NATIONAL INSTITUTE FOR HEALTH AND
CARE EXCELLENCE

Quality standards

Briefing paper: neonatal parenteral nutrition

**Quality Standards Advisory Committee meeting**: 21 September 2021

# Contents

[1 Introduction](#_Toc71542841) 2

[2 Overview 2](#_Toc71542843)

[3 Summary of suggestions 5](#_Toc71542849)

[4 Suggested improvement areas 7](#_Toc71542852)

[4.1 Starting parenteral nutrition](#_Toc71542853) 7

[4.2 Safe delivery of parenteral nutrition 10](#_Toc71542854)

[4.3 Constituents of parenteral nutrition](#_Toc71542853) 14

[4.4 Monitoring and discontinuing use of parenteral nutrition 18](#_Toc71542854)

[4.5 Involving parents and carers 21](#_Toc71542855)

[4.6 Additional areas 25](#_Toc71542855)

[Appendix 1: Suggestions from registered stakeholders 26](#_Toc71542858)

1. Introduction

This briefing paper presents a structured overview of potential quality improvement areas for neonatal parenteral nutrition. It provides the committee with a basis for discussing and prioritising quality improvement areas for development into draft quality statements and measures for public consultation.

This briefing paper includes a brief description of the topic, a summary of each of the suggested quality improvement areas and supporting information.

Recommendations selected from the key development source are included to help the committee in considering potential statements and measures.

* 1. Development source

The key development source referenced in this briefing paper is:

[Neonatal parenteral nutrition. NICE guideline NG154](https://www.nice.org.uk/guidance/ng154) (2020)

1. Overview
	1. Focus of quality standard

This quality standard will cover parenteral nutrition (intravenous feeding) for babies born preterm, up to 28 days after their due birth date and babies born at term, up to 28 days after their birth.

* 1. Definition

Parenteral nutrition (PN) refers to intravenous feeding, a technique for providing nutrition to those who are unable to tolerate adequate enteral nutrition (orally or through an enteral tube). It is frequently needed by preterm babies while they establish enteral feeds, critically ill babies, and babies with gastrointestinal disorders who need surgery.

Inadequate nutrition, particularly in preterm babies, can have short-term and long-term health effects, including longer stays in the neonatal unit, an increased risk of infection, and worsened developmental outcomes. There is also evidence that inappropriate nutritional management soon after birth is linked to the development of metabolic syndrome in adults.

PN contains nutrients such as glucose, electrolytes, amino acids, lipids, minerals, trace elements and vitamins. It may complement enteral feeding or, in some situations, replace it.

* 1. Incidence and prevalence

In 2019, 66,577 babies were admitted to neonatal units for more than 24 hours in England, Wales, Scotland and the Isle of Man ([National Neonatal Audit Programme 2020](https://nnap.rcpch.ac.uk/)). PN is widely used in neonatal care. It has become common practice to start it in preterm babies within the first few hours of life, and also to support term babies who are critically ill.

* 1. Current service delivery and management

The [National Confidential Enquiry into Patient Outcome and Death enquiry into the care of hospital patients receiving parenteral nutrition](https://www.ncepod.org.uk/2010pn.html) (2010) reviewed 264 cases of neonatal PN. It found that 73% of cases represented less than 'good practice', 40% had metabolic complications, 40% did not meet nutritional needs, and in 28% the start of PN was delayed. In 37%, the first PN provided was considered inadequate for the patient's needs.

PN is normally formulated in an aseptic pharmacy unit. It can be in standardised or individualised forms. Prescribing is complex and open to error. Simplified, standardised regimens may reduce this risk, and may reduce costs.

In current practice, virtually all babies born before 31+0 weeks who weigh less than 1.5 kg need PN for a period that depends on gestation, birthweight and other morbidities. Postnatal growth failure is common in babies born before 31+0 weeks. It is associated with an increased need for respiratory support and increased risk of infection. It is also a risk factor for neurocognitive impairment. Optimal use of PN could potentially avoid postnatal growth failure.

PN costs a large tertiary neonatal unit approximately £175,000 a year.

* 1. Resource impact

We do not expect this quality standard to have a significant impact on resources. When NICE’s guideline on neonatal parenteral nutrition was developed, a resource impact statement was produced which noted that:

* the resource impact of implementing any single guideline recommendation will be less than £1 million per year in England (or £1,800 per 100,000 population) and
* the resource impact of implementing the whole guideline in England will be less than £5 million per year (or £9,100 per 100,000 population).

Most of the recommendations aim to re-enforce best practice and reduce clinical variation and the assessment is these will not have a significant impact.

It is noted that where centres are not currently following the existing MHRA guidance on light protection there may be a resource impact to bring practice in line with the guidance and the NICE guideline. More detail is provided under section 4.2, resource impact.

Neonatal services are commissioned by NHS England and clinical commissioning groups. Providers are NHS hospital trusts.

1. Summary of suggestions
	1. Responses

In total 12 registered stakeholders responded to the 2-week engagement exercise.

* All 12 stakeholders suggested areas

9 specialist committee members suggested areas

The responses have been summarised in table 1 for further consideration by the committee.

Table 1 Summary of suggested quality improvement areas

| Area for improvement | Stakeholders  |
| --- | --- |
| **Starting parenteral nutrition*** Timing of administration
* Incremental increases and enteral feeding
 | BH, CN, SCMs, KCH, NHSE&I CRG. |
| **Safe delivery of parenteral nutrition*** Central venous catheters and equipment
* Light protection
* Multidisciplinary team to support parenteral nutrition
 | BH, CN, SCMs, KCH, NHSE&I CRG, RCPCH.  |
| **Constituents of parenteral nutrition*** Use of standardised bags
* Amino acid and phosphate levels
 | BH, SCMs, KCH, NHSE&I CRG, NHSE, RCPCH. |
| **Monitoring and discontinuing use of parenteral nutrition*** Monitoring neonates on parenteral nutrition
* Discontinuing parenteral nutrition
 | SCMs, KCH, RCPCH. |
| **Involving parents and carers*** Information and support
* Shared decision making
* Separation
 | BH, BL, iHV, SCMs, NHSE&I CRG, RCN, BN, UUKBFI. |
| **Additional areas*** Breastfeeding
* Measuring key targets
 | iHV, RCN, BN, BSNA.  |

Abbreviations:

* BH, Baxter Healthcare
* BL, Bliss
* BSNA, British Specialist Nutrition Association
* CN, Cochrane Neonatal
* iHV, Institute of Health Visiting
* KCH, King’s College Hospital NHS Foundation Trust
* NHSE&I CRG, NHS England and NHS Improvement Neonatal Critical Care Clinical Reference Group
* NHSE&I M, NHS England and NHS Improvement Maternity Team
* RCN, Royal College of Nursing
* RCPCH, Royal College of Paediatrics and Child Health
* SCM, Specialist Committee Member
* BN, The Breastfeeding Network
* UUKBFI, Unicef UK Baby Friendly Initiative.

Full details of all the suggestions provided are given in appendix 1 for information.

1. Suggested improvement areas

Section 4 presents a summary of the suggested improvement areas, with provisional recommendations that may support statement development and information on current UK practice.

* 1. Starting parenteral nutrition

### Timing of administration

Stakeholders highlighted the need for preterm and term babies who meet the indications for parenteral nutrition (PN) to be started on PN within 8 hours. Delays to starting can contribute to an increasing nutritional deficit and lead to short- and long-term harms.

A stakeholder commented that when enteral feeds are stopped when very low birthweight babies clinically deteriorate, they are usually given dextrose 10%. They felt that PN should be considered unless it is known that enteral feeds will be restarted quickly.

A stakeholder noted that babies on the neonatal unit born at less than 32 weeks will initially need some respiratory support. They can usually start enteral feeding within the first 24hrs but it may take several days until they receive adequate enteral nutrition meaning they would benefit from PN on admission.

#### Selected recommendations

NICE’s guideline on Neonatal parenteral nutrition (NG154):

1.1.4 For preterm babies on enteral feeds, start parenteral nutrition if:

* enteral feeds have to be stopped and it is unlikely they will be restarted within 48 hours
* enteral feeds have been stopped for more than 24 hours and there is unlikely to be sufficient progress with enteral feeding within a further 48 hours.

1.1.5 For term babies on enteral feeds, start parenteral nutrition if:

* enteral feeds have to be stopped and it is unlikely they will be restarted within 72 hours
* enteral feeds have been stopped for more than 48 hours and there is unlikely to be sufficient progress with enteral feeding within a further 48 hours.

1.1.6 When a preterm or term baby meets the indications for parenteral nutrition, start it as soon as possible, and within 8 hours at the latest.

No recommendations were identified in relation to dextrose with enteral feeding.

#### Current UK practice

The [National Confidential Enquiry into Patient Outcome and Death enquiry into the care of hospital patients receiving parenteral nutrition](https://www.ncepod.org.uk/2010pn.html) (2010) carried out a case-based peer review of parenteral nutrition in neonates across England, Wales, Northern Ireland and the Offshore Islands. The reviewers in the enquiry looked at the case notes of 264 neonates from 74 hospitals and at patient care questionnaires completed by the relevant clinicians.

This enquiry found that there was an unreasonable delay in recognising the need for PN in 28% (71/252) of neonates.

It found that 72% of neonates began PN on the same day as the decision to start was made. 21% started the next day, with 4% starting on the second day and 1 neonate not starting PN until 10 days later. Reasons for delays included PN not being available at the weekend (3 patients), difficult intravenous access (2 patients) and awaiting stabilisation of the patient (2 patients). The enquiry concluded that there was unreasonable delay in starting PN in 17% of cases.

Incremental increases and enteral feeding

A stakeholder commented that neonates receiving PN should have their macronutrient levels incremented up to target levels within 4 days of PN administration beginning.

A stakeholder felt that faster rates of advancement of enteral feed volumes should be used. They stated that advancing the volume of enteral feeds at slow rates results in several days of delay in establishing full enteral feeds and increases the risk of invasive infection.

#### Selected recommendations

NICE’s guideline on Neonatal parenteral nutrition (NG154):

1.3.1 For preterm and term babies who need total neonatal parenteral nutrition, deliver energy as follows:

* If starting parenteral nutrition in the first 4 days after birth:
	+ give a starting range of 40 to 60 kcal/kg/day
	+ gradually increase (for example, over 4 days) to a maintenance range of 75 to 120 kcal/kg/day.
* If starting parenteral nutrition more than 4 days after birth:
	+ give a range of 75 to 120 kcal/kg/day.

No recommendations were identified relating to the advancement of enteral feed volumes.

#### Current UK practice

No current practice data has been identified in this area.

Issues for consideration

**For discussion:**

* What is the priority for improvement?
	+ - When to consider starting PN for preterm or term babies?
		- How quickly it should be started when the decision is made?
		- How quickly the energy delivery should be increased?
* What is the key action that will lead to improvement?
* Can we develop a specific, measurable statement?

