



HEALTHCARE SAFETY
INVESTIGATION BRANCH

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Maternity Investigation 2009-2490

Independent report by the
Healthcare Safety Investigation Branch (HSIB)

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Section 1. HSIB investigations

1.1 How HSIB decide what to investigate

HSIB will undertake maternity investigations in accordance with the Department of Health and Social Care criteria (Maternity Case Directions, 2018), taken from [Each Baby Counts](#) and [MBRRACE-UK](#).

In accordance with these defined criteria, eligible babies include all term babies (at least 37+0 weeks of gestation) born following labour, who have one of the following outcomes:

Intrapartum stillbirth: when a baby was thought to be alive at the start of labour and was born with no signs of life.

Early neonatal death: when a baby dies within the first week of life (0-6 days) of any cause.

Potentially severe brain injury diagnosed in the first seven days of life, when a baby:

- was diagnosed with grade III hypoxic ischaemic encephalopathy (HIE) or
- was therapeutically cooled (active cooling only) or
- had decreased central tone and was comatose and had seizures of any kind.

The defined criteria for maternal death investigations are:

Maternal death: death of a mother while pregnant or within 42 days of the end of the pregnancy*, from any cause related to or aggravated by the pregnancy or its management, and not from accidental or incidental causes.

- Direct: deaths resulting from obstetric complications of the pregnant state (pregnancy, labour and puerperium), from interventions, omissions, incorrect treatment or from a chain of events resulting from any of the above. This excludes cases of suicide.
- Indirect: deaths from previous existing disease or disease that developed during pregnancy and which was not the result of direct obstetric causes, and which was aggravated by the physiological effects of pregnancy in the perinatal period (during or within 42 days of the end of pregnancy).

*Includes giving birth, ectopic pregnancy, miscarriage or termination of pregnancy.

1.2 HSIB investigation approach

It is the role of HSIB to investigate safety incidents without attributing blame or liability. The focus is to identify opportunities to learn and to improve patient safety across the system.

HSIB is funded by the Department of Health and Social Care. It is hosted by NHS England and NHS Improvement. HSIB acts independently. It is independent from regulatory bodies including the Care Quality Commission (CQC). HSIB's ambition is to bring a new perspective and develop meaningful and influential recommendations to support improvements in patient safety.

HSIB's maternity investigations replace any local incident conducted by the healthcare organisation in which the mother and baby received care.

HSIB investigations are independent, it does not investigate on behalf of families, staff, organisations or regulators. Where recommendations are made, these are directed to a specific organisation, and to other organisations or bodies who can influence and support change.

Findings and safety recommendations

On completion of the investigation, the report will contain **findings** which reflect information that was discovered through analysis of the evidence collected during the investigation.

Safety recommendations are made to organisations when the findings identified during an investigation are considered to be contributory to the outcome.

Not all reports will contain **safety recommendations** and organisations are guided to use the findings to support learning and change.

Section 2. Referral, investigation and terms of reference

2.1 Referral of the case

The Trust contacted the Healthcare Safety Investigation Branch (HSIB) about the incident, which met the criteria for HSIB to conduct a maternity investigation.

2.2 Investigation process and methodology

HSIB uses a standard process in all its maternity programme investigations:

- Gather all relevant evidence.
- Establish the factual circumstances leading up to the incident.
- Analyse the evidence.
- Identify the most significant safety factors and safety issues that contributed to the incident being investigated.
- Formulate safety recommendations and findings.

This process is supported by the following:

2.2.1 Review of medical records

All relevant medical records pertaining to a mother and baby are provided on request by a trust after the family have consented to HSIB conducting an investigation.

These may include hospital records and relevant correspondence, primary care (GP) records, ambulance service records and transcripts.

All relevant trust policies, procedures and practices are reviewed. This may include a review of acuity tools, records of acuity levels and staff duty rosters. Additionally, investigators may undertake a walk-through of a mother's and baby's journey within the maternity service.

2.2.2 Family interviews

Introductory and supplemental interviews are held with the family to understand their recollection of events and to hear their concerns. Involvement of families in the investigation process is a fundamental part of HSIB's work, adding value to the evidence gathered and the learning outcomes.

2.2.3 Subject matter review panels

The panels during this investigation were attended by experienced subject matter advisors in obstetrics, midwifery and neonatology, who provided advice and guidance to the investigation team. Their guidance includes signposting to evidence, national guidance and current best practice. The panel assists in formulating the investigation's terms of reference and key lines of enquiry. The investigators also have access to human factors specialists throughout the investigation process.

2.2.4 Staff interviews

Face to face or virtual interviews are conducted with key participants of the incident, who can provide a depth of information in addition to the medical records. HSIB may also request interviews with other members of a trust who may be able to provide further background information to support the investigation. Where individuals may be able to provide small pieces of information relevant to the investigation, investigators may conduct telephone or email enquiries.

2.2.5 Analysis

HSIB use a range of analysis tools to review the evidence collected during the investigation process. These include human factors thinking (H-FACS), Systems Engineering Initiative for Patient Safety (SEIPS) (Holden et al., 2013) and the Maternity Investigation Matrix (MIM), which is derived from the accident investigation matrix (Harris, 2011). These tools allow investigators to incorporate evidence from a range of sources, with the emphasis on how people interact with the tools, systems, and situations they encounter. A safety-II approach (Hollnagel et al., 2015) is used to compare how **'work as prescribed/imagined'** compares with **'work as done'**. The basis of human factors as a science is to understand that humans have limitations, and these limitations are both physical and cognitive. Our process allows us to look at wider systems within healthcare as well as how individuals behave within it.

Once analysis is complete HSIB may form safety recommendations and findings based on the relevant factors of the case, aimed at reducing the chance of reoccurrence and optimising learning for all members of trust staff.

Findings and safety recommendations from individual reports are analysed and may be used nationally to share wider thematic learning.

2.2.6 Communication during investigations

Throughout the investigation process, HSIB maintain regular contact with both families and trusts. The frequency of this may vary according to need. If a serious safety concern is identified this will be escalated back to a trust prior to publication of the report. This ensures an opportunity for a trust to address safety issues in a timely manner.

2.2.7 Quality assurance

Following evidence collection and analysis a report is produced which is reviewed by a second subject matter review panel. Our aim is to ensure that the advisors are different to those on the first panel to ensure a fresh perspective. Following internal quality assurance, external quality assurance is undertaken with both the trust and the family before a report is finalised and shared with the trust and the family.

2.2.8 Modifications to investigation processes during COVID-19

During the COVID-19 pandemic period, HSIB continued to accept all referrals that met the '**Each Baby Counts**' criteria. Where a baby was found to have a normal neurological outcome following therapeutic cooling, and where the trust and family did not express concerns around care, HSIB did not pursue an investigation during the COVID-19 period. In these cases, trusts were asked to follow their internal investigation process.

HSIB followed HM Government guidelines regarding work practices during the COVID-19 period. This required the stopping of face-to-face interviews and hospital visits. Instead, investigators used technology to conduct video and teleconferencing interviews with both families and trust staff.

Trusts were also challenged by the changed working practices during COVID-19. This was recognised within the investigation process and report.

2.3 Terms of reference

- Investigate aspects of maternity care from booking (Trust A) through to the emergency delivery of the Baby (Trust B). This will include exploration of the additional complex social needs of the Mother.

- Consider the management of intrapartum care provided, in the context of being unbooked, with exploration of breech presentation, meconium liquor and CTG monitoring and escalation.
- Investigate aspects of neonatal care from birth, through to the neonatal death.
- Consider infrastructure and resources available within both organisations and the structure of maternity services within the trusts.
- Ensure that the perception of events is captured from the family, the trusts and staff directly involved in the care of the Mother and the Baby.
- To explore the care in the context of the COVID-19 pandemic.

