



# each baby COUNTS ●

2015 full report



October 2017

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*\* denotes an equal contribution to this chapter*

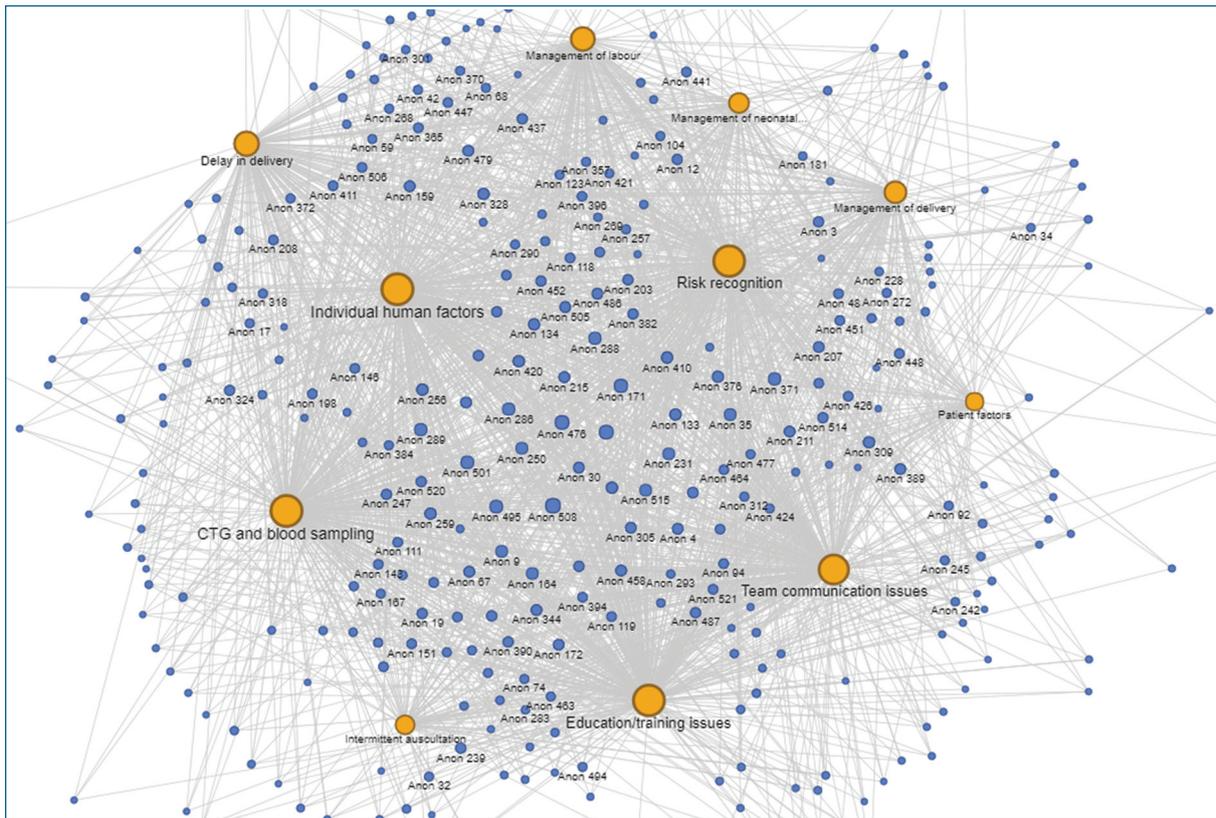
# Foreword

While the UK remains one of the safest places to give birth, serious incidents do occur and can result in stillbirths, neonatal deaths and brain injuries. The likelihood of these events happening is thankfully rare; however, this does not reduce the devastating impact for the families affected, the healthcare professionals involved and the organisations where such events occur. And, when subsequent investigations suggest that the outcome might have been different if the care provided had been different, the impact on families is exacerbated still further, while the ensuing litigation costs divert much needed resources away from improving front-line care for women and their babies

The Royal College of Obstetricians and Gynaecologists (RCOG) is committed to improving this situation and in 2014 we launched a dedicated programme of work, Each Baby Counts, to address this important issue. Each Baby Counts aims to halve the number of babies who die or are left severely disabled as a result of preventable incidents occurring during term labour by 2020, and we are proud that 100% of trusts and health boards across the UK are engaging with the programme and committed to improving care. By collating all local investigations carried out by each maternity unit, and analysing them at a national level, we are able to identify common themes and key actions that can be taken to improve the quality of clinical care.

In June this year we published a summary report based on the complete set of baseline data relating to all stillbirths, neonatal deaths and brain injuries occurring during term labour in 2015. We then held a Clinical Engagement Forum with over 300 midwives, obstetricians and neonatologists to discuss the data and identify how to support healthcare professionals to implement the recommendations. This full and final report presents the detailed data behind our recommendations as well as resources to support improved clinical practice.

The key finding – that for many of the babies reported to Each Baby Counts, different care might have resulted in a different outcome – makes a powerful case for the need to improve care. However, the data also demonstrate the complex nature of maternity care. Through analysis of the reviews submitted to Each Baby Counts, we identified over 3,800 critical contributory factors, with an average of six contributory factors for each baby. The image below demonstrates the intricate relationship between the various contributory factors, which also suggests the need for complex and nuanced solutions. For example, while improving fetal monitoring skills is clearly important, alongside this maternity teams need to be confident in their ability to work as a team, maintain oversight of the full clinical picture and communicate effectively.



This network graphic aims to portray the thematic analysis that affected each case with over 6 contributing factors, and should be taken as a visual aid to comprehend the extent of the complexity. This network analysis is created by compiling each case by all of the individual contributing factors, and then aggregating them by both case and thematic analysis areas.

This report identifies common issues, and makes recommendations on how to improve care, in three areas: fetal monitoring, human factors and neonatal care. The report also includes suggestions for implementation and links to resources to help translate our findings into practical improvements to care. At our Clinical Engagement Forum in June, doctors and midwives told us that their priorities for implementation were improving human factors, or the way teams work together in maternity. For this reason we have focused our efforts on developing tools and training materials to support this area, and have developed a package of resources to support implementation of the human factors recommendations, which maternity units can use to help their staff develop situational awareness. We have published these on the RCOG website and encourage you to share them widely.

We have also collated information about a number of existing resources designed to support the development of fetal monitoring skills. Throughout each chapter you will also see sections titled 'things you can do', which provide practical advice for everyday clinical practice.

So, where next for Each Baby Counts? The programme was intended as a long-term commitment focused on tackling safety, quality and care in maternity services, and we do not

waver from this challenge. We are committed to regularly reporting and monitoring progress over time on stillbirth, neonatal deaths and brain injuries, and will continue to work with all maternity units to support the improvement of the quality of local reports.

We also expect that this full report, alongside the growing learning from related work such as the Perinatal Mortality Review Tool, will provide the tools for teams to deliver safer maternity care for women and their babies.

We are aware that our findings come at a time when there is national attention on maternity services. The Maternity Transformation Programme provides a strong opportunity to improve maternity services and we welcome the commitments already made to address safety. We thank all the individual maternity teams working to improve care and ask them to apply the findings in this report into their local priorities.

At a national level we will continue to work with the many committed partners and organisations to ensure the findings are used to inform and support national priorities, and we welcome new opportunities for greater collaboration.

Finally, I would like to take this opportunity to personally thank all involved for their efforts in working together to make this a success.



Professor Lesley Regan  
President, Royal College of Obstetricians and Gynaecologists

# Executive summary

## Context

Each Baby Counts is the Royal College of Obstetricians and Gynaecologists' (RCOG) national quality improvement programme to reduce the number of babies who die or are left with severe disability as a result of incidents occurring during term labour. Each Baby Counts has an ambitious aim to reduce by 50% the incidence of stillbirth, neonatal death and severe brain injury as a result of incidents during term labour by 2020.

Stillbirths, neonatal deaths and brain injuries occurring due to incidents in labour are initially investigated at a local level. The Each Baby Counts programme brings together the results of these local investigations to understand the bigger picture and share the lessons learned. The results presented are based on analysis of the data submitted along with in-depth thematic analysis of several key topics.

This report builds on the Each Baby Counts interim report published in 2016 and it reports complete data relating to the care of babies born during 2015. A summary report based on the findings of this report was published in June 2017. This report, relating to 2015, will be used as a benchmark for subsequent annual reports. Future reports may focus their in-depth analysis on different topics, depending on the findings of local investigations.

The aim of this report is to share the lessons from the care of Each Baby Counts babies born in 2015. In any individual maternity unit, these incidents are rare and it may be difficult to see the clear patterns or best ways to avoid them. The Each Baby Counts programme utilises a multidisciplinary approach which provides us with the opportunity to learn from parents, midwives and doctors. Together we will continue to work hard to ensure that each baby receives the safest possible care during labour.

## A parent's perspective

“When something goes wrong during labour at the end of a healthy pregnancy, and a baby dies or experiences a serious brain injury, what should be one of life's happiest events turns to devastating tragedy. As parents, we have to go through something for which we had no preparation. We are in a blur of distress and shock. We cannot believe this could happen to our baby, carried with care and love for 9 months ... But it has. And in 2015, it happened to 1136 babies.

The vast majority of parents want desperately to know what happened, even when the truth is difficult. After all we've already experienced the worst. But too many of us are

left with poor explanations and unanswered questions. We want our babies' lives to matter and to see hospitals determined to learn from these grave mistakes that have changed our lives. The Each Baby Counts report shines a spotlight on how too many hospitals are failing to examine and admit, even to themselves, how things go wrong and where care might improve. We want to know that things will be better for the next parents whose labour and birth are like ours. To make this happen, there have to be thorough reviews of every baby's case that involve us, the parents ... the only ones to be present at every stage. And there needs to be learning, and a commitment to change, at every level.

Each Baby Counts is starting to show the areas that need urgent attention. This must not be another report that sits on a shelf; it is vital that it is acted upon and these levels of avoidable harm are confronted."

*Laura Price and Janet Scott from Sands and  
Michelle Hemmington and Nicky Lyon from Campaign for Safer Births*

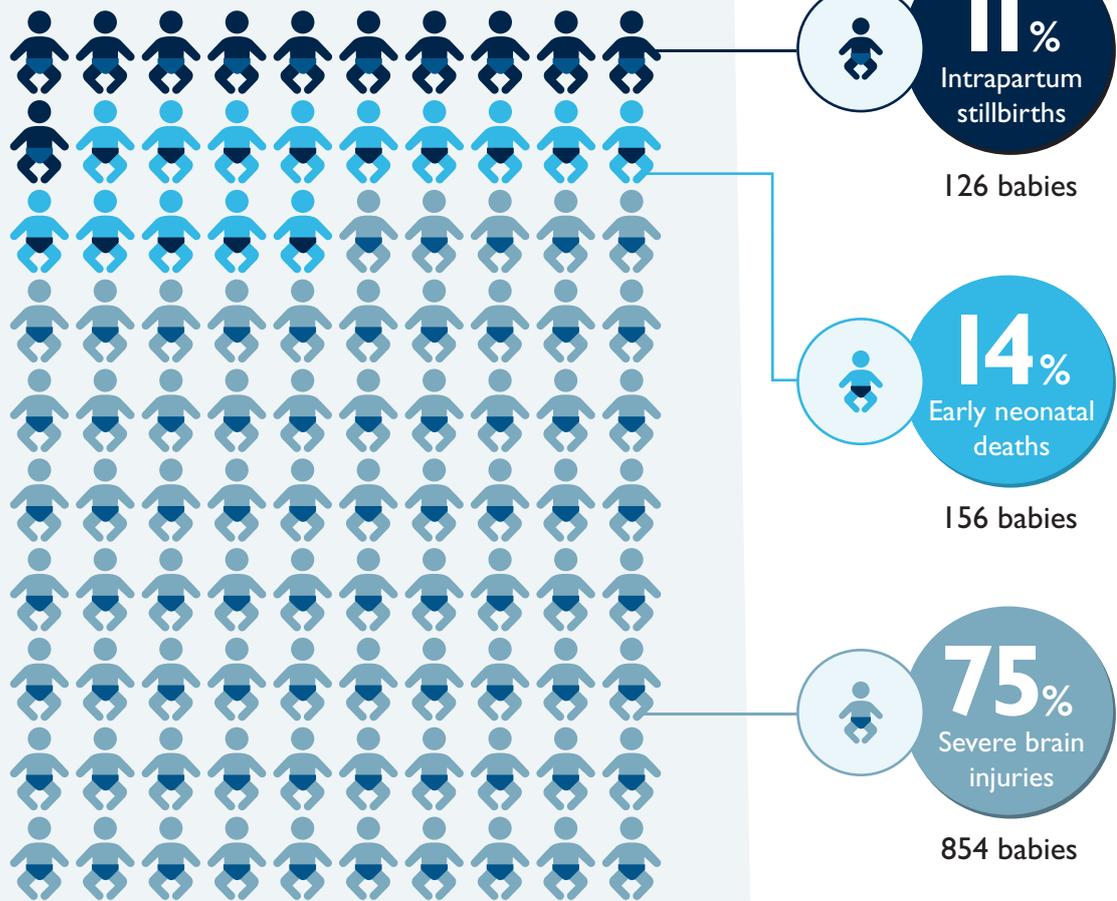
# Key findings

## How many babies?

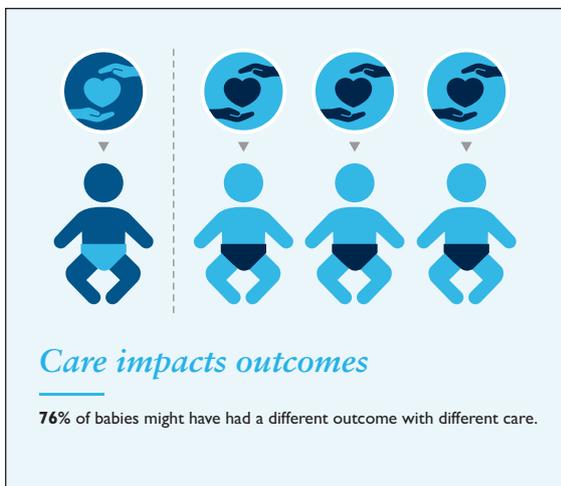
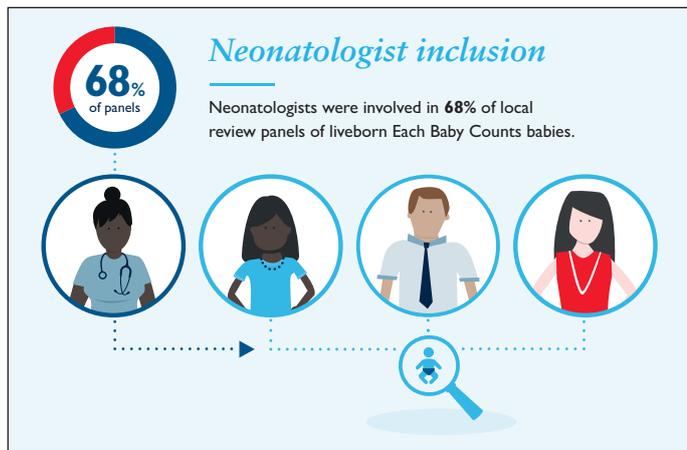
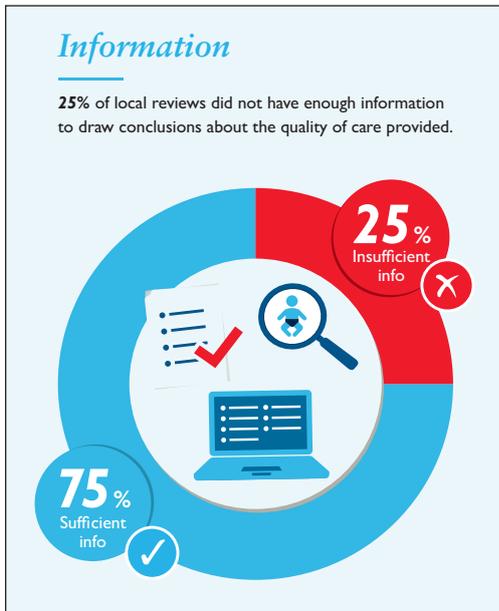
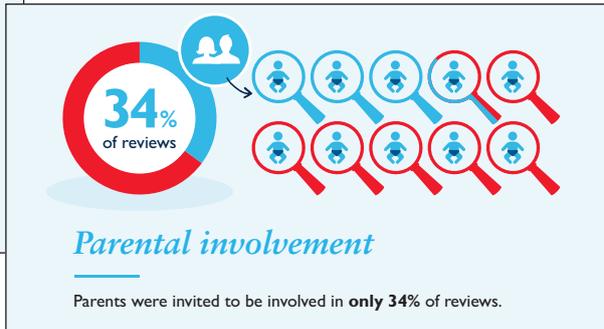
**1136**  
BABIES IN  
2015

The total number of babies fulfilling the “Each Baby Counts” criteria in 2015 was **1136**.

Of these:



Note: These categories are mutually exclusive. Babies with a severe brain injury who died within the first 7 days of life are classified as early neonatal deaths.



