplinary team.

Vignette 24: Good communication and effective interactions

A woman in her late thirties with a history of one previous elective caesarean section for breech and one normal delivery self-referred to the Maternity Assessment Unit reporting fresh vaginal bleeding, abdominal pain and uncertain fetal movements. Auscultation of the fetal heart was performed by the midwife and an obstetric review requested. The woman was reviewed by a junior doctor and a scan performed confirming the presence of the fetal heartbeat, fetal movements, normal amniotic fluid, estimated 4kg fetal weight, normal fetal blood flow and an anterior placenta. Speculum examination showed an early labour cervix with minimal bleeding present. A plan was made for a CTG, intravenous access and blood tests. The CTG was commenced and within 10 minutes demonstrated a fetal bradycardia. An immediate transfer to the delivery suite was undertaken by the midwife, the CTG recommenced and intravenous access obtained. The maternity unit was at capacity and the senior registrar was unable to attend immediately due to another emergency delivery; however, there was effective communication between the multidisciplinary team and the senior midwife facilitated a swift transfer to theatre and preparation until the registrar's attendance. An emergency caesarean section under general anaesthetic delivery was performed for uterine rupture and the baby was effectively resuscitated before transfer to the neonatal unit for therapeutic hypothermia and intensive care.

Team working, leadership and supervision skills are critical during intrapartum care. This is above all the case when clinical problems arise. Timely and appropriate decision-making requires confidence and skill, with adequate and responsive supervision of more junior staff, a willingness to refer and to accept that referral is necessary. In addition the importance of being able to escalate the care and interventions required, gaining support and involving more senior staff in review and decision-making, is essential across the board and especially so when the care pathway has become more complex. In eight of the cases that were reviewed problems with leadership and/or supervision of both medical and midwifery staff were identified with examples of a lack of situational awareness where no single action or 'failure' was wholly responsible for the outcome but, rather, a series of events to which poor communication within the team contributed. An example of this is provided in Vignette 14.

Many of the cases reviewed by the panel required referral by the attending midwife to the medical staff on duty. This may have been at the time of admission in labour or during the process of established labour and may have been from a midwifery-led unit or within the consultant-led unit. In the majority of cases the communication and referral between the professionals occurred in an appropriate and timely manner. There was a small minority of cases where this did not appear to be so. In five, it was noted that there was delay in review by the medical staff, with the underlying reason for that delay not always clear from the notes. This may have been related to delay in recognition of a problem by the midwife, the operational staffing structure of the unit, or the level of activity on the day. In one example the woman was noted to have not been reviewed by the duty consultant in a timely manner even during normal working hours. In another isolated case there was documentation of the consultant declining to attend to review the woman when directly requested to do so by

the midwife. This behaviour was scrutinised in detail by the panel and noted to have been addressed by the employing organisation in the accompanying serious incident report into the death.

In three cases, there was clear evidence of a failure to support and supervise less experienced staff that was almost certainly relevant to the outcome. One involved a junior midwife and in another two student midwives, all of whom appear to have been unsupervised for unacceptably long periods of time. In these circumstances it was not clear if this lack of support was a symptom of a busy unit or a lack of situational awareness on the part of the shift leaders/mentors.

Vignette 25: Lack of supervision

A nulliparous woman in her mid-thirties was appropriately booked for midwife-led care. Her antenatal progress was uneventful. She was admitted to the AMU at 40^{+2} weeks in established labour. Her membranes had ruptured five hours earlier and the liquor was suspected to be stained with light meconium. She was cared for by a student midwife but it is unclear what level of supervision was being provided to the student by the midwife, although all documented entries are countersigned by the supervising midwife. Two hours after admission the student was uncertain of the finding of a vaginal examination and asked the midwife to check this. The midwife confirmed the women was now 9cm dilated. Four hours later the woman was reassessed, found to be fully dilated and her baby was found to be in the direct occipito-posterior position. As the woman had no urge to push, a plan was made for a two-hour passive second stage. The fetal heart continued to be auscultated every 15 minutes. 1 hour 20 minutes after confirmation of full dilatation the student midwife was unable to hear the fetal heart, she tried again 10 minutes later and was still unable hear it. She left the room to find the midwife. The midwife was also unable to hear a fetal heartbeat so the woman was urgently transferred to the delivery suite, 25 minutes after the student was first unable to hear the fetal heart. On the delivery suite an ultrasound confirmed no fetal heart and the baby was born by forceps 15 minutes later, showing no signs of life.

5.11 Conclusion

Three-quarters of the term intrapartum stillbirth and intrapartum related neonatal deaths were found to have issues associated with the quality of their care provided during the intrapartum period. These findings were similar to previous confidential enquiries into intrapartum deaths [15,16] and, not surprisingly had overlapping elements. However, as discussed in the introductory chapter the overall rate of these deaths has decreased over time and, therefore, the number of cases affected by these issues has reduced.

In order to improve the care at this point on the care pathway and further reduce intrapartum stillbirths and neonatal deaths a range of issues need to be addressed. Whilst there remains a need to maintain training to ensure high standards of practice and skills on the delivery suite, there is also a requirement to focus on the less tangible human factors and communication skills involved in the care. There also needs to be a recognition that this care is being provided in an environment where the 'system' is working close to, and on occasion above, the capacity for which it was designed.

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6. Resuscitation and neonatal care

David J Field, Stephen Wardle, Tracey Jones, Ewen Johnston

6.1 Key findings

- **In general, neonatal resuscitation was delivered effectively by clinical staff present at the delivery, based on the Newborn Life Support programme. There was, however, evidence of significant failings in the approach to resuscitation adopted in a small number of deaths.**
- **All of the cases reviewed required extensive resuscitation and the involvement of senior staff to assist. Access to such assistance was sometimes delayed because staff were working elsewhere in the hospital.**
- **In some instances poor record-keeping prevented a clear picture of events at resuscitation from emerging.**
- **Deaths of the type reviewed by the enquiry are rare within any one service. In the absence of immediate senior support there was some evidence of confusion regarding: a) the need for intubation; b) the use of blood; c) any decision to stop resuscitation; and d) actions to be taken following a home birth needing advanced resuscitation.**
- **Of those babies admitted to neonatal care the vast majority were well managed in terms of the risk of HIE and associated risk of multiple organ failure.**
- **Local mortality reviews typically did not consider the neonatal aspects of care.**

6.2 Introduction

A number of studies have tried to estimate the proportion of all newborn babies that need resuscitation after birth and a figure of 6-10% is widely quoted [1,2,3]. However, of these, the large majority will transition to extra-uterine life with minimal intervention. The babies included in this report represent the other extreme; that is, babies apparently born with minimal or no signs of life. In general, whether resuscitation was attempted in a baby born without any signs of life depended on the extent to which there was clear information about the time at which signs of life were lost prior to birth. It is important to understand that this report focuses only on babies who ultimately died and excludes the larger group of mature babies born in very poor condition who, after resuscitation and neonatal care, survive (albeit. in some cases. with long-term neurodevelopmental problems). The care of babies in this second group has not been reviewed as part of this enquiry but a number of the recommendations may be relevant to how such babies are managed in the future.

6.3 Background

In the UK the approach to providing a supported transition to babies born in poor condition shows a great deal of variation, with a range of organisational arrangements. For hospital births the most common arrangement is for any baby who does not respond to initial resuscitation by the midwife to receive additional intervention provided by a medical trainee or nurse practitioner, supported by a senior medical trainee and a consultant. The availability of additional support shows great variation depending on where the birth occurs and whether the support teams who administer advanced neonatal resuscitation also cover the paediatric areas of the hospital. Overnight, the covering consultant may not be present in the hospital and may need to be called in from home. Where births occur in an FMU or at home, responsibility for resuscitation falls on the attending midwives and ambulance crew, with additional specialist support available only following emergency transfer to hospital.

In contrast to the great variety of organisational arrangements, the approach to resuscitation of the newborn has been standardised across the UK, based on the Newborn Life Support (NLS) course which is endorsed and overseen by the Resuscitation Council (UK). The content of the NLS is subject to regular review and updating and there is also international co-operation and co-ordination via the quinquennial meetings of the International Liaison Committee on Resuscitation. The NLS course is a one-day training session which should be attended and passed by all staff who could potentially be involved in neonatal resuscitation. The focus of the course is on ensuring that any baby needing support: i) has a patent airway, ii) receives lung aeration (inflation), and iii) where the heart rate does not respond to i) and ii) receives cardiac compressions, and resuscitation drugs if required. The delivery of breaths to inflate the lungs is divided into aeration breaths (initial long breaths to overcome the high resistance of the fluid filled airways of a baby who has never breathed) and shorter ventilation breaths (to mimic normal breathing once lung inflation has been achieved). The course focuses on the use of non-invasive respiratory support to achieve lung inflation and this reflects both the universal nature of the course and the good evidence to support the effectiveness of these devices. More advanced courses are also becoming increasingly available but are not intended for all frontline maternity and neonatal staff, e.g. Advanced Resuscitation of the Newborn Infant (ARNI), a Resuscitation Council (UK) course. The ARNI course recognises that a minority of infants may benefit from more advanced airway techniques (e.g. tracheal intubation) but maintains a focus on high-quality, non-invasive support to provide lung aeration.

It is against this background that the findings of this enquiry should be viewed. Although for the most part the findings from the individual reviews have been considered as a whole, the circumstances of the births / resuscitations reviewed by the panels reflected the variation described above. For example, the enquiry included home births where resuscitation was provided by the attending midwives alone (perhaps the only time in their career they would be directly responsible for such a resuscitation) and ambulance crew and, at the other extreme, births in a specialist unit with a full medical team including a neonatal consultant present either at birth or immediately afterwards.

6.4 Care provided at resuscitation

General

Considering resuscitation care in a group of babies who all died provides only a picture of the most extreme outcome as in every case, ultimately, it was not possible to secure the baby's survival. In addition, in many cases the need for resuscitation occurred with little or no warning and sometimes the baby presented to staff with limited experience. However, it was clear that in the majority of cases staff knew what to do and had the appropriate equipment. The findings from the enquiry illustrate aspects of care linked to the particularly testing circumstances for staff providing care for these babies.

Sub-optimal care

Of the 78 cases reviewed as part of the enquiry, 12 babies were born without signs of life and no resuscitation was attempted, while 66 babies underwent some attempt at resuscitation. The latter group comprised 28 babies born without signs of life and 38 babies born alive but in very poor condition. Of the 66 babies, 61 were born in a hospital setting with a neonatal service on site that provided staff responsible for leading the resuscitation of babies. Of the remaining five babies, one was born in an FMU and four at home, although only two of the latter were planned as home births.

The panels who reviewed the cases identified a degree of sub-optimal care in relation to the resuscitation in 31 deaths. The highest level of sub-optimal care in relation to resuscitation was identified in just 10 out of the 66 cases (15%) (see Table 9, below, for details).

Table 9: Aspects of care receiving the worst grade (3) in terms of the severity of sub-optimal care at resuscitation as judged by the panel and/or its relevance to outcome (n=10)

Grade of sub-optimal care	Relevance of grade of care to outcome	Panel comment (verbatim)
3	3	Failure to establish adequate chest wall movement before moving on to chest wall compressions - relevant as meconium present and suction required. Failed to follow NLS guidance. Baby found to have an obstructed airway (thick meconium) which needed clearing.
3	2	Ambulance staff resuscitation was inadequate – baby not kept warm (is there a training plan for such staff?)
3	3	Shoulder dystocia. Cord pH 7.08 & 7.2. However, early decision to stop resuscitation
3	2	Inappropriate transfer of baby to A&E instead of labour ward or the neonatal unit
3	2	Delayed 10 minutes before requesting blood for resus despite bleeding ++
3	1	Advanced resus skills not available
3	3	Advanced resus skills not available – midwife / paramedic
2	3	Resus for 40 minutes inappropriate, delay in consultant attendance, possible failure to achieve lung aeration
3	2	Delay in calling consultant
3	1	Delay in calling neonatal team

The themes identified by the panels are discussed below:

Inadequate preparation

In seven cases obstetric and midwifery staff identified that the baby would need resuscitation but did not make adequate plans for this to occur. This included not calling the paediatrician / nurse practitioner prior to delivery, not ensuring that resuscitation equipment was immediately available and not considering transfer to a higher level of care.

Linked to the issue of transfer from home in labour is the question of where mothers should be taken when transfer does occur. Of the six cases born out of hospital, ambulances tended to take the mother to the Accident & Emergency Department where, on four occasions, staff with the appropriate obstetric skills and additional training in newborn resuscitation were not available immediately, or there was a further delay while a separate transfer of the mother (to the delivery suite) or the baby (to the neonatal unit) took place.

Failing to follow Newborn Life Support guidelines

The approach to resuscitation as set out in the NLS course and manual is extremely closely defined. It was clear that in seven cases (including three of the cases listed in the box above) the attending staff did not follow the guidelines in terms of approach. This may have been because of a lack of training, a lack of experience or human error. The issue is highlighted in Vignette 26.

Vignette 26: Failure to follow Newborn Life Support principles

This baby was born in an FMU and showed no signs of life. The midwife commenced resuscitation using the standard approach taught by NLS. A paramedic ambulance crew arrived having been requested to attend when slowing of the baby's heart was noted during the second stage of labour. The paramedic was asked to assist and it appears that the paramedic took over the lead role for the resuscitation. He applied the neonatal defibrillator, presumably to check for a heart rate, and placed a geudel airway and, having requested neonatal cannulas (which were not available), went on to insert an intra-osseus line and give bicarbonate and adrenaline. At post-mortem it was noted that lung inflation had not occurred.

It seems clear from this example that the approach to resuscitation was not standardised between the professionals involved. The difference in emphasis appears to have been important in producing a lack of focus on the basic principle of NLS, which is the need to inflate the lungs.

Availability of assistance

In five cases the staff carrying out the resuscitation requested assistance but this was significantly delayed. Reasons for the delays varied from problems with a switchboard to consultants being occupied in another part of the hospital. The main implications of such delay was that, where prolonged resuscitation was required (virtually all of the cases considered here), the process was somewhat disorganised and decisions regarding escalation or re-orientation of care were not made in a timely manner.

Record-keeping

The circumstances of the resuscitation had a significant effect on the extent to which contemporaneous records could be kept. Where resuscitation took place during normal working hours in a hospital setting there were examples of excellent record-keeping. Under these circumstances a separate scribe could record events minute-by-minute and this record was then supplemented by retrospective notes by all those involved. Even where a separate scribe was not available because of staff numbers there were again excellent examples of detailed retrospective records. However, there were also a number of examples where resuscitation records were very scanty and it was impossible to be sure of either the timing of events or the nature of the various measures employed.

Reviews of care carried out after death

The approach to reviews by individual units and the quality of the reviews is considered in a separate chapter. However, it was noted by the panels that such reviews generally included very little consideration of the baby's resuscitation or any neonatal care the baby received. In addition, in only 12% of those babies for whom it was appropriate (i.e. for whom resuscitation had failed or who had died on the neonatal unit), was there input into the review from a member of the neonatal team.