A note of acknowledgement

We are grateful and give our thanks to the family whose experience is written about in this report. The family gave generously their time and shared openly their thoughts with us. We would also like to thank the Trust and members of staff who participated in this investigation process and openly shared their perceptions of the incident and maternity services with us as well as expressing their empathy for the family involved. To preserve anonymity, the family are referred to as the Mother and the Father throughout. The baby may be referred to as the Fetus, fetal or the Baby until the birth and will be referred to as the Baby after the birth.

Section 3. Summary report

The Mother was 31 years old and in her fourth pregnancy. She was booked under the care of specialist midwives from the complex, vulnerable and safeguarding team at 10 weeks and 1 day' gestation (10+1 weeks). A safeguarding referral was made and a plan put in place for the Baby after birth.

The routine dating and anomaly ultrasound scans (USS) were undertaken and identified no abnormalities. In view of the Mother's high body mass index (BMI), a planned growth USS took place at 28+6 weeks, indicating the Baby's growth was within the expected range. They were noted to be in a breech presentation (when a baby is positioned feet or bottom first, rather than headfirst).

The Mother was offered 16 antenatal appointments, 13 of which she did not attend (DNA). The DNAs were followed up by maternity staff and new appointments issued.

The Mother and Father relocated to another area of England after 28+6 weeks. A national safeguarding alert was delivered to all areas of the UK and a neighbouring country to alert healthcare providers of the family's history and plan for the Baby once born.

The Mother did not seek any maternity care after relocating and went into labour at 42+4 weeks. On recognising the presence of meconium liquor (a baby's first bowel motion in the amniotic fluid) the Father called 999 to summon an emergency ambulance.

The Mother was transferred to the nearest maternity unit and was admitted to the labour ward in the second stage of labour. A cardiotocograph (CTG) was started and was categorised as pathological. A decision was made to perform an emergency caesarean section (CS). The Baby was born, in a breech presentation, by category 1 CS, 24 minutes after the decision for delivery was made. The Baby weighed 4140 grams (g), on the 42nd centile for gestational age.

The Baby was born in poor condition and immediate resuscitation was carried out. Following resuscitation, the Baby was assessed and received cooling therapy.

The Baby's condition deteriorated and the decision was made, in partnership with the Mother and Father, that care should be redirected to comfort care. The Baby died at 22 hours of age.

A coronial investigation, including a post mortem examination (PME) of the Baby and the placenta, was undertaken alongside the HSIB investigation.

The PME report determined the cause of death to be:

‘1 (a) Hypoxic ischaemic encephalopathy

1 (b) Meconium aspiration syndrome

1 (c) Acute chorioamnionitis, breech presentation (initially unattended labour)’.

Section 4. Facts of the case

4.1 Incident criteria: early neonatal death

An early neonatal death is defined as the death of a baby within the first six days of life. Although rare, affecting one in 4,500 births, the death of a baby has a devastating impact on the families affected and the healthcare professionals and organisations involved. Key findings from the Perinatal mortality report (MBRRACE, 2017) indicated that these deaths are attributed to multiple factors rather than a single cause.

4.2 The incident

Before the booking appointment, primary care services contacted maternity services to outline known safeguarding concerns; the Mother's four previous children being placed in the care of the local authority.

The Mother was offered early maternity booking appointments with the specialised team who provide care for vulnerable women, at 7+4 and 7+6 weeks. The Mother DNA both appointments. The appointments were rescheduled each time.

A routine booking appointment took place at 10+1 weeks. The Mother's social history was obtained. A safeguarding referral and plan was put into place with social care services. A decision was made, that once the Baby was born, they would be placed under the care of the local authority.

The Mother's medical and obstetric was obtained (raised BMI of 42.61 kg/m² and 3 previous births – one of which was a CS for the second twin in the Mother's most recent pregnancy). An obstetric appointment, serial growth USS during pregnancy and an oral glucose tolerance test (OGTT) were planned.

Growth ultrasound scan

This is an ultrasound scan performed to check the overall wellbeing of a baby. It involves some combination of assessing a baby's size, the amount of fluid around a baby and the measurement of blood flow to the placenta and within a baby using Doppler ultrasound. (HSIB maternity team)

Oral glucose tolerance test

A medical test in which an initial fasting blood test is taken, then a glucose solution or sugary drink is given by mouth. A further blood sample is taken two hours later. This determines how quickly the glucose is cleared from the blood to diagnose gestational diabetes. Further information available from: [Diabetes UK - testing for diabetes](#)

At the booking appointment, the Mother voiced that she considered herself to have a learning disability. A referral was made to the learning disability services at 11+3 weeks. The outcome of this referral was not recorded. The family informed the HSIB investigation that no appointment was made or attended by them.

A dating USS was performed and it was noted that the Mother was 13+5 weeks. No abnormalities were detected during this USS. A combined screening test was undertaken at the time of the USS. This was later reported to be a low risk result.

Combined test/First trimester screening

This test, which is available between 10-14 weeks screens is for specific chromosomal conditions. Chromosomes are where a person's genetic material is contained within the cells of the body. The combined test tests for three conditions where an extra chromosome is found in cells; these are called Down's (extra chromosome 21), Edwards' (extra chromosome 18) and Patau's (extra chromosome 13) syndromes. The combined test uses a sample of a mother's blood together with the measurement of the fluid at the back of a baby's neck (known as nuchal translucency). The measurement is taken at the dating ultrasound scan along with other factors including a mother's age to work out the chance of a baby having Down's, Edwards' or Patau's syndromes. (HSIB maternity team)

The Mother DNA planned midwifery appointments between 14+3 and 20+3 weeks. Multiple attempts by the Mother's named midwife to contact and reschedule the appointments were made. The social care team were kept updated.

It was recorded that the Father had called the safeguarding lead to advise them that they would not be attending appointments due to the Trust's COVID-19 policy which stated he was unable to attend with the Mother. To try and improve contact with the family, the Father was given permission to attend appointments with the Mother.

It was noted that the Father declined to be seen by the allocated named midwife. The safeguarding lead contacted the Mother at 21+3 weeks. The Mother was informed that she had a new named midwife (still within the specialised team who provide care for vulnerable women) and that a new appointment had been made for 21+6 weeks. This appointment coincided with the planned fetal anomaly scan to reduce the number of times the Mother and Father needed to visit the hospital. The Mother attended this appointment. Observations of the Mother and the Baby were done and reported to be within the expected ranges. Following this appointment, the Mother attended for her fetal anomaly USS. There were difficulties completing the scan due to the Mother's BMI and the Baby's position. A repeat USS was requested.

The Mother received a vaccination for whooping cough at 23+2 weeks and the repeat fetal anomaly USS was performed. There were no abnormalities detected at this USS.

The Mother was contacted at 25+5 weeks and was offered a midwifery appointment at 26+2 weeks. The appointment was rescheduled to 27+2 weeks. It is unclear who rescheduled this appointment and why. This appointment was not attended by the Mother. She was contacted by midwifery staff and the appointment was rearranged.

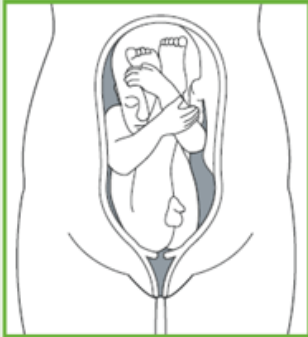
A planned growth USS was performed at 28+6 weeks. The Baby's growth was recorded within the expected range. The clinician undertaking the USS noted that there was '**no GG [GAP] chart in the handheld notes**' to plot the estimated fetal weight (EFW) on. The Baby's presentation was noted to be breech.