**For decision:**

* Should this area be prioritised for inclusion in the quality standard?
	1. Safe delivery of parenteral nutrition

Central venous catheters and equipment

Stakeholders felt that central venous catheters should be used to deliver parenteral nutrition (PN) in preterm babies. It was noted that this lasts longer that peripheral access and has a lower risk of complications such as thrombophlebitis and extravasation. Using a centrally placed venous catheter minimises damage to venous vessels due to the high osmolality of PN.

A stakeholder commented that the main complications from PN are line sepsis and extravasation. They noted that the training for and availability of appropriate line placement support varies across units.

A stakeholder stated that it is not uncommon for neonatal units to use separate PN giving sets, filters and bionectors. There can be issues with the lipid infusion occluding that lead to the line being broken multiple times to change filters and bionectors. This can lead to PN being discontinued.

#### Selected recommendations

NICE’s guideline on Neonatal parenteral nutrition (NG154):

1.2.1 Use a central venous catheter to give neonatal parenteral nutrition. Only consider using peripheral venous access to give neonatal parenteral nutrition if:

* it would avoid a delay in starting parenteral nutrition
* short-term use of peripheral venous access is anticipated, for example, less than 5 days
* it would avoid interruptions in giving parenteral nutrition
* central venous access is impractical.

No recommendations were identified in relation to line placement or to neonatal units using separate PN giving sets, filters and bionectors.

#### Current UK practice

No current practice data has been identified in this area.

### Light protection

Stakeholders noted the importance of light protection of bags, syringes and infusion sets of both aqueous and lipid PN solutions. Light protection can prevent potentially harmful photo-degradation and oxidation of neonatal PN solutions. One stakeholder commented that sometimes neonatal units do not do this with giving sets due to confusion with other types of lines such as epidural, or because of concern that if this is done the lipid and clear line from PN would look the same and this could increase the risk of errors.

#### Selected recommendations

NICE’s guideline on Neonatal parenteral nutrition (NG154):

1.2.3 Protect the bags, syringes and infusion sets of both aqueous and lipid parenteral nutrition solutions from light.

#### Current UK practice

No current practice data has been identified in this area.

### Multidisciplinary team to support parenteral nutrition

Stakeholders felt that neonatal units should have access to a nutritional multidisciplinary team that is involved in the decision-making process and overseeing the governance and delivery of PN. Access to a multidisciplinary team is important to ensure a safe and effective PN service.

#### Selected recommendations

NICE’s guideline on Neonatal parenteral nutrition (NG154):

1.9.1 Neonatal parenteral nutrition services should be supported by a specialist multidisciplinary team. Such teams could be based locally or within a clinical network.

1.9.2 The neonatal parenteral nutrition multidisciplinary team should include a consultant neonatologist or paediatrician with a special interest in neonatology, a neonatal pharmacist and a neonatal dietitian, and should have access to the following:

* a neonatal nurse
* a paediatric gastroenterologist
* an expert in clinical biochemistry.

1.9.3 The neonatal parenteral nutrition multidisciplinary team should be responsible for:

* governance, including:
	+ agreeing policies and protocols for the neonatal parenteral nutrition service
	+ ensuring that policies and protocols for neonatal parenteral nutrition are followed and audited
	+ monitoring clinical outcomes
* supporting delivery of parenteral nutrition, including:
	+ providing clinical advice
	+ providing enhanced multidisciplinary team input for preterm and term babies with complex needs, for example, babies with short bowel syndrome who may need long-term parenteral nutrition.

#### Current UK practice

No current practice data has been identified in this area.

### Resource impact

Recommendation 1.2.3 recommends the use of light-shielding syringes, lines and bags to protect lipids and amino acids from sunlight. This re-enforces the recommendation that is in the existing MHRA safety guidance sent to healthcare professionals and compounding centres in September 2019. Where centres are not currently following the existing MHRA guidance there may be a resource impact to bring practice in line with the guidance and the NICE guideline.

No specific resource impact information was identified for the other areas in this section.

### Issues for consideration

**For discussion:**

* What is the priority for improvement?
	+ - Use of a central venous catheter to give PN?
		- Using light protection?
		- Access to a nutritional multidisciplinary team? Could this be specific enough?
* What is the key action that will lead to improvement?
* Can we develop a specific, measurable statement?

**For decision:**

* Should this area be prioritised for inclusion in the quality standard?
	1. Constituents of parenteral nutrition

### Use of standardised bags

Stakeholders felt that standardised bags should be used as a first choice when delivering parenteral nutrition (PN) to neonates. Standardised PN improves consistency in nutritional care, reduces variation in practice and reduces the risk of errors when making up non-standard bags. They also enable the delivery of early PN, being available on units 24 hours a day.

A stakeholder noted that standardised PN has many benefits, but when a baby becomes hyperglycaemic it is common for much of the PN to be substituted for dextrose 5% meaning the baby is receiving suboptimal nutrition.

A stakeholder suggested the use of all-in-one triple chamber PN bags where appropriate.

A stakeholder commented that the pharmaceutical quality oversight of the procurement of neonatal parenteral nutrition solutions varies across the country. They stated that the majority of solutions used in clinical practice are unlicensed medicines and do not have the same regulatory oversight as licensed medicines. Others noted that a wide selection of standardised bags are available and the lack of availability of a standard formulation will result in variation in the nutrition given to neonates.

#### Selected recommendations

NICE’s guideline on Neonatal parenteral nutrition (NG154):

1.5.1 For preterm and term babies, give glucose as follows:

* If starting parenteral nutrition in the first 4 days after birth:
	+ give a starting range of 6 to 9 g/kg/day
	+ gradually increase (for example, over 4 days) to a maintenance range of 9 to 16 g/kg/day.
* If starting parenteral nutrition more than 4 days after birth:
	+ give a range of 9 to 16 g/kg/day.

1.6.1 When starting neonatal parenteral nutrition for preterm and term babies, use a standardised neonatal parenteral nutrition formulation ('standardised bag').

Note that this might be an off-label use as not all parenteral nutrition formulations have a UK marketing authorisation for this indication. See [prescribing medicines](https://www.nice.org.uk/about/what-we-do/our-programmes/nice-guidance/nice-guidelines/making-decisions-using-nice-guidelines#prescribing-medicines) for more information.

1.6.2 Standardised bags should:

* be formulated to allow delivery of parenteral nutrition as recommended in the sections on [neonatal parenteral nutrition volume](https://www.nice.org.uk/guidance/ng154/chapter/recommendations#neonatal-parenteral-nutrition-volume) and [constituents of neonatal parenteral nutrition](https://www.nice.org.uk/guidance/ng154/chapter/recommendations#constituents-of-neonatal-parenteral-nutrition)
* be prepared following nationally agreed quality standards.

1.6.3 Continue with a standardised bag unless an [individualised parenteral nutrition formulation](https://www.nice.org.uk/guidance/ng154/chapter/recommendations#individualised-parenteral-nutrition-formulations) is indicated, for example, if the baby has:

* complex disorders associated with a fluid and electrolyte imbalance
* renal failure.

No recommendations were identified in relation to all-in-one triple chamber bags or the procurement of neonatal PN solutions.

#### Current UK practice

The [National Confidential Enquiry into Patient Outcome and Death enquiry into the care of hospital patients receiving parenteral nutrition](https://www.ncepod.org.uk/2010pn.html) (2010) found that, out of 236 neonates, 107 (45%) received standard bags, with 34 of these also receiving additives. 86 neonates (36%) received bespoke PN, 21 (9%) received ‘other’ PN which is not defined and the type of PN received was not documented in 22 (9%) of cases.

This data is broken down in the table below:



### Amino acid and phosphate levels

A stakeholder noted that preterm babies eligible for PN should receive 1.5-2 g/kg/d of amino acid on day 1 of PN.

A stakeholder noted that neonates on PN should receive phosphate at 2 mmol/kg/day. They stated that standardised bags available on the market do not contain enough phosphate, usually maximum of 1.5mmol/kg/day, which limits use by neonatal units with no aseptic service. They explained that it is difficult to give intravenous phosphate supplementation to run alongside PN due to volume and compatibility.

#### Selected recommendations

NICE’s guideline on Neonatal parenteral nutrition (NG154):

1.5.2 For preterm babies, give amino acids as follows:

* If starting parenteral nutrition in the first 4 days after birth:
	+ give a starting range of 1.5 to 2 g/kg/day
	+ gradually increase (for example, over 4 days) to a maintenance range of 3 to 4 g/kg/day.
* If starting parenteral nutrition more than 4 days after birth:
	+ give a range of 3 to 4 g/kg/day.

1.5.11 For preterm and term babies, give phosphate as follows:

* If starting parenteral nutrition in the first 48 hours after birth:
	+ give 1 mmol/kg/day
	+ increase to a maintenance dosage of 2 mmol/kg/day after 48 hours.
* If starting parenteral nutrition more than 48 hours after birth, give 2 mmol/kg/day.
	+ Give a higher dosage of phosphate if indicated by serum phosphate monitoring.

#### Current UK practice

The [National Confidential Enquiry into Patient Outcome and Death enquiry into the care of hospital patients receiving parenteral nutrition](https://www.ncepod.org.uk/2010pn.html) (2010) found that in 37% (66/178) of neonates receiving PN, the PN constituents were not adequate for the baby’s needs. The common reasons for inadequate PN constituents were insufficient amino acid and lipid content, or too slow progression of these constituents.

Issues for consideration

**For discussion:**

* What is the priority for improvement?
	+ Standardised bags being the first choice
	+ Focus on glucose, amino acid or phosphate levels
* What is the key action that will lead to improvement?
* Can we develop a specific, measurable statement?

**For decision:**

* Should this area be prioritised for inclusion in the quality standard?
	1. Monitoring and discontinuing use of parenteral nutrition

Monitoring neonates on parenteral nutrition

A stakeholder noted that there is variation within neonatal units on how often to measure triglycerides and concerns on what to do if they are high as limiting fat in parenteral nutrition (PN) would compromise growth.

A stakeholder stated that there is no standardised monitoring of neonates on PN meaning hospitals monitor different aspects of PN. They highlighted the importance of identifying electrolyte disturbances promptly and for interventions to be made quickly. They also advised that standardisation allows good handover if babies are moved between hospitals.

#### Selected recommendations

NICE’s guideline on neonatal parenteral nutrition (NG154):

1.7.6 Measure serum triglycerides:

* daily while increasing the parenteral nutrition lipid dosage
* weekly after reaching a maintenance intravenous lipid dosage.

1.7.7 Measure serum triglycerides more frequently, but not more than once a day, if:

* the level is elevated
* the preterm or term baby is at risk of hypertriglyceridaemia, for example, if the baby is critically ill or has a lipaemic blood sample.

1.7.8 Be aware that ongoing serum triglyceride monitoring may not be needed for stable preterm or term babies transitioning from parenteral nutrition to enteral nutrition.

No recommendations in relation to standardising monitoring of PN in neonates were identified.