# Key recommendations for reporting and reviewing

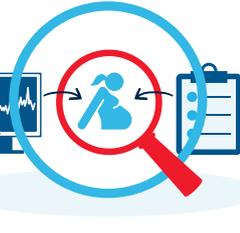
<p>All eligible babies should be reported to Each Baby Counts within 5 working days.</p>	
<p>All local reviews of Each Baby Counts babies should contain sufficient information to determine the quality of the care provided.</p>	
<p>All trusts and health boards should inform the parents of any local review taking place and invite them to contribute in accordance with their wishes.</p>	
<p>All local reviews must have the involvement of an external panel member.</p>	
<p>All reviews of liveborn Each Baby Counts babies must involve neonatologists/neonatal nurses.</p>	

# Key recommendations for care

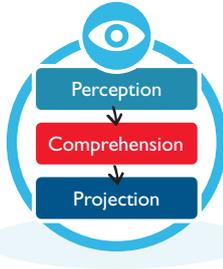
## Intermittent auscultation

<p>Women who are apparently at low risk should have a formal fetal risk assessment on admission in labour irrespective of the place of birth to determine the most appropriate fetal monitoring method. The development of IT tools that bring together data from across a trust's systems to support accurate, easily accessible risk assessment should be prioritised.</p>	
<p>NICE guidance on when to switch from intermittent auscultation to continuous cardiotocography (CTG) monitoring should be followed. This requires regular reassessment of risk during labour.</p>	

## Continuous cardiotocography (CTG)

<p>Staff tasked with CTG interpretation must have documented evidence of annual training.</p>	
<p>Key management decisions should not be based on CTG interpretation alone. Healthcare professionals must take into account the full picture, including the mother's history, stage and progress in labour, any antenatal risk factors and any other signs the baby may not be coping with labour.</p>	

## Situational awareness

<p>All members of the clinical team working on the delivery suite need to understand the key principles (perception, comprehension, projection) of maintaining situational awareness to ensure the safe management of complex clinical situations.</p>	 <p>The diagram shows a circular flow of three stages: Perception (top, blue box), Comprehension (middle, red box), and Projection (bottom, blue box). Arrows indicate a downward flow from Perception to Comprehension, and from Comprehension to Projection. The entire process is enclosed in a blue circle with an eye icon at the top.</p>
<p>A senior member of staff must maintain oversight of the activity on the delivery suite, especially when others are engaged in complex technical tasks. Ensuring someone takes this 'helicopter view' will prevent important details or new information from being overlooked and allow problems to be anticipated earlier.</p>	 <p>The icon features a red helicopter with a white cross on its side, positioned above a circular frame containing three stylized human figures representing a clinical team.</p>

## Stress and fatigue

<p>Decision making is more difficult when staff feel stressed and/or tired. A different perspective improves the chances of making a safe decision. Clinical staff should be empowered to seek out advice from a colleague not involved in the situation who can give an unbiased perspective (either in person or over the phone).</p>	 <p>The icon shows a blue circular arrow with a question mark inside a red circle, symbolizing a need for a different perspective or a difficult decision.</p>
<p>When managing a complex or unusual situation involving the transfer of care or multiple specialities, conduct a 'safety huddle' – a structured briefing for the leaders of key clinical teams. This will ensure everyone understands their roles and responsibilities and shares key clinical information relevant to patient safety.</p>	 <p>The icon depicts a group of stylized human figures in a circle, with a red shield containing a white cross (a medical symbol) positioned to the right, representing a safety huddle.</p>

## Neonatal care

<p>If therapeutic hypothermia is being considered, continuous monitoring of core temperature must be undertaken. Early efforts to passively cool the baby should also be considered (turn off the heater, take off the hat).</p>	
<p>The paediatric/neonatal team must be informed of pertinent risk factors for a compromised baby in a timely and consistent manner.</p>	

# Next steps

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This report sets out a number of recommendations about what is needed to drive quality improvement within UK maternity services. To make the recommendations a reality, engagement and support are needed from all stakeholders.

## Healthcare professionals

Doctors, midwives and other healthcare professionals should ensure this report's recommendations for clinical practice are followed at all times.

Healthcare professionals involved in local reviews should ensure good practice is followed, based on this report's recommendations for the conduct of future reviews.

All healthcare professionals should support the dissemination of learning and, where it is needed, culture change within their unit.

## Trusts and health boards

The RCOG asks all trusts and health boards for their continued commitment to Each Baby Counts, which is vital for the programme's continuing success and impact.

Trusts and health boards should support their staff to implement the recommendations set out in this report, ensuring staff tasked with CTG interpretation receive annual training, promoting the development of nonclinical skills such as situational awareness and providing multidisciplinary training to support good team working.

Trusts and health boards should ensure the necessary protocols are in place to ensure all local reviews are of high quality, incorporating the key points highlighted in this report.

## Policy makers and governments

As an urgent priority, maternity units need to be adequately resourced. Without this trusts, health boards and healthcare professionals will struggle to implement the recommendations from the Each Baby Counts project.

Each Baby Counts should be supported to fulfil its maximum potential as part of the continuing commitment to maternity safety.

# Methodology for the Each Baby Counts project

Each Baby Counts is a UK-wide quality improvement programme led by the Royal College of Obstetricians and Gynaecologists (RCOG). Its aim is to reduce the incidence of intrapartum stillbirth, early neonatal death and severe brain injury as a result of events in labour by 50% between 2015 and 2020.

The Each Baby Counts team is made up of a project team, based at the RCOG, who have compiled this report; 316 local Lead Reporters, who have responsibility for completing an online registration form for all eligible babies born in their unit; and 60 Each Baby Counts reviewers, who complete an independent review of the local investigation reports submitted by Lead Reporters. A full list of Each Baby Counts Lead Reporters and reviewers is available on the RCOG website: <https://www.rcog.org.uk/each-baby-counts-team>.

Lead Reporters were nominated by the clinical director of each trust/board. Trusts/boards are able to nominate more than one Lead Reporter to help identify and report every eligible baby. Each Baby Counts reviewers (25 obstetricians; 24 midwives; 8 neonatologists; 3 anaesthetists) were recruited via the relevant professional bodies and were trained to carry out a structured review using the Each Baby Counts pro forma. The RCOG wishes to stress that the Each Baby Counts project would not function without the expertise and support of the reviewers and Lead Reporters, and the College is indebted to them for all their hard work in providing the information on which this report is based.

By April 2015, all (100%) NHS trusts/boards in the UK had agreed to participate in the Each Baby Count project and nominated Lead Reporter(s) to report all eligible babies born in their trust/board since 1 January 2015. Private maternity hospitals and independent midwives were also invited to participate in the project to ensure improvements in all aspects of intrapartum care can be identified.

Eligible babies include all term babies (at least 37<sup>+0</sup> completed weeks of gestation) born following labour who have one of the following outcomes:

- **Intrapartum stillbirth:** when the baby was thought to be alive at the start of labour but was born with no signs of life.
- **Early neonatal death:** when the baby died within the first week of life (i.e. days 0–6) of any cause.
- **Severe brain injury** diagnosed in the first 7 days of life, when the baby:
  - was diagnosed with grade III hypoxic ischaemic encephalopathy (HIE) OR
  - was therapeutically cooled (active cooling only) OR
  - had decreased central tone AND was comatose AND had seizures of any kind.

Babies whose outcome was the result of congenital anomalies were excluded centrally by the project team.

The definition of labour for Each Baby Counts includes:

- any labour diagnosed by a health professional, including the latent phase of labour at less than 4 cm cervical dilatation
- when the woman called the unit to report any concerns of being in labour, for example (but not limited to) abdominal pains, contractions or suspected ruptured membranes
- induction of labour
- when the baby was thought to be alive following suspected or confirmed pre-labour rupture of membranes.

The rationale for this is to have an inclusive definition of labour to include as many babies as possible and to identify babies who are affected in the latent phase of labour.

The severe brain injury definition is a pragmatic definition which is a composite of defined populations such as those entering the TOBY (Total Body HYpothemia) trial<sup>1</sup> as well as data that can be captured from neonatal information systems. It is not yet known how many of these babies will have a significant long-term disability as a result of the injuries sustained during birth, but the fact that the majority of these infants require active therapeutic cooling – an intensive intervention requiring sedation and admission to the neonatal unit – reflects the serious clinical condition of these babies.

Lead Reporters are requested to complete basic information within 5 working days of the baby's birth or death via a secure online platform.<sup>2</sup> This is used to confirm that the baby is eligible for Each Baby Counts. If a baby is confirmed as eligible by the local trust or health board, the Lead Reporter is required to upload an anonymised copy of the local review and complete a short form capturing details about the review process. The data include professionals involved in the review process, involvement of the parents and the specific review tool(s) used. Lead Reporters are requested to remove all patient identifiers from local investigation report files before these are uploaded.

The anonymised report from the local review is then sent to two independent Each Baby Counts reviewers, a midwife and an obstetrician. The reviewers do not have access to the case notes or statements from the staff involved; therefore the process is reliant upon the quality of the local reviews. The reviewers are required to answer the following questions:

- In your opinion, taking into account the information presented, is this review of sufficient quality to make a judgement about the care provided?
- According to the information presented, might different clinical care have resulted in a different outcome?
- What were the critical contributory factors that, if done differently, could have changed the outcome?<sup>3</sup>

If there is a discrepancy between the reviewers' answers to the first question, the report is read by a member of the Each Baby Counts team and the consensus opinion is upheld. A report that contains insufficient information for a judgement about the care to be made is flagged as such and the Lead Reporter from the reporting unit is informed.

If the report is considered to contain sufficient information and it is felt that different care might have prevented the outcome, the reviewer is asked to identify the factors that contributed to the outcome. The list of contributory factors was adapted from the framework previously used by the National Patient Safety Agency augmented by an analysis of the contributory factors that emerged from the review of the first 100 Each Baby Counts reports received in early 2015.

The reviewers are asked to indicate if they feel that the report requires the review of a neonatologist or anaesthetist. Reviewers are not asked to assess the care of babies who were born in their own or neighbouring regions to protect the confidentiality of both patients and staff involved.

### Case ascertainment

Intrapartum stillbirths and early neonatal deaths are cross-checked against data from MBRRACE-UK. MBRRACE-UK conduct case ascertainment against Office for National Statistics and National Records of Scotland birth and death registration data and hospital data in Northern Ireland, to ensure that all perinatal deaths are recorded. In addition to the cross-checking undertaken by MBRRACE-UK against Each Baby Counts eligibility, the MBRRACE-UK system flags any babies potentially eligible for Each Baby Counts when they are entered.

Babies with a severe neonatal brain injury are cross-checked against the National Neonatal Research Database, which holds data on 98% of neonatal units in England, Wales and Scotland.<sup>4</sup> Northern Irish neonatal units use the BadgerNet database<sup>5</sup> and this is also used to check case ascertainment. A system is currently being developed to cross-check these cases of severe brain injury in Northern Ireland.

Lead Reporters are sent lists of potentially eligible babies identified from these data sources who have been born in their unit but have not been reported to Each Baby Counts. They are asked to confirm their eligibility via the online reporting system. The clinical director of obstetrics (chief of service) in each maternity unit has overall responsibility for ensuring that data are submitted in a timely fashion and that each eligible baby is reported.

## Report structure

This report is comprised of five main sections:

- Overall findings for 2015 (a quantitative summary of the number of eligible babies, the quality of local reviews and the proportion of babies for whom Each Baby Counts reviewers felt that different care might have made a difference to the clinical outcome)
- Thematic analysis 1. Can all Each Baby Counts outcomes be avoided? (A thematic description of the babies for whom both Each Baby Counts reviewers felt that different care might not have changed the outcome)
- Thematic analysis 2. Fetal monitoring
- Thematic analysis 3. Human factors and lack of non-technical skills
- Thematic analysis 4. Neonatal care

## Quantitative summary

Data collection for eligible babies born in 2015 was closed on 1 May 2017. No further data will be collected for these babies. Most of the information presented in this report is based on the 727 babies whose reviews were assessed by Each Baby Counts reviewers as containing sufficient information to make a judgement about the quality of care provided.

## Thematic analysis

The four main thematic analysis chapters for the 2015 report are:

- babies for whom different care might not have made a difference to the outcome
- fetal monitoring
- individual human factors
- neonatal care.

### *Babies for whom different care might not have made a difference to the outcome*

The Each Baby Counts team identified a subset of babies for whom different care might not have made a difference to the clinical outcome. Agreement between the obstetric and midwifery Each Baby Counts reviewer on this pro forma question was taken to mean that, based on the information provided in the local review, it is unlikely that different care would have changed the outcome. Although the reliance upon the content of the local report may not be viewed as the most robust way to assess the care provided, agreement between the two independent reviewers adds weight to the argument that different care was unlikely to have changed the outcome. A member of the Each Baby Counts project team reviewed the reports to identify why and when these outcomes occurred. Vignettes and discussion surrounding the babies' care have been included to illustrate these babies' stories.

### *Fetal monitoring*

Fetal monitoring was chosen for in-depth review because this was highlighted as a commonly recurring clinical contributory factor.

There were 409 babies for whom one or both Each Baby Counts reviewer(s) indicated that fetal monitoring was a key contributory factor in the outcome. These babies were further divided into three groups based on the identified contributory factors:

- the conduct and interpretations of continuous cardiotocography (CTG)
- intermittent auscultation
- both of these factors.

In order to identify the main themes, all babies in the intermittent auscultation group and a random sample of 70 babies from the CTG group were reviewed in depth. Although data saturation (the point at which no further themes emerge) for each group was reached after 30 reports were reviewed, all reports were read for completeness. Vignettes have been included as evidence for the themes identified. The themes along with support from national guidance and current literature have been used to formulate the key recommendations.

### *Individual human factors*

Human factors were chosen as a nonclinical, commonly recurring and growing area of interest with potential for learning.

Human factors were considered to be a contributory factor in 352 babies. The human factors (both individual and team issues) considered were; poor intra or inter-professional communication, lack of team leadership, lack of situational awareness, stress, fatigue and “other” human factor issues. The Each Baby Counts team selected the most frequent individual human factors – lack of situational awareness and stress and fatigue – for thematic analysis.

### *Situational awareness*

To avoid overlap, the Each Baby Counts team selected reports that did not have CTG highlighted as a contributory factor. This produced a sample of 108 babies, from which 54 (50%) were randomly selected for further analysis. NVivo (QRS International, Melbourne, Australia) was used to search the text of the local review reports for the words ‘situational awareness’. Eight reports were found which mentioned this directly, and the remaining 46 were then also coded. After a review of the care of a further eight babies, the team agreed that data saturation on this topic had been reached.

### *Stress and fatigue*

For 25 individual babies, the Each Baby Counts reviewers highlighted stress or fatigue as significant factors leading to the adverse outcome.

### *Neonatal care*

Neonatal care was identified as a significant contributory factor warranting in-depth analysis because over 80% of the babies reported to Each Baby Counts fall into one of two categories:

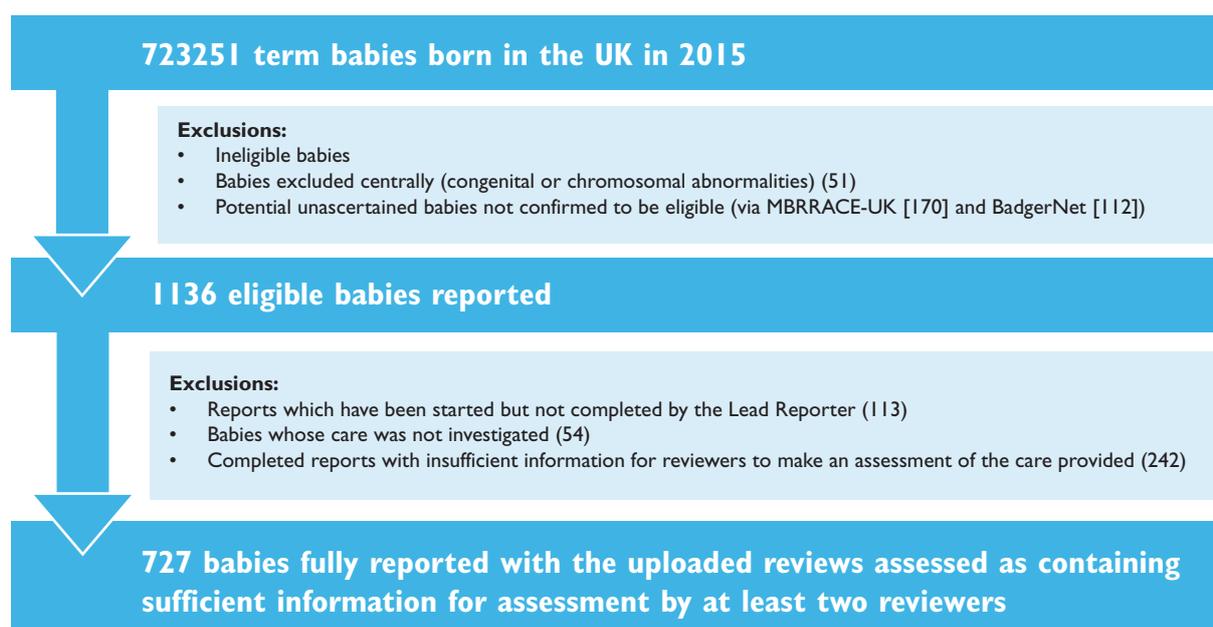
- babies who die within the first 7 days of life and
- those who sustain a severe brain injury.

As the majority of these babies will have received neonatal care, it was felt important to examine this aspect of care alongside the midwifery and obstetric care given in these instances.

Eight specialist neonatal reviewers were recruited and trained to complete Each Baby Counts reviews. By February 2017, each specialist neonatal reviewer had assessed the neonatal care provided to around 20 babies whose reports had been randomly assigned whilst allowing for geographical separation. The Each Baby Counts team hosted a roundtable for the neonatal reviewers to facilitate a discussion and identification of the emergent themes based on their assessments. Five specialist neonatal reviewers attended, discussed the findings and formulated key recommendations for improvements in neonatal care.

