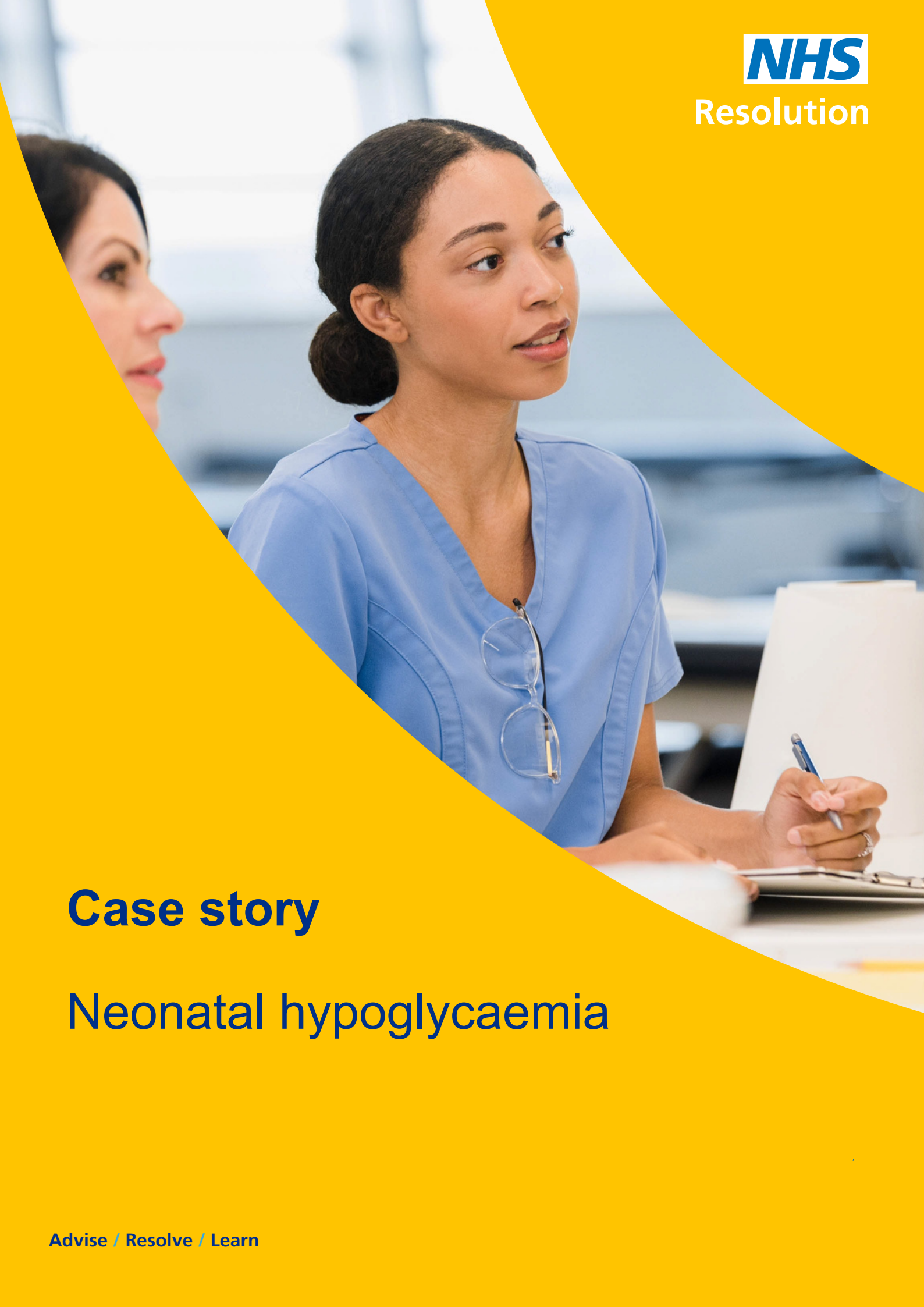


A photograph of two healthcare professionals, likely nurses, in a clinical setting. They are wearing light blue scrubs. The woman in the foreground is looking off to the side with a focused expression, holding a pen over a clipboard. The woman behind her is partially visible, also looking in the same direction. The image is partially obscured by a large yellow curved shape that frames the text on the left.

Case story

Neonatal hypoglycaemia

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.

Topic: The identification and management of babies at risk of hypoglycaemia in the neonatal period.

