

National Perinatal Mortality Review Tool



Learning from Standardised Reviews When Babies Die

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First Annual Report



October 2019



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Foreword

The Perinatal Mortality Review Tool (PMRT) first annual report represents a milestone in improving our understanding of why babies die in the UK. At its heart, it recognises the need for every parent to know as much as possible about what happened to their baby and why he or she died. Importantly, its effective implementation also provides an opportunity to scrutinise care in detail, reflect and learn lessons to prevent future deaths.

The analysis of the PMRT's first 1,500 cases, reported here, is published against the backdrop of approaching government deadlines for reducing the number of mothers and babies who tragically die in the UK. While the MBRRACE-UK 2019 report shows a 12% reduction in extended perinatal mortality from 2013 to 2017, it is still the case that one in every 150 baby dies before birth or within the first 4 weeks after birth. In England, Scotland and Wales, where the PMRT is currently being used, more than 5,000 families are bereaved every year when their baby dies.

Earlier this year, NHS England's Long Term Plan reaffirmed the Department of Health's commitment to halve stillbirth and neonatal mortality by 2025. In 2018, Scotland's Maternity and Children Quality Improvement Collaborative, set out measures to reach its aim of reducing the stillbirth rate by 35%. In July 2019, the Welsh Government launched "Maternity Care in Wales: A Five Year Vision for the Future" which includes initiatives to reduce stillbirth and neonatal mortality rates. Robust, multidisciplinary review, which takes into account parents' perspective and questions about their care, will be the key to meeting these targets and fulfilling policy promises to make maternity and neonatal care safer for every family.

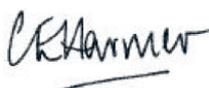
While giving birth in the UK is largely safe, we know from reports in the past decade that both the quality of care and reviews undertaken to learn lessons, have been historically variable. Recent MBRRACE-UK confidential enquiries reported that between 60% and 80% of term deaths, including those associated with an event in labour, might have been prevented with better care. For 1 out of 4 of these deaths a hospital review to learn lessons either didn't take place or was of unacceptably poor quality. It's interesting to note that in the wake of messages from these enquiries, as well as findings regarding the quality of reviews for intrapartum-related term deaths, reported by Each Baby Counts, that the greatest fall in deaths for 2017 reported by MBRRACE-UK, was for babies born at term. Rigorous review, and the strong messages and clear action plans that emerge, clearly has the power to change practice and prevent avoidable harm in the future.

The PMRT sets out high standards for review, and encompasses every relevant care pathway, but it will only be as good as those who are responsible for its governance and use. Information from these first reviews tells us it is still early days: 20% of reviews, for instance, were undertaken by only 1 or 2 members of staff and only 9% had any external input; a high proportion of neonatal reviews did not include a neonatologist/paediatrician. Key members must be present if review is to be described as objective and robust.

Importantly, today's report includes key recommendations to build and improve on what has now begun. Embedding the PMRT will require support from commissioners and local champions, as well as more training and resources; engaging parents more fully in the coming months, thanks to new resources not reflected yet in this report, will require sensitivity and time for communication.

But we have every reason to be hopeful for the future. This first report shows that while a small proportion of deaths were described as being potentially avoidable after review, there were nevertheless actions identified to improve the quality of care, in well over a third of cases. Significantly, the vast majority of parents were also informed a review into their baby's death was being undertaken. These first iterations of the PMRT's use reflect a cultural shift in recognising the stake parents have in review, and taking time to reflect on improving care.

The development of the PMRT represents a true collaboration of clinicians, policy makers, researchers, individual parents and parent advocates who have worked tirelessly for many years to arrive at this point. As the co-founder of the DH/Sands Task and Finish Group which set out to establish standards for perinatal mortality review in 2012, Sands is grateful to have been part of this journey and represented the voices of parents along the way. Today, more families are being heard and more health professionals supported in understanding where lessons learned might save lives, than ever before.



Clea Harmer
Chief Executive
Sands

Executive Summary

Background

The need to improve the quality of reviews of perinatal deaths was identified in 2012. A Department of Health/Sands Task and Finish group was convened and the concept of a national perinatal mortality review tool was established.

Commissioned in 2016, the national Perinatal Mortality Review Tool (PMRT) places at its core the fundamental aim of supporting objective, robust and standardised review to provide answers for bereaved parents about why their baby died. A secondary, but nonetheless important, aim is to ensure local and national learning to improve care and ultimately prevent future deaths.

The national PMRT was developed with clinicians and parents in 2017 and launched in early 2018; further refinement and development continued through 2019 and future developments are planned. These will particularly focus on reducing duplication of data provision by users to meet other requirements, such as Child Death Overview Panels in England.

This report presents the findings from reviews carried out in the first 12 months of the use of the PMRT and so represents the early stages of the journey of implementation of both a formal review process for some Trusts and Health Boards, and the use of a standardised tool for case review for the vast majority. The journey to increase the quality of reviews and to maximise the learning and to improve care continues.

Findings

This report presents data from the first 1,500 reviews conducted using the PMRT and provides a standard against which future improvements in case reviews and the issues with care identified can be compared.

Since it was launched all Trusts and Health Boards across England, Wales and Scotland have engaged with the PMRT and by 10th September 2019 over 6,300 reviews had been started or completed using the tool. This represents review of an estimated 88% of all eligible perinatal deaths comprising 90% of stillbirths and late miscarriages, and 83% of neonatal deaths.

Multidisciplinary review

Multidisciplinary review is key to the review process with recommendations regarding the composition of PMRT review groups having been provided. In this period the majority of reviews were not carried out by review groups consisting of the minimum recommended number of staff fulfilling the appropriate roles. One in five of the reviews were reported as being carried out by only one or two individuals which does not constitute a robust multidisciplinary process.

The involvement of a professional external to the Trust or Health Board as part of the PMRT review team is also recommended to give a 'fresh eyes' perspective to the review process. In this period less than 10% of reviews involved an external member, which needs to be addressed moving forward.

Review of care when a baby dies should be universally regarded as part of routine maternity and neonatal care and should be resourced appropriately. This means including time to participate in reviews in job plans for consultants and prioritising the time required by other staff to participate in reviews; this is a particular issue for those acting as external members of review teams in other Trusts/Health Boards. Support for parents also needs to be adequately resourced. Administrative support is also vital to reduce the burden of tasks for other staff, but this support was generally lacking for the first 1,500 reviews with administrative support only recorded for 11% of reviews.

It is possible that the numbers and roles of staff present at review group meetings have been under-recorded by PMRT users. It is important that this is recorded accurately, not least to demonstrate the engagement of staff in this important aspect of care, but also to quantify the person resource required to conduct high quality reviews with parent engagement.

Parent engagement

It was reported that overall parents had been told in 84% of instances that a review of their care and that of their baby was being carried out. This represents a considerable improvement in parent awareness of reviews from the findings of earlier MBRRACE-UK Confidential Enquiries and the Each Baby Counts programme.

Less than half of all parents were reported to have indicated that they had any questions or concerns about their care. However, this was prior to the release of the PMRT 'Parent Engagement' materials developed using the findings from the PARENTS study results and the 'Being Open' process in Scotland. With better advice and support for health professionals on when and how to engage parents in reviews, now available on the PMRT website, a greater proportion of parents in the future may feel able to ask questions and provide their perspective about their care.

Issues with care identified

Over 90% of reviews identified at least one issue with care, with an average of four issues per death reviewed.

In about 60% of reviews the overall grading of care during pregnancy, labour and birth indicated there were no issues with care that would have affected the outcome for the baby with a similar proportion for the postnatal care for babies born alive who died after birth. For about 25% of reviews the overall grading indicated there were issues with care but they would have made no difference to the outcome for the baby. Only a small proportion of reviews indicated through the grading that different care may or would have made a difference to the outcome: 13% in relation to pregnancy care; 10% in relation to care during labour and birth; and 9% in relation to neonatal care. This is a reminder that in the majority of cases death occurred despite care that was deemed appropriate following review. It is still early days in terms of the PMRT; it remains to be seen whether there is a shift in grading in future reports as the local review groups better fulfil the PMRT recommended criteria for being multidisciplinary and / or issues are dealt with.

Issues with care relevant to the outcome affected many aspects of care throughout the maternity and neonatal pathway. However, the reviews highlighted in particular issues concerning smoking, specifically carbon monoxide monitoring and access to smoking cessation services, inadequate fetal growth surveillance, the management of reduced fetal movements and the assessment of the need for maternal aspirin during pregnancy. Of note these are addressed by version two of the NHS England Saving Babies' Lives Care Bundle.

Issues concerning monitoring of both mother and baby during labour, birth and shortly after birth were highlighted, as were inadequate documentation, particularly during resuscitation of the baby, and poor thermal management at all stages of neonatal care.

Contributory factors

The majority of factors contributing to the issues identified related to a failure to follow or an absence of guidelines, policies and procedures; also identified were the clinical condition of the mother and/or baby, communication problems and organisational priorities.

Action plans

Across the 1,500 reviews a total of 3,010 issues with contributory factors requiring action were identified and incorporated into action plans. The majority of action plans were 'SMART'. The most frequent problem when action plans were not SMART was that the actions were not measurable or time-bound. Moreover, only 10% of the actions planned were 'strong', that is they were system-level changes which reduce the reliance on individuals to choose the correct action by using standardised and permanent physical or digital designs to eliminate human error.

User feedback

Responses to a formal user survey indicate that the majority of respondents felt that the PMRT provides a more structured approach to review which has improved communication with parents and enabled them to identify areas of care to be improved with actionable learning points. Furthermore, they indicated that they felt that all these aspects would improve further in the future with increasing familiarity with the tool.

Since the PMRT requires all aspects of the care pathway to be systematically reviewed, users reported that they have identified issues with care that they would not have identified using their previous method of review.

Conclusions

For the first time, a national tool to reduce variation in and improve the quality of reviews conducted when babies die is now available. The reports available from the PMRT enable comparison of issues with care across individual deaths reviewed within organisations which, together with this national report, provide a basis for prioritisation of resources to support improvements in care likely to have the greatest impact on reducing perinatal deaths.

Designed with parents at its heart, the PMRT also provides for the first time, a systematic means of engaging parents in reviews and ensuring that their perspectives of their care and any questions and concerns they have are considered as part of the review from the outset.

This report presents findings from the early stages of the implementation of the PMRT. With increasing familiarity with the tool and the support of the 'Parent Engagement' materials it seems reasonable to anticipate improvements in all aspects of review, not least the meaningful engagement of parents. This will help ensure that parents' need for as much information as possible about why their baby died will be increasingly met.

Looking to the future it seems reasonable to anticipate that as the NHS England Saving Babies' Lives Care Bundle actions and other initiatives are increasingly adopted into routine practice, future national reports will see a change in the main issues with care being highlighted in reviews.

Recommendations

- 1) Improve the recording of the staff involved in PMRT reviews
Action: PMRT review teams
- 2) Improve the engagement of parents in reviews making sure they have ample opportunities at different stages after their bereavement to discuss their views, ask questions and express any concerns they have about the care they received
Action: Staff caring for bereaved parents
- 3) Provide adequate resourcing of PMRT review teams
Action: Local Trust and Health Boards, Service Commissioners
- 4) Involve an external member as part of the PMRT review team
Action: Local Trust and Health Boards, regional support systems and organisations e.g. Local Maternity Systems in England
- 5) Improve the quality of the actions planned to ensure that the majority of actions are 'strong'¹ and result in system level changes
Action: PMRT review teams, local governance teams in Trusts and Health Boards
- 6) Use the local summary reports and this national report as the basis to prioritise resources towards the aspects of care identified as having issues
Action: Local Trusts and Health Boards, Service Commissioners, regional support systems, e.g. Local Maternity Systems in England, Governments and national service organisations
- 7) Conduct research into new interventions that may be required to address issues with care identified in the PMRT report
Action: Research funding organisations and researchers

¹ The strength of an action describes how well the action would eliminate human error. Strong actions are system changes which remove the reliance on individuals to choose the correct action. They use standardisation and permanent physical or digital designs to eliminate human error and are sometime referred to as 'forcing' actions [1].

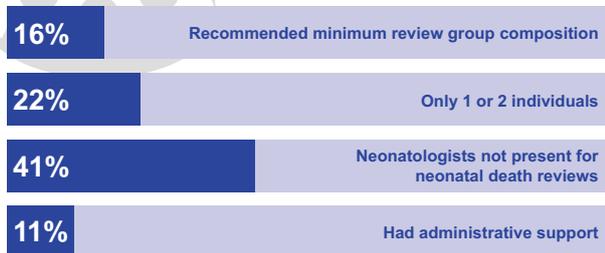
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Key Messages – October 2019

Since the launch of the PMRT in early 2018 over 6,300 reviews have been started. The annual report presents the findings from the first 1,500 reviews completed during the first year of implementation. Here are some of the key messages from the first 1,500 reviews.

Multi-disciplinary group review is essential



Issues with care and areas for improvement identified

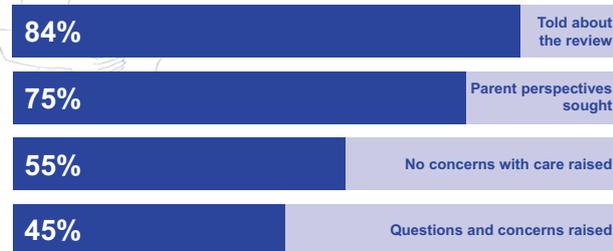


9/10 reviews identified areas for improvement



1/10 issues identified may have made a difference to the outcome

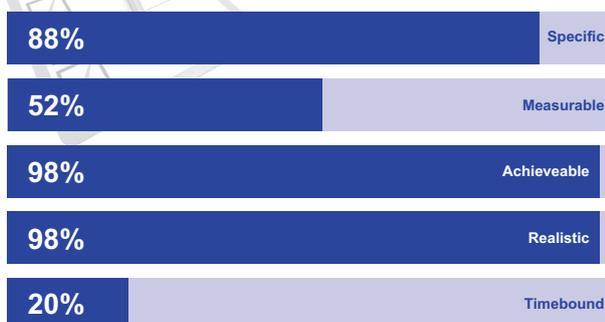
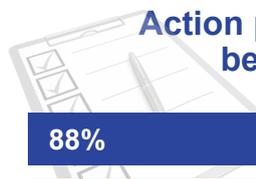
Parent engagement improves the quality of review



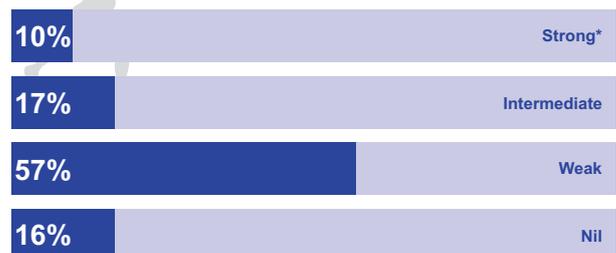
Comments, questions and concerns raised by parents

Sense something was wrong
Well supported
Declined further investigations
Labour care Diagnosis known
The future **Why?**
Maternal guilt
Distrust of health system
Culture within unit
Antenatal care

Action plans need to be SMART



Action plans need to be strong*



*Strong actions are system changes which remove the reliance on individuals to choose the correct action. They use standardisation and permanent physical or digital designs to eliminate human error and are sometime referred to as 'forcing' actions

Acknowledgements

The development of the national PMRT is as a result of a collaborative effort by a substantial number of individuals, many of whom are acknowledged below. We also owe a debt of gratitude to the many users of the PMRT who have contacted us with comments and suggestions about how we might improve the contents and operations of the PMRT.

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Melissa Whitworth - British Maternal Fetal Medicine Society
Rachel Winch - Royal College of Paediatrics and Child Health

Glossary

CDOP	Child Death Overview Panel (England)
CTG	Cardiotocograph
DH	Department of Health
DNA	Did not attend (appointment)
FIGO	International Federation of Gynecology and Obstetrics
GDM	Gestational diabetes mellitus
NCMD	National Child Mortality Database
NPSA	National Patient Safety Authority
MBRRACE-UK	The collaboration established to deliver the MNI-CORP
MNI-CORP	Maternal, Newborn and Infant Clinical Outcome Review Programme
MSU	Mid-stream sample of urine
PMRT	Perinatal Mortality Review Tool
Sands	Stillbirth and neonatal death charity

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1. Introduction and development of the national Perinatal Mortality Review Tool (PMRT)

The concept of developing a national Perinatal Mortality Review Tool (PMRT) had its origins at a stillbirth prevention summit held with over 50 stakeholders by Sands, the stillbirth and neonatal death charity, in March 2012. The need to improve the review of care when babies die, and thus the development of a perinatal mortality review tool, was identified as one of several streams of work with the goal of reducing the incidence of stillbirth in the UK. The Department of Health for England (DH) agreed to support Sands in this endeavour.

Dr Tracey Johnston, Consultant Obstetrician at the Birmingham Women's and Children's NHS Foundation Trust, was asked to chair a DH/Sands Task and Finish Group given the remit of taking forward the work to develop a national perinatal mortality review tool². Along with undertaking a survey of practice the group developed an aspirational vision for a perinatal mortality review tool (Box 1.1) and a set of principles for the purpose and function of a national tool (Box 1.2). From this set of principles they developed a list of data items with the intention that these items would form the basis of the tool.

Box 1.1: Vision for a National Perinatal Mortality Review Tool*

- All perinatal deaths will be reviewed in an objective, robust and standardised way;
- Parents will receive a full explanation as to why their baby died;
- We will learn more about why babies die;
- We will be able to target resources towards causes and address any shortfalls in care at local, network and national levels;
- Learning can be shared;
- Fewer babies will be stillborn or die in the neonatal period and mortality rates will fall.

*DH/Sands Task and Finish Group vision

The DH/Sands Task and Finish Group submitted their final report and an Excel spreadsheet of the data items which a national PMRT would need to include to the Department of Health in March 2014.

The Kirkup Report of the Morecambe Bay Investigation published in March 2015 highlighted that the care and events surrounding both stillbirth and neonatal deaths at Furness General Hospital were either inadequately scrutinised or sometimes not investigated at all [2]. As a result lessons following perinatal deaths were not always learnt. The MBRRACE-UK 2015 Confidential Enquiry of Term, Singleton, Normally Formed, Antepartum Stillbirths in 2013 found that for 60% of the deaths improvements in care were identified which may have made a difference to the outcome, yet there was only evidence that a review of the care provided had been undertaken for a quarter of the deaths [3]. The recommendations by Kirkup set in train a series of responses including the commissioning by the Department of Health (England), with Scotland and Wales, of a national PMRT to improve and standardise the quality of local reviews when perinatal deaths occur.

The Department of Health (England), together with the Scottish and Welsh governments, asked the Healthcare Quality Improvement Partnership (HQIP) to carry out an open, competitive commissioning process for the development and implementation of a national PMRT. Tendering commenced in March

2 **DH/Sands Task and Finish Group representatives:** Dr Tracey Johnston (chair) and representatives from: Bliss the premature baby charity, British Association of Perinatal Medicine, British Maternal Fetal Medicine Society, Department of Health (England), MBRRACE-UK, NHS Litigation Authority, NHS Strategic Network, Improving Quality, Manchester, Parent representatives, Midwifery Research, Perinatal Institute, Royal College of Midwives, Royal College of Obstetricians and Gynaecologist, Royal College of Pathologists, South West Midlands Newborn Network, the stillbirth and neonatal death charity Sands, the Stillbirth Clinical Studies Group and the Devolved Nations. A number of individuals were invited to provide their specific expertise.

2016 and concluded in June 2016 with the appointment of the MBRRACE-UK/PMRT collaboration. The contract award was delayed by external events and work started on developing the PMRT in February 2017.

Box 1.2: Principles for a National Perinatal Mortality Review Tool identified by the DH/Sands Task and Finish Group

- There should be comprehensive and robust review of all perinatal deaths from 22+0 weeks gestation until 28 days after birth; excluding termination of pregnancy and those with a birth weight <500g;
- Such reviews should be conducted using a standardised nationally accepted tool, ideally web-based, that includes a system for grading quality of care linked to outcomes;
- A multidisciplinary group should review each case at a meeting where time is set aside for doing the work;
- There should be scope for parental input into the process from the beginning;
- The outcome of individual reviews should be shared with the parents/families in a sensitive and timely manner;
- There should be a quality control/review process with external peer review;
- Action plans generated by such reviews must be implemented and monitored;
- There should be biannual reporting to the relevant hospital committee, with evidence of organisational learning;
- These reports should feed up regionally and nationally to allow benchmarking and publication of results, to ensure national learning.

1.1 The conceptual basis underpinning the PMRT

When developing the tool, the underlying concept of the PMRT was based on the vision laid out by the Task and Finish Group (Box 1.1), placing at its core the fundamental aim of ensuring objective, robust and standardised reviews to provide answers for bereaved parents. A second but nonetheless important aim was to ensure learning in order to improve care and ultimately prevent future deaths.

