

Case story

Management of hyper-stimulation and fetal bradycardia



Early Notification

Case story guidance

Background

In [Advise, resolve and learn Our strategy to 2025](#), our second strategic priority is to share data and insights as a catalyst for improvement and our third is to collaborate to improve maternity outcomes. Aligned with these aims we have gathered together learning from our Early Notification Scheme and produced a number of case stories to help support learning from harm identified through claims.

These resources

Our case stories are illustrative and based on recurring themes from real life events. These experiences have been highlighted and shared with you, to help identify potential risks in your clinical area, promote learning and prevent fewer incidents like these occurring in the future.

How to use the case stories

There are various ways you may use the case stories, from individual self-directed learning to support continuous professional development to using them in a team environment. The idea is that by learning from the experience of others, maternity unit staff will be able to change their approach to care.

As you read or discuss the examples of incidents that we are sharing we ask you to consider the following:

- Could this happen in my organisation?
- What changes within my organisation or team might I consider after reading the material, including individual practice?
- What information should I share with the team?
- How can I share the learning from this case story?
- Who else needs to know?

Practical applications

1. Consider the key elements of the case story and through reflection apply the learning to influence your practice in the future.
2. Use this case study as a point of discussion at appropriate multi-disciplinary team meetings, safety huddles, and/or human factor's training.
3. Use this case study to create a multi-disciplinary simulation in the clinical area or on mandatory training.
4. Review your claims scorecard to identify whether there are any themes which relate to this case story and identify where improvements could be made.

This case story is illustrative and derived from multiple real events. NHS Resolution aims to share case stories to facilitate learning and prevent similar issues in the future. As you read about this case story, please reflect on the following:

- Could this happen in my organisation?
- Who could I share this with?
- What can we learn from this?

Topic:

Management of hyper-stimulation and fetal bradycardia

Key points:

- Hourly systematic assessments should be performed during labour and this should include a review of the antenatal and intrapartum risk factors.¹
- To ensure that any delays in care such as a planned induction of labour are escalated to senior midwives and obstetricians to determine ongoing management.¹
- Understanding the potential impact of uterine hyper-stimulation on neonatal condition and actions to reduce it, particularly stopping oxytocin.²
- To improve communication within maternity teams through use of emergency buzzers and the emergency call system.
- To understand the potential causes of fetal bradycardia, its timely recognition and effective management.

Maternity story:

Mrs S was appropriately booked for low risk care in her first pregnancy, which progressed smoothly to term.

At a routine appointment at 40⁺³ weeks gestation Mrs S asked her midwife about post-dates induction of labour. At this appointment the symphysis-fundal height (SFH) was measured and plotted less than the 10th centile when previously it had been measured above the 50th centile. Mrs S reported good fetal movements and the midwife discussed the findings with Mrs S and her partner, particularly the possibility that there may be a reduction in fetal growth. Mrs S agreed to a referral for a growth scan. This scan was performed at 40⁺⁵ weeks gestation and the baby's estimated fetal weight measured 2345g (4th centile) with normal umbilical doppler's. Mrs S was reviewed by an obstetrician following her scan and after discussion about her options Mrs S and her partner chose to have an induction of labour, which was booked for the next day. Specific counselling on the risks and benefits of induction of labour was provided and an information leaflet given. A cervical sweep was performed and Mrs S's cervix was 1cm dilated.

Mrs S was contacted the following day by the maternity unit because her induction could not be accommodated as planned because the labour ward was busy. Apologies were offered to Mrs S and she was asked about fetal movements, which she reported were normal. A plan was made to contact her as soon as they were able to facilitate her induction.

The following day (41⁺⁰) she was contacted and the maternity team apologised again because they were still unable to accommodate her induction due to acuity. A plan was made to review the situation in the afternoon and admit her as soon as possible.

At 9am the next day (41⁺¹) Mrs S contacted the maternity unit to enquire about the situation and was advised to attend the antenatal ward at 11:00. Mrs S arrived at 11:14 and the midwife explained the process of induction of labour to her. Mrs S reported that fetal movements had been reduced the previous day but were now normal. She had a normal CTG that met the Dawes-Redman criteria. She was examined and her cervix was 1cm dilated with a Bishops score of 4. A prostaglandin pessary was administered. Regular checks of maternal and fetal wellbeing were normal.

At 41⁺² weeks gestation Mrs S was reassessed 24 hours after the prostaglandin pessary was administered and had a Bishops score of 8 and her cervix was 2cm dilated. At 19:20 Mrs S was transferred to delivery suite to have an artificial rupture of membranes (ARM.) An ARM was performed at 20:04 and clear liquor was noted to be draining. Mrs S was reviewed on the routine obstetric led ward round at 20:35. Her history of fetal growth restriction (FGR) was noted. The cardiotocograph (CTG) was normal and an oxytocin infusion was commenced after a discussion with Mrs S and her partner.