Growth assessment protocol (GAP)

One method of monitoring the growth of a baby is to consider relevant features of a mother (such as height, weight, ethnicity, number and weights of previous babies). These assist in making an individual projected growth chart (GROW chart) for that baby. Two measurements can be plotted on the same chart: • Measurements taken of a mother's uterus (symphysis-fundal height, SFH) • Expected weight of a baby (estimated fetal weight, EFW) at the time of an ultrasound scan Measurements plotted on the individualised graph through the pregnancy, can detect slowing of the growth of a baby. This is known as the growth assessment protocol (GAP) and is produced by the Perinatal Institute. Further information available from: [Perinatal Institute - fetal growth](#)

Breech presentation

When a baby is coming feet or bottom, (rather than head) first.



Extended or frank breech – the baby is bottom first, with the thighs against the chest and feet up by the ears. Most breech babies are in this position.



Flexed breech – the baby is bottom first, with the thighs against the chest and the knees bent.



Footling breech – the baby's foot or feet are below the bottom.

Further information available from [RCOG - breech baby](#), [RCOG - external cephalic version \(ECV\) guideline](#) and [RCOG - breech presentation guideline](#)

The Mother attended a planned appointment with her named midwife following the growth USS. Her BP was recorded within the expected ranges (130/78 mmHg), it was recorded that she had '**some oedema**'. A urine dipstick test showed no abnormalities.

Oedema of pregnancy

Oedema, particularly of a mother's legs, ankles, feet or fingers, is normal in pregnancy. It is often worse at the end of the day and towards the end of a pregnancy. The swelling is not harmful to a mother or a baby; it can be uncomfortable.

For more information see [NHS – swollen ankles, feet and fingers in pregnancy](#)

A specimen of urine was sent to the laboratory for testing as the Mother reported potential signs of a urine infection. This was followed up at a later date and no abnormalities detected. The Mother reported feeling normal fetal movements. The Baby's heart rate was recorded to be 140 bpm using a handheld Doppler device. Routine blood tests were taken and showed the mother to be anaemic; iron tablets were not started. Documentation indicates an OGTT was done, with no results being

apparent in the record. A HbA1c result was recorded as within expected range. A plan was made for a further USS at 31 weeks and a midwifery appointment to follow.

HbA1c

HbA1c is the average blood glucose (sugar) levels over the last two to three months. It is made when glucose in the blood sticks to red blood cells.

Further information available from: [Diabetes UK - HbA1c](#)

At the end of the 28+6 week appointment, it was recorded in the electronic patient record (EPR), Mother and Father expressed that they were unhappy about the plan of care for the Baby after birth and that they made comments about moving to a neighbouring country. The midwifery staff noted that the Mother and Father **‘appeared unusually agitated’** and upset about the position of the Baby.

The Mother informed social care services that they had moved to a neighbouring country. Staff were unaware that the Mother and Father had moved to another area within England. A multidisciplinary **‘core group meeting’** took place at 29+4 weeks because of this information. Representatives from health and social care were present at this meeting. A national child protection safeguarding alert was delivered to all local authorities in the United Kingdom (UK) via the national notification system. This included information about the Mother, Father, family safeguarding history and current concerns and plans. A separate alert was also sent to the Chief Social Worker for the country she had moved to.

The HSIB investigation learnt that the Mother did not attend any further appointments with Trust A. She did not access any maternity care for the remainder of the pregnancy.

The HSIB investigation were informed that the midwifery staff had tried to contact the Mother on over 10 separate occasions. Staff attempted contact by telephone and left voicemails. The communication led by the named midwife and safeguarding staff was largely through text messages, to which the Mother responded. The staff enquired about the Mother’s welfare, gave advice relating to the stage of pregnancy and how she could access maternity care, offered antenatal appointments when they knew she was having contact with her eldest child (near Trust A) and liaised with her social worker. The Mother declined to attend any appointment offered to her; she

informed the midwifery staff that the Baby was no longer in a breech presentation and that she was living in a neighbouring country.

The Mother attended a private USS in England (a USS paid for privately and not undertaken by NHS services) sometime after she had relocated. The timing of this USS or any written information about the outcome, could not be obtained by the HSIB investigation. The Mother informed the HSIB investigation that the USS reassured them that the Baby “**was OK**” and that they were “**still in a breech position**”.

Recollection from the Mother to the HSIB investigation is that she had experienced vaginal discharge at 42+2 weeks, she went into labour on the morning of 42+4 weeks and did not seek maternity advice or services after her labour had started. The Mother and Father recollect that they noticed meconium liquor during labour. They researched meconium liquor and found that this could mean the Baby was in distress. The Father made an emergency 999 call to the ambulance service, to summon help at 13:23 hours.

Meconium

Meconium is a baby's first bowel motion, formed mainly of mucus and bile. It is usually passed after birth and can sometimes be found in the amniotic fluid ('waters') during delivery. Passing meconium before the birth may indicate that a baby's wellbeing has been compromised. In babies born after their due date it can simply indicate that their gut is mature. Approximately 15-20% of babies have meconium-stained fluid in labour. For the majority of those, it does not cause any problems. Significant meconium is defined as dark green or black amniotic fluid that is thick or tenacious, or any meconium-stained amniotic fluid containing lumps of meconium. Non-significant meconium is defined as a thin yellow/green tinged amniotic fluid, with no particles of meconium. If significant meconium is present, mothers should be advised to have continuous electronic fetal monitoring, to transfer to an obstetric-led unit and give birth where healthcare professionals trained in advanced neonatal life support are readily available. (NICE, 2017).

The emergency ambulance arrived 12 minutes after the call was made. The ambulance clinicians obtained a history from the Mother including that she had been in the area for one week, had yellow coloured vaginal discharge (fluid) since the

previous evening (42+3 weeks) and that the uterine contractions had started at 08:30 hours (42+4 weeks).

The ambulance clinicians noted that the Mother was experiencing uterine contractions every 1-2 minutes and that there was meconium stained liquor present. Maternal observations were done. The Mother's breathing rate was above the expected ranges. An immediate transfer to the local maternity unit was undertaken, leaving the address at 13:53 hours and arriving at the maternity unit at 14:02 hours.

The Mother was admitted to the labour ward at 14:04 hours and taken into the delivery room by the clinician in training. Midwifery staff remained outside the room to obtain a handover from the ambulance clinicians, who raised some safeguarding concerns with the maternity staff. The HSIB investigation learnt that the woman was of high BMI, in advanced labour and it was a challenging transfer to the labour ward bed. It was recorded that the Mother was admitted **'from temporary address via ambulance with history of pain and black PV [vaginal] loss – description sounding like meconium. No handheld notes. Very distressed'**. A **'short booking summary'** was undertaken. The Mother informed staff that she had had one previous vaginal birth, that the Baby was in a breech presentation and that she was 36+6 weeks. Risk factors were identified as **'raised BMI [50 kg/m²] and being unbooked'**. After receiving the information from the ambulance clinicians, midwifery staff assisted the clinician in training. Then the midwifery staff left the room to inform members of staff performing a ward round in the delivery room next door.

A clinician in training unsuccessfully tried to attach and start a CTG.

Cardiotocograph (CTG)

Cardiotocography (CTG) is an electronic means of recording the unborn baby's heart rate pattern, to assess their well-being. This is used both during the

antenatal period, and during labour. During labour, a mother's contractions are also monitored by this machine which produces a printed or electronic record referred to as the CTG. It is usually performed externally, using two devices (transducers) placed on a mother's abdomen.

