



Improvement

Reducing harm leading to avoidable admission of full-term babies into neonatal units

Findings and resources for improvement

February 2017

Delivering better healthcare by inspiring and supporting everyone we work with, and challenging ourselves and others to help improve outcomes for all.

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Foreword

England is a safe country in which to have a baby. Those responsible for providing maternity and neonatal care strive constantly to improve outcomes and safety for mothers, babies and their families. The current focus on maternity safety, demonstrated through the work of the national Maternal and Neonatal Health Safety Improvement Collaborative, the Maternity Transformation Programme and the government's Maternity Safety Action Plan, prompts all levels of the system to work collaboratively to bring about improvement at scale and pace. This coalition of commitment shows again that by coming together to support improvement, national organisations can have real relevance where mothers, babies and families need them most and as close to home as possible.

My team and I are delighted to bring you this resource pack, issued alongside a patient safety alert to support the NHS to provide safer care and reduce the number of full-term babies (babies born at or after 37 weeks pregnancy) admitted to neonatal units.

The time just after a baby is born is a special, individual and heart-warming time for infants, mothers and their families. NHS staff in maternity units work hard to provide new mums with safe, high quality and compassionate care, but occasionally babies require additional oversight and intervention. We need to ensure that any additional intervention is appropriate, timely and where possible, optimises the wellbeing of both mother and baby. The work of the atain programme summarised in this report highlights opportunities for care delivery and service improvements. All providers of maternity and neonatal services are asked to review the findings in this report and to consider how they can use them to improve safety.

We hope that by sharing insights from the atain programme and providing the tools and guidance staff need, we can help as many new mums and babies as possible to be cared for together so as to enjoy the benefits of bonding at this important first stage of a baby's life.



Dr Mike Durkin

NHS National Director of Patient Safety
NHS Improvement

1. Introduction

This short resource summarises the work of NHS Improvement, frontline clinical experts, parents and baby charities to lever system-wide change and improvement by understanding preventable factors leading to full-term babies being admitted to neonatal units.

The work aligns with national priorities including:

- the Secretary of State for Health’s ambition to reduce stillbirth, neonatal brain injury and neonatal death by 50% by 2030¹
- recommendations in *Better Births*, taken forward in the NHS England-led Maternity Transformation Programme
- reducing harm through learning from serious incidents and litigation claims
- improving culture, team work and improvement capability within maternity units.

We focused on four key areas relating to term admissions – hypoglycaemia, jaundice, respiratory conditions and asphyxia (hypoxic–ischaemic encephalopathy) – and the factors leading to these admissions.² These represent some of the most frequently recorded reasons for admission according to neonatal hospital admissions data. However with a focus on improving safety and avoidable harm, we also drew on data from safety reports and litigation claims.

We also looked at babies whose care could have been managed without separation from their mother, either at home or in the community without admission. There is overwhelming evidence that separation of mother and baby at or soon after birth can affect the positive development of the mother–child attachment process (Crenshaw 2014). Mothers may find it harder to establish and maintain breastfeeding and it may affect their mental health (Bigelow et al 2012; Dumas et al 2013). Preventing separation, except for compelling medical indications, is an essential part of providing safe maternity services and an ethical responsibility for healthcare professionals (Crenshaw 2007; 2014).

We use ‘full-term’ or ‘term’ admissions here to include all babies born at or after 37 weeks gestation and admitted to a neonatal unit within the first 28 days after birth. Since some babies, eg those with jaundice, are admitted from home into a paediatric rather than a neonatal setting and the data presented in this report does not include these babies, this report underestimates the issues affecting these groups.

¹ www.gov.uk/government/news/new-ambition-to-halve-rate-of-stillbirths-and-infant-deaths

² The work of the asphyxia working group is not reflected in this document. The group focused on developing a leadership training programme for the maternity multidisciplinary leadership team. Their work will be published separately and linked to this document once available.

Our analysis confirms the importance of current national guidance from the National Institute for Health and Care Excellence (NICE), the Royal College of Obstetricians and Gynaecologists (RCOG), the Royal College of Midwives (RCM), the British Association of Perinatal Medicine (BAPM), the Care Quality Commission (CQC) and others. We signpost to resources that can support staff to implement this guidance consistently and identify opportunities for improvements.

2. How to use this resource

This resource gives an overall summary of how we went about analysis and our key findings. We examine each key area in turn. Where appropriate, we include links to relevant guidance and resources to support clinicians to implement evidence-based or best practice. We also outline areas where further support or resources will become available through the work of the NHS England-led Maternity Transformation Programme.

Where there has been detailed analysis, we are publishing our findings in peer-reviewed journals and more detail will be available as these papers are published. For links to open-access versions of these papers visit: <https://improvement.nhs.uk/resources/reducing-admission-full-term-babies-neonatal-units/>

3. Background

Improving the safety of maternity services is a key priority for the NHS and reducing admission of full-term babies to neonatal care is an indicator in the [NHS Outcomes Framework for 2016 to 2017](#). The number of unexpected admissions of term babies is seen as a proxy indicator that harm may have been caused at some point along the maternity or neonatal pathway. We have worked with maternity leads and clinical experts to reduce avoidable admissions to neonatal units for term babies. See Annex 1 for more information about this work.