# Overall findings for 2015

The final results for the babies born in 2015 who have been reported to Each Baby Counts are presented in Figure 1.



**Figure 1** Final results for babies born in 2015 who have been reported to Each Baby Counts

Out of 723 251 term babies born in the UK in 2015,<sup>6</sup> a total of 126 term babies died during labour, of whom 83 were confirmed to be alive at the onset of labour by a health professional and a further 43 might have been alive based on history, but this was not confirmed. A further 159 term babies were born alive following labour but died within the first 7 days after birth. There were 854 term babies reported as meeting the severe brain injury definition.

The estimated proportion of babies who meet the Each Baby Counts definition of stillbirth, early neonatal death or severe brain injury is 1 in every 635 term babies (1.57 per 1000 term births).

It is important to note that the Each Baby Counts definition of severe brain injury is based on information that is available within the first 7 days after birth. It is not yet known how many of these babies will have a significant long-term disability as a result of the injuries

sustained during birth. However, the fact that the majority (96%) of these infants were actively therapeutically cooled – an intensive intervention requiring sedation and admission to the neonatal unit – reflects the serious clinical condition of these babies.

### RECOMMENDATION:

All eligible babies should be reported to Each Baby Counts within 5 working days.

As per the Each Baby Counts reporting protocol, Lead Reporters should begin the initial reporting of any eligible baby to Each Baby Counts within 5 working days. Lead Reporters will be able to determine the eligibility of a baby within this time frame. Lead Reporters should not wait until potentially eligible unreported babies are highlighted to them by Each Baby Counts or flagged on the MBRRACE-UK reporting system.

## Demographics

Table I presents some demographic data relating to the babies reported to Each Baby Counts in 2015. All of the results presented are for term babies born following labour who meet the eligibility criteria for reporting to Each Baby Counts.

**Table I** Demographics for Each Baby Counts eligible babies

Demographic parameter		2015 (final) Reports with sufficient information uploaded to Each Baby Counts N=727		National average (%) <sup>a</sup>
		N	%	
	Singleton birth	718	99	99.6
	Twin births	9	1	0.4
Admission to neonatal unit	Early neonatal death	93	79 <sup>b</sup>	N/A
	Severe brain injury	511	100 <sup>c</sup>	N/A
	Transferred during labour	108	15	7.2
Place of birth	Obstetric unit	628	86	87 <sup>7</sup>
	Alongside midwifery unit	56	8	9 <sup>7</sup>
	Free-standing midwifery unit	16	2	2 <sup>7</sup>
	Home	18	2	2 <sup>7</sup>
	Other	4	1	–
	In transit	5	1	–

<sup>a</sup> Unless otherwise stated, calculations are based on Hospital Episode Statistics for England (2013/14); the cohort is restricted to term births following labour.

<sup>b</sup> Of the total number of Each Baby Counts babies who died within the first 7 days of life for whom sufficient information was available to assess the care provided (117).

<sup>c</sup> Of the total number of Each Baby Counts babies with severe brain injuries for whom sufficient information was available to assess the care provided (511).

## Analysis of local reviews

Of the 1136 babies reported for 2015, the information for 1023 (90%) babies has been fully completed by a Lead Reporter on the Each Baby Counts online reporting system. There were 113 reports on the system which were started but were not, for a variety of reasons, completed by the Lead Reporter(s) of the relevant trusts/health boards. Of the 1023 completed reports, 969 (95%) had a local review of some kind carried out.

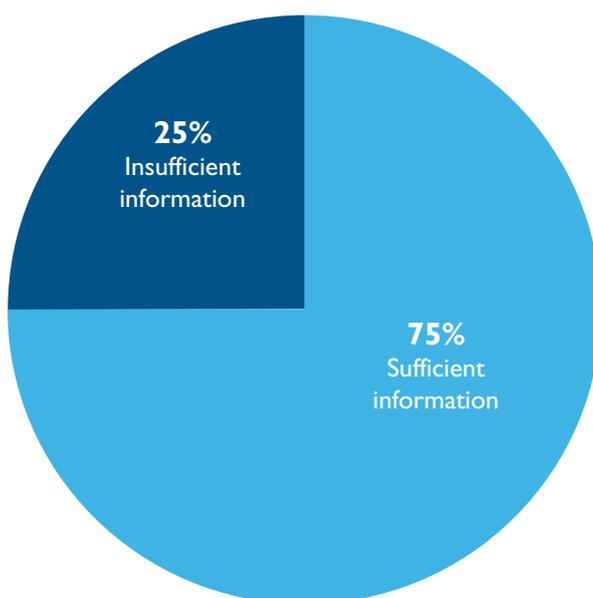
## Quality of local reviews

Out of the 969 local reviews which have undergone assessment to determine if enough information has been included in the investigation review to allow an assessment of the care provided, 727 (75%) contained sufficient information in order for the expert reviewers to classify the care provided (Figure 2).

The reasons for the classification of 242 (25%) reviews as containing insufficient information by Each Baby Counts reviewers were as follows:

- no detailed case description – 201 (83% )
- no timeline provided – 189 (78%)
- no specific tool used – 170 (70%)
- other – 153 (63%).

Note that the reviewers could highlight more than one reason why the information contained in the report was considered to be insufficient.



**Figure 2** Breakdown of completed investigation reports containing sufficient information to classify the care provided (N=969)

Examples of the 'other' reasons include:

- “Unclear whether the policy was followed and which policy/guidelines used.”
- “Lack of information regarding antenatal risk factors.”
- “Slides from perinatal mortality meeting only.”
- “No details of the events, only a short summary available.”
- “This is a supervisory review not an investigation report.”
- “Just a timeline up to delivery, no gases, no description of what happened after delivery. No explanation of why the baby died.”

Although these 242 babies' reports were considered to contain insufficient information for clinical assessment, the Each Baby Counts team has looked at these reviews in relation to parental and external expert involvement. In 127 (52%) reviews there was no parental involvement in the review. In a further 93 (38%) reviews the parents were made aware of the review and/or informed of the outcome of the review, but in only 22 (9%) reviews were the parents invited to contribute to the review. An external panel member was on the review panel in only 7 (3%) reviews.

Out of the 727 reviews fully completed by midwifery and obstetric reviewers with sufficient information to classify the care, 148 (20%) were assessed as requiring further review by a specialist neonatologist. Of those, 142 (96%) have subsequently been assessed by a neonatologist reviewer trained by Each Baby Counts. In 51 (36%) reviews, the specialist neonatal reviewer felt that the local review did not contain enough information about the neonatal care to enable them to adequately assess the quality of the care provided. The neonatal care for the remaining 91 reviews which contained sufficient information about the neonatal care have been fully assessed by the neonatal expert reviewers to extract the themes and lessons learned.

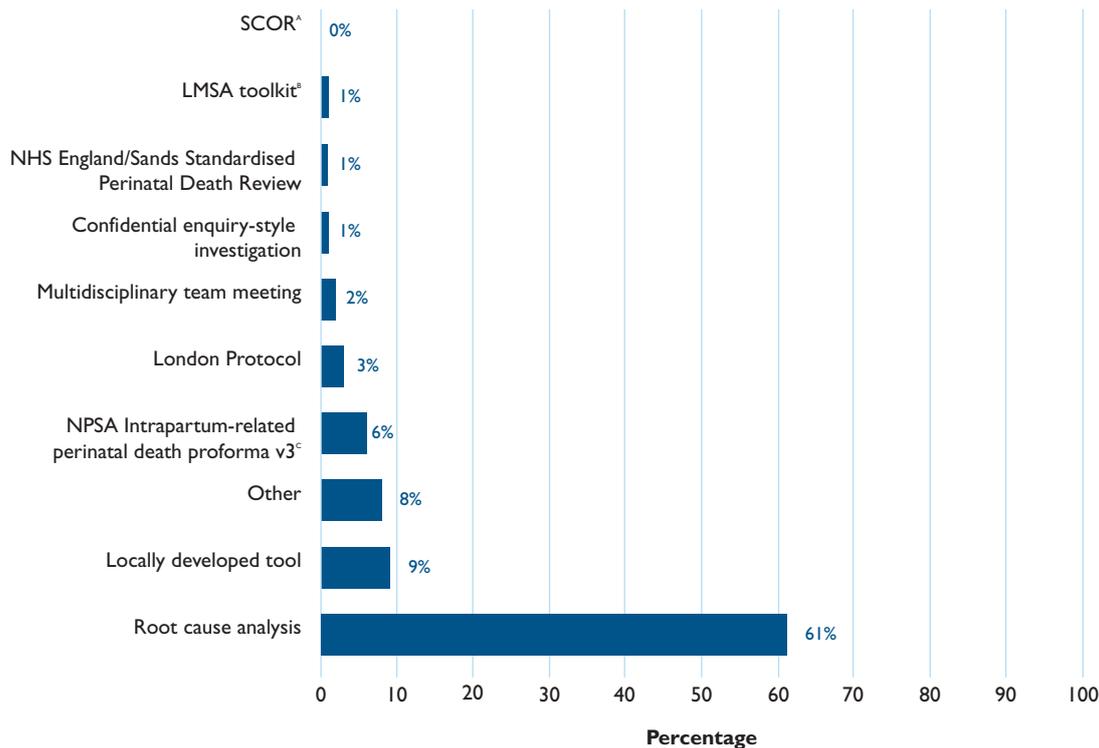
#### **RECOMMENDATION:**

All local reviews of Each Baby Counts babies should contain sufficient information to determine the quality of the care provided.

#### *Tools and methodologies used in reviews*

Out of the 727 local reviews that contained sufficient information, 82% (596 reviews) used a specific tool or methodology to conduct the review. The remaining 18% (131) of reviews were not carried out using any specific process.

Figure 3 shows that, of the local reviews that made use of a specific tool or methodology, the process most commonly used (61%) was Root Cause Analysis. As local investigators may use a range of tools or methodologies in any given review, multiple options could have been checked.



<sup>a</sup> LMSA toolkit: Local Supervising Authority Midwifery Officers Forum UK. Investigation Report Template. Available from: <http://www.lsamforumuk.scot.nhs.uk/policies-guidelines.aspx>.  
<sup>b</sup> SCOR: Perinatal Institute. SCOR – Standardised Clinical Outcome Review. Available from: <http://www.perinatal.org.uk/SCOR/About.aspx>  
<sup>c</sup> NPSA: National Patient Safety Agency. Review of intrapartum-related perinatal deaths pro forma. 2010.

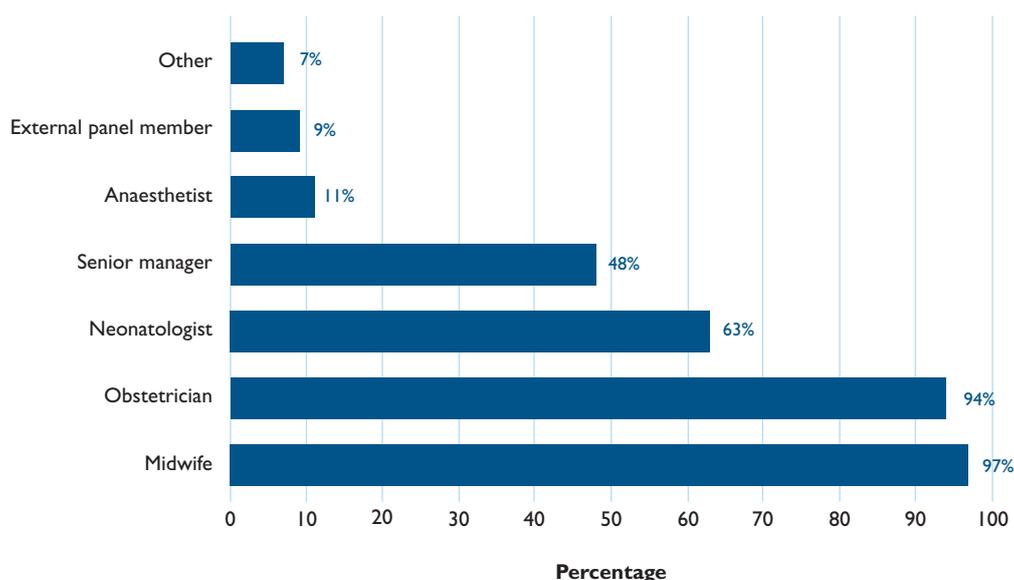
**Figure 3** Tools and methodologies used in local reviews containing sufficient information (N=727)

### Make-up of local review panels

Results show that 96% of local reviews where the quality was sufficient to judge the care were carried out by a multidisciplinary team (i.e. a panel that contained individuals with expertise from more than one specialty). Although these results are encouraging, the Each Baby Counts team would reiterate that the composition of the panel should ensure that individuals with all the relevant expertise according to the circumstances of the incident are involved.

As expected, midwives and obstetricians were regularly present, but participation from other specialities was lower with senior management involved in 48% and anaesthetists involved in 11% of reviews (Figure 4).

Of the 727 reviews with sufficient information for the reviewers to classify the care provided, 628 concerned babies who were born alive. Neonatal clinicians were involved in reviewing the care of only 429 (68%) of these babies. This should be improved to ensure that expert opinions and recommendations relating to the neonatal care of the baby are included in the local review process.



**Figure 4** Contributors to local review panels for reviews containing sufficient information (N=727)

## Recommendations – neonatal involvement in reviews

### RECOMMENDATION:

All reviews of liveborn Each Baby Counts babies must involve neonatologists/neonatal nurses.

Neonatal reviewers indicated that the information contained in the local review relating to the neonatal care of the baby could have been more comprehensive. In over one-third of local reviews assessed by specialist neonatal reviewers, the local review did not contain enough information about the neonatal care to enable them to adequately assess the quality of the care provided.

The scrutiny of initial neonatal management and subsequent neonatal care needs to improve, particularly with respect to the timelines recorded during resuscitation.

Detail on whether local guidelines were followed should be included. A final diagnosis for the baby should ideally be included together, where possible, with clinical evidence to support the final diagnosis, e.g. MRI results and/or a postmortem report in the event of an early neonatal death.

Even when the need for improvements in obstetric care has been identified, there may be further improvements in neonatal care that a specialist neonatal reviewer may identify. This was a weakness in the original Each Baby Counts methodology which project team has sought to rectify.

### **Each Baby Counts action:**

All babies who are born alive and reported to Each Baby Counts will in future be reviewed by midwifery, obstetric and neonatal reviewers.

If a neonatal review of the care provided to a stillborn baby is deemed necessary once the initial Each Baby Counts review has been undertaken by an obstetrician and a midwife, this will be arranged. The neonatal review of all liveborn Each Baby Counts babies is planned to begin from January 2018.

### *External involvement in reviews*

Only 9% of panels included an external expert (Figure 4). Where external panel members were present, these were mostly midwives and obstetricians, but they also included the Care Quality Commission, commissioner representatives and coroners.

### **RECOMMENDATION:**

All local reviews must have the involvement of an external panel member.

### *Parental involvement in reviews*

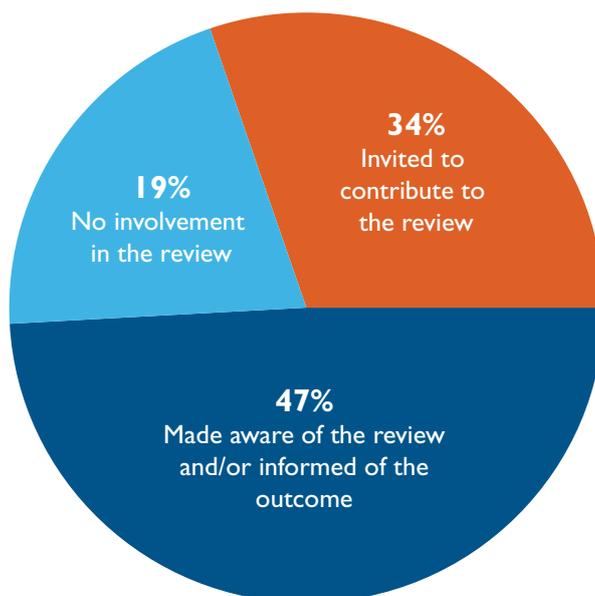
Parental involvement in reviews was inconsistent and requires improvement. In 19% of local reviews, the parents were neither involved nor made aware that a review was taking place. In just over one-third (34%) of instances, the parents were invited to contribute to the review if they wished to (Figure 5).

### **RECOMMENDATION:**

All trusts and health boards should inform the parents of any local review taking place and invite them to contribute in accordance with their wishes.

It should be noted that there are a number of different approaches to involving parents in reviews and a personalised approach should be undertaken. We note that attendance at local investigation meetings in person is not necessarily the most appropriate way to involve parents in reviews. The RCOG acknowledge that there is currently a lack of evidence about how best to involve parents and would welcome the results of work that is currently underway to address this lack of evidence.