#### Current UK practice

The [National Confidential Enquiry into Patient Outcome and Death enquiry into the care of hospital patients receiving parenteral nutrition](https://www.ncepod.org.uk/2010pn.html) (2010) found that while the majority of neonates had an appropriate level of senior review, in 19% (44/226) of cases the monitoring of PN was deemed inadequate. Basic monitoring was not undertaken in many neonates in relation to review of PN constitution, biochemical investigation including glucose and fluid balance.

Discontinuing parenteral nutrition

One stakeholder felt that for babies > 28 weeks gestation, PN should be discontinued once the baby is receiving a maximum of 140 mls/kg/day of enteral feeds. For babies < 28 weeks gestation this should be done when they are receiving a maximum of 150 mls/kg/day of enteral feeds. They stated that longer duration of PN can cause increased risk of complications such as PN induced liver disease and central line associated blood stream infections.

Another stakeholder noted that delays in discontinuing PN where indicated increases the risk of central venous catheter induced infections. They also commented that non-adherence to enteral feeding guidance can have longer term impact on overall growth of the neonate.

A stakeholder noted that continuing the infusion of PN during transport varies. It is not uncommon to discontinue the PN infusion and commence dextrose 10% during transport.

#### Selected recommendations

NICE’s guideline on neonatal parenteral nutrition (NG154):

1.8.1 For all babies, take into account the following when deciding when to stop parenteral nutrition:

* the baby's tolerance of enteral feeds
* the amount of nutrition being delivered by enteral feeds (volume and composition)
* the relative contribution of parenteral nutrition and enteral nutrition to the baby's total nutritional requirement
* the likely benefit of the nutritional intake compared with the risk of venous catheter sepsis
* the individual baby's particular circumstances, for example, a baby with complex needs such as short bowel syndrome, increased stoma losses or slow growth, may need long-term parenteral nutrition.

1.8.2 For preterm babies born before 28+0 weeks, consider stopping parenteral nutrition within 24 hours once the enteral feed volume is 140 to 150 ml/kg/day, taking into account the factors in recommendation 1.8.1.

1.8.3 For preterm babies born at or after 28+0 weeks and term babies, consider stopping parenteral nutrition within 24 hours if the enteral feed volume tolerated is 120 to 140 ml/kg/day, taking into account the factors in recommendation 1.8.1.

No recommendations were identified in relation to parenteral nutrition during transportation.

#### Current UK practice

No current practice data has been identified in this area.

Issues for consideration

**For discussion:**

* What is the priority for improvement?
	+ Monitoring serum triglycerides?
	+ Stopping parenteral nutrition? Note that the recommendations on stopping parenteral nutrition are ‘consider’ recommendations.
* What is the key action that will lead to improvement?
* Can we develop a specific, measurable statement?

**For decision:**

* Should this area be prioritised for inclusion in the quality standard?
	1. Involving parents and carers

Information and support

Stakeholders noted that informing parents about their baby’s care needs and supporting them to take the lead in caring for their baby and making decisions about their baby’s care is important for building parental confidence, as well as ensuring the best outcomes for babies and their families. Parents of babies on neonatal units are often concerned about issues relating to neonatal parenteral nutrition (PN) including central venous catheter placement, the risk of catheter-related infections, taking blood samples, and whether they can hold and care for their baby.

A stakeholder felt parents and carers of preterm babies receiving PN should be informed about why their baby requires PN and how it relates to enteral feeding.

Stakeholders noted that parents of all ethnicities, particularly those who do not speak English as a first language, should be given personalised support to ensure they are able to receive the same standard of care as other parents. It was also highlighted that neonatal units should ensure that up to date information on the provision of neonatal PN is available in suitable formats.

A stakeholder highlighted the importance of support of Perinatal and Infant Mental Health (PIMH) and the mental health and wellbeing of the of family. They noted the role of the health visitor in supporting families of babies receiving PN, through their holistic support of the whole family’s needs and transition through the stages of care.

#### Selected recommendations

NICE’s guideline on neonatal parenteral nutrition (NG154):

1.10.2 Topics to discuss with parents or carers include:

* why their baby needs parenteral nutrition
* what parenteral nutrition involves
* the importance of good nutrition for newborn babies
* how long their baby is likely to need parenteral nutrition for
* common concerns, for example, central venous catheter placement, the risk of catheter-related infections, taking blood samples, and whether they can hold and care for their baby
* simultaneous enteral feeding, unless this is not possible
* how their baby's progress will be monitored
* how their baby will be weaned off parenteral nutrition.

1.10.3 Give information to parents or carers that:

* is tailored to their baby's circumstances
* meets their needs and preferences
* is up to date, relevant and consistent between healthcare professionals
* is available in suitable formats (written and spoken, with information available to take away).

For more guidance on communication (including different formats and languages), providing information, and shared decision making, see the NICE clinical guideline on patient experience in adult NHS services.

1.10.4 Provide regular opportunities and time for parents and carers of babies on parenteral nutrition to discuss their baby's care, ask questions about the information they have been given, and discuss concerns.

No recommendations were identified in relation to personalised support for parents of all ethnicities, however, this can be included in the equality and diversity considerations if a quality statement is progressed.

No recommendations were identified in relation to mental health and the role of the health visitor.

#### Current UK practice

The [National Neonatal Audit Programme](https://nnap.rcpch.ac.uk/default.aspx) (NNAP) uses routine data collection to report on a range of care processes and outcomes throughout the neonatal pathway. The NNAP report published in 2020 focuses on key measures of the care provided to babies in 2019 in the 181 neonatal services in England, Wales, Scotland and the Isle of Man. It noted that there was a documented first consultation with parents within 24 hours of admission to the neonatal unit in 97% of cases (53235/54097).

3% of babies have no record of a consultation between parents and medical staff within 24 hours of admission to the neonatal unit. This is an improvement on 2018 (4.1%). Of the five lowest performing networks in 2018, four had made substantial improvements in 2019.

Performance overall at unit level was generally good, but there was a wide variation in how successful units were at ensuring there was a documented first consultation with parents within 24 hours of admission to the neonatal unit. It ranged from 82% – 100%, with one exception of 67%.

Please note that NNAP does not gather data on the specific details of these initial consultations.

Shared decision making

Stakeholders highlighted the importance of the involvement and empowerment of parents in shared decision making. One stated that parents still feel ignored in decision making and when raising concerns. They said it is essential that families are kept informed of their baby’s treatment and are also key members of the team and supported in making decisions about their baby’s care.

#### Selected recommendations

No relevant recommendations have been identified.

#### Current UK practice

The [Neonatal Audit Programme](https://nnap.rcpch.ac.uk/default.aspx) (NNAP) (2019) noted that in 2019 parents joined a consultant ward round on one or more occasion for more than 75% of all eligible admissions. This is broken down by length of stay in the table below:



Separation

Stakeholders highlighted the importance of support and facilities for parents to ensure that separation is avoided and they are able to spend as much time as possible with their baby, engaging in their care, whilst parenteral feeding is ongoing. Parents should be considered as co-carers in the neonatal ward, asked how they would like to be included in their baby’s care, and given every opportunity to contribute to all possible aspects of that care.

#### Selected recommendations

No relevant recommendations have been identified.

#### Current UK practice

NNAP defines separation days as days of low dependency care when breathing support is not needed. In 2019 it found that there were, on average, 2.9 separation days for every term baby spending one or more days receiving special or normal care (includes only those special care days when oxygen was not administered). For late preterm babies there were 6.5 separation days on average.

Issues for consideration

**For discussion:**

* What is the priority for improvement?
* Regular opportunities for parents to discuss their baby’s care?
* Note that there are no specific recommendations for shared decision making or separation.
* Note that personalised support for parents of all ethnicities can be included in the equality and diversity considerations.
* What is the key action that will lead to improvement?
* Can we develop a specific, measurable statement?

**For decision:**

* Should this area be prioritised for inclusion in the quality standard?
	1. Additional areas

### Summary of suggestions

The improvement areas below were suggested as part of the stakeholder engagement exercise. However, they were felt to be either unsuitable for development as quality statements, outside the remit of this particular quality standard referral or need further discussion by the committee to establish potential for statement development.

There will be an opportunity for the committee to discuss these areas at the end of the Advisory Committee meeting.

Table 2 Summary of information available for additional areas

| Suggested area for improvement | Within remit of NICE QS | In scope | Guideline recs | Relevant existing QS  |
| --- | --- | --- | --- | --- |
| Breastfeeding | Yes | No | No | Yes |
| Measuring key targets | Yes | No | No | No |

**Breastfeeding**

Stakeholders highlighted the importance of supporting breastfeeding and the provision of donor breastmilk if needed. They also suggested support to enable mothers to express breastmilk whilst their baby is receiving PN.

This suggestion has not been progressed because the focus of this quality standard is parenteral nutrition and it does not include enteral feeding. The importance of neonatal breastfeeding support is included in the quality standard on [postnatal care](https://www.nice.org.uk/guidance/qs37) (QS37).

**Measuring key targets**

A stakeholder listed a number of key targets that could be measured and suggested that monitoring energy and protein delivery and linking this to a 12-24-month neurodevelopment outcome may emphasise the importance of PN.

This suggestion has not been progressed as a specific area within the briefing paper and for discussion. Quality statements focus on actions that demonstrate high quality care or support, not the methods by which evidence is collated. However, all areas progressed for inclusion in the quality standard will include measures to monitor progress in achieving the quality standard.

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# Appendix 1: Suggestions from registered stakeholders