In order to achieve these aims a multi-dimensional approach to review underpinned the design of the tool encompassing the following:

- Embedding parents' views of care by placing them at the heart of the review process from the outset;
- Providing parents with the best available explanation of why their baby died by generating standardised reports to support structured discussion between the parents and health professionals;
- Achieving robust, standardised reflective perspectives of care at all stages of the pregnancy and postnatal pathway, based on systematically recorded relevant clinical and sociodemographic information;
- Providing opportunities to improve care by reinforcing national standards and guidelines;
- Improving local care by generating action plans which focus on system level changes rather than changes at the individual level;
- Ensuring shared learning to prevent future deaths by combining the findings from individual reviews into reports both at the Trust and Health Board level, and nationally.

The deaths for which the PMRT would support review were defined by the MBRRACE-UK/PMRT collaborators (Box 1.3). The original Task and Finish vision included supporting review of neonatal but not post-neonatal deaths. However, for neonatologists using the PMRT it would make little sense to use the PMRT to review the care of a baby dying on the neonatal unit at 28 days and not to use it where a baby dies following neonatal care at 29 days or later. Therefore, it was proposed that the PMRT would support the review of post-neonatal deaths where the baby was still receiving neonatal care, or had received neonatal or palliative care at the time of death.

Explicitly excluded from the PMRT review are deaths as the result of a termination of pregnancy or where the death is in the community when the baby was discharged home well. The PMRT can be used to review deaths which fall outside the criteria in Box 1.3, but not all aspects of care which should be reviewed will necessarily be covered by the tool.

The importance of parents and ensuring that parents' concerns and any questions they have about their care are considered during the review was identified as essential. The decision was therefore made to place questions intended to encourage engagement with parents from the start of the review process as the first set of care-related questions in the tool.

Box 1.3: Deaths for which the PMRT is designed to support review of care

The PMRT has been designed to support review of the following perinatal deaths:

- Late miscarriages (also referred to as late fetal losses) where the baby is born between 22⁺⁰ and 23⁺⁶ weeks of pregnancy showing no signs of life
- All stillbirths where the baby is born from 24⁺⁰ gestational weeks showing no signs of life
- All neonatal deaths where the baby is born alive from 22⁺⁰ weeks and dies up to 28 days after birth
- Post-neonatal deaths where the baby is born alive from 22⁺⁰ weeks and dies after 28 days of birth following neonatal care; the baby may have died in hospital, or it may have died in a hospice or at home following palliative care

The PMRT does not support the review of perinatal deaths where the death meets the criteria above but:

- The death follows a legal termination of pregnancy
- The baby was discharged home, had not received neonatal care but died up to 28 days after birth
- The baby was discharged home well, had not received neonatal care but died after 28 days after birth

1.2 The PMRT development process

A working group (see acknowledgements) was established to generate the contents of the PMRT with our starting point as the data items in the Excel spreadsheet developed by the DH/Sands Task and Finish Group. The working group met for nine one-day meetings during 2017 with a further meeting to discuss the contents of the reports generated for individual reviews; not all members were present for all meetings. The group worked through the pathway of care from pre-conception to the death, and bereavement and follow-up investigations, in order to develop the review questions and the issues generated when the care provided was not appropriate.

All elements of care where there are existing national or relevant international (mainly FIGO) standards and guidelines were identified during the process of review question development. 'Tool tips' (pop-up dialogue boxes in the tool) containing the national guidance were drafted as question development proceeded. Following the initial development and incorporation into the PMRT the 'tool tips' have been edited as updated guidance has been released. New tool tips have been written as new guidance has been published.

The grading of care was discussed and agreed by the MBRRACE-UK/PMRT Collaborator group. The National Patient Safety Agency contributory factors framework [4] was incorporated into the tool to enable review teams to use a common framework to document the factors contributing to the issues with care they identified in their reviews.

The development of the web-based tool used agile software development methods, with the programming being carried out contemporaneously with the question development process. Further refinement of questions, issue generation and the structure of the questions in the tool followed internal testing and user feedback in the pilot phase, and continued in response to on-going user feedback following the general release. A full formal user survey was carried out in November 2018 and changes were made to the tool in response to user comments. Tool refinement continues as an on-going continuous improvement process.

1.3 Contents of the tool

The PMRT provides a systematic approach to reviewing care at each stage of the pregnancy and post-natal pathway. This is achieved by combining the collection of relevant clinical and sociodemographic information derived directly from the medical notes recorded in a robust manner (here referred to as 'Factual Questions') with reflective clinical perspectives of the care to support standardised review of care ('Reflective Questions').

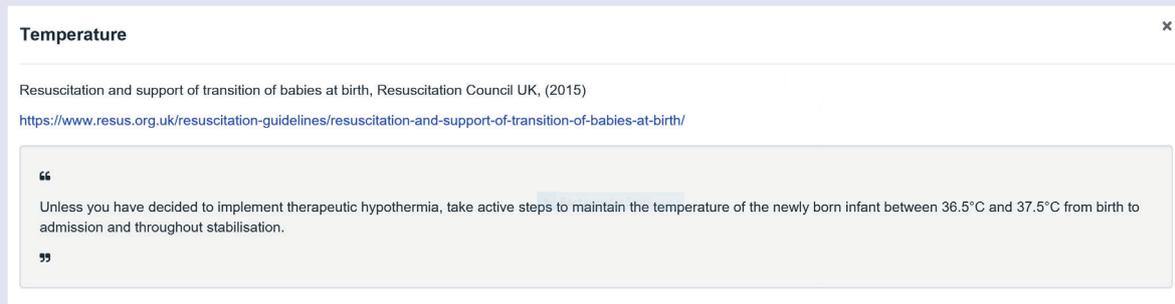
i) Reflective questions

During the development phase of the PMRT, the conceptual basis of the PMRT was further elaborated following the philosophy that the PMRT is a 'tool' to support standardised, systematic, robust review of care and not a data collection system; although, as the PMRT is web-based, data are inevitably 'collected'. Following this philosophy the nature of the questions in the tool ask the multidisciplinary team undertaking the review to reflect on and make 'judgements' about the care provided, by presenting the team with questions which are posed in the general form of:

- Given this woman's past history of (e.g. pre-eclampsia) was her care appropriate?
- Was the baby's temperature within an acceptable range when first measured on the neonatal unit?

Where national (or international e.g. FIGO) standards and/or guidelines exist to support the assessment of the quality of specific aspects of care these are embedded in the tool as 'tool tips' alongside the relevant questions. They are signalled and are accessed by clicking the information icon placed alongside relevant questions. Clicking the information icon opens up a new dialogue box which contains all the relevant available guidance on the particular topic. An example is given in Box 1.4.

Box 1.4: An illustration of the presentation within the PMRT in a 'tool tip' of national standards and guidelines relating to the thermal management of newborn babies



The screenshot shows a dialog box with the title "Temperature" and a close button (x). The text inside reads: "Resuscitation and support of transition of babies at birth, Resuscitation Council UK, (2015) https://www.resus.org.uk/resuscitation-guidelines/resuscitation-and-support-of-transition-of-babies-at-birth/". Below this is a quote: "Unless you have decided to implement therapeutic hypothermia, take active steps to maintain the temperature of the newly born infant between 36.5°C and 37.5°C from birth to admission and throughout stabilisation."

ii) Factual questions

While the review of care questions take the 'reflective' form described above, to ensure that the appropriate aspects of care are considered for each death during the review 'factual' questions precede the reflective questions. The factual questions ensure that only appropriate questions about care are asked. For example, questions about past obstetric history trigger later questions in the tool relevant to past obstetric history to 'open'. These include questions about the management of the current pregnancy given a past history of relevant conditions, for example pre-eclampsia. The inclusion of factual questions avoids the review team being asked to consider questions which do not apply, such as whether care was appropriate based on past obstetric history when this was the woman's first pregnancy.

iii) Issues with care and contributory factors

The concept of 'issue' generation is used for situations where the review team identifies instances where appropriate care had not been provided. For example, if a woman was eligible for gestational diabetes screening and this was not offered, or a baby's temperature was not within the recommended range on arrival in the neonatal unit, an 'issue' with care will be generated. At the end of each review the issues generated within that review are presented as a list. The review team is then asked to select for each issue the factor(s) contributing to the failure to provide appropriate care, using the National Patient Safety Agency Contributory Factors Framework [4].

Following the assignment of contributory factors the review team is then asked to consider, the contribution of each issue in turn, to the outcome using the following options. An issue can be:

- Relevant to the outcome and was managed appropriately;
- Relevant to the outcome, but was not managed appropriately and action is needed to improve future care;
- Not relevant to the outcome in this case, but action is nevertheless needed to improve future care;
- Not relevant and no action is needed.

An example of an issue which was not relevant to the outcome but action is needed is where a mother met the criteria for screening for diabetes mellitus, but was not offered screening. Whilst the baby died from a cause unrelated to diabetes a system level action is nevertheless required to ensure that in the future all eligible women are offered gestational diabetes screening.

iv) Action plans

For each issue which requires action(s), the review team is asked to identify what that action(s) should be. All the actions for all the issues are then combined into an Action Plan. A key responsible individual for each action is identified and a timeline for each action is added. We encourage the development of SMART (specific, measurable, achievable, realistic and time-bound) action plans which focus on systemic organisational solutions rather than focusing on actions involving individual members of staff.

v) Grading of care

In the final section of the tool the review team is asked to 'grade' the quality of the care provided. In the case of a stillbirth or late miscarriage the following aspects of care are graded:

- Care of the mother and baby up to the point of birth of the baby;
- Care of the mother following confirmation of the death of her baby.

In the case of a baby dying after birth the following aspects of care are graded:

- Care of the mother and baby up to the point of birth of the baby;
- Care of the baby from birth up to the death of the baby;
- Care of the mother following the death of her baby.

A four level system for grading the care was agreed by the MBRRACE-UK/PMRT Collaborators (Box 1.5).

Box 1.5: Categories used to grade the different aspects of care for each death

- A. No issues with care identified
- B. Care issues that would have made no difference to the outcome
- C. Care issues which may have made a difference to the outcome
- D. Care issues which were likely to have made a difference to the outcome

1.4 Generation of reports

Once a review has been completed and the responses validated (to ensure that all relevant questions are completed) a report of the review can be generated. The report automatically incorporates the answers to the factual and reflective questions. During the course of the review it is possible for the review team to make notes within the PMRT as the review progresses. These notes are incorporated into the report as editable text which allows the review team to expand their notes into narrative text and provide more detail than is afforded by the automatically generated responses. The report can then be downloaded, which is referred to as 'published', in a PDF format which can be saved electronically and also printed out for inclusion in the medical records in preparation for discussion with parents at their follow-up appointment. The report can be used as the basis for writing a letter to parents after their follow-up appointment as importantly there is the opportunity to include a management plan for any future pregnancies. The reports can also be included should a referral for the management of a subsequent pregnancy be required.

The action plans are also completed at this stage with the addition of the individuals responsible and timelines. The action plans from individual reports can be downloaded as an Excel spreadsheet. This is to allow inclusion of the action plan in the Trust/Health Board governance systems.

There is also a function available to Trust/Health Board users to generate summary reports which cumulate information from reviews carried out in their organisation over a period of time. This enables issues which are repeated through a number of reviews to be identifiable alongside summary information about the deaths. Users can download a summary report any time they wish and the period covered is defined by the user when they download the report. The summary reports can be used for many purposes including quarterly or half yearly reporting to the management board of the Trust/Health Board.

It is also possible for users to download a limited summary dataset as an Excel spreadsheet. Again this is for a user defined period and allows additional local analysis to support the production of summary reports.

1.5 Integration of the PMRT with the MBRRACE-UK system

The PMRT has been designed as an integrated system within the MBRRACE-UK perinatal mortality surveillance data collection system. This enables notification of a death by the provision of demographic and key clinical descriptors that are common to both the perinatal surveillance and the PMRT and thus avoids duplicate data entry. Once the notification is complete the user can either complete the surveillance data collection or start a review using the PMRT. Users are encouraged to complete the surveillance data collection before starting a review as information common to both the surveillance and the PMRT are available to enable cross-population of information from the surveillance data collection into the PMRT, although not vice versa; this is by design to encourage completion of the surveillance data.

1.6 Using the tool in practice

Guidance is provided on how to use the tool in practice. It is strongly recommended that the reviews are carried out by multidisciplinary teams and guidance is provided on the constitution of such teams, together with a template of terms of reference. Advice is also provided on how to incorporate the tool into the process of review, which includes ensuring that prior to review of a particular case some information is pre-populated into the PMRT, first by completing the surveillance for that death and second by completing the factual questions. Some of these questions can be completed by administrative support staff and some will need input from a staff member with a clinical background. Prior to the main review meeting some organisations have clinical staff who will carry out a pre-review which will speed things up during the actual review meeting; for example, by adding relevant information into the notes section of the tool. This guidance is provided in a guidance document and also as a slide set (<https://www.npeu.ox.ac.uk/pmrt/implementation-support>).

1.7 Parent engagement

Parents whose baby has died have the greatest stake in understanding what happened and why their baby died and can also offer extremely helpful insights into their care. Engaging bereaved parents in the review process and including their views and any concerns and questions they have about their care will enhance the review process and ensure that from the outset the review addresses their questions. Parents, particularly mothers, have a unique perspective on everything that happened to them and their baby being the only people actually present for the entirety of the pregnancy.

Engaging bereaved parents in the review process does not mean having the parents present at the review. Engagement emphasises talking to them and asking them for their views and any questions or concerns they have about their care so that these can be specifically considered during the review.

During 2018 materials were developed to support staff in Trusts and Health Boards with engaging with bereaved parents. The materials were developed by a multidisciplinary group from the MBRRACE-UK/PMRT collaboration that included bereaved parents, and are based on the published findings from the PARENTS study [5] and the 'Being Open' process for maternity services in Scotland.

1.8 Approvals and incentives to encourage the use of the PMRT

Review of care when an adverse outcome occurs is accepted as a standard part of clinical care. Indeed, it is a General Medical Council requirement (22(a)) that all doctors take part in regular reviews and audits of their work [6]. As part of standard care it is good practice, for the reasons outlined above, to explain to parents that a review of their care and that of their baby will be carried out. The use of the PMRT to carry out the reviews involves the processing and storage of confidential personal and health data on the MBRRACE-UK/PMRT servers. A legal basis is required to enable this processing and storage to occur. In discussion with our parent, patient and public stakeholder group it was proposed that seeking the consent of parents to use the PMRT to carry out the review and thus to store their data within the MBRRACE-UK/PMRT system would be burdensome for parents at the time of their bereavement. On this basis an application was made to the Confidentiality Advisory Group of the Health Research Authority (for England and Wales) for section 251 approval to set aside the common law duty of confidence for the purpose of carrying out reviews using the PMRT. Approval was granted in October 2017: 17/CAG/0150. A similar application was made to the Public Benefit and Privacy Panel for Health and Social Care (PBPP) in Scotland and approved in March 2018: 1718-0249.

The expectation is that all Trusts and Health Boards in England, Wales and Scotland will use the PMRT to review their perinatal deaths and the funders encourage this to happen. An added incentive was introduced in England as part of the NHS Resolution Clinical Negligence Scheme for Trusts (CNST) Maternity Incentives Scheme. The scheme incorporates 10 actions to support maternity safety that trusts are expected to comply with to avoid a financial penalty. The first action for both years one (2018) and two (2018-19) of the scheme involved use of the PMRT to review eligible deaths.

1.9 Future plans for development of the PMRT

The tool is constantly being developed and updated to refine the questions, improve the flow of the questions and to update the national guidance within the tool. Future developments include continuing to reduce data duplication between the MBRRACE-UK perinatal surveillance system and the PMRT by further cross-population of data; supporting the review of deaths where care was provided in more than one Trust/Health Board by allowing the 'assignment' of the review to the other care provider for a time limited period; and reducing the burden of review for multiple births where both/all the babies die by cross-population of the pregnancy care information.

In England, notification and the findings from reviews of neonatal deaths also need to be submitted to the local Child Death Overview Panel (CDOP) and the newly established National Child Mortality Database (NCMD) [7]. The MBRRACE-UK/PMRT team is working with the NCMD team to develop a single process within the MBRRACE-UK/PMRT system to notify neonatal deaths directly to the local CDOP to prevent unnecessary duplication of notification. As a second stage of this integration the teams are working to ensure that all the data required by CDOPs and the NCMD is collected within the PMRT and can be forwarded directly to the local CDOP and NCMD without the need for a separate process of data provision. Of note, the new 'Working Together to Safeguard Children' guidance (which has legal force) specifies that a local review of all neonatal deaths must to be carried out and the review should be carried out using the PMRT [8].

2. Implementation of the PMRT

2.1 Piloting and release of the PMRT

There was a two stage piloting process for the PMRT in England and Wales at the end of 2017 and in January 2018. The PMRT was launched for use by Trusts in England and Health Boards in Scotland and Wales delivering maternity and/or neonatal services in early 2018. All Trust and Health Boards had registered to use the PMRT within four months of the launch.

The majority of Trusts and Health Boards had started to review deaths using the PMRT shortly after its launch. As of June 2018 all Trusts providing maternity and/or neonatal services in England that had experienced a perinatal death had started to review the care for at least one death; in Wales all Health Boards had started to review the care of at least one death by August 2018; there remains one small Health Board in Scotland which has not yet started to use the PMRT to review their deaths despite having experienced a small number of deaths since the PMRT was launched.

2.2 Use of the PMRT following general release

For those Trusts and Health Boards that had started to use the PMRT by 2nd February 2019 (when the data for this analysis were extracted), the speed of engagement with the PMRT is shown in Table 2.1 as the median time from the launch of the PMRT to the start of the first review using the PMRT and, as the median time from launch to the production of the first review report from the tool. These times, in weeks, are also illustrated in Figures 2.1 and 2.2.

Table 2.1: Median time from launch of the PMRT to starting the first review and production of the first review report

	Time from launch to start of first review (weeks)		Time from launch to first report production (weeks)	
	Median	Range	Median	Range
Country:				
England	7	0 to 22	15	2 to 47
Wales	8	5 to 28	29	12 to 36
Scotland	6	1 to 37	20	6 to 41
Overall	7	0 to 37	16	2 to 47
Service provision:				
Level 3 neonatal unit & neonatal surgery (24 units)	5	0 to 12	10	5 to 40
Level 3 neonatal unit (28 units)	6	1 to 30	15	6 to 30
4,000+ births per annum* (45 units)	7	0 to 16	15	2 to 47
<4,000 births per annum* (55 units)	10	1 to 37	18	5 to 46

*Units without level 3 neonatal service provision or neonatal surgery

Figure 2.1: Time from PMRT launch to the start of the first review by Trusts and Health Boards

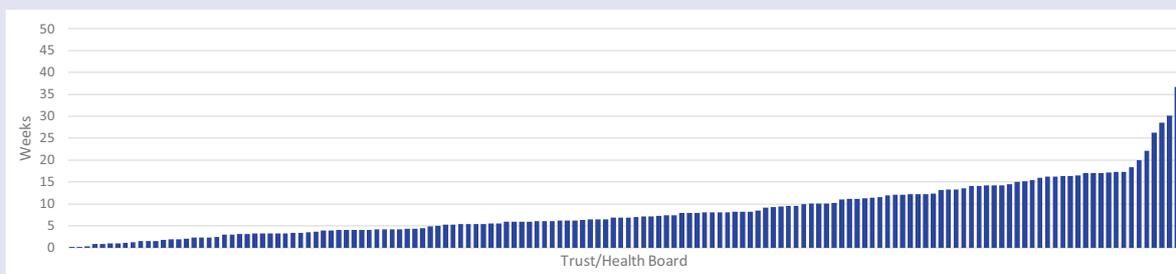
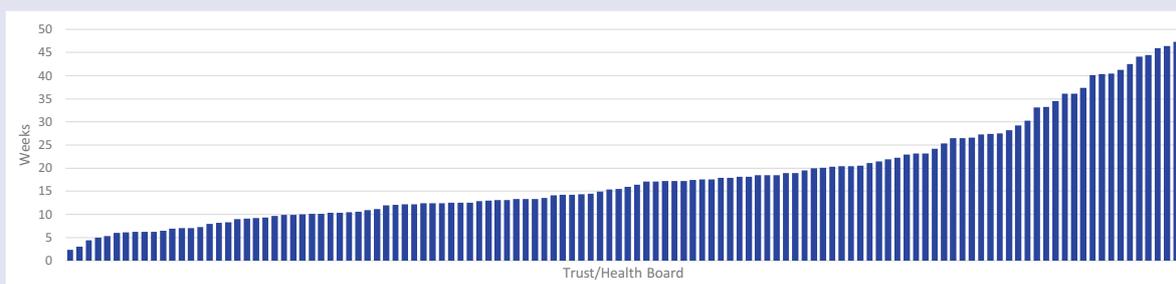


Figure 2.2: Time from PMRT launch to the first published report by Trusts and Health Boards



In general Trusts and Health Boards with the higher level of service provision tended to be earlier adopters, with smaller Trusts and Health Boards being slower on average to undertake their first review. For some small Trusts and Health Boards this will be in part due to the small number of deaths they experience. While there was no time period relating to when the death occurred set within the PMRT (deaths before the launch of the PMRT may be reviewed), it is likely that some units will have waited until they had their first death after the launch to carry out their first review using the PMRT, rather than reviewing a death that had occurred earlier.