In 2013 in England, there were 80,251 admissions to neonatal units of which almost 60% (48,000) were babies born at term. By 2015 the number of term admissions had risen to 54,821 despite a 3.6% fall in term live births. Some term admissions are necessary even if all appropriate care has been given, eg for a baby born with a congenital abnormality requiring surgical management. Other admissions may reflect successful implementation of improvement programmes in other areas, such as stillbirth reduction programmes. Some babies will require admission for antibiotic treatment or intensive phototherapy for jaundice, although babies who remain well with these conditions can often be managed in a transitional care setting alongside their mothers.

However, one unexpected finding of the work was the number of babies who would not have needed to be admitted if there were services that keep mother and baby together. We would encourage clinicians and commissioners to work together to consider the role that transitional care³ models could play locally in reducing unnecessary admissions to neonatal units while keeping mother and baby together.

4. The national picture

Data and population

We created a data file with extracts from the National Neonatal Research Database held at the Neonatal Data Analysis Unit (NDAU), an independent academic unit of Imperial College London. The National Neonatal Research Database contains data on all admissions to neonatal units in England, Wales and Scotland, and is approved by the National Research Ethics Service (ref 10/H0803/151), the Confidentiality Advisory Group of the Health Research Authority (ref 8-05(f)/2010) and the Caldicott Guardians of each contributing NHS trust. The Office of National Statistics (ONS) which contains complete birth registrations provided denominator data.

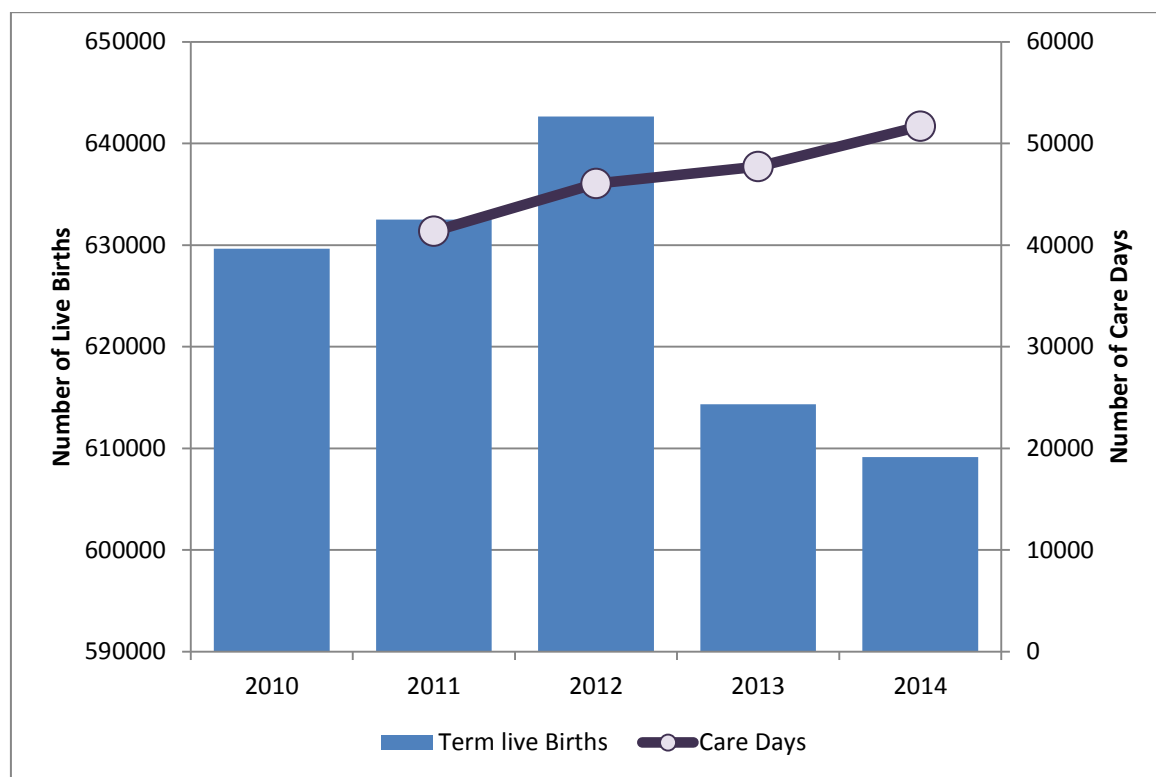
Our study population included babies born at or after 37 weeks gestation, born in an NHS maternity unit and admitted to a neonatal unit in England over three years between 1 January 2011 and 31 December 2013. We excluded babies for whom data about their first admission episode was missing; whose first episode of care was in a non-English neonatal unit or whose gestational age was missing. We did not have information about babies admitted to paediatric or postnatal wards. Our final data file contained information on over 136,600 babies.

Trends in neonatal admission rates

Between 2011 and 2014, the number of term live births in England declined by 3.6%, but the number of admissions of term babies to neonatal units increased by 24% with a further increase of 6% in 2015. This increase is seen across all categories of care but particularly in special care where an extra 10,000 babies were admitted in 2015 compared to 2011.

³ Transitional care is a care model in the maternity setting where the mother is resident with her baby and providing care. Care above that needed normally is provided by the mother with support from a midwife/healthcare professional.

Figure 1: Term live births in England (2011 to 2014) in relation to term care days (2011 to 2015)



Between 2011 and 2015 the number of care days for term admissions across care at levels 1, 2 and 3 rose by over 30%.

