Nutrition

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care for newborn health

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the care of newborn infants

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Topic Expert Group
Nutrition

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Topic Expert Group: Nutrition

Overview

Nutrition in infancy is key for optimal growth of the body and organs such as the brain, and for long-term health and development, as well as later quality of life. (1) This is even more important for infants born preterm compared to those born at term, because preterm infants have much faster weight gain and higher nutrient requirements per kg bodyweight. Also their digestive tract function is often immature, and they regularly require nutritional support (enteral and/or parenteral nutrition). Therefore, professional nutritional care management is very important to prevent the early occurrence of nutrient deficits and growth faltering. Nutritional needs, growth measurements, and feeding practices of the infant need to be regularly assessed by healthcare professionals at the neonatal intensive care unit as well as after discharge, and they need to advise parents on the best nutritional care for the individual preterm infant.

Nutritional care practices vary between hospitals and sometimes even within individual neonatal units. Written protocols based on current evidence can help reduce the requirement for parenteral nutrition, allow more rapid attainment of full enteral feeds, and improved weight gain velocity. (2–8) Although oral feeding may take time to develop after preterm birth, mother's own milk is the first choice and provision of expressed human milk and later breastfeeding is strongly encouraged. (9,10) Parents should be provided with information and support during this period. However, feeding difficulties may still occur and mothers often report that these persist or even just start after discharge from hospital. (11) Caregivers including physicians, nurses and the nutrition support team, play a central role in supporting parents in the feeding of their preterm or ill infant, including identifying infant feeding cues, and supporting the transition from hospital to home. (12,13)

The Topic Expert Group on Nutrition develops standards relating to the special feeding requirements of preterm and sick infants during their stay in the hospital and after discharge.

Sources

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Effective implementation of early parenteral feeding

Koletzko B, Fewtrell MS, Domellöf M, Embleton ND, Grusfzeld D, McNulty A, Lapillonne A, Szitany P

Target group
Very preterm infants and parents

User group
Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard
Parenteral nutrition is commenced on the first day after birth, usually using standard solutions, and continued until sufficient enteral feeding is established.

Rationale
The goal is to provide appropriate nutrient supply and to prevent the early occurrence of nutrient deficits and growth faltering.

Very preterm infants have high nutritional requirements per kilogram body weight but only limited reserves to withstand the interruption of placental nutrient supply at delivery. Establishing full enteral feeding may take many days, especially if the infant is ill. Early commencement of parenteral nutrition (PN) was shown to shorten the time interval until birth weight was regained. PN should commence on the first day, as soon as the infant is admitted to the neonatal unit, to avoid interruption of nutrient supply and accumulation of nutrient deficits whilst enteral feeds are established. (1–3) PN should be continued until an adequate amount of enteral nutrition is established. (4)

PN with amino acids and glucose should be commenced in all very preterm infants. Intravenous lipid emulsions are a good source of energy. It is safe to start lipid emulsions on day one. (1,5,6) The delivery of adequate PN usually requires central venous access. (see TEG Patient safety & hygiene practice)

Standardised PN solutions prepared for preterm infants and most ill term infants were shown to be safe, to contribute to cost savings, and to help to broadly implement initiation of nutrition on the first day. (7–9)

Benefits

Short-term benefits

- Reduced time of postnatal interruption of nutrient supply and negative nitrogen balance (1,3)
- Reduced accumulation of nutrient deficits and growth faltering (1–3)
- Facilitated gradual introduction and advancement of enteral feeds (consensus)
- Reduced risk of prescription errors (1,10)

Long-term benefits

- Possible improved growth and development with optimal provision of nutrients (11,12)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents are informed by healthcare professionals about the benefits of early initiation of parenteral nutrition (PN).	B (High quality)	Patient information sheet[1]
For healthcare professionals		
2. A unit guideline on infant nutrition, including PN, is adhered to by all healthcare professionals.	B (High quality)	Guideline
3. PN is commenced on the first day, soon after admission. (4)	A (Moderate quality)	Audit report
4. Training on infant nutrition, including the importance of nutrient requirements and early PN, is attended by all healthcare professionals working in the NICU.	B (High quality)	Training documentation
5. PN is carried out in consultation with a specialised nutrition support team.	B (Moderate quality)	Audit report
For neonatal unit		
6. A unit guideline on infant nutrition, including PN, is available and regularly updated.	B (High quality)	Guideline
7. The availability of central (or peripheral) venous access is ensured. (see TEG Patient safety & hygiene practice)	B (High quality)	Audit report
For hospital		
8. Training on infant nutrition, including the importance of nutrient requirements and early PN, is ensured.	B (High quality)	Training documentation
9. Standardised PN solutions and lipid emulsions are available 24 hours per day 7 days a week, either from the pharmacy or via the use of stored bags kept in the neonatal unit.	A (Low quality) B (Moderate quality)	Audit report

[1] The TEG Nutrition very much supports the need of good communication with families and regular sharing of key information, but it is not in favour of sharing information on each standard by a „parent information sheet“, which is term chosen by the Chair Committee. In our view, sharing multiple parent information sheets bears the risk of overloading families with a plethora of written information during a stressful time period, which may not be very helpful. We suggest to consider other means of sharing information.

10. A standardised procedure that ensures safe compounding practices and safe delivery of PN is established.	B (High quality)	Guideline
For health service		
11. A national guideline on infant nutrition, including PN, is available and regularly updated.	B (High quality)	Guideline

Where to go – further development of care

Further development	**Grading of evidence**
For parents and family	
N/A	
For healthcare professionals	
N/A	
For neonatal unit	
N/A	
For hospital	
N/A	
For health service	
• Evaluate health econometrics of neonatal standard solutions produced by hospital pharmacies and by commercial providers. (8,9)	A (Moderate quality)
• Invest in research to improve knowledge in and practice of parenteral nutrition (PN).	B (Moderate quality)

Getting started

Initial steps
For parents and family
• Parents are verbally informed by healthcare professionals about the benefits of early initiation of parenteral nutrition (PN).
For healthcare professionals
• Attend training on infant nutrition, including the importance of nutrient requirements and early PN.
For neonatal unit
• Develop and implement a unit guideline on infant nutrition, including PN. • Develop information material on PN for parents.
For hospital
• Source suitable standard solutions. • Support healthcare professionals to participate in training on infant nutrition, including the importance of nutrient requirements and early PN.

For health service

- Develop and implement a national guideline on infant nutrition, including PN.

Description

PN can be delivered with solutions that are individually tailored for each infant, which may be necessary in infants with special requirements or those requiring long-term PN. Individual prescription and compounding of PN solutions has the major disadvantage that the start of PN is usually delayed by the additional time required to make solutions available, and frequently occurring limitations of availability on weekends and holidays. The use of standardised PN solutions tailored to the needs of most preterm or ill term infants that are prepared by hospital pharmacies or commercial providers can enable PN initiation through 24 hours every day and hence improves nutrient delivery and quality of care.