| ID | Stakeholder | Key area for quality improvement | Why is this important? | Why is this a key area for quality improvement? | **Supporting information** |
| --- | --- | --- | --- | --- | --- |
| **Starting parenteral nutrition** |
| 1 | Baxter Healthcare | Appropriate and timely vascular access for optimal parenteral nutrition | The main complications of concern from parenteral nutrition use in neonatal practice are line sepsis and extravasation. Adequate focus on this aspect of parenteral nutrition therapy may reduce complications.The training for and availability of appropriate line placement support varies across units. | Delivery of parenteral nutrition within the 8 hour window described in NG154 requires prompt placement of appropriate vascular access.In their evidence review the committee noted that the use of a centrally inserted catheter can reduce the number of peripheral cannulae inserted and hence the number of procedures the baby is exposed to and the number of skin punctures required. |  |
| 2 | Cochrane Neonatal | Key area for quality improvement 2Use of faster rather than slower rates of advancement of enteral feed volumes. | Evidence from a Cochrane review indicates that advancing enteral feed volumes at daily increments of 30 to 40 mL/kg (compared to 15 to 24 mL/kg) does not increase the risk of NEC or death in VLBW infants. Advancing the volume of enteral feeds at slow rates results in several days of delay in establishing full enteral feeds and increases the risk of invasive infection.  | organ J, Young L, McGuire W. Slow advancement of enteral feed volumes to prevent necrotising enterocolitis in very low birth weight infants. Cochrane Database Syst Rev. 2015 Oct 15;(10):CD001241. doi: 10.1002/14651858.CD001241.pub6. Update in: Cochrane Database Syst Rev. 2017 Aug 30;8:CD001241. <https://pubmed.ncbi.nlm.nih.gov/26469124/> |  |
| 3 | SCM1 | Normally grown infants born at ≥31-32 weeks gestation, who are commenced on a dextrose infusion on admission.  | The infants admitted to the NNU at this gestation will require some respiratory support initially. It is expected, unless there are complications once stabilised, enteral feeding can start within the first 24hrs. Because of this, PN may not be started. However, due lack of available maternal breast milk or the ability to consent for donor breast milk, it may take several days until adequate enteral nutrition is achieved. Therefore, preterm infants born at 31-32 weeks would benefit from PN on admission.  | NICE (2020) *Neonatal parenteral nutrition.* Available from: <https://www.nice.org.uk/guidance/ng154> BAPM (2016) *The provision of parenteral nutrition within neonatal services: a framework for practice.* Available from: <https://www.bapm.org/resources/42-the-provision-of-parenteral-nutrition-within-neonatal-services-a-framework-for-practice-2016>  |  |
| 4 | SCM1 | Very low birthweight infants who have full enteral feeds suspended due to clinical deterioration.  | When very low birthweight infants clinically deteriorate, and enteral feeds are discontinued the default intravenous fluids is generally dextrose 10%. The use of PN should be considered unless it is known that the suspension of enteral feeds will be brief.  | NICE (2020) *Neonatal parenteral nutrition.* Available from: <https://www.nice.org.uk/guidance/ng154> BAPM (2016) *The provision of parenteral nutrition within neonatal services: a framework for practice.* Available from: <https://www.bapm.org/resources/42-the-provision-of-parenteral-nutrition-within-neonatal-services-a-framework-for-practice-2016> |  |
| 5 | SCM2 | Proportion of neonates in whom PN is indicated (as per NG154 recommendations) who receive PN | Delay in indicated PN contributes to an increasing nutritional deficit. Previous publications including those that prompted this guideline showed that a high proportion of neonatal PN use was delayed or suboptimal.Preterm babies have fewer nutritional stores that term babies and are unable to tolerate enteral feeding immediately necessitating PN use. Term babies are sometimes unable to enterally feed because of congenital bowel disorders or being critically unwell.Approaching 100,000 babies need neonatal care annually in the UK <https://www.rcpch.ac.uk/work-we-do/quality-improvement-patient-safety/national-neonatal-audit-programme> and Neonatal services use substantial amounts of parenteral nutrition. | The 2010 National Confidential Enquiry into Patient Outcome and Death (NCEPOD) looked into the care of hospital patients receiving parenteral nutrition and reviewed 264 cases of neonatal parenteral nutrition. It found that 73% of cases represented less than ‘good practice’, 40% had metabolic complications, 40% did not meet nutritional needs, and in 28% the start of parenteral nutrition was delayed. In 37%, the first parenteral nutrition provided was considered inadequate for the patient’s needs.<https://www.ncepod.org.uk/2010pn.html> The 2016 BAPM Framework *The Provision of Parenteral Nutrition within Neonatal Services - A Framework for Practice* <https://hubble-live-assets.s3.amazonaws.com/bapm/attachment/file/57/Parenteral_Nutrition_April_2016.pdf> highlighted *“As few as one quarter of neonates receive optimal care in regard to management of PN.”* |  |
| 6 | SCM2 | Time from decision to start PN in preterm neonates to it being received | Delay in indicated PN contributes to an increasing nutritional deficit. Previous publications including those that prompted this guideline showed that a high proportion of neonatal PN use was delayed or suboptimal.Preterm babies have fewer nutritional stores that term babies. | Evidence review A2 in NG154The NCEPOD enquiry into the care of hospital patients receiving parenteral nutrition (2010) reviewed 264 cases of neonatal parenteral nutrition. It found that in 28% the start of parenteral nutrition was delayed.The 2016 BAPM Framework *The Provision of Parenteral Nutrition within Neonatal Services - A Framework for Practice* <https://hubble-live-assets.s3.amazonaws.com/bapm/attachment/file/57/Parenteral_Nutrition_April_2016.pdf> noted “*Variation in practice, particularly for extremely low birth weight (ELBW) babies, has been highlighted and recommendations made that consensus in best PN neonatal practice be sought and minimum standards required to deliver neonatal PN defined.”* |  |
| 7 | SCM2 | Proportion of neonates receiving PN who have incremented up to target macronutrient levels within 4 days of PN administration (as suggested in guideline) | Neonatal PN is commonly started using lower macronutrient amounts and gradually increased over approximately 4 days. This is partly due to restrictions on how much intravenous volume can be given over the first few days of life.There has been wide variation in PN practice and nutritional deficits commonly arise as prescribed macronutrient intake is either too low or the amount delivered does match the intended delivery rate.For babies starting PN after a period of enteral feeding, that has had to be stopped, there is also significant variation in practice. | The NCEPOD enquiry into the care of hospital patients receiving parenteral nutrition (2010) reviewed 264 cases of neonatal parenteral nutrition. It found that in 37%, the first parenteral nutrition provided was considered inadequate for the patient’s needs.They also produced audit toolkits to help assess PN use <https://www.ncepod.org.uk/2010pn.html> In 2016, the British Association for Parenteral and Enteral Nutrition highlighted issues related to commissioning of parenteral nutrition in a toolkit for commissioners and providers in England <https://www.bapen.org.uk/pdfs/bapen_pubs/bapen-toolkit-for-commissioners-and-providers.pdf> The Paediatric Chief Pharmacists Group (PCPG) <http://nppg.org.uk/> report highlighted prescribing issues and suboptimal PN administration. |  |
| 8 | SCM3 | Key area for quality improvement 1Preterm infants who meet the indications for parenteral nutrition (PN) are commenced within 8 hours  | NCEPOD (2010) report into PN provision in hospitals revealed 45% of infants had a delay in commencing PN either due to lack of recognition of need or procedural delayLocal audit – mean 10.7 hours | <https://www.ncepod.org.uk/2010report1/downloads/PN_summary.pdf>[Grover](https://aspenjournals.onlinelibrary.wiley.com/doi/10.1177/0148607108314373) et al (2008) Iatrogenic Malnutrition in Neonatal Intensive Care Units: Urgent need to modify practice. J. Parenteral and Enteral Nutrition 32(2):140-144Ahmed et al (2004) Education and evidence are needed to improve neonatal parenteral nutrition practice J. Parenteral and Enteral Nutrition. 28(3): 176-179Lapillonne et al. (2013) A systematic review of practice surveys on parenteral nutrition for preterm infants. J Nutr. Dec, 143 (12 Suppl):2061S-2065S National Neonatal Audit Programme (NNAP) |  |
| 9 | SCM4  | Staring PN within 8hrs | Delays to starting can cause significant nutritional deficits and lead to both short and long term harms | Not known - local audit? |  |
| 10 | King’s College Hospital NHS Foundation Trust | Key area for quality improvement 1:Preterm infants under 31+0 weeks should be commenced on parenteral nutrition (PN) within the first 8 hours of life | Preterm infants lose around 1g/kg/day of protein in the urine as urea from birth, and require at least 1.5g/kg/day to prevent them from becoming metabolic and turning to their own body protein stores for protein turnover and basal metabolic requirements. | The “SCAMP” study (Standardised, Concentrated, Additional Macronutrients, Parenteral nutrition in very preterm infants) conducted at the Liverpool Women’s Hospital. Showed that enhanced parenteral protein intake during the first month of life was associated with improved head growth at 28 days and still apparent at 36 weeks gestational age.(Morgan et al, 2014) |  |
| 11 | SCM5 | Indications for, and timing of, neonatal parenteral nutrition  | There was no evidence so the committee used their knowledge and experience to make the recommendations. It would be good to develop some quality measures in this area to start a regular collection of data to baseline and improve outcomes / quality. | Measures around average time to starting PN  | Indications for, and timing of, neonatal parenteral nutrition  |
| 12 | SCM6 | Neonatal parenteral nutrition (PN) to start within 8h of decision being made | There is variability in different neonatal units (especially level 2) of availability/possibility to start neonates on PN out of hours and on the weekends/bank holidays. | BAPM Framework 2016 recommends that units should have 24h access to PN 7 days a week. | Neonatal parenteral nutrition (PN) to start within 8h of decision being made |
| 13 | Neonatal Critical Care Clinical Reference Group | Key area for quality improvement 1Starting neonatal parenteral nutrition (PN) early | When a preterm or term baby meets the indications for PN, start it as soon as possible, and within 8 hours of the decision to do so at the latest.Local, regional and national audit has suggested wide variation in starting PN appropriately early, when indicated. | This should be assessed by local audit |  |
| 14 | SCM7 | Parenteral Nutrition should be given ASAP neonates who meets the indications | Parenteral nutrition for Neonates should be prioritised in all neonatal units (including surgical ones) so that this aspect is not compromised.  | * NICE guideline NG154 1.1.6
* NCEPOD parenteral nutrition 2010
 |  |
| **Safe delivery of parenteral nutrition** |
| 15 | Baxter Healthcare | Infusion safety | Despite the issuance of NHSI alert in 2017 wrong rate errors continue to be an issue in neonatal parenteral nutrition.The mandate by the MHRA to light protect PN solutions and administration lines adds complexity. | 2017 Patient safety alert[Patient\_Safety\_Alert\_-\_TPN\_in\_babies\_FINAL.pdf (england.nhs.uk)](https://www.england.nhs.uk/wp-content/uploads/2019/12/Patient_Safety_Alert_-_TPN_in_babies_FINAL.pdf) |  |
| 16 | Cochrane Neonatal | Key area for quality improvement 1Use of central venous catheters to deliver parenteral nutrition for preterm infants | Evidence from a Cochrane review indicates that percutaneous central venous catheters decreases the number of catheters/cannulae needed to deliver nutrition. No evidence suggests that percutaneous central venous catheter use increases risks of adverse events, particularly invasive infection,  | Ainsworth S, McGuire W. Percutaneous central venous catheters versus peripheral cannulae for delivery of parenteral nutrition in neonates. Cochrane Database Syst Rev. 2015 Oct 6;(10):CD004219. doi: 10.1002/14651858.CD004219.pub4. <https://pubmed.ncbi.nlm.nih.gov/26439610/> |  |
| 17 | SCM1 | Lipid infusion lines occluding, and the infusion discontinued, with multiple changes of separate filters and bionectors.  | It is not uncommon for NNU’s to use separate PN giving sets, filters and bionectors. There can be issues with the lipid infusion occluding and backtracking up the giving set. This often leads to the line being broken multiple times to change filters, bionectors, and finally the lipid infusion discontinued. | NICE (2020) *Neonatal parenteral nutrition.* Available from: <https://www.nice.org.uk/guidance/ng154> BAPM (2016) *The provision of parenteral nutrition within neonatal services: a framework for practice.* Available from: <https://www.bapm.org/resources/42-the-provision-of-parenteral-nutrition-within-neonatal-services-a-framework-for-practice-2016> |  |
| 18 | SCM3 | Key area for quality improvement 5Neonatal units should have access to a multidisciplinary PN support team overseeing the governance and delivery of PN | NCEPOD, NICE and the Chief Pharmacists report all acknowledge the importance of access to a multidisciplinary team to ensure a safe and effective PN service. Access to allied health professionals and therefore nutrition teams across the UK is patchy at best (GIRFT report, 2020; DoH Toolkit for High Quality Neonatal Services, 2009) | Improving Practice and Reducing Risk in the Provision of Parenteral Nutrition for Neonates and Children. Report of the Paediatric Chief Pharmacists Group. November 2011<https://www.ncepod.org.uk/2010report1/downloads/PN_summary.pdf><https://www.rcpch.ac.uk/resources/snapshot-neonatal-services-workforce-uk>http://www.londonneonatalnetwork.org.uk/wp-content/uploads/2015/09/Toolkit-2009.pdfJeong et al (2016) The successful accomplishment of nutritional and clinical outcomes via the implementation of a multidisciplinary nutrition support team in the neonatal intensive care unit. BMC Pediatrics 16:113Sneve et al (2009) Implementation of a multidisciplinary team that includes a registered dietitian in a neonatal intensive care unit improved nutrition outcomes. Nutr Clin Pract 23(6):630-4 |  |
| 19 | SCM4 | Use of central venous access | Preferable to peripheral access as last longer and lower risk of complications. Current variation in practice between units. |  |  |
| 20 | SCM4  | Provision of PN supported by specialist multidisciplinary team | Current variation in practice and 2011 report by Paediatric Chief Pharmacist Group highlighted failings in existing practice. |  |  |
| 21 | King’s College Hospital NHS Foundation Trust | Key area for quality improvement 5All neonatal units should have access to a multidisciplinary nutrition team within their networks | Implementation of a multidisciplinary nutrition team on the neonatal unit improves the neurodevelopmental outcome of neonates.  | Jeong, E., Jung, Y.H., Shin, S.H. *et al.* The successful accomplishment of nutritional and clinical outcomes via the implementation of a multidisciplinary nutrition support team in the neonatal intensive care unit. *BMC Pediatr* 16, 113 (2016). https://doi.org/10.1186/s12887-016-0648-0 |  |
| 22 | SCM5 | Service design  | It would be good to have quality standards in this area as there was limited evidence to demonstrate the positive impact that MDTs can have in providing care and reduce variation  |  | Service design  |
| 23 | SCM6 | Multidisciplinary team to provide PN | Lack of availability of specialist staff in level 1 or level 2 hospitals that provide PN for neonates. Staff prescribing PN has limited experience in PN prescribing.  |  | Multidisciplinary team to provide PN |
| 24 | SCM6 | Light protection of giving sets | Light protecting giving sets available are usually amber. Lack of use from neonatal units due to confusion with other types of lines such as epidural or concern that if used lipid and clear line from PN would look the same and can increase risk of errors in PN infusion. Also issue with filters that are not light protected. | Confidential enquiry of various Trusts | Light protection of giving sets |
| 25 | Neonatal Critical Care Clinical Reference Group | Key area for quality improvement 2Use of central venous catheters for neonatal PN | Give neonatal PN via a central venous line, unless criteria for administration via a peripheral venous line are met, including not delaying starting PN due to lack of central venous access.Central venous catheters have a longer lifespan and a lower risk of thrombophlebitis / extravasation but it has been acknowledged that there is widely varying practice. | This should be assessed by local audit |  |
| 26 | Neonatal Critical Care Clinical Reference Group | Key area for quality improvement 4Safer administration of neonatal PN by use of light protection | Bags, syringes and infusion sets of both aqueous and lipid PN solutions should be protected from light.Light protection is likely to prevent potentially harmful photo-degradation and oxidation of neonatal PN solutions.  | This is also in line with European Medicines Agency and Medicines and Healthcare Products Regulatory Agency guidance that states 'for administration to neonates and children below 2 years of age, parenteral nutrition products containing amino acids and/or lipids should be protected from light (containers and administration sets)'This should be assessed by local and neonatal operational delivery network (ODN) audit |  |
| 27 | SCM8  | Key area for quality improvement 2Reduction in extravasation injuries | Extravasation injuries are not uncommon with PN, particularly when given peripherally. NICE was unable to recommend a specific osmolarity of solution that could be safely given peripherally because of lack of evidence |  |  |
| 28 | Royal College of Paediatrics and Child Health | Key area for quality improvement 1Administration method | All parenteral nutrition should be administered via a central line to prevent extravasation injuries. This will also allow the administration of components such as potassium at a higher concentration where required. | Use of Central Venous Catheters in Neonates (Revised 2018) |  |
| 29 | SCM7 | Light protection for both aqueous and lipid parenteral nutrition  | Slow rate of infusion predisposes degradation of vitamins, which are essential for neonates.  | NICE guideline NG154 1.2.3  |  |
| 30 | SCM7 | Use a central venous catheter to give neonatal parenteral nutrition. | Using a centrally placed venous catheter will minimise damage to venous vessels due to the high osmolality of parenteral nutrition.  | NICE guideline NG154 1.2.1  |  |
| 31 | SCM7 | A Nutritional MDT should be involved in decision making process regarding NPN | Parenteral nutrition use is complex and spans across multiple disciplines. No one person would be able to have all the latest knowledge regarding its use.  | NICE guideline NG154 1.9.1  |  |
| **Constituents of parenteral nutrition** |
| 32 | Baxter Healthcare | Availability and suitability of optimised parenteral nutrition solutions  | The pharmaceutical quality oversight of the procurement of neonatal parenteral nutrition solutions varies across the country.The majority of solutions currently used in clinical practice are unlicensed, aseptically compounded medicines and do not have the same regulatory oversight as licensed medicines. | Standards should align with the goals of the Aseptic services review[Transforming NHS pharmacy aseptic services in England (publishing.service.gov.uk)](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/931195/aseptic-pharmacy.pdf)And with the MHRA guidance note 14 on use of unlicensed medicines[The\_supply\_of\_unlicensed\_medicinal\_products\_\_specials\_.pdf (publishing.service.gov.uk)](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/373505/The_supply_of_unlicensed_medicinal_products__specials_.pdf) |  |
| 33 | SCM1 | Preterm infants who become hyperglycaemic on standardised PN, and the use of dextrose 5% to reduce the glucose infusion rate.  | Standardised PN has many benefits, but when the infant becomes hyperglycaemic the practice of significantly substituting the rate of PN for dextrose 5% is not uncommon. This may reduce the glucose infusion rate and improve glucose homeostasis, but the infant is receiving suboptimal nutrition.  | NICE (2020) *Neonatal parenteral nutrition.* Available from: <https://www.nice.org.uk/guidance/ng154> BAPM (2016) *The provision of parenteral nutrition within neonatal services: a framework for practice.* Available from: <https://www.bapm.org/resources/42-the-provision-of-parenteral-nutrition-within-neonatal-services-a-framework-for-practice-2016> |  |
| 34 | SCM2 | Proportion of neonates < 28 days receiving PN who receive PN from a standardised bag | The guideline strongly encourages the use of standardised PN bags. Previous publications including those that prompted this guideline suggested that most neonatal PN requirements could be meet with standardised PN requirements.Standardised PN may have clinical benefits (rapidity of access to PN, simplicity of prescribing and administration) and economic ones (price per bag cheaper than bespoke PN). | The NCEPOD enquiry into the care of hospital patients receiving parenteral nutrition (2010) reviewed 264 cases of neonatal parenteral nutrition. It found that 73% of cases represented less than ‘good practice’, 40% had metabolic complications, 40% did not meet nutritional needs, and in 28% the start of parenteral nutrition was delayed. In 37%, the first parenteral nutrition provided was considered inadequate for the patient’s needs.The Paediatric Chief Pharmacists Group (PCPG) <http://nppg.org.uk/> report recommended that *‘The Chief Pharmacist must ensure that the hospital’s medicines policy mandates the use of standard parenteral nutrition solutions in preference to individualised solutions whenever it is clinically appropriate’*. It also suggested that 80% of prescriptions could be met using standardised parenteral nutrition.*The 2016 BAPM Framework “The Provision of Parenteral Nutrition within Neonatal Services - A Framework for Practice”* <https://hubble-live-assets.s3.amazonaws.com/bapm/attachment/file/57/Parenteral_Nutrition_April_2016.pdf> recommended the use of standardised PN. |  |
| 35 | SCM3 | Key area for quality improvement 3Standardised bags are used as first line in the provision of parenteral nutrition for preterm and term infants | Standardised PN improves consistency in nutritional care and reduces variation in practice. They also enable the delivery of early PN, being available on units 24 hours a day. Safety and stability is also improved.  | Improving Practice and Reducing Risk in the Provision of Parenteral Nutrition for Neonates and Children. Report of the Paediatric Chief Pharmacists Group. November 2011Dice et al (1981). Standardized versus pharmacist monitored individualised parenteral nutrition in low-birth-weight infants. American journal of hospital pharmacy. 38:1487-9Morgan et al (2009). Improving early protein intake for very preterm infants using a standardised concentrated parenteral nutrition formulation. E-SPEN, 4 e324-328 |  |
| 36 | SCM3 | Key area for quality improvement 2Preterm infants eligible for PN receive 1.5-2 g/kg/d of amino acid on day 1 of PN | NCEPOD (2010) report into PN provision in hospital revealed that 37% of infants received inadequate nutrient provision | <https://www.ncepod.org.uk/2010report1/downloads/PN_summary.pdf>Grover et al (2008) Iatrogenic Malnutrition in Neonatal Intensive Care Units: Urgent need to modify practice. J. Parenteral and Enteral Nutrition 32(2):140-144Ahmed et al (2004) Education and evidence are needed to improve neonatal parenteral nutrition practice J. Parenteral and Enteral Nutrition. 28(3): 176-179Moltu et al (2021) Nutritional management of the critically ill neonate: A position paper of the ESPGHAN committee on Nutrition. J. Ped Gastroenterol. Feb 16. |  |
| 37 | SCM4  | Use of standardised PN bag | Improve nutrition and reduce serious adverse events - have been several in past due to errors in making up non standard bags. Use of standardised bag would address many recommendations on micro and macronutrient ratios in NICE PN in neonates guideline.  |  |  |
| 38 | King’s College Hospital NHS Foundation Trust | Key area for quality improvement 2:Standardised Parenteral nutrition bags should be the used as a first choice for most neonates  | Systematic surveys of PN across various countries highlighted huge variations in PN practice. Neonatal population receiving PN form 20% of the population receiving PN and majority of the neonates received PN based on local guidelines. Standardised bags are safe and cheap and minimise prescribing and delivery errors.  | D G Mason et al: Parenteral nutrition for neonates and children: a mixed bag1. <http://dx.doi.org/10.1136/adc.2010.188557>