Other themes

As well as the points highlighted above in relation to particular aspects of sub-optimal care, a number of other issues arose. Sometimes these particular concerns were also raised in the context of what the panel saw as sub-optimal care. However, on other occasions, the panel discussions represented uncertainty about what could be considered best practice. These themes are set out below:

Decisions to stop resuscitation / re-orientate care to a palliative approach

This aspect of care showed enormous variation, from decisions to stop resuscitation in a baby with no heart rate at 15 minutes to decisions delayed for nearly an hour. The difficulties that can arise in this situation and the importance of employing clear criteria are highlighted in Vignette 27. Similarly, where a heart rate was restored after resuscitation, the basis of decision-making and advice to parents about a subsequent re-orientation of care and how the role of therapeutic hypothermia should be incorporated into these situations revealed a range of practice amongst the cases reviewed. One panel member noted that on at least one occasion the decision had not followed the latest Royal College of Paediatrics and Child Health guidance, published in 2015, which describe the circumstances when decisions to limit treatment are appropriate [4]. Clearly this is an area of practice which is hugely influenced by the exact circumstances of the case and the seniority and experience of those present. Even allowing for this, however, it was clear that practice showed great variation in terms of who should make such a decision, when such a decision should be made, the criteria that should be used and the extent to which it is possible to involve parents. There seems no doubt that there is a lack of evidence regarding what represents best practice in this situation, especially when local circumstances are taken into account.

Vignette 27: The difficulties of assessment in relation to re-orientation of care

This birth occurred in hospital by emergency caesarean section at a very late stage in the labour and was a difficult delivery. The baby was born in very poor condition. Resuscitation was led by a paediatric registrar with a consultant present after a few minutes. No signs of life were detected during the resuscitation, which included intubation, intravenous adrenaline and blood. Resuscitative measures stopped at 25 minutes. However, the baby subsequently began gasping, received comfort care and ultimately died around 16 hours later. It later became clear at post-mortem that the baby had suffered a skull fracture at delivery. Since cord blood gases were not severely deranged (arterial pH 7.074, venous pH 7.068) it is likely that the head injury confused the picture of this baby's condition at birth, making the assessment of the baby's condition much more complicated than was apparent at the time.

Failure to recognise that the lungs were not aerated adequately

In general, resuscitation of the newborn in the UK relies on external respiratory support, with intubation seen as most appropriate where it seems likely that there will be a need for prolonged ventilatory support. In five cases the baby's response to resuscitation improved when a more senior member of the team arrived and intubated the baby, presumably improving lung inflation (given the retrospective nature of the enquiry it was not possible to tell whether the same effect could have been achieved by external support delivered by a more experienced team member). All of the babies in this enquiry ultimately went on to die whether or not they were ever intubated but there may well be other babies whose outcome was improved by the arrival of a practitioner with more advanced airway management skills. Clearly there will be situations where advanced resuscitation skills, such as the ability to intubate, are simply not available. For staff involved in front line resuscitation it seems important that the role of intubation is clarified when the baby does not respond to basic life support and a member of staff with advanced neonatal resuscitation skills is unlikely to arrive for a further, for example, 15 or 20 minutes. Guidance to front line staff in this regard should reflect local circumstances. This is of particular importance when it comes to managing the newborn who does not respond to initial attempts at mask aeration. There are a number of potential reasons for this and a systematic approach can improve the likelihood of a successful resuscitation. This approach need not involve intubation necessarily, but must include advice on the use of additional personnel, airway clearance devices, oropharyngeal and/or laryngeal mask airways.

Confirmation of endotracheal tube placement

In a further five cases an endotracheal tube was inserted in a baby born without a heart rate; however, there was uncertainty about whether it was correctly placed in the trachea. Normally it is possible to check that an endotracheal tube is in the trachea by using a colorimetric carbon dioxide detector which shows a colour change if the gases being exchanged are entering and leaving the lung in response to exhaled carbon dioxide. The general view is that in the face of cardio-respiratory arrest such devices may be unreliable and hence colour change could be absent whether or not the tube is in the trachea [5,6]. Again the exact circumstances, particularly in terms of the experience of the staff present / availability of experienced staff, affects the importance of this issue but it can act as a major distraction during resuscitation where there is ongoing uncertainty. The NLS and ARNI manuals acknowledge the usefulness of these devices, but also their limitations, and state that no single method (of verifying endotracheal tube placement) is completely reliable. This issue is of particular importance in units where intubation is an infrequent event and is another area where local advice developed from the national guidance on how to deal with this situation could prevent staff from becoming inappropriately fixated on the issue, e.g. re-intubate but, if uncertainty regarding placement continues, use an external device until a more senior member of staff is present.

Use of blood / volume

On rare occasions a baby suffers a major haemorrhage just prior to birth and, in these circumstances, a rapid volume expansion can be lifesaving. While in some cases volume expansion with saline may be an adequate temporising measure, in others rapid access to blood may be essential, with use of the O-negative blood available on all delivery suites required. Being sure that blood is needed can be difficult as there is often significant blood present at delivery and there is normally no easy and quick way of determining whether the blood has been lost from the baby. Ten of the cases reviewed successfully received blood as part of their resuscitation; in most there was no direct indication that it was needed and its use appeared primarily to support

the circulation. In many other cases saline was used in this role. However, there were three further cases where there was evidence of blood loss and O-negative blood requested. In these cases it took 13, 18 and 39 minutes respectively for the blood to become available and, in the latter two cases, transfusing the blood did not affect the baby's outcome. In a further case, where the baby was born in poor condition and was said to be "pouring blood", no transfusion was requested. There is clearly a need for all units to have guidance on when and how blood should form part of neonatal resuscitation and to be confident that they have a means of providing rapid access to the emergency blood supply on the delivery suite when it is needed.

Neonatal care – findings

All of the babies whose care was reviewed died and only 37 were admitted to the neonatal unit. Of those who did receive neonatal care the vast majority were well managed in terms of the risk of HIE and associated risk of multiple organ failure. In just two cases, both of whom required transfer, it was this aspect of care which was felt to be sub-optimal and this included delays / problems with the transfer itself. In a third case, although the care was felt to be of an appropriate standard, the baby was transferred to another neonatal network which was thought particularly inappropriate given the baby's death away from the wider family.

Management of death on the neonatal unit

The management of the re-orientation of care and bereavement support is considered in more detail in a separate chapter. However, of the 38 deaths that occurred on a neonatal unit, in only three cases was the management of the death felt to be poor. This included the baby involved in a transfer to another network referred to earlier. There were inconsistencies, though, particularly in relation to the documentation of discussions with parents and the approach to the decision-making. Such variation in decision-making is, however, to be expected as most decisions to suggest to parents a re-orientation of care are made based on the individual clinical circumstances in terms of the history, examination and test results, all of which show inevitable individual variation. In just a single case did the clinical situation, as described in the notes, cause a panel to raise concern that the decision to re-orientate care did not follow the most recent Royal College of Paediatrics and Child Health guidelines [4]. In general, these are not seen as relevant to decision-making in the circumstances of babies born in extremis.

There were excellent examples of both the management of the re-orientation of care and the subsequent bereavement support provided to parents. Similarly, documentation of these events was exemplary in a number of cases. However, for those services where such events are rare, guidance in terms of the documentation that should occur (perhaps simply in the form of headings highlighting the aspects of the process that should be covered) would probably be helpful.

6.5 Conclusion

Newborn Life Support appears to be well understood and delivered by the majority of front line staff. However it is essential that all "new starters" potentially involved in resuscitation continue to attend the course and that established members of staff attend regular updates. This should include any staff who would routinely be present at deliveries, including all paediatric doctors and all midwives. Ambulance staff who might attend home or out of hospital deliveries should also receive such training.

All services, as well as having routine policies with respect to resuscitation, should prepare guidance to cover the particular circumstances of resuscitation of a baby born in extremis and out of hours in their service. This guidance should be practical and include issues around the use of volume expansion and the use (or not) of intubation. During a critical event, when many human factors come into play, experienced leadership can positively influence the outcome. It is recognised that these advanced skills can also be taught (for example on the ARNI and Managing Obstetric Emergencies and Trauma courses); senior practitioners should be supported to acquire this training.

Guidance is required in a number of areas: i) local guidance should be developed that makes clear the actions to be undertaken when serious problems arise in a home birth, either planned or unplanned; ii) national guidance is needed regarding the principles that should guide decisions to stop resuscitation and/or re-orientate care,

and further research is also needed to guide practice in this area; and iii) both local and national guidance should consider the approach to resuscitation of a baby with prolonged bradycardia following delivery, once lung aeration has been confirmed.

If intubation is undertaken, an exhaled carbon dioxide detector should be used to aid confirmation of endotracheal tube placement but specific advice should be provided on the interpretation of a 'negative' end-tidal carbon dioxide reading during circulatory arrest.

Finally, it is important that mortality reviews undertaken by local clinical teams take full account of any resuscitation and neonatal care that the baby received.

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7. Care after birth

Maggie Redshaw, Jo Dickens, Sara Kenyon, Tracey Jones and Alexander Heazell

7.1 Key findings

The quality of bereavement care was variable, with a lack of joint obstetric and neonatal input seen. This was demonstrated by the following:

- **The quality of bereavement care was assessed as good for nearly a half of the parents, satisfactory for nearly a third, and either poor or with insufficient information in the notes in the remaining instances.**
- **A bereavement checklist was present in the majority of notes; however, this was more likely to be in the notes of those mothers who had experienced a stillbirth than in the notes of those who had experienced a neonatal death.**
- **It was not clearly documented that all relevant healthcare professionals had been informed of the stillbirth or neonatal death.**
- **Continuing midwifery involvement after discharge home was not documented for all women. For those for whom continuing midwifery support was documented, the number of postnatal contacts varied, with those women who had experienced a stillbirth having the highest numbers of visits.**
- **The obstetric team almost always provided the bereavement care when intrapartum stillbirths occurred. When intrapartum-related neonatal deaths occurred both teams were involved in over half of deaths and just the neonatal team in a quarter.**
- **Written information to support the offer of a post-mortem was apparent in half the deaths. However, this represents around three-quarters of stillbirths and a quarter of neonatal deaths. This may reflect that non-medicolegal post-mortems are conducted with less frequency following neonatal death.**
- **Follow-up meetings with parents were documented as taking place in just over half of stillbirths and two-thirds of neonatal deaths. Where no follow-up visit took place the reasons were not documented in half the cases.**
- **Follow-up meetings were documented as having been conducted by a consultant obstetrician or neonatologist in about two-thirds of cases and a third took place over 12 weeks after the death. Plans for any future pregnancy were documented as having been discussed in just over half of cases.**
- **A letter summarising the discussion, results of investigations / post-mortem findings and plans for any future pregnancy were only sent to just over a third of parents. While half of those letters sent were of good quality, a further third were considered adequate and the remainder were felt to be poor.**

7.2 Introduction

Care during and after the death of a baby that dies during labour or as a result of labour has a profound immediate effect on women, their partners and the wider family. In the short- and longer term it affects their physical health and psychological wellbeing and both family and other relationships, including their interaction with the healthcare system [1,2,3]. The shock and distress of what has happened is substantial [4]. However, appropriate, kind and respectful care at this time makes a difference to how parents feel and their

experiences [5]. This chapter will look at the care provided following the stillbirth or neonatal death (both in hospital and the community), bereavement support, discussion of offer and information provided in relation to post-mortem examination and follow-up.

The panels were asked to consider the care supported by a series of checklists developed by the TEG which included issues that could reasonably be extracted from the case notes. These were based on the Audit Tool for Maternity Services developed by Sands [6] and NICE's 'Antenatal and Postnatal Mental Health: Clinical management and service guidance' [7].

The focus in this part of the confidential enquiry was on care more broadly and details of appropriate care, follow-up and information-giving to parents. The antepartum stillbirth review in 2015 [8] also looked at which investigations were subsequently undertaken, aspects of hospital post-partum care and details from the bereavement checklist, including memory-making activities.

Parents' needs are likely to differ and the context within which such life-changing events occur can markedly affect their experience. Some babies had died in the delivery suite; for some, but not all, of these resuscitation had been attempted unsuccessfully. Other babies had been admitted to a neonatal unit, where they died.

The quality of care given was reviewed and categorised using the detail contained within the case notes. Review included whether there was documentation regarding:

- quality of bereavement care;
- the use of a bereavement checklist;
- midwifery contact and support;
- informing health professionals involved in care;
- follow-up arrangements and timing;
- information and feedback to parents following post-mortem, including letters / letter content.

7.3 The quality of bereavement care

Using an overall rating, the confidential enquiry panels rated the quality of bereavement care as 'good' for less than half of parents in both groups (43% of stillbirths and 42% of neonatal deaths) and as 'satisfactory' for a further third. 'Poor' or 'insufficient information' was judged in a quarter of both the stillbirths and the neonatal deaths.

Vignette 28: An example of appropriate bereavement care

A primigravida in her early thirties underwent an emergency caesarean section and the baby was a stillbirth with unsuccessful resuscitation. Bereavement care as an inpatient was well documented with a comprehensive and fully-completed checklist. The Chaplain was contacted for spiritual care. Contemporaneous notes regarding the transfer of the baby to the mortuary and the onward transfer for post-mortem were made. Once home, the parents requested casts of the baby's hands and feet, and these were organised by the bereavement officer and facilitated by the mortuary staff. This was followed up with ongoing communication with the family regarding care of the baby in the mortuary.

Where care involved both the obstetric and neonatal teams (where resuscitation was attempted or the baby died on the neonatal unit), it was felt that both groups of health professionals should participate in the bereavement care, support and follow-up. In relation to the provision of bereavement care it appeared that the obstetric / midwifery team and neonatal team were rarely both involved when the death was an intrapartum stillbirth and resuscitation had been attempted (3%), but that in just over half of the neonatal death cases (55%) both teams were involved in bereavement care. The enquiry identified some cases where communication between the obstetric and neonatal teams was lacking, which was felt to have had a direct impact on the quality of care offered to the bereaved parents, particularly with regard to planning for future pregnancies and births.

Vignette 29: Lack of multidisciplinary communication and poor documentation regarding bereavement and postnatal care

A primigravida in her early thirties was booked for midwifery-led care and remained low-risk throughout her pregnancy. At 39+ weeks she underwent an emergency caesarean section during labour for fetal bradycardia and delivered a normally-grown infant who was resuscitated and admitted to the local neonatal unit with suspected HIE. The baby was transferred to a tertiary unit for therapeutic cooling on Day 1 and the woman was transferred to be near her baby. There was poor documentation of discussion with the parents regarding re-orientation of care, errors were made when certifying the subsequent neonatal death and no consideration of referral to the Coroner was evident until the parents expressed unhappiness with the certified cause of death.

Evaluation of the documentation pertaining to the woman's postnatal care demonstrated a lack of effective communication between the obstetric and neonatal teams with no evidence of obstetric review following delivery. An appointment with a neonatal consultant took place three months after birth; however, there was no evidence that a letter summarising the appointment was sent to the parents and a plan for care in future pregnancy was not discussed.