Further information available from: [NICE - care in labour \(includes CTG\)](#)

The midwifery staff returned to the room at 14:15 hours and started the CTG monitoring. The Baby's heart rate was recorded on the CTG as 95 bpm, dropping to 70 bpm when the CTG was started, which is lower than the expected range:

The Baby's heart rate rose to 165 bpm at 14:16 hours. A vaginal examination (VE) was performed at 14:17 hours, to assess the progress of labour. The Mother's cervix was fully dilated and the Baby was found to be in a breech presentation. The Baby's heart rate dropped to 95 bpm on the CTG. The midwifery staff called for immediate assistance, knowing that the obstetric consultant was nearby. The Baby's heart rate rose to 140 bpm at 14:18 hours. An immediate obstetric review took place, with midwifery staff handing over that the Mother was in the active second stage of labour, was pushing with contractions, the Baby was in a breech position, the presenting part was low in the Mother's pelvis and meconium had been noted to be on the Mother's body when she was admitted to the labour ward. Staff did not observe any meconium-stained liquor at this time.

Second stage of labour

The second stage of labour can be divided into two parts.

1. The first part is referred to as the passive second stage, when the cervix is fully opened up, a mother may not have an urge to push.
2. The second part is referred to as the active second stage, when the cervix is fully open and one of the following is present:
 - a baby can be seen or
 - a mother has an urge to push or
 - when a mother is encouraged to push, whether she has the urge to push or not, after a period of time has elapsed.

Further information available from: [NICE - care in labour](#)

The CTG was noted to be pathological and staff expected that the Baby would be born soon as they were aware that Mother had had a previous vaginal birth. A decision was made to transfer the Mother to a bigger delivery room that could facilitate a vaginal breech birth. The neonatal doctor was requested to attend the Baby's birth.

The Mother was moved to a larger room at 14:23 hours and the CTG re-started. The Mother's legs were put into lithotomy position (when a mother's legs are elevated and supported in rests). The ongoing obstetric review included another VE which confirmed full dilatation and the breech position and, took into account the Mother's risk factors. There was no further descent of presenting part in the Mother's pelvis. The Mother continued to push.

The Baby's heart rate was noted to be '**difficult to monitor**' and it was recorded as being approximately 134 bpm. A bedside portable USS was requested to check the Baby's heart rate. There was no evidence to suggest this was performed.

The Baby's heart rate was recorded as 140 bpm at 14:25 hours and 100 bpm at 14:30 hours, using the CTG transducer. It was recorded that there was difficulty finding the fetal heart rate due to the Mother's physical build. The Baby's heart rate was within the expected range at 14:30 hours.

The midwifery staff recorded that there was loss of contact on the CTG at 14:32 hours and that '**decelerations appear to be continuing**'. Minimal descent of the presenting part with pushing was noted. A decision was made at 14:32 hours, to perform a category 1 CS, due to '**a pathological CTG, breech position and no further descent**'.

Classification of urgency of caesarean section	
Category 1	There is immediate threat to the life of the woman or fetus. This is performed as quickly as possible after making the decision, ideally within 30 minutes.
Category 2	There is maternal or fetal compromise which is not immediately life-threatening. Delivery should be performed as soon as possible which in most cases will be within 75 minutes.
Category 3	There is no maternal or fetal compromise, early delivery needed.
Category 4	The delivery can be timed to suit woman or staff.

From NICE Clinical Guideline CG132 'Caesarean Section 2011 (updated 2012)

The Baby's heart rate was recorded as 120 bpm at 14:35 hours. Intravenous (IV) access was obtained and pre medications for the operation were given to the Mother. The consultant anaesthetist was informed of the emergency CS. The Mother

was transferred to the OT at 14:44 hours. The obstetric consultant recorded retrospectively that they explained to the consultant anaesthetist that if the Baby's heart rate was noted to be bradycardic (a single prolonged deceleration for three minutes or more), the Mother would require a general anaesthetic (GA) not a spinal anaesthetic.

General anaesthesia

For a general anaesthetic, the anaesthetist gives a mother medication to make her go to sleep and passes a tube through the mouth into her airway to allow oxygen to be delivered to the lungs. General anaesthesia is used less often nowadays. It may be needed for some emergencies if there is a reason why a regional anaesthetic is not suitable or if a mother prefers to be asleep.

Further information available from: [OAA - anaesthetic for caesarean section](#)

Spinal anaesthesia

A type of regional anaesthetic used to give total numbness to the lower parts of a mother's body, for example during a caesarean section, instrumental delivery or stitches after birth. It is given by injection into the lower back and lasts around three hours.

Further information available from: [NHS - spinal anaesthesia](#)

The neonatal doctor present, contacted a more senior neonatal doctor, to support them in the OT as the category 1 CS was most likely going to be performed under GA.

Once in the OT, a VE was performed; it indicated that a vaginal birth not possible and the Baby's heart rate '**was low**'. The team proceeded to a category 1 CS.

Staff tried to obtain the Mother's medical history, which was unsuccessful. They recorded that she did not want a GA and did not want to discuss her anaesthetic plan. There was difficulty positioning the mother for a spinal anaesthetic, and one attempt was made to give it at 14:50 hours. Whilst this was attempted, staff were unable to hear the Baby's heart rate. The anaesthetist proceeded to give the Mother a GA.

The Baby was delivered by category 1 CS at 14:56 hours. No meconium liquor was noted during the delivery. The Baby weighed 4140 grams (g), on the 42nd centile for gestational age. The umbilical cord was cut and clamped immediately to facilitate transfer to the resuscitaire.

Resuscitaire

A piece of equipment which combines a warming therapy platform along with the additional equipment required for managing neonatal clinical emergencies and resuscitation. (HSIB maternity team)

The Baby was handed to the neonatal team present in the OT. The Baby was pale in colour, floppy and made no respiratory effort, and no heart rate could be heard. Resuscitation started immediately.

Inflation and ventilation breaths

If a baby is not breathing by themselves following birth, they may require inflation breaths to help fill their lungs with air and expel the fluid that is within the lungs in the womb. These are given using emergency breathing equipment designed for newborn babies on a resuscitaire or carried by the midwife at a homebirth. Once the lungs have been adequately inflated if a baby still needs support with breathing the same equipment is used to provide shorter, more frequent ventilation breaths to a baby. (HSIB maternity team)

The Apgar scores were calculated as 0 at 1 minute, 0 at 5 minutes and 0 at 10 minutes of age.

The Apgar score

Soon after birth, observations are made of a baby's heart rate, breathing, colour, muscle tone and response to stimulation. These are performed at 1 minute and 5 minutes of age. There may be a third assessment at 10 minutes. The five observations are each given a score of 0, 1 or 2. The total of these scores is referred to as the Apgar score. If a baby requires resuscitation, the aim is to see the score rising, and the baby's condition improving. (HSIB maternity team)

At one minute of age, a two person jaw thrust technique was undertaken. Five inflation breaths were given and no chest rise was seen. The Baby was repositioned

and five inflation breaths were given. Chest rise was seen on the last two of the five inflation breaths. A further set of inflation breaths were given. Chest rise was seen.

At two minutes of age, good chest rise was seen with a two person airway manoeuvre. The Baby's heart rate could not be heard. No improvements in the Baby's condition were seen and an emergency call was placed to request additional support.

The Baby's heart rate was rechecked at two minutes and 30 seconds of age. No heart rate was detectable. 30 seconds of ventilation breaths were given and chest rise was seen.

At three minutes of age there was no detectable heart rate and chest compressions were started. Neonatal staff requested the presence of the neonatal consultant for support.