Components of standardised PN solutions are prepared by hospital pharmacies and commercial providers, and hence carry less risk of microbial contamination and infection than mixing PN solutions on the ward. They also reduce the risk of prescription errors.

Source

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Establishment of enteral feeding in preterm infants

Embleton ND, Koletzko B, Fewtrell MS, Domellöf M, Gruszfeld D, van Goudoever H, McNulty A

Target group
Preterm infants and parents

User group
Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard
Early enteral feeding is established, based on a standard protocol, preferably with mother's own breast milk.

Rationale
The goal is to provide an appropriate nutrient supply, support gut adaptation and health, and reduce the risk of growth faltering.

Early enteral feeds are an important component to establishing good nutrition, particularly with mother's own breast milk (MOM). (see TEG Nutrition) However, there are too few data from high-quality trials to determine the exact day on which this should be started. (1–3) In high-risk groups there is no advantage to delaying the first feed to day six, compared to day two. (4,5) Most neonatal units start oral or enteral feeds in an otherwise stable infant before 48-72 hours. Many start feeds with MOM in the first 24 hours, sometimes with small amounts of maternal colostrum or MOM placed inside the cheek ('buccal colostrum'), whilst lactation is established. If MOM is not available, it is not clear whether the type of milk available, e.g. donor or formula, impacts on the optimal timing of first feed.

In infants <32 weeks of gestation, there was no difference in the incidence of sepsis or risk of necrotising enterocolitis between infants randomised to 30 mls/kg/day compared to 18 mls/kg/day at the point that clinicians were happy to start increasing feeds. (6) Faster increases are associated with shorter duration of parenteral nutrition, with its associated risks. (7) Data on whether it is better overall to use bolus or continuous feeds are currently uncertain, but units should adopt a consistent approach.

Benefits

Short-term benefits

- Reduced duration of parenteral nutrition and associated complications (6) and costs (consensus)
- Reduced risk of serious morbidities such as sepsis, or necrotising enterocolitis with human milk (8)
- Improved nutritional status (including growth) at discharge (consensus)

Long-term benefits

- Improved neurodevelopmental and other health outcomes (7,9)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents are informed by healthcare professionals about the importance of early enteral feeding and they are encouraged to provide breast milk. (see TEG Nutrition, see TEG Care procedures)	A (Low quality) B (High quality)	Patient information sheet[2]
For healthcare professionals		
2. A unit guideline on infant nutrition, including early enteral feeding, preferably with mother's own milk (MOM) is adhered to by all healthcare professionals. (see TEG Nutrition)	A (Low quality) B (High quality)	Guideline
3. Training on infant nutrition, including early enteral feeding, preferably with MOM, is attended by all responsible healthcare professionals.	B (High quality)	Training documentation
For neonatal unit		
4. A unit guideline on infant nutrition, including early enteral feeding, preferably with MOM, is available and regularly updated.	B (High quality)	Guideline
5. Adherence to the unit guideline is monitored.	A (Low quality)	Audit report
For hospital		
6. Training on infant nutrition, including early enteral feeding, preferably with MOM, is ensured.	B (High quality)	Training documentation
For health service		
7. A national guideline on infant nutrition, including early enteral feeding, preferably with MOM, is available and regularly updated.	B (High quality)	Guideline

[2] The TEG Nutrition very much supports the need of good communication with families and regular sharing of key information, but it is not in favour of sharing information on each standard by a „parent information sheet", which is term chosen by the Chair Committee. In our view, sharing multiple parent information sheets bears the risk of overloading families with a plethora of written information during a stressful time period, which may not be very helpful. We suggest to consider other means of sharing information.

Where to go – further development of care

Further development	**Grading of evidence**
For parents and family	
N/A	
For healthcare professionals	
N/A	
For neonatal unit	
N/A	
For hospital	
N/A	
For health service	
• Support research to investigate the optimum starting day and rate of advancement of feeds.	A (Low quality)

Getting started

Initial steps
For parents and family
• Parents are verbally informed by healthcare professionals about the importance of enteral feeding and breast milk.
For healthcare professionals
• Attend training on infant nutrition, including the importance of early enteral feeding, preferably with mother´s own milk (MOM).
For neonatal unit
• Develop and implement a unit guideline on infant nutrition, including early enteral feeding, preferably with MOM. • Develop information material for parents on early enteral feeding, preferably with MOM. • Develop a nutrition support team.
For hospital
• Support healthcare professionals to participate in training on infant nutrition, including early enteral feeding, preferably with MOM.
For health service
• Develop and implement a national guideline on infant nutrition, including early enteral feeding, preferably with MOM.

Source

1. Morgan J, Young L, McGuire W. Delayed introduction of progressive enteral feeds to prevent necrotising enterocolitis in very low birth weight infants. Cochrane Database Syst Rev. 2014;(12):CD001970.

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Family education and training on infant feeding in the unit and after discharge

Herber-Jonat S, Koletzko B, Fewtrell MS, Embleton ND, van Goudoever JB, Gruszfeld D, Lapillonne A, McNulty A, Szitanyi P

Target group
Infants and parents

User group
Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard
Parents develop appropriate knowledge and skills in feeding their preterm infant.

Rationale

To sustain life, growth, and be discharged from the hospital, an infant must be adequately nourished. (1) Parents are encouraged to feed their infant, even though most of them are not knowledgeable about the care of preterm or ill infants in general and about determining preterm infant readiness or tolerance of oral feeding. For the parent who is eager to provide direct care and nurturing to her or his infant, feeding can be an especially rewarding caregiving activity. However, feeding difficulties may occur and mothers often report that these persist or start after discharge from hospital. (2) Oral feeding may take time to develop after birth and parents should be provided with information and support during this period. They may struggle with infant feeding in the first weeks and experience a period of transition before comfort develops. (3) For the preterm infant, oral feeding can be exhausting and potentially risky, leading to poor weight gain, delayed oral feeding development, and physiologic decompensation with apnoea, bradycardia, oxygen desaturation and aspiration. (4,5) Parents should be educated on how to feed a preterm or ill infant who is likely to fatigue easily and demonstrate feeding behaviours such as long breathing pauses, long sucking pauses and significant oxygen desaturations. Caregivers and especially nurses and the nutrition support team play a central role in supporting parents to feed their preterm or ill infant, including identifying infant feeding cues, and supporting the transition from hospital to home. (6,7) (see TEG Education & training and TEG Follow-up & continuing care)