In other cases there were examples of more effective collaboration and communication, as illustrated in Vignette 30.

Vignette 30: Good communication and follow-up involving input from both obstetric and neonatal teams

A primigravida in her late twenties had a spontaneous delivery of a normally-grown infant in poor condition at term. The baby was admitted to the neonatal unit with suspected HIE. Regular communication was evident in the notes between the neonatal team, the obstetric team and the mother during the baby's time in the neonatal unit. Reorientation of care was sensitively broached on more than one occasion and, following extensive discussion with the parents, took place on Day 10. The parents were seen for joint consultant follow-up nine weeks after birth and the obstetric consultant, neonatal consultant and a senior midwife were present. A plan for future pregnancy was discussed and a letter summarising the issues covered at the appointment was sent to the parents.

7.4 Bereavement checklists

It is apparent that many Trusts and Health Boards have developed bereavement checklists which are designed to improve the quality of bereavement care and facilitate good communication between different healthcare professionals, as well as meeting parents' specific individualised care requirements. Their use is recommended by the recently published Sands guideline for professionals [9].

Completed bereavement checklists were found in the notes of 56 out of the 78 cases (72%). However, these were more likely to be present in women who had experienced a stillbirth, where the majority had one (35 out of 40), than in the notes of those who had experienced a neonatal death, where about half the cases had one (21 out of 38).

7.5 Midwifery support and care

Sands have argued that it is vital for maternity units to have access to a bereavement midwife / nurse with specialist knowledge and overview of all the essential components of perinatal bereavement care [10].

The checklist data developed for the confidential enquiry specifically asked whether a bereavement midwife had been informed of the death and referral was only documented in a third of deaths – nine in each group. Input from a bereavement midwife was reported to be similar in the antepartum stillbirth confidential enquiry in 2015 [8] and in the 'Listening to Parents' study [5].

Two-thirds of mothers had one or more documented contacts with a community midwife. Of these, most saw a community midwife on two to three occasions (70%). However, greater numbers of mothers having an intrapartum stillbirth saw the midwife four or more times compared with those whose baby died on a neonatal unit, where only five mothers were seen more than four times. There was evidence of some excellent care where the community midwife provided continuity and sensitively responded to parents' requests to be seen on specified days that were easier for them.

7.6 Management of death on the neonatal unit

Overall, the management of the re-orientation of care and bereavement support on the neonatal unit was good. Of the 38 deaths that occurred on a neonatal unit in only three cases was the management of the death felt to be poor. In one case this included a baby involved in a transfer to another network, which was felt to be inappropriate as the baby then died away from the wider family support network. There were inconsistencies particularly in relation to the documentation of discussions with parents and the approach to the decision-making. Such variation in decision-making is, however, to be expected as most decisions to suggest to parents a re-orientation of care are made based on the individual clinical circumstances in terms of the history, examination and test results, all of which show inevitable individual variation. However, there was only one case where the clinical situation as described in the notes raised concern at the panel discussion that the decision to re-orientate care did not follow the most recent Royal College of Paediatrics and Child Health guidelines [4]. In general, these are not seen as relevant to decision-making in the circumstances of babies born in extremis.

There were excellent examples of both the management of the re-orientation of care and the subsequent bereavement support provided to parents. Similarly. documentation of these events was exemplary in a number of cases. However, for those services where such events are rare, guidance in terms of the documentation that should occur (perhaps simply in the form of headings highlighting the aspects of the process that should be covered) would probably be helpful.

7.7 Informing health professionals and others involved in care

Informing the health professionals who work in the community of the death is recognised as a priority in caring for mothers and families immediately following stillbirth and neonatal death. Family doctors (GPs) and community midwives were the most frequently contacted health professionals, with around three-quarters of the deaths being notified (78% of stillbirths and 74% of neonatal deaths). The health visitor was informed in less than half the cases (40%).

Although in a third of cases the antenatal clinic was informed, this represents half of the stillbirths cases and only a quarter of the neonatal deaths. It is also important to inform organisations contacting new parents, and checks were made on this point with regard to the Bounty packs and possible promotional literature and products. Overall, this was documented in only a quarter of notes (23% of stillbirths and 26% of neonatal deaths).

7.8 Follow-up for parents

The Sands Audit Tool [4] and the RCOG Green-top Guideline for maternity services [11] recommend that all parents whose baby dies should be offered a post-mortem and given written information. Information regarding hospital post-mortem documentation was recorded in half of cases, with a clear difference between the cases of stillbirth (73%) and neonatal death (29%). This may reflect that non-medicolegal post-mortems are conducted with less frequency in cases of neonatal death, as the cause of death is known. Further detail is given in Chapter 8.

The majority of parents wish to understand why their baby died and to be able to ask questions of the health professionals involved. Both the Sands Audit Tool [4] and the RCOG Green-top Guideline [11] suggest that a flexible approach is appropriate and that all available test data / findings should be ready so that parents are able to discuss these within twelve weeks of birth. However, there was only evidence of follow-up appointment meetings with parents taking place in approximately half of stillbirths and two-thirds of neonatal deaths. Where

no follow-up visit took place the reasons were not documented in half the cases. For the parents who attended a follow-up meeting, these were at variable lengths of time following the birth. For around half this was within an eight-week period following the death of the baby and for a quarter this was at more than 12 weeks later. For two-thirds of parents the meeting was with a consultant obstetrician or neonatologist. For only half the parents was the meeting documented as having covered plans for any future pregnancy.

Following intrapartum stillbirth and intrapartum-related neonatal deaths a letter summarising the results of investigations / post-mortem findings and details of any plans for managing any future pregnancy was sent to parents in only two-fifths of cases overall. In just over half of cases was a copy sent to the parents and in some instances letters were only sent to the GP and not to parents (7 in each group). The letters sent to parents were reviewed and an overall assessment made of the quality. Of the 29 letters, the panels considered half to be 'good', more than a third 'adequate' and one was 'poor', being factually incorrect. In one instance, parents were sent notes from an earlier meeting with them.

7.9 Conclusions

Documentation reviewed for the confidential enquiry provides some evidence that following intrapartum stillbirth and intrapartum-related neonatal deaths parents did not receive the postnatal care recommended by national guidance, though there were differences in specific aspects of the postnatal and bereavement care provided. Areas for improvement have been identified which require attention, particularly in relation to continuing midwifery care, specialist bereavement support and adequate, informative follow-up for parents. Multidisciplinary working between the obstetric and neonatal teams, although necessary in the majority of cases, was often lacking. Responsive and respectful care after the birth and in the context of follow-up can make a difference to parents' understanding, experience and what they take away with them in the longer term.

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8. Post-mortem examination and reporting

Marta C Cohen, Margaret J Evans and Samantha Holden

8.1 Key Findings

- **Almost all of the intrapartum stillbirths and three-quarters of the intrapartum-related neonatal deaths selected for the confidential enquiry underwent some form of formal pathological examination although a quarter of both groups only had placental examination. Almost a third of the neonatal deaths had neither post-mortem nor placental histology carried out.**
- **Placental histology reports were evaluated according to a predefined checklist based upon guidelines from the Royal College of Pathologists. Although many of these reports were regarded as excellent or good, a substantial number were considered poor or unsatisfactory.**
- **Almost three-quarters of the reports contained a specific clinico-pathological correlation and/or interpretation of histological findings as recommended by the Royal College of Pathologists.**
- **Post-mortem reports were evaluated by trained perinatal pathologists and were found, with few exceptions, to be of good quality.**

8.2 Introduction

This chapter examines the role and current status of the autopsy and placental histological examination in the investigation of term intrapartum stillbirth and intrapartum-related neonatal death to identify areas of concern that might be improved upon.

Identifying the condition(s) leading to fetal and neonatal death is of vital importance to parents and clinicians; not only does it help in understanding the reason for the death but also with planning for future pregnancies.

Full post-mortem examination of the baby and placenta has the highest diagnostic yield of all investigations and helps establish the immediate cause and timing of intrauterine death [1]. The RCOG recommends that all women who have a stillbirth are offered a post-mortem with placental examination [2]. If this is declined the placenta alone should be submitted for pathological analysis.

Placental pathology can help to identify the immediate diagnosis of conditions affecting the mother or infant or that are likely to recur in subsequent pregnancies [3,4]. It can also help to delineate clinical syndromes into distinct pathological phenotypes for further investigation and to uncover the underlying cause of unexpected adverse outcomes such as fetal death, fetal growth restriction, spontaneous preterm birth or central nervous system injury.

Pathological abnormalities of the placenta, cord or membranes are attributed as a cause or contributory factor to stillbirth in 11-65% of deaths in various classifications [5,6]. Moreover, a comparison of findings in stillbirths and live births has shown that placental lesions were highly associated with stillbirth compared to live births and that prevalence of lesions varies by gestational age at delivery [7].

Multidisciplinary discussions of each death or significant adverse event reviews are a very good resource to determine the cause(s) of death, agree advice to be given to parents about future pregnancies and review where local practice can be improved. At all levels, attendance at multidisciplinary perinatal pathology or mortality meetings is to be encouraged.

Obstetricians and neonatologists benefit through being familiar with both the potential and limitations of a perinatal autopsy, and through familiarity with the pathologist's terminology [4,7].

In this chapter we will deal with consent / authorisation of post-mortem and the availability of the placenta for examination in cases where post-mortem was refused, the adequacy of placental and autopsy reports and the presence within the reports of a clinico-pathological comment. We also looked at the availability of post-mortem and placental reports at multidisciplinary discussion meetings, involvement of HM Coroner or the Procurator Fiscal and possible delays in provision of reports for hospital discussion.

8.3 Summary of cases and findings from panels

Overall pathology input

Information regarding hospital post-mortem documentation was recorded in half of all cases. However, this represents nearly three-quarters of the stillbirths and less than a third of the neonatal deaths.

In contrast to the previous report in 2015 [8], where less than half of the term antepartum stillbirths had a formal post-mortem examination, in this current review 37 (93%) of the term intrapartum stillbirths had some form of examination after death. However, only 27 (71%) of the intrapartum-related neonatal deaths had some form of examination (Table 10). The reasons for this discrepancy are beyond the scope of this review, but clearly highlight the need for a review of the way in which post-mortems are offered to the parents when a neonatal death occurs since, given the discrepancy in the manner in which neonatal deaths and stillbirths seem to be treated, the current system is not meeting the needs of all parents. Issues may include the education of clinicians and consent takers, access to the service, availability of perinatal pathologists, acceptability of the procedure itself or a belief that the cause of death is known in the case of neonates.

Table 10: Examination by type of jurisdiction and perinatal death

	Stillbirth		Neonatal death	
	n	%	n	%
Full hospital consented post-mortem examination including placenta	22	*55.0*	4	*10.5*
Full hospital consented post-mortem examination excluding placenta	1	*2.5*	2	*5.3*
Limited hospital consented post-mortem examination	3	*7.5*	1	*2.6*
HM Coroner / Procurator Fiscal post-mortem examination including placenta	0	-	6	*15.8*
HM Coroner / Procurator Fiscal post-mortem examination without placenta	1	*2.5*	1	*2.6*
HM Coroner / Procurator Fiscal post-mortem examination with no report available	0	-	3	*7.9*
Placental examination only	10	*25.0*	10	*26.3*
None	3	*7.5*	11	*28.9*
Total cases reviewed	**40**	***100***	**38**	***100***

Three of the post-mortem examination reports were not available for review (all HM Coronial / Procurator Fiscal cases). The 41 post-mortem examination reports available were generally of good quality, although in two cases the clinico-pathological correlation was very brief.

In three of the 41 cases where reports were available the placenta was submitted to the local pathology department for examination rather than being submitted with the infant for investigation as part of the post-mortem examination. In a further two cases the placenta was 'lost' or 'disposed of', as detailed in Vignette 31.

Vignette 31: Failure to submit the placenta for pathological examination

Following spontaneous onset of labour at term, the fetal heart rate was lost during the intrapartum period and a stillborn infant was delivered. Maternal postpartum pyrexia was noted. The post-mortem examination showed signs which raised the possibility of placental abruption; however, the placenta was discarded at the referring hospital.

We recommend the placenta is submitted with the infant as part of standard procedure in all deaths.

In a number of deaths, organs (mainly the brain) or other sections were referred for specialist opinion although no evidence of this opinion was present in the information submitted for review; we would highlight the importance of ensuring the specialist opinion is available prior to submission of the final post-mortem report, as demonstrated in Vignette 32.

Vignette 32: Importance of inclusion of specialist findings in post-mortem report

An infant was born in poor condition following induction of labour at term and required resuscitation. An early neonatal death occurred later that day with the clinical impression of HIE. A full post-mortem examination was performed, including referral of the brain for specialist opinion. This opinion was not present in the report, nor was there reference either to it or to hypoxic brain injury in the comment and cause of death provided.

Involvement of HM Coroner or Procurator Fiscal

It should be noted that HM Coroner / the Procurator Fiscal (PF) does not have jurisdiction in cases of known stillbirth, although they may opt to accept the case if there is a question of whether the infant was stillborn or if there may have been an incident during delivery which may have impacted on whether the child was stillborn or liveborn. Similarly, if a death certificate can be issued for a neonatal death there is not necessarily a reason for a medicolegal investigation to be undertaken; in these cases, the parents should be offered a consented hospital post-mortem examination.

In total, three stillbirths were referred to the Coroner or Procurator Fiscal, one of which was accepted for legal investigation. In contrast, nearly a third (31.5%) of neonatal deaths were reported to the Coroner or Procurator Fiscal. Of these, no further action was taken for two of the neonatal deaths whilst the remaining ten underwent autopsy at the behest of the legal system. Of the four stillbirths and neonatal deaths not accepted for Coronial / Procurator Fiscal investigation three underwent a consented hospital post-mortem examination. In three of the cases accepted by HM Coroner / the Procurator Fiscal, no post-mortem report was available to inform ongoing hospital reviews and the information available for parents was limited or delayed.

Quality of placental reports

It has been suggested that examination of the placenta is the single most useful component of the death investigation of stillbirth in terms of contributing to understanding the cause the death and should be encouraged in all cases regardless of whether autopsy is performed. It was therefore of concern that only 60% of placental reports were regarded as excellent or good with the remaining 40% assessed as poor or unsatisfactory. Around a quarter (27%) of placental reports contained no specific clinico-pathological correlation or interpretation of histological findings. This is contrary to the guidance of the Royal College of Pathologists' Placenta Tissue Pathway [9]. Other poorly-rated placental histology reports lacked a detailed description. In addition, it was noted during the case reviews that in many cases non-specific findings were variably interpreted regarding their significance, sometimes overconfidently, despite the absence of a perinatal pathologist. Indeed, only two of the hospital reviews carried out for the cases in this confidential enquiry included a pathologist as part of the review team. Whilst autopsy and placental examination are important components of the investigation of stillbirth, areas of uncertainty in which published evidence is lacking or inconclusive should be clearly stated in the report.