The increase in activity generated by term admissions was seen in all types of units: neonatal intensive care units (NICUs), local neonatal units (LNUs) and special care units (SCUs) as well as in all categories of care.⁴

Intensive care and high dependency activity were primarily concentrated in the NICUs and LNUs, suggesting that sicker babies were being transferred appropriately within neonatal networks. The increase in special care activity equated to 9,947 days between 2011 and 2015, 93% of which occurred in LNUs and NICUs. This is not surprising as there are now very few stand-alone SCUs.

⁴ SCUs provide special care for their local population. They also provide a stabilisation facility for babies who need to be transferred to a higher level of care and they receive transfers for continuing special care.

LNUs provide all categories of neonatal care for their catchment population, but they transfer babies who require complex or longer-term intensive care to a NICU. Some LNUs provide high dependency care and short periods of intensive care for their network population.

NICUs provide the whole range of medical neonatal care for their local population, along with extra care for babies referred from the neonatal network. Many NICUs in England are co-located with neonatal surgery services and other specialised services. (See the toolkit for high quality neonatal services at: http://webarchive.nationalarchives.gov.uk/20130107105354/http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/@ps/@sta/@perf/documents/digitalasset/dh_108435.pdf)

To identify variation in the percentage of term admissions by unit, the number of term live births by level of unit is required.

Since this special care activity is dictated by birth population rather than neonatal network pathways, it is likely to reflect changes in the way care of term babies is being delivered.

Local clinical review of admissions of term babies

Although the four areas focused on in the attain programme make up the majority of admissions to neonatal units, shared learning from local reviews shows that some units have identified other causes for high term admission rates. Regular, multidisciplinary local reviews will provide a useful starting point for understanding why a term baby has been admitted to the neonatal unit and for identifying service improvements.

- For all unplanned admissions to a neonatal unit for medical care at term a thorough and joint clinical review by the maternity and neonatal services should identify learning points to improve care provision, consider the impact service re-design might have on reducing admissions and identify avoidable harm.
- Clinical reviews undertaken jointly by both maternity and neonatal services should optimise understanding of potential areas of suboptimal care so that the learning and impact can be fully addressed.
- This should include considering whether the baby was admitted as a 'safety net' strategy because of concern for infant wellbeing on the delivery unit or the postnatal ward, or because of lack of availability of transitional care.

Resources to support clinical review of term admissions

For more information and guidance on clinical reviews go to:

<https://improvement.nhs.uk/resources/reducing-admission-full-term-babies-neonatal-units/>

5. Admissions for management of hypoglycaemia

During the study period, there were 13,136 term neonatal admissions with hypoglycaemia as the principal reason for admission: it was the third most common cause of admissions of term newborns.

Admissions for hypoglycaemia accounted for nearly 12% of all term admissions for which a reason for admission was recorded and 0.7% of all term live births in England during this period.

Babies born at 37 to 38 weeks gestation accounted for 21% of all term live births but 55% of term admissions for hypoglycaemia. This was not fully explained by increased incidence of maternal or obstetric risk factors resulting in an early delivery.

Nearly two-thirds of admissions for hypoglycaemia occurred in 'normal' birth weight (2500 to 4500 g) infants.

Thirty-nine per cent of admissions for hypoglycaemia occurred in infants deemed at low risk (no recorded maternal medical or obstetric problems, birth weight between 2500 and 4500 g and no requirement for resuscitation at birth). Since there is no indication to measure blood glucose in the absence of clinical signs in these babies, it appears a significant number of them have blood glucose measurements outside guidelines recommended by the World Health Organization, British Association of Perinatal Medicine (BAPM) and UNICEF Baby Friendly Initiative.

As clinical signs were not available, this group could also include babies with unexpected and potentially damaging hypoglycaemia demonstrating the need for clinical vigilance and action on abnormal signs even in babies with no apparent risk factors.

Babies born by caesarean section (CS) were over-represented. They accounted for 48% of all admissions for hypoglycaemia, 33% of the low risk babies admitted before they were one hour old were born by CS.

Blood glucose of <2.6 mmol/l at admission was significantly more common in babies who were hypothermic on admission (admission temperature 36°C) than among those whose body temperature was within normal limits (71.3% vs 56.8%, $p < 0.001$).

Twenty-five to 40% of admissions of at-risk infants occurred before the infants were four hours old.

Thirty per cent of low risk infants were admitted before they were four hours old, a period of physiological transient fall in neonatal blood glucose, and a period of time required for postnatal feeding interventions. Half of these occurred within 60 minutes of birth.

Where a source of admission was recorded, 44% of all admissions for hypoglycaemia were directly from the birth room or theatre. This proportion increased to 71% among those admitted before they were four hours old, and to 86% among infants of diabetic mothers admitted before they were four hours old.

These admissions in the first hours after birth and directly from place of birth suggest a policy of 'prophylactic' admissions, and that insufficient time was given for postnatal feeding and thermoregulation interventions to succeed.

In term newborns, blood glucose concentrations less than 2.6 mmol/l have traditionally been suggested as the threshold for intervention, although there is no evidence base for this. In this cohort where hypoglycaemia was recorded as the principal reason for admission, admission blood glucose was not recorded in 23% of admissions. Among the recorded values, 24% of admission

blood glucose concentrations were greater than 2.6 mmol/l. For babies admitted within four hours of birth, 41% had an admission blood glucose greater than 2.6 mmol/L.

