

# A survey of newborn babies admitted for the treatment of jaundice

Reducing the number of full term infants admitted into neonatal units is a priority for the NHS. Neonatal jaundice is the fourth most common reason for a term admission into a neonatal unit and the most common reason for admission from home. This article considers the findings of a three-month retrospective national survey of practice aimed at understanding variation in admission processes and management of term newborn babies admitted with jaundice from home.

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## Background

Reducing the number of full term infants ( $\geq 37$  weeks' gestation) admitted into neonatal units is a priority for the NHS and a welcome focus for clinical teams working to address the recommendations of *Better Births* and the Maternity Transformation Programme.<sup>1-3</sup> Work undertaken by the Patient Safety Team within NHS Improvement in collaboration with clinical experts identified that jaundice is the fourth most common reason for a term admission into a neonatal unit and the most common reason for admission from home.<sup>4</sup>

## Neonatal jaundice

Jaundice is a common and usually harmless short-term condition affecting approximately 60% of term and 80% of preterm babies in the first week of life. Breast milk fed babies are more likely than formula fed babies to develop jaundice and about 10% of breastfed babies are still jaundiced at one month of age.<sup>5</sup> While some admissions to the hospital environment may be appropriate most are unexpected and may lead to babies being separated from mothers and/or families, which can result in a number of adverse consequences including:

- Interruption of the mother-child attachment process
- unnecessary medical intervention
- adverse impact on establishing breastfeeding
- higher risk of exposure to iatrogenic infection
- financial pressure for families travelling to and from the hospital and the additional costs of using hospital facilities.

Data informing neonatal admissions for

jaundice are available from BadgerNet but this source does not give a full or accurate account of the story behind an admission for jaundice, nor does it capture those babies who are admitted from home to postnatal and paediatric wards. Current figures extracted from the National Neonatal Research Database (NNRD), which captures only admissions to neonatal care, are likely to reflect only the tip of the iceberg.

A retrospective survey was undertaken to capture current practice in relation to the identification and management of term newborn babies admitted for the primary reason of jaundice to all neonatal, maternity and paediatric settings. The aim was to accurately record the entire clinical picture relating to admissions for jaundice.

## Methodology

The inclusion criteria, in line with the ATAIN (Avoiding Term Admissions into Neonatal Units) programme, initially comprised babies born at  $\geq 37$  weeks' gestation who were either transferred within the hospital setting or admitted from the community with a primary diagnosis of jaundice. A pilot study was undertaken during the month of August 2016 and several changes were made to the survey proforma in line with feedback. The inclusion criterion for age was extended from  $\geq 37$  weeks' gestation to  $\geq 35$  weeks' gestation because this additional cohort was identified as significant from the community admissions and also for the reason that the National Institute for Health and Care Excellence (NICE) recommends the use of transcutaneous bilirubinometers (TcB) from  $\geq 35$  weeks' gestation.<sup>6</sup>

## Keywords

neonatal jaundice; newborn; term admission; infant feeding; transcutaneous bilirubinometer

## Key points

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1. Admission to hospital for neonatal jaundice is widely under-reported due to the variety of admission locations.
2. Babies born at 37 weeks' gestation appear to be at greater risk of admission than any other age group.
3. Formula milk is often introduced to breastfeeding babies following admission for jaundice.
4. Transcutaneous bilirubinometer monitoring in the community remains low despite the documented benefits.

A letter inviting participation was sent to all operational delivery network leads asking them to disseminate at unit level. Those wishing to contribute then made contact with the named national lead for the survey. The data collection was then carried out by the named leads at trust level using an online questionnaire and electronic survey platform. The questionnaire could only be completed once the baby was discharged. Ethics approval was not sought as this was carried out as a service improvement project. Although data could be entered anonymously, participants could choose to leave their contact details should they wish to have their local data returned to them for further analysis.

No identifiable data was requested except the infant's date of birth. The data collection details included:

- gestational age at birth
- age at admission
- the method used to diagnose jaundice (eg transcutaneous monitor, blood sampling)
- date of admission
- admission source
- which care delivery area of the hospital they were admitted to
- feeding status throughout the admission pathway
- subsequent management and treatment provided.