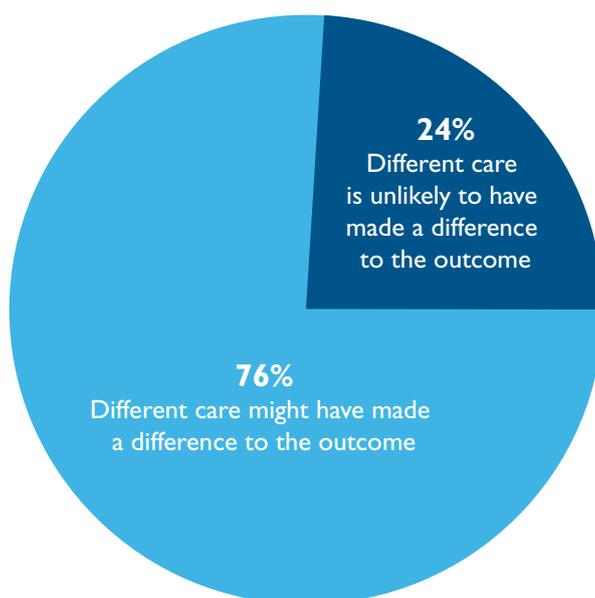
Sands, the stillbirth and neonatal death charity, has published ten principles that detail what Sands consider to be the key elements of high-quality bereavement care.<sup>8</sup> These principles include the involvement of parents and this should be applied to all local reviews into the care of babies eligible for Each Baby Counts.



**Figure 5** Parental involvement in local reviews containing sufficient information (N=727)

## Would different care have made a difference to the outcome?

Where a reviewer indicates that there is enough information contained in the uploaded local review to assess the care provided, the reviewer is then asked whether different management might have made a difference to the outcome. In 24% of babies, the reviewers agreed that – based on the information contained in the local review – different management was unlikely to have made a difference to the outcome (Figure 6). In the remaining 556 (76%) instances, at least one of the independent reviewers considered that different management might have made a difference to the outcome.



**Figure 6** Proportion of babies for whom different care might have made a difference to the outcome (N=727)

Where a reviewer considers that different care might have made a difference to the outcome, they are asked to indicate what the critical contributory factors were in the care provided. The distribution of these factors for babies born in 2015 is outlined in Figure 7 under the theme in which the factors fall. Note that reviewers are able to select more than one critical contributory factor and the review of care for these 556 babies identified over 3800 critical contributory factors. The average number of critical contributory factors identified for each of the 556 babies was 6 and there were no babies where a single identifiable critical contributory factor could be conclusively identified. The reviewers found that there are multiple and complex interactions between clinical and non-clinical factors which can often be inter-related.

In addition, specialist neonatal reviewers also assessed the neonatal care in the 91 reports where there was sufficient information to classify the neonatal care provided. This analysis found that in 50 (55%) of the 91 reports reviewed, delivering neonatal care in a different manner might have made a difference to the outcome.

Neonatal specialist reviewers often identified critical contributory factors which were not an existing option on the current Each Baby Counts online review pro forma. As a consequence the 'other' option under the 'management of neonatal care' heading was completed in 54% of instances where the reviewer considered that different management might have made a difference to the outcome. From these, common themes were identified, and a new version of the review pro forma will capture these.

Further information and key recommendations that can be made from the care of babies relating to intrapartum fetal monitoring, individual human factors and lack of nontechnical skills, and neonatal care can be found in the respective chapters of this report.

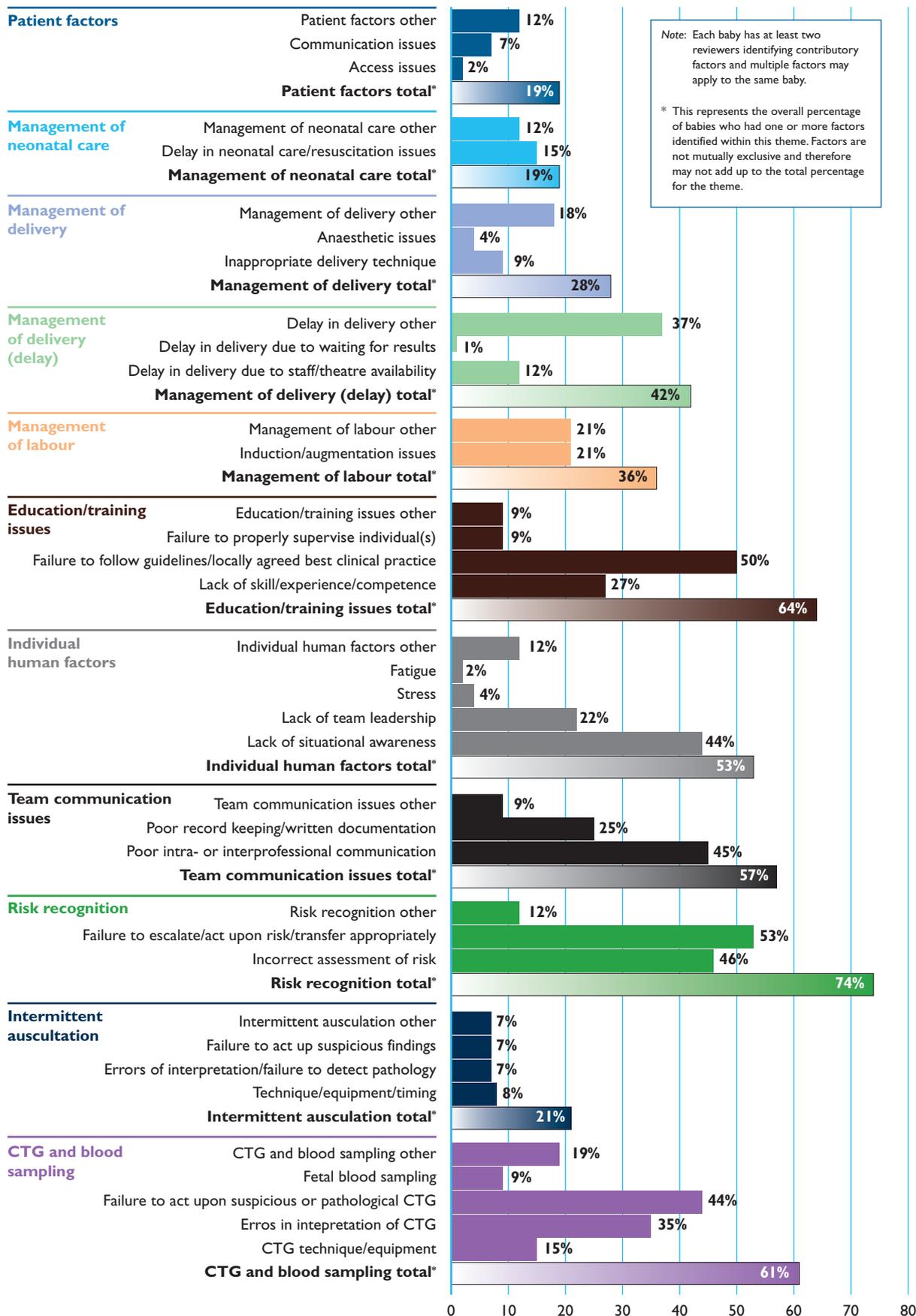


Figure 7 Critical contributory factors identified in babies for whom different care might have prevented the outcome (N=556)

## What are the actions that follow local reviews?

Of the 727 local reviews which contained sufficient information for an assessment of care, over one-fifth – 150 (21%) – contained no actions or recommendations. Of the 542 local reviews which contained clear actions or recommendations, 126 (23%) had actions or recommendations which were aimed solely at individual members of staff (for example, a requirement to attend further training). The remaining 418 reviews (77% of reviews with clear actions or recommendations) contained actions or recommendations which took a systemic approach (Figure 8).



**Figure 8** Recommendations and actions from the local reviews (N=542)

# Thematic analysis I

## Can all Each Baby Counts outcomes be avoided?

Each Baby Counts reviewers assessed the care of babies reported and considered that, in a number of instances, different care might not have changed the outcome. We do however acknowledge that there are still important lessons to be learned from these babies' reviews.

Each Baby Counts reviewers identified 171/727 (24%) babies for whom different care might not have changed the outcome (Figure 9). Of the 171 babies, 131 babies (77%) had a severe brain injury, 19 babies (11%) were stillborn and 21 babies (12%) died in the first week of life. A total of 22 of the 171 babies (13%) were not monitored during labour, because in 14 babies there was no heartbeat detectable on arrival, in 2 babies a bradycardia was detected using ultrasound scanning on arrival after the fetal heart could not be heard and in 5 babies the critical event occurred before arrival at the birthing unit. For one baby, information on the fetal monitoring method used is missing. Of the 149 babies who were monitored during labour, 71% were monitored with CTG and 29% had intermittent auscultation.

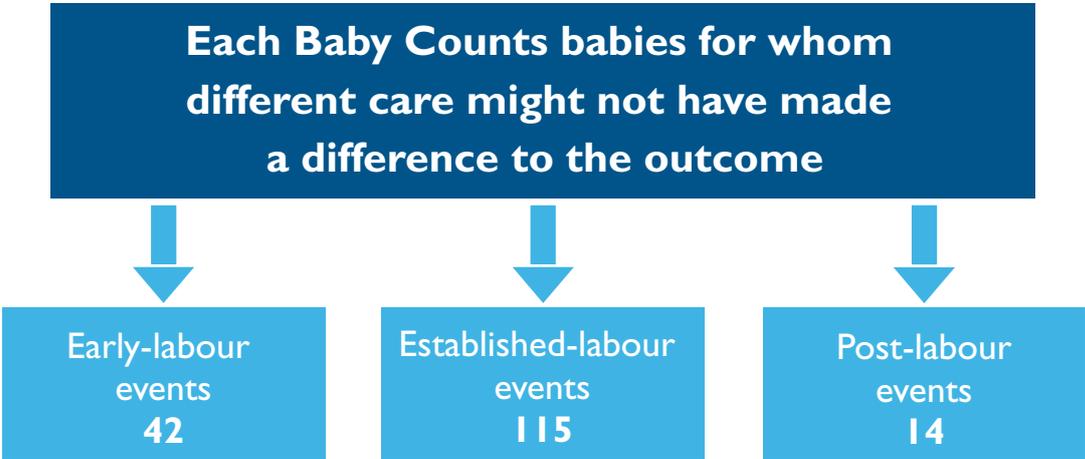


Figure 9 Stage of labour and number of babies for whom different care might not have changed the outcome

## Early-labour events

**Table 2** Causes of events during early labour

Cause identified in review	Number of babies
Pathological fetal monitoring (unknown cause) recognised and acted upon	11
Attended in early labour with no detectable fetal heart rate	11
<i>Cord entanglement/true knot in cord</i>	5
<i>Unexplained</i>	5
<i>Placental pathology</i>	1
Acute events (e.g. uterine rupture, placental abruption)	10
Fetal pathology detected postnatally thought to be unrelated to labour (e.g. thrombosis, infarction)	7
Cord prolapse	3

### Acute events

A low-risk mother presented with ruptured membranes. On admission, she had appropriate assessment with no concerns identified. After discussion regarding management options, she was discharged to await events at home with the advice to contact the unit if there were any concerns.

Later that evening she reattended with fresh vaginal bleeding. On examination the uterus was tense. The fetal heart rate was difficult to determine, but believed to be around 85 beats/minute. The obstetric team was summoned promptly and the baby was delivered by emergency caesarean with evidence of placental abruption.

The baby was resuscitated before transfer to a tertiary unit for cooling. Grade I HIE was confirmed.

### Commentary

The placental abruption was promptly recognised and managed. The mother had no significant risk factors for placental abruption and she was cared for in line with the National Institute for Health and Care Excellence (NICE) guideline on inducing labour for term ruptured membranes<sup>9</sup> and the RCOG Green-top Guideline on antepartum haemorrhage.<sup>10</sup>

A mother who had delivered by caesarean section in her previous pregnancy presented via ambulance with suspected labour. On arrival she was found to be tachypnoeic, mildly hypertensive and bleeding vaginally. She was immediately assessed by a midwife and an obstetric registrar who found her to be very distressed. The uterus was firm to palpate. An ultrasound scan revealed a bradycardia of 40 beats/minute. Immediate

emergency caesarean section was performed and a uterine rupture was confirmed. The baby was born within 18 minutes of the mother arriving in the unit.

The baby was resuscitated in theatre and was transferred for active cooling.

### **Commentary**

In this instance, the team acted promptly to recognise the uterine rupture and fetal distress. This mother had been counselled appropriately in the antenatal clinic regarding the risks of uterine rupture with vaginal delivery after caesarean section.

### **Fetal pathology unrelated to labour**

A low-risk mother presented in labour at term. The mother opted for epidural analgesia and therefore a CTG was commenced with no concerns. Due to slow progress in labour, an oxytocin infusion was commenced. The obstetric consultant reviewed the CTG during labour. Fetal blood samples were appropriately taken, the results of which were within the normal range. A nonrotational forceps delivery was performed for fetal distress in the second stage based on the CTG.

The baby was born in poor condition with an Apgar score of 6 at 5 minutes and normal cord gases. Neonatal cardiovascular and respiratory problems resolved quickly, but the baby's tone remained poor and active therapeutic cooling was commenced. After 1 hour, the baby developed a focal seizure. An MRI scan revealed multifocal areas of ischaemia that were not typical of classical HIE. It was suggested that an embolic or metabolic cause should be considered.

### **Commentary**

There can be a tendency to ascribe all unexpected fetal outcomes to an intrapartum event. In this pregnancy, the management in labour followed national guidance<sup>11</sup> and yet the baby still required therapeutic cooling. It is important to consider the possibility of antenatal adverse events when reviewing the care of these babies.

## Established-labour events

**Table 3** Causes of events during established labour

Cause identified in review	Number of babies
Difficult delivery (e.g. shoulder dystocia, second twin, unsuccessful instrumental delivery, difficult caesarean section)	37
Pathological fetal monitoring recognised and acted upon appropriately	33
Appropriate reassuring fetal monitoring throughout (continuous CTG or intermittent auscultation)	23
Acute events (e.g. placental abruption)	17
Infection	4
Maternal complication (e.g. maternal decision not to have lower-segment caesarean section)	1

### Difficult delivery

A low-risk mother presented to her local birthing unit in spontaneous labour after a prolonged latent phase. Labour progressed well to 9 cm, when delay was diagnosed. She was transferred to the obstetric-led labour ward. On arrival her cervix was found to be fully dilated; after 1 hour of pushing, the mother was exhausted and a ventouse delivery was performed. Fetal monitoring was felt to be normal throughout labour. The head was delivered on the third pull. The shoulders did not deliver with the next contraction and the baby was delivered using the McRoberts position and suprapubic pressure. The head-to-delivery interval was 5 minutes.

The neonatal team was present at delivery and immediately initiated resuscitation of the baby. The baby had an apnoeic episode 10 minutes after delivery and seizures. The baby underwent active therapeutic cooling. An MRI scan was normal.

### Commentary

Although the baby had a birth weight of 4.760 kg, symphysial fundal height measurements and a growth scan that had been performed opportunistically at 34 weeks did not demonstrate macrosomia. Risk factors for shoulder dystocia have a low predictive power.<sup>12</sup> This baby's shoulder dystocia was well managed in accordance with the RCOG Green-top Guideline on shoulder dystocia<sup>12</sup> and the neonatal team was present at the delivery to immediately assess and initiate resuscitation as required.

## Appropriate reassuring fetal monitoring throughout labour, unexpected outcome

A low-risk mother presented with ruptured membranes in labour to her local birthing unit. The birthing pool was used for analgesia and the fetal heart rate was auscultated every 15 minutes for 1 minute after a contraction. No abnormalities were detected in either the maternal or the fetal observations. On the next vaginal examination, the mother was fully dilated and second-stage fetal monitoring was instigated, which revealed no abnormalities. After just over 1 hour of pushing, the vertex was visible at the perineum. After a further 20 minutes, the mother was helped out of the pool and an episiotomy was performed to assist delivery of the fetal head.

The baby was born with no respiratory effort and the cord was noted to have been tight around the neck. Neonatal resuscitation was started immediately by the midwife, and the neonatal team were crash-bleeped and arrived at 4 minutes. The baby's Apgar scores were 0 at 1 minute, 4 at 5 minutes and 4 at 10 minutes. The baby underwent active therapeutic cooling and an MRI scan revealed mild changes.

### Commentary

Despite following the current NICE guidance on intermittent auscultation<sup>11</sup> and correctly assigning risk, this baby required active therapeutic cooling. The midwife acted promptly summoning the neonatal team and initiating resuscitation in a timely manner.

## Post-labour events

**Table 4** Causes of post-labour events

Cause identified in review	Number of babies
Neonatal collapse	<b>12</b>
<i>(Unexplained)</i>	6)
<i>(Congenital alveolar dysplasia)</i>	1)
<i>(Hyperinsulinaemia)</i>	1)
<i>(Infection)</i>	1)
<i>(Persistent pulmonary hypertension of the newborn)</i>	1)
<i>(Pulmonary haemorrhage – cause unknown)</i>	1)
<i>(Ruptured arteriovenous malformation)</i>	1)
Difficulty with resuscitation	<b>2</b>

### Difficulty with resuscitation

A mother presented with ruptured membranes. As she was not in labour, she opted – after adequate counselling – for expectant management and was discharged home. Labour did not start spontaneously and so she underwent induction of labour.

As the baby was not delivered after 1 hour of active second stage and the baby was in the occipito-posterior position, the mother consented to a trial of instrumental delivery in theatre.

The baby was delivered by an uneventful rotational ventouse delivery with the paediatrician present. The cord gases were normal. The baby was floppy with poor respiratory effort and a heart rate of over 100 beats/minute. Initially, inflation breaths did not produce chest rise and so the paediatric registrar reassessed the baby. Using a laryngoscope, copious secretions and a large mucus plug were suctioned under direct vision. The baby was stabilised and transferred to the tertiary unit for active cooling.

Grade II HIE was diagnosed, but the baby had no seizures, established breastfeeding and a normal MRI scan.