Overall summary of quality of care

Overall, the findings are in keeping with previous studies which show that good quality post-mortem and placental examinations can contribute to clinical care. Pathology input remains important even if parents refuse standard autopsy, since placental examination may be useful for these families. Pathologists must ensure that placental pathology and post-mortem reports provide maximum value by including accurate clinico-pathological interpretation comments and issuing reports within an acceptable time frame.

Furthermore, although the proportion of placentas examined has increased since the last confidential enquiry [8], the quality of placental reports has declined (from 80% rated as excellent or good in the 2015 report to 60% in the current review). It is unclear whether this is due to reporting by non-specialists or to a lack of confidence in interpreting findings.

8.4 Conclusions

The findings of this pathology review for intrapartum stillbirths and intrapartum-related neonatal deaths highlight the need for improved communication between obstetricians, neonatologists and pathologists. In addition, it has identified a need for the pathological examinations for stillbirths and neonatal deaths to be carried out by specialists within this field who contribute to multidisciplinary discussions, ensuring that all clinical facts are addressed and correlated with the autopsy and placental findings.

A number of issues were raised by this review of the pathological input into these deaths. It is unclear why the autopsy rate is so variable between the stillbirth and neonatal populations. It may be that the role of more limited autopsy and/or placental examination and other investigations should be explored, and that, as a minimum. placental examination (by a perinatal pathologist) should be encouraged in all deaths. In the previous MBRRACE-UK enquiry [8] the need for clinico-pathological statements in autopsy and placental histology reports was highlighted, including the likely clinical significance of any abnormal histological findings, and this is repeated here. It is important that areas of controversy or uncertainty are also highlighted in the report, with statements based on published evidence and subjective interpretations clearly distinguished from factual observations. A further issue concerns the referral of cases to the Coronial and Fiscal services and this should be monitored, especially with regard to clear lines of communication and availability of post-mortem reports for “in-house” reviews. Finally, the nature of reviews needs to be standardised so that each region carries out a similar process with similar descriptions, enabling the effective comparison of information across regions.

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9. Local review of intrapartum-related death

Sara Kenyon, Fiona Cross-Sudworth, Claire Keegan, Tracey Johnston

9.1 Key findings

- **Although the majority (95%) of intrapartum-related deaths were reviewed, many of the reviews were lacking in quality. Review should be undertaken using the 'Serious Incident Framework' which should include review of contributory factors / root causes.**
- **While root cause analysis was documented in around two-thirds of reviews, consideration of the nine contributory factors (as recommended by the National Patient Safety Agency) was documented in only 11% of all reviews.**
- **Multidisciplinary panels reviewed 86% of deaths. For those babies whose care included care from the neonatal team (for whom resuscitation failed or who died in the neonatal unit) only just over a tenth included input from the neonatal team. A pathologist was only documented as present for two reviews.**
- **Parents were documented as being involved in only five of the reviews and an external person in nine of them.**
- **Actions were recommended in the majority of reviews. Individual actions were recommended in over two-thirds of reviews and institutional actions in over three-quarters. Audit was planned or undertaken for less than a fifth of cases.**
- **The quality of the reviews was assessed by the multidisciplinary confidential enquiry panels and judged to be good for around a quarter, adequate for a further quarter and poor for just under half, with two not assessed.**

9.2 Introduction

The death of a baby at term who was alive at the start of care in labour is an almost unimaginable tragedy for the parents and staff involved. Open, transparent and thorough review of what happened is essential to ensure full understanding of why the baby died. Such reviews are vital for the parents as they try to make sense of events and for the maternity unit to facilitate reflection and learning, and, where needed, improvements in care. Whilst recognising that not all deaths are preventable, all health care professionals nevertheless have a duty of candour – they must be open and honest when something goes wrong with treatment or care that causes, or has the potential to cause, harm or distress [1].

9.3 National recommendations for review of death

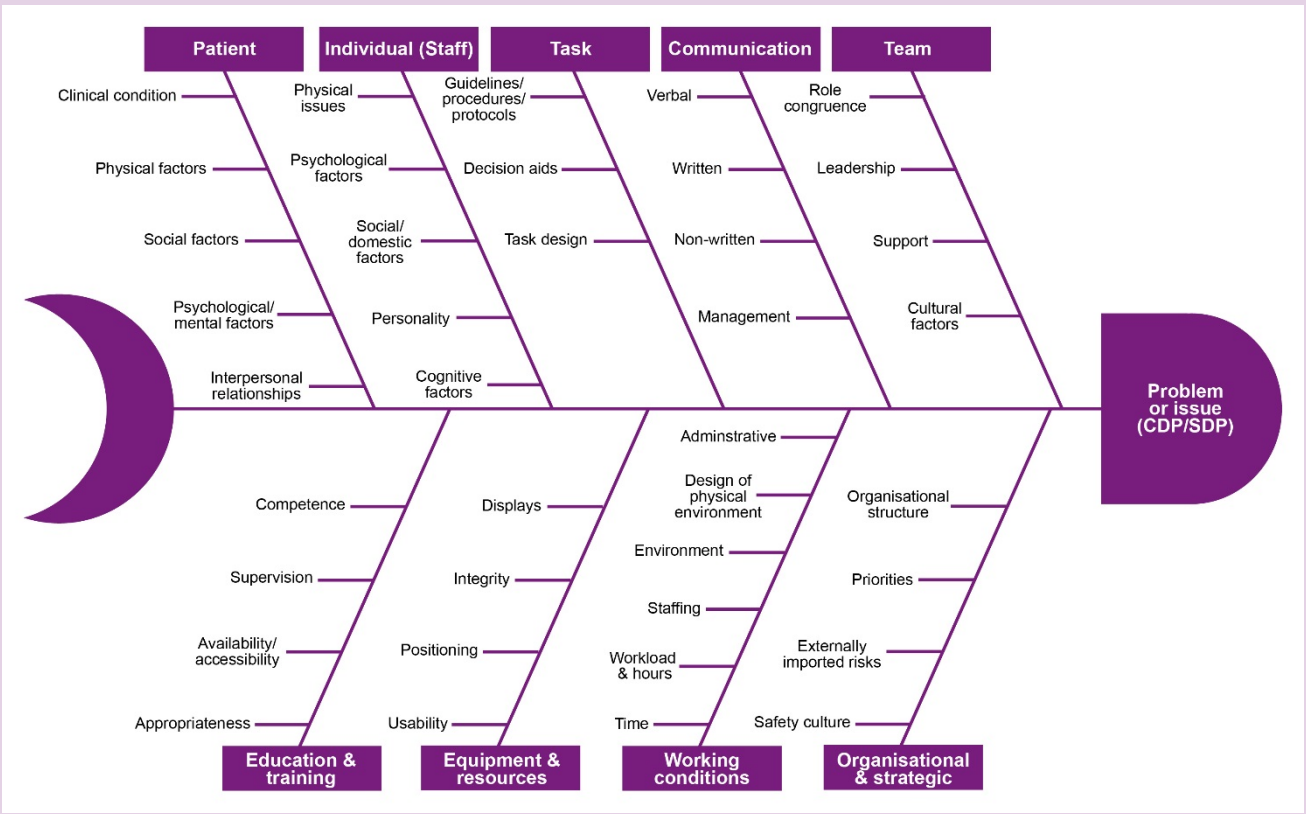
Term intrapartum stillbirths and intrapartum-related neonatal deaths should be described as 'unexpected and avoidable' until proven otherwise and, as such, should be considered under the 'Serious Incident Framework' [2], whether the death occurred in England, Scotland, Wales or Northern Ireland.

Within England the 'Serious Incident Framework' outlines the definition, categories and the underpinning principles of review of all serious incidents (see Figure 2).

Figure 2: Principles of serious incident management

Similar frameworks exist in Scotland [3] and Wales [4]. Within Northern Ireland there has only been recent national agreement as to the definition of and process for reporting of Serious Incidents [5]. In each case, there is an explicit recommendation that contributory factors / root causes should be examined to identify fundamental issues and ensure a full understanding of the event in an attempt to maximise the learning opportunity. The NPSA has developed a Root Cause Analysis (RCA) investigation toolkit [6] that provides a structured way of examining potential contributory factors, which they stipulate should include patient, staff, task, communication, equipment, work environment, organisational, education and training, and team factors (see Figure 3). These headings are explicitly referred to in the guidance from England and Scotland, while that from Wales refers to the importance of examining root causes. Indeed, in 2010 the NPSA produced a proforma, together with guidance, for any professionals involved in the review of intrapartum-related perinatal deaths which they suggested could also be used for the review of all perinatal deaths [7]. The aim was to elicit any avoidable factors (using the contributory factors mentioned above), identify any lessons to be learned and then to develop and disseminate an action plan.

Figure 3: Contributory factors from National Patient Safety Agency Root Cause Analysis Toolkit [5]



A number of deaths included in this confidential enquiry are stillbirths, for whom the RCOG Green-top Guideline recommends: 'All stillbirths should be reviewed in a multi-professional meeting using a standardised approach to analyse for substandard care and means of future prevention. Results of the discussion should be recorded in the mother's case record and discussed with the parents' [8]. While there is explicit mention of feedback to parents within this guidance there is no more detail as to what should be included within the review.

9.4 Findings from the confidential enquiry

Documentation relating to internal review of each case was requested from all Trusts and Health Boards that were included in the confidential enquiry. For the purposes of this chapter the results will be presented for those babies who were stillborn, those for whom resuscitation on the delivery suite was unsuccessful and those who died following admission to the neonatal unit, as well as for the total number of cases reviewed. As demonstrated in Table 11, below, 95% of cases had been reviewed within their Trusts / Health Boards, which is reassuring.

Table 11: Number of reviews received

Stillbirths with no attempt at resuscitation (n=12)	Stillbirths with unsuccessful resuscitation (n=28)	Neonatal deaths (n=38)	Total (n=78)
12	25	37	74 *(95%)*

9.5 Root cause analysis

As detailed earlier, the NHS England recommendation is that a Serious Incident Framework is used to review the case and that that should contain an RCA. Table 12 details the title of each local review and whether it contained an RCA.

Table 12: Title of the local review and whether the review contained a root cause analysis

Title of review	Proportion of reviews of stillbirths containing RCAs	Proportion of reviews of unsuccessful resuscitation containing RCAs	Proportion of reviews of death on neonatal units containing RCAs	Total proportion of reviews
Serious incident review	4/5	5/6	7/ 7	16/18 *(89%)*
Root cause analysis	0/1	8/9	9/9	17/19 *(89%)*
Investigation/ Trust report	4/6	4/9	5/15	13/30 *(43%)*
Meeting summary	0	0/1	0/4	0/5 *(0%)*
Datix/ PowerPoint	0		0/2	0/2 *(0)%*
TOTALS	**8/12**	**17/25**	**21/37**	**46/74 *(62%)***

Of the reviews undertaken, 46 out of 74 (62%) contained an analysis of the contributory factors and these were examined for key components recommended by the NPSA RCA toolkit: namely, an executive summary, a chronology, and recommendations for actions with a person and date associated with the action. We also looked at whether the review contained the listed contributory factors as detailed in Figure 3, above.

Table 13: Comparison of reviews which contained root cause analysis with key components of the contents based on National Patient Safety Agency recommendations

	Stillbirth (n=8)		Unsuccessful resuscitation (n=17)		Death on neonatal unit (n=21)		Total (n=46)	
Root cause analysis	**n**	***%***	**n**	***%***	**n**	***%***	**n**	***%***
Executive summary	7	*88*	6	*35*	14	*67*	27	*59*
Appropriate chronology	8	*100*	14	*82*	15	*71*	37	*80*
Actions	6	*75*	17	*100*	18	*86*	41	*89*
Person responsible for actions	5	*63*	16	*94*	16	*76*	37	*80*
Timeline for actions	5	*63*	15	*88*	14	*67*	34	*74*
Contributory factors identified								
All nine individual NPSA contributory factors	2	*20*	5	*32*	1	*5*	8	*17*
Some contributory factors identified using NPSA headings	1	*10*	1	*7*	4	*19*	6	*13*
Some contributory factors identified using different headings	1	*10*	1	*7*	1	*5*	3	*7*
Some factors identified using mixed headings	0	*0*	1	*7*	0	*0*	1	*2*
Overall factors identified in summary paragraph only	2	*25*	8	*70*	10	*48*	20	*43*
No contributory factors identified	2	*20*	1	*7*	5	*25*	8	*17*

Of the reviews which contained root cause analysis just over half (59%) had an executive summary. An appropriate chronology was included for 80% of those babies who died and actions were recommended in 89%. A person responsible for the actions in the action plan was identified for 80% with an associated timeline in 74%. All of the recommended individual root causes were considered in eight reviews which, overall, represents only 11% of the 74 deaths reviewed.

9.6 Composition of the panel

The guidance available suggests that the review panel should be multidisciplinary and we looked at the people documented as being involved in the reviews.

Table 14: Person(s) documented as present at review

Person	Stillbirth (n=12)	Unsuccessful resuscitation (n=25)	Death on neonatal unit (n=37)	Total reviews (n=74)	
				n	%
Number of reviews					
Obstetrician	8	18	26	52	*70*
Midwife	9	23	24	56	*76*
Neonatologist	0	8	16	24	*32*
Pathologist	0	0	2	2	*3*
Anaesthetist	0	3	4	7	*9*
Senior manager	8	9	16	33	*45*
Risk manager	7	23	22	52	*70*
Neonatal nurse	0	0	3	3	*4*
Parent	0	3	2	5	*7*
External person	1	3	5	9	*12*
Overall composition					
Multidisciplinary panel	11	24	29	64	*86*
Single reviewer	0	1	3	4	*5*
Unknown composition	1	0	5	6	*8*

A multidisciplinary panel was involved in the vast majority of reviews (86%) but a pathologist was only documented as being present in 3% of reviews, parents as being involved in 7% and an external person present in 12% of reviews.

We then considered further who we felt should be present at the Trust / Health Board reviews for each of these deaths. Accepting that the majority were reviewed by a multidisciplinary group (64 out of 74; 86%), as recommended by national guidance, we felt that the exact composition of the group was sometimes lacking, particularly regarding the inclusion of a neonatologist. For review of a stillbirth it could be argued that an obstetrician and midwife should always be present and this was the case for 7 out of 12 deaths (58%). For the babies where resuscitation was unsuccessful a neonatologist should be included in this core membership but this was only the case for 6 out of 25 cases (24%). For the babies that died on the neonatal unit we felt the core membership should comprise an obstetrician, a midwife and neonatologist and a neonatal nurse, but this was only the case for 2 out of 37 deaths (5%). It could be that these clinicians were present as either risk managers or senior managers, who were more frequently documented as being present, but detail is lacking to enable us to be sure. While a neonatologist was present for 24 out of 62 of the reviews, the composition of the group was optimal (as described above) in only 8 out of 62 (13%) of the cases.

The potential consequences on the quality of the review of not having a multidisciplinary review team are illustrated in Vignette 33.