Key points:

- All neonates experience a physiological period of relative hypoglycaemia following birth¹. During this period they use other reserves (such as fat) to provide energy for the brain. The neonatal brain can use alternative fuels such as ketones. Small or unwell babies often do not have sufficient reserves to cover this period and may experience hypoglycaemia.
- Babies who plot on or below the 2nd centile for birth weight are at increased risk of hypoglycaemia and hypothermia².
- Other key risk factors for hypoglycaemia are²:
 - Moderate to late prematurity
 - Maternal diabetes (type 1, type 2 or gestational diabetes)
 - Maternal treatment with beta-blockers in the third trimester or at the time of delivery
 - Perinatal acidosis (cord arterial pH <7.1, base deficit ≥-12)
 - Confirmed or suspected sepsis
- Babies identified as being at risk of hypoglycaemia should be commenced on NEWTT³ (Newborn early warning track and trigger) or equivalent observations in order to closely monitor their wellbeing².
- Babies at risk of hypoglycaemia (as well as those who are reluctant to feed) require extra feeding support to ensure a safe transition from placental to enteral nutrition. This may include observed feeds, support with expressing breast milk and consideration of top up feeds. Breastfeeding should be assessed using a structured tool such as those published by the Baby Friendly initiative⁴.
- Trusts should have clear guidance on which babies require blood sugar monitoring to ensure a safe transition from fetal to neonatal metabolism.
- Babies who display signs of hypoglycaemia should be reviewed by the neonatal / paediatric team. Pathological signs of hypoglycaemia include²:
 - An altered level of consciousness
 - Feeding problems
 - Hypotonia
 - Lethargy
 - A high pitched cry
 - Hypothermia (not attributable to environmental factors)
 - Seizures
 - Apnoeas
 - Cyanosis

If there are acute concerns about the wellbeing of the baby, an emergency call should be used to summon immediate help.

- Rarely, babies have a condition in which too much insulin is produced from the pancreas. In this situation, enteral feeds cannot provide sufficient glucose and the baby will develop signs of hypoglycaemia.
- Untreated, neonatal hypoglycaemia may eventually lead to seizures, collapse, brain damage and death.

Maternity story

A 29 year old woman booked at 8 weeks and 2 days gestation (8+2 weeks). This was her first pregnancy and she had no significant medical problems. She was a non-smoker and had a BMI of 25. She was booked for low risk, midwifery-led care. The pregnancy progressed as expected and there were no problems or complications of note.

At 40+1 weeks the mother was admitted in established labour at 7cm dilatation. During labour there were concerns about the mother's urine output and she was encouraged to drink plenty of water. She was also started on intravenous (IV) fluids. Her urine output normalised and her observations remained stable. She progressed to a spontaneous vaginal birth of a healthy male infant at 17:55. The cord was clamped and cut and the baby was placed on his mother's chest for skin to skin care. The birth weight was recorded as 2620g. The Apgar scores were 9, 10 and 10.

At around one hour of age a paediatric doctor was contacted at parental request to review a birth mark. On arrival, the doctor was also informed that the mother's electrolytes had been tested and that her sodium was 126. The doctor examined the baby and reassured the parents regarding a small, benign birthmark. The doctor also carried out a heel prick blood gas in order to check the baby's sodium. This was taken to the blood gas analyser and processed by a midwife looking after another woman in the neighbouring room while the paediatrician spoke to the mother and father. The blood gas results were as follows:

pH 7.36	Na 135
CO ₂ 5.6	K 3.5
O ₂ 4.8	Lactate 2.6
BE -2.1	Glucose 1.5

The paediatrician noted that the sodium was normal and would not need to be rechecked. The baby could feed normally and continue with midwifery led care.

The mother was shown how to latch the baby to breast feed and the midwife left the room to attend handover. When the night midwife returned to the room, the parents reported that the baby had taken a good feed and was now asleep. The family were moved to a postnatal room as the mother was to stay in overnight for monitoring of her renal function and electrolytes. Overnight the baby was put to the breast a few

times, although the mother reported some discomfort when latching the baby and was unsure if she was doing it properly. The midwife gave advice regarding positioning but upon returning to check, the mother and baby were asleep. They were not disturbed again until the morning.