### Commentary

Neonatal resuscitation such as this requires skill and lateral thinking when inflation breaths are not ventilating the baby's lungs. In this situation, the paediatrician used their skills to maximum effect to deal with an unexpected situation.

## Neonatal collapse

A mother was admitted for induction of labour for reduced fetal movements. The induction was unsuccessful and so she was consented for a caesarean section.

The baby was delivered in good condition with normal gases and was assessed by the paediatrician present for the delivery. Whilst the mother was breastfeeding, the baby was found to be pale and not making any respiratory effort. No heartbeat was detected on the arrival of the paediatric team. Neonatal resuscitation was commenced and the baby was intubated. A heart rate was established and the baby was transferred to the neonatal unit for active cooling. However, the baby had suffered a profound hypoxic brain injury and the decision was made to withdraw care.

### Commentary

Neonatal collapse is a devastating and largely unpredictable event. Infection, anaemia or underlying cardiac or metabolic disorders can be the cause in some babies,<sup>13</sup> but in just under half of these babies, such as with this baby, no cause can be identified.<sup>13,14</sup> It can be difficult for healthcare professionals and families to accept that, despite best efforts and evidence-based care, some apparently healthy babies have serious complications, which in some cases lead to the baby's death.

## Summary

The Each Baby Counts assessors have concluded that in 24% of Each Baby Counts babies, different care might not have made a difference to the outcome. In such circumstances, maternity teams must ensure a robust, thorough, open and honest review is undertaken. By undertaking a high-quality transparent review, healthcare providers and parents will gain more understanding that the care provided to their baby was appropriate and thorough, and therefore the family may be less likely to apportion blame, or lose faith in, the system.

It is important to stress that, as the number of babies whose outcome might have been different with different care falls, the relative proportion of babies for whom different care might not have made a difference will rise in the years to come. That being said, future research should also be focused towards reducing the numbers of these babies.

# Thematic analysis 2

## Fetal monitoring

Fetal monitoring was identified by the Each Baby Counts reviewers in 409 babies as a critical contributory factor where improvement in care may have prevented the outcome. This represents 74% of the babies for whom there was sufficient information to classify the care provided and one or more reviewer indicated that different care might have made a difference to the outcome.

To identify potential avenues for improvement, the babies were divided into either of two categories – intermittent auscultation or continuous cardiotocography (CTG) – depending upon the contributory factors identified by the reviewers. There was a small proportion of babies for whom both intermittent auscultation and continuous CTG were regarded as contributory factors. They were not examined separately as it was felt the same themes would emerge from this mixed group.

### Intermittent auscultation

There were a number of Each Baby Counts babies for whom an issue with intermittent auscultation was considered, by at least one reviewer, to be a significant contributory factor to the outcome. A random selection of the reports of 70 babies was reviewed to identify common themes in these babies that could be highlighted to drive improvement in their care. In the care of 68 babies, at least one reviewer felt that intermittent auscultation management was a significant contributory factor to the outcome, and that different care might have made a difference to the outcome. The distribution of the contributory factors can be found in Table 5.

**Table 5** Distribution of intermittent auscultation critical contributory factors identified

Contributory factor	% of babies for whom contributory factor was applied
Technique/equipment/timing	6
Errors of interpretation/failure to detect pathology	6
Failure to act upon suspicious findings	5
Intermittent auscultation – other	5

Note: These contributory factors are not mutually exclusive; reviewers can indicate that there was more than one critical contributory factor in the care of each baby.

## Assigning risk status at the onset of labour

The first theme that emerged on reviewing the reports was the quality of assessment of the risk for mothers and their babies at the start of labour. By incorrectly assigning a mother to a low-risk pathway, maternity providers limit the intensity of fetal monitoring that the baby receives and may be caring for a mother and her baby without access to all the necessary resources.

A mother attended in labour with a history of no fetal movements that day, mildly raised blood pressure and a maternal tachycardia. The fetal heart rate was monitored with intermittent auscultation. When she ruptured her membranes at full dilatation, thin meconium was evident. There was a prolonged deceleration. Help was summoned but the baby was born quickly with maternal effort only, whilst the obstetrician was preparing for an instrumental delivery.

The baby was born in poor condition and underwent therapeutic cooling. The baby was subsequently diagnosed with grade III HIE.

### Commentary

The use of intermittent auscultation for fetal monitoring was inappropriate as the mother had multiple risk factors including a history of reduced fetal movements, raised blood pressure and maternal tachycardia. Current national guidance is that such women should be offered continuous CTG for fetal monitoring and be cared for in an obstetric-led unit.<sup>11</sup>

A mother arrived in labour at full term. Her previous baby was small for gestational age. Symphysial fundal height measurements had not been performed since 36 weeks and she had not had serial fetal growth scans. Intermittent auscultation was performed throughout labour and was reported as normal. After spontaneous rupture of membranes, the fetal heart could not be located. However, the baby was born several minutes later in poor condition.

The baby was small for gestational age (below the first centile) and was transferred for active therapeutic cooling with a diagnosis of grade II HIE.

### Commentary

Although the missed opportunity to assess the growth of this baby began in the antenatal period, this baby's story highlights the importance of performing a fresh risk assessment when a mother presents in labour. Had it been noted that this baby was at risk of being small for gestational age (because of the previous baby's birth weight) and that this baby had not had sufficient growth assessment in this pregnancy, the high-risk nature of this pregnancy may have been anticipated and CTG monitoring considered.

### Things you can do

A local IT system to facilitate adequate risk assessment at the onset of labour should be designed, to ensure that mothers are giving birth in the most appropriate setting with the appropriate monitoring.

### Timely actions when an abnormality is identified

Another theme that emerged on reviewing these babies was the potential to improve the outcome had the abnormality identified through intermittent auscultation been recognised and/or acted upon in a more timely manner.

A low-risk mother was booked for a home delivery. Her community midwife attended and did a vaginal examination, which revealed the woman's cervix was fully dilated. Membranes had ruptured earlier in the day and pink liquor was now draining. Despite a deceleration being heard on intermittent auscultation, 80 minutes of pushing with slow descent of the head and further persistent audible decelerations, an ambulance was not requested.

The baby showed no signs of life when born and an ambulance was then called. Resuscitation was successful and the baby was transferred for active therapeutic cooling. Grade III HIE was diagnosed.

### Commentary

It is not always clear from a review why a health professional acted in a certain way; they may not have realised that the change in the fetal heart rate represented a deceleration, they may have noted decelerations but not considered them to be significant enough to prompt action or they may not have appreciated the wider picture in the given situation.

A mother attended in the latent phase of labour and decided to use the birthing pool to help with pain relief. A few hours later, the mother reported rectal pressure and was examined out of the birthing pool. Her cervix was fully dilated. The fetal heart rate was around 105 beats/minute on intermittent auscultation, having previously been around 140 beats/minute, and the mother was encouraged to push. The mother wished to go back into the birthing pool and, despite the decelerations persisting, she had a further 10-minute trial of pushing in the birthing pool.

After another 15 minutes, delivery had still not occurred and the decelerations were still audible. The mother was transferred to a trolley in preparation to transfer to the obstetric-led labour ward. As the vertex was advancing, an episiotomy was performed and the baby was born. This was approximately 1 hour after the initial deceleration was heard.

The baby was born in poor condition and was transferred for active therapeutic cooling.

## Commentary

This baby's story highlights the need to act when an abnormal fetal heart rate is identified rather than continuing with a plan that is no longer appropriate for the clinical situation. There were missed opportunities to call for assistance and expedite delivery by performing artificial rupture of the membranes. Despite abnormalities being detected on intermittent auscultation, fetal monitoring was not escalated to continuous CTG as is recommended in national guidance.<sup>11</sup>

## Things you can do

When labour deviates from a low-risk pathway, for example, when decelerations, a rising baseline rate, presence of meconium or vaginal bleeding are detected, the mother's care should be reassessed in a holistic manner. Care should be escalated through the use of continuous CTG monitoring including, if necessary, transfer to a unit with access to obstetric and neonatal support.

Employing a 'fresh ears' approach to intermittent auscultation, whereby a second midwife confirms the fetal heart rate pattern every hour, may reduce interpretation errors.

## Following NICE guidance with regards to the practice of intermittent auscultation

NICE recommends that the fetal heart should be auscultated for 1 minute after a contraction every 15 minutes in the first stage of labour and at least every 5 minutes in the second stage.<sup>11</sup>

A mother attended in labour at 9 cm dilatation. Her membranes had ruptured spontaneously and the liquor was blood-stained. She was reassessed 4 hours later and found to be fully dilated but with no urge to push. A passive second stage was allowed for 2 hours. The fetal heart was auscultated every 15 minutes in the second stage. One hour after being fully dilated, the fetal heart rate could not be heard; however, help was not summoned for more than 20 minutes. The mother was transferred to the delivery suite and a forceps delivery was performed 50 minutes after the loss of the fetal heart rate.

The baby was born with no signs of life. Resuscitation was unsuccessful and was abandoned at 25 minutes of age.

## Commentary

If the fetal heart is not auscultated every 5 minutes in the second stage, maternity providers may miss subtle signs that the baby is becoming distressed. The baseline rate may start to rise or

decelerations may be noted. Although it is not known whether this baby would have demonstrated these signs, maternity teams need to do their utmost to look for these signs in the second stage. The time taken to establish the absence of the fetal heart is also worth noting.

A mother attended at 5 cm dilatation. She laboured in the birthing pool and the fetal heart was auscultated every 15 minutes. After 3 hours, she was examined and was fully dilated. The midwife continued with auscultation every 15 minutes.

The baby was born after around 60 minutes of active pushing. The baby was born in poor condition and required active therapeutic cooling. In her statement, the midwife reported that she had not been aware the fetal heart should be auscultated every 5 minutes in the second stage.

### Commentary

The second stage of labour is more demanding upon both the mother and the baby and this is why increased monitoring is recommended in the second stage. A baby can quickly become distressed in the second stage and in this instance the signs of distress may have been missed through the infrequent fetal heart assessment that did not comply with NICE guidance for intermittent auscultation.

### Things you can do

When there is a concern regarding the fetal heart rate, immediate help should be sought.

Full compliance with the NICE recommendations for intermittent auscultations whilst also providing support to the mother and her birth partners, performing maternal observations and maintaining contemporaneous record keeping is a challenge, particularly in the second stage of labour. When full compliance may not be achievable, help should be sought including asking someone to act as a scribe or to provide support to the mother. If this is not possible, continuous CTG must be considered to ensure adequate fetal monitoring.

### Recognising the transition between the stages of labour

In a proportion of the babies, the transition between the latent phase and the active phase of labour or that from the active phase of labour to the second stage of labour should have been acknowledged. Identifying such transitions enables maternity teams to perform the optimal fetal and maternal monitoring for the given stage of labour.

A first-time mother attended at 4 cm dilatation. She was considered not to be in labour and was offered a bath for analgesia. Just under 3 hours later, she had a desire to

push and was fully dilated. The fetal heart was assessed once in the first stage of labour. During the second stage, the fetal heart was not auscultated every 5 minutes.

The baby was born in poor condition and underwent active therapeutic cooling. Grade III HIE was diagnosed.

### Commentary

The transition between the latent phase to the established first stage of labour and then into the second stage was not identified; therefore, there was limited fetal monitoring. Had the fetal heart been auscultated in the first stage of labour and correctly in the second stage of labour, an abnormality may have been identified that could have led to the baby's birth being expedited or anticipated allowing the relevant health professionals, such as the neonatal team, to be present at birth.

A mother attended with ruptured membranes and regular uterine activity. On examination, she was 3–4 cm dilated, so a plan was made to mobilise. She returned 1 hour later complaining of increased pains and three contractions every 10 minutes. The fetal heart was auscultated and the rate had risen but this was not acted upon. A plan was made to reassess in 1 hour. After 30 minutes, the contractions increased and she also reported backache. She was 5–6 cm dilated and the fetal heart was auscultated after examination and was found to be around 60 beats/minute. Help was summoned and a decision to deliver by caesarean section was made.

The baby was born 25 minutes after the detection of the fetal bradycardia. At caesarean section, there was evidence of placental abruption. The baby died later that day.

### Commentary

A change in the mother's perception of the pain she is experiencing may be an indicator of a change in the course of her labour and maternity teams need to be receptive to this.

### Things you can do

Listening, acknowledging and reacting appropriately to what a mother is communicating should be central to the care provided to her. It may be necessary to bring forward an examination or fetal heart rate assessment, rather than sticking rigidly to a previous plan. The clinical situation and the risk status are continuously evolving during labour and healthcare professionals must be alive to such change.

## Recommendations – intermittent auscultation

### RECOMMENDATION:

Women who are apparently at low risk should have a formal fetal risk assessment on admission in labour irrespective of the place of birth to determine the most appropriate fetal monitoring method.<sup>11</sup>

It is not always easy to identify in maternity notes all risk factors that may make intermittent auscultation inappropriate. The relevant information may be contained in the latest ultrasound report (small for gestational age, abnormal fetal Doppler), a recent, as yet unfilled laboratory report or the mother's history when she presents in labour.

The development of IT tools that bring together data from across a hospital's systems to support accurate, easily accessible risk assessment should be prioritised.

### RECOMMENDATION:

NICE guidance on when to switch from intermittent auscultation to continuous CTG monitoring should be followed (Table 6).

This requires regular reassessment of risk during labour as recommended in the guideline on intermittent auscultation from the Royal College of Midwives.<sup>15</sup> Fetal heart rate abnormalities identified or suspected through intermittent auscultation need careful assessment to ensure the baby is coping with labour. The stage of labour, progress through labour, the well-being of the mother and the baby and the ability to access help must be an integral part of any decision making in labour.

### RECOMMENDATION:

Healthcare professionals should be alert to the possibility of quick transition between different phases of labour (latent phase to active stage, active stage to second stage).

In contrast to continuous CTG monitoring, the frequency of fetal monitoring with intermittent auscultation varies according to the labour phase and yet the transitions from the latent to the active phase and from the active to the second stage may occur unnoticed. There needs to be a careful balance between too frequent, intrusive assessments of progressive cervical dilatation and the risks associated with inadequate fetal monitoring. There is no objective method as an alternative to vaginal examination which can be recommended to determine the stage of labour. Therefore, clinicians have to rely on their clinical experience and judgement if they choose not to perform vaginal examination.

**Table 6** Main indications for continuous CTG (adapted from the NICE guideline on intrapartum care for healthy women and babies<sup>11</sup>)

Maternal assessment	Baby's assessment
Pulse over 120 beats/minutes on two occasions 20 minutes apart	Any abnormal presentation including cord presentation
Single reading of either raised diastolic blood pressure of 110 mmHg or more or raised systolic blood pressure of 16 mmHg or more	Reduced fetal movements in the last 24 hours reported by the mother
Either raised diastolic blood pressure of 90 mmHg or more or raised systolic blood pressure of 140 mmHg or more on two consecutive readings taken 30 minutes apart	Deceleration heard in the fetal heart rate on intermittent auscultation
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)	Suspected fetal growth restriction or macrosomia
Temperature of 38°C or above on a single reading, or 37.5°C on two consecutive readings 1 hour apart	Suspected anhydramnios or polyhydramnios
Any vaginal blood loss other than a show	Fetal heart rate below 110 or above 160 beats/minute
Rupture of membranes more than 24 hours before the onset of established labour	
Presence of significant meconium	
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	
Confirmed delay in the first or second stage of labour	
Request by the woman for additional pain relief involving regional anaesthesia	
Obstetric emergency, including antepartum haemorrhage, cord prolapse, postpartum haemorrhage, maternal seizure or collapse, or a need for advanced neonatal resuscitation	

## Continuous cardiotocography (CTG)

Of the 409 babies where fetal monitoring was identified as a critical contributory factor by one or more reviewer, continuous CTG interpretation and/or its subsequent management was a significant contributory factor to the outcome for 341 babies. 47 of these babies had critical factors identified in both intermittent auscultation and CTG. The Each Baby Counts team examined the care of the remaining 294 babies in which only CTG factors were identified in the fetal monitoring categories. The distribution of the contributory factors for these 294 babies can be found in Table 7. A random selection of the local investigation reports of 70 babies was reviewed to identify common themes in these babies that could be highlighted to drive improvement in their care.

**Table 7** Distribution of continuous CTG critical contributory factors identified

Contributory factor	% of babies, N=294
CTG technique/equipment	12
Errors of interpretation of CTG	27
Failure to act upon suspicious or pathological CTG	34
Fetal blood sampling	7
CTG and blood sampling – other	14

Note: These contributory factors are not mutually exclusive; reviewers can indicate that there was more than one critical contributory factor in the care of each baby.

## Recognition of and prompt action when faced with a pathological CTG

A significant proportion of the reviews identified that healthcare professionals either did not recognise a pathological CTG or did not act upon a pathological CTG even when it was recognised.

A mother was admitted in early labour with severe hypertension. Continuous CTG was commenced 1 hour after admission as the initial focus was on stabilising the mother’s blood pressure. The CTG was not formally assessed using a recognised classification system for over 2 hours. Eventually, the CTG was classed as suspicious and the consultant was asked to review. The lack of reactivity was attributed to the antihypertensive therapy, and the plan was to continue with CTG and repeat vaginal examination 4 hours later.

At the next vaginal examination, the cervix was found to be 3 cm dilated; artificial rupture of the membranes was performed with thick meconium draining. The plan was to initiate ST Analysis (STAN) monitoring. However, the fetal scalp electrode could not pick up the fetal heart; a second clip was obtained and, despite good application, no fetal heart rate was recording. The consultant obstetrician was contacted to locate the fetal heart rate with transabdominal ultrasound, by which time there was a fetal bradycardia.