Paediatric Chief Pharmacists Group. Improving Practice and Reducing Risk in the Provision of Parenteral Nutrition for Neonates and Children. [Online] 2011. Available at: www.rpharms.com/ support-pdfs/minimising-risk-pn-children[The Effect of Individualized Versus Standardized Parenteral Nutrition on Body Weight in Very Preterm Infants](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5330777/)Vincent H. M. Evering, Peter Andriessen, Carola E. P. M. Duijsters, Jeroen Brogtrop, Luc J. J. DerijksJ Clin Med Res. 2017 Apr; 9(4): 339–344. Published online 2017 Feb 21. doi: 10.14740/jocmr2893wPMCID: PMC5330777 |  |
| 39 | SCM5 | Standardised neonatal parenteral nutrition formulations  | By having agreed quality standards in this area it will support the standardisation thus reducing the risk of delays in starting PN, minimising prescribing or clinical variation | % of standardised bags vs bespoke bagsLinks into timing if there are delays due to prescribing  | Standardised neonatal parenteral nutrition formulations  |
| 40 | SCM6 | Give phosphate at 2 mmol/kg/day | Standardised bags available on the market (e.g. Numeta or Babiven) do not contain enough phosphate (usually maximum of 1.5mmol/kg/day), which limits use by neonatal units with no aseptic service.Phosphate supplementation IV to run alongside PN difficult due to volume and compatibility.  |  | Give phosphate at 2 mmol/kg/day |
| 41 | Neonatal Critical Care Clinical Reference Group | Key area for quality improvement 3Use of standardised preparations of neonatal PN | Standardised preparations of PN should be used when starting PN and use of standardised preparations should continue unless there are complex disorders with fluid and electrolyte imbalance or renal failure.Standardised preparations of PN are likely to reduce the risk of prescription error and save costs. | This should be assessed by local and Neonatal Operational Delivery Network (ODN) audit |  |
| 42 | NHSE (maternity team) | Key area for quality improvement 1 | Can NICE please consider how to improve the safety of administration of Neonatal Parenteral Nutrition.   | This relates to:* 2017 PSA: [Patient\_Safety\_Alert\_-\_Total Parenteral Nutrition\_in\_babies\_FINAL.pdf (england.nhs.uk)](https://www.england.nhs.uk/wp-content/uploads/2019/12/Patient_Safety_Alert_-_TPN_in_babies_FINAL.pdf)
* 2019 Update: [Rapid Over Infusion of Parenteral Nutrition – SPS - Specialist Pharmacy Service – The first stop for professional medicines advice](https://www.sps.nhs.uk/articles/rapid-over-infusion-of-parenteral-nutrition/)