The following morning, a midwife attended to repeat the mother's blood tests and complete the newborn infant physical examination (NIPE). The baby was noted to be fractious and would not latch to feed by breast. The mother was advised to express some colostrum and give this to the baby by syringe. The baby took 0.7mls of colostrum.

While awaiting the results of her own blood tests, the mother put the baby to the breast once more and fed him until he fell asleep. The mother's blood tests were now normal and the baby had fed so they were discharged home.

At 20:05 that evening, the parents called the postnatal ward with concerns that the baby had not woken to feed since they arrived home. The last feed was 8 hours previously, in the hospital. The postnatal ward staff advised the parents to wake the baby and put him to the breast. The parents also expressed concerns that the baby looked a little yellow. They were reassured that this was normal in newborn babies.

The parents attempted to feed the baby but he did not wake. They called the postnatal ward back and explained this. They were advised to undress the baby and to stimulate him as he might be sleeping. Again, when unable to wake the baby, the parents called the postnatal ward. This time they were advised to take the baby to hospital.

The parents drove to their nearest hospital and were triaged in the emergency department at 21:30. The staff in the emergency department recognised that the baby was unwell and directed the family straight into a resuscitation bay. The baby had shallow breathing and began to display eye rolling and some shaking of his limbs. His oxygen saturations were 64% and his heart rate was 60 – 80 beats per minute. His temperature was 35.9 degrees Celsius. The baby required extensive resuscitation. A blood gas revealed a severe mixed acidosis and an unrecordable blood glucose level.

Once intubated and stable, the baby was moved to the paediatric intensive care unit. Although the baby was over 24 hours old, therapeutic hypothermia was commenced on a compassionate basis as the baby was acidotic and encephalopathic. An MR brain scan five days later revealed widespread changes, likely related to hypoglycaemia as well as areas affected by profound hypoxia. A radiology report suggested that these changes were likely to be associated with poor head growth, motor and visual problems and cognitive delays. The baby remained very unwell and the decision was made to move to palliative care on day 7. Sadly, he died in his parents' arms two days later.

Learning points and their clinical relevance

- Learning point 1

In a previous study of neonatal claims, low birth weight was the most common risk factor for the development of hypoglycaemia⁵.

In this case story, there are no maternal risk factors for neonatal hypoglycaemia. However, the birth weight of 2620g plots below the 2nd centile for a boy born at 40 weeks.

NICE intrapartum care guidance⁶ states that head circumference and weight should be recorded in the first hour of life. In order to ensure that high risk infants are identified early², the centile should also be checked and recorded at this point. A reference table can be used as a quicker alternative to plotting on a growth chart. This baby should have been identified as at risk of hypoglycaemia and hypothermia and placed on a specialised care pathway².

- **Clinical consideration 1**

Does your hospital have easily accessible centile reference tables for use at birth? There is one available on the back of the BAPM NEWTTTS chart. Do you routinely check the growth centile when weighing a baby after birth? If not, what could be done to remind staff and make this easy to do without taking excess administrative time?

- **Learning point 2**

Hypoglycaemia care pathways vary slightly between trusts but should include; early provision of energy (breast or formula milk), careful and ongoing assessment of feeding and wellbeing, and regular blood sugar monitoring.

- **Clinical consideration 2**

What is your local guidance regarding babies at risk of hypoglycaemia? Are the details of care pathways / bundles widely accessible on the labour / postnatal wards and do staff know the details? If not, how can you make this more accessible or memorable?

- **Learning point 3**

When a blood gas was checked, primarily to look at the sodium, the abnormal glucose result was overlooked. This is likely to have been due to inattentional blindness⁷.

Inattentional blindness is a concept that describes the process of failing to notice objects or information within our direct vision because our attention is elsewhere. In this case, the reviewer sought out the sodium result and did not notice the abnormal glucose reading.

It is important that we recognise the risk of inattentional blindness and other human factors. Where possible, systems should mitigate against these risks. If the result print-out had highlighted the sugar in red ink or if the gas had been reviewed by two different clinicians, who knew the clinical background, the risk of inattentional blindness would have been lower overall.

- **Clinical consideration 3**

Are there processes in your trust to highlight abnormal results and to mitigate against inattentional blindness? Do computer systems or print-outs highlight abnormal results? What could you do to make this process safer?

- **Learning point 4**

National guidance² dictates that a blood sugar of <2mmol/L requires prompt action. (Some trusts exercise extra caution and use a higher value than 2mmol/L.)