Table 2.2 shows the total number of reviews started and completed and the estimated proportion of deaths which have been reviewed using the PMRT between the launch and 10th September 2019. This is an estimate based on the number of eligible deaths expected to have occurred in 2018 and 2019 based on mortality data from 2017. Of note, it is not possible to use the 2018 and 2019 deaths directly reported to MBRRACE-UK to calculate this proportion since deaths in this period were not reported in a sufficiently timely way and information for up to 5% of deaths is only provided by Trusts/Health Boards once the death has been identified through linkage with routine mortality data sources by the MBRRACE-UK team.

Overall a total of 6,358 reviews have been started or completed since the PMRT was launched and the care of an estimated 88% of all eligible perinatal deaths comprising 90% of stillbirths and late miscarriages, and 83% of neonatal deaths have been reviewed using the PMRT (Table 2.2). A greater proportion of 'expected' stillbirths, late miscarriages and neonatal deaths have been reviewed in England compared with Wales and Scotland. Stillbirths and late miscarriages were more likely to have been reviewed than neonatal deaths in England and Scotland; the reverse was the case in Wales.

Table 2.2: Number of reviews started* and completed and the estimated proportion of deaths where a review has been started and completed using the PMRT between the PMRT launch and July 2019**

Country	Review			Estimated percentage of deaths reviewed±	
	Started*	Completed**	Total	Stillbirths and late miscarriages	Neonatal deaths
England	2,303	3,631	5,934	96%	86%
Wales	72	61	133	37%	62%
Scotland	157	131	288	68%	55%
Total	2,535	3,823	6,358	90%	83%

*Started but not yet complete

**Completed includes those complete to a draft report and those where the report has been published

± Based on started and completed reviews and an estimated number of deaths (see the text)

3. Conducting reviews

3.1 Multidisciplinary nature of the groups carrying out reviews

Trusts and Health Boards are responsible for establishing their own local multidisciplinary perinatal mortality review group. In many places the group will be convened within the Trust/Health Board but, alternatively a group might be organised across different Trusts/Health Boards, for example, in England across a Strategic Clinical Network or Local Maternity System.

As identified in the MBRRACE-UK Perinatal Confidential Enquiries and the Each Baby Counts assessment of reviews, the quality of the local review is much higher when a multidisciplinary group conducts the review compared with a single individual or just one or two members of staff [3,9,10]. The recommended composition for the perinatal mortality review group is set out in the 'Guidance for Trusts and Health Boards Conducting Perinatal Mortality Reviews using the National Perinatal Mortality Review Tool (PMRT)' and is shown below in Box 3.1. The guidance indicates that it is possible for group members to fulfil multiple roles, provided this does not result in too small a group of individuals.

Box 3.1: PMRT recommended composition of the local perinatal mortality review group

Core membership

Roles within the group:

- Chair and Vice-Chair
- Scribe/Admin support
- PMRT/Maternity Safety Champion

Minimum of two of each of the following:

- Obstetrician
- Midwife
- Neonatologist and Neonatal Nurse for:
 - All deaths where resuscitation was commenced
 - All neonatal deaths
- Bereavement team (1 acceptable)
- Risk manager/governance team member (1 acceptable)
- External panel member (1 acceptable)
- Other members as appropriate to the organisation of care in the Trust/Health Board e.g. service manager

Additional members

Named and invited to attend or contribute where applicable:

- Pathologist
- GP/Community healthcare staff
- Anaesthetist
- Sonographer/radiographer
- Safeguarding team
- Service manager
- Any other relevant healthcare team members pertinent to death

Each participant involved in a review session should be recorded in the PMRT. The information in Table 3.1 is derived from the session participant data. However, there are significant data quality issues due to incomplete, possibly inaccurate reporting and changes to the way this information was recorded within the tool. When the tool was first launched the details of each review participant information had to be entered separately for each death reviewed. In the second half of 2018 this was modified to include a 'memory' function so that within a Trust/Health Board names were retained by the system and presented as a drop-down list from which the participants can be selected. Following this modification the number of participants recorded increased. Other problems with recording have however persisted; for example, a number of reviews recorded zero participants. This may represent a failure to record the participants in a review meeting and there is no way of knowing how pervasive this problem is. Alternatively it may represent a session where only factual information was being entered in preparation for review and thus was not regarded as a 'review' session.

For the purposes of this report data from the free text entries were manually coded to role categories. In a number of instances, coding to these categories was not possible due to insufficient information in the free text (for example "consultant" with no recorded specialty); these participants were coded as unknown. For many free text responses no role was given and these were also coded as unknown; 82% of reviews involved at least one participant with an undocumented or inadequately documented role. It is also not entirely clear how information about junior staff, and junior doctors in particular, is entered. The role-based data (Table 3.2) should therefore be interpreted with some caution.

The review for any particular death may be re-opened within the PMRT multiple times. Indeed the recommendation is that 'factual' information should be entered ahead of the review meeting so that this meeting can be devoted to discussion of the care. Some review teams also undertake a preliminary review of the care prior to the full review discussion. Furthermore, when information is not available or new information comes to light the death may be discussed at more than one full review meeting. There will be varying numbers of people present for each of these different scenarios. For this reason Table 3.1 shows the number of participants for the session with the largest number of participants recorded.

Table 3.1: Number and percentage of staff recorded at the review session with the largest number of participants by type of death

Number of staff recorded as present	Late miscarriage* (N = 143) n (%)	Stillbirth (N = 1,011) n (%)	Neonatal death (N = 346) n (%)	All deaths (N = 1,500) n (%)
1	11 (8%)	83 (8%)	23 (7%)	117 (8%)
2-3	54 (38%)	262 (26%)	87 (25%)	403 (27%)
4-7	57 (40%)	420 (42%)	129 (37%)	606 (40%)
8+	19 (13%)	246 (24%)	107 (31%)	372 (25%)
Median	5	5	6	5
At least the minimum number of staff with the correct roles recorded as present for the largest review session *	21 (15%)	224 (22%)	1 (0%)	246 (16%)

*Two late miscarriages had zero participants recorded

** Minimum recommended staff: two midwives and two obstetricians for reviews of stillbirths and late miscarriages, and in addition two neonatal nurses and two neonatologists for neonatal deaths

The number of participants recorded as present ranged from 0 to 26, with a median of six participants for reviews of neonatal deaths, and five for reviews of late miscarriages and stillbirths. Based on the recorded participants, over a fifth (22%) of reviews were undertaken by only one or two people rather than a multidisciplinary group. This was similar for reviews of late miscarriages (28%), stillbirths (21%) and neonatal deaths (23%).

Review group members may fulfil multiple roles, for example a midwife may also be a member of the bereavement team, and it is possible that only the principal role was recorded for some participants. However, there is unlikely to be overlap between midwives, obstetricians, neonatal nurses and neonatologists. The minimum recommended core group, assuming multiple roles, would therefore be two midwives and two obstetricians for reviews of late miscarriages and stillbirths, with the addition of two neonatologists and two neonatal nurses for reviews of neonatal deaths.

Table 3.1 shows the number of reviews where the recorded participants for the largest review met or exceeded this minimum core group requirement with staff fulfilling the correct roles. Only 15% of reviews of late miscarriages and 22% of reviews of stillbirths had a record of at least two midwives and two obstetricians participating in the largest review session. Only one of the 346 reviews of neonatal deaths had a record of at least two midwives, two obstetricians, two neonatologists and two neonatal nurses participating in the largest review session; the staff members most likely to be absent were neonatal nurses.

Table 3.2 shows the number and percentage of reviews where each type of professional was recorded as being involved in any session for review of a particular death i.e. not just the largest session.

Table 3.2: Number and percentage of reviews involving each type of professional

Professional role	Number of reviews with a record of involving this type of professional in any session (% of reviews)			
	Late fetal loss N = 143 n (%)	Stillbirth N = 1,011 n (%)	Neonatal death N = 346 n (%)	All deaths N = 1,500 n (%)
External panel member	15 (10%)	90 (9%)	29 (8%)	134 (9%)
Midwife	124 (87%)	848 (84%)	267 (77%)	1239 (83%)
Neonatologist/paediatrician	13 (9%)	127 (13%)	204 (59%)	344 (23%)
Obstetrician	100 (70%)	793(78%)	253(73%)	1146(76%)
Bereavement team member	70 (49%)	425 (42%)	145 (42%)	640 (43%)
Risk manager/governance team member	79 (55%)	670 (66%)	206 (60%)	955 (64%)
PMRT/maternity safety champion*	8 (6%)	117 (12%)	24 (7%)	149 (10%)
Neonatal nurse	5 (3%)	51 (5%)	83 (24%)	139 (9%)
Service manager/member of management team	26 (18%)	262 (26%)	65 (19%)	353 (24%)
Administrative support staff	14 (10%)	108 (11%)	48 (14%)	170 (11%)
Pathologist	4(3%)	22 (2%)	4 (1%)	30 (2%)
Anaesthetist	0 (0%)	39 (4%)	4 (1%)	43 (3%)
Other**	22 (15%)	201(20%)	67 (19%)	290 (19%)
Unknown (in addition to other)	107 (75%)	831 (82%)	297 (86%)	1,235 (82%)

*Maternity safety champions only relevant in England

**Coded as 'other' from text description for the purposes of this report

Of note is that only 9% of reviews had an external member recorded as present. The PMRT guidance recommends the involvement of external members i.e. someone who is external to the Trust/Health Board with relevant clinical expertise, to provide a 'fresh pair of eyes' to the review of the care provided and to provide robust challenge where complacency or 'group think' in service provision has crept in. Anecdotal reports from Trusts/Health Boards indicate that this is one of the more difficult aspects of multidisciplinary review to achieve due to governance issues, workload and, as a consequence, finding suitable clinicians/units to partner with.

Administrative support staff members were only recorded as being involved in 11% of reviews. This is consistent with findings from the PMRT user survey where only 20% of respondents indicated that their review group had dedicated administrative staff to support the conduct of reviews. Again, anecdotal reports suggest that some review groups who originally had administrative support have lost this support due to service pressures. This results in more senior clinical staff undertaking tasks which could be completed by a member of the administrative team.

The professional groups involved in the highest proportion of reviews were midwives, who were recorded as involved in 87% of late miscarriage reviews, 84% of stillbirth reviews and 77% of neonatal death reviews, and obstetricians present for 70%, 78% and 73% respectively. Recorded involvement of neonatal staff in reviews of neonatal deaths was low, with only 24% of these reviews involving a neonatal nurse and 59% involving a neonatologist/paediatrician. Only 3% of all reviews involved an anaesthetist and pathologists were present for only 2% of all reviews. However, the number of reviews involving at least one participant with an unknown role was high at 82% and so the actual involvement of each of these professional groups may have been higher. Clearly not all review groups involve the requisite staff to meet the PMRT guidance or the recommendations from Each Baby Counts [10].

It is possible the quality of some reviews is being compromised due to the lack of a multidisciplinary review group. However, due to the poor recording of participants in some instances, it is not possible to know with any certainty the size of this risk.

3.2 Timeframes for the conduct of reviews

There are three stages to the conduct of a review using the PMRT. The first stage involves the review being started and carried out. As noted above this may involve multiple staff interactions with the PMRT and may involve more than one review meeting at which the care of a particular mother and baby is discussed. The second stage is when the review is complete and a draft report is generated within the tool. At this stage if more information becomes available the review can be re-opened to take account of this additional information. The third and final stage is when the review is deemed to be finally complete, the report is generated and 'published' in PDF format. The published report can be downloaded from the PMRT and saved and printed for inclusion in the medical records in preparation for discussions with the parents at their follow-up appointment. Table 3.3 shows the time from death to the completion of the second stage of the review process (draft report) and the time from the death to completion of the third stage with publication of the report.

Table 3.3: Time from the death to the review report generation and publication

	Time from death to report start (weeks)		Time from death to report publication (weeks)	
	Median	Range	Median	Range
Country:				
England	16	0 to 80	17	0 to 80
Wales	15	1 to 31	16	1 to 41
Scotland	15	2 to 80	16	2 to 80
Overall	16	0 to 80	17	0 to 80
Service provision:				
Level 3 neonatal unit & neonatal surgery	16	0 to 58	17	0 to 67
Level 3 neonatal unit	18	1 to 80	19	1 to 80
4,000+ births per annum*	14	0 to 70	16	0 to 70
<4,000 births per annum*	15	1 to 58	19	1 to 80
Type of death:				
Late miscarriages	16	0 to 47	16	0 to 47
Stillbirths	15	0 to 80	17	0 to 80
Neonatal deaths	17	0 to 55	18	0 to 55

*Units without level 3 neonatal service provision or neonatal surgery

Reviews involving neonatal care tend to take longer to complete and publish. This is probably because there is a greater amount of care to review and the review will need more staff to be involved in the review group. Some Trusts/Health Boards hold neonatal death reviews over to particular meetings so that neonatal staff are only involved in meetings to review neonatal deaths and stillbirths where resuscitation was attempted, in order to maximise the efficiency of staff time involvement. There was no consistent pattern of duration by level of service provision and the duration was unrelated to the number of reviews carried out. The review time periods were similar by gestation at birth (data not shown).

3.3 Parent engagement in reviews

At the time the data were extracted for this report the 'Parent Engagement' materials, which include principles and resources around parent engagement in review, were being developed and had not yet been uploaded on to the PMRT website and therefore could not have impacted the depth and quality of parent engagement seen in the reviews reported here.

The first two questions in the PMRT concern parent engagement in the review process. First, the review group are asked to indicate whether parents have been informed that a review of their care and that of their baby will be carried out. Overall, for 84% (1,264) of reviews the answer to this first review question indicated that parents had been told a review of their care and that of their baby was being carried out. Whilst not all parents were told a review would take place this nevertheless represents a considerable improvement from earlier findings. Whilst not directly comparable it is of note that in the MBRRACE-UK enquiry of term, antepartum deaths in 2013 the concerns of parents were only reported for 20% of reviews and in the Each Baby Counts reviews in 2016 only 41% of parents were aware or invited to take part in a review [3, 10].

3.4 Parent perspectives and concerns

The second question in the PMRT asks whether the parents’ perspectives and any concerns about their care and/or the care of their baby had been sought. For 75% (1,124) of reviews there was an indication that parents’ perspectives and any concerns about their care and the care of their baby had been sought (Table 3.4); for 20% of reviews the answer to this question was ‘no’; and this question had not been completed for a further 5%. Of note, for a small number of reviews the documentation of parental concerns and questions included answers which related to what parents had been told about plans of care, or about the information that had been provided rather than the parents’ own questions suggesting that this question in the PMRT had been misinterpreted by the review group. There is evidence of some variation in whether parents’ perspectives were sought by level of service provision but not by type of death.

Table 3.4: Number and percentage of reviews indicating parents’ perspectives of care were sought and comments recorded

	Reviews where parents’ perspectives were indicated as having been sought		Reviews with parents’ comments recorded**	
	Number	Percentage	Number	Percentage
Country:				
England	1,070	76%	1037	73%
Wales	19	82%	18	78%
Scotland	35	57%	34	56%
Overall	1,124	75%	1089	73%
Service provision:				
Level 3 neonatal unit & neonatal surgery	404	86%	387	83%
Level 3 neonatal unit	245	76%	241	75%
4,000+ births per annum*	330	64%	321	62%
<4,000 births per annum*	145	75%	140	72%
Type of death:				
Late miscarriages	100	70%	98	69%
Stillbirths	781	77%	755	75%
Neonatal deaths	243	70%	236	68%

*Units without level 3 neonatal service provision or neonatal surgery

** A small number of the comments were not actually parental comments

All the parents’ comments were visually scanned for the purposes of this analysis in order to gain an understanding of their main concerns and comments reported by the review teams.

Of the 1,078 reviews which contained at least one comment over half (55%) of these indicate that parents had ‘no concerns’. Examples include:

‘The parents had no concerns regarding the care they or their baby received’

‘[Name of mother] has no concerns about her care. She reports that it could not have been better’.

Whilst it is a positive finding that parents have no concerns, and indeed many, as illustrated above, expanded by then praising the care that they had received, it is somewhat surprising that over half of parents voiced no concerns about their care at all. This may to some extent reflect the quality of parent engagement and more particularly the timing of the discussions with parents.

Importantly the MBRRACE-UK/PMRT 'Parent Engagement' materials had not yet been made available to staff when these reviews were conducted. The materials emphasize the point that some parents may need multiple opportunities to discuss their care as concerns may arise as they continue to reflect on what had happened and the care they received. Parents may also find it difficult to express their concerns unless the staff discussing their care with them actively asks about any concerns they may have, rather than just waiting for parents to raise concerns themselves. Furthermore, these discussions need to happen in an environment which is conducive to parents feeling able to disclose their experiences and feelings. One might anticipate that with improved approaches to parents a greater proportion of them will feel more able to express their views about their care and this will be reflected in future reports.

It was nevertheless encouraging to see that some parents were able to share their perspective about their care. It was reassuring to see that 8% of reviews indicated that the parents were happy or satisfied with the care that they had received with many of these parents praising the high-quality care they had received.

It was difficult to fully and accurately quantify the number of comments reported, as although there is the capacity within the PMRT to write up to five separate concerns with room for 'other', in some instances multiple comments were written as single answers. Overall 18% of reviews with comments included only a single comment and 21% included more than one. Four percent of parents explicitly declined contact, did not respond to attempts on the part of hospital staff to engage them in the review process or indicated that they did not wish to engage with the review process:

'The parents have not responded to attempts to involve them in the review'

The number of parent comments, which were collected as text, was too large to analyse in their entirety. A qualitative approach was therefore taken with reports reviewed in-depth and coded until the point that data saturation was reached and no new themes emerged. This involved in-depth analysis of 270 PMRT reviews which contained 474 parent comments. All 474 comments were read and re-read and coded using the emergent themes from the data. Reports referring to plans of care, or documentation about the information that had been provided, rather than parental comments were excluded (n=25). Twelve overarching themes emerged with 29 sub-themes. These are shown in Table 3.5. The findings are illustrated in the word cloud (Figure 3.1) for those where a comment was expressed.

Table 3.5: Emergent themes from parental comments on their care in order of frequency from the analysis of comments reported in 270 PMRT reviews

Theme	Number (%) of reviews with references to this theme	Subthemes	Illustration of subtheme
No concerns	114 (42%)	No concerns	The parents had no concerns regarding the care they or their baby received
Why?	71 (26%)	Desire for information	'Why the baby died?'
		Scans	'Why did they not do an ultrasound to find the reason for the pain?'
		Monitoring and tests	'If I was monitored more regularly, is it more likely than not that [name of baby] would have survived?'
		Care of baby	'There was no discussion regarding resuscitation of [name of baby]'.

