Cerebral Palsy

Effects on Nutrition Status and Feeding

Cerebral Palsy (CP) is a non-progressive disorder of the brain that results in abnormal muscle control, tone or coordination, depending on the extent and location of the brain injury. Increased tone (stiffness, hypertonicity, spasticity) occurs in 60 percent of children with cerebral palsy. Other children may have low muscle tone (hypotonia). Abnormalities in tone may cause incoordination of the muscles involved in swallowing, chewing, passage of food along the gastrointestinal tract, and elimination. Gastroesophageal reflux (GER), poor growth, and dental problems may also be seen in children with CP.

Oral Motor Problems Affect Food Intake

Children with cerebral palsy often consume less food due to tongue thrust, poor lip closure, or abnormal reflexes. Delayed development of feeding skills may lead to prolonged mealtimes or unfinished meals because of the frustration or fatigue of the caregiver and/or child. GER, seen in approximately 25 percent of children with moderate or severe CP, may cause pain during swallowing, so that eating is unpleasant and intake decreases.

Children with CP Need High-Calorie, Nutrient Dense Foods

Most infants and children with cerebral palsy will be able to eat by mouth. Foods should be chosen which provide the greatest nutrient intake. Infants may need 24 to 30 kcal/oz (calories per ounce) formula, whereas the typical formula contains 20 kcal/oz. However, the higher calorie, more concentrated formula may increase the burden on an infant’s kidneys, or contribute to constipation in a toddler. The use of a higher calorie formula should be discussed first with the infant’s physician. Children weighing over 20 pounds or older than one year of age can be given high-calorie, nutrient-dense foods such as sweet potatoes, grated cheese, mashed beans or spreads made with dried fruits.
Varied Food Texture Is Important

When possible, children should be offered foods with different food textures. Some foods can be smooth and easily eaten. Other foods should have more texture (with lumps or in pieces) in order to encourage tongue movements or chewing. A therapist specializing in feeding can determine what food textures are appropriate for a child.

Positioning and Feeding Aids Are Crucial to Adequate Intake

An occupational or physical therapist can recommend a position for feeding which supports the child, minimizes abnormal tone and reflexes, and makes it easier to swallow food. Input from both a therapist and a nutritionist is essential to any program designed to promote oral motor development and increase nutrient intake. Plastic coated small spoons may make it easier to feed an infant. Special bowls and non-skid mats can make it easier for a child to self-feed, thereby increasing independence and, in some instances, food intake.

Non-Oral Feeding May Be Necessary

Some children may have such poor oral-motor skills that a combination of oral intake and intermittent or nighttime NG (nasogastric) or G tube (gastrostomy tube) feeding may be needed. A pediatric gastroenterologist and/or feeding team evaluation can determine the best ways to feed the child.

Constipation Can Decrease Appetite and Food Intake

Due to abnormal muscle tone and other factors, children with CP often have slower movement of food through the GI tract. Increased fluids can improve this problem. If swallowing thin liquids causes choking, liquids can be thickened with yogurt or instant baby cereal. Some infants may benefit from formulas containing fiber. For the child over 20 pounds or one year of age, higher-fiber foods such as whole-grain cereals, cooked vegetables and raw fruits will help with elimination. Both increased fluids and fiber are needed to lessen constipation.
**Poor Growth Is Common in Children with CP**

Up to 40 percent of children with CP were born prematurely or with a low birth weight. These infants need time and extra nutrition for catch-up growth. When assessing growth of a premature baby, chronological age must be corrected for prematurity before the weight and height are plotted. Measuring the growth velocity or rate of growth (grams/week or centimeters/month) is helpful in determining whether a child is growing at a slower, expected, or catch-up rate (see *Nutrition Screening* section). Short-term NG tube feedings can be a very helpful and necessary therapy for the child with poor growth who is having difficulty eating.