Chest compressions

Chest compressions are used as part of neonatal resuscitation following inflation and ventilation breaths, if a baby's heart rate is less than 60 bpm, to move oxygenated blood from a baby's lungs to the rest of their body. (HSIB maternity team)

It was recorded that the Baby made a **'first gasp at 5 mins'**. The Baby's heart rate was reassessed every 30 seconds. At five minutes and 30 seconds of age, there was no detectable heart rate. The Baby remained pale, hypotonic (low muscle tone) and was not moving. The decision was made to intubate the Baby to **'secure [their] airway and allow continuous chest compressions'**.

Intubation

When a baby needs additional support with breathing a small tube may be passed through the mouth and into the windpipe to allow oxygen to be delivered directly to the lungs.

Further information available from: [Bliss - equipment on the neonatal unit](#)

Following successful intubation, the additional neonatal staff arrived in response to the emergency call made, when the Baby was six minutes and 30 seconds of age. It was recorded that there was **'good chest rise and bilateral air entry noted'**. No

change to the carbon dioxide (CO₂) sensor was seen. The ET used to intubate the baby earlier was secured and colour change on the CO₂ sensor was noted. Resuscitation of the Baby continued.

Carbon dioxide monitoring

The neonatal team may use a carbon dioxide (CO₂) sensor. This changes colour when CO₂ is detected indicating a baby's breathing tube is in the correct place. (HSIB maternity team)

Endotracheal tube

This is a soft plastic tube (sometimes called an ET tube) that is put through the mouth or nose into the windpipe (trachea), which is attached to a ventilator to help breathing. It is often called a tracheal or ET tube. (HSIB maternity team)

The neonatal consultant was present when the Baby was 10 minutes of age. They were still receiving ventilation breaths; they were intubated and there was '**no detectable heart rate**'. A discussion took place about inserting an umbilical venous catheter (UVC) a thin tube inserted into the vein in a baby's cord) to give the Baby some adrenaline (a medicine given to stimulate a heartbeat). When the neonatal consultant listened to the Baby's heart, it was recorded that a heart rate below 60 bpm was heard. Attempts to insert a UVC started. Resuscitation of the Baby continued.

There were difficulties inserting the UVC and attempts at this were stopped when the Baby's condition improved at 16-17 minutes of age. The Baby's heart rate was above 100 bpm and improvements in their colour were seen. Active resuscitation had stopped and the neonatal team started to passively cool the Baby. This was achieved by turning off the heater above the resuscitaire. The Baby's temperature was recorded as 36.4 °C at that time. It was recorded that they '**remained profoundly floppy and unresponsive**'. The Baby was transferred to the NICU.

Umbilical cord blood gas results were recorded as follows:

Arterial pH 6.86, base excess -20 mmol/L.

Venous pH 7.15, base excess -9.70 mmol/L.

Umbilical cord blood testing

The umbilical cord contains three blood vessels. One large vein carries oxygenated blood to the unborn baby. Two smaller arteries carry deoxygenated blood from the unborn baby. Two indicators of a baby's well-being are measured in the cord blood. These are known as the pH and the base excess (BE). The blood from a baby's artery reflects the condition of a baby at the moment of birth. These indicators are significant because they can be associated with an increased risk of brain injury due to lack of oxygen (hypoxic ischaemic encephalopathy, or HIE). A cord pH less than 7.0; or cord BE less than -16 mmol/L, may be associated with HIE. Because of this it may be necessary to cool a baby. Some babies may be born in poor condition despite the cord gas results outside the description above. They may also need cooling. (HSIB maternity team)

The Baby was admitted to the NICU at 15:35 hours (39 minutes of age). Active therapeutic cooling therapy was started at 15:44 hours (44 minutes of age). IV fluids and medications were started, and they were put onto a ventilator machine. The Baby remained ventilated with '**grossly abnormal**' cerebral function monitoring (CFM) whilst on the NICU.

Cerebral function monitoring (CFM)

Cerebral function monitoring is a minimally invasive tool to detect/confirm the presence of seizure activity in newborn babies. It is performed by attaching electrodes to the baby's head which provide a continuous read out of electrical activity in the brain, generally over a period of hours to days.

Intensive care continued and the Baby was reviewed by the neonatal team on the ward round. The HSIB investigation were informed that it was evident that the Baby had "**suffered a very significant hypoxic ischaemic injury**".

Following discussions with the Mother and Father, the Baby's care was re-oriented to palliative care. The family was given the opportunity to spend time with their baby. The Baby died in the Mother's arms at 13:00 hours (22 hours following the birth).

Palliative care

The planning and provision of supportive care during life and end of life care for the baby and their family when managing an appropriate life limiting condition.

Consent for a PME was given in addition to placental and blood investigations. The case was referred to HM Coroner. Five days after the Baby died, the placental swab results were available. There was no bacterial growth noted.

The PME result was made available to the HSIB investigation and recorded that the suggested the cause of death was:

‘1 (a) Hypoxic ischaemic encephalopathy

1 (b) Meconium aspiration syndrome

1 (c) Acute chorioamnionitis, breech presentation (initially unattended labour)’.

Section 5. Investigation findings and analysis

5.1 Antenatal care

The Mother's booking appointment was completed in line with local and national guidance. A risk assessment identified that in addition to midwifery care, the Mother required **'further antenatal assessment by an obstetrician'** (Trust, 2019a). The local guideline suggests that this is undertaken at 28 weeks (Trust, 2019a). This did not happen and the reason for this was unclear. The Mother was seen at 28+6 weeks in the hospital and the HSIB investigation were unable to find out why an appointment was not made to see the obstetric team at this time.

The HSIB investigation learnt that the Mother required an anaesthetic review in view of her raised BMI (Trust, 2019a). This is in line with national guidance (RCOG, 2018). The HSIB investigation could not find evidence that a referral to the anaesthetic team was made. The reason for this was unclear.

The HSIB investigation considers that appointments with obstetric and anaesthetic teams provide opportunities to enable multi-disciplinary discussion and planning for labour and birth. The Mother may have received **'individualised information about the benefits and risks of different modes of birth'** (RCM, 2018) for vaginal birth after caesarean section (VBAC) and where a baby is in the breech position, information about anaesthesia during labour and healthy living advice (in addition to that provided by the midwifery staff).

In view of the Mother's raised BMI serial growth USS were requested, as symphysis-fundal height (SFH) measurements are inaccurate when a mother's BMI is greater than 35 kg/m² (RCOG, 2018). This is in line with local and national guidance. The first USS was performed at 28+6 weeks and the EFW was not plotted on a customised growth chart because one was not available in the Mother's handheld notes. There was no evidence that a customised growth chart was requested or generated at this time. This did not have an impact on the outcome for the Baby and the HSIB investigation have not explored this further as part of this investigation. The HSIB investigation considers that the Trust should review the process for ensuring all mothers have a customised GROW chart available.

5.2 Maternity care for complex social factors

The HSIB investigation learnt that there had been multidisciplinary communication between primary care services, maternity services and social care, regarding safeguarding concerns, from the start of the Mother's pregnancy.

The Mother was booked under the care of specialist midwives from the complex, vulnerable and safeguarding team. This is in line with local and national policy and guidance (NICE, 2010; Trust, 2017; Trust, 2018; Trust, 2019b). The HSIB investigation considers that the ongoing coordinated communication between social care and maternity services was responsive to the needs of the Mother.

The HSIB investigation learnt that the Mother considered herself to have a learning disability. A referral was made to the learning disability services. The outcome of referral was not recorded in the medical records. The Trust informed the HSIB investigation that on receipt of the referral, the learning disabilities service undertook a '**comprehensive review**'. This indicated that the Mother did not have a learning disability and no further follow up was required. The Mother remained under the care of the specialist midwives from the complex, vulnerable and safeguarding team. The HSIB investigation were informed that midwifery staff were assured that the Mother understood information that was given to her and had the capacity to make decisions about her care. They observed that the Mother demonstrated the ability to make informed choices about her care.