Consideration of the use of all-in-one triple chamber Parenteral Nutrition bags where appropriate; to reduce the risk of the themes identified above: [P36 Numeta G13% preterm neonatal parenteral nutrition solution – a licensed all-in-one triple chamber, ready to use and terminally sterilised parenteral nutrition for preterm newborn infants | Archives of Disease in Childhood (bmj.com)](https://adc.bmj.com/content/105/9/e25) |  |
| 43 | SCM8 | Key area for quality improvement 1Formulation and availability of a licensed ‘standard’ bag to meet the requirements of the NICE guideline | The lack of availability of a standard formulation means that different units will interpret the advice in the guideline differently resulting in variation in nutrition supplied to this patient group. It will also help to ensure commencement of PN early. |  |  |
| 44 | Royal College of Paediatrics and Child Health | Key area for quality improvement 2Use of standardised neonatal parenteral nutrition formulations | This ensures that the optimum amount of individual components are received for optimal growth. Different trusts have different policies and practice and components currently vary amongst each trust. | Neonatal parenteral nutrition – NICE guidance |  |
| 45 | SCM9 |  | Adherence to using standard PN and reducing the use of prescribed or ‘tailor-made’ PN. |  |  |
| 46 | SCM7 | A limited selection of neonatal standardised bags to be used across England.  | Currently, a wide selection of neonatal standardised bags are available, sometimes with immaterial difference between them. Due to the differences though, there is unnecessary wastage This is in additional to the use of bespoke PN which also is not cost effective.  | * NICE guideline NG154 1.6.1
* Uthaya 2017 Infant Vol 13(1): 12-16

EFCNI Position Paper: Addressing the nutritional Emergency of preterm birth- optimal practice in neonatal parenteral nutrition 2019 |  |
| 47 | Baxter Healthcare | Prescribing process simplification | Standardised solutions are advocated in NG154 | The guideline committee identified the evidence supporting the use of a standardised approach to both prescribing and solution provision. |  |
| **Monitoring and discontinuing use of parenteral nutrition** |
| 48 | SCM1 | The interruption of PN during transport of an infant to another NNU.  | The practice of continuing the infusion of PN during transport varies. It is not uncommon to discontinue the PN infusion and commence dextrose 10% during transport.  | NICE (2020) *Neonatal parenteral nutrition.* Available from: <https://www.nice.org.uk/guidance/ng154> BAPM (2016) *The provision of parenteral nutrition within neonatal services: a framework for practice.* Available from: <https://www.bapm.org/resources/42-the-provision-of-parenteral-nutrition-within-neonatal-services-a-framework-for-practice-2016> |  |
| 49 | SCM5 | Monitoring neonatal Parenteral nutrition | There was no evidence so the committee used their knowledge and experience to make the recommendations. It would be good to develop some quality measures in this area to start a regular collection of data to baseline and improve outcomes / quality. |  | Monitoring neonatal Parenteral nutrition |
| 50 | King’s College Hospital NHS Foundation Trust | Key area for quality improvement 3In babies > 28 weeks gestation, PN should be discontinued once the infant is receiving a maximum of 140 mls/kg/day of enteral feeds | Longer duration of PN can cause increase risk of complications such as PN induced liver disease and central line associated blood stream infections. Longer duration of PN and higher dosage of carbohydrates were independent risk factors for the development of PN cholestasis. | Kheira Jolin-Dahel, Emanuela Ferretti, Carolina Montiveros, Renee Grenon, Nick Barrowman, Carolina Jimenez-Rivera, "Parenteral Nutrition-Induced Cholestasis in Neonates: Where Does the Problem Lie?", Gastroenterology Research and Practice, vol. 2013, Article ID 163632, 6 pages, 2013. https://doi.org/10.1155/2013/163632 |  |
| 51 | King’s College Hospital NHS Foundation Trust | Key area for quality improvement 4In babies < 28 weeks gestation, PN should be discontinued once the infant is receiving a maximum of 150 mls/kg/day of enteral feeds | Early discontinuation of PN in the <28 weeks and <1000gm babies can delay could cause delay in them regaining their birth weight back, as well as continued poor growth subsequently.  | L Perrem et al: Effect of Early Parenteral Nutrition Discontinuation on Time to Regain Birth Weight in Very Low Birth Weight Infants: A Randomized Controlled Trial: Effect of Early Parenteral Nutrition Discontinuation; January 2019 [Journal of Parenteral and Enteral Nutrition](https://www.researchgate.net/journal/Journal-of-Parenteral-and-Enteral-Nutrition-1941-2444) 43(3)DOI:[10.1002/jpen.1502](http://dx.doi.org/10.1002/jpen.1502) |  |
| 52 | SCM6 | Triglycerides measurement and monitoring | Widespread variation within neonatal units on how often to measure triglycerides and concerns on what to do if they are high as limiting fat in PN would compromise growth.Triglycerides reference ranges not take into account patients receiving PN. | Local audit in TG reference ranges in neonates on PN. | Triglycerides measurement and monitoring |
| 53 | Royal College of Paediatrics and Child Health | Key area for quality improvement 3Optimising enteral and parenteral nutrition | There is clear guidance on when the parenteral nutrition is initiated and discontinued. Delay in discontinuing parental nutrition where indicated increases the risk of central venous catheter induced infections. Non-adherence to enteral feeding guidance can have longer term impact on overall growth of the neonate. | Neonatal parenteral nutrition – NICE guidance |  |
| 54 | Royal College of Paediatrics and Child Health | Key area for quality improvement 4Standardised monitoring of neonates on total parenteral nutrition | Different Trusts monitor different aspects of parenteral nutrition e.g. some Trusts do not do lipid profile. It is important to identify electrolyte disturbances promptly and interventions to be made quickly. It allows good handover between Trusts if all Trusts monitor the same components, especially where babies are moved between Trusts. | Neonatal parenteral nutrition – NICE guidance |  |
| **Involving parents and carers** |
| 55 | Baxter Healthcare | Parent Information | Timely and appropriate provision of information on therapies being administered to their infants can alleviate anxiety in parents. | [Parenteral Nutrition (PN) – EFCNI](https://www.efcni.org/activities/projects-2/position-paper-parenteral-nutrition/#:~:text=Parenteral%20nutrition%20is%20also%20needed,nutrients%20directly%20to%20the%20bloodstream.) |  |
| 56 | Bliss | Key area for quality improvement 1Information and support for parents and carers. | Informing parents about their baby’s care needs and actively supporting them to take the lead in caring for their baby & make decisions about their baby’s care is important for building parental confidence, as well as ensuring the best outcomes for babies and their families.The Neonatal Parenteral Guideline notes that there was no evidence available to inform recommendations on how best to support families when their baby requires parenteral nutrition. It is likely that there is variation in practice.It is important to recognise that most parents will be unaware of parenteral nutrition until their baby is receiving it. This might be a difficult experience for some families for many reasons, including the emotional difficulty of their expectations about how they thought they would feed their baby, changing. While not noted in the Guideline or in the Equality Assessment, it’s important to recognise that existing information and support may be inaccessible to some families, and so localised quality improvement on this topic should be developed to ensure *all* parents of babies receiving parenteral nutrition are able to access information and support.If the committee agrees that this is a key area for quality improvement, it is essential that the subsequent quality standard reflects the importance of involving parents directly in the development of information and support. | Information for parents and carers about feeding their baby on the neonatal unit, including PN, can be found on Bliss’ website:<https://www.bliss.org.uk/parents/about-your-baby/feeding>  |  |
| 57 | Institute of Health Visiting (iHV) | Key area for quality improvement 2The role of the health visitor in supporting families of babies receiving Neonatal Parenteral Nutrition, through their holistic support of the whole family’s needs and transition through the stages of care. | Although this a clinical procedure, there is a need to include wider holistic considerations in section 1.10: *Information and support for parents and carers*, which currently has a limited holistic consideration.Health visitors are highly qualified Specialist Community Public Health Nurses (SCPHN), who have a universal reach supporting all families with children under 5-years of age. This puts them in an ideal place to support the holistic needs of parents of babies receiving Neonatal Parenteral Nutrition.* Health visitors support parents transition to parenthood – parents with a baby that requires Neonatal Parenteral Nutrition are likely to need additional support as they adjust to their early experiences of parenting an unwell baby and circumstances surrounding the birth which may have been traumatic.
* Health visitors undertake a holistic assessment in partnership with the family, which builds on their strengths as well as identifying any difficulties. It includes the parents’ capacity to meet their baby’s needs, the impact and influence of wider family, community and environmental circumstances.
* Continuity of health visitor is important, particularly for families with higher levels of need and less resilience. Ideally, the health visitor will have seen the family antenatally, or with previous children, which enables them to build on their existing knowledge of the family’s individual circumstances and work with them to identify their current risk and resilience factors and support needs.
* By developing early effective relationships with families and working closely with midwifery services and other partners health visitors can provide seamless support and care, using a strength-based approach as families transition through services.
* Working with parents and families, health visitors identify the most appropriate level of support for their individual needs.
* Health visitors work with many different health care professionals, services and charities within local communities. By having health visitors involved from the earliest opportunity, families can be supported at all transition stages and referrals can be made to additional support services and peer groups as needed.