The requirement for intravenous glucose infusion for management of hypoglycaemia would be a valid reason for admission to the neonatal unit. Fifty-six per cent of babies admitted to the neonatal unit for hypoglycaemia did not need an intravenous glucose infusion. Eighty-six per cent of infants of diabetic mothers admitted within an hour of birth did not ever need an intravenous glucose infusion.

Infants admitted for hypoglycaemia accounted for over 76,000 care days with the special care category accounting for around 80% of care at all levels. At a conservative estimate, these admissions imposed a financial burden of over £25 million over the three-year period.

There was marked variation among different providers in the proportions of early (within four hours of birth) admissions for hypoglycaemia (ranging from 6 to 95%); low-risk infants admitted (15 to 88%); and use of intravenous glucose infusion (3 to 79%). This suggests that different providers have substantially different approaches to prevention and management of hypoglycaemia in term newborn infants.

We acknowledge that untreated neonatal hypoglycaemia may be a cause of long-term harm. We advocate optimal preventive management, with prompt and appropriate treatment if hypoglycaemia is persistent or associated with clinical signs.

However, our analysis indicated that many admissions for hypoglycaemia could be prevented by anticipatory management of at-risk babies, eg with thermoregulation and feeding support. Our analysis also indicated that many babies who do not have clinically significant hypoglycaemia or have not benefited from anticipatory management are admitted unnecessarily.

Guidance for clinical review teams

We used the questions below to provide clinical insights for our analysis: they may be useful to support local analysis of admissions for hypoglycaemia:

- Was the baby at risk of hypoglycaemia:
 - did the mother have diabetes?
 - was the baby diagnosed with intrauterine growth restriction?
 - did the baby require resuscitation?
 - was the mother taking beta-blockers antenatally?
 - was there evidence of fetal compromise during the labour or immediately after birth, ie were blood gases, base deficit and/or lactate within normal ranges?

- Did the baby have clinical signs of hypothermia?
- What method of blood glucose monitoring was used?
- What were the pre-admission interventions?
- What level of intervention was required on admission to the neonatal unit?
- Was local hypoglycaemia guidance followed?
- Is local hypoglycaemia guidance in line with current national guidance?
- Were Unicef UK Baby Friendly Initiative (BFI) and World Health Organization (WHO) guidelines followed?
- Was the baby admitted as a default concern around infant wellbeing on the postnatal ward?
- Was the correct diagnosis ascribed at admission?
- Did the level of intervention require separation of mother and baby?
- Could this baby have been managed in a setting that kept mother and baby together?

Resources to support prevention, identification and management of neonatal hypoglycaemia

- Anticipation and identification of 'at risk' babies:
www.cqc.org.uk/sites/default/files/20160707_babyclinicalrisks_web.pdf
www.bapm.org/publications/documents/guidelines/NEWTT%20framework%20final%20for%20website.pdf
- Implementation of the BAPM Newborn Early Warning Trigger and Track (NEWTT) tool:
www.cqc.org.uk/sites/default/files/20160707_babyclinicalrisks_web.pdf
www.bapm.org/publications/documents/guidelines/NEWTT%20framework%20final%20for%20website.pdf
- Prevention and management of neonatal hypoglycaemia outlined in UNICEF BFI:
www.unicef.org.uk/BabyFriendly/Resources/Guidance-for-Health-Professionals/
- Ensuring adequate feeding support is in place for all babies:
www.unicef.org.uk/BabyFriendly/Resources/Guidance-for-Health-Professionals/
www.nice.org.uk/guidance/cg132/chapter/1-guidance#care-of-the-baby-born-by-cs
- Avoiding hypothermia after birth through appropriate thermal care including skin-to-skin contact:
www.unicef.org.uk/BabyFriendly/Resources/Guidance-for-Health-Professionals/

- Responsive attitudes to maternal concerns regarding feeding and/or infant wellbeing:
www.rcm.org.uk/sites/default/files/Emotional%20Wellbeing_Guide_WEB.pdf
- Implement the BFI standards to achieve and maintain UNICEF Baby Friendly accreditation (Unicef 2011))
- Recommendations following the thematic review of litigation claims (Hawdon et al 2016):
<http://fn.bmj.com/content/early/2016/08/23/archdischild-2016-310936.full>
www.nhs.uk/Safety/Documents/Did_you_know_NHSLA_Neonatal_Hypo_Flyer.pdf
- BAPM Framework for Practice: Identification and Management of Neonatal Hypoglycaemia in the Full Term Infant

6. Admissions for management of jaundice

Each year, on average, 2,700 babies are recorded as admitted for the primary reason of jaundice. This represents around 6% of term babies admitted to neonatal care and 0.4% of babies born in England, but is likely to be an underestimate as the study data did not include babies admitted to paediatric settings.

Jaundice was the primary reason for 1,082 admissions from home over three years; representing 22.3% of all admissions from home.

Risk factors for admission for jaundice among term babies included being born at 37 weeks, male, of lower birth weight, one of a multiple birth or of Asian ethnicity.

Babies were admitted at a median age of 1.9 postnatal days but this was significantly later for babies born at home than for babies born in hospital (median 3.9 days versus 1.7).

Of babies admitted for jaundice 80.6% received phototherapy for a median duration of one day (interquartile range (IQR) one to three days); 32.8% received intravenous fluids for a median duration of two days (IQR one to three days)

The rate of exchange transfusion (1.6%) was similar among babies admitted from home and hospital.