A vaginal examination (VE) was performed at 01:05 and Mrs S's cervix was 4cm dilated with clear liquor draining. At 01:10 (41⁺³) Mrs S was reviewed on the routine ward round. She was contracting 6 in 10 minutes, strong on palpation and the CTG was normal with a baseline of 130bpm and her Modified Early Obstetric Warning Score (MEOWS) was 0. At 07:50 there was a review by the obstetric registrar because the CTG baseline had risen to 150bpm. There were variable decelerations present for 60 minutes. The CTG was classified as normal. MEOWS 2 for a temperature of 37.7c and maternal heart rate was 115bpm.

Mrs S was examined and she had progressed in labour to a cervical dilation of 7cm. Her contractions remained strong and were palpated to be 5-6 in 10 minutes. A plan was made to continue the oxytocin at the same rate and to give some IV fluids for the maternal tachycardia and rising baseline.

At 09:30 Mrs S was reviewed on the consultant ward round. She had a MEOWS score of 2 for a maternal heart rate of 118 and a temperature of 37.6c. There were 5-6 contractions palpated in 10 minutes that were strong on palpation. The CTG was classified as suspicious due to a baseline of 150bpm and the presence of variable decelerations for over 30 minutes.

A plan was made to examine for labour progress at 11:50 and to reduce the oxytocin rate. However at 11:35 Mrs S reported urges to push and was examined by the midwife. Her cervix was 10cm dilated with the presenting part at spines in a left

occipito-anterior position. The MEOWS score was 1 for a maternal heart rate of 125bpm. Mrs S was contracting 5 in 10 minutes and the CTG continued to be classified as suspicious. The midwife discussed her findings with the midwife co-ordinator and a plan was made for Mrs S to have an hour for passive descent of the presenting part.

At 11:50 the obstetric registrar was asked to review due to concerns about the CTG: there was a baseline of 155bpm with concerning decelerations in over 50% of contractions for over 30 minutes. Some decelerations lasted over 60 seconds. There was no classification of the CTG. The obstetric registrar performed a VE and determined that the position was left occipito-anterior, +1 station with no caput and no moulding now with thick meconium. The obstetric registrar asked Mrs S to commence active pushing and advised that they would return in the next 30 minutes.

At 12:10 the room call bell was pressed. A senior midwife attended and there was a fetal bradycardia lasting 4 minutes. Mrs S was turned into a left lateral position, the emergency buzzer pulled and the oxytocin infusion was turned off. The registrar arrived at 12:14 and reviewed the CTG, which showed a persistent bradycardia of 8 minutes duration. Mrs S was examined and her cervix was fully dilated and the baby in a left occipito-transverse (LOT) position at the ischial spines. A decision for a category 1 caesarean section was made at 12:21 after discussion with Mrs S who gave her consent for the procedure.

At 12:24 Mrs S was transferred into theatre. The anaesthetist was setting up for a spinal anaesthetic, but after a very brief discussion the obstetric team decided that a general anaesthetic (GA) was the most reliable with a prolonged bradycardia of 12 minutes that was not recovering. The GA was completed at 12:28. Knife to skin was at 12:29 and baby was born at 12:30.

Table 1: Umbilical Cord Gases and Apgar scores

<i>Umbilical Cord Gases</i>	pH	Base Excess	Lactate
<i>Arterial</i>	6.92	-16.4	13.6
<i>Venous</i>	7.05	-9.1	10.2

Apgar Scores	1 Minute	5 minutes	10 Minutes
	0	1	4

At birth the baby was pale, floppy and unresponsive with an undetectable heart rate. The baby was dried and resuscitated with five inflation breaths with good chest rise seen. This was followed by 30 seconds of ventilation breaths. On reassessment, baby's heart rate was auscultated at 50bpm. At 2 minutes of age, the neonatal team commenced chest compressions at a ratio of 3:1 with ventilation breaths, and reassessed at 30 second intervals. At 6 minutes of age, the baby's heart rate increased to over 100bpm and chest compressions were stopped. The baby made minimal respiratory effort so ventilation breaths continued. At 10 minutes of age, the baby was successfully intubated at the second attempt. The tube position was confirmed with a capnograph, as well as bilateral air entry on auscultation. The baby was transferred to SCBU on 100% oxygen. On admission baby had poor tone and abnormal reflexes, so passive cooling was commenced. The baby was transferred to the regional neonatal intensive care unit for therapeutic hypothermia treatment. The baby also received antibiotics for suspected sepsis.