**Mouth Structure and Prolonged Bottle Feeding Increase Risk of Dental Caries**

Tongue protrusion, weak oral-facial muscles or prolonged bottle feeding in children with CP may cause malocclusion or an anterior open bite. Good oral hygiene is important in preventing cavities. Regular dental visits for children should begin at age two. But children with active infection, pain or other dental problems should be referred to a dentist for immediate care, regardless of the child’s age. Fluoride drops or tablets and dental sealants may protect a child’s teeth from decay.
Down Syndrome —
Effects on Nutrition Status and Feeding

At birth, infants with Down Syndrome may be diagnosed with congenital heart disease or blockage of the intestine (duodenal atresia). During infancy, feeding problems often develop due to oral hypotonia (low tone), small oral cavity causing tongue protrusion, and delayed and/or abnormal tooth formation. Short stature (height), decreased head circumference and a tendency toward obesity are also common. Specialized growth charts for children with Down Syndrome are available and should be used to assess length or height (see Nutrition Screening section). Appropriateness of weight for height should be assessed using the NCHS growth charts.

Optimal Nutrient Intake Is Needed After Birth

All infants need adequate nutrients (protein, fat, carbohydrates, vitamins, minerals, water) from breastmilk or infant formula to promote cell growth throughout the body.

Some infants with Down Syndrome need extra nutrients and calories. If an infant is born with intestinal blockage, emergency surgery will be performed. Additional nutrients will be needed to repair tissue and to recover from the stress of surgery. Heart repair, when needed, may be postponed until the infant has reached a specific weight.

When heart disease is severe, the infant may have breathing difficulties, making it more difficult to take formula by mouth. Breathing difficulties also will mean lack of oxygen to body tissues and extra work for the heart. Lack of oxygen will result in incomplete metabolism of nutrients. Breathing difficulties, incomplete metabolism, and greater demands on the heart all increase nutrient and energy needs.

Increases in weight, length, and head circumference must be measured regularly (weekly, while weight gain is a goal). This helps to determine if dietary intake is resulting in appropriate growth (plotted on Down Syndrome growth charts). Breastmilk can be supplemented, or a calorically-dense formula (24 to 30 kcal/oz) can be given if weight gain is insufficient.
Some infants and children with Down Syndrome, on the other hand, do not need extra calories. Older infants and toddlers who do not have heart disease may need fewer calories due to low muscle tone and/or delayed motor skills. Although fewer calories are needed, protein, mineral and most vitamin requirements remain the same, so foods must be carefully selected to provide adequate nutrients in fewer calories (see Overweight section of this manual).

## A Feeding Assessment May Prevent Feeding Problems

During the first 12 months of life, a feeding assessment is recommended for all children with Down Syndrome. At this time, adequacy of food intake, growth rate, oral motor skills, caregiver concerns and knowledge of feeding skills are evaluated. A feeding plan is developed that can be incorporated into the daily routine. Normalization of oral-motor tone is a part of an overall infant development program. An upright position, appropriate feeding equipment, jaw control, behavioral strategies, and caregiver counseling (with demonstration of techniques) will facilitate the development of adequate feeding skills.

Foods for meals and snacks should be chosen for their nutritional value. Higher or lower calorie food choices should be selected to promote a normal rate of growth based on the Down Syndrome growth chart. At the same time, the goal is to maintain weight for height ideally between the 25th and 75th percentiles on the NCHS growth chart.

The child with low tone may not be as aware of liquid or food in the mouth. Thus, the sucking or chewing rate may be slowed and swallowing may be delayed. If the child’s mouth gets too full, chewing becomes more difficult and the gag reflex may be triggered, causing the child to spit up. When oral skill development is delayed, the gradual transition from pureed to chopped and bite-sized foods may be slowed. It is important to continue to progress toward more textured foods, or the child may later refuse lumpy foods when they are introduced. A feeding assessment may identify possible interventions that can help maximize the child’s ability to eat and grow.
**Vitamin and Mineral Needs May Increase**

In children with Down Syndrome, biochemical abnormalities suggestive of poor nutritional status have been reported for vitamins A, B₆, folacin, and the mineral zinc. Decreased resistance to infection (runny nose, conjunctivitis) may be the result of inadequate nutrient intake and nutrient insufficiency at the cellular level. As with all children, foods served for meals and snacks, both at home and away from home, must be chosen for high nutrient content. When a child is unwilling or unable to eat the amount of food necessary, or the caregivers are unable to provide adequate food, a pediatric multivitamin/mineral supplement may be useful (see Supplements section in this manual). Remember that the supplement does not take the place of a good and varied diet.

