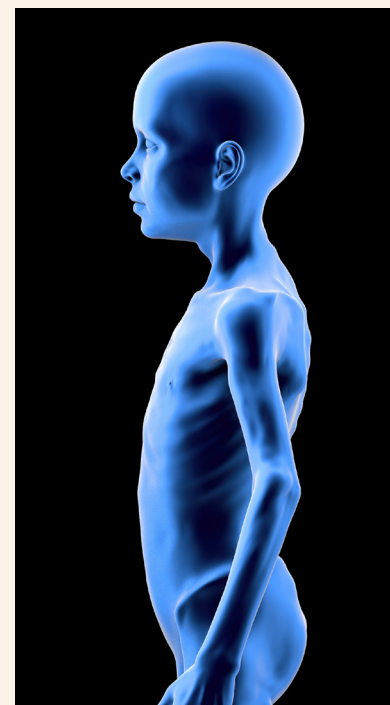


# Enteral Nutrition in Children with Malnutrition

Up to 30% of children in acute and long-term care settings have been reported with pediatric malnutrition.<sup>1</sup> This is particularly concerning in pediatric patients with special needs as disability and malnutrition interact in many ways. Feeding problems related to anatomic or motor impairments, nutrient malabsorption, or social exclusion are some of the factors in which an underlying disability can increase the risk of malnutrition.<sup>2</sup> Enteral nutrition (EN) is a vital component of nutrition and allows for delivery of nutrients to those who cannot maintain adequate nutrition by oral intake alone.<sup>3</sup>



## Patient Case

This is the case of an 8-year-old boy with neurological impairment (NI) with severe seizures due to a congenital brain disease. He has had decreasing cognitive function over the past year, is unable to ambulate, and his mother has been hand feeding him soft foods. He has had weight loss and has been declining on the growth charts over the past three months. He has been coughing with a low-grade fever. He was admitted to the local hospital and underwent a swallowing evaluation which was positive for aspiration.



## Nutrition Assessment

Multiple domains are a part of the nutritional assessment when identifying pediatric patients with malnutrition/undernutrition.<sup>4</sup>

- Anthropometric data and growth parameters assessed using z-scores from the appropriate growth reference.
  - » Weight in pounds or kilograms
  - » Length/height: In a patient with NI, accurate height may not be feasible. Alternative measurements include segmental lengths (ulnar, upper arm length, tibial length, and knee height obtained with knee height calipers). Equations are available to estimate stature using these measurements.<sup>5</sup>
  - » Weight for length or BMI
- Weight history to assess weight gain velocity (under two years of age) or percent weight loss (ages 2-20).
- Mid-Upper Arm Circumference (MUAC) (is usually low in children with NI because of decreased muscle bulk).
- Triceps skinfold (TSF) measurement, an important proxy for body composition.
- Nutrition-focused physical exam (NFPE): include fluid status assessment, examination for fat loss and muscle wasting, skin, nails, hair, eyes, lips, and mouth.<sup>5</sup>
- Food and nutrition intake through caregiver history and observation with estimation of energy and protein needs.
- Patient's history, including social, medical, and all medications.
- Laboratory data (particularly if NFPE shows concerns for micronutrient deficiency).



## Diagnosing Malnutrition<sup>4</sup>

- Documenting the degree of malnutrition (mild, moderate, or severe) is essential.
- Malnutrition indicators when only one reference point is available include weight for height z-score, BMI for age z-score, length/height z-score, and MUAC z-score. Resources such as PediTools ([peditools.org](http://peditools.org)) can calculate z-scores for clinicians.
- Diagnosis-specific growth charts exist, such as for children with cerebral palsy, however, it is recommended to use the standard growth reference and specialized growth curves together to accurately assess the nutritional status of patients with NI.
- If multiple time points are available, additional indicators of malnutrition include weight gain velocity, percentage of weight loss, decline in weight for length z-score, and nutrient intake.
- Along with the degree of malnutrition, include a statement of acute (less than three months duration) vs. chronic (greater than three months).