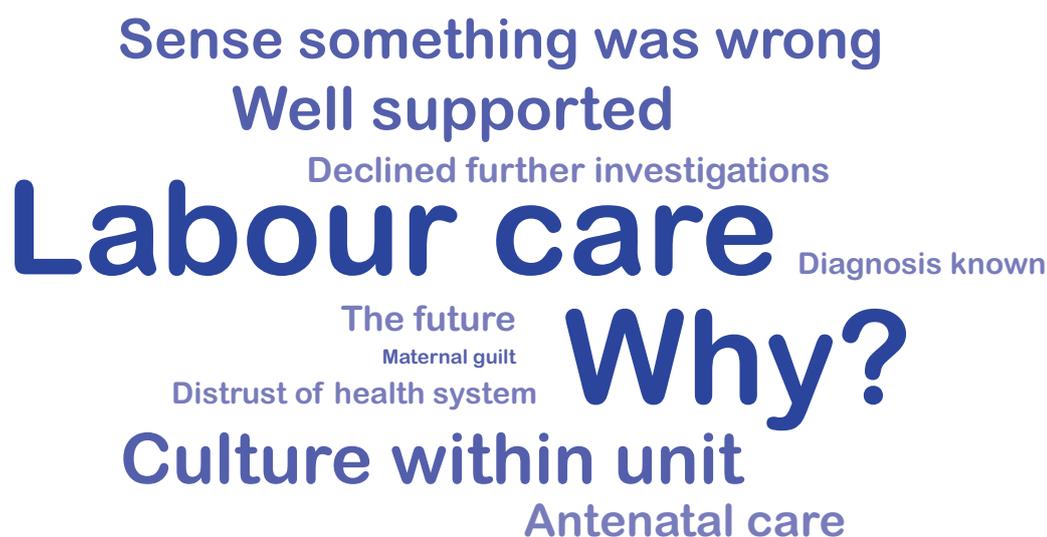
Theme	Number (%) of reviews with references to this theme	Subthemes	Illustration of subtheme
Labour Care	69 (26%)	Delays	<i>'Why was my wife left in this condition for 45 minutes?'</i>
		Fetal monitoring	<i>'Why the CTG* was removed when the baby was still not moving and had only moved once on the monitor?'</i>
		Timing of birth	<i>'Why did it take so long for the C-Section to happen when it was clear I wasn't progressing quick enough?'</i>
		Analgesia	Mum asked for pain relief but it took about 40 minutes to receive any.
Culture within unit	38 (14%)	Staff attitudes	<i>'Why was the doctor dismissive and rude and why was we not listened to and our requests dismissed after returning to the labour ward?'</i>
		Communication	<i>'Poor communication throughout'.</i>
		Conflict of professional opinion	Inconsistent and conflicting counselling about prognosis
Well supported	33 (12%)	Satisfied or happy with care received	Care in hospital following diagnosis and her postnatal care from Community Midwives has been <i>"absolutely brilliant"</i> .
Sense something was wrong	30 (11%)	Issues not acted on	<i>'Why [was] no action was taken when mum persistently reported reduced fetal movements during admission'.</i>
		Reviewed but treatment not started	<i>'Why was mother seen multiple times in triage with headache and no treatment commenced?'</i>
		Not treated as high risk	<i>'My wife and I do not believe that her symptoms were taken seriously'.</i>
Antenatal care	23 (9%)	Lack of education	Unaware of significance of fetal movements.
		Lack of continuity of carer	<i>'Why did we see a different person at most antenatal visits?'</i>
Declined further investigations	18 (7%)	Do not want to be involved with review	The parents did not want to be involved in the investigation
		Too distressed	The reason for her decline was that she felt she was recovering from events and did not wish to discuss further.
The future	18 (7%)	Concern about future pregnancies	The family would like to understand how this outcome could be prevented from occurring again in the future
		Would like to know the outcome of the review	<i>'Any lessons to learn?'</i>
Diagnosis known	16 (6%)	Parents aware of prognosis	Were aware of the anomalies detected and opted for conservative management with a view to revisit after Christmas - baby delivered prior to this.

Theme	Number (%) of reviews with references to this theme	Subthemes	Illustration of subtheme
Distrust of health system	16 (6%)	Hospital could have done more	<i>'Felt their baby could have been saved'.</i>
		Was the diagnosis correct?	<i>'The doctor made an incorrect diagnosis, by saying it was an infection'</i>
		Lack of documentation	Is concerned that the student midwife's findings / concerns on [date] were not documented in her maternity notes or plotted on her customised growth chart.
		Concern over effectiveness of investigation	Concern about effectiveness of investigation process because of systems in place.
Maternal sense of guilt	11 (4%)	Underlying maternal factors	<i>'Did my BMI affect the placenta and cause this to happen?'</i>
		Mother feels it was her fault	She blames herself for not insisting on further investigation at this point.

* CTG - cardiotocograph

As noted above in the analysis of all the reviews, 'no concerns' was the most frequently noted comment (42%) and in a further 12% of reviews parents were reported as feeling they had been well supported. Parents requesting more information about why their baby died was noted in over a quarter of reviews. One in four had concerns about their labour care, 1 in 7 raised concerns about aspects of the unit's culture and 1 in 17 expressed distrust of the health service. Maternal guilt about what happened was mentioned in 1 in 25 reviews.

Figure 3.1: Illustration of the parents' comments where concerns were expressed, identified as themes in the in-depth analysis of 270 PMRT reviews



4. Findings from the first 1,500 PMRT reviews

The results given below relate to the first 1,500 reviews carried out using the PMRT (Table 3.1) between the general release of the PMRT and 20th February 2019 when the data were extracted for this analysis.

4.1 Characteristics of the first 1,500 reviews

Table 4.1 shows the characteristics of the first 1,500 perinatal deaths reviewed using the PMRT. The majority of the reviews were carried out in England which reflects the fact that the majority of births, and thus deaths, occur in England. It also reflects that the uptake of the PMRT was faster and more complete than in Wales and Scotland, which is most likely an effect of the NHS Resolution Maternity Incentive Scheme which was introduced as the PMRT was launched in England.

Table 4.1: Characteristics of the first 1,500 PMRT reviews by country, size of unit, and type of death by gestational age carried out by February 2019

	Number of reviews	Percentage of reviews	Percentage of deaths overall in 2016
Country:			
England	1,416	94%	89%
Wales	23	2%	5%
Scotland	61	4%	7%
Overall	1,500	100%	101%
Service provision:			
Level 3 neonatal unit & neonatal surgery	468	31%	
Level 3 neonatal unit	321	21%	
4,000+ births per annum*	517	35%	
<4,000 births per annum*	194	13%	
Type of death by gestation at birth:			
Late miscarriages	143	10%	10%
Stillbirths			
24 - <28 weeks	284	19%	
28 - <32 weeks	186	12%	
32 - <37 weeks	246	16%	
37+ weeks	292	20%	
Missing gestation	3	--	
All stillbirths	1,011	67%	58%
Neonatal deaths			
<24 weeks	96	6%	
24 - <28 weeks	89	6%	
28 - <32 weeks	37	3%	
32 - <37 weeks	49	3%	
37+ weeks	75	5%	
All neonatal deaths	346	23%	32%

*Units without level 3 neonatal service provision or neonatal surgery

Stillbirths were over-represented as a proportion of deaths reviewed when compared with perinatal deaths overall in the UK. This suggests that stillbirths were more likely to be reviewed than neonatal deaths in this sample of 1,500 reviews.

4.2 Grading of care

A key part of the review is the final assessment of the overall grading of care provided at the different stages of the care pathway (Tables 4.2 to 4.7).

For 62% of reviews no issues with care were identified during pregnancy for both stillbirths and neonatal deaths (grade A) (Tables 4.2 and 4.3). For 25% of stillbirths and 29% of neonatal deaths care issues were identified that would not have made a difference to the outcome (grade B). For 16% of stillbirths and 5% of neonatal deaths issues were identified that may (grade C) or were likely (grade D) to have made a difference to the outcome. Importantly grades of care where issues with care were identified (B, C and D) require action even if the issue with care would not have made a difference to the outcome for this particular baby.

The grading of care requires the review group to take a robust and self-critical view of the care provided. The only comparison available to identify whether this type of robust consideration had occurred comes from the two MBRRACE-UK confidential enquiries [3, 9]. For term antepartum stillbirths, 60% of deaths were considered by the confidential enquiry panels to have had issues with care that may have made a difference to the outcome. In the term intrapartum stillbirths and intrapartum related neonatal deaths enquiry 78% of deaths were identified as having issues with care that may have made a difference to the outcome. The disparity in the findings between PMRT reviews and the confidential enquiries may be a result of the fact that the confidential enquiries only included deaths at term and that the PMRT reviews were conducted at the early stages of implementation. For some Trusts and Health Boards this type of robust review may not have been a very familiar activity.

Table 4.2: Grading of pregnancy care for late miscarriages and stillbirths (N = 1,154)

	Number of reviews	Percentage of reviews*
A – No issues with care identified	710	62%
B - Care issues that would have made no difference to the outcome	291	25%
C - Care issues which may have made a difference to the outcome	114	10%
D - Care issues which were likely to have made a difference to the outcome	30	3%
Unrecorded	9	1%

*Rounding errors may result in percentages totalling 99% or 101%

Table 4.3: Grading of care during pregnancy, labour and delivery for neonatal deaths (N=346)

	Number of reviews	Percentage of reviews
A – No issues with care identified	214	62%
B - Care issues identified that would have made no difference to the outcome	102	29%
C - Care issues identified which may have made a difference to the outcome	20	6%
D - Care issues identified which were likely to have made a difference to the outcome	7	2%
Unrecorded	3	1%

The grading of neonatal care following the birth of babies who were born alive but die after birth showed a similar proportion of reviews, 68%, with no issues with care identified (Table 4.4); 27% were identified as having issues with care that would have made no difference to the outcome; and only 3% of reviews identified issues with care which may have made a difference to the outcome. The latter is in contrast to the finding from the MBRRACE-UK term, intrapartum confidential enquiry where for 79% of the neonatal deaths issues with care were identified which may have made a difference to the outcome. Again this wide disparity is unlikely to be entirely due to the fact that the confidential enquiries reviewed only deaths at term.

Table 4.4: Grading of care from birth to the death of the baby for neonatal deaths (N=346)

	Number of reviews	Percentage of reviews*
A – No issues with care identified	237	68%
B - Care issues identified that would have made no difference to the outcome	92	27%
C - Care issues identified which may have made a difference to the outcome	11	3%
D - Care issues identified which were likely to have made a difference to the outcome	1	0%
Unrecorded	5	1%

* Rounding errors may result in percentages totalling 99% or 101%

Table 4.5: Most serious level of grading of care during pregnancy, labour, delivery and during the neonatal period for neonatal deaths (N=346)

	Number of reviews	Percentage of reviews
A – No issues with care identified	159	46%
B - Care issues identified that would have made no difference to the outcome	147	42%
C - Care issues identified which may have made a difference to the outcome	26	7%
D - Care issues identified which were likely to have made a difference to the outcome	8	2%
Unrecorded	6	2%

The quality of bereavement care is a very important aspect of care for parents (Tables 4.6 and 4.7) and has the potential to impact both parents' psychosocial wellbeing after bereavement. When the first 1,500 reviews were analysed questions around the quality of bereavement care had not yet been included in the tool and it is therefore hard to be sure this aspect of care had been adequately reviewed. Only 3% of issues with bereavement care were identified which may have made a difference to the outcomes for the mother (Table 4.6). This compares to 65% of mothers who had a term, antepartum stillbirth and 45% of mothers who had a term intrapartum stillbirth from the MBRRACE-UK confidential enquiries [3, 9]. Similarly issues which may have affected the outcome for the mother were identified by MBRRACE-UK in 50% of term intrapartum-related neonatal deaths in the confidential enquiries compared with only 1% of PMRT reviews (Table 4.7).

The development and recent launch of the National Bereavement Care Pathway has focused attention on the need for high quality bereavement care. The inclusion of questions around bereavement care, which are based on Sands Guidelines for Professionals and the National Bereavement Care Pathway [11], may provide a better signal to Trusts and Health Boards of what high quality bereavement care should include. As a consequence subsequent PMRT reports may better reflect the quality of care currently provided.

Table 4.6: Grading of bereavement care following late miscarriage and stillbirth (N=1,154)

	Number of reviews	Percentage of reviews
A – No issues with care identified	955	83%
B – Care issues identified that would have made no difference to the outcome	141	12%
C – Care issues identified which may have made a difference to the outcome	23	2%
D- Care issues identified which were likely to have made a difference to the outcome	8	1%
Unrecorded	27	2%

Table 4.7: Grading of bereavement care following neonatal death (N=346)

	Number of reviews	Percentage of reviews*
A – No issues with care identified	312	90%
B – Care issues identified that would have made no difference to the outcome	22	6%
C – Care issues identified which may have made a difference to the outcome	5	1%
D- Care issues identified which were likely to have made a difference to the outcome	0	0%
Unrecorded	7	2%

*Rounding errors may result in percentages totalling 99% or 101%

There was little difference in the grading of care findings between early and later reviews, although the majority of the missing grades were in reviews carried out in the first half of 2018.

4.3 Issues with care identified

Issues with care are generated within the tool in response to questions about appropriateness of care. There are currently 538 unique issues which can be generated within the PMRT although it is also possible for the users to generate their own custom issues on the basis of their review findings.

Overall, in 94% of deaths reviewed at least one issue was generated, with a median of four issues per death (Table 4.8). A smaller proportion of reviews identified at least one issue for late miscarriages (89%) and stillbirths (93%), with a greater proportion for neonatal deaths (99%); the respective median numbers of issue being three, four and seven. It is not necessarily the case that poorer care was provided when a neonatal death occurred compared with a late miscarriage. In part, some of this difference is likely to be a function of the fact that more care will have been provided where mothers experience a neonatal death compared with a stillbirth and compared with a late miscarriage, and thus there are more circumstances for issues with care to arise.

Table 4.8: Number and proportion of reviews with issues with care identified and the average number of issues identified per death reviewed

	Number of reviews with at least one issue generated	Percentage of all reviews with at least one issue generated	Median number of issues per death reviewed
Country:			
England	1,334	94%	4
Wales	23	100%	4
Scotland	59	97%	3
Overall	1,416	94%	4
Service provision:			
Level 3 neonatal unit & neonatal surgery	436	93%	4
Level 3 neonatal unit	311	97%	4
4,000+ births per annum*	488	94%	4
<4,000 births per annum*	181	93%	5
Type of death:			
Late miscarriages	127	89%	3
Stillbirths			
<37 weeks	664	93%	4
37+ weeks	281	96%	4
All stillbirths	940	93%	4
Neonatal deaths			
<37 weeks	266	98%	7
37+ weeks	75	100%	8
All neonatal deaths	341	99%	7

*Units without level 3 neonatal service provision or neonatal surgery

To present the findings about the issues coherently, the closely related issues in the 538 unique issues that can be generated were grouped a priori into 84 'issue categories'. For each issue category the number and proportion of reviews with at least one issue in each category was identified. Tables 4.9 to 4.13 illustrate the most frequent categories of issues in pre-conception and antenatal care, intrapartum care, neonatal care, end of life care, and care after death respectively. The individual issues included in each of the most frequent categories are outlined in Appendix A. Only those issue categories which featured in 10 or more reviews are shown in the tables below.

Table 4.9: The most common issues with care presented in related categories identified during the review of antenatal care

Issue categories	Number and percentage of reviews (N = 1,500) n (%)	Number of issues relevant to the outcome (N = 883) n (%)	Number of issues not relevant to the outcome (N = 883) n (%)
Smoking assessment and management of exposure to tobacco smoke	604 (40%)	113 (13%)	556 (22%)
Inadequate growth surveillance	384 (26%)	269 (30%)	362 (14%)
Assessment and management of aspirin requirement	339 (23%)	66 (7%)	278 (11%)
Inadequate investigation or management of reduced fetal movements ¹	230 (15%)	142 (16%)	188 (7%)
Not offered routine MSU at booking	222 (15%)	<10	213 (8%)
Late booking/unbooked pregnancy	220 (15%)	65 (7%)	280 (11%)
Lack of appropriate referral for social issues ² or screening for domestic abuse at booking	196 (13%)	11 (1%)	191 (7%)
Screening for or management of gestational diabetes mellitus (GDM)	164 (11%)	17 (2%)	172 (7%)
Delay in diagnosis or inappropriate management of significant medical/surgical/social problems during pregnancy ³	155 (10%)	106 (12%)	117 (5%)
Lack of appropriate pre-conception counselling/ management of medical and past obstetric complications ⁴	77 (5%)	16 (2%)	75 (3%)
Communication with mothers with learning difficulties, hearing problems or poor/no English	62 (4%)	10 (1%)	54 (2%)
Issues with anomaly screening or management of anomalies ⁵	50 (3%)	21 (2%)	42 (2%)
Incorrect risk assessment or type of care at booking	37 (3%)	28 (3%)	33 (1%)
No local DNA policy, or policy not instituted following DNA for antenatal appointments ⁶	31 (2%)	12 (1%)	22 (1%)
No antenatal discussion of birth options after previous caesarean section	31 (2%)	<10	26
Inappropriate management given obstetric and/or family history	22 (1%)	<10	16

1. Includes: no risk assessment; investigations indicated not carried out; poor quality, or incorrectly interpreted CTGs; lack of appropriate written information for mother

2. Includes: housing, benefits, social support, teenager, other vulnerabilities

3. Includes: appropriate management according to local guidelines, but not national guidelines

4. Includes: for anti-convulsants, warfarin, SSRIs, psychoactive drugs or history of pre-eclampsia/HELLP syndrome/eclampsia

5. Includes: anomaly scan late or not offered despite booking early enough; further trisomy testing indicated but not offered or results missing; condition amenable to prenatal diagnosis/ultrasound detection but not detected prenatally

6. Includes: GDM screening

Issues generated concerning informing parents of the review and seeking their perspectives and views are not included here as they are described in section 3(d) (parental perspectives and concerns). The tables also show the number and proportion of all issues generated that were in each category both for issues that were directly relevant to the outcome for that death and issues that were not relevant to the outcome. Issues that are not directly relevant to a particular death are nevertheless still important to identify as they demonstrate a potential deficiency in care that may need to be addressed to improve care provision and prevent future deaths and serious morbidity.

Table 4.9 shows that the most common issue category, both in antenatal care and overall, was concerned with 'smoking assessment and management of exposure to tobacco smoke': 40% of reviews identified smoking-related issues. By far the single most common smoking-related issue was not performing carbon monoxide screening at booking, which was an issue in 484 (32%) reviews. The second most common single smoking-related issue, identified in 91 (6%) reviews, was not offering referral to smoking cessation services for family members who live with the mother and who smoke.

The most common category for issues in antenatal care that were identified as relevant to the outcome was inadequate growth surveillance: 30% of relevant issues. This was followed by inadequate investigation or management of reduced fetal movements: 16% of relevant issues; and smoking-related issues: 13% of relevant issues. Assessment and management of aspirin requirement was the third most common issue category identified overall and was the fifth most common issue relevant to the outcome (7% of relevant issues).

Inadequate growth surveillance, inadequate investigation and/or management of reduced fetal growth and failure to screen for gestational diabetes were identified in the MBRRACE-UK antepartum stillbirth enquiry [3]. The first two issues together with prevention of smoking (three of the top four categories) are addressed by the Saving Babies' Lives Care Bundle in England [12].

It is clear from the reviews that some Trusts/Health Boards do not offer the recommended routine mid-stream urine test [13]. Social issues, diagnosis and management of medical and surgical problems and lack of appropriate pre-conception care are all significant issues that figure highly in both the MBRRACE-UK perinatal confidential enquiries and the confidential enquiry into maternal deaths [10, 14].

Table 4.10 shows the most common issue categories for intrapartum care.

Table 4.10: The most common issues with care identified during intrapartum care

Issue group	Number and percentage of reviews (N = 1,500)	Number of issues relevant to the outcome (N = 346)	Number of issues not relevant to the outcome (N = 1,033)
Issues with monitoring of the mother ¹	507 (34%)	52 (15%)	506 (49%)
No assessment of mother's risk status or inadequate management at the start of her care in labour or during the course of her labour	118 (8%)	41 (12%)	116 (11%)
Staffing issues ²	82 (5%)	40 (12%)	107 (10%)
Issues with communication with mothers with poor/no English	77 (5%)	13 (4%)	64 (6%)
Fetal monitoring issues ³	53 (4%)	67 (19%)	44 (4%)
Inappropriate setting/location of delivery	53 (4%)	24 (7%)	30 (3%)
Issues with birth mode(s) ⁴	42 (3%)	19 (5%)	28 (3%)
Issues in management of intra and post-partum complications	37 (2%)	24 (7%)	18 (2%)
Issues in management of (threatened) preterm labour	27 (2%)	22 (6%)	18 (2%)
Inappropriate duration of labour or management of delay in labour	23 (2%)	<10	21 (2%)
Inadequate documentation	20 (1%)	10 (3%)	20 (2%)
Maternal transfer issues	19 (1%)	12 (3%)	18 (2%)

Issue group	Number and percentage of reviews (N = 1,500)	Number of issues relevant to the outcome (N = 346)	Number of issues not relevant to the outcome (N = 1,033)
Pain management issues	19 (1%)	<10	13 (1%)
Specific birth planning advice indicated for pregnancy complications but not given	19 (1%)	<10	12 (1%)
Medication issues ⁵	12 (1%)	<10	11 (1%)

1. Includes: infrequent observations and lack of partogram

2. Includes: insufficiently senior staff involved in care and lack of one-to-one care in established labour

3. Includes: incorrect method of fetal monitoring, interpretation or management, from prior to established labour to the latent phase of labour

4. Includes: inappropriate choice, timing and management

5. Includes: oxytocin and medication for pre-existing conditions

The most common issue category for intrapartum care (Table 4.10), was 'issues with monitoring of mother'; this was identified in 34% of reviews. The single most common issue within this category was that the mother's progress in labour was not monitored on a partogram: identified in 441 (29%) reviews. In 8% of reviews, maternal observations in labour, commensurate with the mother's level of risk and national guidelines, were not carried out. These findings mirror those of the confidential enquiry into term intrapartum deaths [9].

Of the issues that were assessed as relevant to the outcome, fetal monitoring issues comprised the largest proportion at 19%. The most common single issues in fetal monitoring were during established labour and included an inappropriate type of fetal monitoring, not carrying out fetal heart monitoring correctly, poor technical quality of CTGs and incorrect interpretation of the fetal heart rate.

Table 4.11: The most common issues with care identified during intrapartum care

Issue group	Number and percentage of reviews (N = 346) n (%)	Number of issues relevant to the outcome (N = 81) n (%)	Number of issues not relevant to the outcome (N = 907) n (%)
Inadequate documentation			
- Resus - 172 (50%)			
- Neonatal care - 35 (10%)			
- Neonatal transfer to neonatal unit - 25 (7%)	185 (53%)	32 (40%)	579 (64%)
- Neonatal transfer to another unit - 14 (4%)			
- Postnatal ward care 1 (0%)			
Thermal management issues			
- Neonatal transfer to neonatal unit - 47 (14%)			
- Resus - 18 (5%)	61 (18%)	14 (17%)	60 (7%)
- Neonatal care - 14 (4%)			
- Neonatal transfer to another unit - 3 (1%)			
Issues with respiratory management during resuscitation ¹	56 (16%)	<10	54 (6%)
Issues with cardiovascular management on neonatal unit ²	21 (6%)	<10	18 (2%)
Issues with fluid or nutrition management issues on neonatal unit	15 (4%)	<10	13 (1%)

Issue group	Number and percentage of reviews (N = 346) n (%)	Number of issues relevant to the outcome (N = 81) n (%)	Number of issues not relevant to the outcome (N = 907) n (%)
Resuscitation not carried out appropriately or in line with NLS guidelines	14 (4%)	<10	15 (2%)
Issues with investigations on neonatal unit	14 (4%)	<10	10 (1%)
Issues with communication with parents on the neonatal unit ³	13 (4%)	<10	18 (2%)
Issues with respiratory management on neonatal unit	13 (4%)	<10	<10
Issues with infection prevention or management on neonatal unit	12 (3%)	<10	<10
During resuscitation, vascular access not secured or took too long to achieve	11 (3%)	<10	<10
Neonatal transfer to postnatal ward/transitional care/neonatal unit/another unit delayed	10 (3%)	<10	<10
Neonatal transfer to postnatal ward/transitional care/neonatal unit/another unit inappropriate	10 (3%)	<10	11 (1%)
Delayed cord clamping issues for babies receiving resuscitation	10 (3%)	<10	<10

1. Includes: issues around establishing ventilation, intubation, positive pressure respiratory support, oxygen saturation monitoring and administration of surfactant

2. Includes: line placement and radiological confirmation of line position

3. Includes: mothers with poor/no English

Table 4.11 demonstrates that the majority (53%) of reviews of neonatal deaths found documentation that was inadequate such that particular aspects of care could not be reviewed. Gaps in documentation most commonly related to resuscitation, including: whether a carbon dioxide detector was used during the resuscitation (14% of reviews); whether delayed cord clamping was indicated and carried out appropriately during resuscitation (10% of reviews); whether parents were kept informed about the progress of the resuscitation of their baby (10% of reviews); and whether thermal management during resuscitation was appropriate (7% of reviews). In 21 reviews, the notes relating to the resuscitation of the baby were only partially adequate making it difficult to fully assess the quality of the resuscitation. After inadequate documentation, thermal management issues were the most common issue, particularly during transfer of the baby to the neonatal unit. They were identified in 18% of reviews of neonatal deaths, and represented 17% of the issues relevant to the outcome.

The most common issues during end of life care (Table 4.12) related to not having discussions with parents about organ donation (24% of reviews) and post-mortems (15% of reviews) as well as inadequate documentation (16% of reviews). Reassuringly, combined issues relating to parent preferences, parent involvement in decisions, or the meeting of parental religious, cultural and spiritual needs, occurred in fewer than 10 reviews.

Table 4.12: The most common issues with care identified during end of life care

Issue group	Number and percentage of reviews (N=346) n (%)
Organ donation not discussed with parents despite no specific contraindications	82 (24%)
Inadequate documentation	57 (16%)
Post-mortem not discussed with parents prior to the baby's death	52 (15%)

The most common issues after death (Table 4.13) related to placental histology, in particular, placental histology being carried out but not by a perinatal or paediatric pathologist (12% of reviews) or the placenta not being sent for histological examination (3% of reviews).

Table 4.13: The most common issues with care identified after the baby had died

Issue group	Number and percentage of reviews (N=1,500) n (%)
Placental histology was performed but not by a perinatal/paediatric pathologist	177 (12%)
The placenta was not sent for histological examination	38 (3%)
The placenta was sent for histological examination but there is no result in the notes	27 (2%)
It is not possible to assess from the notes whether the parents were offered a hospital post-mortem	19 (1%)
The parents consented to a full or limited post-mortem examination but this was not carried out	17 (1%)
The parents were not offered a hospital post-mortem	16 (1%)

4.4 Contributory factors

Once a review is complete the team is presented with the list of issues which have been generated in the course of the review. They are then asked to identify for each issue the factor(s) contributing to the failure to provide appropriate care using the National Patient Safety Agency Contributory Factors Framework [4]. It is possible to identify more than one contributory factor per issue although this happened on relatively few occasions. The review team is then asked to consider for each issue whether that issue contributed to the outcome and whether a remedial action is needed. Remedial action may be required regardless of whether or not the issue contributed to the outcome and this is an outcome option.

Across the 1,500 reviews a total of 7,911 issues were identified and a total of 7,993 'contributory factors' were identified as contributing to the issues. Table 4.14 presents the number of contributory factors by whether or not they had an impact on the outcome and whether they required remedial action.

Overall 38% of the contributory factors identified required action to improve the care provided; 13% where the factor may have contributed to the outcome and 25% where the factor had no impact on the outcome but action was needed. Reviews carried out in Scotland and Wales were more likely than reviews carried out in England to identify factors that may have contributed to the outcome and required action. Other than Trusts/Health Boards with services including a level 3 neonatal unit, which identified a greater proportion of contributory factors that did not affect the outcome but required action (35%) versus those that possibly affected the outcome and required action (10%), the proportion of contributory factors was similar across level of service provision at 21% versus 13% respectively (data not shown).

The proportion of contributory factors which had a possible impact on the outcome where action was needed increased with increasing gestational age group for stillbirths (11% to 24%) but not for neonatal deaths. Similar proportions of factors that did not affect the outcome, were identified for both stillbirths and neonatal deaths (21% to 27%).

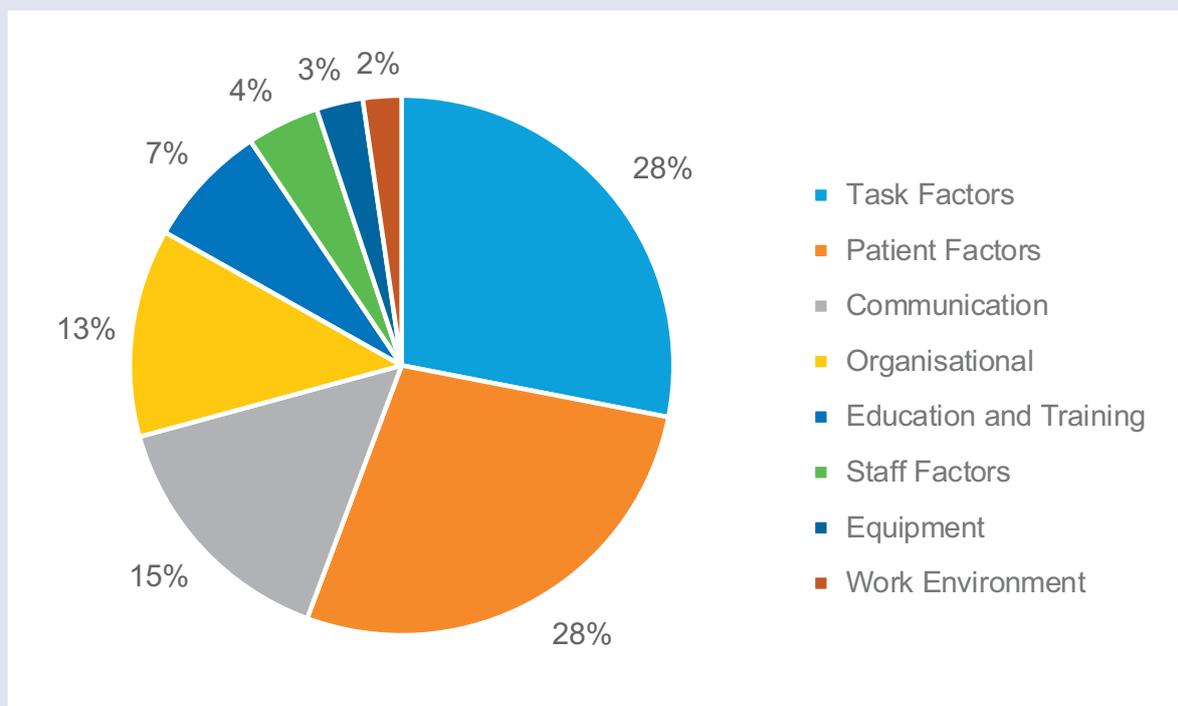
Table 4.14: Number and proportion of contributory factors by impact on outcome and the need for remedial action (N=7,993)

	Number of contributory factors with:				
	No outcome contribution	No impact on outcome and no action needed (% of issues)	Possible impact on outcome but no action needed (% of issues)	No impact on outcome but action needed (% of issues)	Possible impact on outcome and action needed (% of issues)
Country: (row percentages)*					
England	263 (3%)	3921 (5%)	591 (8%)	1860 (25%)	949 (13%)
Wales	0 (0%)	30 (24%)	30 (24%)	32 (26%)	31 (25%)
Scotland	6 (2%)	107 (37%)	35 (12%)	78 (27%)	60 (21%)
Overall	269 (3%)	4058 (51%)	656 (8%)	1970 (25%)	1040 (13%)
Type of death: (row percentages)*					
Late miscarriages	18 (3%)	314 (60%)	25 (5%)	127 (24%)	40 (8%)
Stillbirths					
24 to <28 weeks	38 (3%)	634 (53%)	90 (8%)	304 (25%)	128 (11%)
28 to <32 weeks	19 (2%)	479 (52%)	74 (9%)	220 (26%)	97 (11%)
32 to <37 weeks	27 (2%)	460 (42%)	101 (9%)	295 (27%)	204 (19%)
37+ weeks	38 (3%)	513 (37%)	138 (10%)	361 (26%)	339 (24%)
Missing gestation	0 (0%)	18 (61%)	3 (10%)	0 (0%)	9 (29%)
All stillbirths	122 (3%)	2056 (45%)	403 (9%)	1180 (26%)	768 (17%)
Neonatal deaths (row percentages)*					
<24 weeks	0 (0%)	387 (63%)	43 (7%)	150 (24%)	34 (6%)
24 to <28 weeks	51 (6%)	480 (55%)	84 (10%)	191 (22%)	63 (7%)
28 to <32 weeks	32 (9%)	179 (52%)	21 (6%)	91 (27%)	19 (6%)
32 to <37 weeks	21 (6%)	227 (60%)	28 (7%)	85 (23%)	16 (4%)
37+ weeks	25 (4%)	396 (56%)	49 (7%)	146 (21%)	91 (13%)
All neonatal deaths	129 (4%)	1669 (57%)	225 (8%)	663 (23%)	223 (8%)

*Rounding errors may result in percentages totalling 99% or 101%

The NPSA contributory factors framework has a three level hierarchical structure. The number of issues linked to the eight level 1 contributory factors are shown in Figure 4.1. This figure excludes those issues where a contributory factor was not assigned (N=1,691). Task and patient factors accounted for 56% of factors and communication and organisational factors accounted for a further 28%. These four categories together accounted for over 80% of the contributory factors assigned.

Figure 4.1: Categories of level 1 National Patient Safety Authority contributory factors for 5,885 issues



The level 2 details are given in Appendix B. In brief the most common task-related factor (83%) was concerned with guidelines, policies and procedures, indicating that these were either not followed or not available to follow. Clinical conditions accounted for 56% of patient-related factors and 25% of social factors. Written and verbal communication together, not surprisingly, accounted for 73% of communication factors and communication management accounted for 26% of factors in this category. Organisational structures accounted for 60% and priorities accounted for 26% of organisational factors. Competence was identified for 56% of educational and training factors.

Considering the contributory factors by stage of care: patient (clinical) factors and organisational issues (70%) were the commonest contributory factors identified for issues related to pre-conceptual care. Patient and task factors were the commonest factors identified in relation to antenatal care and intrapartum care (47% and 50% respectively). Communication (31%) was the commonest factor identified for neonatal resuscitation, with patient, task and communication factors (20%, 11% and 15% respectively) identified for neonatal transfer. Patient factors (26%) and communication factors (15%) were the commonest factors related to neonatal care. Patient factors and communication accounted for 36% and 23% respectively in relation to end of life care. Organisational factors (21%), communication (18%) and task factors (15%) were identified in relation to after death care.

4.5 Actions planned

Across the 1,500 reviews a total of 3,010 issues with identified contributory factors requiring action were recorded and 3,003 actions with accompanying action plans were included, a further 47 did not require an action based on outcome contribution, but actions were written anyway. Thus a total of 3,050 actions were included in the action plans produced from the PMRT.

4.6 Assessment of the quality, impact and strength of the actions planned

Two qualitative analyses of actions planned were undertaken for the purposes of this report. The first was conducted on a sample of 100 actions planned that were randomly selected from the 3050 actions recorded in the PMRT. The purpose of this analysis was to describe the types of actions planned as a consequence of the reviews and assess their quality. Three measures of quality were used: whether actions were SMART (Specific, Measurable, Achievable, Realistic and Time-bound), the strength of actions, and how the impact of the action will be assessed (process measure, root cause measure or adverse event measure).

The strength of an action describes how well the action would eliminate human error [1]. Stronger actions are system changes which remove the reliance on individuals to choose the correct action. They use standardisation and permanent physical or digital designs to eliminate human error. They are sometimes referred to as 'forcing' actions. Intermediate strength actions reduce the risk of human error but do not fully control the actions of individuals. Weaker actions only support individuals to choose the correct action but do not control their actions. Table 4.15 shows the frequency of issues for which the actions planned were reviewed for the purposes of this analysis.

Table 4.15: Frequency of issues randomly sampled for quality assessment

Issue group	Number
Antenatal booking	22
Antenatal care	31
Care during labour	23
Language	1
Neonatal care	11
Parents' perspectives of care	9
Pathology	3
Total	100

Table 4.16 shows the grouping of the type of action/implementation planned; more than one action can be planned per issue which accounts for the fact there were 111 actions planned for the 100 issues. Overall 91 issues had one action planned, seven had two actions planned and two had three actions planned.

Table 4.16: Type of action/implementation planned

Action/implementation planned	Number
Introduce a checklist	6
Introduce a decision aid	1
Equipment replacement or repair	1
Provide feedback to the other site of care	6
Conduct a further review	8
Increase the number of staff	1
Provide feedback to an individual	17
Develop a policy/guideline	2
Refer for a serious incident investigation	5
Send out a staff reminder	23

Action/implementation planned	Number
Provide staff training	18
Standardise the process	3
Develop a system change	14
No action required/incorrectly completed/entered in error	6
Total	111

The commonest actions planned were to send out a staff reminder (21% of the actions planned), provide staff training (16%), provide feedback to individuals (15%) and to develop a system change (13%). Of note feedback to individuals was the only action identified for 10 of the actions planned.

Box 4.1 gives examples of the types of actions planned.

Box 4.1: Examples of actions planned by type of action

System change

“Placental histology was performed but was not carried out by a perinatal/paediatric pathologist...Pathology Manager and Bereavement Midwife to arrange a meeting to discuss appropriate pathway and protocol for re-direction of placentae which are inaccurately sent to XXX to facilitate rapid transfer to YYY when required.”

Staff training

“This mother was not appropriately managed given her carbon monoxide level...staff education on smoking assessment and referrals.”

Further review

“This mother’s second stage of labour was not of an appropriate duration... XX to review labour / delivery care in YY.”

Individual feedback

“This mother’s progress in labour was not monitored on a partogram...Labour ward Manager to ensure staff members use partogram to monitor the progress of labour.”

Table 4.17 presents the analysis of the individual actions planned to assess whether the objectives were SMART. The majority of the actions were specific, achievable and realistic. However, just over half were measurable and less than 1 in 5 were time-bound. Box 4.2 gives examples of actions planned according to how SMART they were.

Table 4.17: Actions/implementation planned by whether or not the objectives were SMART (row percentages)*

SMART criteria	Whether the objective was SMART		
	Yes n (%)	No n (%)	Total
Specific	74 (88%)	10 (12%)	84
Measureable	43 (52%)	41 (49%)	84
Achievable	82 (98%)	2 (2%)	84
Realistic	82 (98%)	2 (2%)	84
Time-bound	17 (20%)	67 (80%)	84
No objectives			16

*Rounding errors may result in percentages totalling 99% or 101%

Box 4.2: Examples of actions planned by how SMART they were

Vague

“Discussed at consultant meeting and plans made to embed the practice of debrief and documentation of same in these circumstances.”

No plan

“This mother did not receive one-to-one care through established labour...Due to the workload on this day there is no action required.”

SMART

“The parents were not told that a review of their care and that of their baby is being carried out...This needs to be discussed at the time of birth. Bereavement Leads and Risk and Patient Safety Manager will make contact with the families to discuss any concerns or issues relating to their care that they wish to have addressed...This has now been incorporated into the check list used at the point of care for pregnancy loss in July 2018.”

Table 4.18: Assessment of the strength of the actions planned

Action strength	Number
Weak	57
Intermediate	17
Strong	10
Nil	16

Box 4.3: Examples of the strength of actions planned

Weak

“There is no evidence in the notes that this mother was asked about domestic abuse at booking...Community midwives will be reminded that they are required to ask at booking and other visits where possible. Reminder to go in governance newsletter.”

A reminder for individual action without any controls

Intermediate

“This mother was not assessed for the need for aspirin...New antenatal notes include risk assessment for all women re: aspirin.”

A new system in place, but still requires an individual to act without any controls

Strong

“This mother presented with reduced fetal movements, scans and and/or other investigations were indicated but were not carried out...Scan referral form completed on DAU but did not get to scan department - new radiology process in place from Sept 2018 for electronic referrals.”

A system level digital design to eliminate human error

Having put an action in place it is important to assess whether the action was followed through. Table 4.19 shows the assessment of the type of measure put in place to assess the outcome of the action

Table 4.19: Impact measures for the actions/implementation planned

Impact measure	Number	Action strength
Process	57	55 weak, 2 intermediate
Cause/adverse event	27	10 strong, 15 intermediate, 2 weak
Nil	16	

The stronger and intermediate actions were more likely to be associated with an outcome measure that was based on the effect on the intended outcome rather than being based just on a process measure, whereas the weak actions tended to be associated with impact measures that were solely based on a measure of process. An example of the former is where an audit was planned to assess the impact of the change, not just the implementation of the change:

“Implementing safety alert sticker (purple) on intra-partum notes with guidance to midwives dealing with labour following IUD. 2. Audit planned to assess current practice and follow up audit to assess the impact of the above change.”

Overall, whilst the majority of the actions planned met three of the five SMART criteria, only 10% of actions were strong and 17% were of intermediate strength. Assessment of the impact of the actions planned tended to rely on process measures rather than impact on outcome. A strong action planned was more likely to be associated with a planned impact measure that was based on the outcome compared with weak actions. About 1 in 6 of the comments included under actions planned did not constitute a planned action.

One other important aspect to consider is that whilst the PMRT review group may plan a series of actions these are unlikely to be ‘owned’ by the PMRT team. Action plans need to be incorporated into the Trust and Health Board local governance processes and it is possible that when these actions are transferred to the local governance team that any relatively weak actions are translated into stronger actions. This information cannot be captured within the PMRT so it is not possible to assess whether this is in fact the case. It does, however, highlight the fact that members of the local governance team should be part of the PMRT review team and should support the development of strong actions by the PMRT team.

4.7 Assessment of actions planned for issues with the greatest impact on outcomes

The purpose of the second qualitative analysis of actions planned was to describe the actions developed for the issues in antenatal, intrapartum and neonatal care that may have the most impact on the deaths. In order to identify these issues, for the 178 reviews which concluded that different care before the death may or would have made a difference to the outcome, the most common issues that were relevant to the outcome and required action were identified. For antenatal care this was inadequate growth surveillance; for intrapartum care it was inadequate monitoring of the fetus; and for neonatal care it was issues with thermal management. The free text for all the actions planned for each of these potentially high impact issues was analysed and categorised into the type of actions planned.

i) Antenatal care – inadequate growth surveillance

In total, there were 135 actions planned in response to growth surveillance issues that were relevant to the outcome and required action, identified in reviews where the grading of care indicated that different care would or may have made a difference to the outcome. Several categories of actions emerged from analysis of the free text data. These are outlined in Table 4.20, along with the frequency of each action category.

Table 4.20: Types of action/intervention planned for high impact issues in antenatal care

Action	Frequency (%*) of all actions planned N=135
Education/communication to staff	70 (52%)
Update, amend or review guidance, policy, protocol or process	45 (33%)
Staff assessment	12 (9%)
New tool/aide development or modification (mostly SFH charts)	12 (9%)
Audit/service evaluation/QA process	11 (8%)
Further investigation, RCA or SIRI	9 (7%)
Process other than education for individual(s) involved	7 (6%)
Feedback to another organisation	5 (4%)
Escalation	4 (3%)
Review of capacity or staffing	4 (3%)
No action	1 (1%)
Other	8 (6%)

*Percentages exceed 100% as a plan could include more than one action type

The most common action planned was education of staff, which featured in the majority (52%) of actions planned. Further details of the targets, formats and content of educational interventions are shown in Table 4.21.

Table 4.21: Types of action/intervention planned for high impact issues in antenatal care

Aspect	Specific plan	Frequency (%*) of all education actions N=70
Target	All staff or all members of a staff group	44 (63%)
	Individual(s) involved and all members of a staff group	16 (23%)
	Individual(s) involved in the death only	10 (14%)
Format	Individual learning plan/reflection	18 (26%)
	Communiqué (email, memo, newsletter, bulletin, brief, reminder etc.)	16 (23%)
	Mandatory training	15 (21%)
	Case presentations / sharing lessons learnt	12 (17%)
	Additional training (education road show, junior doctor training sessions, new training programme)	12 (17%)
	Feedback to individual(s) involved	5 (7%)
Content	Fetal growth measurement and plotting	28 (40%)
	Lessons learnt	14 (20%)
	Guideline clarification /amendment /update /reminder	8 (11%)
	Other growth related training	19 (27%)
	Need for aspirin, serial scans or other early interventions	3 (4%)
		1 (1%)

*Percentages exceed 100% as a plan could include more than one action type

Although the majority of educational interventions were to be delivered to all staff, 14% were targeted only at the individuals involved in the particular death. The latter most commonly took the form of developing individual learning plans or personal reflection. This approach is rather more reassuring than simply providing feedback to individuals.

Educational interventions were not the only intervention targeted solely at the individuals involved. 6% of action plans involved managing individuals via the Trust or Health Board’s capability policy or by re-allocating the roles and responsibilities of the individual. Whilst in individual cases this may have been appropriate it was also clear that opportunities were missed to introduce system-level changes in order to prevent other individuals making the same error and for wider departmental learning to occur.

The most common format of educational interventions targeting all staff was communiqués, via various mediums, such as newsletters and emails. These represent weak actions since these types of communiqués may not be read, there is no way to determine if they were read, and no means of evaluating whether learning followed. They are also time-limited actions since any learning which occurs will be lost with staff turnover. The second most common format of educational intervention was mandatory training. Whilst this has some limitations it represents a low level system change since it is possible to measure the reach of the training and can be delivered regularly thereby ensuring that the learning is not lost with staff turnover. It is also possible to evaluate competency following such training. Appropriate assessment of fetal growth was the most common content of training.

After educational interventions, the next most common action type was the updating or reviewing of guidance, policy, protocol or processes. This type of action was included in a third of actions planned.

ii) Intrapartum care – inadequate fetal monitoring

There were 51 actions responding to inadequate fetal monitoring that were deemed relevant to the outcome and requiring action, for those reviews where different care may or would have impacted the outcome. The categories of actions and their frequencies are shown in Table 4.22, with further details of educational interventions in Table 4.23.

Table 4.22: Types of action/intervention planned for high impact issues in intrapartum care

Action	Frequency (%*) of all action plans N=51
Education/communication to staff	33 (65%)
Update, amend or review guidance, policy, protocol or process	19 (37%)
Further investigation, RCA or SIRI	16 (31%)
Staff assessment	5 (10%)
New tool/aide development or modification	1 (2%)
No action	1 (2%)
Other	1 (2%)

*Percentages exceed 100% as a plan could include more than one action type.

Again, educational interventions were by far the most common actions planned, featuring in two thirds of action plans. Similarly to the actions planned for inadequate growth surveillance, 15% of these targeted the individuals involved, mostly through individual learning plans and personal reflection rather than simply providing feedback to the individuals.

In contrast to the actions planned for inadequate growth surveillance, educational interventions for all staff were more likely to involve formalised teaching, such as CTG training, or to be part of a presentation series or training plan (Table 4.23). No action plans involved a simple communiqué.

The content of educational interventions was most commonly about the lessons learnt from deaths and on CTGs. However, human factors were also identified as an area for learning.

As with the action plans for inadequate growth surveillance, the second most common type of action was updating or reviewing guidance, policy, protocol or processes, again featuring in about a third of action plans.

Table 4.23: Education and communication to staff in relation to high impact intrapartum care issues

Aspect	Specific plan	Frequency (%*) of all education actions N=33
Target	All staff or all members of a staff group	19 (58%)
	Individual(s) involved and all members of a staff group	9 (27%)
	Individual(s) involved only	5 (15%)
Format	Individual learning plan/reflection/CPD	9 (27%)
	Additional training (specialist CTG training, Prompt training, Skills Drills presentations, develop new training plan)	8 (24%)
	Mandatory training	7 (21%)
	Case presentations / sharing lessons learnt	6 (18%)
	Feedback to individual(s) involved	4 (12%)
Content	Lessons learnt/root causes	16 (48%)
	CTG (including K2 package, indications, checking working before start, how long to record, interpretations)	14 (42%)
	Risk assessment	4 (12%)
	Human factors	3 (9%)
	Updated guidance	2 (6%)
	Documentation, auscultation and pathways	1 (3%)

iii) Neonatal care – inadequate thermal management

There were only eight actions identified to address thermal management issues that were relevant to the outcome and required action, for reviews where different care may or would have made a difference to the outcome. These fit into three categories outlined in Table 4.24.

Audits, service evaluation and quality assurance processes were the most common actions planned for these issues, for example:

“This is an item on the NNAP [National Neonatal Audit Programme] dashboard and is under constant review as part of ongoing QI projects to improve the temperature control of our extreme premature babies due to the link with mortality”

Staff education featured in three of the action plans. An example of one of these plans was

“The importance of keeping lines visible needs to be widely disseminated - at local maternity and neonatal presentations, to be discussed with the transfer team and to be emphasised at the CDOP panel meeting as an issue for national dissemination.”

Table 4.24: Types of action/intervention planned for high impact issues in intrapartum care

Action	Frequency (%) of all action plans N=8
Audit/service evaluation/QA process	5 (63%)
Education/communication to staff	3 (38%)
Further investigation, RCA or SIRI	1 (13%)

Percentages exceed 100% as a plan could include more than one action type.

5. Findings from the formal user survey

In November 2018, we conducted a survey to gather the views of PMRT users regarding the implementation and impact of the PMRT. An invite to the survey was distributed by email to all 1,222 registered users of the PMRT in November 2018. The survey was open from Monday 5th to Friday 30th November 2018.

A total of 292 registered users, with a broad range of professional roles, completed the survey. Respondents answered the questions as individuals, only selecting their Trust/Health Board at the end of the survey. The 288 respondents who stated which Trust/Health Board they work for represented 121/153 (79%) different Trusts/Health Boards in England, Scotland and Wales. However, for 53 of the Trusts/Health Boards there was only a single respondent. There was not always consistency between responses for those Trusts/Health Boards with more than one respondent.

The survey asked PMRT users about their organisation's processes prior to the introduction of the PMRT, progress with implementation, and perceived impact on review processes, their organisation, and on reviews. Further questions addressed views on the PMRT support resources used and how the PMRT website could be improved.

i) User survey findings

The PMRT user survey asked respondents how much they agreed with the statements that the PMRT has:

- Supported a more structured approach to reviews
- Improved communication with parents
- Identified areas of care to be improved
- Identified actionable learning points to prevent future perinatal deaths

They were also asked how much they agreed that the PMRT would improve these four areas in the future.

It is notable that that 38% of respondents disagreed or strongly disagreed that the PMRT had already supported a more structured approach to review (Figure 5.1). However, the majority (62%) agreed or strongly agreed that the PMRT had already supported a more structured approach to review, and an even higher proportion (77%) believed that it would do in future. A similar pattern, with greater agreement regarding future impacts than current impacts, was seen for improving communication with parents (44% current, 68% future) (Figure 5.2), identifying areas of care to be improved (56% current, 70% future) (Figure 5.3), and identifying actionable learning points to prevent future perinatal deaths (53% current, 70% future) (Figure 5.4). Overall this suggests that when the survey was conducted there was a level of optimism about the value of using the PMRT, even among those users who currently felt that reviews carried out using the PMRT had not necessarily yet had an impact. This may reflect the relatively early stage of implementation and embedding of the PMRT into local processes, some aspects of which would have been completely new in some Trusts/Health Boards.

Figure 5.1: Survey respondents view of whether the PMRT supported a more structured approach to reviews

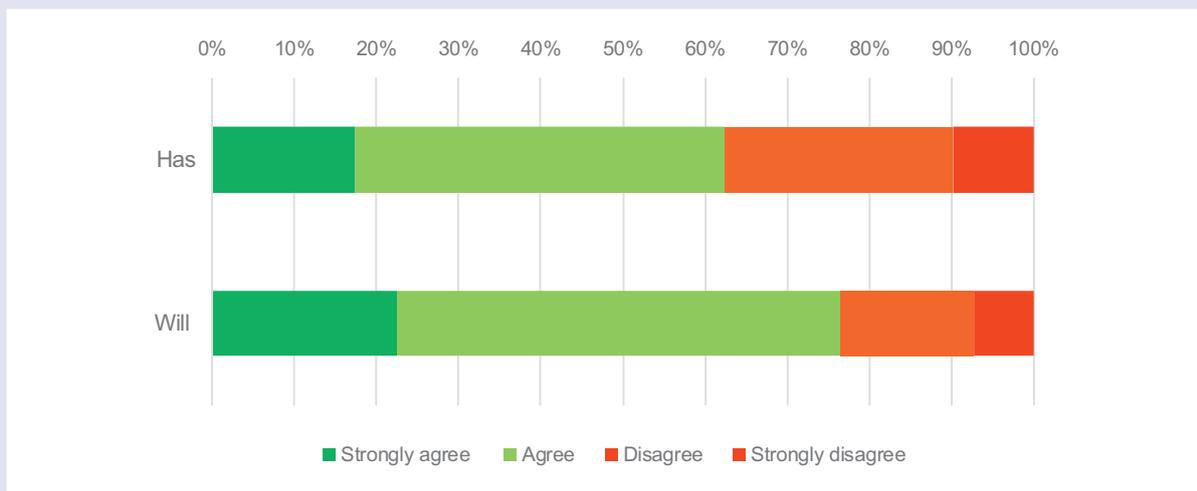


Figure 5.2: Survey respondents view of whether the PMRT supported improved communication with parents

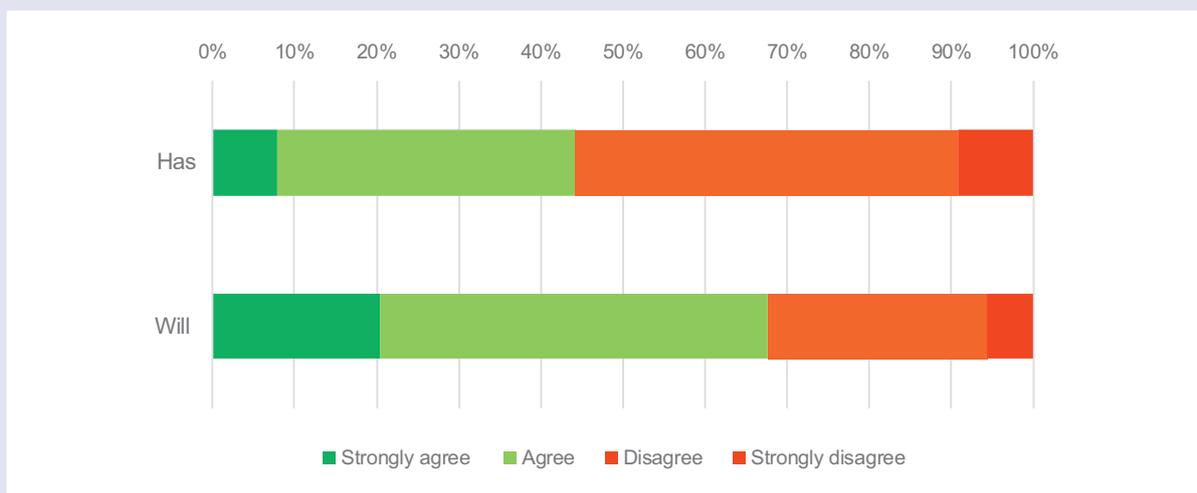


Figure 5.3: Survey respondents view of whether the PMRT supported improved identification of areas of care to be improved

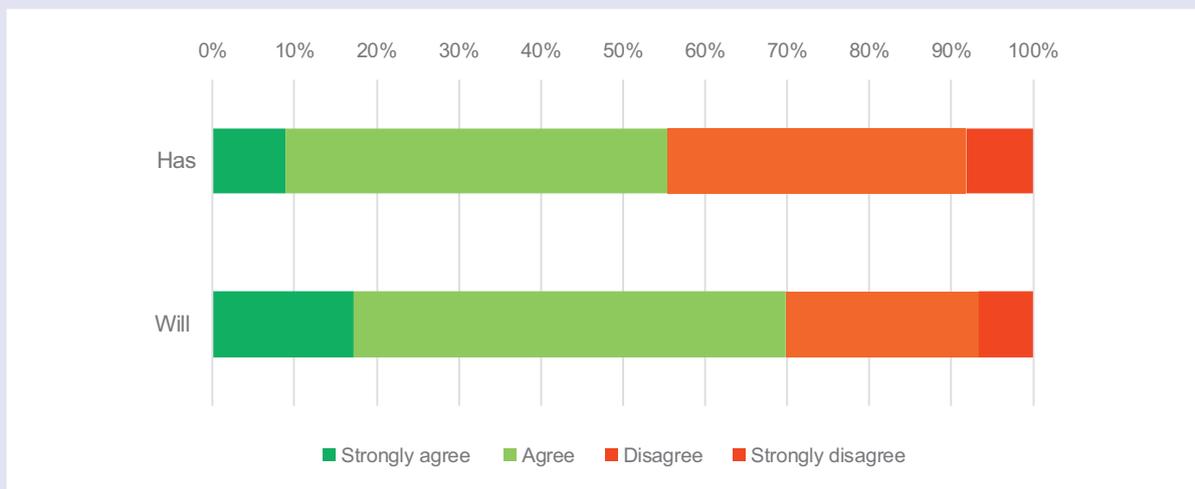
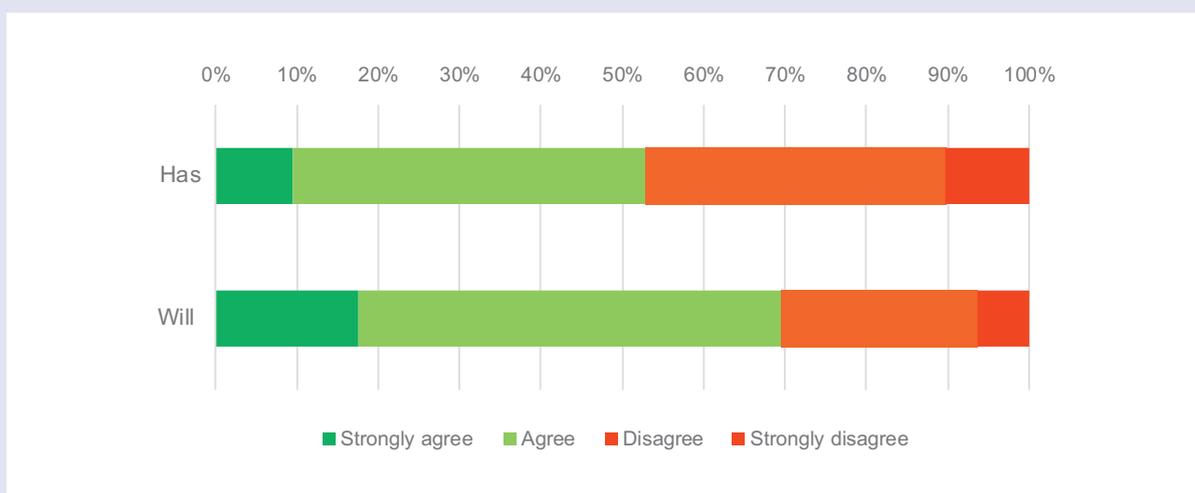


Figure 5.4: Survey respondents view of whether the PMRT supported the identification of actionable learning points to prevent future perinatal deaths



Multiple themes emerged within the free text answers to questions about the impact of the PMRT on review processes, their organisation and reviews. The key positive and negative themes describing the impacts of the PMRT, in order of decreasing frequency, are shown in Box 5.1.

Box 5.1: Key positive and negative themes describing the impact of the PMRT

Key positive themes describing the impact of the PMRT:

- **More standardised/systematic/robust/formalised/thorough approach to reviews**
- **Improved multidisciplinary team involvement**
- **Improved parent involvement**
- **Improved action planning and monitoring**
- **Identified areas for improvement/improved learning**
- **Improved sharing of learning**
- **Introduced an external reviewer**
- **Generates reports**

Key negative themes describing the impact of the PMRT:

- **Increased time/workload**
- **Felt they already had a robust process prior to PMRT which was working well**
- **Increases complexity and difficulty in completing reviews**
- **Creates duplication**
- **Difficulties bringing all the necessary multidisciplinary staff together**
- **Automatically generated reports not good enough**

The key themes, both positive and negative, are further illustrated by the following quotes:

Supported a more standardised/systematic/robust process:

'It provides a more consistent and structured approach to the review. It ensures parents are kept central to the review. It encourages a broader spectrum of participation. It is systems focused and the production of the action plan is of benefit.'

'Structured review process. MDT now reflects national recommendation for reviews. Actions now logged and Improvement evident and recorded in response to reviews.'

Identified issues that would not otherwise have been identified

'It takes longer but is more structured and is able to pick out issues in care that we might not have noticed'

'...The root cause is considered as well as care at the time of death as PMRT looks at the whole pregnancy... PMRT gives an opportunity for all aspects of care to be considered not just that relating to the death...'

Improved action generation and logging

'It has made the review more robust and ensured actions are identified, allocated to individuals for responsibility and followed up. It has also ensured parents views are taken into account, explored and addressed.'

'...Action plans are more effective as given more credence since PMRT. Easy to identify learning needs.'

Involvement of parents

'We now ask parents if they have any questions/aspects of care that they would want us to explore during our review.'

'Using the PMRT has supported us in formalising processes and being inclusive with families. The tool helps us review cases in a standardised way and provides a summary with measurable actions that we are able to share further with Trust groups.'

'...The focus of the Perinatal Mortality Meeting has changed from learning for junior doctors (they used to present cases with insufficient knowledge) to the focus being the review of the case and answering PMRT issues and parents questions.....'

Identified areas of care to improve

'Whilst we already had a systematic review of perinatal deaths (all slides in perinatal were formatted so all reviews covered all elements of care) as part of the perinatal process it [the PMRT] has highlighted to us themes of substandard care in a much more prompt manner. I am believe that this is for two reasons, firstly all the people in the room hear all of the case, not some hearing some of the case so links and themes are expressed much sooner in a team that is motivated to action any care / systematic issues. Secondly the computer support has highlighted some system issues (e.g. use of aspirin) which we had not realised was such a recurrent problem. It has also highlighted the greater need to share with the teams the parents' thoughts and feeling on a more formal manner, we were already sharing on an informal manner and have a well-developed open culture.'

'.....It has also helped us to roll out MSU testing at booking, and documentation of CO monitoring as a field during the booking process which cannot be bypassed - the prompts in the tool highlighted that this was an issue for us. We have also now improved our formal paediatric involvement [in the review] for stillbirths where neonatal resuscitation was attempted unsuccessfully.'

6. Conclusions

For the first time, a national tool to reduce variation in and improve the quality of reviews conducted when babies die is now available. Designed with parents at the core, the PMRT also provides for the first time, a systematic means of engaging parents in reviews and ensuring that their perspectives of care and any questions and concerns they have are considered as part of the review process from the outset.

The journey to improving local reviews by using the National PMRT is still at an early stage for many Trusts and Health Boards. Many are still at the beginning of the learning curve to improve the quality of reviews and so maximise learning and improve future care.

Since the launch of the tool in early 2018 over 6,300 reviews of late miscarriages, stillbirths and neonatal deaths have been undertaken. This represents review of an estimated 88% of all eligible perinatal deaths comprising 90% of stillbirths and late miscarriages, and 83% of neonatal deaths. These figures vary by country.

The results from the first 1,500 reviews carried out using the PMRT provide a standard against which future improvements in review and the issues with care identified can be compared.

Analysis of these 1,500 reviews has highlighted the need for increased multidisciplinary involvement in reviews. The majority of review groups did not meet the minimum recommended number of staff fulfilling the appropriate roles. One in five reviews were reported as carried out by one or two individuals which does not constitute a robust multidisciplinary process.

The involvement of a member of the PMRT review team external to the Trust/Health Board is recommended but was reported in less than 10% of reviews.

It is possible that the numbers and roles of staff present at review group meetings have been under-recorded by PMRT users. It is important that this is recorded accurately to reflect the engagement of staff in this important aspect of care, but also to quantify the person resource required to carry out high quality reviews.

Over 90% of reviews identified at least one issue with care with an average of four issues per death reviewed.

The overall grading of care identified that in 60% of deaths reviewed there were no issues with care that would have affected the outcome for the baby. For those with any issues identified it is important that action is taken to improve care to prevent future deaths.

The proportion of reviews where it was indicated that parents had been told that a review of their care and that of their baby would take place was high at 84%. This was a considerable improvement compared to previous findings from MBRRACE-UK confidential enquiries and the Each Baby Counts Programme. However, less than half of parents were reported to have any questions or concerns about their care. This was prior to release of the PMRT 'Parent Engagement' materials. In future with better advice for health professionals on when and how to engage parents in review, a greater proportion of parents may feel able to ask questions and provide their perspective of their care.

Issues with care were highlighted throughout the pathway of care. Smoking, growth surveillance, management of reduced fetal movement and assessment of the need for antenatal aspirin were four of the leading issues identified. These are addressed by the Saving Babies' Lives Care Bundle version two. Intrapartum issues included maternal and fetal monitoring and documentation during neonatal resuscitation and poor thermal management during all stages of neonatal care were also identified.

Across the 1,500 reviews a total of 3,010 issues with contributory factors requiring action were identified. Whilst many actions plans were SMART, of those that were not the most frequently missing elements were actions which were measurable and time-bound. Moreover, only 10% of actions were 'strong' with plans for system-level changes that reduce the reliance on individuals to choose the correct action by using standardised and permanent physical or digital designs to eliminate human error.

Review of care when a baby dies should be universally regarded as part of routine maternity and neonatal care and needs to be adequately resourced.

The reports available from the PMRT enable comparison of issues with care across individual deaths reviewed within organisations which, together with this national report, provide a basis for prioritisation of resources to support improvements in care likely to have the greatest impact on reducing perinatal deaths.

7. Recommendations

The recommendations from the findings of the first 1,500 PMRT reviews are to:

- 1) Improve the recording of the staff involved in PMRT reviews
Action: PMRT review teams
- 2) Improve the engagement of parents in reviews making sure they have ample opportunities at different stages after their bereavement to discuss their views, ask questions and express any concerns they have about the care they received
Action: Staff caring for bereaved parents
- 3) Provide adequate resourcing of PMRT review teams
Action: Local Trust and Health Boards, Service Commissioners
- 4) Involve an external member as part of the PMRT review team
Action: Local Trust and Health Boards, regional support systems and organisations e.g. Local Maternity Systems in England
- 5) Improve the quality of the actions planned to ensure that the majority of actions are 'strong'³ and result in system level changes
Action: PMRT review teams, local governance teams in Trusts and Health Boards
- 6) Use the local summary reports and this national report as the basis to prioritise resources towards the aspects of care identified as having issues
Action: Local Trusts and Health Boards, Service Commissioners, regional support systems, e.g. Local Maternity Systems in England, Governments and national service organisations
- 7) Conduct research into new interventions that may be required to address issues with care identified in the PMRT report
Action: Research funding organisations and researchers

3 The strength of an action describes how well the action would eliminate human error. Strong actions are system changes which remove the reliance on individuals to choose the correct action. They use standardisation and permanent physical or digital designs to eliminate human error and are sometime referred to as 'forcing' actions [1].

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Appendix A - Issue groupings

Antenatal Issues

Issue Group	Issue Description	No of Reviews
Issues with smoking assessment and management of exposure to tobacco smoke	NICE guidance recommends carbon monoxide testing for all mothers at booking; this mother was not screened	484
	'This mother lives with family members who smoke but they were not offered referral to smoking cessation services	91
	This mother lives with family members who smoke but they were not offered referral to smoking cessation services because there is no service available	48
	This mother smoked during pregnancy but was not offered referral to smoking cessation services	26
	This mother was not appropriately managed given her carbon monoxide level	16
	This mother smoked during pregnancy and was not offered referral to smoking cessation services because there is no service available	7
Inadequate growth surveillance	This mother had a risk factor(s) for having a growth restricted baby or there were concerns about the growth of the baby but serial scans were not planned	101
	Fundal height measurements had not been plotted on a chart	99
	This baby was small for gestational age at birth, but appropriate growth surveillance had not been carried out	95
	The baby was small for gestational age at birth, scans were indicated and performed but the baby was not identified as IUGR	76
	Symphysis fundal height measurements were not performed at correct times/intervals	62
	The baby was small for gestational age at birth, scans were indicated but had not been performed	35
	Estimated fetal weights from scans had not been plotted on a chart	30
	Referrals for scans and/or further investigations were not undertaken when required	26
	This mother had a risk factor(s) for having a growth restricted baby but serial scans were not performed at correct times/intervals	22
	This baby was small for gestational age at birth, this was not identified prenatally and the quality of the scan images has not been reviewed	21
	This mother had a risk factor(s) for having a growth restricted baby but the plan to carry out serials scans was not followed	16

Issue Group	Issue Description	No of Reviews
	There were concerns about the baby's growth rate but these were not investigated and acted upon appropriately	12
	The baby was small for gestational age at birth and had been identified as IUGR prenatally but the management was not appropriate	11
	Fundal height measurements were not correctly plotted	10
	This mother had a risk factor(s) for having a growth restricted baby but serial scans were not performed at correct times/intervals because of capacity issues	7
	Estimated fetal weights from scans were only correctly plotted some of the time	5
	This baby was small for gestational age at birth, the scan images have been reviewed and they were of poor quality	4
Issues in assessment and management of aspirin need	This mother was not assessed for the need for aspirin	280
	This mother was not assessed but in retrospect she was high risk and should have been prescribed aspirin	47
	This mother was assessed as high risk and in need of aspirin but aspirin was not prescribed	22
Inadequate investigation or management of reduced fetal movements (including no risk assessment; indicated investigations not done, poor quality, or incorrectly interpreted; lack of appropriate written information for mother)	This mother presented with reduced fetal movements and there is no evidence that during her antenatal care she had been given written information about what to do if she experienced a change in fetal movements	143
	This mother presented with reduced fetal movements at >28 weeks and a CTG was not performed	36
	This mother presented with reduced fetal movements at >=37 weeks but induction was not discussed	28
	This mother presented with reduced fetal movements but management was not appropriate and was not in line with national guidance	24
	This mother presented with reduced fetal movements and scan was indicated but not carried out	16
	At first presentation with reduced fetal movements this mother was not appropriately risk assessed	15
	This mother presented with reduced fetal movements, scans and and/or other investigations were indicated but were not carried out	13
	This mother presented with reduced fetal movements and the scan images have not been reviewed	12
	This mother presented on more than one occasion with reduced fetal movements after 28 weeks, a scan was indicated but not carried out	11

Issue Group	Issue Description	No of Reviews
	This mother presented with reduced fetal movements; the written material about reduced fetal movements available to give her during her antenatal care was not written in a language that she could read	8
	This mother presented with reduced fetal movements but on the basis of her scans and/or other investigations an appropriate management plan was not put in place	6
	This mother presented with reduced fetal movements and her scans and/or other investigations were not interpreted appropriately	6
	This mother presented with reduced fetal movements at >28 weeks and the CTG performed was inappropriately interpreted	5
	This mother presented with reduced fetal movements a management plan was put in place but not followed	4
	This mother presented with reduced fetal movements and the scan images have been reviewed and they were of poor quality	2
Not offered routine MSU at booking	This mother was not offered a routine MSU at booking	222
Late booking/ unbooked pregnancy	This mother booked late. Are there any organisations to consider in relation to her booking late?	180
	This mother booked late. Did this affect her care?	179
	This mother was unbooked at delivery. Are there any organisational issues to consider in relation to her not booking?	40
Lack of appropriate referral for social issues (housing, benefits, social support, teenager, other vulnerabilities) or screening for domestic abuse at booking	There is no evidence in the notes that this mother was asked about domestic abuse at booking	186
	This mother experienced other vulnerabilities but was not referred appropriately	6
	This mother is a teenager with problems and was not referred for age appropriate services to support her	4
	This mother lacked social support but was not referred appropriately	3
	This mother had problems with her housing or benefits but was not referred appropriately	2

Issue Group	Issue Description	No of Reviews
Issues in GDM screening or management	The test used to screen for gestational diabetes does not follow national guidance	55
	This mother met the national guideline criteria for screening for gestational diabetes but was not offered screening	50
	This mother met the national guideline criteria for screening for gestational diabetes, screening was organised but the results were not available	48
	From information identified earlier in the tool this mother met the national guideline criteria for screening for gestational diabetes but this does not appear to have been identified and she was not offered screening	31
	This mother developed an indication for a GTT but she was not offered a GTT	4
	This mother developed an indication for a GTT and a GTT was organised but there were no results available	3
	This mother had gestational diabetes but it was not managed appropriately	1
Delay in diagnosis or inappropriate management of significant medical/surgical/social problems during pregnancy <i>(including appropriate management according to local guidelines, but not national guidelines)</i>	This mother had a history of [a significant medical/surgical/social factor] which was not managed appropriately in her pregnancy	138
	This mother developed [a significant medical problem] during her pregnancy and there was a delay in diagnosis	48
	This mother had a history of [a significant medical/surgical/social factor] and her antenatal care was managed according to the local but not the national guideline although there is a national guideline – why does the local guideline not meet the national guideline?	36
Lack of appropriate pre-conception counselling/management <i>(including for anti-convulsants, warfarin, SSRIs, psychoactive drugs or history of pre-eclampsia/HELLP syndrome/eclampsia)</i>	No pre-conception management	68
	This mother was taking SSRIs and/or other psychoactive drugs, this was identified in a previous pregnancy, but she did not receive specialist pre-conceptual counselling/management	15
	This mother had a history of severe pre-eclampsia/HELLP syndrome/eclampsia but she did not receive appropriate pre-conceptual management	7
	This mother was taking Anti-convulsants, this was identified in a previous pregnancy, but she did not receive specialist pre-conceptual counselling/management	3
	This mother was taking Warfarin, this was identified in a previous pregnancy, but she did not receive specialist pre-conceptual counselling/management	1

Issue Group	Issue Description	No of Reviews
Issues with communication with mothers with learning difficulties, hearing problems or poor/no English	This mother had poor/no English and family members were used as interpreters on occasions during her antenatal care	41
	This mother had poor/no English and an interpreter was not used on every occasion when she was seen for her antenatal care	19
	This mother had communication difficulties due to learning difficulties/hearing problems and family members were used to communicate with her on occasions during her antenatal care	3
	This mother had communication difficulties due to learning difficulties/hearing problems and appropriate service provisions were not made to communicate with her during her antenatal care	1
Issues with anomaly screening or management of anomalies (including anomaly scan late/ not offered despite booking early enough; further trisomy testing indicated but not offered/result missing; condition amenable to prenatal diagnosis/ ultrasound detection but not detected pre-natally)	This mother booked early enough but her mid-trimester anomaly scan was carried out after 20+6 weeks	24
	This mother had a baby with a congenital anomaly or genetic condition which was amenable to prenatal ultrasound detection which was not identified prenatally	6
	This mother had a baby with a congenital anomaly or genetic condition which was amenable to prenatal diagnosis which was not detected prenatally and this had an adverse effect on her management and pregnancy outcome	4
	This mother had a baby with a congenital anomaly or genetic condition which was amenable to prenatal diagnosis which was not identified prenatally	4
	This mother had a baby with a congenital anomaly or genetic condition which was amenable to ultrasound detection but it was not identified although the scan images were of good quality	2
	This mother had a baby with a congenital anomaly or genetic condition which was amenable to ultrasound detection but it was missed and the scan images have not been reviewed	2
	This mother's baby was identified prenatally as having an anomaly but her management was not appropriate	2
	This mother's baby was identified prenatally as having an anomaly but she was not offered appropriate management	2
	This mother booked early enough but was not offered mid-trimester anomaly scanning	1
	This mother was identified as high risk for a trisomy but was not offered further testing	1
	Trisomy screening was organised for this mother but there were no results available in the notes	12

Issue Group	Issue Description	No of Reviews
Incorrect risk assessment or type of care at booking	The risk allocation of this mother based on her history at booking was incorrect	33
	The type of care this mother was booked for was inappropriate for her risk allocation at booking	27
No local DNA policy, or policy not instituted following DNA for antenatal appointments (including GDM screening)	This mother missed some of her antenatal appointments but was not followed-up according to the local DNA policy	23
	This mother met the national guideline criteria for screening for gestational diabetes was offered screening, she did not attend and the DNA policy was not instituted	5
	This mother missed some of her antenatal appointments but was not followed-up as there is no local DNA policy	4
	This mother developed an indication and was offered a GTT during her pregnancy but did not attend for the test and the DNA policy was not instituted	2
No antenatal discussion of birth options after previous C-section	This mother had had a caesarean section previously but her birth options for this pregnancy were not discussed with her during the antenatal period	31
Inappropriate management given obstetric and family history	This mother had a history of recurrent miscarriage but she did not receive appropriate pre-conceptual management	10
	These parents have a first degree relative with a relevant cardiac condition and an urgent referral for a cardiac echo was not offered	4
	This mother had a history of adverse pregnancy outcome but her care in this pregnancy was not appropriate given her history	4
	This mother had a previous pregnancy/baby affected by a genetic condition or a major congenital anomaly and an urgent referral to genetic services was not offered	3
	These parents have a first degree relative with a genetic condition and an urgent referral to genetic services was not offered	1

Intrapartum Issues

Issue Group	Issue Description	No of Reviews
Issues with monitoring of mother (including observations and partogram)	This mother's progress in labour was not monitored on a partogram	441
	During this mothers's labour maternal observations, commensurate with her level of risk and national guidelines, were not carried out	84
	This mother's progress in labour was monitored on a partogram but the partogram was only partially completed	37
No assessment of mother's risk status or inadequate management at the start of her care in labour or during the course of her labour	This mother's risk status during labour was not assessed during the course of her labour	78
	This mother's risk status was not formally assessed at the start of her care in labour to ensure that her intended place of care in labour was appropriate	63
	In retrospect this mother's care should have been transferred at the start of her care in labour but her risk status was not formally assessed at the start care in labour	16
	This mother's risk status during labour was assessed and it had changed but she was not managed appropriately	8
Staffing issues (including insufficiently senior staff involved and lack of one-to-one care in established labour)	This mother did not receive one-to-one care through established labour	66
	The maternity staff present at this mother's birth were not appropriate given her and/or her baby's clinical requirements	33
	In view of this mother's risk factors there should have been senior involvement in the management plans for her birth once labour was established	17
	Senior staff were needed at the time this mother was giving birth but they were not available	10
	In view of this mother's risk factors there was not appropriately senior involvement in the management plans for her delivery prior to the establishment of labour or elective delivery	9
	There should have been senior escalation when this mother was giving birth but this was not instigated	8
	Senior staff were needed at the time this mother was giving birth, they were called but didn't arrive in a timely way	3
Issues with communication with mothers with poor/no English	This mother had poor/no English and family members were used as interpreters during her labour and birth	47
	This mother had poor/no English and language line was used to interpret during her labour and birth	10
	This mother had poor/no English and arrangements other than an interpreter were made during her labour and birth	20

Issue Group	Issue Description	No of Reviews
Fetal monitoring issues (including incorrect method, interpretation or management, from prior to established labour to the latent phase of labour)	The type of fetal monitoring used in established labour was not appropriate	16
	The fetal heart monitoring in established labour was not carried out correctly	14
	A CTG was performed during established labour but the technical quality was poor	11
	The interpretation of the fetal heart rate monitoring in established labour was not correct	11
	The type of fetal monitoring used in the latent phase of labour was not appropriate	10
	The fetal heart monitoring in the latent phase of labour was not carried out correctly	9
	The interpretation of the fetal heart rate monitoring in the latent phase of labour was not correct	8
	The fetal heart rate monitoring during the induction prior to labour being established was not carried out correctly	5
	There were abnormalities of the fetal heart rate during established labour but these were not recognised	5
	Appropriate action was not taken when fetal heart rate abnormalities were identified during established labour	5
	A CTG was performed during the latent phase of labour but the technical quality was poor	5
	Appropriate action was not taken when fetal heart rate abnormalities were identified during the latent phase of labour	3
	This mother was induced but the type of fetal monitoring used during induction followed the local guideline not the national guideline although there is a national guideline - why does the local guideline not meet the national guideline?	2
	This mother was induced but the type of fetal monitoring used during induction was not appropriate	2
	Fetal heart rate abnormalities were present during the latent phase of labour but were not identified	2
	The fetal heart rate during induction prior to established labour was abnormal but appropriate action was not taken	1
The fetal heart rate monitoring during the induction prior to labour being established was not interpreted correctly	1	
Inappropriate setting/ location of delivery	This mother did not give birth in a setting appropriate to her and/or her baby's clinical needs	53
	This mother's operative delivery was carried out in an inappropriate location	1

Issue Group	Issue Description	No of Reviews
Issues with birth mode(s) including inappropriate choice, timing and management	Induction or elective delivery was indicated but the timing of the induction/elective delivery was not appropriate for 'other' reasons	10
	This mother had a Caesarean section but this was not carried out with appropriate urgency	9
	This mother was induced but the method and/or process of induction was not appropriate	9
	Induction of labour or a caesarean section was indicated but not carried out for 'other' reasons	8
	One or more modes of birth which were attempted for this mother were not appropriate	5
	This mother planned a vaginal birth after a previous caesarean section but this was not managed appropriately	4
	Induction or elective delivery was indicated but the timing of the induction/elective delivery was not appropriate due to organisation issues	2
	Induction of labour or a caesarean section was indicated but not carried out because the unit was too busy	1
Issues with anomaly screening or management of anomalies (including anomaly scan late/ not offered despite booking early enough; further trisomy testing indicated but not offered/result missing; condition amenable to prenatal diagnosis/ ultrasound detection but not detected pre-natally)	This mother booked early enough but her mid-trimester anomaly scan was carried out after 20+6 weeks	24
	This mother had a baby with a congenital anomaly or genetic condition which was amenable to prenatal ultrasound detection which was not identified prenatally	6
	This mother had a baby with a congenital anomaly or genetic condition which was amenable to prenatal diagnosis which was not detected prenatally and this had an adverse effect on her management and pregnancy outcome	4
Incorrect risk assessment or type of care at booking	The risk allocation of this mother based on her history at booking was incorrect	33
	The type of care this mother was booked for was inappropriate for her risk allocation at booking	27
No local DNA policy, or policy not instituted following DNA for antenatal appointments (including GDM screening)	This mother and/or her baby had an intrapartum complication(s) which was not managed appropriately	30
	This mother had immediate postpartum complications which were not managed appropriately	9
	This mother had pre-eclampsia and it was not managed appropriately during labour	1
Issues in management of intra and post-partum complications	This mother had had a caesarean section previously but her birth options for this pregnancy were not discussed with her during the antenatal period	31

Issue Group	Issue Description	No of Reviews
Issues in management of (threatened) preterm labour	This mother was in preterm labour/threatened preterm labour but was not offered magnesium sulphate for fetal neuroprotection when this was indicated	16
	This mother was in preterm labour/threatened preterm labour but was not offered antibiotics when they were indicated	10
	This mother was in preterm labour/threatened preterm labour but was not offered antenatal steroids when they were indicated	7
	This mother was in preterm labour/threatened preterm labour but was not offered tocolysis when this was indicated	7
	This mother was in preterm labour/threatened preterm labour and was managed with antibiotics according to the local but not the national guideline although there is a national guideline - why does the local guideline not meet the national guideline?	4
Inappropriate duration of labour or management of delay in labour	This mother's second stage of labour was not of an appropriate duration	17
	This mother's first stage of labour was not of an appropriate duration	6
	The confirmed/suspected delay in this mother's labour was not managed appropriately	5
Inadequate documentation	It was not possible to tell from the documentation if the interpretation of the fetal heart rate monitoring in established labour was correct	7
	From the documentation it was not possible to tell if the fetal monitoring in established labour was carried out correctly	6
	Induction of labour or a caesarean section was indicated but not carried out and it is not clear from the notes why not	4
	This mother required transfer of her care but it is unclear from the notes if this decision was made in a timely way	4
	This mother required a transfer of her care during labour but from the notes it is not possible to tell if her transfer was managed appropriately	4
	It was not possible to tell from the documentation if the interpretation of the fetal heart rate monitoring in the latent phase of labour was correct	3
	From the documentation it is not possible to tell if the fetal monitoring in the latent phase of labour was carried out correctly	3

Issue Group	Issue Description	No of Reviews
Maternal transfer issues	In retrospect this mother's care should have been transferred to obstetric-led care during labour but this need was not identified	12
	This mother required transfer of her care but the time from decision to the transfer was too slow because there was an 'other' reason for the delay	6
	This mother required a transfer of her care during labour but her transfer was not managed appropriately	6
	This mother required transfer of her care but the decision to transfer her was not timely	3
	In retrospect the decision to transfer this mother's care during labour was not an appropriate decision	1
	This mother required transfer of her care but the time from decision to the transfer was too slow because there was a capacity issue in the receiving unit	1
	This mother's care was transferred to obstetric-led care but she remained on the midwifery unit	1
Pain management issues	This mother's pain was not managed appropriately during labour	19
Specific birth planning advice indicated for pregnancy complications but not given	This mother had pregnancy complications recognised as requiring specific birth planning advice but the advice wasn't given	13
	This mother had pregnancy complication but they were not recognised as requiring specific birth planning advice	6
Medication issues (including oxytocin and pre-existing conditions)	This mother had a pre-existing condition(s) which required specific medication which was not given	9
	This mother required oxytocin during her labour, but this was not managed appropriately	3

Neonatal Issues

Issue Group	Issue Description	No of Reviews
Inadequate documentation <ul style="list-style-type: none"> Resus 	It is not possible to assess from the notes whether following the resuscitation of the baby a rapid safety focused resus de-brief with the staff involved was carried out	128
	It is not possible to assess from the notes whether a CO2 detector was used during the resuscitation of the baby	50
	It is not possible to assess from the notes whether delayed cord clamping was indicated and carried out appropriately during the resuscitation of the baby	35
	It is not possible to assess from the notes whether the parents were kept informed about the progress of the resuscitation of their baby	35
	It is not possible to assess from the notes whether the thermal management during resuscitation of the baby was appropriate	25
	The notes relating to the resuscitation of the baby were only partially adequate making it difficult to fully assess the quality of the resuscitation	21
	It is not possible to assess from the notes whether the resuscitation of the baby followed the Neonatal Life Support (NLS) guidelines	8
	It is not possible to assess from the note whether the initial resuscitation of the baby was carried out appropriately	7
	It is not possible to assess from the notes whether positive pressure respiratory support was required and given appropriately during the resuscitation of the baby	7
	It is not possible to assess from the notes whether the baby's airway was appropriately secured during the move to the neonatal unit	6
	The notes relating to the resuscitation of the baby were inadequate and so it is not possible to fully assess the quality of the resuscitation	5
	It is not possible to assess from the notes whether surfactant was indicated and given appropriately during the resuscitation of the baby	5
	It is not possible to assess from the notes whether any problems encountered during the move to the neonatal unit were managed appropriately	5
	It is not possible to assess from the notes whether continuing respiratory support was required and carried out appropriately during the resuscitation of the baby	4
	It is not possible to assess from the notes whether drugs were required and given at the correct dose during resuscitation of the baby	4

Issue Group	Issue Description	No of Reviews
	It is not possible to assess from the notes whether the baby required intubation and whether this was achieved during the resuscitation	3
	It is not possible to assess from the notes whether appropriately trained staff were involved in moving the baby to the neonatal unit	3
	It is not possible to assess from the notes whether vascular access was required and secured during resuscitation of the baby	3
	It is not possible to assess from the notes whether admission to the neonatal unit was the appropriate course of action for the baby	2
	It is not possible to assess from the notes whether a blood transfusion was required and/or given in the correct volume during resuscitation of the baby	2
	It is not possible to assess from the notes whether the decision to cease attempting to resuscitate the baby was made in consultation with the parents	2
	It is not possible to assess from the notes whether chest compressions were indicated and administered appropriately during the resuscitation of the baby	2
	It is not possible to assess from the notes whether continuing chest compressions were required and administered appropriately during the resuscitation of the baby	2
	It is not possible to assess from the notes whether admission of the baby to the neonatal unit was timely	2
	It is not possible to assess from the notes whether during the resuscitation of the baby appropriate additional resuscitations measures were instituted to deal with the baby's diagnosed condition(s)	2
	It is not possible to assess from the notes whether the basis of the decision to cease attempting to resuscitate the baby was appropriate	1
	It is not possible to assess from the notes whether the timing of the decision to cease attempting to resuscitate the baby was appropriate	1
Inadequate documentation • Neonatal care	It is not possible to assess from the notes whether the skin care of the baby during the first 24 hours on the neonatal unit was appropriate	11
	It is not possible to assess from the notes whether the baby was assessed appropriately on arrival in the neonatal unit	10
	There was no early management plan for the baby documented in the neonatal notes	9
	It is not possible to assess from the notes whether the clotting & general haematological management of the baby during the first 24 hours on the neonatal unit was appropriate	8

Issue Group	Issue Description	No of Reviews
	It is not possible to assess from the notes whether the management of other medication for the baby during the first 24 hours on the neonatal unit was appropriate	7
	It is not possible to assess from the notes whether the ongoing skin care of the baby was on the neonatal unit appropriate	7
	It is not possible to assess from the notes whether the fluid management of the baby during the first 24 hours on the neonatal unit was appropriate	6
	It is not possible to assess from the notes whether the metabolic management of the baby during the first 24 hours on the neonatal unit was appropriate	6
	It is not possible to assess from the notes whether the neurological management of the baby during the first 24 hours on the neonatal unit was appropriate	6
	It is not possible to assess from the notes whether the nutritional management of the baby during the first 24 hours on the neonatal unit was appropriate	6
	It is not possible to assess from the notes whether the pain and sedation management of the baby during the first 24 hours on the neonatal unit was appropriate	6
	It is not possible to assess from the notes whether the ongoing haematological management of the baby on the neonatal unit was appropriate	5
	It is not possible to assess from the notes whether the management of the baby in the first hour on the neonatal unit was appropriate	5
	It is not possible to assess from the notes whether the ongoing pain and sedation management of the baby on the neonatal unit was appropriate	5
	It is not possible to assess from the notes whether appropriate investigations were carried out in a timely fashion during the first 24 hours on the neonatal unit appropriate	5
	It is not possible to assess from the notes if appropriate lines were placed and confirmed radiologically within 24 hours of the baby's arrival on the neonatal unit	4
	It is not possible to assess from the notes whether the cardiovascular management of the baby during the first 24 hours on the neonatal unit was appropriate	4
	It is not possible to assess from the notes whether the ongoing fluid management of the baby on the neonatal unit was appropriate	4
	It is not possible to assess from the notes whether the infection management and/or prevention for the baby during the first 24 hours on the neonatal unit was appropriate	4

Issue Group	Issue Description	No of Reviews
	It is not possible to assess from the notes whether the ongoing drugs management of the baby on the neonatal unit was appropriate	4
	It is not possible to assess from the notes whether the renal management of the baby during the first 24 hours on the neonatal unit was appropriate	4
	It is not possible to assess from the notes whether ongoing appropriate investigations were carried out in a timely fashion	4
	It is not possible to assess from the notes whether appropriate later referrals for specialist care were made	3
	It is not possible to assess from the notes whether the ongoing cardiovascular management of the baby on the neonatal unit was appropriate	3
	It is not possible to assess from the notes whether there was an early discussion with the parents on the neonatal unit about their baby's condition	3
	It is not possible to assess from the notes whether the glycaemic management and hypoglycaemia prevention of the baby during first 24 hours of arrival on the neonatal unit was appropriate	3
	It is not possible to assess from the notes whether the ongoing metabolic management of the baby on the neonatal unit was appropriate	3
	It is not possible to assess from the notes whether the ongoing renal management of the baby on the neonatal unit was appropriate	3
	It is not possible to assess from the notes whether the respiratory management of the baby during the first 24 hours on the neonatal unit was appropriate	3
	It is not possible to assess from the notes whether the parents were seen by an appropriately senior member of neonatal team in the first 24 hours after the baby was admitted to the neonatal unit to update them about their baby's condition	3
	It is not possible to assess from the notes whether the parents were seen by an appropriately senior member of neonatal team at appropriate times during the baby's stay on the unit	3
	It is not possible to assess from the notes whether the thermal management of the baby during the first 24 hours on the neonatal unit was appropriate	3
	It is not possible to assess from the notes whether the ongoing infection management and/or prevention of the baby on the neonatal unit was appropriate	2
	The mother had poor/no English and it is not possible to assess from the notes what arrangements were made for interpretation during the time that her baby was on the neonatal unit	2

Issue Group	Issue Description	No of Reviews
	It is not possible to assess from the notes whether the ongoing neurological management of the baby on the neonatal unit was appropriate	2
	It is not possible to assess from the notes whether the ongoing nutritional management of the baby on the neonatal unit was appropriate	2
	It is not possible to assess from the notes whether the ongoing respiratory management of the baby on the neonatal unit was appropriate	2
	It is not possible to assess from the notes whether a senior clinician was involved or informed of the baby's admission to the neonatal unit within the first hour	2
	It is not possible to assess from the notes whether the baby's temperature was measured on arrival or within an hour of arrival on the neonatal unit	2
	It is not possible to assess from the notes whether the ongoing thermal management of the baby on the neonatal unit was appropriate	2
	It is not possible to assess from the notes whether the baby's temperature was measured on admission to the postnatal ward or within an hour of arrival	2
	It is not possible to assess from the notes whether the clinician involved in the early management of this baby on the neonatal unit was of an appropriate seniority	1
	It is not possible to assess from the notes whether appropriate specialist referral(s) was made	1
	The mother had poor/no English and it is not possible to assess from the notes what arrangements were made for interpretation during the first 24 hours that her baby was on the neonatal unit	1
	It is not possible to assess from the notes whether the baby was seen by the specialist team in a timely way	1
	It is not possible to assess from the notes whether there was any evidence that the baby was already unwell when he/she was admitted to the postnatal ward	1
Inadequate documentation	It is not possible to assess from the notes whether the handover on arrival on the neonatal unit was appropriate	12
• Neonatal transfer to another unit	It is not possible to assess from the notes whether the baby was monitored appropriately whilst being moved to the neonatal unit	12
	It is not possible to assess from the notes whether all the equipment needed to move the baby to the neonatal unit was available	11
	It is not possible to assess from the notes whether the baby's thermal management was appropriate whilst being moved to the neonatal unit	11

Issue Group	Issue Description	No of Reviews
Inadequate documentation • Neonatal transfer to another unit	It is not possible to assess from the notes whether all the equipment needed to transfer the baby to another neonatal/specialist unit was available	11
	It is not possible to assess from the notes whether the baby's airway was appropriately secured during the transfer to another unit	10
	It is not possible to assess from the notes whether the baby's thermal management was appropriate during transfer to another unit	10
	It is not possible to assess from the notes whether cardiovascular support for the baby was managed appropriately during the transfer to another unit	9
	It is not possible to assess from the notes whether appropriate drugs were given to the baby during the transfer to another unit	9
	It is not possible to assess from the notes whether appropriate fluids were given to the baby during the transfer to another unit	9
	It is not possible to assess from the notes whether there were any problems encountered during the transfer and whether they were managed appropriately	9
	It is not possible to assess from the notes whether respiratory support for the baby was managed appropriately during the transfer to another unit	8
	It is not possible to assess from the notes whether the baby was monitored appropriately whilst being transferred to another neonatal/specialist unit	8
	It is not possible to assess from the notes whether appropriately trained staff were involved in transferring the baby to another neonatal/specialist unit	7
	It is not possible to assess from the notes whether the time from the request for neonatal transfer to the transport arriving was within the expected timescale	4
	It is not possible to assess from the notes whether the time taken to stabilise the baby before transfer was appropriate	3
	It is not possible to assess from the notes whether the baby was stable enough to be transferred when staff started the transfer	2
	It is not possible to assess from the notes whether the baby was transferred to a unit which was able to provide the appropriate level and type of neonatal care	1
It is not possible to assess from the notes whether the decision to transfer the baby to another unit was timely	1	
Inadequate documentation Postnatal ward care	It is not possible to assess from the notes whether the deterioration in the baby's clinical condition was responded to appropriately on the postnatal ward	1

Issue Group	Issue Description	No of Reviews
Thermal management issues • Neonatal transfer to neonatal unit	The baby was cold on arrival in the neonatal unit	44
	During the move to the neonatal unit the baby's temperature was not maintained within an appropriate range	13
Thermal management issues • Resus	There is no evidence in the notes that this mother was asked about domestic abuse at booking	186
Thermal management • Neonatal care	The thermal management of the baby during the first 24 hours of arrival on the neonatal unit was not appropriate	8
	The ongoing thermal management of the baby on the neonatal unit was not appropriate	5
	The baby's temperature was not measured on arrival or within an hour of arriving on the neonatal unit	1
Thermal management • Neonatal transfer to another unit	During the transfer to another neonatal/specialist unit the baby's temperature was not maintained within an appropriate range	3
Issues with respiratory management during resuscitation (including issues around establishing ventilation, intubation, positive pressure respiratory support, oxygen saturation monitoring and surfactant)	During resuscitation the baby required intubation but there were difficulties with the intubation	31
	During resuscitation the baby was intubated and ventilated but a CO2 detector was not used	15
	During resuscitation the baby required intubation but this was not achieved	5
	During the resuscitation of the baby surfactant was indicated but was not given	5
	During the resuscitation of the baby chest compressions were started prior to ventilation having been established	4
	Positive pressure respiratory support or oxygen was required but a saturation monitor was not used to assess the baby's oxygen saturation	4
	During the resuscitation of the baby positive pressure respiratory support was required but it was not administered appropriately	2
	During the resuscitation of the baby surfactant was indicated and given, but was not given at the appropriate dose	1

Issue Group	Issue Description	No of Reviews
Issues with cardiovascular management on neonatal unit (including line placement and radiological confirmation)	During the first 24 hours of the baby's arrival on the neonatal unit appropriate lines were placed but their position was not radiologically confirmed	13
	During the first 24 hours of the baby's arrival on the neonatal unit not all appropriate lines were placed and radiologically confirmed	5
	The ongoing cardiovascular management of the baby on the neonatal unit was not appropriate	4
	The cardiovascular management of the baby during the first 24 hours of arrival on the neonatal unit was not appropriate	1
Issues with fluid or nutrition management issues on neonatal unit	The nutritional management of the baby during the first 24 hours of arrival on the neonatal unit was not appropriate	10
	The fluid management of the baby during the first 24 hours of arrival on the neonatal unit was not appropriate	5
	The ongoing nutritional management of the baby on the neonatal unit was not appropriate	3
	The ongoing fluid management of the baby on the neonatal unit was not appropriate	2
Resuscitation not carried out appropriately or in line with NLS guidelines	During the resuscitation of the baby the initial resuscitation was not carried out appropriately	9
	The resuscitation of the baby did not follow the Neonatal Life Support (NLS) guidelines	9
Issues with investigations on neonatal unit	Ongoing investigations on the neonatal unit were carried out appropriately but were not always timely	5
	Appropriate ongoing investigations on the neonatal unit were not always carried out	4
	Appropriate investigations were not carried out during the first 24 hours of the baby's arrival on the neonatal unit	3
	During the first 24 hours of arrival on the neonatal unit appropriate investigations were carried but they were not timely	3
Issues with communication with parents on neonatal unit (including with mothers with poor/no English)	The mother had poor/no English and arrangements other than an interpreter were made during the first 24 hours that her baby was on the neonatal unit	5
	The mother had poor/no English and a mixture of family members and an interpreter were used to interpret during the first 24 hours that her baby was on the neonatal unit	4
	The mother had poor/no English and arrangements other than an interpreter were made during the time that her baby was on the neonatal unit	4
	The mother had poor/no English and other family members were used as interpreters during the first 24 hours that her baby was on the neonatal unit	2

Issue Group	Issue Description	No of Reviews
	The mother had poor/no English and other family members were used as interpreters on occasions during the time that her baby was on the neonatal unit	2
	There was no early discussion with the parents on the neonatal unit about their baby's condition	2
Issues with respiratory management on neonatal unit	The respiratory management of the baby during the first 24 hours of arrival on the neonatal unit was not appropriate	7
	The ongoing respiratory management of the baby on the neonatal unit was not appropriate	6
Issues with infection prevention or management on neonatal unit	The infection management and/or prevention for the baby during the first 24 hours of arrival on the neonatal unit was not appropriate	10
	The ongoing infection management and/or prevention on the neonatal unit was not appropriate	4
During resuscitation, vascular access not secured or took too long to achieve	During resuscitation of the baby vascular access was secured but this took more than one attempt or took too long to achieve	10
	During resuscitation of the baby vascular access should have been secured but this was not achieved	1
Neonatal transfer to postnatal ward/ transitional care/ neonatal unit/another unit delayed	There was a delay between the request for neonatal transfer and the arrival of the transport although this was not thought to have affected the outcome for the baby	4
Neonatal transfer to postnatal ward/ transitional care/ neonatal unit/another unit inappropriate	The baby was admitted for neonatal care which was not appropriate in the circumstances	5
	The baby was transferred for neonatal care, on arrival in the neonatal unit the handover was not appropriate	3
	This baby was transferred to another unit for neonatal or other specialist care which was not appropriate in the circumstances	1
	On arrival on the postnatal ward the baby was pyrexial	1
	There was evidence that the baby was already unwell when he/she was sent to the postnatal ward	1
	On arrival for transitional care the baby was pyrexial	1
	There was evidence that the baby was already unwell when he/she was admitted for transitional care	1
Delayed cord clamping issues	This baby was resuscitated and delayed cord clamping was not instituted although this was indicated	7
	This baby was resuscitated and delayed cord clamping was not indicated, but it was carried out	3

Neonatal Issues

Issue Group	Issue Description	No of Reviews
Organ donation not discussed with parents despite no specific contraindications	There were no specific contraindications to organ donation but this was not discussed with the parents as part of end of life care for their baby	52
	There were no specific contraindications to organ donation but this was not discussed with the parents as part of end of life care for their baby as procedures for organ donation are not available	30
Inadequate documentation	It is not possible to assess from the notes whether options for organ donation were considered and discussed with the parents as part of the end of life care for their baby	19
	It is not possible to assess from the notes whether the parents' particular religious/cultural/spiritual were followed before their baby died	18
	It is not possible to assess from the notes whether the opportunity for a post-mortem was discussed with the parents prior to their baby's death as part of the end of life care	12
	It is not possible to assess from the notes whether the parents had the opportunity to be actively involved in the development of an end of life care plan for their baby	10
	It is not possible to assess from the notes whether the parents' preferences for end of life care for their baby were respected and followed wherever possible	10
	It is not possible to assess from the notes whether the parents were offered the opportunity to have photos and make memories with their baby before their baby died	9
	It is not possible to assess from the notes whether the baby's end of life care needs were managed appropriately	6
	It is not possible to assess from the notes whether the timing of the baby's death was managed as appropriate for the family	3
	It is not possible to assess from the notes whether the end of life care provided for the baby was appropriate given the clinical circumstances	3
	It is not possible to assess from the notes whether the parents were offered the opportunity to spend time in private with their baby as their baby died	2
	It is not possible to assess from the notes whether the parents had the opportunity to spend time in private with their baby before their baby died	2
	It is not possible to assess from the notes whether the timing of the decision to offer re-orientation of care was appropriate	2

Issue Group	Issue Description	No of Reviews
	It is not possible to assess from the notes whether the process of reaching a decision to re-orientate care involved the parents	1
Post mortem not discussed with parents prior to baby's death	The opportunity to discuss post mortem with the parents prior to their baby's death as part of end of life care was not taken	40
	The opportunity to discuss post mortem with the parents prior to their baby's death as part of end of life care was not taken as it was felt that post-mortem would not add anything to the understanding of the baby's condition	8
	The opportunity to discuss post mortem with the parents prior to their baby's death as part of end of life care was not taken	4

Appendix B - Categories of level 1 and level 2 NPSA contributory factors for 5,885 issues

Contributory Factors	Number of issues linked to this contributory factor N = 7,576
Task Factors	1,652
Guidelines, Policies and Procedures	1,366
Procedural or Task Design	159
Decision making aids	127
Patient Factors	1,623
Clinical Conditions	903
Social Factors	404
Mental/Psychological Factors	130
Physical Factors	106
Interpersonal Relationships	80
Communication	888
Written communication	481
Communication Management	235
Verbal communication	170
Non-verbal communication	2
Organisational	734
Organisational structure	435
Priorities	190
Externally imported risks	61
Safety culture	48
Education and Training	436
Competence	242
Appropriateness	129
Availability / accessibility	44
Supervision	21
Staff Factors	254
Cognitive Factors	194
Physical issues	38
Psychological Issues	14
Social Domestic	6
Personality Issues	2
Equipment	163
Usability	83
Positioning	46
Integrity	18
Displays	16
Work Environment	135
Staffing	34
Environment	25
Time	24
Work load and hours of work	22
Administrative factors	18
Design of physical environment	12
Blank	1,691



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