The median total length of stay was five days (IQR three to seven days). Babies admitted for jaundice were mainly cared for in special care: 99% received care in special care, 4.9% required high dependency care and only 3.6% required admission to intensive care.⁵

The reported rate of kernicterus (a serious complication of neonatal jaundice that can cause severe brain injury, disability or death)⁶ was higher among babies admitted from home (0.28%) than from hospital (0.06%); there were eight cases diagnosed in the neonatal period in total. Fifty per cent of babies diagnosed with kernicterus were admitted from home; 50% were admitted at five or more postnatal days. All were discharged home. We appreciate that this is likely to be an underestimate because kernicterus is not always diagnosed in the neonatal period.

Jaundice cannot be prevented; it is an expected facet of neonatal physiology. Once present, it should be monitored to ensure that the baby's bilirubin levels remain below a threshold level that is considered non-toxic. Once the baby has been transferred home, community-based monitoring should continue, and midwifery support is essential to ensure adequate feed intake. These are important interventions which help avoid re-admission.

Bilirubin levels that are above the threshold level require treatment with phototherapy. In general, phototherapy is a highly effective treatment that will control and reduce bilirubin levels. At moderately high levels of bilirubin the treatment can be given while the baby stays at the mother's bedside and continues feeding via her chosen method.

Treatment with 'simple phototherapy' does currently require hospital re-admission but is much more acceptable to families and a less distressing experience than an emergency admission to a neonatal unit. At higher bilirubin levels, or when the bilirubin levels rise despite treatment, babies require admission to a neonatal unit for more intensive management.

Review of national data has shown that many babies treated with 'simple phototherapy' are currently admitted to neonatal units and separated from their mothers; this treatment can and should be provided in a setting that keeps mother and baby together.

Guidance for clinical review teams

We used the questions below to provide clinical insights: they may be useful to support local analysis:

- Did the baby have risk factors for jaundice?
- If so, was a plan in place for early detection and management of hyperbilirubinaemia?
- Was the baby re-admitted from the community setting?

⁵ Totals exceed 100% because babies can be transferred between levels of care during their neonatal stay.

⁶ Kernicterus It is caused by excess bilirubin damaging the brain or central nervous system when high bilirubin levels cross the blood/brain barrier.

- Could use of transcutaneous bilirubinometers have helped to avoid this admission?
- Were there delays in admission and management following referral from the community?
- Did the baby's parents/carers have the necessary information to recognise jaundice, and were they empowered to seek help?
- Was there a delay between the carers recognising the problem and healthcare professionals responding which contributed to the need for admission?
- Was NICE guidance followed in the management of jaundice?
- What was the highest level of intervention in relation to management of hyperbilirubinaemia (observation, phototherapy, exchange transfusion, etc)?
- Did the level of intervention require separation of mother and baby?
- Could this baby have received care in a setting which kept mother and baby together?
- Was there an associated weight loss and history of poor feeding?

Resources to support prevention, identification and management of neonatal jaundice

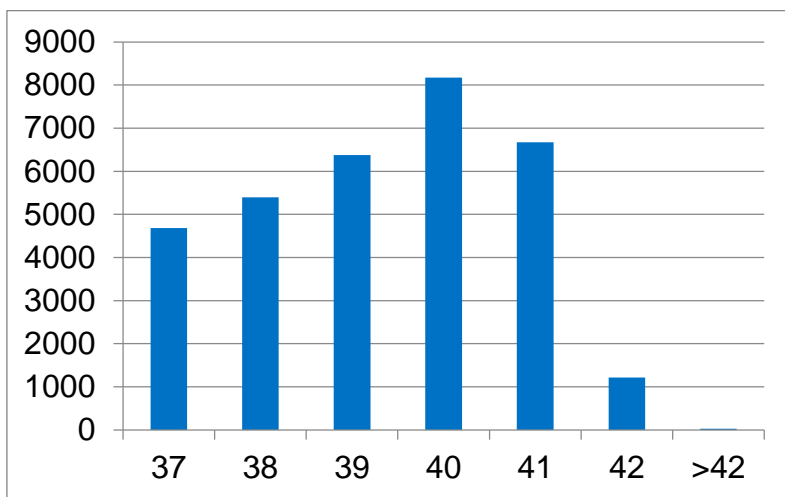
- Targeted assessment of jaundice in the first few days of life according to NICE guideline CG 98:Jaundice in newborn babies under 28 days: www.nice.org.uk/guidance/cg98
- Implementation of the BAPM NEWTT tool:
www.cqc.org.uk/sites/default/files/20160707_babyclinicalrisks_web.pdf
www.bapm.org/publications/documents/guidelines/NEWTT%20framework%20final%20for%20website.pdf
- Postnatal care: www.nice.org.uk/guidance/cg37/evidence

7. Admissions for management of respiratory symptoms

Respiratory problems were the most common reason for admission of term infants, with approximately 25% of the total cohort having this recorded as their primary problem at the time of admission.