The specific actions advised may vary between trusts but include assessing for clinical signs of low blood sugar, giving a feed, giving oral glucose gel and repeating the test within a set time period.²

The neonatal team should be informed of babies with low blood sugar readings. Persistently low blood sugars will require escalation to top-up oral or NG feeds and consideration of admission to the neonatal unit for the administration of IV dextrose and further investigation.

- **Clinical consideration 4**

Familiarise yourself with local guidance, treatment thresholds and expected management. Is this guidance easily accessible to those looking after newborn babies? If not, how can you improve this?

- **Learning point 5**

As outlined in the UNICEF baby friendly initiative⁴, it is important that all mothers are supported to “get breastfeeding off to a good start”.

Even if this baby had been a well, term baby with no IUGR (intrauterine growth restriction), there were a number of signs that feeding was not going well:

- This was the parents' first baby. The mother expressed concerns about discomfort when latching the baby and was not sure if she was doing it properly.
- Although advice was given, no feeds were witnessed.
- The mother was supported to express and give a top up feed but this was not followed up with further breastfeeding support.
- When the baby was reported to have taken a final breastfeed, it was again unwitnessed.

Abnormal feeding behaviour has been shown to be a presenting clinical feature in up to 75% of babies with hypoglycaemia⁵. Poor feeding itself may also result in hypoglycaemia. There were a number of missed opportunities to recognise a feeding problem in this baby.

- **Clinical Consideration 5**

Are you aware that abnormal feeding behaviour can be varied? It may include not waking for feeds, not latching at the breast, not sucking effectively, appearing unsettled and demanding very frequent feeds⁵.

Does your trust have a reluctant feeder² policy? Do you always observe at least one feed before a baby is discharged? Is there anything you could do to better support mothers to “get breastfeeding off to a good start”?

- **Learning point 6**

When the parents contacted the postnatal ward with concerns about lethargy, jaundice and poor feeding, the urgency of the problem was not recognised. While any of these in isolation may be managed with telephone advice, a baby displaying a number of signs of illness should be seen by a clinician urgently.

When transporting the baby to the hospital, an ambulance should have been called. Transporting an unresponsive baby in a car seat can be dangerous if they are too floppy to protect their airway. Seeking paramedic help in the community means that treatment can be commenced before arrival at hospital. It also ensures that the baby is correctly triaged and seen as quickly as possible on arrival to hospital, with crews able to call ahead with an alert if required.

- **Clinical consideration 6**

Who gives telephone advice in your trust? Do they have access to appropriate guidance and training? What is the system for recording telephone advice, and is it robust? Are local policies easily available to those giving telephone advice? Is there a threshold in your trust whereby a certain number of phone calls prompts a face to face review? Is this something that could be implemented?

- **Learning point 7**

In addition to implementing inpatient monitoring, it may have been possible to educate and empower the parents prior to discharge. If the baby had been identified as at risk of hypoglycaemia, verbal and written advice regarding the signs of poor feeding and hypoglycaemia should have been given to the parents¹ and they may have recognised problems themselves at an earlier stage.

- **Clinical Consideration 7**

What verbal and written information is provided to families about hypoglycaemia and hypothermia in your trust? Is this always provided? Is it easy to understand? Do staff know how and where to find written information for families? One such information advice leaflet can be found in the appendices of the BAPM Neonatal Hypoglycaemia framework for practice².

What has happened as a result?

This case is an example of those referred to NHS Resolution as part of the Early Notification scheme in light of the active cooling required and therefore the potential neonatal brain injury sustained.

Cases such as these are reviewed further to consider whether the injury could and should have been avoided. Where poor outcomes occur as a result of deficiencies in care, NHS Resolution aims to resolve all such cases as fairly and as quickly as possible. NHS Resolution will work with the family to ensure that, if appropriate, they are supported and compensated.

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. The current compensation cost to the NHS for a baby who has a long term severe brain injury is on average £12 million.

The human costs to the baby, families and clinical teams involved as a result of such cases are immeasurable and often devastating.

Resources:

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6. Nice.org.uk. 2021. *Overview | Intrapartum care for healthy women and babies | Guidance | NICE*. [online] Available at: <<https://www.nice.org.uk/guidance/cg190>> [Accessed 23 July 2021].
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(Published 8 October 2021)



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