An MRI on day 6 of age was reported to demonstrate "changes suggestive of acute hypoxic ischemic injury" indicating that a brain injury had occurred. Baby was discharged on day 14 with a plan for outpatient follow up.

Learning points:

This case highlights the importance of:

- Inviting woman in each day where there are known delays in care to perform a personalised risk assessment including an assessment of both maternal and fetal well-being. Any delays in care due to acuity should be highlighted to both the senior midwifery and obstetric teams to ensure a suitable plan is made on an individualised basis.¹
- Conducting hourly assessments during labour including a "fresh eyes" review.² These assessments should consider antenatal and intrapartum risk factors as well as the frequency, length and strength of her contractions. It should also include the current wellbeing of the woman and the fetus. This assessment should be discussed with the woman and her birthing partner or partners to plan ongoing care.²
- Ensuring that fetal monitoring is a tool that provides guidance on the condition of the baby but this must be considered with all other risk factors when assessing the clinical situation. Each CTG assessment should include a classification and not just a description.¹
- Recognising the presence of a rising baseline by 20 beats or more. This should be considered an amber criteria when categorising the CTG. Antenatal and intrapartum risk factors should be considered as this may indicate a developing infection or hypoxia.²
- Uterine hyper-stimulation and the potential consequences as well as understanding that this can cause fetal hypoxia. If 5 or more contractions per 10 minutes are present the following actions should be taken;
 - Perform a full risk assessment
 - Take action to reduce contraction frequency by either;

- Reducing or stopping oxytocin if being used
 - Offering a tocolytic drug (Terbutaline 0.25mg)
- Explain to the woman what is happening and ensure she has adequate pain relief.²⁻⁴
- Closely monitoring all women for signs of infection during labour and to consider a septic screen and IV antibiotics when abnormal observations are present such as a maternal pyrexia and/or maternal tachycardia as were present in this case.²
- The presence of meconium, which should trigger a full assessment of the clinical picture including consideration of antenatal and intrapartum risk factors. The presence of meconium is associated with poor clinical outcomes and can lead to complications such as meconium aspiration syndrome.^{1,2}
- Using an emergency buzzer and or emergency crash bleep system to summon help quickly in any emergency system. A 2222 crash bleep system ensures that all team members are aware of any emergency situation in a timely manner.⁵
- Communicating with the anaesthetic team the urgency required to expedite the birth to determine the quickest, safest mode of anaesthesia in the clinical context.
- Considering the causes of fetal bradycardia and risk factors for fetal compromise such as uterine hyper-stimulation and sepsis.^{2,3}
- Documentation; If a decision is made to expedite birth ensure the time at which an urgent review was requested is clearly documented as well as the time the decision was made. In this case there was a delay in delivering the baby.²