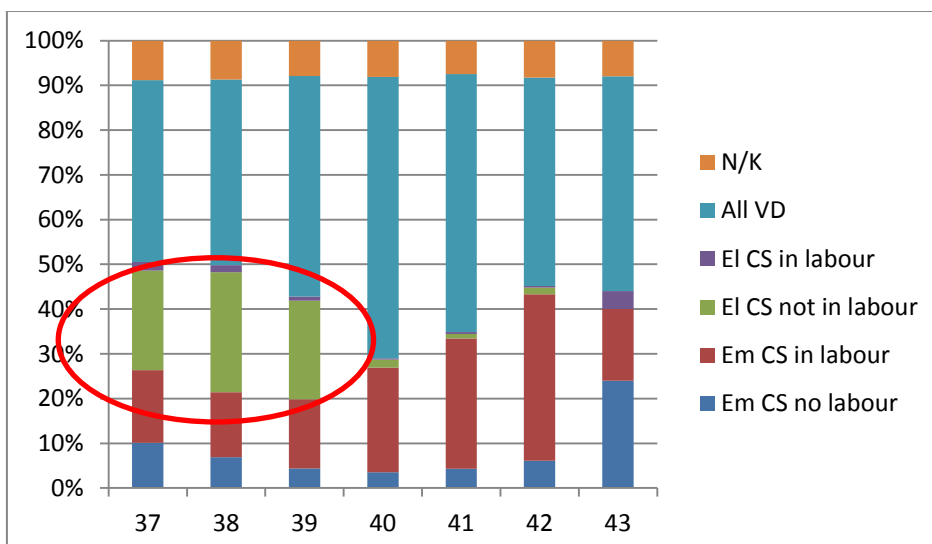
Of the 31,722 babies admitted with respiratory symptoms, approximately 10,000 were below 39 weeks gestation.

Figure 2: Gestation of babies admitted with respiratory symptoms



Twenty-five per cent were delivered by elective CS before the onset of labour.

Figure 3: Percentage of babies admitted with respiratory symptoms who were delivered by elective CS before the onset of labour



Thirty-five per cent of babies admitted with respiratory symptoms were admitted for less than 72 hours and required only special care.

Two-thirds of these (23% of the total) were admitted for less than 48 hours and 10% of them never required oxygen.

Hypothermia was not a significant factor in most admissions of babies for respiratory symptoms: 68% had an admission temperature between 36.5°C and 37.5°C and 86% an admission temperature between 36°C and 37.5°C.

Avoiding elective CS before 39 weeks and maintaining an optimal thermal environment are modifiable factors for reducing term admissions for respiratory symptoms.

Guidance for clinical review teams

We used the questions below to provide clinical insights: they may be useful to support local analysis:

- Was the baby born by elective CS before 39 weeks?
- Was there a medical indication for delivery before 39 weeks?
- Did the level of intervention warrant separation of mother and baby?
- What was the length of stay?
- Could this baby have been cared for in a setting that kept mother and baby together?
- Was the baby admitted because of a default concern around infant wellbeing on the postnatal ward?
- If infection was the underlying cause, were intrapartum antibiotics given if indicated (eg intrapartum pyrexia or risk factors for Group B Streptococcus)?

Resources to support prevention, identification and management of respiratory symptoms

- Highlighting the increased risk of admission to a neonatal unit for babies born before 39 weeks associated with elective caesarean:

www.nice.org.uk/guidance/cg132/chapter/1-guidance

- Care of the baby born by CS:

www.nice.org.uk/guidance/cg132/chapter/1-guidance#care-of-the-baby-born-by-cs

- Implementation of the BAPM NEWTT tool:

www.cqc.org.uk/sites/default/files/20160707_babyclinicalrisks_web.pdf

www.bapm.org/publications/documents/guidelines/NEWTT%20framework%20final%20for%20website.pdf

- Postnatal care:
www.nice.org.uk/guidance/cg37/evidence
- Avoiding hypothermia after birth through appropriate thermal care including skin-to-skin contact:
www.unicef.org.uk/BabyFriendly/Resources/Guidance-for-Health-Professionals/
- Responsive attitudes to maternal concerns about infant wellbeing:
<http://fn.bmj.com/content/early/2016/08/23/archdischild-2016-310936.full>
- Royal College of Midwives *Maternal Emotional Wellbeing and Infant Development: a good practice guide for midwives*:
www.rcm.org.uk/sites/default/files/Emotional%20Wellbeing_Guide_WEB.pdf

8. The importance of keeping mother and baby together

Our analysis of term babies admitted to neonatal units using patient-level data between 2011 and 2014 suggests that a substantial proportion of term admissions are probably preventable with a different care model. For example:

- **Respiratory problems:** 23% of admissions for respiratory problems stayed for up to 48 hours and needed special care only, with 10% not needing oxygen at all.
- **Jaundice:** Most babies admitted for jaundice required phototherapy only and could be more appropriately managed in a transitional care setting.
- **Hypoglycaemia:** Similarly, among babies admitted for hypoglycaemia, 30% of admissions occurred before they were four hours old (with half of these within an hour of birth) – a period of physiological transition in glucose metabolism. Forty-four per cent were admitted directly from the delivery suite, and admission blood glucose concentration was above the operational threshold in a quarter of these admissions, suggesting few or no postnatal ward interventions.
- This was supported by the finding that nearly 75% of babies admitted for hypoglycaemia within an hour of birth did not need intravenous glucose infusion.

Mothers and babies have a psychological and physiological need to be together at the moment of birth and during the hours and days that follow. Keeping mothers and babies together is a safe and healthy birth practice (Crenshaw, 2007) that can reduce the chances of harm from later health concerns occurring as a consequence of early separation.