Immediate caesarean section was performed under general anaesthesia, but despite extensive resuscitation efforts the baby did not survive. A retroplacental clot was found on delivering the placenta.

### Commentary

This scenario illustrates a CTG that was pathological yet not acted upon as it was perceived to be caused by the antihypertensive therapy. The risk factors for abruption were not considered. The discovery of thick meconium on the rupture of membranes should have been added into the picture when considering the management of this baby.

The Each Baby Counts reviewers highlighted the repeated missed opportunities to identify earlier a suspicious or pathological CTG. In some babies, there was a lack of documented formal assessment and categorisation of the CTG.

A low-risk first-time mother attended her local birthing unit in labour. In the second stage, a deceleration was heard and so she was transferred to the delivery suite and continuous CTG was commenced. The CTG was abnormal, but it was interpreted incorrectly as having accelerations with contractions. Eventually, the CTG was identified as abnormal by the senior midwife (shift coordinator), who alerted the obstetric registrar. An instrumental delivery was performed immediately. The baby was pale and floppy on delivery and underwent active therapeutic cooling with a diagnosis of grade II HIE.

### Commentary

Interpretation of a CTG can be subjective. When acting alone, maternity providers have limited safeguards against getting this interpretation wrong.

### Things you can do

Formal recording of the CTG assessment (e.g. stickers in the notes) should be undertaken as it has been shown to reduce the incidence of babies born with an Apgar score of less than 7.<sup>16</sup>

A buddy system and a 'fresh eyes' approach to CTG interpretation should be used in all units interpreting continuous CTG as there is evidence this may reduce errors in CTG interpretation.<sup>17</sup>

### Dealing with technical difficulties in obtaining adequate continuous CTG tracings

A further theme was the management of mothers when there was difficulty obtaining adequate continuous CTG tracings. Time can be lost by blaming the equipment for a CTG abnormality and significant events can be missed if maternity providers do not react and investigate a sudden change in the CTG patterns.

A mother with a history of a previous caesarean section was admitted in early labour and had continuous CTG monitoring and an epidural. The CTG became difficult to interpret with a suspected high baseline and variable decelerations. Vaginal examination was performed and the cervix was 9 cm dilated. After 1 hour, it was noted that the tocograph was not recording the uterine contractions and that they were no longer palpable abdominally. After discussion with the consultant, the decision was made to commence an intravenous oxytocin infusion.

When delay in the second stage of labour was diagnosed, a decision was made to increase the oxytocin dose in preparation for a trial of instrumental delivery in theatre. This was discussed and agreed by the consultant obstetrician. The CTG was described as reassuring. However, on retrospective review the maternal heart rate was 120 beats/minute and it seems likely the CTG was recording the maternal rather than the fetal pulse.

The obstetric registrar performed a forceps delivery of a stillborn infant. This was followed by fresh vaginal bleeding, which persisted after the repair of the perineal tear. The consultant attended, and when the mother started to complain of shoulder tip pain, the possibility of a uterine rupture was considered. A second consultant was called and a laparotomy performed confirming uterine rupture.

### Commentary

This vignette highlights the need to be alert to the other aspect of the CTG – the tocograph. Had the sudden loss of contractions in a mother with a previous caesarean section been considered more thoroughly, the diagnosis of uterine rupture may have been made earlier preventing the outcome.

A mother attended with a history of pink vaginal discharge and contractions. Continuous CTG demonstrated a prolonged deceleration and the mother was transferred to theatre. The fetal heart rate recovered and she was transferred to a delivery room with the plan to perform artificial rupture of membranes if decelerations persisted.

After a further deceleration, artificial rupture of membranes was performed at 4 cm dilatation revealing thick meconium. The fetal heart became difficult to monitor. An attempt to place a fetal scalp electrode lasted more than 30 minutes. When a second CTG machine was used, it also failed to record the fetal heart. Eventually, the obstetric registrar was asked to perform an ultrasound scan. A fetal bradycardia was noted and a category I caesarean section was performed. The baby was stillborn.

### Commentary

When a fetal heart rate becomes undetectable, maternity teams need to act quickly to ensure that the fetal heart rate is satisfactory. Although fetal scalp electrodes are a recognised way to monitor the fetal heart when the transabdominal route is unsatisfactory, they can still be unreliable and it can take time to establish a good trace. Good-quality, continuous recordings of both the fetal heart rate and uterine contractions are a critical prerequisite for adequate CTG interpretation. Trying to achieve this in a timely manner can be intrusive, but it is the duty of health providers, when appropriate, to find a way to adequately monitor women and their babies in labour.

### Things you can do

Ultrasound scanning should be used to exclude severe fetal heart rate abnormalities when a CTG recording cannot be obtained reliably via a transabdominal transducer or a fetal scalp electrode.

### Delay in expediting delivery once fetal compromise is identified or suspected

A mother attended with spontaneous rupture of membranes and raised blood pressure. Thick meconium was noted to be present. The CTG was nonreassuring and remained so despite fluid resuscitation. A decision was made to perform delivery by category I caesarean section. However, the delivery was delayed whilst awaiting the maternal blood results. The baby was delivered 3 hours and 45 minutes after the mother's initial presentation to the unit.

The baby was in poor condition at birth. The baby was intubated and transferred for active therapeutic cooling.

### Commentary

Although it could be argued this vignette reflects a baby with potentially antenatal chronic hypoxia, there was evidence of fetal distress on the CTG in the presence of thick meconium, but this was not acted upon promptly. Maternal safety is important, but the blood results should have been processed more quickly and the baby delivered sooner.

It is accepted that there can be many factors that influence the decision on how and when to deliver a baby. However, there were a number of instances where there was either inappropriate persistence with vaginal delivery, a delay in intervention in the second stage or a delay in delivery by caesarean section.

### Things you can do

A robust system should be developed locally to ensure that the urgency of a delivery is communicated effectively between all teams involved in the mothers care. Any delay in delivery must be flagged up to the most senior obstetrician in charge and action should be taken immediately to reassess the necessity and potential impact of such a delay.

### The value of reviewing the 'whole picture'

The most common theme, and one that runs through all of the above vignettes, is the lack of appreciation for the whole picture when assessing continuous CTG. By focusing solely on the CTG, maternity providers miss the other warning signs a baby or mother may be demonstrating that intervention is required.

A low-risk mother attended with painful contractions and reduced fetal movements. Initially, there were no accelerations on the CTG and the mother was admitted for observation with a plan to repeat the CTG in 4 hours. However, after 1 hour the mother still complained of reduced fetal movements and increased abdominal pain. The midwife commenced the CTG and decelerations were noted. The mother was transferred to the labour ward, and on recommencing the CTG the fetal heart rate was less than 80 beats/minute. The membranes were ruptured and thick meconium was present. A decision for a category I caesarean section was made and the baby was born within 15 minutes of the mother's arrival on the labour ward, but died despite resuscitation.

### Commentary

This vignette highlights the multiple signs that the mother and baby were demonstrating that were not drawn together to identify how at risk this baby was. Although a plan was made for admission and observation, the significance of the CTG was not appreciated in the context of the reduced movements and maternal abdominal pain.

A mother attended in labour and was found to be 4 cm dilated. After 4 hours, there was no progress and she was transferred to the antenatal ward to await events. When the CTG was repeated, it was considered to be suspicious, but after review by a doctor the woman was allowed home.

When the mother reattended a few hours later, the CTG was abnormal. This was discussed with the on-call consultant obstetrician, who recommended the doctor perform fetal blood sampling. When the obstetric registrar performed the vaginal examination prior to fetal blood sampling, the cervix was fully dilated. This was not fed back to the consultant and the registrar persisted with the fetal blood sampling despite the evidence that an assisted vaginal delivery could have been attempted. The consultant attended and reviewed the mother 30 minutes later. A ventouse delivery was performed promptly.

The baby was born in poor condition and died in the early neonatal period.

### Commentary

The local reviewers commented that when the consultant was asked to review the situation, the whole team was not fully appreciative of the complete picture. The background of the prolonged latent phase and the nonreassuring CTG prior to discharge, attendance with an abnormal CTG and persistence with a fetal blood sampling at full dilatation when assisted delivery was achievable should have been assessed as a whole to prompt earlier delivery of this baby.

## Things you can do

A holistic approach that takes into account the risk factors for both the mother and the baby as well as the stage and progress in labour should be adopted when making any management decisions.

The identification and consideration of risk factors such as persistently reduced fetal movements before labour, fetal growth restriction, previous caesarean section, thick meconium, suspected infection, vaginal bleeding or prolonged labour must become standard practice when reviewing a CTG.

## Recommendations – continuous CTG

The Confidential Enquiry into Stillbirths and Deaths in Infancy (CESDI) report<sup>18</sup> published in 1997 found suboptimal care in three-quarters of babies who died from an intrapartum-related cause. Most of the criticism focused on electronic fetal monitoring. The report highlighted failure to initiate CTG when indicated, failure to ensure good-quality CTG, inadequate CTG interpretation and failure to communicate the findings to senior staff in a timely manner. The conclusions resulting from these findings included recommendations for:

- a regular/rolling programme of training in the use of electronic fetal monitoring
- simple guidelines on the interpretation of electronic fetal monitoring
- guidelines on appropriate management in situations where the CTG is abnormal and clear lines of communication when an abnormal CTG is suspected.

Medical and midwifery staff have responded and now there are NICE intrapartum guidelines and several structured training programmes. However, the themes identified in the present Each Baby Counts report remain remarkably similar to those in the CESDI report 20 years ago. It was anticipated that computer-assisted CTG assessment and management alerts would revolutionise fetal monitoring, but a recent large randomised control trial, the INFANT study, did not demonstrate this. INFANT found no evidence that using computer assisted decision support software in conjunction with CTG reduced the occurrence of poor outcomes for babies at birth or developmental issues at 2 years when compared with CTG alone.<sup>19</sup> Therefore, reinforcement of the recommendations from CESDI 1997 remains essential if the aspirations of the Each Baby Counts project are to be realised.

It is also crucial to challenge the research community to continue to search for more robust methods for intrapartum assessments of fetal well-being. The continued reliance on fetal heart rate changes to inform maternity staff about fetal health in often complex, high-risk situations is inadequate. The maternity profession urgently requires a more holistic approach to well-being assessment and training to achieve improved outcomes for babies.

**RECOMMENDATION:**

Staff tasked with CTG interpretation must have documented evidence of annual training.

The RCOG recommends formal documented evidence of regular continuous CTG training and competency assessment through such means as e-Learning for Healthcare (e-LfH) electronic fetal monitoring training,<sup>20</sup> Advanced Life Support in Obstetrics (ALSO®) Provider Course,<sup>21</sup> Managing Medical and Obstetric Emergencies and Trauma (mMOET)<sup>22</sup> and locally developed CTG training sessions for all intrapartum care providers. 'Fresh eyes' reviews or a buddy system should be part of the culture of CTG assessment in order to minimise misinterpretation of CTGs. In England, these recommendations comprise element 4 of the Saving Babies' Lives care bundle.<sup>23</sup>

**RECOMMENDATION:**

Key management decisions should not be based on CTG interpretation alone.

When reviewing a continuous CTG, healthcare professionals must take into account the full picture, including the mother's history, stage and progress in labour, any antenatal risk factors and any other signs the baby may not be coping with labour. A CTG should not be reviewed as a stand-alone investigation.

## Thematic analysis 3

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# Human factors and lack of non technical skills

### Summary

People will always make mistakes, this can be referred to as human error, or the human factor. The goal of the study of human error is to attempt to prevent its occurrence, avoid recurrence or mitigate the effects of both. Maintaining a perfect awareness of the whole situation is impossible, and in some reports it proved an easy way to target and blame individuals. We should not stop seeking to improve our personal qualities, but we need to understand the limitations of our abilities to 'train out' undesirable characteristics. Continuing to blame individuals inhibits improvements which could genuinely reduce the chances of human error, by focusing on the individuals rather than the system.

### Human factors overview

Human factors have been highlighted before as causes of clinical errors in high-profile reports in obstetrics. The 2014 MBRRACE-UK maternal report<sup>24</sup> highlighted 'fixation error' that must be avoided by being sure to "always consider other possible diagnoses in the event of failure to respond to treatment of the initial presumed cause of illness." The Morecambe Bay report<sup>25</sup> described "repeated instances of failure to communicate important clinical information about individual patients" as well as highlighting that "working relationships between staff groups were extremely poor".

Generally, Each Baby Counts reviewers interpreted 'human factors' as being 'human errors' and the means to overcome them as 'human factor training'. Whilst experience from the aviation industry and some early experience from obstetrics suggests that such training can be effective, connections to improved obstetric outcomes have yet to be made. Nontechnical skills training,<sup>26</sup> human factors training and crew resource management all attempt to improve the abilities of healthcare providers to analyse and make sense of what is going on around them, to improve their situational awareness, team working and communication. Although not linked directly to improvements in outcomes, human factors training will raise awareness that human factors exist. Such training should standardise certain elements such as communication, understanding of personal bias, personality and team working.

The distribution of the human factors identified by Each Baby Counts reviewers as contributory to the outcome can be found in Table 8.

**Table 8** Distribution of human factor critical contributory factors identified

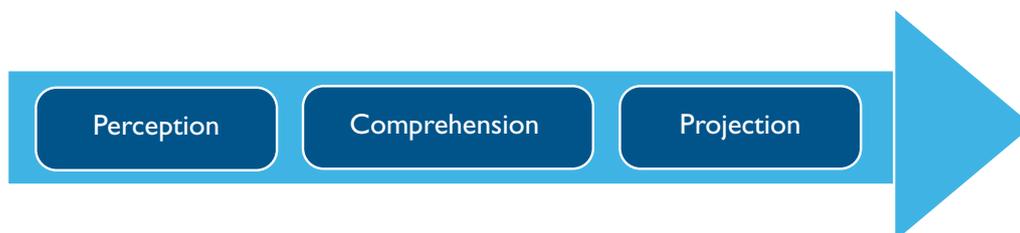
Contributory factor	% of babies, N=556
Individual human factor issues	
Situational awareness	44
Stress	4
Fatigue	2
Team issues	
Intra- or interprofessional communication	45
Team leadership	22
Other	12

Note: These contributory factors are not mutually exclusive; reviewers can indicate that there was more than one critical contributory factor in the care of each baby.

For this report, the focus was set on individual human factors rather than team issues in order to allow staff to take personal responsibility for their own development. All human factors involve human interaction in some way, so it has never been possible to completely separate individual and team factors. Team factors require multifactorial, complex interventions and will be the focus of a future report. The themes of situational awareness, stress and fatigue form the basis of the subsequent analysis.

### Situational awareness

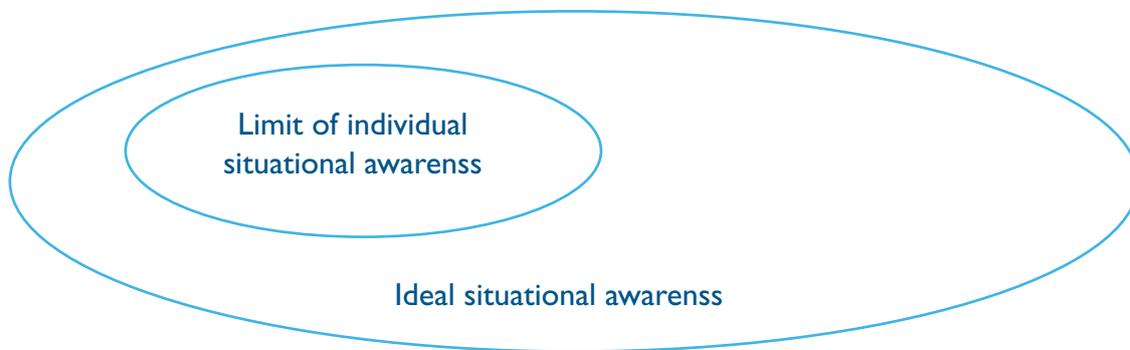
Situational awareness can be defined simply as “knowing what is going on around us”,<sup>27</sup> or – more technically – as “the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future” (Figure 10).<sup>28</sup> The first part of situational awareness can be achieved by situation assessment using perception and attention. Comprehension follows this, the interpretation of the situation assessment. Knowing how the situation is likely to evolve is projection.<sup>27</sup> Once complete, situational awareness forms the foundation of good decision making.<sup>27</sup> Once we have formed a mental model of the environment, our communication skills allow us to share this with others.



**Figure 10** Components of situational awareness

In an ideal situation, one has a complete ‘helicopter view’ of the overall picture in any given situation and can share it with colleagues. However, it is easy to see how failure to interpret a key finding or result, or failure to process one element of a complex item such as a CTG correctly, could be part of a critical chain of events leading to a catastrophe.<sup>29</sup> Working memory is limited to up to seven items, depending on genetics and environmental factors

such as stress, fatigue and health. If working memory becomes overloaded, items will simply be forgotten. Given that there may be many more variables to contend with on a labour ward at any one time, the essentially fallible nature of situational awareness becomes apparent. Figure 11 is a common model of situational awareness which expresses this limitation.



**Figure 11** Model of ideal and practical situational awareness

The construct of situational awareness, the limitations of human memory and the complexity of any given situation mean that, inevitably, situational awareness will be suboptimal at any one time. Put simply, we cannot remain aware of everything which is going on around us. When looking retrospectively at an incident with all of the available information, it will always be possible to highlight where situational awareness failed because the key, critical variables will be obvious. This is an inherent bias we have to consider when conducting investigations, and when analysing reports.