The final data collection criteria and parameters included all admissions with a primary diagnosis of jaundice throughout the three month period of October 2016 to December 2016.

A total of 519 responses were received from approximately 46 trusts across England. However, due to a lack of clarity as to the main reason for admission within the hospital setting, 222 cases were excluded from the analysis, reducing the sample to 297 babies.

### Summary of findings

This survey identified variability in admission settings, assessment, treatment and location.

Over half of the babies admitted were white British, born by vaginal delivery and exclusively breastfeeding at the point of admission (FIGURE 1). A third were delivered at 37 weeks' gestation.

These findings are in keeping with a recently published study by Battersby et al,<sup>7</sup> which identified babies displaying similar demographic characteristics admitted with

Admissions from home (n=297)		
	Number	%
Male	168	57
Female	129	43
White British	159	54
Any other white	33	11
Delivery at 37 weeks' gestation	104	35
Vaginal delivery	201	68
Breast milk feeding at admission	203	68
Serum bilirubin identified using a transcutaneous device	79	27

FIGURE 1 An overview of the babies admitted with a diagnosis of jaundice.

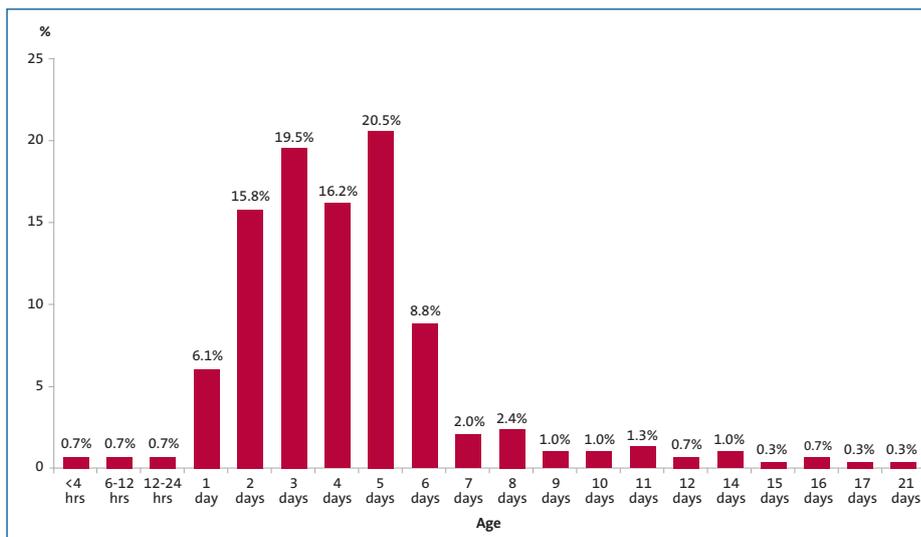


FIGURE 2 Age at admission.

a diagnosis of jaundice: predominantly babies born by vaginal delivery (61.5%) and born at 37 weeks' gestation (30.8%). The survey reported here identified a lower Asian ethnicity (10%) compared to Battersby et al (17.9%).

### Admissions from the community

It must be noted that the population of Battersby et al's study, covering admissions during 2011-2013, were to neonatal units. Their research found that babies were transferred from the postnatal ward to the neonatal unit and were therefore more likely to be separated from their mother. The findings within the study presented here demonstrate that the majority of babies with a primary diagnosis of jaundice admitted from the community to hospital settings were admitted to facilities that keep mothers and babies together.

Babies from the community were more likely to be admitted directly to the postnatal ward (33%), followed by transitional care (25%) and the paediatric

ward (25%). One per cent were treated at home. Only 16% were admitted directly to the neonatal unit. This is largely due to admission policies from community settings into acute services. It suggests that community admissions allow mothers a greater opportunity to remain with their babies, thus reducing the negative effects of separation. However, the variation in admission pathways suggests that mothers have different experiences dependent on which hospital they are admitted to, although this may also be due to the clinical needs of the baby, local cot capacity, lack of transitional care facilities and individual trusts' policies.

### Age at admission

Admission from the community was most common on day three (19.5%) and day five (20.5%), which coincides with the current timings of community midwife visits when poor feeding and weight loss are frequently identified (FIGURE 2).