Vignette 33: Example of the effect of having a single reviewer on the quality of the review

A 27-year-old woman in her first pregnancy was booked for antenatal care at 11 weeks. She was low risk and had an uneventful antenatal period. When she self-referred in labour at 40 weeks it was noted that there was blood stained liquor draining. This was not considered to be abnormal and the woman went on to labour in a birthing pool. Further documentation of blood loss was scant throughout the maternal record. There was a prolonged active second stage of labour with documentation of active pushing for three and a half hours without escalation or review. There was an absence of fetal heart rate monitoring in the 30 minutes preceding the birth of the baby, who was born in poor condition. Immediate care at birth was appropriate, although there was a delay in calling for the neonatal team and the baby was not intubated until five and a half minutes after birth. Following resuscitation the baby was transferred to the neonatal unit for cooling but some days later re-orientation of care was discussed with the parents and the baby died. Subsequent review undertaken by a single health care professional failed to review any of the care in the intrapartum period and categorised the death as 'expected'.

9.7 Recommended actions following review

As detailed within national guidance the review should include actions and recommendations made to improve care and these actions should be identified as being either individual or institutional. Table 15 illustrates that there is still a substantial focus on the actions of individuals.

Table 15: Frequency of individual and institutional actions identified from reviews

	Stillbirths (n=12)	Unsuccessful resuscitation on delivery suite (n=25)	Neonatal death (n=37)	Total reviews (n=74)	
				n	%
Individual	8	21	21	50	*68*
Institutional	8	23	27	58	*78*

Audit was recommended to ensure change had occurred in only 12 out of 74 (16%) of the reviews; two within the reviews of stillbirths, six within those cases in which resuscitation was unsuccessful and four within the reviews of the neonatal deaths.

Vignette 34: Example of a poor action and audit plan

A multiparous woman with a history of caesarean section had continuous abdominal pain throughout her pregnancy and eventually decided to attempt a VBAC. She was admitted in labour at 5cm dilation and progressed well over the next two hours to 9cm when she had some vaginal bleeding and her contractions suddenly stopped. None of the team involved recognised the possible significance of this or that the uterus could have ruptured. The locum registrar reviewed the woman and, on the telephone advice of the resident consultant, commenced syntocinon infusion to increase the contractions. This continued for the next two hours with the contractions becoming more frequent and the fetal heart rate increasingly difficult to monitor. Following a rapid review by the consultant the woman was taken to the operating theatre for caesarean section. The baby was stillborn and the mother was found to have a ruptured uterus and bladder. Her blood loss was between three and four litres and she was transferred for care on ITU. A full review was undertaken which identified the issues but included weak actions (reflection / training / update guidance), with no timeline or person responsible for ensuring the actions were carried out.

9.8 The quality of the review

The quality of the reviews was also considered by the multidisciplinary confidential enquiry panels and the results are detailed below. These demonstrate room for improvement, with 43% of reviews considered by the panels to be of poor quality.

Table 16: Assessment of quality of the local review by the multidisciplinary confidential enquiry panels

	Stillbirths (n=12)	Unsuccessful resuscitation on delivery suite (n=25)	Neonatal death (n=37)	Total reviews (n=74)	
				n	%
Good	3	8	9	20	*27*
Adequate	4	8	8	20	*27*
Poor	5	9	18	32	*43*
Not assessed	0	0	2	2	*3*

Vignette 35 illustrates an example of one of the poor quality reviews.

Vignette 35: Example of a poor review

A woman in her early thirties booked early in her first pregnancy. Her first language was not English. Previous medical history was appropriately noted and documented. The antenatal period was unremarkable until self-referral at 41 weeks with concerns around fetal movements and vaginal loss. The CTG was wrongly categorised as normal and the meconium-stained liquor was described as 'thrush'. Over the next 36 hours there was a continued failure to recognise the CTG as abnormal or the significance of the presence of meconium. No management plan was made and the woman was discharged home. She returned two days later with a second episode of reduced fetal movements. The CTG was recognised as abnormal and birth by emergency caesarean section was undertaken. The baby was born in poor condition and resuscitation was unsuccessful. The review was undertaken by a multidisciplinary group. It failed to identify that there had been incorrect classification of the CTG on the first admission and went on to state that it was "uncertain" whether induction of labour at first admission would have led to a "different outcome".

9.9 Conclusions and discussion

While the majority of intrapartum-related deaths were reviewed (74 out of 78; 95%), nearly half of the reviews were lacking in quality. Review should be undertaken using a 'Serious Incident Framework' and should include review of contributory factors / root causes. While root cause analysis was documented in 62% of reviews, consideration of the nine contributory factors (as recommended by NPSA) was documented in only one in ten reviews. Multidisciplinary panels reviewed 86% of deaths, but for those babies whose care included input from the neonatal team this was only documented for 13% of reviews. Parents were documented as being involved in only 7% and an external person in 12% of reviews. Actions were recommended in the majority of cases as a result of the reviews: individual actions in 68% and institutional actions in 78%. The quality of reviews was assessed by the multidisciplinary confidential enquiry panels and considered to be good for 27%, adequate for 27% and poor for 43%.

Findings of this nature have previously been identified by a confidential enquiry into intrapartum-related deaths undertaken by the West Midlands Perinatal Institute in October 2010 [9]. For the 25 cases they reviewed they reported great variation in the maternity unit reviews, little collaboration between obstetricians and neonatologists, and a lack of actions arising from the reviews, with no clear plans for implementation or monitoring. The quality of review of perinatal death has also been questioned by evidence from the MBRRACE-

UK confidential enquiry into antenatal, term, normally formed stillbirths [9] where we found that only 23% of cases had a review carried out, with only 10% being undertaken according to RCOG guidance [9].

Within maternity care the quality of review was questioned by the Morecambe Bay Investigation [10] which warned about the consequences of not conducting thorough reviews or learning from adverse outcomes following maternal and perinatal deaths. Shah and colleagues [11] also examined severe maternal morbidity serious incident reviews from six UK Trusts and identified that the care of some women who had severe morbidities was not reviewed and, in those that were, key issues affecting the outcome were not always identified, nor were lessons evidenced as being learned.

National initiatives to improve review of death

A recent review entitled 'Learning, candour and accountability' by the Care Quality Commission found that the NHS is missing opportunities to learn from patient deaths and that too many families are not being included or listened to when an investigation happens [12]. This has led to national guidance for England on the review of death which includes a framework for identifying, reporting, investigating and learning from deaths in care [13]. This recommends that Trust boards should include an existing executive and non-executive director to be responsible for oversight of the process. Providers should review and enhance skills and training to support review and should have a clear policy for engagement with bereaved families and carers. Trusts should use an evidence-based methodology for reviewing quality of care - they suggest the 'Structured Judgement Review' method as one such approach but do not mandate its use and mention the National Mortality Perinatal Review Tool discussed below for use in maternity care. This new programme from the Royal College of Physicians will help standardise review of death under the 'National Mortality Case Record Programme' [14] and more detail can be found on their website.

Within maternity care, Each Baby Counts is a national quality improvement programme by the RCOG, launched in October 2014, which aims to halve the number of babies who die or are left severely disabled as a result of preventable incidents occurring during term labour (i.e. after 37 weeks) by 2020. Cases of intrapartum stillbirth, neonatal death and severe brain injury within seven days of birth are included. The objective is to establish UK surveillance and to undertake ongoing analysis of the reviews of the cases undertaken by the local Trusts. These are submitted to the Each Baby Counts team and two independent assessors assess if there is adequate information within the review and, where possible, assess the quality of the review and classify the care given. The Each Baby Counts team analyse the data from the assessors, which provides common themes that are present, and they make recommendations to improve care and to prevent these events from happening.

National Perinatal Mortality Review Tool

The need to improve the quality of perinatal death review has been recognised and the newly established PMRT collaboration, led by MBRRACE-UK, has been commissioned by HQIP on behalf of the Department of Health (England), and the Scottish and Welsh Governments to lead the development, implementation and maintenance of the National Perinatal Mortality Review Tool (PMRT). The development builds on the work of the Department of Health/Sands Perinatal Mortality Review Task and Finish Group. The PMRT is being designed and pilot tested with user and parent involvement to support high quality standardised perinatal reviews on the principle of 'review once, review well'. The aims of the PMRT programme are given in Box 1. Training materials to support the conduct of high quality reviews and the use of the tool are being developed. More information is available on the PMRT website: www.npeu.ox.ac.uk/pmrt.

Box 1: The aim of the National Perinatal Mortality Review Tool programme

The aim of the PMRT programme is to iteratively develop, implement and maintain standardised perinatal mortality reviews across NHS maternity and neonatal units in England, Scotland and Wales. The tool will support:

- systematic, multidisciplinary, high quality reviews of the circumstances and care leading up to and surrounding stillbirth and neonatal death;
- active communication with parents to ensure they are told that a review of their care and that of their baby will be carried out and how they can contribute to the process;
- a structured process of review, learning, reporting and actions to improve future care;
- coming to a clear understanding of why each baby died, accepting that this may not always be possible even when full clinical investigations have been undertaken; this will involve a grading of the care provided;
- production of a report for parents which includes a meaningful, plain English explanation of why their baby died and whether, with different actions, the death of their baby might have been prevented;
- other reports from the tool which will enable organisations providing and commissioning care to identify emerging themes across a number of deaths to support learning and changes in the delivery and commissioning of care to improve future care and prevent those future deaths which are avoidable;
- production of national reports of the themes and trends associated with perinatal deaths to enable national lessons to be learned from the nationwide system of reviews.

Parents whose baby has died have the greatest interest of all in the review of their baby's death. Alongside the national annual reports a lay summary of the main technical report will be written specifically for families and the wider public. This will help local NHS services and baby loss charities to help parents engage with the local review process and improvements in care.

It is clear from the findings of this confidential enquiry that there is significant room for improvement when it comes to the quality of review of term intrapartum stillbirth and intrapartum-related neonatal deaths. The introduction of the national PMRT, along with the guidance and training that will come with it, should improve the situation. In the meantime, organisations should define how case reviews will be conducted as well as the constitution of the review panels. Time, resource and training for staff to undertake reviews should be provided. Families should be informed that a review will take place and offered the opportunity for their perspectives and any concerns about the care they received to be considered in the review process. Such an approach will ensure as far as possible that families receive a clear explanation as to why their baby died, and will enable organisations to learn from and therefore prevent future avoidable deaths.

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Appendices

A1. Panel guidance and evaluation form

MBRRACE-UK 2016/17 Perinatal Confidential Enquiry into: intrapartum stillbirth and intrapartum-related neonatal death ≥ 37 weeks

Case review panel member guidance and training

Thank you for agreeing to take part in the confidential enquiry into term intrapartum stillbirth and intrapartum-related neonatal death at ≥ 37 weeks, including multiple births and non-lethal congenital anomalies. The purpose of the enquiry is to look at quality of care, identifying aspects of both good practice and aspects where there is a need for improvement. By way of preparation for the process, this document sets out the key steps in the process and the general principles that will be applied.

Preparation for the enquiry process

The cases to be reviewed have been randomly selected from cases reported to MBRRACE-UK for babies born during 2015. Approximately 100 cases have been selected to form the basis of the confidential enquiry and have been chosen to represent a geographical spread across the UK. The case notes of the selected cases have been anonymised to safeguard the identity of the babies and families involved. A Topic Expert Group was convened to steer the enquiry (a multidisciplinary group comprising of clinical experts and a patient representative. The aim of this document is to provide a framework against which cases can be assessed.

The assessment process

You will be asked whether you are able to attend an assessment panel on a particular date and once it is clear that a full multidisciplinary team can be convened (joining by telephone will not be acceptable) all the members of the assessment team will receive a confirmed date and venue (we will do our best to make travel arrangements as easy as possible). The meeting will generally last the whole day. Each meeting will comprise a maximum of 12 panel members of mixed specialty and will be chaired by one of the MBRRACE-UK team.

Approximately one month ahead of the meeting you will be given access to the case notes of the cases to be discussed on that day. You will be asked to read all of the cases and “score” the care. In addition one or perhaps two cases will be identified for which you will be asked to lead the presentation at the face to face consensus meeting.

When you attend case review panel consensus meetings the Chair (neutral) will re-iterate the principles of the process and answer any questions prior to the start of the meeting. During the course of the case review panel meetings each case will be discussed with the aim of resolving any differences of opinion about the standard of care provided. At the end of each discussion a confidential enquiry case summary form based on the panel review will be completed. The final consensual assessment of each case will be collated by the MBRRACE-UK team.

Access to case notes

All details of allocated cases (surveillance data, case notes, post-mortem report and local review) will be available for viewing ***only*** via a secure online high compliance system. Full details for accessing the anonymised notes via the case viewer will be provided to each case reviewer in an email, as well as an invitation to access an online demonstration of the system before the review process begins. Please note: all users of the MBRRACE-UK system are required to complete and return our confidentiality statement and declaration of interest form, before access is granted to view the selected cases [see below].

Panel members will access the case notes they have been allocated online and assess each case using the standard form. As a case review panel member you will be sent copies of the assessment forms by the MBRRACE-UK office and instructed to complete the forms for each case allocated for review. A summary score will be determined for inclusion in the final report.

For the purposes of this enquiry, we will consider the outcome for the baby and for the mother separately.

Anonymisation of cases

All cases will be supplied in an anonymised format and no attempt should be made to try to identify the identity of cases.

We have developed a form to support the review process. The assessment form asks the reviewer to consider a series of steps on the care pathway which map to the various headings on the document produced by the Topic Expert Group. It comprises questions about the quality of care at each stage using a grading system, but also includes free text boxes for reviewer's opinions or other points they wish to raise.

Categorisation of cases

For each aspect of care along the pathway, reviewers will be asked to grade the care into one of the following three categories separately for the outcome for the mother and the baby:

- ***Good care; no improvements identified***
- ***Improvements in care* identified which would have made no difference to outcome***
- ***Improvements in care* identified which may have made a difference to outcome***

(*Improvements in care should be interpreted to include adherence to guidelines, where these exist and have not been followed, as well as other improvements which would normally be considered part of good care, where no formal guidelines exist.)

At the end of the discussion of each case at the panel meeting, a consensus score will be agreed by the panel for the mother and for the baby for inclusion in the final report.

Please note that whilst the aim of the enquiry is to focus on quality of care HQIP has specific guidance that applies in any case where any deficiencies in care are of a more serious nature:

HQIP Cause for Concern Guidance

- **Death (child or adult) attributable to abuse or neglect, in any setting, but no indication of cross agency involvement (i.e. no mention of safeguarding, social services, police or LSCB).**
- **Staff member displaying:**
    - ***Abusive behaviour (including allegations of sexual assault)***
    - ***Serious professional misconduct***
    - ***Dangerous lack of competency***
    - ***But not clear if incident has been reported to senior staff***
- **Standards in care that indicate a dysfunctional or dangerous department or organisation, or grossly inadequate service provision.**

Cases felt to fulfil these criteria must be notified separately and urgently.

University of Leicester

Confidentiality statement

Confidential Enquiry Panel Assessors

MBRRACE-UK is a collaboration led from the NPEU, University of Oxford who was appointed by the Healthcare Quality Improvement Partnership ("HQIP") to deliver the national Maternal, Newborn and Infant Clinical Outcome Review Programme, including the Confidential Enquiry into Perinatal Mortality and Morbidity. The MBRRACE-UK collaborators are delighted that you have agreed to act as an MBRRACE-UK Confidential Enquiry Panel Assessor.