### Unexplained loss of situational awareness

In one review that was analysed, it was found that everyone present at a difficult vaginal breech delivery failed to appreciate a pathological CTG for over 1 hour. The delivery was complex and completed by the consultant as the fetal head was entrapped. In the report, the following reason was given for the failure to act on the pathological CTG findings:

“There was a loss of situational awareness by all members of the team who became focused on the process of the vaginal breech delivery and lost sight of the whole clinical picture, including the fetal heart rate monitoring.”

### Commentary

The unspoken shared mental model across the team was that the delivery was progressing safely and that the fetal well-being was assured. The single element that was overlooked was the CTG, but the reason for this being overlooked by all involved is unclear. No information is available as to why the CTG was not taken into account, but this was a far from isolated incident.

The solution offered in this instance was comprehensive individual supervisory investigations and individual action plans for all involved. This approach – to identify human error as a cause, and to identify a course of training to prevent healthcare professionals from making errors in the future as a solution – was frequently noted in reviews.

### Things you can do

There was no consideration in this case report that there could be other ways to influence human behaviour on the delivery suite. Options available might include identifying error traps, care bundles and pathways.<sup>30</sup>

A similar situation was described in another report:

“MW 2 and Dr 1 both exhibited poor situational awareness as neither recognised the pathology of the CTG and both enabled a 1st year midwifery student to deliver the baby under direct supervision from MW 2.”

### Commentary

Within this example, the local reviewers correctly identify a loss of situational awareness. What stands out is that – in this instance and in other instances in different reports – concerns were not apparent at the time of the incident, and nobody in the team at the time noticed them. Considering the model of situational awareness in Figure 11, it is easy to see the reviewers’ perspective (the so-called ‘retrospectroscope’) compared with that of the clinicians’ at the time of the incident. It is clear to the reviewers what the critical factor was, with the benefit of hindsight. There is a danger that situational awareness becomes simply another way of highlighting ‘human error’ and attributing failures to ‘bad apples’.

### Lack of understanding of situational awareness on the part of report writers

“Lack of situational awareness. Lack of escalation. Failure to take appropriate action at various times.”

### Commentary

This report statement is indicative of some attitudes to situational awareness, with situational awareness being buried into a series of nonspecific and vague causes. In several reports, there was a tendency to ‘add-on’ situational awareness as a problem, this time in the context of interpreting a CTG correctly but failing to inform the medical team.

## Distractions as a cause of loss of situational awareness

In one review analysed, a midwife had been assigned to care for two women in early labour, one of whom had been violent towards a midwife; the second woman was in early labour and then progressed unexpectedly quickly.

“Midwife 2 became distracted while providing care to another patient. She lost sight of the time and importance of monitoring the fetal heart of [the] baby.”

### Commentary

Distractions are an important cause of loss of situational awareness, and in this case having two competing tasks was a problem. It is easy to see how having two complex patients would push one over the threshold of working memory and allow distractions to creep in. In this example, the major distractor was the emotional difficulty of dealing with a woman who had been violent. The midwife could not concentrate properly on the other women she was caring for.

### Things you can do

Many hospitals have adopted visual barriers to prevent interruptions during safety-critical tasks, for example by displaying written “Do not interrupt the drug round” messages during medication administration.

## Cognitive overload as a cause of loss of situational awareness

“At this point the team (obstetricians, anaesthetist and co-ordinating midwife) felt that delivery suite was busy and had many complex problems, but that they were managing it safely and effectively and did not consider escalating the situation. Having reviewed the workload, it appears that the team had lost situational awareness and were only just managing. On reflection the team now feel that there would have been benefit in calling the on call consultant. This may not have changed the overall outcome for the patient but it may have helped with the remainder of the work on delivery suite. The amount and complexity of the work that night also impacted on the midwives in that Midwife 1 needed support in theatre which was unavailable until the Band 7 midwife came into theatre. Calling out a second theatre team should have triggered the response of informing the on call consultant, this is an area of learning which will be taken forward as a recommendation of this report.”

### Commentary

This report highlights a number of important areas and is typical of a good systems-based response. The team at the time were clearly happy with their situational awareness and implicitly seemed to have considered this. In retrospect, they could see they were deficient. Having reviewed the workload, it appears that the team had lost situational awareness and were only just managing. On reflection, the team felt that there would have been benefit in calling the on-call consultant. This may not have changed the overall outcome for the patient but it may have helped with the remainder of the work on delivery suite. The report identifies the potential use of the on-call consultant to act in a role where he or she has oversight of the whole delivery suite in times of high activity.

### Things you can do

A safety trigger should be created to make sure that the system does not rely on the team on delivery suite realising they have lost situational awareness; instead, there should be a fixed, forced trigger for the consultant to be contacted. Calling out a second theatre team could be trigger to the response of informing the on-call consultant to come and adopt a helicopter view whilst other team members are concentrating on tasks.

## Recommendations – situational awareness

### RECOMMENDATION:

Staff undertaking a complex technical task should focus on it and delegate responsibility for looking at the overall picture to a colleague.

When staff are performing a technical task, they need to concentrate on it. Situational awareness will be lost if the task is being performed with due attention. When about to undertake something technical (caesarean section, fetal blood sampling, vaginal breech delivery), staff should actively delegate the job of maintaining a 'helicopter view' to someone else. This could be another doctor or another midwife, either onsite or offsite. Staff should learn to recognise when situational awareness is being lost, and the times when people are more prone to this (stressed, fatigued), and practice responding to these in simulations. Human factors training can help in this regard.

### RECOMMENDATION:

All members of the clinical team working on the delivery suite need to understand the key principles of maintaining situational awareness to ensure the safe management of complex clinical situations.

For example:

- Avoid distracting someone when they are undertaking or completing a task.
- If multiple tasks occur at once, maintain the role of someone having a ‘helicopter view’ at all times.
- The delivery suite board contains a wealth of information and should be constantly referred to and updated.
- If doctors, midwives or others caring for women in labour feel that they or their team are losing situational awareness, make a challenge and take action. Providers should feel open to constructively challenge other team members to reassess the CTG, or review progress in labour if they feel it is needed.

Ensure that regular simulation happens which incorporates a ‘safe space’ to practise and reflect on personal and team behaviours. Use checklists for common emergencies and drill their use.

#### RECOMMENDATION:

A senior member of staff must maintain oversight of the activity on the delivery suite, especially when others are engaged in complex technical tasks.

Ensuring someone takes this ‘helicopter view’ will prevent important details or new information from being overlooked and allow problems to be anticipated earlier.

Please refer to Appendix I for information on the implementation of the recommendations surrounding maintaining a helicopter view and situational awareness.

## Stress and fatigue

Stressful situations reduce the ability to process complex information. They make us more likely to pursue a familiar course of action, or something we are good at, even if it is unwise. Situations where we are fatigued diminish our ability to physically react and perform.

When exposed to stress, the ability to perform complex analytical tasks falls. We show a preference for “implicit memory and well-rehearsed tasks”.<sup>31</sup> This behaviour was evident in the repeated attempts to deliver vaginally in a situation where this was clearly inappropriate, the unwillingness to transfer to a different care setting or the reluctance to open a third theatre. In an emergency with high stress responses, there was a tendency to revert to behaviours which were well practised leading to a failure to analyse a problem fully and respond appropriately.

Fatigue is well recognised as having similar deleterious effects to stress on both cognition and manual dexterity. Not having slept for 18 hours reduces reaction times to those of someone who has a blood alcohol level of the legal driving limit.<sup>32</sup> Disconcertingly, where staff expressed concerns that they were tired, no mention of this was made in any action plans.

Stress and fatigue may be caused by the workload or complexity of cases being dealt with, or may be attributable to workforce issues which the trust/board needs to address.

### Inadequate staffing levels

When analysing the reviews, there was a recurring theme of perceived inadequate staffing levels and high unit activity contributing towards staff stress and fatigue.

In some instances, it was understandable how the external stressors contributed to the baby's injury:

“The unit was experiencing high levels of clinical activity. A statement from the shift labour ward coordinator indicates all delivery rooms and recovery beds were occupied with simultaneous emergencies occurring. At the time of the second fetal bradycardia the ST7 was in labour ward theatre preparing a woman for a potentially complicated category 2 caesarean section.”

There were also instances where fatigue was clearly a contributory factor:

The midwife concerned had been working for a long period of time, having worked in the community during the day, and after a short break was called in to the birth centre for support. She had recognised that she was now tired and planned to go home. Her tiredness led to her losing sight of the situation when dealing with the telephone call from the mother.

### Commentary

According to the midwife's statement, tiredness led to her failing to detail elements of her conversation in the telephone record, leading to key information being missed. A woman was sent inappropriately to a midwife-led unit. This was echoed in another very similar situation:

“The midwife reported that she did not have a break during a very busy night shift and identified that she was very tired and thought this might be the reason she did not complete the telephone message.”

Whilst the arguments for too-busy labour wards or midwifery-led units were cogent or logical, some did not seem plausibly connected. In one report, the following connection between high workload and clinical outcome was made:

“Unexpectedly high workload [led to] failure to recognise delay in 2nd stage.”

### Commentary

In this instance, a midwifery student was looking after a multiparous woman who was fully dilated on admission and then remained in the second stage for a further 3.5 hours. The medical team then administered oxytocin. It was not clear what the high workload was in this case, but it was concerning that such a long second stage was accepted, by different health professionals. It seems unlikely that this would be solely attributable to a high workload, but no further factors were identified by the local team undertaking the review of this woman’s care.

### Simultaneous emergencies

The pattern of more than one emergency happening at once causing delay or deviation from standard practice was an emergent theme, particularly where more than one or two obstetric theatres were needed at once.

In the following instance, where a theatre was unavailable and a fetal bradycardia was being observed, there were multiple unsuccessful attempts at vaginal delivery. A possible cause of this is lack of situational awareness. A comprehensive review identified a possible cause as:

“Belief that a multiparous woman could deliver vaginally, hence persistence with an attempted instrumental delivery when the first attempt with [the] successfully placed instrument had failed.”

### Commentary

This was an emergent theme in the analysis with similar situations identified. One report outlined a situation where two obstetric emergency theatres were occupied, one with an ongoing operation and the other with preparation for a category 2 caesarean section, and a third emergency – a fetal bradycardia – occurred on the delivery suite. No action was taken at this point to stop the preparation for the category 2 caesarean section. Rather than attempting to open a third theatre, the team waited for an obstetric theatre to become free. Once it did, they then made multiple attempts at instrumental delivery under pudendal block, despite lack of descent of the head, and an emergency caesarean was required. An option to open a third theatre in the main theatre block was available, but was either not considered or the staff were unaware of this option.

## Responses to stress

The following is a typical comment about team responses to stress on the labour ward:

“The labour ward was busy that night and [the midwife] was unable to provide one-to-one midwifery care, which, given the history of reduced fetal movements and suspicious CTG trace, she would have done if there had been another midwife available. No formal escalation policy was followed and the midwifery team just tried to ‘cope’.”

In another stressful situation, concerns about a baby had been raised at a midwifery-led birthing unit, requiring transfer to the delivery suite. Instead of transferring the woman out of the midwife-led unit immediately, a midwife from the community was called to help with the transfer to the consultant-led unit, resulting in a delay of over 2 hours.

Individual responses to stress were highly variable. One report highlighted the conflict created when there is a need to speak up during an emergency and a reluctance to acknowledge it because of the possibility of distressing the pregnant woman:

“The general consensus was that all were aware of the bradycardia but the increasing urgency was not escalated to the operator [In this case the obstetrician waiting to perform a caesarean section, whilst the anaesthetic was ongoing]. It was also felt that it was difficult to verbalise the urgency more in front of very distressed parents.”

### Commentary

In this instance, the stress of the situation caused the team to fail to prioritise the need to communicate the urgency of the situation over the need not to cause any upset to the mother.

In another report, a woman with diabetes was undergoing induction of labour because of suspected fetal macrosomia and developed failure to progress in the second stage. A challenging instrumental delivery failed. The registrar responded to this stress in a positive way:

“The surgeon was alert to the slow progress and that potentially the baby may be large. She was aware that the caesarean may be difficult to perform as the fetal head was deep within the pelvis.”

### Commentary

There was early recognition that there was the potential for difficulty, and help was summoned early. A difficult delivery required the assistance of two consultants. The report detailed responses from the whole team, which reflected a positive response to stress.

None of the reports where stress, fatigue or a high workload were identified as contributory causes made systemic recommendations to address these issues.

## Recommendations – stress and fatigue

### RECOMMENDATION:

Decision making is more difficult when staff feel stressed and/or tired. A different perspective improves the chances of making a safe decision.

Clinical staff should be empowered to seek out advice from a colleague not involved in the situation who can give an unbiased perspective (either in person or over the phone).

It must be accepted that calling for help is not a sign of weakness or incompetence, or an inability to cope on one's own. It is an appropriate response to dealing with a stressful situation. In the case that any healthcare professional needs an unstressed opinion, they must feel able to call a colleague and explain this. An SBAR (Situation, Background, Assessment, Recommendation)<sup>33</sup> handover could help this. "I'm feeling stressed and I'm not sure about this decision, can I check it with you?" Consultants and other senior healthcare professionals, too, are susceptible to stress and units should consider how they can call for help when this situation arises.

### RECOMMENDATION:

When managing a complex or unusual situation involving the transfer of care or multiple specialties, conduct a 'safety huddle' – a structured briefing for the leaders of key clinical teams.

This will ensure everyone understands their roles and responsibilities and shares key clinical information relevant to patient safety.

Huddles are both scheduled and ad hoc meetings of key professionals to discuss care and can help to improve communication in complex cases. Safety huddles have great potential benefits to improve staff awareness of safety and communication between staff groups<sup>34</sup> and are being championed by other specialities such as paediatrics.<sup>35</sup> They must be short, well led and perceived as useful to staff in order to be successful. They are an integral part of a safety culture, but will only flourish if staff feel empowered to speak openly about patient safety.

## Thematic analysis 4

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# Neonatal care

Over 80% of the babies reported to Each Baby Counts fall into one of two categories: babies who die within the first 7 days of life and those who sustain a severe brain injury. As the majority of these babies will have received neonatal care, it is important to examine this aspect of care alongside the midwifery and obstetric care given in these instances.

The total number of babies who are admitted to a neonatal unit each year is around 95 000,<sup>36</sup> and the specialist reviewers have therefore assessed a very small proportion of the care given to sick babies. The reviews that have been looked at by the specialist reviewers have been highlighted as requiring review by a neonatal expert by other Each Baby Counts reviewers. The care of these babies should therefore be considered in this context. It is to be noted that the requirement for a neonatal reviewer was highlighted by the midwife and/or obstetric reviewer in only 13% of the babies reported to Each Baby Counts.

It must be reiterated that because of the nature of neonatal brain injury, the long-term outcome for many of these babies reported to Each Baby Counts remains unknown. Any neurodevelopmental impact which may lead to ill health from these early life brain injuries will become clearer as survivors progress through early childhood and the severity of their injury can then be adequately assessed. The Each Baby Counts programme does not have access to the long-term follow-up data for these infants in order to assess their long-term health.

## Communication

Reviewers observed that communication with the neonatal or paediatric team was variable and led, on a number of occasions, to paediatricians not being present at delivery or being called late, or to the paediatric/neonatal team being only represented by relatively less experienced/junior members of the team, even in high-risk situations which were identified prospectively.

### Communication with neonatal teams prior to delivery

A baby born at 42 weeks following a rise in the fetal heart-rate baseline along with a high maternal heart rate and temperature required extensive resuscitation. Adequate resuscitation was commenced immediately because a paediatric junior doctor was present at delivery. When the condition of the baby deteriorated, care was escalated quickly and appropriately to the neonatal emergency team, who arrived immediately.

Due to complications with the resuscitation, care was also appropriately escalated to an obstetric anaesthetist and a paediatric ENT (ear, nose and throat) consultant. The baby died at approximately 2 hours of age.

### **Commentary**

The communication before delivery of this baby, in anticipation of problems, was commended by the local review team. Multiple teams and specialties were involved in the care of both the mother and the baby and it was felt that the swift communication between teams provided this baby with good care.

### **Communication of risk factors**

The mother of a baby born at 41 weeks had a high temperature and was receiving intravenous antibiotics during labour. The baby's delivery was delayed because of shoulder dystocia and the neonatal team arrived after the baby had been born. Absence of the neonatal team during delivery caused a delay in intubation and the neonatal team was not made aware of the possible diagnosis of sepsis for both the mother and the baby. The baby was actively cooled for 72 hours and discharged home on day 7.

For a baby delivered at 41 weeks by category I caesarean section under general anaesthesia, there was a failure to communicate the significance of abnormalities on the CTG trace and a profound fetal bradycardia, which meant that the delivery was attended only by a junior paediatric trainee. Had these additional risk factors been communicated, this might have led to the delivery being attended by a team of people, including those of appropriate seniority, ensuring a more timely and robust resuscitation process. Efforts to resuscitate the baby were stopped shortly after birth.

### **Commentary**

The reviewers observed a number of instances where senior paediatricians were not involved early in the care of babies. The reviewers considered that the delivery of care for these babies might have been improved had a more senior member of staff been involved in their care at an earlier stage.

### Things you can do

The communication of relevant risk factors is vital when neonatal assistance is requested at a birth. Provision of this information in a timely manner will help the neonatal team assess who should attend.