### Length of stay

The average length of stay for admissions from the community was 56 hours with 42% of admitted babies staying 1-2 days and 24% staying 2-3 days (FIGURE 3). The range was 0 hours to 36 days.

The length of stay varied by gestational age. The average length of stay for babies born at 35-37 weeks' gestation was 2-3 days. For babies born at 38 weeks' gestation the length of stay was 3-4 days and just 1-2 days for those born at 39-42 weeks' gestation (FIGURE 3).

### Gestational age and type of delivery

Babies born at 37 weeks' gestation were significantly more likely to be admitted

than any other gestation (FIGURE 4). This might suggest an inherent vulnerability in babies born at the cusp of full term. The majority of these babies were born vaginally suggesting most were treated as low risk during the postnatal period. Admissions at this particular gestation were more likely to be from home on day 3 or day 3.5.

The cohort of babies born at 35 and 36 weeks' gestation were less likely to be admitted than might have been anticipated given their vulnerability, with only 17% admitted directly from the community with a diagnosis of jaundice. This probably relates to having been classified as high risk at birth – they will have stayed longer in

hospital following their birth and/or received enhanced postnatal care due to their prematurity.

### Diagnosis and treatment

Of babies admitted from the community, 96% were managed with phototherapy although 20% of these had treatment despite having bilirubinaemia below the threshold set by NICE guidance.<sup>8</sup>

### The use of handheld TcBs

The NICE guideline CG98, *Jaundice in Newborn Babies under 28 Days*,<sup>6</sup> clearly states that a baby whose bilirubin does not exceed the threshold level should not receive phototherapy. In this study, it was identified that 58 out of 297 babies received phototherapy even though their bilirubinaemia was below the NICE threshold. This practice suggests incorrect plotting of serum bilirubin levels or over-cautious and prophylactic use of phototherapy when babies were admitted from the community. These findings contribute to promoting the case for the use of TcBs in the community to avoid unnecessary admissions to hospital and unwarranted interventions.

Of all babies admitted from the community just 27% (79 out of 297) were assessed using transcutaneous monitors to measure bilirubin levels (FIGURE 5). This indicates that the value of TcB in the community may be underappreciated.

The survey only captured information on the method used to diagnose jaundice at the first screen and did not specify whether it was undertaken in the home or hospital. The mean length of stay was shorter in the group diagnosed by TcBs (37 hours vs 63 hours), which suggests they were diagnosed and treated promptly.

### Feeding

Of the 297 admissions from the community, 81 (27%) were admitted with

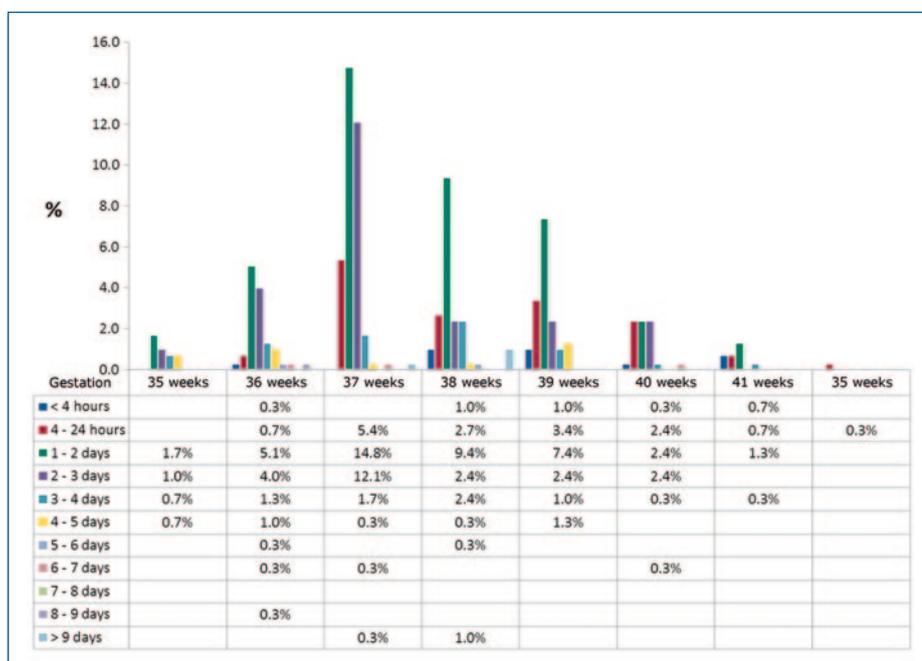


FIGURE 3 Gestational age vs length of stay.