Support seamless transition between services with families engaging in the care of their baby on the neonatal unit to increase their levels of confidence and competence.  | * Healthy child programme 0 to 19: health visitor and school nurse commissioning (<https://www.gov.uk/government/publications/healthy-child-programme-0-to-19-health-visitor-and-school-nurse-commissioning#history>)
* PHE Early years high impact area 1: Supporting the transition to parenthood (<https://www.gov.uk/government/publications/commissioning-of-public-health-services-for-children/early-years-high-impact-area-1-supporting-the-transition-to-parenthood>)
* NHS Long Term Plan (<https://www.longtermplan.nhs.uk/>)
 |  |
| 58 | Institute of Health Visiting (iHV) | Key area for quality improvement 3Support of Perinatal and Infant Mental Health (PIMH) and the mental health and wellbeing of the of family. | Although this a clinical procedure for the baby, there is a need to include wider mental health and wellbeing considerations of the family and the mental health needs of the baby in section 1.10 *Information and support for parents and carers*This is because:Parents of babies on the neonatal unit report relatively high levels of post-traumatic stress disorder symptoms and relatively high levels of mood symptoms, like depression and anxiety.There is strong evidence that: * Birth trauma can lead to post-traumatic stress disorder (PTSD) which occurs after childbirth, and can be impacted further by invasive procedures such as Neonatal Parenteral Nutrition
* Mental health problems in the perinatal period are very common, affecting up to 20% of women; prevalence is even higher for those with babies on the neonatal unit.
* There is indisputable evidence that the first years of a child’s life are the most crucial period of human development, providing a foundation for health, wellbeing, educational and economic success across the life-course.
* Maternal mental health problems during the perinatal period can have a broad range of negative outcomes in the baby and their neurodevelopment. This can affect the cognitive functioning and emotional regulation of children, shaping behavioural and emotional outcomes. These risks are not inevitable but are moderated by a range of factors including socioeconomic status, level of social support (including support for partners), parenting stress and the persistence and severity of the mental health problem.
* Perinatal mental illness can affect a parent’s ability to provide consistent, sensitive attuned caregiving; this is particularly relevant among parents who did not receive this level of caregiving themselves.
* Parental mental illness can affect bonding between a parent and their baby, which impacts on the baby’s ability to form a secure attachment which we know is so important for future emotional wellbeing and development.
* Parents’ wellbeing is therefore essential for babies’ wellbeing and development. Identifying and treating perinatal mental illness is important as children of mothers, fathers and partners who have experienced mental health problems have an increased risk of adverse cognitive, behavioural, social and emotional developmental outcomes.
* Neonatal Parenteral Nutrition is an invasive process, taking place at a time when families will be experiencing heightened anxiety and stress. Therefore, mental health and wellbeing support needs to be considered as part of a robust package of support for families.
* Practitioners should provide parents with the opportunity to talk about their emotional wellbeing and support them to share any concerns about their mental health. Enquiring about mental health and wellbeing is pivotal to early identification of need to enable a timely response from supporting services and the health visitor.
* Health visitors are trained and skilled in initial assessments to identify mental health concerns. They can use their established relationships with the family to support them throughout the Neonatal Parenteral Nutrition administration and identify when further expert mental health support is needed.

The health visitor can support parents to bond with their baby on the unit whilst receiving parenteral nutrition and then continue this post-discharge. | * Roque, A. T. F., Lasiuk, G. C., Radünz, V., & Hegadoren, K. (2017). Scoping review of the mental health of parents of infants in the NICU. Journal of Obstetric, Gynecologic & Neonatal Nursing, 46, 576-587
* Early years high impact area 2: Supporting maternal and family mental health (<https://www.gov.uk/government/publications/commissioning-of-public-health-services-for-children/early-years-high-impact-area-2-supporting-maternal-and-family-mental-health>)
* Implementing the Recommendations of the Neonatal Critical Care Transformation Review (<https://www.england.nhs.uk/wp-content/uploads/2019/12/Implementing-the-Recommendations-of-the-Neonatal-Critical-Care-Transformation-Review-FINAL.pdf>)
* Please see further references below for the links between parental mental health and outcomes: Glover, V. & Capron, L. (2017). Prenatal parenting. *Current opinion in psychology* 15, 66-70.
* NSCDC. (2007). The Timing and Quality of Early Experiences Combine to Shape Brain Architecture: Working Paper No. 5
* National Collaborating Centre for Mental Health (2018) The Perinatal Mental Health Care Pathways. Full implementation guidance. London: National Collaborating Centre for Mental Health.
* Barlow, J. & Underdown, A. (2017). Child maltreatment during infancy: atypical parent–infant relationships. *Paediatrics and Child Health*.
* Goodman J.H. (2019) Perinatal depression and infant mental health. *Arch. Psych. Nurs.*2019;33:217–224. doi: 10.1016/j.apnu.2019.01.010.
* Stein A, Pearson R, Goodman S, Rapa E, Rahman A, McCallum M, et al. Effects of perinatal mental disorders on the fetus and child. The Lancet. 2014;384:1800-19.
* Wanless SB, Rosenkoetter SE, McClelland MM. (2008) Paternal depression and infant cognitive development: implications for research and intervention. Infants & Young Children 2008; 21 2:134–141. 87
* Glover V, Barlow J, (2014), ”Psychological adversity in pregnancy: what works to improve outcomes?”, Journal of Children’s Services, Vol. 9 Iss 2 pp. 96 – 108
 |  |
| 59 | SCM3 | Key area for quality improvement 4Parents and carers of preterm infants receiving PN are informed about why their infant requires PN and how it relates to enteral feeding | The importance of involving parents and carers in their infant’s direct care is being increasingly recognised. Evidence suggests large variation between units in this regard. Family centred care should include nutritional management including parenteral nutrition. | <https://shop.bliss.org.uk/shop/files/BlissBabyCharterbookletforprintLR.pdf>Burger et al. (2015). Parents’ experiences of neonatal care in England. Patient Experience Journal Vol 2: Iss2, Article 7 |  |
| 60 | SCM4  | Information and advice for parents/careers | Great variation in the amount and type of information provided to parents and caters. Generally very little available currently except through BLISS and GOSH and unclear how much this is signposted. Evidence from work undertaken by BLISS and other organisations that increasing information and advice to parents/carers helps support them and their experience/role in child’s care. | The forthcoming NICE guideline on babies, children and young peoples experience of healthcare |  |
| 61 | Neonatal Critical Care Clinical Reference Group | Key area for quality improvement 5Provision of appropriate information for parents | Neonatal Units (NNUs) should ensure that up to date information on provision of neonatal PN is available in suitable formats (written and spoken, with information available to take away).It is widely acknowledged that there are common concerns from parents of babies on NNUs regarding neonatal PN, including central venous catheter placement, the risk of catheter-related infections, taking blood samples, and whether they can hold and care for their baby. | This should be assessed by local and neonatal operational delivery network (ODN) audit |  |
| 62 | SCM8  | Key area for quality improvement 3Improvement in parenteral knowledge about the parenteral nutrition their baby is receiving | No evidence was found on this during the guideline development. The National Neonatal Audit Programme has parenteral involvement as some of its key areas |  |  |
| 63 | Royal College of Nursing  | Key area for quality improvement 1The involvement and empowerment of parents in shared decision making  | This is a widely held belief and principle of many, yet parents still report feeling of being ignored in decision making and when raising concerns (maternity reviews).  | See BAPMs document Enhancing Shared Decision Making in Neonatal Care 2019 [Enhancing Shared Decision Making in Neonatal Care | British Association of Perinatal Medicine (bapm.org)](https://www.bapm.org/resources/158-enhancing-shared-decision-making-in-neonatal-care) | Key area for quality improvement 1The involvement and empowerment of parents in shared decision making  |
| 64 | The Breastfeeding Network | Support and facilities for parents to ensure that separation is avoided and they are able to spend as much time as possible with their baby, engaging in their care, whilst parenteral feeding is ongoing. Parents should be considered as co-carers in the neonatal ward. The be asked how they would like to be included in their baby’s care, and given every opportunity to contribute to all possible aspects of that care. | The Bliss Families Kept Apart report showed that facilities and financial support for parents, enabling them to spend as much time as possible in the neonatal unit caring for their baby, are lacking. Maximum parental involvement in the care of neonates improves bonding, supports breastfeeding and expression of breastmilk and results in better health outcomes for babies.  | The Bliss report: Families Kept Apart, and campaign to improve support for families gives details of lack of support and recommendations for improvement.[Families-kept-apart.pdf](https://s3.eu-west-2.amazonaws.com/files.bliss.org.uk/documents/Research-and-campaigns/Campaigns/Families-kept-apart.pdf?mtime=20180411141112&focal=none)[Improve support for families in England | Bliss](https://www.bliss.org.uk/research-campaigns/our-campaigns/families-kept-apart-take-action-now/families-kept-apart-in-england)The UNICEF Baby Friendly Initiative Guidance for Neonatal Units provides detailed information on the importance and process of supporting parents to be involved in their baby’s care.[Guidance for Neonatal Units (unicef.org.uk)](https://www.unicef.org.uk/babyfriendly/wp-content/uploads/sites/2/2015/12/Guidance-for-neonatal-units.pdf) |  |
|  | The Breastfeeding Network | Parents of all ethnicities, particularly those who do not speak English as a first language, must be given personalised support, such as a link worker or interpreter, to ensure they are able to receive the same standard of care as first language English speakers. Staff should be trained in equality and diversity to recognise and meet the needs of these groups.  | Ethnic minority infants born between 2006 and 2012 had up to twice the risk of adverse birth outcomes of white British infants.  | Opondo C, Gray R, Hollowell J, et al. Joint contribution of socioeconomic circumstances and ethnic group to variations in preterm birth, neonatal mortality and infant mortality in England and Wales: a population-based retrospective cohort study using routine data from 2006 to 2012. BMJ Open 2019;9:e028227. doi:10.1136/ bmjopen-2018-028227 |  |
| 65 | Unicef UK Baby Friendly Initiative | Communication with families | Essential that families are kept informed of their baby’s treatment and are also key members of the eam and supported in making decisions about their baby’s care | UNICEF UK Baby Friendly standards for neonatal units (standard 3) recognises the important role parents play and how they can be enabled to be partners in care <https://www.unicef.org.uk/babyfriendly/baby-friendly-resources/implementing-standards-resources/neonatal-guide-to-the-standards/>  |  |
|  **Additional areas** |
| 66 | Institute of Health Visiting (iHV) | Key area for quality improvement 1Breastfeeding and Baby Friendly Initiative (BFI) standards. | Although this a clinical procedure, there is a need to include wider holistic considerations in section 1.10: *Information and support for parents and carers*, which currently has a limited holistic consideration.Infant feeding with breastmilk and the longer-term continuation of breastfeeding saves lives, improves health, reduces health care costs, and can help reduce health inequalities and improve life chances. Breastfeeding continuation rates in the UK remain some of the lowest in the world, which is having a serious impact on the health and wellbeing of babies and their mothers. The Neonatal Critical Care Transformation review shares a vision for Neonatal Units to provide a seamless, responsive and multidisciplinary service built around the needs of new-born babies and the involvement of families in their care to improve outcomes for all families.Ensuring every child has the best start in life is one of Public Health England (PHE) national priorities. Breastfeeding is one of the health visiting High Impact Areas (HIA) set out in the guidance to support delivery of the Healthy Child Programme. Baby Friendly Initiative (BFI) accreditation is outlined as a strategy to improve breastfeeding rates and neonatal outcomes in the NHS Long Term Plan.Unicef data shows that only 15 neonatal units out of 200 have achieved full, independent BFI accreditation, which highlights a key quality area for improvement particularly when considering administration of Neonatal Parenteral Nutrition to a baby. Although breastfeeding and/or /infant feeding is not possible at this time, it is important that the longer-term feeding options for babies are considered by working within the Unicef BFI Guidance for Neonatal Units when caring for a baby who is being administered Neonatal Parenteral Nutrition:* Supporting parents to have a close and loving relationship with their baby, including skin to skin contact and responding to behavioural cues.
* Enabling babies to receive breastmilk and to breastfeed when possible, including preparing mothers to feed and care for their baby after discharge.

