Community Provider Support of Growth in Premature Infants

Wisconsin Association for Perinatal Care

Community care providers are critical in supporting premature infants and their families in attaining healthy outcomes. These providers include primary physicians (family physicians and pediatricians), public health nurses, nurse practitioners, Birth to 3 providers, registered dietitians, and WIC nutritionists. Growth is a reflection of a young child's well being. Compared to good growth, inappropriate growth is more often associated with frequent illnesses and hospitalizations[1], lower bone density[2], and adiposity[3]. Quality of care affects growth[4]. Evidence-based care to support growth begins with adjusting a premature infant's chronological age for prematurity. Quality care includes close monitoring of growth parameters to allow for early recognition of an abnormal trajectory, immediate efforts to encourage appropriate growth, (e.g., nutritional supplementation), and early detection and treatment of illness.

The purpose of this statement is

- To describe the method for adjusting an infant's age for prematurity.
- To define appropriate parameters for monitoring an infant's growth.
- To provide resources and intervention strategies for community care providers in their efforts to support optimal growth in premature infants.

Adjusting age for prematurity

Adjusting age for prematurity (birth prior to 37 weeks' gestation) helps health care providers set realistic expectations for the infant's growth and development. The provider can then communicate these expectations to parents and other individuals caring for the infant. For as long as the first two to three years of life, premature infants are likely to exhibit lower than average weight and length unless allowance is made for gestational age. Therefore, what is normal may not seem normal unless one adjusts for prematurity.

Tips for adjusting an infant's age for prematurity

- Use infant's due date for calculating adjusted age. For example, an infant born on March 30 and due on June 30 would be approximately 1 month old (or 4 weeks) on July 30.
- Round off the adjusted age to the nearest week.
- Continue to adjust at least through 24 months (2 years).

Plotting anthropometric measurements

It is important to plot an infant's measurements routinely on a consistent growth chart. Incremental weight charts (measuring velocity) provide more graphic illustration than standard growth charts regarding the changes in weight over time[5] , but these charts may not be readily available or applicable to current age (e.g., when an infant has not reached term). Current growth charts (weight for age, length for age, head circumference for age, weight for length), available in English, Spanish, and French, can be downloaded from http://www.cdc.gov/growthcharts/.

Tips for obtaining accurate and reliable measurements

- Measuring length requires two people and a length board with a head and foot piece. One person holds the head in position. The second person straightens the knees and brings the ankles to a right angle with the foot piece. Lengths done on exam tables using a tape measure are approximations at best, and often useless in accurately tracking growth.
- Weigh on a digital scale.

Measuring and plotting BMI

Experts recommend following the Body Mass Index (BMI) because of its accessibility and correlation with total body fat and risk factors for obesity-related morbidity in adults[6]. BMI is defined as the individual's body weight (kg) divided by the square of his or her length/height (m). Calculating BMI of an infant requires accurate measures of weight and recumbent length/height. BMI tables, nomograms, and calculator programs are available from a number of sources. Current BMI standards are based on term infants; data for prematurely born infants are not available.

Online resources for BMI tables, nomograms

- http://www.who.int/childgrowth/standards/bmi_for_age/en/index.html
- http://www.cdc.gov/nccdphp/dnpa/bmi/calc-bmi.htm
- http://www.nhlbisupport.com/bmi/bmicalc.htm

Growth faltering

Growth faltering means that attained growth is inadequate or growth velocity is reduced, compared to expected growth velocity. Alternatively, growth faltering describes the situation when one or more parameters drop two or more channels on the growth chart (e.g., from the 50-75th percentiles to the 5-10th). Generally, growth faltering happens first in weight, then length, then head circumference. Poor head growth is a late, and more ominous, sign of nutritional deficits.

Early identification and close monitoring of growth faltering, combined with appropriate nutritional intervention, may reverse the downward growth trajectory before it affects the infant's brain and overall development.

Sometimes clinicians are deceived about growth by how a baby looks, or the clinician might think, "Well, the parents are small." Remember, to judge adequate growth, you need accurate anthropometric measurements.

Catch-up growth

Inadequate

A premature infant's weight, length, and head circumference frequently fall below the 50th percentile when plotted on a growth grid, even when the infant's age is adjusted for prematurity. The distance between where the infant's growth actually falls and the 50th percentile is considered to be his or her growth potential, or the gap that needs to be closed in order to say that the infant has "caught up" with peers. Catch-up growth is dependent on growth velocity (the rate of change in growth over time) that exceeds expected velocity. The velocity excess during catch-up equals the deficit during growth faltering[7]. Factors that influence catch-up growth include gestational age at birth, size for gestational age at birth, genetic potential, neurological injury, illness, and nutritional intake. Generally, catch up occurs first in head circumference, then length, then weight.

Excessive

While earlier studies indicated a beneficial effect of catch-up growth on head circumference and infant development[8,9] recent research has suggested an association between rapid postnatal weight gain and the metabolic syndrome. Increased global and central adiposity have been associated with rapid postnatal weight gain in both premature and full term infants, changes which increase concerns about the development of insulin resistance and the metabolic syndrome[10,11].

However, adult behaviors and lifestyle are stronger predictors of metabolic syndrome than rapid postnatal growth[12,13]. Thus, there is insufficient evidence at this time to recommend sub-maximal nutrition support for premature infants, but further study is necessary.

Considerations

- Infant head circumference growth and development are positively associated with catch-up growth
- Excessive catch-up growth has been associated with global and central adiposity and has been associated with metabolic syndrome in adults

Providing optimum nutrition to premature infants

Breast milk is the nutrient of choice for premature infants[14]. Breast milk protects against infection, is easily digested and well tolerated, contains species-specific nutrients, enhances cognitive development, and reduces cost of both health care and infant feeding.

- Premature infants who are breastfed, as well as those fed either breast milk or formula, may need additional calories and nutrients through supplementary feedings[15]. To determine appropriate supplementary feedings, consultation with someone with expertise in premature infant nutrition and growth may be necessary.
- All premature infants (including late preterm infants) need closer monitoring than full-term infants[16].
- Nutritional management of premature infants should consider such factors as degree of prematurity and presence of other medical conditions which could affect metabolic demands.

Premature infants are often discharged to home on nutrient-enriched formula to facilitate "catch-up" growth. A meta-analysis of seven trials, enrolling a total of 631 infants, provided no strong evidence that feeding with nutrient-enriched formula following hospital discharge affects growth and development[17]. Similarly, randomized controlled trials have provided insufficient evidence to determine whether multicomponent-fortified breast milk is superior to unfortified breast milk for premature infants following discharge[18].

Additional resources

- "Gaining and Growing: Assuring Nutritional Care of Premature Infants" (http://www.depts.washington.edu/growing) is a source of good information on nutrition and growth of premature infants.

Summary

The goal of monitoring the growth of premature infants is two-fold: to prevent or arrest growth faltering and to improve the odds of achieving appropriate catch-up growth in a timely manner. For the newborn premature infant, care should focus on support of the infant's return to his or her in utero growth trajectory prior to hospital discharge[19]. For the premature infant who is already living in the community at large, family and health care services should focus on provision of nutrients to support appropriate catch-up growth. While not every premature infant will achieve the 50th percentile, or even the 10th percentile weight, length, and/or head circumference for adjusted age, with few exceptions, the goal should continue to be achievement of, or return to, the growth pattern the infant would have followed if he or she had been born at term.

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