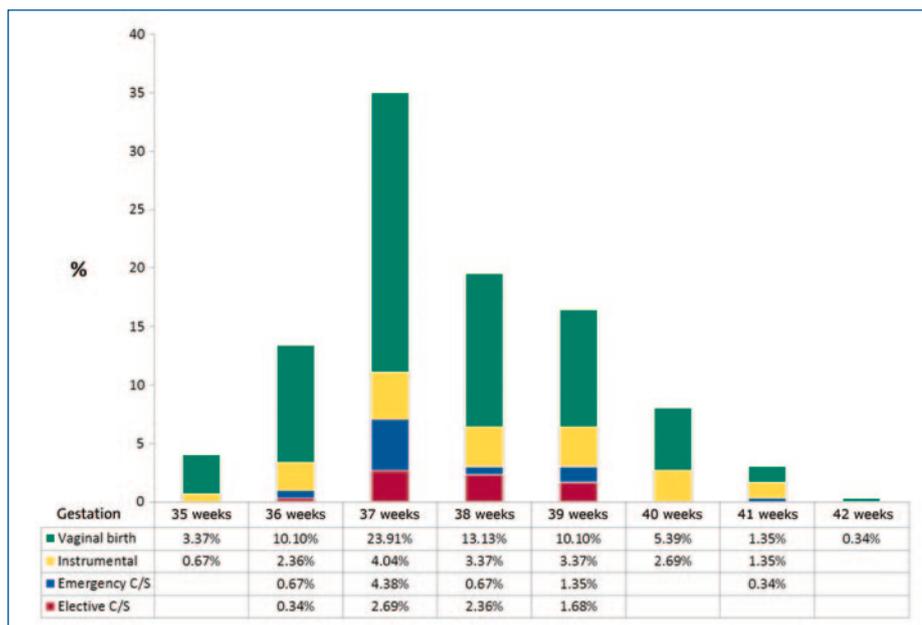


FIGURE 4 Gestational age and type of delivery. Key: C/S = caesarean section.

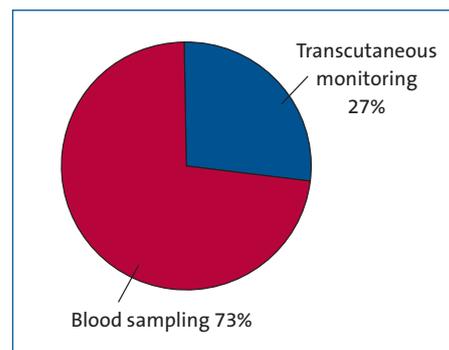


FIGURE 5 The use of transcutaneous devices in the community.

poor feeding as well as jaundice. Unsurprisingly, 25% (21 out of 81) of babies were born at 37 weeks' gestation, highlighting vulnerability at this lower gestational age of term.

FIGURE 6 shows the method of feeding in these 81 babies vs their gestational age. Notably, 68% of these babies were fully breastfeeding prior to admission but this changed significantly after admission (FIGURE 7). The survey found that babies were more likely to be admitted from home fully breastfeeding at each gestation but were more likely to be mixed feeding after admission. This is a disappointing finding as it suggests that formula feeding has become an integral part of the treatment for jaundice.

At discharge, fewer than half the original number had continued with breastfeeding (42%) indicating that more targeted support is needed within the hospital environment to assist and encourage breastfeeding and thus restore maternal confidence and choice.

### Limitations of the survey

Additional questions could have revealed further insights into factors affecting admission, management and outcomes including maternal and antenatal influences such as whether this was a first baby, the mother's health and body mass index, fetal wellbeing pre-delivery and type of anesthetic used at delivery. From a neonatal perspective, factors could include being one of a multiple, home delivery, age at discharge home following delivery in hospital, whether the peak bilirubin was taken before or after treatment or how many days treatment the baby received. Findings from this survey do not provide definitive answers, however local case note reviews and drawing on the insights gleaned from this small study could help to identify modifiable factors leading to avoidable admissions for jaundice.