Based on decades of evidence, the WHO and UNICEF recommend that all healthy mothers and babies, regardless of feeding preference and method of birth, have uninterrupted skin-to-skin care beginning immediately after birth for at least an hour and/or, for breastfeeding women, until after the first feed (Unicef 2011).

Skin-to-skin care reduces stress in the newborn; helps the transition to postnatal life (Moore et al 2012; Buckley 2014); reduces the risk of neonatal hypothermia by promoting thermoregulation (Bergström et al 2007; Gabriel et al 2010; Sobel et al 2011; Takahashi 2011; Moore et al 2012); and enables colonisation of the newborn with maternal flora (as opposed to hospital bacteria), which provides protection against infection (Sobel et al 2011). Most importantly, skin-to-skin care facilitates primitive reflexes of the newborn baby which in turn assist the baby's positioning and latching to breast feed ('biological nurturing'). This is the most important intervention in the first hour following delivery, with long-term positive health implications for mother and baby (Crenshaw 2014).

The benefits of skin-to-skin care extend beyond the immediate period after birth. Whether in a maternity care setting or at home, the physical and emotional need of mother and baby for each other continues. Being together, the mother learns her baby's needs and how best to care for, comfort and soothe them. Evidence suggests keeping mothers and babies together 24 hours a day improves health outcomes for both mother and baby (Crenshaw 2007; Sobel et al 2011)

Furthermore there is increasing evidence that early emotional interactions between a baby and their parents, particularly the mother, are fundamental to brain development, subsequent success, life chances and the ability to form strong loving relationships (Gerhardt 2004; Bystrova et al 2009; Howard et al 2011).

Impact of mother–baby separation

Lack of skin-to-skin care and early separation may disturb maternal–infant bonding, reduce the mother's affective response to her baby, and have a negative effect on maternal behaviour (Bystrova et al 2009). It increases the risk of failure to establish and continue breastfeeding (Yamauchi 1990). Babies who are not exclusively breastfed are at higher risk of illnesses and complications in infancy, childhood and adulthood, including gastrointestinal infection, atopy, lower respiratory tract infections, sudden infant death, type 1 and type 2 diabetes, obesity and heart disease (Ip et al 2007). Mothers who do not breast feed are at higher risk of osteoporosis, ovarian cancer and breast cancer (Ip et al 2007). Breastfeeding may also reduce the likelihood of postnatal depression (Bigelow et al 2012).

Resources to support mother–baby bonding, breastfeeding and neonatal thermoregulation

- Promoting skin to skin between mother and baby as soon as possible after delivery:
www.unicef.org.uk/BabyFriendly/Resources/Guidance-for-Health-Professionals/
www.nice.org.uk/guidance/cg37/evidence
- Discouraging early interruption (within two hours of birth) of skin-to-skin contact as this reduces the chances of early breastfeeding:
www.unicef.org.uk/BabyFriendly/Resources/Guidance-for-Health-Professionals/
- Evidence-based breastfeeding support and advice:
www.unicef.org.uk/BabyFriendly/Resources/Guidance-for-Health-Professionals/
www.nice.org.uk/guidance/cg37/evidence
- Responsive attitudes to maternal concerns about infant wellbeing:
<http://fn.bmj.com/content/early/2016/08/23/archdischild-2016-310936.full>

9. Actions for NHS Improvement

NHS Improvement will work with system partners and the Maternity Transformation Programme to:

- provide published evidence to support the case for provision of adequately resourced transitional care facilities to keep baby and mother together where safe to do so
- develop an e-learning training package with Health Education England (HEE) for all professionals involved in the care of women and newborns to identify ‘at risk babies’ and address learning needs identified through our data analyses
- use publications and speaking events to promote the use of handheld bilirubinometers to aid earlier detection and assessment of jaundice; highlighting the role of transcutaneous bilirubinometry in early assessment of jaundice in the community and emphasising their cost effectiveness
- highlight the impact of maternal–infant separation on maternal mental health and long-term outcomes
- raise awareness of the impact of separation of mother and baby on breastfeeding rates and the implications for long-term outcomes

- support maternity and neonatal teams as part of the [national maternal and neonatal health safety collaborative](#)⁷ to deliver improvements in care to address term admissions.

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⁷ <https://improvement.nhs.uk/resources/maternal-and-neonatal-safety-collaborative/>

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The atain programme



Atain (an acronym for ‘avoiding term admissions into neonatal units’) is a programme of work to reduce harm leading to avoidable admission to a neonatal unit for infants born at term, ie $\geq 37^{+0}$ weeks gestation.

The programme is led by clinical experts from a range of organisations, including NHS Improvement, who have worked together to offer system-wide insights, practice points and evidence for healthcare organisations and professionals.

The programme focused on four key clinical areas: respiratory conditions; hypoglycaemia; jaundice; asphyxia (perinatal hypoxia–ischaemia). They represent a significant amount of potentially avoidable harm to babies. Two extra overarching groups were set up to focus on professional education and training needs and provide information for parents, recognising the key role parents play in their infants’ wellbeing.