The HSIB investigation considers that the referral for additional assessment was in line with local guidance. A clear record of the assessment and ongoing plans are required to support staff providing care. This did not affect the outcome for the Baby.

5.2.1 DNA antenatal appointments

Local and national guidance (Trust, 2018 and NPEU, 2018) state that late booking and poor engagement with antenatal care are associated with poor outcomes.

Local guidance (Trust, 2018) describes actions that can be taken to support a mother's engagement with antenatal appointments. The HSIB investigation were informed that in line with this guidance, it is usual practice for midwives to discuss the importance of attending antenatal appointments at the time of booking. The

Mother was provided with a named midwife and their contact details in line with national guidance.

Before the Mother moved to another part of the country, evidence from the clinical records and staff recollections suggest that she was offered a total of 16 antenatal appointments from booking through to a planned appointment at 32+4 weeks. The Mother attended three of these appointments at 10+1, 21+6 and 28+6 weeks (see appendix 1). The HSIB investigation learnt that the Mother and Father do not recall having been offered all of these appointments and that they attended what they were asked to.

In relation to missed appointments, the HSIB investigation learnt that midwifery staff followed local guidance (Trust, 2018) by making attempts to contact the Mother (by telephone call and text messages) to reschedule the appointments that she did not attend. The HSIB investigation were informed that the Mother did answer the calls and text messages on some occasions, to agree to a new appointment being given. The HSIB investigation considers that this showed disguised compliance, where parents may appear to co-operate with professionals to dispel concerns and stop professional engagement (HM Government, 2018). The HSIB investigation learnt that decisions made by the Mother and Father were motivated by a desire to keep their baby.

The HSIB investigation learnt that staff communicated the non-attendance at appointments to social care services and the safeguarding lead, in line with local guidance (Trust, 2018).

The HSIB investigation learnt there were occasions where the Mother DNA two to three appointments in a row. Trust guidance (2018) states that if contact is difficult to establish, midwifery staff should visit a mother's house. A card should be left at the house, inviting contact with maternity services / primary care services / hospital as soon as possible. The HSIB investigation could find no evidence that this happened on those occasions. The HSIB investigation learnt that there was a risk assessment in place, preventing staff visiting the family, due to aggression towards health care professions from the Father. This created a barrier to the home visit. Local guidance does not suggest what staff should do in that situation. The HSIB investigation learnt that Mother and Father were living in a hostel, where social care staff regularly

visited and had contact with the families living there. The HSIB investigation considers that there were opportunities to check in with the Mother.

The HSIB investigation learnt that the midwifery staff adapted care to deliver it in a more personalised way for the Mother. This included joining appointments together (for example USS and midwifery appointments) and making an exception for the Father to attend appointments at the hospital, even with COVID-19 guidance stating this should be avoided to reduce the risk the spread of the virus.

The HSIB investigation considers that there was evidence of multidisciplinary communication and working to support the Mother to access maternity care. When the Mother relocated, information was shared nationally using existing frameworks, to safeguard the Mother and the Baby.

5.3 Private scanning studio

The HSIB investigation were informed that the Mother booked an USS with a private company to check if the Baby was **“OK and still in a breech position”**. The HSIB investigation learnt that the private company does not offer diagnostic or medical USS. The information on their website states that their USS cannot be used in place of a hospital USS. They also state that if a problem is detected, with permission, they would refer a mother to NHS services.

An USS report could not be provided by the Mother and the exact gestation of when the USS was done could not be established. The Mother informed the HSIB investigation that the Baby was still in a breech presentation at the time of the USS. The person undertaking the USS had reassured them that **“the Baby still had time to turn”** and that the Baby was **“bum first not feet first”**. It is unclear whether the Mother was advised to attend NHS services. The HSIB investigation were unable to confirm any details of the private USS with the private scanning studio, as HSIB do not investigate maternity care that takes place outside that which is provided and funded by the NHS.

Approximately 3-4% of babies are in a breech presentation towards the end of pregnancy (RCOG, 2017). A baby in a breech presentation is associated with higher perinatal mortality and morbidity when compared to a cephalic presentation (Payne, 2016). The HSIB investigation considers that if the Mother was directed to NHS

maternity services this may have enabled her to have informed discussions about planning a safe birth for the Baby. The Mother recalls not fully understanding what having a baby in the breech position meant for labour. The HSIB investigation acknowledges that the unattended planned NHS clinical scans were opportunities to identify the Baby's presentation.

5.4 Intrapartum care

5.4.1 Assessment on arrival to the labour ward

The HSIB investigation learnt that the Mother planned to give birth to the Baby without medical assistance from a midwife or obstetric staff. As the labour progressed, the Mother and Father noticed that there was meconium stained liquor. They undertook an internet search and realised this could mean the Baby was in distress. This prompted them to call 999 to summon an emergency ambulance.

The HSIB investigation learnt that at the time of the Mother's admission, the maternity unit was '**in escalation** [busy and considering diverting admissions to surrounding maternity units]' and the obstetric registrar was assessing another mother for a prolonged fetal bradycardia and considering a category 1 CS.

The HSIB investigation learnt that whilst midwifery staff were outside the delivery room (taking handover from ambulance clinicians and informing staff undertaking a ward round of the Mother's admission) a clinician in training attempted to assess maternal and fetal wellbeing and commence a CTG. The Mother's BMI was calculated to be over 50 kg/m² and this created a challenge when trying to auscultate and monitor the Baby's heart rate. The HSIB investigation considers that assistance could have been by pulling the emergency call bell, enabling the qualified staff to remain in the room and assist the clinician in training. The HSIB investigation considers an urgent assessment including listening to the Baby's heart rate was required and that an emergency request for an obstetric review was required. The presence of qualified staff in the room may have facilitated this earlier.

HSIB safety recommendation

The Trust to ensure when a mother with a complex or unknown history is admitted the priority of care is an assessment of fetal and maternal wellbeing by a qualified clinician, with urgent escalation for obstetric review where required.

The Mother arrived at the maternity unit (Trust B) via emergency ambulance; unbooked and in the second stage of labour. The HSIB investigation learnt that staff were unaware that information given by the Mother at the time of her admission included an incorrect name, incorrect gestation and an inaccurate obstetric history.

Based upon concerns relating to fetal (baby) wellbeing, the Mother presenting unbooked, the minimal obstetric history shared and not knowing how long the Mother had been in labour for, the HSIB investigation considers that it would have been reasonable to make a decision to deliver the Baby and transfer the Mother to the OT, at 14:17 hours, 13 minutes after her admission to the labour ward.

The HSIB investigation learnt that a mother presenting to the maternity unit unbooked (and with safeguarding concerns raised by the ambulance clinicians), would normally prompt the midwifery staff to explore national safeguarding alerts available to them. The HSIB investigation learnt that safeguarding alerts also contain the obstetric history of women, in addition to more information about the family. In this case, the alert also included a photo of the Mother, which may have helped to identify her, regardless of using a false name.

The HSIB investigation learnt that as events in the room were unfolding at speed and the maternity unit was busy, staff were unable to check the safeguarding information. HSIB considers that staff being able to explore the safeguarding information may have given them further information relevant to risk assessment and care planning. For example, they would have been aware that the Mother had had four previous children with the most recent birth being by CS and that no antenatal care had been accessed from 28+6 weeks. The HSIB investigation were informed that this may have influenced where the Mother was cared for on the labour ward and may have prompted staff to consider taking the Mother to a larger delivery room or straight to the OT.