To ensure effective communication in all instances, information should be provided in an SBAR<sup>33</sup> format or using a similar structured communication tool in all maternity units. This may also provide further potential for clinical audit and service improvement.

### Communication with families

As outlined previously in this report, neonatal reviewers considered that the quality of the information pertaining to the neonatal care of babies was often lacking. As a result, reviewers found they were unable to assess the quality of neonatal communication with families as there was insufficient information contained within the reviews.

### Things you can do

Open and consistent communication between all team members and families should occur promptly. Verbal communication may be complemented by printed information, e.g. Bliss or local parental information leaflets on therapeutic hypothermia.

## Recommendations – communication

### RECOMMENDATION:

There should be clear local guidance detailing the seniority of personnel required to attend various types of delivery, including detail about when to summon paediatric/neonatal presence prior to a high-risk delivery.

Such guidance should include an escalation process to access more senior support in a timely manner.

### RECOMMENDATION:

The paediatric/neonatal team must be informed of pertinent risk factors for a compromised baby in a timely and consistent manner.

Relevant risk factors could include intrauterine growth restriction, infection, suspected hypoxia, thick meconium, placental abruption, potential fetal anaemia and concerns relating to the fetal heart rate.

## Quality of resuscitation

Reviewers identified that, in a number of instances, the quality of resuscitation that newborns received could have been improved to meet with the standards defined in current national guidelines.

### Resuscitation competence

A baby was born at 41 weeks of gestation with no spontaneous respirations. There was a significant delay in intubation even once a lack of respiratory drive was recognised. Once the decision was made to intubate, the endotracheal tube, when inserted, was too far in (10 cm) and this then slipped to 12 cm. This is likely to have contributed to the development of a right-sided pneumothorax. In addition, there was a delay in inserting a chest drain when it was recognised as tension pneumothorax. The baby passed away at approximately 12 hours old.

### Commentary

As this example clearly demonstrates, issues related to intubation were an emerging theme where improvements could be made. Misplaced endotracheal (ET) tubes and a lack of end-tidal CO<sub>2</sub> monitoring were common examples.

### Things you can do

All members of staff who may be involved in resuscitation of a newborn should be familiar with the current guidelines and attend annual training to ensure their competence in this area is maintained.

### Management of babies born through meconium-stained liquor

During the care of a baby born at 40 weeks of gestation, the resuscitation team remained focused on the removal of meconium from the trachea with multiple episodes of intubation and suctioning. This delayed early lung inflation and, hence, oxygenation in a profoundly hypoxic baby, who subsequently met the criteria for therapeutic hypothermia. The MRI scan undertaken at 11 days of age showed grade III HIE.

### Commentary

When reviewing the care of babies, reviewers found that, in particular, the management of babies born through meconium-stained liquor was variable. There were a number of babies

whose care reflected this and the specialist reviewers highlighted a need to raise awareness of current International Liaison Committee on Resuscitation (ILCOR) recommendations relating to the initial approach to managing these babies.

### Things you can do

The presence of thick viscous meconium in a nonvigorous baby is the only indication for considering visualisation of the oropharynx, and suctioning and tracheal intubation should only be performed for suspected tracheal obstruction.<sup>37</sup> Tracheal intubation may be considered at several points during neonatal resuscitation:

- when suctioning the lower airways to remove a presumed tracheal blockage, e.g. thick meconium secretions, mucus plug
- when, after correction of mask technique and/or the baby's head position, bag mask ventilation is ineffective or prolonged
- when chest compressions are performed
- special circumstances, e.g. congenital diaphragmatic hernia, tracheal surfactant administration.<sup>37</sup>

## Recommendation – quality of resuscitation

### RECOMMENDATION:

Neonatal resuscitation must follow the latest agreed national guidelines. Currently these are based on the 2015 ILCOR recommendations.<sup>37</sup>

Any member of staff who could be involved in neonatal resuscitation needs regular newborn resuscitation training and should be familiar with all local equipment.

Examples of newborn life support training include the Newborn Life Support (NLS)<sup>38</sup> course or equivalent; alternatively, skills would be developed as part of wider training such as PRactical Obstetric Multi-Professional Training (PROMPT).<sup>39</sup>

## Therapeutic hypothermia

### Decision making surrounding therapeutic hypothermia

The reviewers found that, at times, the information contained within the local reviews lacked detail on whether or not criteria were met to initiate therapeutic hypothermia treatment. The reviewers considered that such clinical decisions should be made in the context of readily available agreed best-practice guidance. Clear detail should be included in any review of whether each criterion was being met or not.

A baby was born at 39 weeks of gestation via emergency caesarean section following decelerations and a pathological CTG. At birth, the baby had poor tone and minimal respiratory effort. The investigation report was unclear as to how the decision was made to start therapeutic hypothermia treatment for the baby and the documentation of neurological findings was lacking. The baby received therapeutic hypothermia treatment for 72 hours but the report does not detail a discharge diagnosis and it is unknown on which day the baby was discharged.

### **Commentary**

Reviewers noted that where babies were being considered for therapeutic hypothermia, staff should consider passive cooling. If so, the baby's core temperature must be continuously monitored prior to and during passive cooling.

### **Things you can do**

Decision making around whether or not to treat babies with therapeutic hypothermia should be based on local best-practice guidance.<sup>1</sup>

## **Recommendation – therapeutic hypothermia**

### **RECOMMENDATION:**

If therapeutic hypothermia is being considered, continuous monitoring of core temperature must be undertaken. Early efforts to passively cool the baby should also be considered (turn off the heater, take off the hat).

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## Appendix I

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# Implementation

## Introduction

On average it takes 17 years for an evidence-based recommendation to achieve full clinical uptake.<sup>1</sup> The RCOG and the Each Baby Counts team are committed to seeing recommendations from reports implemented into practice as soon as possible.

There are challenges in implementing recommendations, including resource implications, cultural resistance from staff, trusts or commissioning groups, and barriers from demographic differences. The RCOG considered the type of recommendations available and the challenges they posed.

## Designing recommendations

**Behavioural change elements – medium cost, very hard to implement, good at effecting lasting change**

*Example: human factors education and simulation package*

Changing our behaviours and optimising the way we work as a team sounds easy. However, in order to change how we behave at work, we need to have the correct culture in place. This work is in its infancy in maternity, being led by NHS Improvement's Maternity and Neonatal Health Safety Collaborative. Once the culture is correct, senior leaders need to role-model, consistently, the changes they want to see. Human factors and team-working will only improve if those leading the team work consistently towards a clear goal. These packages are hard to implement, because training is needed followed by a measured period of reinforcement of desired behaviours.

**Structural elements – high cost, easy to implement, good at effecting lasting change**

*Example: risk assessment tool (electronic) for women coming on to the labour ward*

Elements of a system that use forcing measures to change care pathways are very effective at making changes. For example, if you wanted to make absolutely sure that no women came on to the delivery suite without a risk assessment, you could create a piece of software to complete the risk assessment and make it generate a code which is then required to open the door to the delivery suite. This is an extreme example, and would have obvious safety implications, but demonstrates the principle of how a structural element can be effective at

making change. Practical examples of this in health care include blood fridges that do not unlock until you scan a patient's wristband. These elements are costly to design, but once made are easy to implement and effect lasting change.

### Educational elements – low cost, easy to implement, poor at effecting lasting change

#### *Example: Attending a CTG course*

The power of education to effect changes to patient care is greatest in under-developed healthcare systems. In a system like the NHS, the reason for good care not being delivered is rarely that the staff involved were untrained or didn't know what to do; it is more likely that the right thing to do was not available or not easy. Courses and conferences are poor at changing physicians' behaviours<sup>2</sup> and improving practice, but cost very little and are likely to be better than doing nothing at all.

## Prioritising recommendations

At the Each Baby Counts Clinical Engagement Forum (June 2017) we ran an interactive session during which the audience (predominantly midwives and obstetricians who are Each Baby Counts Lead Reporters) responded to questions in real time using their smartphones. Three hundred delegates attended, of whom 103 registered to take part in the interactive session; there may be some bias towards attendees who owned smartphones and were willing to register, but this represents a reasonably representative sample of those who were at the meeting.

The first question we asked was ‘Which of the recommendations in the report are most important to you?’ Seventy-three delegates answered this question, representing 71% of those who registered for the interactive session. The responses are as follows:

<b>Rank the key recommendations in order of importance to you (73 Responses 71% engagement):</b>	
A senior member of staff must maintain oversight of the activity on the delivery suite, especially when others are engaged in complex technical tasks.	1st
All members of the clinical team working on the delivery suite need to understand the key principles of maintaining situational awareness to ensure the safe management of complex clinical situations.	2nd
Key management decisions should not be based on CTG interpretation alone.	3rd
Women who are apparently at low risk should have a formal fetal risk assessment on admission in labour irrespective of the place of birth to determine the most appropriate fetal monitoring method.	4th
When managing a complex or unusual situation involving the transfer of care or multiple specialties, conduct a ‘safety huddle’ – a structured briefing for the leaders of key clinical teams.	5th
The paediatric/neonatal team must be informed of pertinent risk factors for a compromised baby in a timely and consistent manner.	6th
Staff tasked with CTG interpretation must have documented evidence of annual training.	7th
NICE guidance on when to switch from intermittent auscultation to continuous CTG monitoring should be followed. This requires regular reassessment of risk during labour.	8th
Decision making is more difficult when staff feel stressed and/or tired. A different perspective improves the chances of making a safe decision.	9th
If therapeutic hypothermia is being considered, continuous monitoring of core temperature must be undertaken. Early efforts to passively cool the baby should also be considered (turn off the heater, take off the hat).	10th

The two top-ranked recommendations were the human factors recommendations relating to oversight of activity on the delivery suite and understanding situational awareness.

## Selecting implementation tools

We then asked the attendees what implementation tools they would most like to help them in their units. Those relevant to human factors included:

Training scenarios
Culture shift
Human factors training specific to maternity and birth centre.
Triggers that midwives/junior doctors can use to insist that the Consultant is present
Checklist
Training video
Human factors training package/presentation
Human factor training
Other unit's experience as an example
Collated learning from human factor issues

## Implementation 'mini-toolkit'

Based on the feedback we received and the need to make an implementation toolkit that was as close to cost-neutral as possible for trusts and health boards to use, we decided to develop a 'mini-toolkit' for situational awareness.

In collaboration with the Norfolk and Norwich University Hospitals NHS Foundation Trust and Atrainability (a human factors consulting firm), we created a mini-toolkit consisting of three elements, aimed at supporting implementation of the human factors recommendations about maintaining a helicopter view and situational awareness. This is a complex educational intervention that aims to change behaviours by reinforcing the video learning with simulation. It should have minimal resource implication for maternity providers to implement.

The three elements are hosted within the Each Baby Counts webpages:

- An 8-minute video covering:
  - Situational awareness— introduction by Healthcare Safety Investigation Branch (HSIB) safety expert Paul Davis
  - Establishing, maintaining and handing over the helicopter view
  - How to recognise when you are losing situational awareness
- A set of three scenarios relating to common reasons for losing situational awareness, to practise maintaining situational awareness; these are written as training documents
- A set of signposts and tools to useful quality improvement resources and a pro-forma (online form) to fill in and report back progress and improvements made.

## References

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## Appendix 2

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# Improvement opportunities in fetal monitoring

The Each Baby Counts 2015 report identified that out of the 556 babies for whom different care might have led to a different outcome, there were 409 babies for whom fetal monitoring was identified as a critical contributory factor by one or more reviewer. It is also clear from the report that fetal monitoring, whether through intermittent auscultation or continuous cardiotocography (CTG), requires a complex interplay of staff knowledge, use of equipment, team working and interpretation of what is inevitably a dynamically changing picture.

This appendix brings together the key recommendations and the practical ‘things you can do’ set out in the report, together with up-to date resources to help your team find guidance and courses to plan and support your maternity safety training strategy.

We have also indicated who is likely to take responsibility for these improvements. For projects that require national implementation, we recommend that responsible bodies commence discussion to address these issues. For local or regional service improvements, we recommend these are addressed within 1 year of this report’s publication.

## Intermittent auscultation

### Key recommendations:

- 1 Women who are apparently at low risk should have a formal fetal risk assessment on admission in labour irrespective of the place of birth to determine the most appropriate fetal monitoring method
- 2 NICE guidance on when to switch from intermittent auscultation to continuous CTG monitoring should be followed
- 3 Healthcare professionals should be alert to the possibility of quick transition between different phases of labour (latent phase to active stage, active stage to second stage).

### Things you can do:

- 1 A local IT system to facilitate adequate risk assessment at the onset of labour should be designed, to ensure that mothers are giving birth in the most appropriate setting with the appropriate monitoring.

**(Government in partnership with relevant professional bodies)**

- 2 When labour deviates from a low-risk pathway, for example, when decelerations, a rising baseline rate, presence of meconium or vaginal bleeding are detected, the mother's care should be reassessed in a holistic manner. Care should be escalated through the use of continuous CTG monitoring including, if necessary, transfer to a unit with access to obstetric and neonatal support.  
**(Local clinical management and midwifery staff)**
- 3 Employing a 'fresh ears' approach to intermittent auscultation, whereby a second midwife confirms the fetal heart rate pattern every hour, may reduce interpretation errors.  
**(Local clinical management and midwifery staff)**
- 4 When there is a concern regarding the fetal heart rate, immediate help should be sought.  
**(All clinical staff)**
- 5 Full compliance with the NICE recommendations for intermittent auscultations whilst also providing support to the mother and her birth partners, performing maternal observations and maintaining contemporaneous record keeping is a challenge, particularly in the second stage of labour. When full compliance may not be achievable, help should be sought including asking someone to act as a scribe or to provide support to the mother. If this is not possible, continuous CTG must be considered to ensure adequate fetal monitoring.  
**(All clinical staff)**
- 6 Listening, acknowledging and reacting appropriately to what a mother is communicating should be central to the care provided to her. It may be necessary to bring forward an examination or fetal heart rate assessment, rather than sticking rigidly to a previous plan. The clinical situation and the risk status are continuously evolving during labour and healthcare professionals must be alive to such change.  
**(All clinical staff)**

## Continuous CTG

### Key recommendations:

- 1 Staff tasked with CTG interpretation must have documented evidence of annual training.
- 2 Key management decisions should not be based on CTG interpretation alone.

### Things you can do:

- 1 Formal recording of the CTG assessment (e.g. stickers in the notes) should be undertaken as it has been shown to reduce the incidence of babies born with an Apgar score of less than 7  
**(Local clinical management and all clinical staff)**
- 2 A buddy system and a 'fresh eyes' approach to CTG interpretation should be used in all units interpreting continuous CTG as there is evidence this may reduce errors in CTG interpretation  
**(Local clinical management and all clinical staff)**

- 3 Ultrasound scanning should be used to exclude severe fetal heart rate abnormalities when a CTG recording cannot be obtained reliably via a transabdominal transducer or a fetal scalp electrode.  
**(All clinical staff)**
- 4 A robust system should be developed locally to ensure that the urgency of a delivery is communicated effectively between all teams involved in the mother's care. Any delay in delivery must be flagged up to the most senior obstetrician in charge and action should be taken immediately to reassess the necessity and potential impact of such a delay  
**(Local clinical management and all clinical staff)**
- 5 A holistic approach that takes into account the risk factors for both the mother and the baby as well as the stage and progress in labour should be adopted when making any management decisions.  
**(All clinical staff)**
- 6 The identification and consideration of risk factors such as persistently reduced fetal movements before labour, fetal growth restriction, previous caesarean section, thick meconium, suspected infection, vaginal bleeding or prolonged labour must become standard practice when reviewing a CTG.  
**(Local clinical management and all clinical staff)**

## Useful resources

- NICE Guideline 190: Intrapartum care for healthy women and babies:  
<https://www.nice.org.uk/guidance/cg190>
- NICE Baseline Assessment tool:  
<https://www.nice.org.uk/guidance/cg190/resources/baseline-assessment-tool-excel-248724397>
- NICE CTG Interpretation tool:  
<https://www.nice.org.uk/guidance/cg190/resources/interpretation-of-cardiotocograph-traces-pdf-248732173>
- RCOG/RCM Joint Statement on electronic fetal monitoring:  
[https://www.rcm.org.uk/sites/default/files/RCMRCOG%20Consensus%20Statement%20on%20EFM%20A4\\_3\\_0.pdf](https://www.rcm.org.uk/sites/default/files/RCMRCOG%20Consensus%20Statement%20on%20EFM%20A4_3_0.pdf)
- E-Learning for Healthcare EFM package:  
<https://www.e-lfh.org.uk/programmes/electronic-fetal-monitoring/>
- NHS England Saving Babies' Lives Care Bundle:  
<https://www.england.nhs.uk/mat-transformation/saving-babies/>
- RCOG events and courses: <https://www.rcog.org.uk/events>
- RCOG guidelines and research services:  
<https://www.rcog.org.uk/en/guidelines-research-services/>
- RCM events and workshops: <https://www.rcm.org.uk/get-involved/events>
- RCM clinical practice and guidance: <https://www.rcm.org.uk/clinical-practice-and-guidelines>

- NHS Improvement Maternal and Neonatal Health Safety Collaborative:  
<https://improvement.nhs.uk/resources/maternal-and-neonatal-safety-collaborative/>
- HEE Maternity Safety Training Catalogue:  
<https://www.hee.nhs.uk/sites/default/files/documents/Maternity%20Safety%20Training%20Catalogue.pdf>

Please let us know if there are any other resources you would recommend. We will keep the RCOG website updated with new resources.

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