The appointment requires you to review case studies and to provide your written findings, conclusions and recommendations in relation to your assessment of the case. Accordingly, your appointment will involve the disclosure to you, both directly and indirectly, of confidential case materials in a variety of forms and media. In consideration of the opportunity to be involved in this project as an MBRRACE-UK Confidential Enquiry Panel Assessor, please read the terms set out below, and confirm your agreement to these terms by signing the enclosed duplicate where indicated.

In my role as an MBRRACE-UK assessor I declare that:

- I undertake not to make or keep an electronic or paper copy of the case materials with which I am provided for the purposes of MBRRACE-UK confidential enquiries.
- I will only discuss the details of any individual case (findings, conclusions and recommendations) which I assess in my role as an MBRRACE-UK assessor with other MBRRACE-UK assessors and members of the MBRRACE-UK team unless otherwise specifically authorised to do so by the MBRRACE-UK Perinatal Lead Prof Elizabeth Draper.
- I will at all times keep completely confidential any information relating to the review of individual cases, discussions with other MBRRACE-UK panel assessors and MBRRACE-UK team members, and any other aspects of my role as an MBRRACE-UK panel assessor.
- Should I recognise a case from my clinical work, medico-legal work or some other set of circumstances I will immediately stop reviewing the case and declare this prior knowledge to the MBRRACE-UK Perinatal Lead Prof Elizabeth Draper, or to the MBRRACE-UK Lead Prof Jenny Kurinczuk. I understand that depending upon the circumstances it may be necessary to reallocate the case.
- Having reviewed an individual case for the purposes of the MBRRACE-UK confidential enquiries should I encounter this case at any point in the future in relation to medico-legal work or any other similar work, that I will declare a conflict of interest and withdraw from that work thereby ensuring that I do not make use of any privileged information arising from my involvement in MBRRACE-UK for any other purposes and that all such activities are kept completely separate and confidential.
- In the course of my work for MBRRACE-UK that I understand that I am bound by my usual professional code of conduct.
- I understand that this agreement will extend in perpetuity beyond my tenure as an MBRRACE-UK panel assessor.

Signature: …… Date: _____/_____/_____

Name: ……

Declaration of Relevant Interests form

Name:	

Relevant paid interests (it is not necessary to disclose the amount):
Other relevant interests (e.g. membership of organisations or unpaid work):
Relevant interests of the panel assessor personal partner and other close family members:
Is there any other information which would be deemed reasonable for the MBRRACE-UK team to be informed of that could give rise to a conflict or perceived conflict of interest with the MBRRACE-UK Confidential Enquiry work?

I have declared above all current, relevant interests and I will identify any future interests to the MBRRACE-UK team if and when they arise.

Signed …….. Date ……/……/……../

Name……

Current Standards and Guidelines

The table below lists the current standards and guidelines for good practice. These are available to you for reference when evaluating the care provision from the case notes allocated to you for review. Please click on the web link for direct access to the full guidance (right click, then choose the "open hyperlink" option).

It is not possible to grade the presence or absence of good clinical practice markers in isolation. The markers of good clinical care set out below need to be graded within the clinical context of each individual case. What might not have influenced outcome in one case might well do so in another. How each is graded will depend on the assessor's clinical interpretation of how the various aspects of care were delivered in relation to the circumstances of the particular case being reviewed.

Standards and guidance	Applicable stage of the care pathway
NICE Clinical Guideline 62 (2008) Antenatal care for uncomplicated pregnancies	Antenatal care
NICE Quality Standard QS22 (Sep 2012) Antenatal care	Antenatal care
NICE Antenatal Pathway (2014)	Antenatal care
RCOG Standards for Maternity Care (2008)	Antenatal, intrapartum, resuscitation, postnatal, bereavement care, post-mortem examination
NICE Clinical Guideline 70 (2008) Inducing labour	Antenatal, intrapartum care
RCOG Green-top Guideline 57 (2011) Reduced fetal movements	Antenatal care
NICE Clinical Guideline 63 (2008) Diabetes in pregnancy: Management of diabetes and its complications from pre-conception to the postnatal period	Antenatal, intrapartum, postnatal care
NICE Guideline PH27 (2010) Weight management before, during and after pregnancy	Antenatal, postnatal care
NICE Quality Standard 35 (2013) Hypertension in pregnancy	Antenatal, intrapartum, postnatal care
NICE Clinical Guideline 110 (2010) Pregnancy and complex social factors: a model for service provision for pregnant women with complex social factors	Antenatal, intrapartum, resuscitation, bereavement and postnatal care
NICE Clinical Guideline 45 (2007) Antenatal and postnatal mental health	Antenatal, postnatal care

RCOG Green-top Guideline 55 (Oct 2010) Late Intrauterine Fetal Death and Stillbirth	Antenatal, intrapartum, postnatal, bereavement care, post-mortem examination
Sands Listening to Parents Report	Intrapartum, resuscitation, postnatal, bereavement care, post-mortem examination
NICE Clinical Guideline 55 (Sep 2007) ***Intrapartum care for healthy women and babies***	***Intrapartum care*** ***The cases selected for the confidential enquiry are for the deaths of babies who were born in 2015 and it is therefore unlikely that all UK hospitals implemented the new guideline below from January 2015. Please use this version of the guideline to evaluate care. Changes included in the revised edition are highlighted below***
NICE Clinical Guideline 190 (2014) Intrapartum care for healthy women and babies https://www.nice.org.uk/guidance/cg190/chapter/1-recommendations	Intrapartum care (revised version 2014) *"New recommendations have been added in a number of areas, including choosing place of birth, care during the latent first stage of labour, transfer of care, fetal assessment and monitoring during labour (particularly cardiotocography compared with intermittent auscultation) and management of the third stage of labour."*
SANDS The Sands Audit Tool for Maternity Services (2011)	Intrapartum, resuscitation, postnatal, bereavement care, post-mortem examination
The Sands Guidelines, Pregnancy Loss and the Death of a Baby: Guidelines for Professionals (2007)	Resuscitation, bereavement care, post-mortem examination
RCUK Guideline: Resuscitation and support of transition of babies at birth (2015)	Resuscitation care
BAPM Service Standards for Hospitals Providing Neonatal Care 3rd Ed (2010)	Neonatal care
NICE Clinical Guideline 37 (2006) Postnatal care up to 8 weeks after birth	Postnatal care
Human Tissue Authority (2009) Code of Practice 3 Post-Mortem Examination	Post-mortem examination
Royal College of Pathologists' Guidelines on autopsy practice	Post-mortem examination
Royal College of Pathologists' Tissue pathway for histopathological examination of the placenta	Placental histology

Supporting information for MBRRACE-UK 2016/17 Perinatal Confidential Enquiry into: intrapartum stillbirth and intrapartum-related neonatal death > 37 weeks

Antenatal Risk Factors

– taken from NPSA Review of intrapartum-related perinatal deaths

Maternal risk factors include all maternal medical conditions which are either pre-existing or develop during pregnancy. An example of failure to identify risk factors would include the failure to involve a physician or diabetes nurse specialist in the care of a woman with type 1 diabetes.

The following is not an exhaustive list, but consideration should be given to:

- cardiac disease, including hypertension;
- renal disease;
- endocrine disorders or diabetes requiring insulin;
- psychiatric disorders (being treated with medication);
- haematological disorders;
- autoimmune disorders;
- epilepsy requiring anticonvulsant drugs;
- malignant disease;
- severe asthma.

Attention also needs to be paid to the patient's previous medical and social history including, for example, previous pregnancies, maternal weight, maternal drug/alcohol use, HIV/HBV infection, maternal age over 40, and if the mother was a heavy smoker. Other factors may include:

- recurrent miscarriage (three or more consecutive pregnancy losses or a mid-trimester loss);
- preterm birth;
- severe previous pre-eclampsia, (H) haemolytic anaemia, (EL) elevated liver enzymes, and (LP) low platelet count (HELLP syndrome) or eclampsia;
- rhesus isoimmunisation or other significant blood group antibodies;
- uterine surgery including caesarean section, myomectomy or cone biopsy;
- previous puerperal psychosis;
- grand multiparity (more than six pregnancies);
- previous stillbirth or neonatal death;
- previous small for gestational age infant (below 5th centile) or large for gestational age infant (above 95th centile);
- a previous baby weighing below 2.5 kg or above 4.5 kg;
- a previous baby with a congenital abnormality (structural or chromosomal).

NICE Intrapartum Guideline 2014

Medical conditions indicating increased risk suggesting planned birth at an obstetric unit

Disease area	Medical condition
Cardiovascular	Confirmed cardiac disease Hypertensive disorders
Respiratory	Asthma requiring an increase in treatment or hospital treatment Cystic fibrosis
Haematological	Haemoglobinopathies – sickle-cell disease, beta-thalassaemia major History of thromboembolic disorders Immune thrombocytopenia purpura or other platelet disorder or platelet count below 100×10^9/litre Von Willebrand's disease Bleeding disorder in the woman or unborn baby Atypical antibodies which carry a risk of haemolytic disease of the newborn
Endocrine	Hyperthyroidism Diabetes
Infective	Risk factors associated with group B streptococcus whereby antibiotics in labour would be recommended Hepatitis B/C with abnormal liver function tests Carrier of/infected with HIV Toxoplasmosis – women receiving treatment Current active infection of chicken pox/rubella/genital herpes in the woman or baby Tuberculosis under treatment
Immune	Systemic lupus erythematosus Scleroderma
Renal	Abnormal renal function Renal disease requiring supervision by a renal specialist
Neurological	Epilepsy Myasthenia gravis Previous cerebrovascular accident
Gastrointestinal	Liver disease associated with current abnormal liver function tests
Psychiatric	Psychiatric disorder requiring current inpatient care

Other factors indicating increased risk suggesting planned birth at an obstetric unit

Factor	Additional information
Previous complications	Unexplained stillbirth/neonatal death or previous death related to intrapartum difficulty Previous baby with neonatal encephalopathy Pre-eclampsia requiring preterm birth Placental abruption with adverse outcome Eclampsia Uterine rupture Primary postpartum haemorrhage requiring additional treatment or blood transfusion Retained placenta requiring manual removal in theatre Caesarean section Shoulder dystocia
Current pregnancy	Multiple birth Placenta praevia Pre-eclampsia or pregnancy-induced hypertension Preterm labour or preterm pre-labour rupture of membranes Placental abruption Anaemia – haemoglobin less than 85 g/litre at onset of labour Confirmed intrauterine death Induction of labour Substance misuse Alcohol dependency requiring assessment or treatment Onset of gestational diabetes Malpresentation – breech or transverse lie BMI at booking of greater than 35 kg/m^2 Recurrent antepartum haemorrhage Small for gestational age in this pregnancy (less than fifth centile or reduced growth velocity on ultrasound) Abnormal fetal heart rate/Doppler studies Ultrasound diagnosis of oligo-/polyhydramnios
Previous gynaecological history	Myomectomy Hysterotomy

Medical conditions indicating individual assessment when planning place of birth

Disease area	Medical condition
Cardiovascular	Cardiac disease without intrapartum implications
Haematological	Atypical antibodies not putting the baby at risk of haemolytic disease Sickle-cell trait Thalassaemia trait Anaemia – haemoglobin 85–105 g/litre at onset of labour
Infective	Hepatitis B/C with normal liver function tests
Immune	Non-specific connective tissue disorders
Endocrine	Unstable hypothyroidism such that a change in treatment is required
Skeletal/neurological	Spinal abnormalities Previous fractured pelvis Neurological deficits
Gastrointestinal	Liver disease without current abnormal liver function Crohn's disease Ulcerative colitis

Other factors indicating individual assessment when planning place of birth

Factor	Additional information
Previous complications	Stillbirth/neonatal death with a known non-recurrent cause Pre-eclampsia developing at term Placental abruption with good outcome History of previous baby more than 4.5 kg Extensive vaginal, cervical, or third- or fourth-degree perineal trauma Previous term baby with jaundice requiring exchange transfusion
Current pregnancy	Antepartum bleeding of unknown origin (single episode after 24 weeks of gestation) BMI at booking of 30–35 kg/m^2 Blood pressure of 140 mmHg systolic or 90 mmHg diastolic or more on two occasions Clinical or ultrasound suspicion of macrosomia Para 4 or more Recreational drug use Under current outpatient psychiatric care Age over 35 at booking
Fetal indications	Fetal abnormality
Previous gynaecological history	Major gynaecological surgery Cone biopsy or large loop excision of the transformation zone Fibroids

Transfer the woman to obstetric-led care, following the general principles for transfer of care described in Section 1.6 [of clinical guideline 190], if any of the following are observed on initial assessment:

- Observations of the woman:
  - pulse over 120 beats/minute on 2 occasions 30 minutes apart
  - a single reading of either raised diastolic blood pressure of 110 mmHg or more or raised systolic blood pressure of 160 mmHg or more
  - either raised diastolic blood pressure of 90 mmHg or more or raised systolic blood pressure of 140 mmHg or more on 2 consecutive readings taken 30 minutes apart
  - a reading of 2+ of protein on urinalysis and a single reading of either raised diastolic blood pressure (90 mmHg or more) or raised systolic blood pressure (140 mmHg or more)
  - temperature of 38°C or above on a single reading, or 37.5°C or above on 2 consecutive readings 1 hour apart
  - any vaginal blood loss other than a show
  - rupture of membranes more than 24 hours before the onset of established labour (see recommendation 1.15.25)
  - the presence of significant meconium (see recommendation 1.5.2)
  - pain reported by the woman that differs from the pain normally associated with contractions
  - any risk factors recorded in the woman's notes that indicate the need for obstetric led care.
- Observations of the unborn baby:
  - any abnormal presentation, including cord presentation
  - transverse or oblique lie
  - high (4/5–5/5 palpable) or free-floating head in a nulliparous woman
  - suspected fetal growth restriction or macrosomia
  - suspected anhydramnios or polyhydramnios
  - fetal heart rate below 110 or above 160 beats/minute
  - a deceleration in fetal heart rate heard on intermittent auscultation
  - reduced fetal movements in the last 24 hours reported by the woman.