Benefits
- Improved nutritional care of preterm and ill infants (consensus)
- Decreased postnatal growth faltering (consensus)
- Improved parent-infant interaction (consensus)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents are informed by healthcare professionals about infant feeding challenges.	B (High quality)	Patient information sheet[3]
For healthcare professionals		
2. A unit guideline on parental feeding techniques to improve oral infant feeding behaviours is adhered to by all healthcare professionals.	B (High quality)	Guideline
3. Training on possible feeding difficulties and on the educational and support needs of parents is attended by all responsible healthcare professionals.	B (High quality)	Training documentation
For neonatal unit		
4. A unit guideline on parental feeding techniques to improve oral infant feeding behaviours is available and regularly updated.	B (High quality)	Guideline
5. Educational programmes (parental feeding techniques to improve oral infant feeding behaviours) are provided by a multidisciplinary infant nutrition team.	A (Low quality)	Training documentation
6. Opportunities for skin-to-skin care and comfort holding of the preterm infant prior to and during the feeding are provided.	B (Moderate quality)	Parent feedback
For hospital		
7. Training on techniques to improve oral infant feeding behaviours and parental feeding techniques is ensured.	B (High quality)	Training documentation

[3] The TEG Nutrition very much supports the need of good communication with families and regular sharing of key information, but it is not in favour of sharing information on each standard by a „parent information sheet“, which is term chosen by the Chair Committee. In our view, sharing multiple parent information sheets bears the risk of overloading families with a plethora of written information during a stressful time period, which may not be very helpful. We suggest to consider other means of sharing information.

For health service		
8. Outpatient or community-based support and networks for feeding difficulties are provided.	B (Moderate quality)	Audit report, parent feedback

Where to go - further development

Further development	**Grading of evidence**
For parents and family	
N/A	
For healthcare professionals	
N/A	
For neonatal unit	
• Develop networks for feeding support across regions.	B (Moderate quality)
For hospital	
N/A	
For health service	
• Examine the effectiveness of different programmes to educate and support parents of preterm and ill infants.	B (Moderate quality)
• Consider covering costs of feeding support.	B (Moderate quality)

Getting started

Initial steps

For parents and family

- Parents are verbally informed about oral feeding of their preterm or ill infant and feeding challenges by healthcare professionals.

For healthcare professionals

- Attend training on preterm or ill infant feeding techniques.

For neonatal unit and hospital

- Develop and implement a unit guideline on feeding techniques to improve oral feeding behaviours and parental feeding techniques.
- Support healthcare professionals to participate in training on the difficulties of oral feeding.
- Provide room with appropriate privacy for oral feeding.

For health service

- Establish outpatient or community-based follow-up.

Source

1. Koletzko B, Poindexter B, Uauy R, editors. Nutritional care of preterm infants: scientific basis and practical guidelines. Basel: Karger; 2014. 314 p. (World review of nutrition and dietetics).

2. Thoyre SM. Mothers' ideas about their role in feeding their high-risk infants. J Obstet Gynecol Neonatal Nurs JOGNN. 2000 Dec;29(6):613–24.

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Feeding of late preterm infants

Lapillonne A, Koletzko B, Fewtrell MS, Herber-Jonat S, Embleton ND, van Goudoever JB, Gruszfeld D, Szitanyi P

Target group
Late preterm infants and parents

User group
Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard
Early nutrition, preferably using human milk, is established and feeding difficulties, growth, and breastfeeding are monitored during and after hospitalisation.

Rationale
Nutritional issues in late preterm infants do not always receive appropriate attention. (1)

Late preterm infants (34 to 36 weeks of gestation) comprise 6-7% of all births and about 75% of preterm births in Europe. (2) This population is at risk for short and long-term morbidities and adverse outcome, including a two- to five-fold increase in mild to moderate neonatal morbidities compared to infants born at term. These include hypoglycemia, poor feeding and nutritional compromise in the early neonatal period. (3–6) Furthermore, feeding difficulties are a dominant reason for delay in discharge of late preterm infants. (6,7)

Overall 30-40% of late preterm infants are not admitted to a neonatal department but are cared for in general maternity units. Late preterm infants should not be considered similar to term infants because they have unique, often unrecognised, medical vulnerabilities and nutritional needs that predispose them to high rates of morbidity and hospital readmissions. (4) They require nutritional support more frequently than term infants and they are less likely to be breastfed. (8,9)

Breastfeeding without adequate support may put these infants at risk of morbidities especially when discharged early. (10) Rates of readmission after initial hospital discharge are high because of jaundice, suspected sepsis and feeding difficulties. Parental education and timely outpatient follow-up by a provider knowledgeable in breastfeeding and preterm infant care are crucial in the proper management for these mother–infant dyads. (11) Mothers of late preterm infants should receive extended lactation support, frequent follow-up and, if necessary, delayed hospital discharge.

Benefits

Short-term benefits

- Reduced risk of neonatal morbidities including hypoglycaemia, poor feeding, and growth faltering (7–11)

Long-term benefits

- Reduced risk of readmissions and failure to successfully breastfeed, and improved long-term outcomes (7–11)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents are informed and counselled by healthcare professionals about the importance of early feeding and breastfeeding, and the need to establish breastfeeding before discharge. (see TEG Nutrition)	B (High quality)	Patient information sheet[4]
2. Mothers are supported to breastfeed or where appropriate to express breast milk by healthcare professionals. (see TEG Care procedures)	B (High quality)	Parent feedback
For healthcare professionals		
3. A unit guideline on infant nutrition, including initial triage of late preterm infants and for starting and increasing enteral/oral feeds, is adhered to by all healthcare professionals.	B (High quality)	Guideline
4. Training on infant nutrition, including the nutritional risks of late preterm infants, is attended by all responsible healthcare professionals.	B (High quality)	Training documentation
For neonatal unit		
5. A unit guideline on infant nutrition, including initial triage of late preterm infants and for starting and increasing enteral/oral feeds, is available and regularly updated.	B (High quality)	Guideline
For hospital		
6. Training on infant nutrition, including the nutritional risks of late preterm infants, is ensured.	B (High quality)	Training documentation
For health service		
7. A national guideline on infant nutrition, including initial triage of late preterm	B (High quality)	Guideline

[4] The TEG Nutrition very much supports the need of good communication with families and regular sharing of key information, but it is not in favour of sharing information on each standard by a „parent information sheet“, which is term chosen by the Chair Committee. In our view, sharing multiple parent information sheets bears the risk of overloading families with a plethora of written information during a stressful time period, which may not be very helpful. We suggest to consider other means of sharing information.

	infants and for starting and increasing enteral/oral feeds, is available and regularly updated.	
8.	Outpatient or community-based follow-up is organised.	B (Moderate quality) Audit report

Where to go – further development of care

Further development	**Grading of evidence**
For parents and family	
N/A	
For healthcare professionals	
N/A	
For neonatal unit	
• Audit and monitor nutritional risks of late preterm infants.	A (Low quality)
For hospital	
• Evaluate benefits/cost ratio of introduction of enhanced care.	A (Low quality)
For health service	
• Develop research and guidelines on nutritional care of late preterm infants.	A (Low quality)

Getting started

Initial steps

For parents and family

- Parents are verbally informed about the importance of early feeding and breastfeeding support and about the importance of outpatient monitoring by healthcare professionals.
- The mother is encouraged to breastfeed.