### Discussion

If left unchecked, neonatal jaundice has the potential for avoidable harm including rare but catastrophic outcomes. This survey confirmed that while the majority of babies are successfully treated over a short period of time, there is potential for reducing unnecessary admissions through early recognition of jaundice using TcBs and improvements in community feeding support.

Non-invasive screening used in the community is more likely to encourage

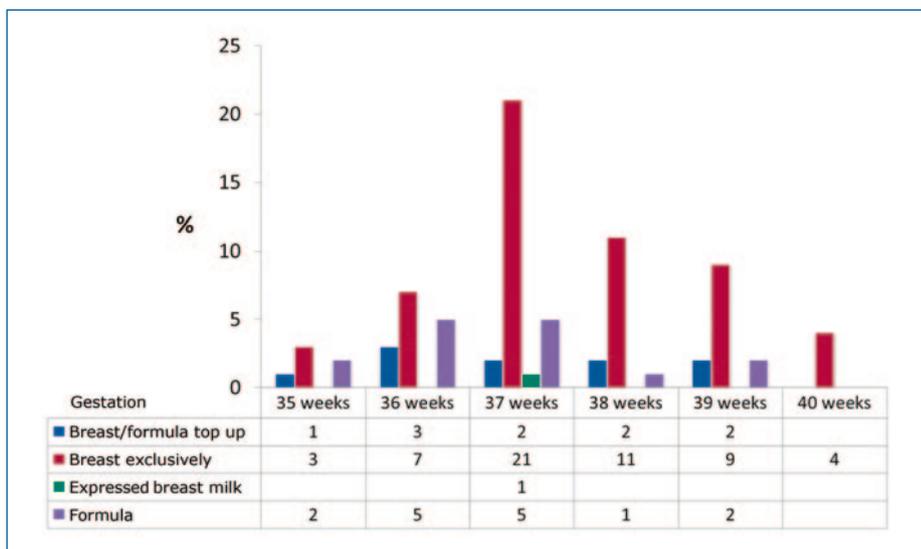


FIGURE 6 The method of feeding in 81 babies admitted with poor feeding as well as jaundice vs their gestational age.

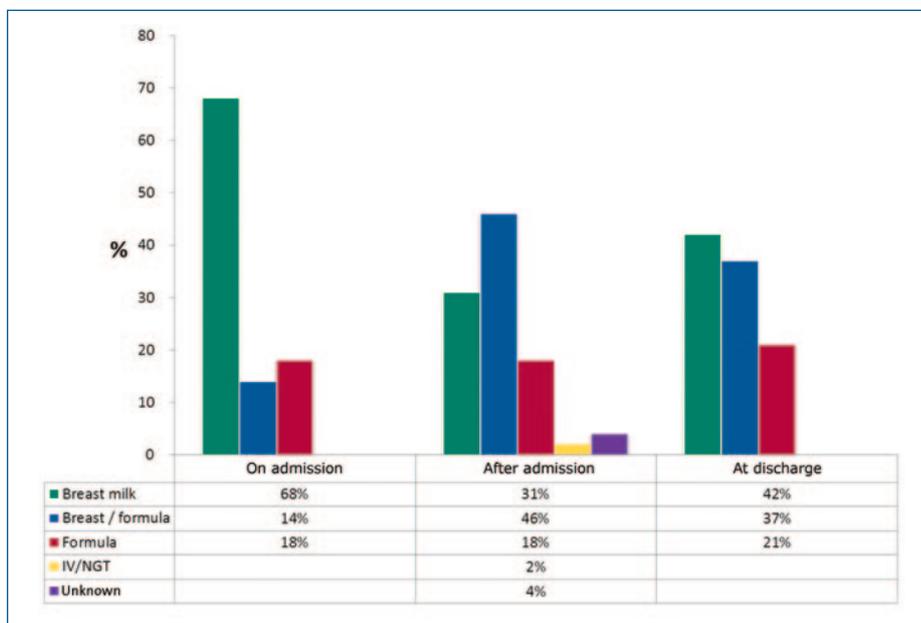


FIGURE 7 Feeding at admission, after admission and discharge. Key: IV = intravenous, NGT = nasogastric tube.

