

Nutrition Guideline

Healthy Infants and Young Children

Introduction of Complementary Foods for Preterm Infants

For Professional Reference Only

Applicable to: Physicians, Nurses and Other Health Professionals

Recommendations

- Preterm infants should be assessed for signs of readiness prior to starting complementary foods.
- Complementary foods should be introduced to preterm infants between 4 – 6 months corrected age when signs of readiness are demonstrated.
- Evidence suggests there may be risks with starting complementary foods prior to four months corrected age or delaying beyond six months corrected age.

Definitions

Chronological/Postnatal age (days, weeks, months or years): time elapsed from birth.¹

Gestational age (completed weeks): time elapsed between the first day of the last menstrual period and the day of delivery.¹

Corrected age (weeks or months): chronological age minus the number of weeks born before 40 weeks of gestation; generally used for children birth to 24 months corrected age (up to 36 months in some clinical situations) who were born preterm.¹

Preterm infants: an infant born at less than 37 weeks 0 days gestation.²

Complementary food: all solid and liquid foods other than breastmilk or infant formula.³

Health Benefits

- Appropriate timing for the introduction of complementary foods to preterm infants supports healthy growth and may prevent behavioral and developmental challenges associated with the development of feeding skills.⁴

Key Questions

What signs of readiness should a preterm infant show before starting complementary food?

All preterm infants should be assessed for signs of readiness prior to the introduction of complementary foods. Although there is no specified number of signs an infant should be demonstrating, it is reasonable to expect preterm infants to show most of the signs of readiness prior to the introduction of complementary food. Some signs of readiness are:^{5,6}

- Sits up with little help
- Has good head/neck control
- Opens mouth when food is offered
- Turns head away when full
- Shows an interest in what others are eating
- Grabs for objects to put in their mouths

Notice, May 2019: There has been a practice change regarding the recommendation for the introduction of commonly allergenic foods for infants. Please see the [Introduction of Commonly Allergenic Foods for Infants](#) practice change notice. This Nutrition Guideline is being updated to reflect these changes.

Nutrition Guideline

Healthy Infants and Young Children

Introduction of Complementary Foods for Preterm Infants

For Professional Reference Only

Applicable to: Physicians, Nurses and Other Health Professionals

A complicated medical course in hospital with prolonged illness including early endotracheal intubation, chronic lung disease, gastro-esophageal reflux disease and prolonged early naso-gastric feeding, may lead to delays in reaching feeding milestones and readiness for complementary food.⁴ These factors may also affect gross motor control in some preterm infants resulting in poor head control, trunk instability and poor oral-motor skills.⁴ Some preterm infants may demonstrate good head control and other signs of readiness but may not be able to sit fully unassisted. This reinforces the need for individualized assessment of readiness. In these situations, the infant may benefit from further assessment by an Occupational Therapist, Physical Therapist, Physician and Registered Dietitian.

Infants continuing to require medical supports post hospital discharge, such as oxygen therapy and tube feeds, may need specific recommendations from their health care team to support complementary feeding.

What are signs of hunger and fullness in a preterm infant?

Once an infant appears ready for solids, it is important to offer solids based on hunger and fullness cues. Common signs of hunger and fullness are:⁶

Signs of Hunger:

- Opens mouth or reaches at sight of food
- Sucks or smacks lips
- Excited when put in high chair
- Puts fist in mouth or cries (late sign)

Signs of Fullness:

- Turns head away
- Covers mouth with hands
- Closes mouth
- Falls asleep
- Cries

Respecting the division of responsibility in infant feeding fosters a trusting and healthy feeding relationship. Parents are responsible for 'what' the infant is offered to eat, and the infant is responsible for 'how much' food they eat.⁶

Preterm infants that have experienced a complicated medical course in hospital may experience delays in ability or interest to start complementary foods. These infants may require care from other health professionals such as Speech Language Pathologists, Occupational Therapists, Physicians and Registered Dietitians. Complementary foods can be introduced when signs of readiness are demonstrated, and safety of clinical condition allows.

Can complementary food be introduced if the infant's tongue protrusion reflex is still present?

The tongue-extrusion or protrusion reflex is an automatic response in infants to force the tongue outward when the lips are touched. It is not necessary to wait until the tongue protrusion reflex is gone or until the lips can clear a spoon (lip seal), before starting complementary food.⁴ Lip seal and diminishing tongue protrusion reflex are not useful signs of developmental readiness. In term infants, lip seal may not be seen until around eight months and the tongue protrusion reflex may persist until nine months.⁷ It is important to differentiate between food refusal, fullness and a persistent tongue protrusion reflex. Initial introduction of solids is the beginning of a complex learning process with actual intake initially being quite small. Feeding skills will develop over time.⁴ Regular feeding with a spoon will likely help lip seal to develop and decrease the tongue protrusion reflex.⁴

Nutrition Guideline

Healthy Infants and Young Children

Introduction of Complementary Foods for Preterm Infants

For Professional Reference Only

Applicable to: Physicians, Nurses and Other Health Professionals

At what age are preterm infants ready to start complementary food?

The need for evidence informed guidelines for the optimal age of introduction of complementary foods for preterm infants has been identified. Health Canada does not have guidelines for the timing of the introduction of complementary foods for preterm infants; however, available literature and guidelines from the international community provide a range of recommendations to guide practice.^{3,8,9,10,11}

Based on the available literature and expert opinion, it is reasonable to consider introducing complementary foods to preterm infants between 4 – 6 months corrected age¹² once signs of readiness have been established.

Is it too early to feed a preterm infant complementary food at four months corrected age?

No, as long as the infant is showing signs of readiness. Guidelines for feeding term infants recommend starting complementary food at around six months. Compared to term infants, preterm infants have unique and diverse needs and variances in their degree of prematurity making a range of ages to introduce complementary food more appropriate than a specific age.^{4,9}

The following statements confirm the physiological ability of preterm infants to receive and process complementary food by at least four months corrected age.

Gastrointestinal Function

Although a preterm infant's ability to digest food is immature at birth, digestive capability increases in response to enteral feeds (especially breastmilk).⁴ A preterm infant's gastrointestinal function is sufficiently mature to metabolize nutrients from complementary foods well before the recommended age of introducing complementary food.⁴

Kidney Function

Introduction of nutrient dense complementary food with higher protein content will provide an increased renal solute load. Maturation of kidney function in preterm infants improves after birth, and sufficient kidney function is available to handle the increased renal solid load of complementary food by two weeks corrected age,^{4,9} well before the recommended time to introduce complementary food.^{13,14}

Is there any harm in waiting until after 6 months corrected age to introduce complementary food?

Preterm infants are at risk for feeding problems due to illness, presence of nasogastric feeds, or prematurity itself.⁴ Possible feeding problems include the following:

Rejection of Food

In order to prevent rejection of complementary food, introduction during critical periods of development is important.¹⁵ The longer the delay in introduction of complementary food, the more difficult it may be for infants to accept solid food.¹⁵ Watching infants closely for demonstrated signs of readiness will help prevent additional feeding problems associated with delay and lack of practicing skills.

Nutrition Guideline

Healthy Infants and Young Children

Introduction of Complementary Foods for Preterm Infants

For Professional Reference Only

Applicable to: Physicians, Nurses and Other Health Professionals

Delayed Texture Progression

Preterm infants will progress through texture changes at different rates. Infants with more delayed development may progress more slowly.⁴ Delayed texture progression has been associated with feeding problems in term infants which persist into childhood years.¹⁶ There may be a critical window for introducing foods of different textures. Introducing age appropriate foods, of the correct consistency, and by the correct feeding method is important for both developmental and nutritional reasons, and for preventing feeding difficulties later on.

Allergy Risks

There is some research in term infants which reports that delaying the introduction of allergenic foods after 4 – 6 months chronological age and up to 2 – 4 years, may increase the risk of developing an allergy.^{17,18,19} For more information, refer to the *Nutrition Guideline: [9.1 Allergy Prevention](#)*.

Iron Deficiency

In concordance with nutrition recommendations for term infants, foods rich in iron are introduced to provide a dietary source of iron.

Does introduction of complementary foods decrease the need for vitamin D and iron supplementation?

No, vitamin D and iron supplementation continue to be necessary in order to meet the preterm infant's increased nutrient needs. Supplementation is typically started prior to hospital discharge and ongoing assessment is required to ensure the infant is meeting their requirements.

Vitamin D supplementation is recommended for all babies and children at 400 IU/day, but may be increased in some clinical scenarios based on individual assessment by a Physician and/or a Registered Dietitian.^{20,21} For more information, refer to the *Nutrition Guideline: [5.2 Vitamin D](#)*.

Iron supplementation usually ranges 2 – 4 mg/kg/day (total intake) and is dependent upon the clinical condition of the infant.^{22,23} Iron supplementation should continue until the infant is at least 12 months corrected age^{22,23} and taking a variety of iron rich complementary food. The infant's Physician or Registered Dietitian will provide guidance as to when iron supplementation should be discontinued.

When can preterm infants be transitioned from formula or breastmilk to whole fluid milk?

Preterm infants should not receive whole fluid milk until they are 12 month corrected age. Preterm infants have increased iron needs until 12 months corrected age which includes iron from complementary food, iron-fortified formula or breastmilk. Providing whole fluid milk which is low in iron to preterm infants prior to 12 month corrected age may have a negative effect on their iron status.^{1,3,}

Nutrition Guideline
Healthy Infants and Young Children
Introduction of Complementary Foods
for Preterm Infants

For Professional Reference Only

Applicable to: Physicians, Nurses and Other Health Professionals

Are there any handouts I can use with my clients?

The resources listed below have been developed for use in healthy term infants; however, the information about order of foods to introduce and the progression of textures may be useful in the introduction of complementary foods for preterm infants.

For infant nutrition resources visit Nutrition Education Materials at <http://www.albertahealthservices.ca/nutrition/Page11115.aspx> and click on **Infants**.

For more information related to healthy infants and children see [Healthy Parents Healthy Children](#).

Nutrition Guideline

Healthy Infants and Young Children

Introduction of Complementary Foods for Preterm Infants

For Professional Reference Only

Applicable to: Physicians, Nurses and Other Health Professionals

References

- ¹ American Academy of Pediatrics. Policy statement. Age terminology during the perinatal period. *Pediatrics* 2004;114(5):1362-4
- ² Beck S, Wojdyla D, Say L, Betran A, Merialdi M, Requejo J, et al. The worldwide incidence of preterm birth: a systematic review of maternal mortality and Morbidity. *Bulletin of the World Health Organization* 2010;88:31-8
- ³ Oregon Pediatric Nutrition Practice Group. Nutrition practice care guidelines for preterm infants in the community. [Internet] 2013 [cited 2015 April] Available from: <http://public.health.oregon.gov/HealthyPeopleFamilies/wic/Pages/providers.aspx>
- ⁴ King C. An Evidence based guide to weaning preterm infants. *Pediatr Child Health*. 2009;19(9):405-13.
- ⁵ Grenier D, Leduc D. *Well beings: A guide to health in child care*. 3rd edition Ottawa: Canadian Paediatric Society; 2008
- ⁶ Satter E. *Child of mine: feeding with love and good sense*. Palo Alto (CA): Plutonium Press, 2000
- ⁷ Morris E. *Pre-feeding skills*. Tuscon (AZ): Therapy Skills Builders; 1987
- ⁸ Norris FJ, Larkin MS, Williams CM, Hampton SM, Morgan JB. Factors affecting the introduction of complementary foods in the preterm infant. *Eur J Clin Nutr* 2002;(56):448-54
- ⁹ Palmer DJ, Makrides M. Introducing solid foods to preterm infants in developed countries. *Ann Nutr Metab* 2012;60(suppl 2):31-8
- ¹⁰ Fewtrell M, Lucas A, Morgan J. Factors associated with weaning in full term and preterm infants. *Arch Dis Child Fetal Neonatal Ed* 2003;88:F296-301
- ¹¹ Fanaro S, Borsari G, Vigi V. Complementary feeding practices in preterm infants: an observational study in a cohort of Italian infants. *J Pediatr Gastr Nutr* 2007;45:S210-4
- ¹² Groh-Wargo S. *Nutritional care for high risk newborns*. 3rd Edition. Chicago (IL): Precept Press, Inc. 2000
- ¹³ Aperia A, Zetterstrom R. Renal control of fluid homeostasis in the newborn infant. *Clin Perinatol* 1982;9:523-33
- ¹⁴ D'Souza SW, Vale J, Sims DG, Chiswick ML: Feeding, growth, and biochemical studies in very low birthweight infants. *Arch Dis Child* 1985;60:215-8
- ¹⁵ Udall J. Infant feeding: initiation, problems, approaches. *Curr Probl Pediatr Adolesc Health Care*. 2007;37:374-99
- ¹⁶ Coulthard H, Harris G, Emmett P. Delayed introduction of lumpy foods to children during the complementary feeding period affects child's food acceptance and feeding at 7 years of age. *Mater Child Nutr* 2009;5:75-85
- ¹⁷ Tang M, Robinson M. Allergy prevention: current recommendations and new insights. *Aust Fam Physician*. 2008;37(4):204-8
- ¹⁸ ESPGHAN Committee on Nutrition: Agostoni C, Decsi T, Fewtrell M, Goulet O, Kolacek S, Koletzko B, et al. Complementary feeding: a commentary by the ESPGHAN committee on nutrition. *Medical Position Paper*. *J Pediatr Gastroenterol Nutr*. 2008.46:99-110
- ¹⁹ Du Toit G, Lack G. Can food allergy be prevented? The current evidence. *Pediatr Clin N Am*. 2011:481-509
- ²⁰ Wagner CL, Greer FR. Prevention of rickets and vitamin D deficiency in infants, children, and adolescents. *Pediatrics*. 2008;122:1142-52

Nutrition Guideline

Healthy Infants and Young Children

Introduction of Complementary Foods for Preterm Infants

For Professional Reference Only

Applicable to: Physicians, Nurses and Other Health Professionals

²¹ Agostoni C, Buonocore G, Carnielli VP, De Curtis M, Darmaun D, Decsi T, et al. Enteral nutrient supply for preterm infants: commentary from the European society for paediatric gastroenterology, hepatology, and nutrition committee on nutrition. *J Pediatr Gastr Nutr* 2010; 50(1):85-91

²² Canadian Pediatric Society Nutrition Committee. Nutrient needs and feeding of premature infants. *Can Med Assoc J* 1995;152(11):1765-85

²³ Rao R, Georgieff M. Iron therapy for preterm infants. *Clin Perinatol* 2009;36:27-42