For healthcare professionals

- Attend training on infant nutrition, including the nutritional risks of late preterm infants.

For neonatal unit

- Develop and implement a unit guideline on infant nutrition, including initial triage of late preterm infants and for starting and increasing enteral/oral feeds including criteria for safe discharge.
- Develop information material on the importance of early feeding and breastfeeding support and about the importance of outpatient monitoring for parents.

For hospital

- Support healthcare professionals to participate in training on infant nutrition, including nutritional risks of late preterm infants.
- Provide support for lactation consultants.

For health service

- Develop and implement a national guideline on infant nutrition, including initial triage of late preterm infants and for starting and increasing enteral/oral feeds.
- Establish outpatient or community-based follow-up.

Source

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6. Pulver LS, Denney JM, Silver RM, Young PC. Morbidity and discharge timing of late preterm newborns. Clin Pediatr (Phila). 2010 Nov;49(11):1061–7.

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11. Academy of Breastfeeding Medicine. ABM clinical protocol #10: breastfeeding the late preterm infant (34(0/7) to 36(6/7) weeks gestation) (first revision June 2011). Breastfeed Med Off J Acad Breastfeed Med. 2011 Jun;6(3):151–6.

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Lifecycle

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Recommended citation

EFCNI, Lapillonne A, Koletzko B et al., European Standards of Care for Newborn Health: Feeding of late preterm infants. 2018

Monitoring growth in the neonatal unit

Embleton ND, Koletzko B, Fewtrell MS, Herber-Jonat S, van Goudoever JB, Gruszfeld D, Lapillonne A, McNulty A, Szitanyi P

Target group
Preterm and ill infants, and parents

User group
Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard
Growth monitoring and assessment of nutritional status is performed using suitable equipment and appropriate growth charts in order to optimise nutritional support and outcomes.

Rationale
Preterm infants grow more slowly than age matched in-utero fetuses. (1) Slow growth is frequently due to poor macronutrient intakes (2), compounded by clinical complications, common neonatal morbidities, and poorly prioritised nutritional care. Patterns of early growth and nutrient intakes are strongly associated with long term metabolic and cognitive outcomes. Growth acceleration in the first three months in infants born at term may increase the risk of metabolic complications in later life. (3) There is no conclusive evidence that catch-up growth in preterm infants increases this risk, and in general the risks of poor growth are far more common and serious. (4) Clinical practice must be considered alongside the strong evidence of worse neuro-developmental or cognitive outcomes in infants who gain weight more slowly (5,6), or who receive lower nutrient intakes. (7–9)

Nutritional screening tools are widely used in other patient groups, but have not been widely used in preterm infants, although tools exist and deserve further evaluation. (10) All infants on NICUs should have regular measurement of weight and head circumference. All measures must be plotted on growth charts appropriate to the population. Measurement of linear (length) growth is more complex, and shows high inter-observer variability. (11) Whilst more detailed growth measures can be used, e.g. tibial length, mid-arm/mid-thigh circumference, their usefulness in routine practice has not been established. (11) Body composition appears to be important but cannot be easily measured routinely in clinical practice. In the longer term weight gain should be interpreted in the context of linear growth to ensure that growth is proportional i.e. attempt to avoid excess fat deposition.

Benefits

Short-term benefits
- Optimised nutritional status (12)

Long-term benefits
- Reduced risk of under- and over-nutrition (consensus)
- Optimised long-term metabolic and cognitive outcomes (7)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents are informed and educated about normal patterns of growth in infants by healthcare professionals.	B (High quality)	Patient information sheet[5]
For healthcare professionals		
2. A unit guideline on infant nutrition, including growth measurements and assessment of feeding practices is adhered to by all healthcare professionals.	B (High quality)	Guideline
3. Training and education on how to weigh and measure, which growth charts to use and how measurements can be plotted and interpreted is attended by all responsible healthcare professionals.	B (High quality)	Training documentation
For neonatal unit		
4. A unit guideline on infant nutrition, including growth measurements and assessment of feeding practices is available and regularly updated.	B (High quality)	Guideline
For hospital		
5. Training on how to weigh and measure, which growth charts to use and how measurements can be plotted and interpreted is ensured.	B (High quality)	Training documentation
6. Appropriate calibrated equipment to measure infants (electronic scales, length boards, incubator length measures etc.) is available.	B (High quality)	Audit report
For health service		
7. A national guideline on growth measurements and assessment of	B (High quality)	Guideline

[5] The TEG Nutrition very much supports the need of good communication with families and regular sharing of key information, but it is not in favour of sharing information on each standard by a „parent information sheet“, which is term chosen by the Chair Committee. In our view, sharing multiple parent information sheets bears the risk of overloading families with a plethora of written information during a stressful time period, which may not be very helpful. We suggest to consider other means of sharing information.

	feeding practices is available and regularly updated.		
8.	Appropriate growth references are agreed on and used.	A (Low quality)	Audit report, guideline

Where to go – further development of care

Further development	**Grading of evidence**
For parents and family	
N/A	
For healthcare professionals	
N/A	
For neonatal unit	
N/A	
For hospital	
N/A	
For health service	
N/A	

Getting started

Initial steps
For parents and family
• Parents are verbally informed about normal patterns of growth in infants. • Parents are encouraged to seek medical advice from healthcare professionals in case of abnormal growth pattern or feeding problems.
For healthcare professionals
• Attend training on appropriate growth measurements and how to monitor them.
For neonatal unit
• Develop and implement a unit guideline on infant nutrition, including monitoring growth and feeding. • Develop information material about normal patterns of growth in infants for parents.
For hospital
• Support healthcare professionals to participate in training on how to weigh and measure, which growth charts to use and how measurements can be plotted and interpreted.
For health service
• Develop and implement a national guideline on growth measurements and assessment of feeding practices. • Establish the use of appropriate growth references.

Source

1. Embleton DN, Cleminson DJ, Zalewski DS. What growth should we aim for in preterm neonates? Paediatr Child Health U K [Internet]. 2017 [cited 2018 May 15]; Available from: https://eprint.ncl.ac.uk/236544

2. Embleton NE, Pang N, Cooke RJ. Postnatal malnutrition and growth retardation: an inevitable consequence of current recommendations in preterm infants? Pediatrics. 2001 Feb;107(2):270–3.

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5. Ehrenkranz RA. Growth in the Neonatal Intensive Care Unit Influences Neurodevelopmental and Growth Outcomes of Extremely Low Birth Weight Infants. PEDIATRICS. 2006 Apr 1;117(4):1253–61.

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12. Koletzko B, Poindexter B, Uauy R, editors. Nutritional care of preterm infants: scientific basis and practical guidelines. Basel: Karger; 2014. 314 p. (World review of nutrition and dietetics).