  If none of these are observed, continue with midwifery-led care unless the woman requests transfer (see also recommendation 1.4.10). **[new 2014]**

1.4.4 If any of the factors in recommendation 1.4.3 are observed but birth is imminent, assess whether birth in the current location is preferable to transferring the woman to an obstetric unit and discuss this with the coordinating midwife. **[new 2014]**

Transfer the woman to obstetric-led care (following the general principles for transfer of care described in section 1.6 [of clinical guideline 190]) if any of the following are observed at any point, unless the risks of transfer outweigh the benefits:

- Observations of the woman:
  - pulse over 120 beats/minute on 2 occasions 30 minutes apart
  - a single reading of either raised diastolic blood pressure of 110 mmHg or more or raised systolic blood pressure of 160 mmHg or more
  - either raised diastolic blood pressure of 90 mmHg or more or raised systolic blood pressure of 140 mmHg or more on 2 consecutive readings taken 30 minutes apart
  - a reading of 2+ of protein on urinalysis and a single reading of either raised diastolic blood pressure (90 mmHg or more) or raised systolic blood pressure (140 mmHg or more)
  - temperature of 38°C or above on a single reading, or 37.5°C or above on 2 consecutive occasions 1 hour apart
  - any vaginal blood loss other than a show
  - the presence of significant meconium (see recommendation 1.5.2)
  - pain reported by the woman that differs from the pain normally associated with contractions
  - confirmed delay in the first or second stage of labour
  - request by the woman for additional pain relief using regional analgesia
  - obstetric emergency – including antepartum haemorrhage, cord prolapse, postpartum haemorrhage, maternal seizure or collapse, or a need for advanced neonatal resuscitation
  - retained placenta
  - third-degree or fourth-degree tear or other complicated perineal trauma that needs suturing.
- Observations of the unborn baby:
  - any abnormal presentation, including cord presentation
  - transverse or oblique lie
  - high (4/5–5/5 palpable) or free-floating head in a nulliparous woman
  - suspected fetal growth restriction or macrosomia
  - suspected anhydramnios or polyhydramnios
  - fetal heart rate below 110 or above 160 beats/minute
  - a deceleration in fetal heart rate heard on intermittent auscultation.

  If none of these are observed, continue with midwifery-led care unless the woman requests transfer (see also recommendation 1.4.10). **[new 2014]**

1.4.1.3 Offer women with gestational hypertension an integrated package of care covering admission to hospital, treatment, measurement of blood pressure, testing for proteinuria and blood tests as indicated in [the following table 'Management of pregnancy with gestational hypertension']:

Management of pregnancy with gestational hypertension

Degree of hypertension	Mild hypertension (140/90 to 149/99 mmHg)	Moderate hypertension (150/100 to 159/109 mmHg)	Severe hypertension (160/110 mmHg or higher)
Admit to hospital	No	No	Yes (until blood pressure is 159/109 mmHg or lower)
Treat	No	With oral labetalol† as first-line treatment to keep: diastolic blood pressure between 80–100 mmHg systolic blood pressure less than 150 mmHg	With oral labetalol† as first-line treatment to keep: diastolic blood pressure between 80–100 mmHg systolic blood pressure less than 150 mmHg
Measure blood pressure	Not more than once a week	At least twice a week	At least four times a day
Test for proteinuria	At each visit using automated reagent-strip reading device or urinary protein:creatinine ratio	At each visit using automated reagent-strip reading device or urinary protein:creatinine ratio	Daily using automated reagent-strip reading device or urinary protein:creatinine ratio
Blood tests	Only those for routine antenatal care	Test kidney function, electrolytes, full blood count, transaminases, bilirubin Do not carry out further blood tests if no proteinuria at subsequent visits	Test at presentation and then monitor weekly: kidney function, electrolytes, full blood count, transaminases, bilirubin

1.5.1.2 Offer women with pre-eclampsia an integrated package of care covering admission to hospital, treatment, measurement of blood pressure, testing for proteinuria and blood tests as indicated in [the following table 'Management of pregnancy with pre-eclampsia]:

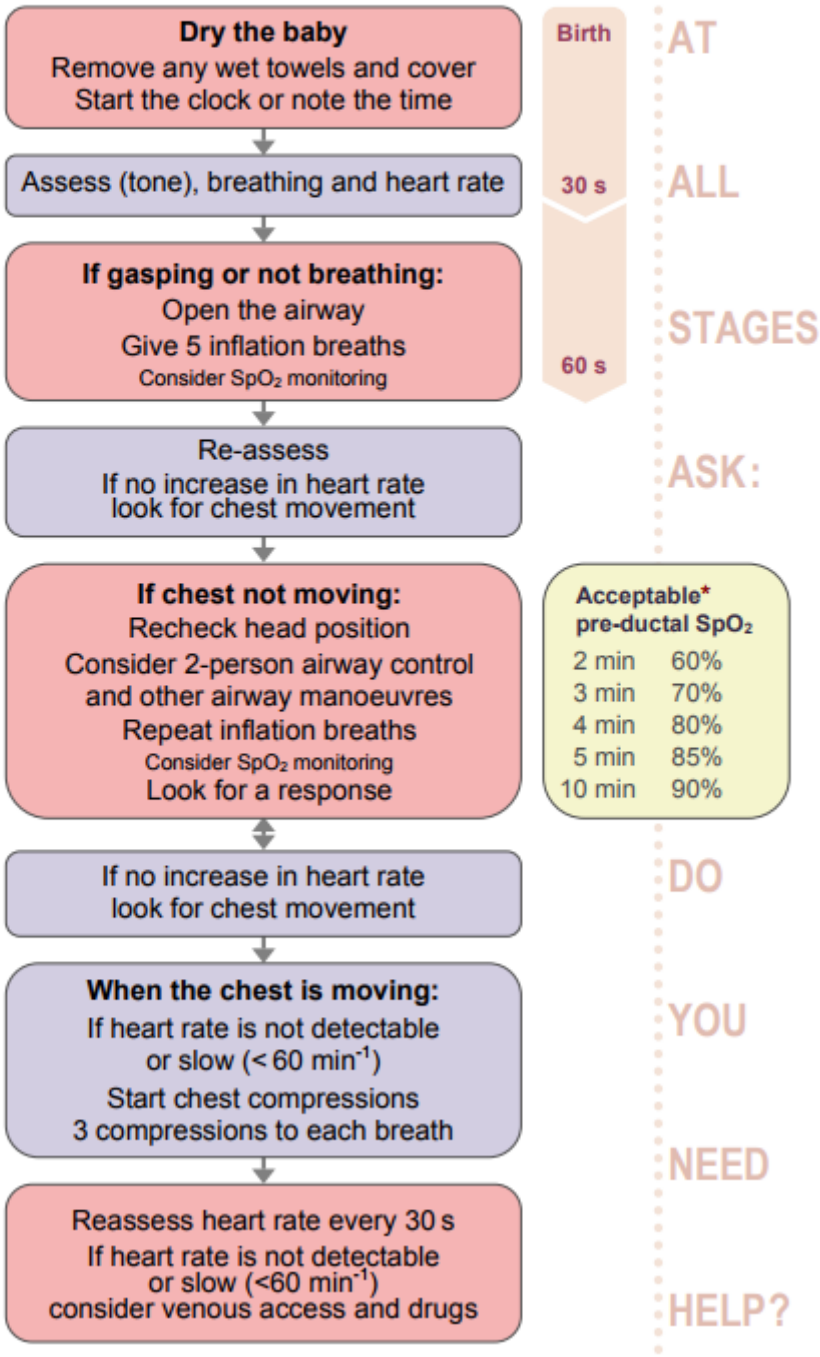
Management of pregnancy with pre-eclampsia

Degree of hypertension	Mild hypertension (140/90 to 149/99 mmHg)	Moderate hypertension (150/100 to 159/109 mmHg)	Severe hypertension (160/110 mmHg or higher)
Admit to hospital	Yes	Yes	Yes
Treat	No	With oral labetalol† as first-line treatment to keep: diastolic blood pressure between 80–100 mmHg systolic blood pressure less than 150 mmHg	With oral labetalol† as first-line treatment to keep: diastolic blood pressure between 80–100 mmHg systolic blood pressure less than 150 mmHg

Degree of hypertension	Mild hypertension (140/90 to 149/99 mmHg)	Moderate hypertension (150/100 to 159/109 mmHg)	Severe hypertension (160/110 mmHg or higher)
Measure blood pressure	At least four times a day	At least four times a day	More than four times a day, depending on clinical circumstances
Test for proteinuria	Do not repeat quantification of proteinuria	Do not repeat quantification of proteinuria	Do not repeat quantification of proteinuria
Blood tests	Monitor using the following tests twice a week: kidney function, electrolytes, full blood count, transaminases, bilirubin	Monitor using the following tests three times a week: kidney function, electrolytes, full blood count, transaminases, bilirubin	Monitor using the following tests three times a week: kidney function, electrolytes, full blood count, transaminases, bilirubin

Resuscitation Council (UK)

Newborn Life Support



Available online at: www.resus.org.uk/EasySiteWeb/GatewayLink.aspx?alId=811

MBRRACE-UK 2016/17 Perinatal Confidential Enquiry **Case number**: _____

Sub-optimal care:
0: No sub-optimal care
1: Minor sub-optimal care
2: Significant sub-optimal care
3: Major sub-optimal care

Relevance of grade of care to outcome:
0: Not relevant
1: Possibly relevant
2: Probably relevant
3: Almost certainly relevant

What:
R: Failure to recognise problem
A: Failure to act appropriately
C: Communications failure
S: Failure to supervise
H: Any lack of human resource
E: Any lack or failure of equipment
O: Other (please specify

Who:
Type of health professional or darer involved
(e.g. GP, Hospital Midwife, Obstetrician, parents)
If more than one person for this factor, write on separate lines.

No:	Antenatal care	Sub-optimal care	Relevance of grade to outcome	What	Who
1					
2					
3					
4					
5					
6					

MBRRACE-UK 2016/17 Perinatal Confidential Enquiry **Case number**: _____

Sub-optimal care:
0: No sub-optimal care
1: Minor sub-optimal care
2: Significant sub-optimal care
3: Major sub-optimal care

Relevance of grade of care to outcome:
0: Not relevant
1: Possibly relevant
2: Probably relevant
3: Almost certainly relevant

What:
R: Failure to recognise problem
A: Failure to act appropriately
C: Communications failure
S: Failure to supervise
H: Any lack of human resource
E: Any lack or failure of equipment
O: Other (please specify

Who:
Type of health professional or darer involved
(e.g. GP, Hospital Midwife, Obstetrician, parents)
If more than one person for this factor, write on separate lines.

No:	Care during labour	Sub-optimal care	Relevance of grade to outcome	What	Who
1					
2					
3					
4					
5					
6					

MBRRACE-UK 2016/17 Perinatal Confidential Enquiry **Case number**: _____

Sub-optimal care:
0: No sub-optimal care
1: Minor sub-optimal care
2: Significant sub-optimal care
3: Major sub-optimal care

Relevance of grade of care to outcome:
0: Not relevant
1: Possibly relevant
2: Probably relevant
3: Almost certainly relevant

What:
R: Failure to recognise problem
A: Failure to act appropriately
C: Communications failure
S: Failure to supervise
H: Any lack of human resource
E: Any lack or failure of equipment
O: Other (please specify

Who:
Type of health professional or darer involved
(e.g. GP, Hospital Midwife, Obstetrician, parents)
If more than one person for this factor, write on separate lines.

No:	Care at birth	Sub-optimal care	Relevance of grade to outcome	What	Who
1					
2					
3					
4					
5					
6					

MBRRACE-UK 2016/17 Perinatal Confidential Enquiry **Case number**: _____

Sub-optimal care:
0: No sub-optimal care
1: Minor sub-optimal care
2: Significant sub-optimal care
3: Major sub-optimal care

Relevance of grade of care to outcome:
0: Not relevant
1: Possibly relevant
2: Probably relevant
3: Almost certainly relevant

What:
R: Failure to recognise problem
A: Failure to act appropriately
C: Communications failure
S: Failure to supervise
H: Any lack of human resource
E: Any lack or failure of equipment
O: Other (please specify

Who:
Type of health professional or darer involved
(e.g. GP, Hospital Midwife, Obstetrician, parents)
If more than one person for this factor, write on separate lines.

No:	Resuscitation care	Sub-optimal care	Relevance of grade to outcome	What	Who
1					
2					
3					
4					
5					
6					

Sub-optimal care:
0: No sub-optimal care
1: Minor sub-optimal care
2: Significant sub-optimal care
3: Major sub-optimal care

Relevance of grade of care to outcome:
0: Not relevant
1: Possibly relevant
2: Probably relevant
3: Almost certainly relevant

What:
R: Failure to recognise problem
A: Failure to act appropriately
C: Communications failure
S: Failure to supervise
H: Any lack of human resource
E: Any lack or failure of equipment
O: Other (please specify

Who:
Type of health professional or darer involved
(e.g. GP, Hospital Midwife, Obstetrician, parents)
If more than one person for this factor, write on separate lines.

No:	Neonatal care	Sub-optimal care	Relevance of grade to outcome	What	Who
1					
2					
3					
4					
5					
6					

MBRRACE-UK 2016/17 Perinatal Confidential Enquiry **Case number**: _____

Sub-optimal care:
0: No sub-optimal care
1: Minor sub-optimal care
2: Significant sub-optimal care
3: Major sub-optimal care

Relevance of grade of care to outcome:
0: Not relevant
1: Possibly relevant
2: Probably relevant
3: Almost certainly relevant

What:
R: Failure to recognise problem
A: Failure to act appropriately
C: Communications failure
S: Failure to supervise
H: Any lack of human resource
E: Any lack or failure of equipment
O: Other (please specify

Who:
Type of health professional or darer involved
(e.g. GP, Hospital Midwife, Obstetrician, parents)
If more than one person for this factor, write on separate lines.

No:	Post-natal and bereavement care	Sub-optimal care	Relevance of grade to outcome	What	Who
1					
2					
3					
4					
5					
6					

Sub-optimal care:
0: No sub-optimal care
1: Minor sub-optimal care
2: Significant sub-optimal care
3: Major sub-optimal care

Relevance of grade of care to outcome:
0: Not relevant
1: Possibly relevant
2: Probably relevant
3: Almost certainly relevant

What:
R: Failure to recognise problem
A: Failure to act appropriately
C: Communications failure
S: Failure to supervise
H: Any lack of human resource
E: Any lack or failure of equipment
O: Other (please specify

Who:
Type of health professional or darer involved
(e.g. GP, Hospital Midwife, Obstetrician, parents)
If more than one person for this factor, write on separate lines.

No:	Follow-up visit and review of care	Sub-optimal care	Relevance of grade to outcome	What	Who
1					
2					
3					
4					
5					
6					

MBRRACE-UK 2016/17 Perinatal Confidential Enquiry **Case number**: _____

Sub-optimal care:
0: No sub-optimal care
1: Minor sub-optimal care
2: Significant sub-optimal care
3: Major sub-optimal care

Relevance of grade of care to outcome:
0: Not relevant
1: Possibly relevant
2: Probably relevant
3: Almost certainly relevant

What:
R: Failure to recognise problem
A: Failure to act appropriately
C: Communications failure
S: Failure to supervise
H: Any lack of human resource
E: Any lack or failure of equipment
O: Other (please specify

Who:
Type of health professional or darer involved
(e.g. GP, Hospital Midwife, Obstetrician, parents)
If more than one person for this factor, write on separate lines.