**Overweight Can Be Prevented**

If a child consumes more food than is needed for body maintenance, growth and activity, fat stores increase. Children with Down Syndrome may be less active (due to hypotonia and delayed gross motor skills) and shorter than other children of the same age. Children in the 25 to 48 month age range appear to be at increased risk for overweight based on increasing weight for height. Early intervention programs serving children with Down Syndrome can help prevent overweight by working with caregivers to encourage activities which will help develop gross motor skills, by performing nutrition screening and making a referral as needed, and by providing caregivers with information on feeding children.
Prenatal Drug-Exposure — Effects on Nutrition Status and Feeding

Substance abuse is estimated to occur in 10 to 15 percent of all pregnancies in the U.S. Although alcohol is the number one cause of birth defects, one-third of all passively addicted babies are thought to be exposed to cocaine. In the vast majority of cases there is exposure to more than one drug: cocaine and alcohol, cocaine and marijuana, or cocaine and barbiturates are common examples.

The effects of drug use on the fetus depends upon the stage of pregnancy and duration of exposure, as well as the number of drugs used. Some infants will have few long-lasting effects, while others may be severely impaired for life. Cocaine-exposed infants have an increased incidence of premature birth and low birth weight. Feeding problems are common in most infants prenatally exposed to drugs. The lifestyle of the substance-abusing woman (diet, sleep, exercise, smoking) affects her own health and nutritional status, and that of the infant.

Lifestyle Effects on Pregnancy Outcome

Women who abuse drugs during pregnancy are also at increased risk of lack of prenatal care, poor nutrition, infections and sexually-transmitted diseases. These factors increase the chance of a premature birth. Infants born prematurely are at risk for nutritional deficiencies, feeding problems, poor growth and developmental delay. Because these infants may require a longer hospital stay, infant-caregiver bonding may be more difficult to achieve.

Drug Effects on Organ Development, Nutrition and Feeding

Cocaine is a vasoconstrictor (restricts blood flow within the arteries). Restricted blood flow to the uterus results in intrauterine growth retardation due to decreased availability of oxygen, vitamins, minerals, amino acids, fatty acids and glucose. Decreased oxygen causes uterine irritability, which may result in premature birth. Reports indicate that cocaine use (either smoked or snorted) during pregnancy increases the risk of fetal abnormalities such as limb reduction defects, septal cardiac
defects, and gastrointestinal, genitourinary, central nervous system (CNS) and neurological abnormalities.

Neurological effects in infants with prenatal drug exposure include “driven and disorganized” behavior. Feeding behavior may range from frantic sucking and hyperphagia (overeating) to disinterest in eating or inability to suck. The baby may show oral hypersensitivity and overall tactile defensiveness. Distractibility may make it difficult to get the baby to attend to eating. Increased crying, with inability to soothe, may cause air to be swallowed, leading to gas formation.

Prenatal substance abuse often produces a small baby who is in need of increased nutrients for catch-up growth. However, because of CNS problems the baby may be less able to consume formula. Lastly, family caregivers may be depressed and have little expertise and patience to work with a difficult-to-feed infant.

**Intervention**

Although the incidence of breastfeeding by substance-abusing women is low, it is important to counsel women who want to breastfeed about the risks of drug use while breastfeeding. Infants who are unable to consume adequate formula for growth should have a feeding team assessment before hospital discharge in order to determine nutrient needs and feeding ability. A feeding plan should specify how to handle the baby, as well as feeding position, feeding environment (place, lighting, noise, equipment), calming or alerting techniques and formula type.

Formula may be offered on demand if the infant is capable of recognizing hunger and satiety. Otherwise, a schedule with recommended amounts per feeding is needed. Consistency in approach will help the infant to attend to feeding and consume the needed amount of formula. The hospital team will need to identify community-based resources (WIC, Regional Center, or high-risk follow-up programs) for post discharge follow-up. The primary caregiver will want to observe and “practice” feeding prior to discharge. Transition to home will be easier if the caregiver, hospital team, and community-based team communicate and set mutual goals.