Valuing parents as partners in care through effective communication, listening to parent’s feelings and providing unrestricted access (unless justified restrictions are in place) | Please see the documents below which outline the supporting evidence of breastfeeding as a high impact area for improving health inequalities and health outcomes. Please find further evidence of the BFI standards to support close and loving relationships between parents and their babies.<https://www.unicef.org.uk/babyfriendly/about/standards/><https://www.unicef.org.uk/babyfriendly/wp-content/uploads/sites/2/2015/12/Guidance-for-neonatal-units.pdf><https://www.gov.uk/government/publications/commissioning-of-public-health-services-for-children/early-years-high-impact-area-3-supporting-breastfeeding><https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/973112/The_best_start_for_life_a_vision_for_the_1_001_critical_days.pdf><https://www.longtermplan.nhs.uk/publication/nhs-long-term-plan/><https://www.who.int/news/item/11-04-2018-who-and-unicef-issue-new-guidance-to-promote-breastfeeding-in-health-facilities-globally><https://www.unicef.org.uk/babyfriendly/about/accreditation-statistics-and-awards-table-2/><https://www.england.nhs.uk/wp-content/uploads/2019/12/Implementing-the-Recommendations-of-the-Neonatal-Critical-Care-Transformation-Review-FINAL.pdf>)  |  |
| 67 | Royal College of Nursing  | Key area for quality improvement 2Support for mothers who want to breast feed their babies | There is a wealth of evidence regarding the benefits of breast feeding for both the mother and the new-born (including pre-term). Yet this is not always supported and or actively encouraged leaving mothers feeling unable to raise this as a possibility  | See RCN’s Promoting Optimal Breastfeeding in Children’s Wards and Departments and Formula feeds RCN guidance for nurses caring for infants and mothers both available via the RCN website (although please note the later publication is being updated)  | Key area for quality improvement 2Support for mothers who want to breast feed their babies |
| 68 | The Breastfeeding Network | Enabling babies to receive breastmilk, including colostrum, wherever possible, through provision of effective and timely support for mothers to express and store breastmilk, whilst parenteral feeding is ongoing and whilst transitioning to enteral feeding. Support should also cover the availability and easy access to hospital-grade breast pumps and pumps that could allow for double pumping, a comfortable space to use the pump that is as close to the baby as possible, and supporting skin-to-skin contact whenever possible. Use of mother’s milk wherever possible for any enteral feeding, and for mouth care.Parents should be signposted to other sources of support, including the National Breastfeeding Helpline, and Breastfeeding support charities such as The breastfeeding Network, La Leche League and Association of Breastfeeding mothers. | Breastmilk is the best source of nutrition for babies once they can tolerate enteral feeding. It reduces the risk of necrotizing enterocolitis and is protective against the development of parenteral nutrition-associated liver disease (PNALD) in infants receiving parenteral nutrition.The British Association of Perinatal Medicine (BAPM) states that appropriate minimal enteral feeds, preferably maternal or donor breast milk should be given in conjunction with PN wherever possible to prevent gut atrophy and encourage gut adaptation, as well as reduce the risk of PN-associated liver disease.The proportion of very preterm infants fed with some of their mother’s own milk at the time of discharge has remained persistently low over 5 years, with marked geographical variation. Only 58% of babies were receiving any of their mother’s milk on discharge from neonatal care in 2019. This has not significantly changed since 2013. In 2019, 82% of very pre-term babies were receiving some of their mother’s own milk at 14 days after birth. This was also very variable geographically (76%-88%) and shows a significant reduction between 14 days and discharge.The NICE guidance on Neonatal parenteral nutrition (NG154), section 1.9.2 describes the neonatal parenteral nutrition multidisciplinary team. This does not currently include a breastfeeding specialist, which would be beneficial to supporting a transition to feeding breastmilk.  | For information on PNALD, see *Kulkarni et al (2013). Breast Milk Is Better Than Formula Milk in Preventing Parenteral Nutrition–Associated Liver Disease in Infants Receiving Prolonged Parenteral Nutrition.* <https://journals.lww.com/jpgn/Fulltext/2013/09000/Breast_Milk_Is_Better_Than_Formula_Milk_in.24.aspx> National Neonatal Audit Programme 2020 Annual report on 2019 data gives details of these findings and recommendations for improvement.[NNAP-report-2020-FINAL-v2-0421.pdf (hqip.org.uk)](https://www.hqip.org.uk/wp-content/uploads/2020/11/NNAP-report-2020-FINAL-v2-0421.pdf)Bliss Baby Charter, Principle 6, Feeding, contains standards all neonatal units should adhere to. [Baby-Charter-booklet-2020.pdf](https://s3.eu-west-2.amazonaws.com/files.bliss.org.uk/images/Baby-Charter-booklet-2020.pdf?mtime=20210104142806&focal=none)The UNICEF Baby Friendly Initiative Guidance for Neonatal Units provides detailed information on supporting expressing and recommend use of breastmilk for mouth care.[Guidance for Neonatal Units (unicef.org.uk)](https://www.unicef.org.uk/babyfriendly/wp-content/uploads/sites/2/2015/12/Guidance-for-neonatal-units.pdf)The BAPM framework can be seen here:[BAPM Framework for Practice on the provision of Parenteral Nutrition in Neonatal Intensive Care Units – May 2015 (hubble-live-assets.s3.amazonaws.com)](https://hubble-live-assets.s3.amazonaws.com/bapm/attachment/file/57/Parenteral_Nutrition_April_2016.pdf)The NICE guideline on postnatal care (NG194) covers the importance of breastfeeding and support required postnatally  |  |
| 69 | The Breastfeeding Network | Provision of donor breastmilk wherever sufficient quantities of the mothers breastmilk are not available when introducing and transitioning to enteral feeding. | Donor breastmilk is known to be associated with fewer risks than formula milk, when mother’s breastmilk is not available in sufficient quantity. However, it is a limited resource and routinely offered to only the most premature and sick babies. Its availability is variable depending on proximity to one of the few milk banks in the UK. Increasing the availability of donor milk would improve outcomes. | Quigley M, Embleton ND, McGuire W. Formula versus donor breast milk for feeding preterm or low birth weight infants. Cochrane Database of Systematic Reviews 2019, Issue 7. Art. No.: CD002971. DOI: 10.1002/14651858.CD002971.pub5<https://www.cochrane.org/CD002971/NEONATAL_formula-versus-donor-breast-milk-feeding-preterm-or-low-birth-weight-infants> See here for information on the limitations of the existing milk bank network.<https://gpifn.org.uk/breastmilk-donation/> |  |
| 70 | The Breastfeeding Network | Culture and knowledge of all staff, including specialist roles, within neonatal units should support and protect breastfeeding and ensure babies receive as much breastmilk as possible, whenever the feeding regime allows. All units should conform to UNICEF baby friendly standards and comply with the World Health Organisation International Code of Marketing of Breast-milk Substitutes.  | Workforce teams should be equipped with the knowledge or have access to additional specialist roles such as neonatal peer supporters that can help build understanding as to why human milk is important. This could translate into early conversations with parents about the value of colostrum and breastmilk. It can also help support parents and families with links to community support as they transition out of the care of the unit. Any promotion of breastmilk substitutes is known to influence parental choices. Parents should not be exposed to any form of advertising or marketing of breastmilk substitutes or associated branded items.  | The NICE guidelines on Postnatal care (NG194) cover the importance of breastfeeding and support, and should be applied in all post-natal settings, including neonatal units. The UNICEF Baby Friendly Initiative Guidance for Neonatal Units provides detailed information and resources on the importance of training staff to be baby friendly and enable breastfeeding.[Guidance for Neonatal Units (unicef.org.uk)](https://www.unicef.org.uk/babyfriendly/wp-content/uploads/sites/2/2015/12/Guidance-for-neonatal-units.pdf)<https://www.who.int/nutrition/publications/code_english.pdf> |  |
| 71 | Unicef UK Baby Friendly Initiative | Support for families to enable expressing of breastmilk whilst their baby is receiving PN | Although the baby may not be able to tolerate enteral feeds, support is required to enable the mother to express breast milk for when the baby requires it at a later point | UNICEF UK Baby Friendly standards for neonatal units (standard 2) recognises the need for support of early and effective expressing to enable breast milk use or breastfeeding at when the baby is able. <https://www.unicef.org.uk/babyfriendly/baby-friendly-resources/implementing-standards-resources/neonatal-guide-to-the-standards/> <https://www.nice.org.uk/guidance/ng194/chapter/recommendations#supporting-women-to-breastfeed>  |  |
| 72 | British Specialist Nutrition Association (BSNA)  | Key area for quality improvement 1Measuring key targets:* % of babies who achieve energy targets – based on NICE guidelines
* % of babies who achieve protein targets – based on NICE
* Target number of hours from birth for a neonate to be provided with nutrition – NICE says within 8 hours for PN

There could also be a target for a 12 month follow up – to assess the progress the babies have made. | Need to shift focus from survival to outcomes. Neonatal survival improving but focus on parenteral nutrition is poor. | Monitoring energy/protein delivery and comparing to energy/protein target delivery then linking this to a 12-24-month neurodevelopment outcome may emphasise the importance of parenteral nutrition and support recommendation 1.9 (Service design) highlighting the need for an allied Multi-Disciplinary Team working within neonatology. |  |