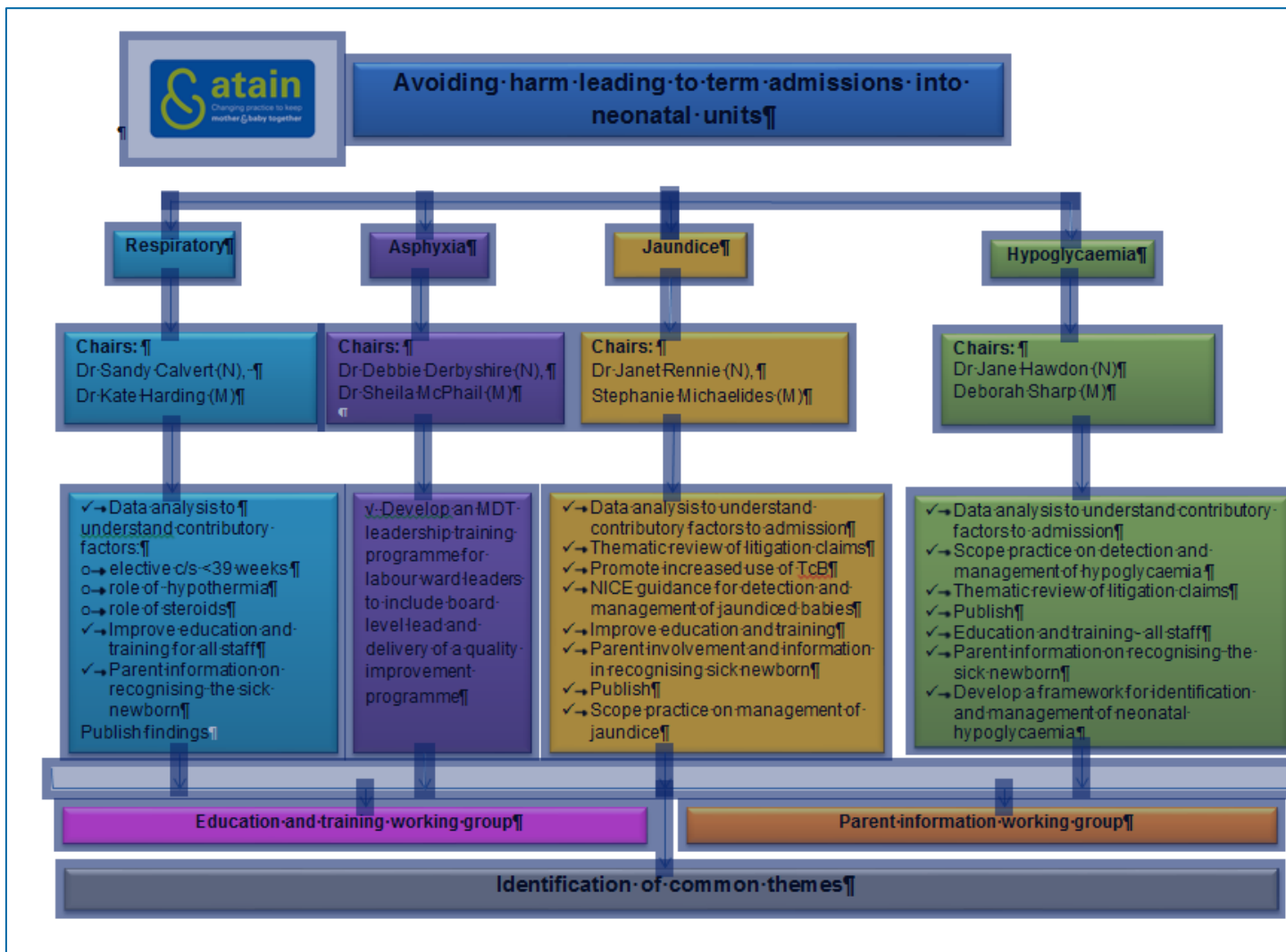
The working groups drew on intelligence gathered as part of the team’s response to indicator 5.5 of the NHS Outcomes Framework 2016 to 2017. Sources including patient safety reports, hospital admission data and litigation claims indicate that a healthcare system-wide approach is required to address the issue of preventing avoidable term admissions.

Furthermore, there is overwhelming evidence that separation of mother and baby at or soon after birth interrupts the normal bonding. Not only is there the potential for significant impact on maternal mental health and bonding, but also the adverse impact on successful breastfeeding. Although the main focus is avoiding harm that requires admission, we are also identifying learning on babies whose care could have been managed without admission.

Two subject expert clinicians (maternity and neonatal) led the work in each area, bringing perinatal insights. They were supported by a small working group. The working groups are made up of a multidisciplinary team of subject specialists, clinicians and parents with an interest in the relevant topic area. They identified priorities and deliverables, outlined in the figure below.

Shared learning from local reviews, done as part of a national CQUIN, demonstrated that although the four areas are relevant to most units, some units have identified other causes for high term admission rates. It is therefore imperative that there are regular, multidisciplinary, local reviews to understand why a term baby has been admitted to the neonatal unit and identify service improvements.

Figure 4: The atain programme



Key: N = neonatal lead; M = maternity lead; TcB = transcutaneous bilirubinometers

Priorities ✓ = completed

Atain was included as a best practice programme of work in the Department of Health *Safer Maternity Care action plan* announced by the Secretary of State for Health on 17 October 2016.

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- NHS England
- Nicky Lyon, Harry's Mum, Campaign for safer Births
- The Royal College of Midwives
- The Royal College of Nursing
- The Royal College of Obstetricians and Gynaecologists
- UNICEF Baby Friendly Initiative.

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