Figure 1; Causes of Fetal Bradycardia

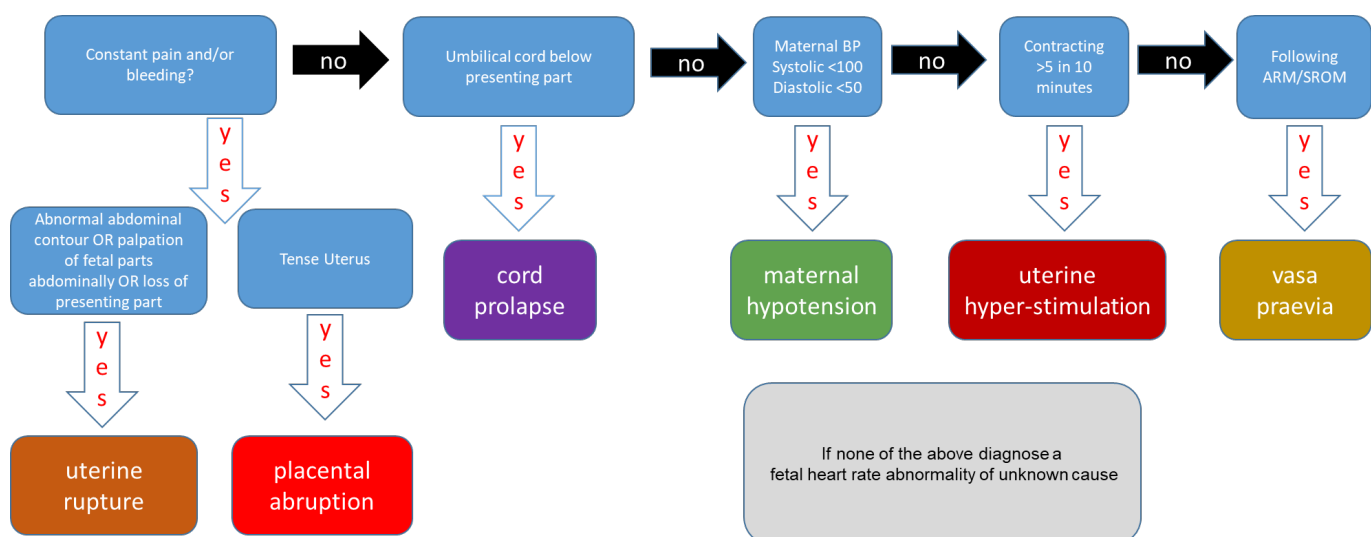


Figure 1; Shows the common causes of fetal bradycardia.³

Considerations for your hospital:

- Does your trust have a plan of escalation in place for delayed inductions of labour?

- Is your trust ensuring that all CTG reviews are categorised? Is this being audited?⁷
- Does your trust have a 2222 Emergency crash bleep system in place for obstetric emergencies? Do all team members know how to summon help?
- Do trust clinical guidelines recommend that the management of hyper-stimulation should be followed if contractions are over 5 in 10?
- Do clinical guidelines include specific instructions on how fetal bradycardia should be managed?

What has happened as a result?

This case story is illustrative. If a similar case were to occur in real life, then it would be referred to NHS Resolution's Early Notification Scheme. NHS Resolution's in-house, specialist teams will review all available information about the care received, to decide whether there is any evidence of substandard care which could potentially result in compensation.

The expertise of NHS Resolution is used to proactively assess the legal risk and provide early support to families where liability is established.

NHS Resolution supports an open, transparent discussion between clinicians and families following adverse events.⁶ The scheme is also designed to improve the experience for NHS staff by time limiting the need for protracted involvement in the legal process and rapidly share learning.

Legal Analysis:

Early evidence gathering and investigation found there was a breach of duty for failure to recognise hyper-stimulation, which occurred during labour in the presence of other risk factors. There was a further breach of duty in the time taken to deliver the baby, which should have been quicker when concerns regarding fetal monitoring were present.

Independent expert evidence confirmed that escalation for earlier review should have been undertaken. Further, when CTG review and assessment was performed the overall clinical picture appeared not to be reflected on. Namely, following the assessments at 07:50, 09:30 and 11:35 hours.

Had there been earlier intervention then the expert evidence confirmed on the balance of probabilities that the brain injury suffered would have been avoided. The care provided was not of the standard expected and this unfortunately caused significant injury.

It is very important to note that no amount of money is comparable with the loss of a child or a child living with lifelong neurological injuries. Where poor outcomes occur as a result of deficiencies in care, NHS Resolution aims to resolve all such claims or cases fairly and as quickly as possible.

The current compensation cost to the NHS for a baby who has long term severe brain injury is on average £13.5 million. The human costs to the babies, families and clinical teams involved are immeasurable.

Resources:

1. Intrapartum Care for healthy women and babies NICE CG 190 published December 2014, revised December 2022
[Intrapartum care for healthy women and babies NICE CG 190](#)
2. Fetal Monitoring in Labour. NICE NG 229 published December 2022
[Fetal Monitoring in Labour](#)
3. Cheung KW, Bonet M, Frank KA, Oladapo OT, Hofmeyr GJ; WHO Intrapartum Care Algorithms Working Group. Clinical algorithms for management of fetal heart rate abnormalities during labour. BJOG. 2022 Apr 12. doi: 10.1111/1471-0528.16731. Epub ahead of print. PMID: 35415966.
4. Leathersich SJ, Vogel JP, Tran TS, Hofmeyr GJ. Acute tocolysis for uterine tachysystole or suspected fetal distress. Cochrane Database Syst Rev. 2018 Jul 4;7(7):CD009770. doi: 10.1002/14651858.CD009770.pub2. PMID: 29971813; PMCID: PMC6513259.
5. Summary of Themes arising from the HSIB maternity programme. HSIB. March 2020.
[Summary of Themes arising from the Healthcare Safety Investigation Branch](#)
6. NHS Resolution Saying Sorry June 2017
[Read saying sorry \(duty of candour\) - NHS](#)
[Resolutionhttps://resolution.nhs.uk/resources/saying-sorry/ion](https://resolution.nhs.uk/resources/saying-sorry/ion)
7. Saving Babies Lives Care Bundle. Version 2. NHS England.
<https://www.england.nhs.uk/wp-content/uploads/2019/07/saving-babies-lives-care-bundle-version-two-v5.pdf>



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maternity campaign 2022/25
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