earlier diagnosis as midwives/nurses are able to frequently review the baby's jaundice levels. TcBs play a key role in improving the experience of care, reducing clinical intervention and avoiding unnecessary trips to hospital. TcBs can be used to monitor babies born at  $\geq 35$  weeks' gestation who are over 24 hours old. The handheld meters can be used in any setting and give instantaneous results. The practice is not distressing for the baby, less traumatic for the parents, and does not involve travel to the hospital for a blood test to measure serum bilirubin.<sup>9</sup> This latter point is especially pertinent if the result does not indicate a need for treatment.

Uptake within community and maternity services remains low despite the

benefits of transcutaneous monitoring to practitioners, parents and babies. This may be due to financial implications (high device cost) and controversies regarding evidence of benefit; however long-term savings related to community midwife time due to enhanced efficiency and less reliance on acute and drop-in services promotes efficiency within healthcare processes.<sup>10</sup>

In line with findings from Battersby et al,<sup>7</sup> it is evident from this study that babies born at 37 weeks' gestation are more at risk of admission to a hospital setting. These early term babies are regarded as full term, however the data identify their vulnerability. These babies may have additional needs and it is recommended that mothers

should be given extra support and information on early intervention as well as the signs of early deterioration.

The findings show that once babies are admitted, formula milk is often introduced and frequently continued until discharge. Formula should be used as an interim intervention for the treatment of jaundice with targeted support for breastfeeding and clear communication regarding the short-term role that formula plays.

Babies from the community are more likely to be admitted to ward settings that support mothers and babies being kept together. The inevitable interruption in the establishment of feeding and disruption to family life could be mitigated through better management of babies with an increased likelihood of significant jaundice (exclusively breastfeeding babies, a previous sibling with neonatal jaundice requiring phototherapy, visible jaundice in the first 24 hours of life and a gestational age of <38 weeks<sup>3</sup>) through targeted feeding support and the use of TcBs in the community.

Importantly, unless these infants were admitted to a neonatal unit, (which routinely records all babies onto the BadgerNet database), mapping the 'true' incidence of all admissions for jaundice would remain unknown. In keeping with the aims of the ATAIN programme, individual trusts should monitor and review all unanticipated term admissions to level 1, 2 and 3 neonatal units so as to identify trends in processes and practice, which will help reduce and prevent avoidable admissions. When admission is unavoidable, a pathway of care should be followed to ensure that all babies receive consistent, evidence-based care regardless of the place of admission. It is important to ensure feeding preferences are supported and all mothers are given the confidence to continue breastfeeding successfully.

The use of phototherapy when serum bilirubin results were under the NICE

treatment threshold is concerning. When used unnecessarily this intervention increases parental anxiety and interrupts early family bonding with no benefit to the baby. There is a significant incremental leap in the treatment thresholds recommended by NICE between 37 and 38 weeks' gestation. However, the survey was unable to evidence whether this adversely affects outcomes because it did not document whether the peak bilirubin was obtained before or after treatment or how long the baby had been receiving treatment. Nevertheless, an increase in the threshold at 37 weeks' gestation would reduce the number of babies being admitted with jaundice at this gestation.

Many of the findings outlined in this paper are covered under current NICE recommendations. The NICE Quality Standard QS57, *Jaundice in Newborn Babies under 28 Days*, states: "A person-centred approach to providing services is fundamental to delivering high quality care to babies with neonatal jaundice in all settings."<sup>3</sup> A robust care pathway at birth with early community support and sustained breastfeeding is central to reducing admissions for jaundice.

### Recommendations

The authors make the following recommendations:

- Use of a care bundle based on NICE guidance to provide a definitive pathway for babies regardless of place of admission
- Enhanced feeding and maternal support at discharge and in the community for those babies identified as more likely to develop significant jaundice, particularly those born at 37 weeks' gestation.
- Further examination by NICE of treatment thresholds at 37 and 38 weeks' gestation.
- Local case reviews on all admissions for jaundice to identify modifiable factors so as to implement interventions to reduce

avoidable admissions.

- Financial support for local maternity services to purchase TcBs.

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