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Lifecycle

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Recommended citation

EFCNI, Embleton N, Koletzko B et al., European Standards of Care for Newborn Health: Monitoring growth in the neonatal unit. 2018.

Providing mother's own milk (MOM) for preterm and ill term infants

Herber-Jonat S, Koletzko B, Fewtrell MS, Embleton ND, van Goudoever JB, Gruszfeld D, Lapillonne A, McNulty A, Szitanyi P

Target group
Preterm and ill term infants, and parents

User group
Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard
Mothers are encouraged and supported to provide their own breast milk for their infant.

Rationale
The promotion and provision of mother's own milk (MOM) is a convincing strategy for reducing the risk of necrotising enterocolitis (NEC), sepsis and the associated costs, and improving brain, visual and cognitive development in preterm infants. (1–5)

Although the rates of human milk feedings for preterm infants have increased over the last decade, breast-pump dependant mothers of preterm infants face specific barriers to the initiation and maintenance of sufficient lactation. (6) Similarly, term infants benefit from the provision of MOM. Implementation of multidisciplinary lactation teams for education and advocacy of healthcare professionals, mothers and families as well as accessible milk pumps and storage space improve milk volume and infant nutrition. (7,8)

Unfortified human milk does not fully provide for the unique nutritional needs of the very preterm infant. Fortification of MOM can correct inadequate protein-to-energy and mineral-to-protein ratios, and micronutrient supply. (9) The recommended supply of docosahexaenoic acid (DHA) for very low birth weight infants can be met through MOM if maternal DHA intake is markedly increased. (10)

Benefits

Short-term benefits
- Reduced prematurity related morbidity (less feeding intolerance, decreased risk of serious morbidity, i.e. NEC and sepsis) (1–3)
- Reduced healthcare costs (2,3)

Long-term benefits
- Improved neurodevelopmental outcomes (4,5)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents are informed by healthcare professionals about the benefits of mother's own milk (MOM) and encouraged and supported to provide MOM. (see TEG Care procedures)	A (Low quality) B (High quality)	Guideline, patient information sheet[6]
For healthcare professionals		
2. A unit guideline on infant nutrition, including the importance and provision of MOM as well as the initiation and maintenance of lactation and its appropriate documentation, is adhered to by all healthcare professionals.	B (High quality)	Guideline
3. Training on infant nutrition, including the importance and provision of MOM as well as the initiation and maintenance of lactation, is attended by all responsible healthcare professionals. (see TEG Care procedures)	B (High quality)	Training documentation
For neonatal unit		
4. A unit guideline on infant nutrition, including the importance and provision of MOM as well as the initiation and maintenance of lactation and its appropriate documentation, is available and regularly updated.	B (High quality)	Audit report, clinical records, guideline
5. Multidisciplinary infant nutrition and lactation teams to provide education and advocacy for MOM provision are available.	A (Low quality)	Audit report
6. Timely access to effective and efficient breast pumps, containers, pump kits and breast shields for mothers of preterm infants is provided.	A (Low quality)	Audit report, guideline, parent feedback

[6] The TEG Nutrition very much supports the need of good communication with families and regular sharing of key information, but it is not in favour of sharing information on each standard by a „parent information sheet", which is term chosen by the Chair Committee. In our view, sharing multiple parent information sheets bears the risk of overloading families with a plethora of written information during a stressful time period, which may not be very helpful. We suggest to consider other means of sharing information.

For hospital		
7. Training on infant nutrition, including the importance and provision of MOM as well as the initiation and maintenance of lactation, is ensured.	B (High quality)	Training documentation
8. Sufficient resources (staff, equipment including fridges and freezers, and space for milk expression) are provided.	A (Low quality) B (High quality)	Audit report
For health service		
9. A national guideline on infant nutrition, including the importance and provision of MOM, fortification, and supplementation is available and regularly updated.	B (High quality)	Guideline

Where to go – further development of care

Further development	**Grading of evidence**
For parents and family	
N/A	
For healthcare professionals	
N/A	
For neonatal unit	
N/A	
For hospital	
• Review impact of establishing and increasing human milk usage and potential cost saving from decreased use of parenteral nutrition.	A (Low quality)
For health service	
N/A	

Getting started

Initial steps
For parents and family
• Parents are verbally informed by healthcare professionals about the benefits of mother's own milk (MOM) during pregnancy and after delivery.
For healthcare professionals
• Attend training on infant nutrition, including the importance and provision of MOM as well as the initiation and maintenance of lactation.

For neonatal unit

- Develop and implement a unit guideline on infant nutrition, including the importance and provision of MOM as well as the initiation and maintenance of lactation and its appropriate documentation.
- Develop information material on the importance and provision of MOM as well as the initiation of lactation for parents.

For hospital

- Support healthcare professionals to participate in training on infant nutrition, including the importance and provision of MOM as well as the initiation and maintenance of lactation.
- Provide facilities and equipment for milk expression.

For health service

- Develop and implement a national guideline on infant nutrition, including the importance and provision of MOM, fortification, and supplementation.

Description

The use of mother's own milk (MOM) for preterm and ill term infants should be encouraged. Special emphasis should be placed on the early lactation period during the first two weeks after delivery when the mammary gland transits from secretory differentiation to secretory activation. Special guidance of the lactating mother with regard to pumping strategies to facilitate breastfeeding should be implemented in the daily routine on the NICU. Mothers should also be informed about the physiology of lactation to set their expectations; in particular they need to understand the importance of small amounts of colostrum (see TEG Care procedures) and that they should not expect to express large volumes of milk in the early days. Protocols for the safe handling are helpful to preserve the high quality of mother's own milk. Fortification of own mother's milk and nutrient supplementation of the lactating mother will further improve the nutritional value of MOM for the preterm infant.

Source

1. Corpeleijn WE, Kouwenhoven SMP, Paap MC, van Vliet I, Scheerder I, Muizer Y, et al. Intake of own mother's milk during the first days of life is associated with decreased morbidity and mortality in very low birth weight infants during the first 60 days of life. Neonatology. 2012;102(4):276–81.

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4. Vohr BR, Poindexter BB, Dusick AM, McKinley LT, Higgins RD, Langer JC, et al. Persistent beneficial effects of breast milk ingested in the neonatal intensive care unit on outcomes of extremely low birth weight infants at 30 months of age. Pediatrics. 2007 Oct;120(4):e953-959.

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6. Meier PP, Johnson TJ, Patel AL, Rossman B. Evidence-Based Methods That Promote Human Milk Feeding of Preterm Infants: An Expert Review. Clin Perinatol. 2017 Mar;44(1):1–22.

7. Bixby C, Baker-Fox C, Deming C, Dhar V, Steele C. A Multidisciplinary Quality Improvement Approach Increases Breastmilk Availability at Discharge from the Neonatal Intensive Care Unit for the Very-Low-Birth-Weight Infant. Breastfeed Med Off J Acad Breastfeed Med. 2016 Mar;11(2):75–9.

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10. Koletzko B. Human Milk Lipids. Ann Nutr Metab. 2016;69 Suppl 2:28–40.

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EFCNI, Herber-Jonat S, Koletzko B et al., European Standards of Care for Newborn Health: Providing mother's own milk (MOM) for preterm and ill term infants. 2018.

The role of human milk banks

van Goudoever JB, Koletzko B, Fewtrell MS, Gruszfeld D, Herber-Jonat S, Embleton N, Lapillonne A, McNulty A, Szitany P

Target group
Very preterm infants and parents

User group
Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard
Standards are established for the safe use of human donor milk when mother's own milk is not available.

Rationale

There are numerous indications of beneficial effects of feeding human milk to very preterm infants on neurocognitive development and the risk of necrotising enterocolitis. (1,2) The use of mother's own milk as primary feeding for very preterm infants should be encouraged (see TEG Nutrition). When mother's own milk is not available, human donor milk may be considered as an alternative, despite the considerable costs of running a human milk bank service. (3) The aim of human milk banks is to deliver safe and high-quality donor human milk, with elimination of pathogens while preserving immunological and nutrient components. Holder pasteurisation destroys bile-simulated lipase, reduces lactoferrin, lysozyme, immunoglobulins, and bactericidal capacity of human milk. (4) Freeze-thaw cycles also alter the structure of the fat globule membrane and its core and surface lipids. High temperature short time pasteurisation, high pressure processing, or ultraviolet irradiation are currently tested as alternative to holder pasteurisation, but they have been tested in experimental conditions only.

A recent meta-analysis suggests that donor human milk, compared to formula, reduces the risk of necrotising enterocolitis (NEC). (4) More trials are ongoing, but all units use milk that has been pasteurised with the Holder method.

Donor milk should be obtained from milk banks that have established procedures to screen donors and collect, store, and pasteurise the milk in a safe and controlled way. A track and trace system from donor to recipient should be in place.

Benefits

Short-term benefits
- Reduced risk of NEC (4)

Long-term benefits
N/A

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents are informed by healthcare professionals about the possibility of the safe provision of donor milk, when mother's own milk is not available to the child.	B (High quality)	Patient information sheet[7]
For healthcare professionals		
2. A unit guideline on infant nutrition, including the use of donor milk, when mother's own milk is not available, is adhered to by all healthcare professionals.	B (High quality)	Guideline
3. Training on infant nutrition, including the use of donor milk, when mother's own milk is not available, is attended by all responsible healthcare professionals.	B (High quality)	Training documentation
For neonatal unit		
4. A unit guideline on infant nutrition, including the use of donor milk, is available and regularly updated.	B (High quality)	Guideline
5. A relationship with an existing human milk bank is in place or considered.	B (Low quality)	Guideline
For hospital		
6. The use of donor milk is considered.	B (Low quality)	Guideline
7. Training on infant nutrition, including the use of donor milk, when mother's own milk is not available, is ensured.	B (High quality)	Training documentation
For health service		
8. A guideline on human milk banking is available and regularly updated.	B (High quality)	Guideline

[7] The TEG Nutrition very much supports the need of good communication with families and regular sharing of key information, but it is not in favour of sharing information on each standard by a „parent information sheet", which is term chosen by the Chair Committee. In our view, sharing multiple parent information sheets bears the risk of overloading families with a plethora of written information during a stressful time period, which may not be very helpful. We suggest to consider other means of sharing information.

Where to go – further development of care

Further development	**Grading of evidence**
For parents and family	
N/A	
For healthcare professionals	
N/A	
For neonatal unit	
•	
For hospital	
N/A	
For health service	
• Support research into the health effects of donor milk. (5)	A (High quality)

Getting started

Initial steps
For parents and family
• Parents are verbally informed by healthcare professionals about the possibility of the safe provision of donor milk, when mother's own milk is not available to the child.
For healthcare professionals
• Attend training on infant nutrition, including the use of donor milk.
For neonatal unit
• Develop and implement a unit guideline on infant nutrition, including the use of donor milk. • Develop information material on milk banks and the use of donor milk for parents.
For hospital
• Support healthcare professionals to participate in training on infant nutrition, including the use of donor milk.
For health service
• Develop and implement a guideline on human milk banking.

Source

1. Lechner BE, Vohr BR. Neurodevelopmental Outcomes of Preterm Infants Fed Human Milk: A Systematic Review. Clin Perinatol. 2017 Mar;44(1):69–83.

2. Corpeleijn WE, de Waard M, Christmann V, van Goudoever JB, Jansen-van der Weide MC, Kooi EMW, et al. Effect of Donor Milk on Severe Infections and Mortality in Very Low-Birth-Weight Infants: The Early Nutrition Study Randomized Clinical Trial. JAMA Pediatr. 2016 Jul 1;170(7):654.

3. ESPGHAN Committee on Nutrition, Arslanoglu S, Corpeleijn W, Moro G, Braegger C, Campoy C, et al. Donor human milk for preterm infants: current evidence and research directions. J Pediatr Gastroenterol Nutr. 2013 Oct;57(4):535–42.

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The role of nutrient supplements for preterm infants

Lapillonne A, Koletzko B, Fewtrell MS, Embleton ND, Herber-Jonat S, van Goudoever JB, Gruszfeld D, McNulty A, Szitanyi P

Target group
Preterm infants and parents

User group
Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard
Preterm infants are given supplements to reduce nutritional deficits.

Rationale
Fortified human milk and preterm formulas in adequate volume meet most nutrient requirements even of very preterm infants. (1) However, the intake of some macro- or micronutrients is often inadequate. (2,3) This may result from both the specific medical condition and poor nutritional intake. A variety of dietary supplements can bridge the gap between achieved nutrient provision and calculated requirements. Extremely preterm infants can have specific protein needs above those provided by fortified human milk or preterm formula and may require a modular protein supplement. (4) Preterm infants with a high energy expenditure due to ongoing disease (e.g. bronchopulmonary dysplasia or heart failure) may require added energy supplements. (5)

Fat soluble vitamins, iron, zinc and sodium are supplements widely used during hospitalisation. (5) Vitamin supplements may be appropriate for infants on low daily volume of fortified milk or preterm formula. Total vitamin D intake is usually suboptimal even with adequate feeding, and vitamin D supplements are generally provided to all preterm infants. (6) Infants with severe cholestasis require additional fat soluble vitamins. (7) Iron may be needed in amounts >2 mg/kg as often provided by fortified human milk or preterm formula, especially in extremely preterm infants and in those receiving erythropoietin therapy. (8) Other possible supplements that may be needed include calcium, phosphorus, potassium (high urinary losses with diuretic therapy), sodium (high urinary losses in preterm infants) and zinc (enterostomy losses).

Supplements are generally started when full enteral feeding is achieved and continued after discharge as needed. (9) Surveillance of blood markers may be required based on an individual assessment. (10)

Benefits
Short-term benefits
- Reduced risk of nutrient deficits (1)

Long-term benefits
- Reduced risk of long-term sequelae of early nutritional deficit (e.g. growth faltering, anaemia, rickets) (1)

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents are informed by healthcare professionals about the importance of providing supplements to prevent nutritional deficits.	B (High quality)	Patient information sheet[8]
2. Parents are informed by healthcare professionals about the importance of continuing the supplements when their infant is discharged home.	B (High quality)	Patient information sheet[1]
For healthcare professionals		
3. A unit guideline on infant nutrition, including screening for selective deficits and their management during the inpatient and outpatient periods, is adhered to by all healthcare professionals.	B (High quality)	Guideline
4. Training on infant nutrition, including screening for selective deficits and their management during the inpatient and outpatient periods, is attended by all responsible healthcare professionals.	B (High quality)	Training documentation
5. Selective nutritional deficits that may occur in preterm infants are screened for and the appropriate prescriptions are given. (9)	A (Moderate quality)	Audit report
For neonatal unit		
6. A unit guideline on infant nutrition, including screening for selective deficits and their management during the inpatient and outpatient periods, is available and regularly updated.	B (High quality)	Guideline
For hospital		
7. Training on infant nutrition, including screening for selective deficits and their	B (High quality)	Training documentation

[8] The TEG Nutrition very much supports the need of good communication with families and regular sharing of key information, but it is not in favour of sharing information on each standard by a „parent information sheet“, which is term chosen by the Chair Committee. In our view, sharing multiple parent information sheets bears the risk of overloading families with a plethora of written information during a stressful time period, which may not be very helpful. We suggest to consider other means of sharing information.

management during the inpatient and outpatient periods is ensured.		
8. Supplements are made available for use.	B (High quality)	Audit report
For health service		
9. A national guideline on infant nutrition, including screening for selective deficits and their management during the inpatient and outpatient periods is available and regularly updated.	B (High quality)	Guideline
10. Supplements for outpatient care are made available and reimbursed.	B (Moderate quality)	Guideline

Where to go – further development of care

Further development	**Grading of evidence**
For parents and family	
N/A	
For healthcare professionals	
N/A	
For neonatal unit	
N/A	
For hospital	
N/A	
For health service	
• Support the development of supplements specifically designed for preterm infants.	B (Moderate quality)

Getting started

Initial steps
For parents and family
• Parents are verbally informed about the importance of providing supplements by healthcare professionals. • At the time of discharge parents receive guidance and a prescription for providing supplements.
For healthcare professionals
• Attend training on infant nutrition, including selective nutritional deficits in preterm infants, and how to assess and manage them.
For neonatal unit
• Develop and implement a unit guideline on infant nutrition, including screening for selective deficits and their management during the inpatient and outpatient periods. • Develop information material on the importance of providing supplements for parents.
For hospital

- Support healthcare professionals to participate in training on infant nutrition, including selective nutritional deficits in preterm infants, and how to assess and manage them.

For health service

- Develop and implement a national guideline on infant nutrition, including screening for selective deficits and their management during the inpatient and outpatient periods.

Source

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The role of preterm formula

van Goudoever JB, Koletzko B, Fewtrell MS, Gruszfeld D, Herber-Jonat S, Embleton N, Lapillonne A, McNulty A, Szitany P

Target group
Preterm infants and parents

User group
Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard
Formula for preterm infants promotes growth and functional outcomes approaching those of preterm infants fed fortified mother's milk.

Rationale
Growth of fetuses in utero is extremely rapid. To match fetal growth, preterm infants born at 24 weeks' gestation need to double their weight by 30 weeks' postmenstrual age and be more than five times their birthweight by 40 weeks. This extraordinary growth demands a much higher intake of energy, protein, and other nutrients than is needed by infants born at term. Extremely preterm infants are also born with low stores of key nutrients such as iron, zinc, calcium, and vitamins and with little or no subcutaneous fat and glycogen stores because most placental transfer of nutrients to provide these stores occurs in the third trimester of pregnancy. (1) Adequate nutrition during their stay in the Neonatal Intensive Care Unit is pivotal for appropriate growth (2), but the smaller the infant, the greater the challenge in providing optimal early nutrition.

When mother's own milk or donor milk is not available, preterm formula is the alternative choice, at least for preterm infants born before 34 gestational weeks or with a birth weight of <2000g. Preterm formula should be safe and meet the infant's requirements as it is usually the sole source of nutrition. The objective of the nutritional management using preterm formula should be to mimic growth, body composition and functional outcomes similar to those of infants born at term. There is evidence that preterm formula, compared to donor milk, increases the risk of necrotizing enterocolitis (3), and this is why preterm formula should only be used when breast milk is not available.

Benefits

Short-term benefits
- Improved weight gain, similar to that of fetuses in utero, and higher when compared to unfortified donor milk (4,5)
- Reduced duration of parenteral nutrition with the related complications (consensus)

Long-term benefits
N/A

Components of the standard

Component	Grading of evidence	Indicator of meeting the standard
For parents and family		
1. Parents are informed by healthcare professionals about the possibility of preterm formula when mother's own milk or donor milk is not available for the infant.	B (High quality)	Patient information sheet[9]
For healthcare professionals		
2. A unit guideline on infant nutrition, including the use of preterm formula, is adhered to by all healthcare professionals.	B (High quality)	Guideline
3. Training on infant nutrition, including the use of preterm formula, is attended by all responsible healthcare professionals.	B (High quality)	Training documentation
For neonatal unit		
4. A unit guideline on infant nutrition, including the use of preterm formula, is available and regularly updated.	B (High quality)	Guideline
5. Suitable preterm formulae are available.	B (High quality)	Audit report
For hospital		
6. Suitable preterm formulae are available.	B (High quality)	Audit report
7. Training on infant nutrition, including the use of preterm formula, is ensured.	B (High quality)	Training documentation
For health service		
8. A guideline on infant nutrition, including the use of preterm formula, is available and regularly updated.	B (High quality)	Guideline

[9] The TEG Nutrition very much supports the need of good communication with families and regular sharing of key information, but it is not in favour of sharing information on each standard by a „parent information sheet", which is term chosen by the Chair Committee. In our view, sharing multiple parent information sheets bears the risk of overloading families with a plethora of written information during a stressful time period, which may not be very helpful. We suggest to consider other means of sharing information.

Where to go – further development of care

Further development	**Grading of evidence**
For parents and family	
N/A	
For healthcare professionals	
N/A	
For neonatal unit	
N/A	
For hospital	
N/A	
For health service	
• Support research on preterm formula to improve health outcomes.	B (High quality)

Getting started

Initial steps
For parents and family
• Parents are verbally informed by healthcare professionals about the possibility of preterm formula when mother's own milk or donor milk is not available for the infant.
For healthcare professionals
• Attend training on infant nutrition, including the use of preterm formula.
For neonatal unit
• Develop and implement a guideline on infant nutrition, including the use of preterm formula. • Develop information material on preterm formula when mother's own milk or donor milk is not available for the infant.
For hospital
• Support healthcare professionals to participate in training on infant nutrition, including the use of preterm formula.
For health service
• Develop and implement a guideline on infant nutrition, including the use of preterm formula.

Source

1. Agostoni C, Buonocore G, Carnielli V, De Curtis M, Darmaun D, Decsi T, et al. Enteral Nutrient Supply for Preterm Infants: Commentary From the European Society of Paediatric Gastroenterology, Hepatology and Nutrition Committee on Nutrition: J Pediatr Gastroenterol Nutr. 2010 Jan;50(1):85–91.

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Written standards of nutritional practice

Koletzko B, Fewtrell MS, Domellöf M, Embleton N, Gruszfeld D, Lapillonne A, McNulty A, Szitanyi P

Target group
Preterm and ill term infants, and parents

User group
Healthcare professionals, neonatal units, hospitals, and health services

Statement of standard
All units treating preterm and ill term infants develop and implement guidelines on nutritional care and aim at establishing nutrition support teams, inform and train all healthcare professionals regarding the use of these guidelines on nutritional care, and monitor implementation.

Rationale
The goal is to promote consistent, good quality nutritional care for all preterm and ill term infants to improve clinical outcomes.

Even in the situation where experts agree on optimal nutritional care for very preterm infants (1,2), this may not be translated into practice for many reasons, including different interpretations or opinions, and different levels of understanding or experience amongst healthcare professionals. Recommendations may also not be considered locally applicable or feasible. Often, less nutrition is provided to the sickest infants, who might benefit from it the most, contributing to adverse clinical outcomes. (3)

Practice variation within individual neonatal units can be reduced by the use of standardised feeding protocols. Implementation of a standardised feeding guideline can lead to more rapid attainment of full enteral feeds, reduced requirement for parenteral nutrition, reduced risk of sepsis, necrotising enterocolitis (NEC) and chronic lung disease, and improved growth velocity. (3–9)

Having written standards of practice, based on the other standards of the Topic Expert Group Nutrition, which are adhered to by all staff caring for preterm and ill term infants will promote a more consistent approach and maximise the delivery of optimal nutritional care. It will also allow the care delivered to be monitored in relation to the standards.

The delivery of nutritional care can be facilitated and improved by nutrition support teams. (10) In the neonatal unit, neonatal nutritionists are vital members of the neonatal care team and can supervise the implementation of standardised nutritional guidelines.

Benefits

Short-term benefits

- Increased consistency and quality of nutritional care (4)
- Facilitated care in the neonatal unit (4)
- Improved delivery of nutritional support, meeting a greater proportion of nutrient needs (5,6)
- Improved growth, reduced growth faltering (4–6)
- Reduced requirement for parenteral nutrition (4,5)
- Reduced risk of sepsis, NEC, chronic lung disease (5–9)

Long-term benefits

- Increased rate of growth and better growth measures at discharge (4,5)
- Expected benefits for neurodevelopmental outcomes and other health outcomes (5–9)

Components of the standard

Component	**Grading of evidence**	**Indicator of meeting the standard**
For parents and family		
1. Parents are informed by healthcare professionals about unit policy and the importance of nutrition.	A (Low quality) B (High quality)	Patient information sheet[10]
For healthcare professionals		
2. A unit guideline on nutritional standards is adhered to by all healthcare professionals.	B (High quality)	Audit report
3. Training on infant nutrition is attended by all responsible healthcare professionals.	A (Low quality) B (High quality)	Training documentation
For neonatal unit		
4. A unit guideline for nutritional care of preterm and ill term infants, involving all groups of healthcare professionals involved in care, is available and regularly updated. (5)	A (Moderate quality) B (High quality)	Guideline

[10] The TEG Nutrition very much supports the need of good communication with families and regular sharing of key information, but it is not in favour of sharing information on each standard by a „parent information sheet“, which is term chosen by the Chair Committee. In our view, sharing multiple parent information sheets bears the risk of overloading families with a plethora of written information during a stressful time period, which may not be very helpful. We suggest to consider other means of sharing information.

5. Adherence to the guideline is monitored. (4)	A (Moderate quality)	Audit report
6. A nutrition support team is established. (10)	A (Moderate quality)	Audit report
For hospital		
7. Training on infant nutrition is ensured.	B (High quality)	Training documentation
8. A nutrition support team is proactively supported.	A (Low quality)	Audit report
For health service		
9. A national guideline for nutritional care of preterm and ill term infants is available and regularly updated.	B (Moderate quality)	Guideline
10. Compliance of each neonatal unit with their unit guideline is monitored as a quality of care indicator.	A (Low quality)	Audit report

Where to go – further development of care

Further development	**Grading of evidence**
For parents and family	
N/A	
For healthcare professionals	
N/A	
For neonatal unit	
N/A	
For hospital	
N/A	
For health service	
• Benchmark nutritional outcomes against similar services. (5)	A (High quality)

Getting started

Initial steps
For parents and family
• Parents are verbally informed by healthcare professionals about unit policy and the importance of nutrition.
For healthcare professionals
• Attend training on infant nutrition.
For neonatal unit
• Develop and implement a unit guideline on infant nutrition.

- Develop information material on nutrition for parents.
- Develop a nutrition support team.

For hospital

- Support healthcare professionals to participate in training on infant nutrition.
- Support the development of a nutrition support team.

For health service

- Develop and implement a national guideline for nutritional care of preterm and ill term infants.

Description

Studies have shown that the provision of nutrition support is influenced in practice by the clinical status of a preterm infant. Newborn infants who were perceived to be more critically ill, based on their ventilation status at day seven, received significantly less nutritional support in the first three weeks than their counterparts, who were perceived to be more medically stable. The risks of adverse outcomes including poorer growth velocity, increased rates of late-onset sepsis, death, moderate or severe bronchopulmonary dysplasia, longer hospital stays, and worse neurodevelopmental outcomes at 18-22 months among the sicker infants were associated with the total daily energy intake during the first seven days. (3)

Differences exist between neonatal centres in terms of weight gain related to processes that are unique to the centres where higher weight gains are achieved. In one study, these "meaningful differences" were then provided to the centres where weight gains were lower, resulting in improvements in outcomes at 76% of the sites. (11)

Source

1. Agostoni C, Buonocore G, Carnielli V, De Curtis M, Darmaun D, Decsi T, et al. Enteral Nutrient Supply for Preterm Infants: Commentary From the European Society of Paediatric Gastroenterology, Hepatology and Nutrition Committee on Nutrition: J Pediatr Gastroenterol Nutr. 2010 Jan;50(1):85–91.

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