No:	Post-mortem/placental histology	Sub-optimal care	Relevance of grade to outcome	What	Who
1					
2					
3					
4					
5					
6					

Summary comments:

Grade of care

1: Good care; no improvements identified **Overall Grade** ☐

2: Improvements in care* identified which would have made **no difference** to outcome

3: Improvements in care* identified which **may have made a difference** to outcome

Does the overall grade relate to: Mother's health? ☐ **Care of the baby?** ☐ **Both?** ☐

A2. Checklists

MBRRACE-UK 2016/17 Perinatal Confidential Enquiry into intrapartum stillbirth and intrapartum-related neonatal death ≥ 37 weeks

Checklist for Panel Members

Antenatal care

Monitoring the growth of the baby

Was there a growth chart in the notes?	☐SFH	☐USS	☐No
Was growth measured and plotted correctly at each antenatal visit?	☐Yes	☐No	
Were abnormalities in growth appropriately responded to?	☐Yes	☐No	

Reduced fetal movements

Did the mother present with history of reduced fetal movements in late pregnancy (prior to her attendance in labour)?	☐Yes	☐No	
Was the antenatal management of reduced fetal movements appropriate?	☐Yes	☐No	
Did the mother have reduced fetal movements when she presented in labour?	☐Yes	☐No	
If so, was she then managed under Consultant care?	☐Yes	☐No	

Diabetes in pregnancy

Were any of the risk factors for gestational diabetes identified?	☐Yes	☐No	
If yes, was a glucose tolerance test offered?	☐Yes	☐No	
If the woman was diabetic or developed gestational diabetes was she managed at a joint antenatal clinic?	☐Yes	☐No	

Maternal hypertension

Was significant hypertension or proteinuria identified?	☐Yes	☐No	

Care during labour

When completing the questions below please refer to the summary document provided, relating to risk factors for place of birth and transfer to obstetric led care from the NICE intrapartum guidelines.

Place of birth

Was the place of birth appropriate for the mother's risk status?	☐Yes	☐No	
If cared for in a midwife led setting, was she transferred to an obstetric unit?	☐Yes	☐No	☐N/A

Induction of labour

Was the indication for induction of labour appropriate?	☐Yes	☐No	
Was the place of induction appropriate? (antenatal ward/Delivery suite)	☐Yes	☐No	

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Monitoring

Was there sufficient time before the birth to consider the use of a partogram?	☐Yes	☐No	
Was a partogram filed in the mother's medical case notes?	☐Yes	☐No	
If yes, was the partogram completed? **Please tick one option:**			
☐ Fully ☐ Partially ☐ Not at all			
Was the method of monitoring appropriate for the risk status	☐Yes	☐No	
Was intermittent auscultation performed?	☐Yes	☐No	
Was the frequency correct in first stage of labour? (every 15 mins after a contraction, for 1 min)	☐Yes	☐No	
Was the frequency correct in the second stage of labour (every five minutes or immediately after a contraction for a minute)	☐Yes	☐No	
Were abnormalities detected?	☐Yes	☐No	
If yes, was CTG monitoring started?	☐Yes	☐No	
Were hourly reviews of the CTG documented?	☐Yes	☐No	☐N/A
Was the quality of the CTG trace acceptable? **Please tick one option:**	☐Yes	☐No	
☐ All ☐ Some ☐ Not at all			
Did the CTG require medical review?	☐Yes	☐No	
If Yes, were there:	☐Yes	☐No	
delays in attendance of medical staff?	☐Yes	☐No	
delays in decisions by medical staff?	☐Yes	☐No	
delays in performing the procedure? (FBS or delivery)	☐Yes	☐No	
For all fetal monitoring: were there delays in referral to medical staff by the midwives?	☐Yes	☐No	

Birth

Were there any delays in deciding to expedite birth?	☐Yes	☐No	
Were there any delays in achieving birth?	☐Yes	☐No	
Were any of the following factors present? **Please tick all that apply:**			
☐ Shoulder dystocia ☐ Cord prolapse ☐ Uterine rupture			
☐ APH ☐ Pyrexia ☐ Meconium ☐ Group B Strep infection			
Did the 2nd stage of labour or birth take place in water?	☐Yes	☐No	

Neonatal care

Did the baby require resuscitation?	☐Yes	☐No	
Were there problems with the resuscitation?	☐Yes	☐No	
If Yes, were these related to **(please tick all that apply)**:			
☐ Trained resuscitator not requested to attend prior to birth			
☐ Inadequate leadership ☐ Insufficient numbers of personnel present			
☐ Overall approach to resuscitation inadequate ☐ Problems in achieving intubation			
☐ Problems with equipment ☐ Other (please specify): ……			

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Was urgent access to blood required?	☐Yes	☐No	
If Yes, was this achieved in a timely fashion?	☐Yes	☐No	
If No please specify: ……..			
Were problems with transfer to NNU from delivery suite identified?	☐Yes	☐No	☐N/A
Was there difficulty in finding appropriate neonatal bed?	☐Yes	☐No	☐N/A
Difficulty / problems in transporting baby to another hospital for cooling and or ITC?	☐Yes	☐No	☐N/A
Were there technical difficulties in relation to cooling?	☐Yes	☐No	☐N/A
Were there sub-optimal aspects of the overall intensive care provided?	☐Yes	☐No	☐N/A
Were there problems with communicating with the family in the neonatal unit?	☐Yes	☐No	☐N/A
Was the decision-making in relation to any decision to re-orientate care appropriate?	☐Yes	☐No	☐N/A

Bereavement Care

Was there a completed bereavement checklist in the notes?	☐Yes	☐No	
Who provided the bereavement care?			
☐ Obstetric/midwifery team ☐ Neonatal team			
Quality of bereavement care (**please tick one option):**			
☐ Poor ☐ Satisfactory ☐ Good ☐ Insufficient information to comment			

Communication with staff outside of the hospital setting

Was there a record of informing **(please tick all that apply)**:				
	☐ Antenatal clinic	☐ Community midwives	☐ Health visitor	
	☐ General Practitioner	☐ Others	☐ Bounty Pack	
	☐ Insufficient information to comment			

Community Midwifery Care

Was the mother seen by a community midwife?	☐Yes	☐No	☐ Insufficient information to comment
If yes, how many visits are documented?	……		

Post-mortem examination

Was it documented whether the parents were given written information about post-mortem examination?	☐Yes	☐No	

Bereavement follow-up visit

Did the follow-up appointment take place?	☐Yes	☐No	
If so, how long after the baby's death?	☐Yes	☐No	
If the follow-up appointment did not take place, was it documented why not?	☐Yes	☐No	
Was it documented whether the mother was seen by her consultant?	☐Yes	☐No	

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Was it documented whether a plan was discussed for any future pregnancy?			☐Yes	☐No
Was a letter summarising results of the review of care/investigations relating to the mother/post-mortem examination and a plan for managing future pregnancies (if relevant) sent to:			☐Yes	☐No
bereaved parents			☐Yes	☐No
General Practitioner			☐Yes	☐No
Quality of the letter to the parents **(please tick one option)**:				
☐ Good	☐ Adequate	☐ Poor – insensitive	☐ Poor - factually incorrect	
☐ Inadequate information to comment				

Duty of candour

Did the healthcare team providing care comply with guidance relating to duty of candour with the bereaved parents?	☐Yes	☐No

Availability of interpretation services

Did the mother require an interpreter?	☐Yes	☐No	
Was an interpreter provided?	☐Yes	☐No	
If yes, please tick all that apply in the table below:			

Interpreting services:	**Family member**	**Trained interpreter**	**Language Line**
Antenatal visits	☐	☐	☐
During labour & birth	☐	☐	☐
In the neonatal unit	☐	☐	☐
At the bereavement follow-up visit	☐	☐	☐

Local review of perinatal death

Was a local review of care undertaken?			☐Yes	☐No
If yes, who was involved **(please tick all that apply)**?				
☐ Midwife	☐ Obstetrician	☐ Neonatologist	☐ Pathologist	
☐ Anaesthetist	☐ Senior manager	☐ Risk Manager / Governance Lead	☐ Parents/family members	
☐ Other*	☐ External person	☐ Not recorded		
**please provide details*				
Was root cause analysis undertaken?			☐Yes	☐No
Were any of the following filed in the case notes?			☐Yes	☐No
Slide from perinatal meeting			☐Yes	☐No
Copy of Datix report			☐Yes	☐No
Summary from risk management meeting			☐Yes	☐No
Serious incident report			☐Yes	☐No
Root cause analysis			☐Yes	☐No

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Hospital review (detail if known)	☐Yes	☐No	
Review mentioned in notes but no evidence	☐Yes	☐No	
Statements from clinicians only	☐Yes	☐No	
Other (specify)	☐Yes	☐No	
Were any actions identified?	☐Yes	☐No	
If yes, were these: ☐ Individual ☐ Institutional			
Was an audit recommended to evaluate changes in practice?	☐Yes	☐No	

What was the quality of the review **(please tick <u>one</u> option):**

	☐ Good	☐ Adequate - but improvements could be made	☐ Poor - failed to identify major contributing factors

Cause of death

Was the reported cause of death appropriately attributed?	☐Yes	☐No	
If no, what was the original attribution of cause of death?			
Following the case review, what was the cause of death considered to be attributable to?			

Issues identified in the local review

Of the issues identified in the Confidential Enquiry, which were identified in the local review **(please tick <u>one</u> option)?**

	☐ All main issues identified	☐ One or more issues identified
	☐ None of the issues identified	☐ Review inadequate to assess

List issues identified at Confidential Enquiry but <u>not</u> in Review:

Case ID:

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Placental Histology Reporting

Was the following information available to the pathologist?	Yes	No	Unknown
Gestational age	☐	☐	☐
Birth-weight	☐	☐	☐
Indication for referral	☐	☐	☐

Were the following noted in the macroscopic description?	Yes	No	Unknown
Length of umbilical cord and approximate diameter	☐	☐	☐
Site of cord insertion	☐	☐	☐
Number of umbilical cord vessels	☐	☐	☐
Degree of coiling	☐	☐	☐
Appearance of the placental membranes	☐	☐	☐
Appearance of the fetal surface	☐	☐	☐
Appearance of the maternal surface (complete or incomplete, attached clot, etc)	☐	☐	☐
Weight of trimmed placental disc	☐	☐	☐
Measurement of placental disc (in 3 dimensions)	☐	☐	☐
Appearance of the cut surface (if no lesions - is this stated)	☐	☐	☐
Rough assessment of percentage of infarction, if present	☐	☐	☐
Weight of clot if received			

Was there adequate sampling for histology?	Yes	No	Unknown
One transverse section of umbilical cord	☐	☐	☐
One roll of membranes	☐	☐	☐
At least two full thickness blocks of the placental parenchyma	☐	☐	☐
At least one block of any lesion described macroscopically	☐	☐	☐

Does the report contain a microscopic description of the following?	Yes	No	Unknown
Umbilical cord	☐	☐	☐
Membranes	☐	☐	☐
Villous development (in relation to gestational age)	☐	☐	☐
Any focal lesions	☐	☐	☐
Maternal decidua (i.e. maternal vessels)	☐	☐	☐

Case ID:

Does the report contain a clinicopathological comment (where appropriate)?	Yes	No	Unknown
	☐	☐	☐

Specific considerations for twin placentas	Yes	No	Unknown
Was chorionicity established?	☐	☐	☐

In monochorionic placentas:	Yes	No	Unknown
Was the site and distance between the two umbilical cords recorded?	☐	☐	☐
Was the relative shares of the placental disc commented upon?	☐	☐	☐
Was the vasculature of the chorionic plate assessed for anastomoses?	☐	☐	☐

Overall, how would you grade the quality of this placental pathology report?

☐ **Poor** ☐ **Satisfactory** ☐ **Good** ☐ **Excellent**

A3. Guidance for anonymisation of case notes

On arrival

Storage and Identification

Identify the MBRRACE ID (normally on the accompanying checklist). If the MBRRACE ID has not been supplied, contact the lead reporter and ask them to confirm it by email.

Place the notes in a folder clearly labelled with the MBRRACE ID and case type and file in the locked filing cabinet. Cases should be stored in numerical order.

Logging arrival

Log the arrival of the case notes on the Access database.

Acknowledgment

Send an email of acknowledgement (and a thank you) to the lead reporter or person nominated to retrieve and forward the case notes. Record this in the Access database.

Checking for completeness

Please use the document checklist supplied to the Trust with the initial request. Identify any missing sections and request them from the Trust as soon as possible. Once a set of notes has been confirmed as complete record this in the database.

Do not review more than one set of notes at once.

Structure and ordering

Please use the following section breaks to divide up the case notes and insert dividers into the appropriate place in the case notes:

- Antenatal care
- Scans and reports
- Correspondence
- Intrapartum care
- CTGs
- Anaesthetic/Post-operative care
- Maternal prescription charts
- Laboratory reports
- Postnatal care
- Resuscitation care
- Neonatal care
- Neonatal prescription charts
- Neonatal laboratory reports
- Bereavement and follow-up care
- Post-mortem examination/Placenta histology/Coroner or Procurator Fiscal's report
- Local perinatal mortality review

Order the sections chronologically in the above order. All charts (except ultrasounds and antenatal diagnostic tests which should be filed under 'antenatal' at the back in chronological order) may be filed separately from the main body of the notes. If a test is repeated e.g. blood tests, these may be filed together for comparison to help the reviewer understand the progress of the case.

Synopsis sheet

Create a synopsis sheet for the panel reviewer providing a chronological summary of all key events in the care of the mother and baby. This is to be placed at the beginning of each set of case notes.

When not being reviewed ensure that the case notes are filed in a secure filing cabinet, the cabinet is locked and this key is locked in the key cabinet.

Case notes requiring total removal of all patient identifiers

Scan and import the notes using the MBRRACE case ID as the file name.

The redaction process

Import the case note file into Adobe Acrobat DC and save using the MBRRACE ID as the filename. Obscure the following information using the redaction facility.

- Mother's name (replace with "mother")
- Baby's name (replace with "baby)
- Mother's or baby's NHS number
- Father/partner/other relative's name (replace with "father" or as appropriate)
- Mother's exact DOB (leave the year)
- Information relating to other siblings e.g. names/exact DOB (Leave the Year and type of birth)
- Addresses of family members
- Telephone numbers

Do not obscure the following:

- Race or religion
- Occupation of mother & partner/father
- Age of mother
- Birth year of mother
- Birthweight of baby (or previous pregnancies)
- Birth year of previous pregnancies, type of delivery and outcome
- Time/date of birth
- Time/date of death
- Time/date of discharge
- Dr/ Mrs or other title which gives an indication of the role/responsibility of the health care professional providing care.

The redaction process should be completed twice, by different persons, to ensure complete anonymisation. Once anonymisation is complete, log the case in the Access database, with the date and your details. Save the anonymised case file under the allocated anonymous Confidential Enquiry ID in the MBRRACE section of the R drive (accessible only by MBRRACE-UK staff using their unique username and password). Any unanonymised case note files should then be deleted.

MBRRACE-UK

Department of Health Sciences
University of Leicester
Centre for Medicine
University Road
Leicester
LE1 7RH

Tel: +44-116 252 5425
Email: mbrrace-uk@npeu.ox.ac.uk
Web: www.npeu.ox.ac.uk/mbrrace-uk

MBRRACE-UK
Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK