**Definition:** Cerebral palsy is a common physical disability caused by an injury to the brain before, during, or shortly after birth.¹ Cerebral palsy is fairly common, occurring in 1 in 500 children.²,³,⁴ Diagnosis generally occurs when a child is not meeting common milestones, and can often lead to a CT scan to look for brain injury or malformations.¹,⁴

**Nutrition Focused Physical Findings**
Children with cerebral palsy are more likely to be underweight and short of stature. This may be caused by one or more of the following¹:
- Central nervous problems
- Decreased muscle tone
- Limited physical activity
- Abnormal endocrine activity
- Orthopedic surgery
- Lack of weight-bearing activity

**Related Conditions**
Common related conditions that patients with cerebral palsy have include: constipation, hypotonia, decreased bowel function, intellectual disability, hearing problems, poor vision, and epilepsy.¹,³

**Feeding Ability and Oral Problems**
Children with cerebral palsy generally have multiple problems that would affect their ability to consume needed energy. These can lead to poor nutritional status, poor growth, and need for interventions. They include excess tongue movement or forward tongue thrust, tactile defensiveness, unable to feed self, “silent aspiration”, facial weakness, drooling, GERD, oral hypersensitivity, refusal to eat, delayed physical development, poor lip closure, delayed physical development, and poor coordination. Involvement with a SLP or OT is generally needed when working with this population.¹,³

**Labs, Tests, and Procedures**
The following labs, tests, and procedures are commonly conducted in children with cerebral palsy²:
- Vitamin D
- Ferritin
- Hemoglobin
- Hematocrit
- Swallow study
- Video fluoroscopy
- Possible DEXA scan

**Medications**
Medications will be prescribed on an individual basis based on personal difficulties and additional conditions¹. These would include medicine to treat seizures (anticonvulsants, sedatives, muscle relaxants), and stool softener for constipation.

**Client History for Nutrition Status**
Some specific items to take note of are¹:
- Total energy intake
- Oral fluid
- Meal duration
- Eligibility for government programs
- Physical ability to self-feed
- Physical activity history
- Rapid weight loss or rapid weight gain
- Placement of tube for feeding

**PES**
Commonly seen PES statements that are specific to cerebral palsy include:
- **NI 2.1 Inadequate oral intake** related to gastroesophageal reflux as evidenced by 24 recall 75% of estimated needs and 2 episodes or more of emesis.¹
- **NI 2.1 Inadequate oral intake** related to oral-motor dysfunction as evidenced by 3 day food record energy intake at 74% estimate needs.¹
- **NI 5.7.1: Inadequate protein intake** related to poor suck/swallow reflex or oral aversion as evidenced by inadequate weight gain and decreased intakes.¹
**Goals**
The main goal is to help provide the best nutrition possible through needed interventions, counseling, and supporting the family. Goals should be based on the client's previous growth and weight patterns, as well as developmental ability.\(^1\)

**Intake Needs/Comparative Standards**

**Energy**
Children with cerebral palsy generally have lower energy needs. The exception to this is if they have frequent seizures that are not controlled by medication. Hypotonia, decreased activity level, and sedation medications all contribute to this decreased need. Because of this, the Harris-Benedict equation and the World Health Organization equations generally over-estimate energy needs.\(^1\)\(^,\)\(^5\)\(^,\)\(^6\) The current recommended formula was developed by Krick and is the most accurate in estimating needs.\(^1\)\(^,\)\(^8\) The formula is: \(\text{Resting energy expenditure} \times \text{muscle tone factor} \times \text{activity factor} \times \text{growth factors} = \text{kcal/day}\)\(^1\)

<table>
<thead>
<tr>
<th>Muscle tone</th>
<th>Add 10% for high tone</th>
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<tbody>
<tr>
<td></td>
<td>Subtract 10% for low tone</td>
</tr>
<tr>
<td></td>
<td>No adjust for normal tone</td>
</tr>
<tr>
<td>Activity</td>
<td>Add 15% for bedridden</td>
</tr>
<tr>
<td></td>
<td>Add 20% for wheelchair</td>
</tr>
<tr>
<td></td>
<td>Add 30% for ambulation</td>
</tr>
<tr>
<td>Growth Factors</td>
<td>Add 5 kcal/g of expected, desired or catch-up growth</td>
</tr>
</tbody>
</table>

**Fluid**
Needs are based on body weight, rather than calories.\(^1\)

<table>
<thead>
<tr>
<th>Weight Range</th>
<th>Fluid/Body Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10 kg</td>
<td>100 mL fluid/kg</td>
</tr>
<tr>
<td>11-10 kg</td>
<td>50 mL fluid/kg</td>
</tr>
<tr>
<td>&gt;21 kg</td>
<td>25 mL fluid/kg</td>
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</tbody>
</table>

**Tube Feeding Support**
Families who have a child on tube feeding need extra support.\(^9\)\(^,\)\(^10\) Many do not feel that it is a natural way to feed, or find it overwhelming to incorporate into their life.\(^10\) Provide information to help them incorporate it into their life. Also, make sure to include a speech language pathologist in treatment of those with tube feeds to prevent facial sensitive to interfere with possible reintroduction of food.\(^1\)

**Anthropometric**
Growth charts tailored specifically for cerebral palsy are the most accurate way to track and analyze patients.\(^1\)\(^,\)\(^5\)\(^,\)\(^6\) One example of these can be found at [http://www.kennedykrieger.org](http://www.kennedykrieger.org). However, all growth charts may be difficult to use or inaccurate due to the difficult for measuring height accurately.

Length or height may be difficult to obtain. It this is true, you may need to use alternate measurements, such as segmental lengths or sitting heights, to calculate height.\(^5\)

**Nutrition Interventions**
When planning nutrition interventions, each client needs to be considered on a case-by-case basis. The majority of clients will have increased nutrition needs due to the inability to gain enough nutrition orally. To help clients increase their intake, interventions may include:

- Increase meal frequency while decreasing portion size\(^1\)
- Provide adaptive cups, silverware, or plates\(^1\)
- Avoid distractions during meals and snacks\(^1\)
- Inserting a tube feed for partial or total nutrition\(^1\)\(^,\)\(^2\)\(^,\)\(^9\)\(^,\)\(^10\)\(^,\)\(^11\) Patients generally see significant improvements after placement.\(^11\) Bolus feeds are preferred unless the patient only tolerates continuous.\(^1\)

If the patient has rapid weight gain, alterations should be made to decrease energy intake.\(^1\)

**Client Resources**
[http://cerebralpalsy.org/](http://cerebralpalsy.org/)
References:

   nutrition services for infants, children and adult with developmental disabilities and special 
   study of growth, nutrition and sedentary behavior in young children with cerebral palsy. BMC 
5. Chumlea WC, Guo SS, Steinbaugh ML. Prediction of stature from knee height for black and white 
   adults and children with applications to mobility-impaired of handicapped persons. J Am Diet 
   Assoc. 1994; 94:1385-1388.
   population of children and adolescents with cerebral palsy. Dev Med Child Neural. 2007; 
   of tube-fed patients with severe neurodevelopmental disabilities. J Am Coll Nutr. 1999; 18: 61- 
   68.
8. Krick J, Murphy PE, Markham JFB, Shapiro BK. A proposed formula for calculating energy needs 
   requiring gastrostomy need more support. Dev Med Child Neurol. 2003; 45:183-188.
10. Petersen MC, Kedia S, David P, Newman L, Temple C. Eating and feeding are not the same: 
    caregivers' perceptions of gastrostomy feeding for children with cerebral palsy. Dev Med Child 
    Neural. 2006; 48: 713-717.
11. Mahant S, Friedman JN, Connolly B, Goia C, Macarthur C. Tube feeding and quality of life in 