HSIB considers that in different circumstances, if there had been time to gather this information or had the Mother shared the details about her previous pregnancies, this may have led to a different decision about the place and timing of birth.

5.4.2 Decision to deliver the Baby

The HSIB investigation learnt that in “**their experience**” staff thought that a vaginal breech birth was imminent (likely to happen soon) after the first VE. This influenced the decision to move the Mother from the initial small delivery room to a larger delivery room, to facilitate a vaginal breech birth. Evidence shows how people typically make sense of a situation by drawing on their experiences and intuition (Klein, 2008).

The HSIB investigation considers that staff may define imminent birth differently. Six minutes after the first VE there was no further descent of the Baby’s buttocks seen. Findings of a study completed by Reitter et al (2020) suggest that spontaneous vaginal breech births occur very quickly once the buttocks have descended past the ischial spines (a point in a mother’s pelvis, which is where the Baby’s buttocks were noted to be) and are visible at a mother’s vaginal opening. Once a baby’s buttocks are seen between contractions, they would be anticipated to be born within seven minutes. HSIB considers that the Baby’s birth was not imminent and that there was a shared mental model between staff, that the birth was imminent. The belief that a vaginal breech birth would happen quickly dominated the focus of the staff. This resulted in a loss of awareness of the whole clinical picture including the CTG and lack of knowledge about the Mother’s history. The HSIB investigation also considers that there is evidence of task overload, due to several tasks the staff were undertaking. This can result in reduced mental and physical capacity to achieve each task, with increased susceptibility to losing situational awareness.

The HSIB investigation considers that this was an opportunity to transfer the Mother to the OT at the time of the first room transfer, in view of the lack of information known about the Mother, the breech presentation, her high BMI and a concerning CTG from the start. The panel considers that a vaginal birth can be facilitated in the OT, with the ability to convert to an emergency CS if needed.

Within nine minutes of arrival into the larger delivery room the decision was made to perform a category 1 CS, in response to the pathological CTG and no descent of the Baby when the Mother pushed. The Mother was transferred to the OT within 12 minutes of the decision for a category 1 CS.

HSIB safety recommendation

The Trust to ensure that when there is fetal compromise and birth is not imminent, a mother is transferred directly to the operating theatre where further assessment can take place. This should be reflected in the multi-disciplinary emergency skills training.

The Baby was born 24 minutes after the decision to perform a category 1 CS was made. In line with national guidance, this is within the 30 minute time frame expected for a category 1 CS.

The HSIB investigation considers that the CTG and blood gases suggested the insult to the Baby had happened for some time prior to delivery. It is difficult to know how much of a difference an earlier delivery would have made.

The HSIB investigation considers that the staff made decisions based on incorrect and significant information they were given at the time, which was considered against their clinical experience. This information influenced their decisions, which were complicated by the speed at which events were unfolding and the belief that the Baby would be born by vaginal breech birth quickly. The HSIB investigation considers that this did delay the timing of the Baby's birth and may have affected the outcome.

5.5 Choice of anaesthesia for emergency CS

A joint decision was made, between the consultant anaesthetist and consultant obstetrician, that providing the Baby's heart rate was acceptable, a single shot spinal anaesthetic would be the first and safest choice of anaesthesia. The HSIB investigation learnt that the rationale for this was that a GA carries increased risk, particularly when a mother has a raised BMI (OAA, 2011; Mhyre and Sultan, 2019) and a single shot spinal anaesthetic results in less maternal and neonatal morbidity than general anaesthesia (NICE, 2011).

One attempt to insert a single shot spinal anaesthetic was made and when unsuccessful, the Mother was given a GA. This did not affect the ability to undertake the emergency CS within the recommended 30 minutes. The CS was undertaken without complication.

5.6 Neonatal resuscitation and cooling decision

The HSIB investigation learnt that neonatal staff were called to attend the Baby's birth, in line with local guidance. When the plan changed to a category 1 CS for a breech birth with a pathological CTG, the neonatal staff present summoned additional and more senior support. The additional neonatal doctor was present in the OT at the time of the Baby's birth. The HSIB investigation considers this was good practice.

The HSIB investigation considers that the resuscitation of the Baby followed the newborn life support (NLS) algorithm (Resuscitation Council (UK), 2015) and that when summoned, additional support was provided by the neonatal team.

The HSIB investigation learnt that the criteria was met for active therapeutic cooling. Passive cooling was started in the OT and active cooling was started on the Baby's arrival to the NICU. The target temperature (33°C) was reached when the Baby was 44 minutes old, which is within the recommended timeframes.

5.7 Decision to reorientate treatment

The decision was made that care should be redirected as it was not in the Baby's best interests to continue receiving intensive care treatment (RCPCH, 2014). This was in partnership with the Mother, the Father and the members of the healthcare team (Nuffield Council on Bioethics, 2006; RCPCH, 2014).

The HSIB investigation learnt that the decision to redirect care was made based on the following factors: the CFM indicated the Baby had suffered a high level of irreversible brain damage; it was likely that the significant brain injury would severely affect the Baby's quality of life and the Baby continued to deteriorate with intensive care treatment. These factors are identified in national guidance as situations where it is appropriate to withdraw treatment (RCPCH, 2014).

5.8 Post mortem examination and placental histology

The PME report was made available to the HSIB investigation and recorded that the cause of death was:

‘1 (a) Hypoxic ischaemic encephalopathy

1 (b) Meconium aspiration syndrome

1 (c) Acute chorioamnionitis [inflammation of the placental membranes], breech presentation (initially unattended labour)’.

5.9 COVID-19 pandemic

The Mother’s care and the Baby’s birth was during the COVID-19 pandemic period. The HSIB investigation considers that the COVID-19 pandemic did not have an impact on the care of the Mother and outcome for the Baby.

Section 6. HSIB findings and safety recommendations

6.1 Findings

1. The Mother's booking appointment was completed in line with local and national guidance. Acknowledging complex social factors, the Mother was booked under the care of specialist midwives from the complex, vulnerable and safeguarding team. This was in line with local and national guidance and was responsive to her needs.
2. There was early communication from primary care services and with a social worker, evidencing a coordinated approach to the care of the Mother and safety of the unborn child. A safeguarding referral was made in line with local policy and guidance.
3. The Mother considered herself to have a learning disability. A referral for assessment was made by the learning disabilities service. A comprehensive review indicated that the Mother did not have a learning disability. The Mother continued to receive support from the complex, vulnerable and safeguarding midwifery team.
4. Clinical risk factors indicated the need for an antenatal review by the obstetric and anaesthetic doctors. These reviews did not happen and the reason for this is unclear. These reviews would have provided opportunities to enable multi-disciplinary discussion and care planning, in addition to enabling the Mother to make informed decisions.
5. The Mother DNA several antenatal appointments. Midwifery staff sent text messages or telephoned the Mother to reschedule appointments. There is no evidence that midwifery staff visited the Mother's house in line with local guidance, when she DNA consecutively. The Mother and Father were living in a hostel, where there were regular visits from social care staff.
6. The Mother relocated to another area of England after the 28 week appointment. She did not access any further antenatal care and planned to birth her baby without midwifery or obstetric assistance. The named midwife did keep in contact with the Mother via text message, to provide information and advice where possible.

7. A joint meeting between health and social care took place when staff were aware the Mother had moved. A safeguarding alert was circulated across the UK and neighbouring country, to safeguard the Mother and the Baby.
8. The Mother had a private USS after she relocated. The private scanning studio did not offer diagnostic or medical USS. The Baby was in a breech presentation at this time. It is unclear whether the Mother was advised to attend NHS services, considering this, to enable discussions to take place about birth planning.
9. The Mother and Father recognised that meconium stained liquor in labour can indicate that a baby is in distress. They summoned an emergency ambulance, which transported them to the nearest maternity unit.
10. The staff at the maternity unit rapidly gained the information required to undertake a quick risk assessment. They were unaware at the time that some of the information provided by the Mother was inaccurate. This impacted on some of the initial decisions made by midwifery and obstetric staff. This delayed the timing of the Baby's birth.
11. While a handover of care was given to the LWC outside the Mother's room, a clinician in training attempted to commence a CTG. An urgent assessment including listening to the Baby's heart rate was needed and an emergency request for an obstetric review was required. The presence of qualified staff in the room may have facilitated this earlier.
12. Neonatal staff were called to attend the Baby's birth, in line with local guidance. Neonatal resuscitation was carried out in line with national guidance.
13. Active therapeutic cooling was started in line with national and regional guidelines. The decision was made to redirect care before 72 hours of active cooling had been completed. The decision was made in partnership with the Mother, Father and the neonatal team and, in line with national guidance. The Baby died shortly afterwards.
14. The Mother's care and the Baby's birth was during the COVID-19 pandemic period. The COVID-19 pandemic did not have an impact on the care of the Mother and the outcome for the Baby.

6.2 Safety recommendations

1. The Trust to ensure when a mother with a complex or unknown history is admitted the priority of care is an assessment of fetal and maternal wellbeing by a qualified clinician, with urgent escalation for obstetric review where required.
2. Trust to support staff to transfer a mother to the operating theatre for interventions to expedite birth, unless birth is immediately imminent.

Appendix 1. Antenatal appointments, DNAs and follow up

Gestation (weeks)	Appointment offered	Appointment attended	Appointment DNA	Plan / follow up
7+4 booking	Yes		Yes	The Mother contacted and appointment rescheduled for 7+6 weeks.
7+6 booking	Yes		Yes	The Mother contacted and appointment rescheduled for 10+1 weeks.
10+1	Yes	Yes		Midwifery staff planned to see the Mother at 14 weeks.
13+5	Yes		Yes	The Mother attended the USS appointment. She did not attend the midwifery appointment. The Mother contacted and appointment rescheduled.
15+3	Yes		Yes	Midwifery staff attempted to contact the Mother to reschedule for 17+1 weeks.
17+1	Yes		Yes	Midwifery staff attempted to contact the Mother to reschedule.
18+3	Yes		Yes	Midwifery staff contacted the Mother. She informed them she had had a bad night's sleep and would see the midwife later that day.
18+3	Yes		Yes	The Father contacted the midwifery staff to inform them that they would not be attending the midwifery appointment. The midwifery staff attempted to contact the Mother and reschedule the appointment to 19+2 weeks.
19+2	Yes		Yes	Midwifery staff attempted to contact the Mother to reschedule for 20+3 weeks.
20+3	Yes		Yes	Midwifery staff attempted to contact the Mother to reschedule for 21+6 weeks. Social worker informed.

21+6	Yes	Yes		Midwifery staff planned to see the Mother at 25 weeks. Social care updated as part of ongoing communication.
25+5	Yes		Yes	Midwifery staff attempted to contact the Mother to reschedule for 26 weeks.
26	Yes		Yes	Midwifery staff attempted to contact the Mother to reschedule for 27+2 weeks.
27+2	Yes		Yes	Midwifery staff contacted the Mother to reschedule for 28+6 weeks.
28+6	Yes	Yes		Midwifery staff planned to see the Mother at around 31 weeks.
32+4	Yes		Yes	Social worker informed midwifery staff that the Mother had moved to a different country and would not be attending this appointment.

Appendix 2. Evidence log

Medical records

- Medical records from the electronic patient record system including blood results and scan reports, from both hospital trusts involved.
- Paper based medical records.

Trust guidelines

- Booking and antenatal clinical risk assessment.
- DNA (Women who fail to attend antenatal visits in the community or in hospital.
- Referral to specialist midwifery teams.
- Safeguarding policy.

National guidelines

- Bioethics (Full reference in appendix 2).
- Breech presentation (Full reference in appendix 2).
- Caesarean section including anaesthesia for CS (Full reference in appendix 2).
- Neonatal resuscitation
- Obesity (Full reference in appendix 2).
- Pregnancy and complex social factors (Full reference in appendix 2).
- Safeguarding (Full reference in appendix 2).

Investigation evidence

- Family interview.
- Staff interviews and supplementary evidence provided by email.
- Post mortem examination report.

Appendix 3. Reference list

Endsley, M. R. (2015) Situation Awareness Misconceptions and Misunderstandings. *Journal of Cognitive Engineering and Decision Making*; 9(1): 4-32.

Harris, S. (2011) Human factors investigation methodology. Proceedings International Symposium on Aviation Psychology, Dayton, US, 2-5 May.

HM Government (2018) Working Together to Safeguard Children A guide to inter-agency working to safeguard and promote the welfare of children. Government guidance.

Holden R et al (2013) *SEIPS 2.0: A human factors framework for studying and improving the work of healthcare professionals and patients*. *Ergonomics* 2013 November; 56 (11)

Hollnagel, E; Wears R.L. and Braithwaite J (2015) *From Safety-I to Safety-II: A White Paper*. The Resilient Health Care Net: Published simultaneously by the University of Southern Denmark, University of Florida, USA, and Macquarie University, Australia.

Klein, G (2008) Naturalistic Decision Making. *HUMAN FACTORS*, Vol. 50, No. 3, pp. 456–460.

Mhyre, J.M., and Sultan, P. (2019) General Anesthesia for Cesarean Delivery: Occasionally Essential but Best Avoided. *Anesthesiology*, Vol. 130, p.864–866.

NICE (2010) Pregnancy and complex social factors: a model for service provision for pregnant women with complex social factors. Clinical guideline 110. National Institute for Health and Care Excellence.

NICE (2011) Caesarean section. Clinical guideline 132. National Institute for Health and Care Excellence.

NPEU (2018) cited in Trust A (2018) DNA (Women who fail to attend antenatal visits in the community or in hospital: Cross-site guidance). Clinical guideline.

Nuffield Council on Bioethics (2006) Critical care decisions in fetal and neonatal medicine: ethical issues.

OAA (2011) Advice to OAA Members from the OAA Committee: Re: CMACE Report 'Maternal obesity in the UK: findings from a national project' (2010). Obstetric Anaesthetists Association.

RCM (2018) Midwifery care in labour guidance for all women in all settings. Midwifery Blue Top Guidance No.1. Royal College of Midwives.

RCOG (2017) Management of Breech Presentation. Green-top Guideline No. 20b. Royal College of Obstetricians and Gynaecologists.

RCOG (2018) Care of Women with Obesity in Pregnancy. Green-top Guideline No. 72. Royal College of Obstetricians and Gynaecologists.

RCPCH (2014) Making decisions to limit treatment in life-limiting and life-threatening conditions in children: a framework for practice.

Reitter,A; Halliday, A; Walker, S. (2020) Practical insight into upright breech birth from birth videos: A structured analysis. Birth: Issues in Perinatal Care, January 2020.

Resuscitation Council UK (2015) Guidelines: Resuscitation and support of transition of babies at birth.

Trust (2017) Criteria for Referral to Specialist Midwifery Teams. Clinical guideline.

Trust (2018) DNA (Women who fail to attend antenatal visits in the community or in hospital: Cross-site guidance). Clinical guideline.

Trust (2019a) Booking and Antenatal Clinical Risk Assessment (Cross site guideline). Clinical guideline.

Trust (2019b) Safeguarding Policy. Trust policy.