## Determining Nutrition Care Plan

- While malnutrition may be related to feeding difficulties, energy needs may be reduced in non-ambulant children with NI due to lower metabolic rate related to decreased physical activity.
- When initiating EN, it is important not to overfeed children with NI. Needs may be based on kcals/cm of height, with recommendations for children ages 5–11 ranging between 13.9 kcals/cm with mild to moderate activity and 11.1 kcals/cm with severe physical limitations.<sup>4</sup> The daily reference intake (DRI) or WHO equation are also acceptable standards to estimate basal energy/resting energy expenditure as a starting point; however, energy needs must be individualized to the patient and follow up weights are very important.
- Target the DRIs for protein and micronutrient intake unless deficiencies are present. Assure that fluid needs are met, especially with lower energy needs.



## Enteral Nutrition Access

Children with NI are a large group of children who often need EN support. Those children who are at greatest risk of malnutrition have significant motor impairment and eating and drinking challenges. Prevention and treatment of malnutrition in these children can improve functioning, help with wound healing, improve overall health, well-being and social interaction, and impact risk of mortality.<sup>6</sup>

- Gastrostomy tube (GT) placement is encouraged for children with NI requiring EN support as they often require long-term EN and need enteral access for prescribed fluids and medications.
- Parents often have a lot of decisional uncertainty when it comes to GT placement, so some choose NG tube feeding as an interim step. This may be challenging due to tube dislodgement and potential difficulty and safety of reinsertion.
- Many families value the shared sensory and social experiences that mealtime brings, so they need to be involved in a shared decision-making process when talking about EN.
- Reassure parents that the tube is simply a tool to get in better nutrition, fluids, and medications. Also inform them that parental satisfaction with GT placement is generally very high afterwards.



## Transition to Home on EN

The EN formula and feeding methods should be individualized to the patient and family. Bolus feedings are the most physiologic and can be scheduled to mimic meals. If aspiration risk is high, give EN via gravity or with an infusion pump over 30–45 minutes. The dietitian should communicate the home EN plan with the home care company and nutrition follow-up should be scheduled serially to monitor weight change, tolerance to the EN regimen, and hydration status.<sup>7</sup> To prepare a patient for home EN, the following steps should be taken:

- **Home Feeding Regimen:** Ensure the current feeding regimen is practical for the home setting. For example, a patient who is receiving 72 mL of formula every 3 hours will have a hard time measuring that amount at home and should be rounded up or down.
- **Free Water Flushes:** Convert any IV fluids the patient is receiving to free water flushes. This will avoid dehydration in the home setting, especially in the pediatric patient who often cannot verbalize thirst.
- **Home Environment:** Ensure the home environment is clean and safe.
- **Caregiver Acceptance:** Confirm which caregivers will be involved and determine their ability to receive education and provide the necessary care.
- **Enteral Therapy Education:** Complete caregiver education on EN therapy and have them complete return demonstration. They should also know who to call if they need support.
- **Home Care Insurance Coverage:** Check with the home care provider and provide all necessary documents to obtain insurance verification.



## Home EN Management

**Initial Home Follow-up:** Call the family within 48 hours to make sure they are doing okay at home. See them within two weeks of discharge to assess if they are administering the optimal EN formula volume and are troubleshooting appropriately.

**Nutrition Follow-up:** The initial EN volume is only a starting point, and it is important not to under- or overfeed. Children with NI who are overweight have more difficulty breathing and moving. Also, their devices like custom wheelchairs and standers may not fit well with rapid weight gain and their parents and caregivers may need help lifting them. Prevention of excessive weight gain may require a hypocaloric diet. Monitor weight and height by segmental measures if they are unable to stand, triceps skin fold (TSF) and mid upper arm circumference MUAC). Ideally:

- Weight better than a z-score of -2 and the TSF and MUAC >10th percentile for age.<sup>9</sup>
- Weight gain velocity for children over 1 year to be 4–7 grams per day.<sup>10</sup>
- Protein, fluid and micronutrient intake as suggested for their peers without NI.<sup>2</sup>
- **Challenges:** Feeding intolerance, skin problems with granulation tissue, mechanical tube problems and tube dislodgement prior to stoma maturity are the biggest problems in the first few weeks after GT placement. GT follow-up: See children twice during the first 8 weeks, then teach caregivers how to change GT, and conduct an oral feeding assessment.

### Longer-term Follow-up:

- Monthly for small children until they have a stable weight gain trajectory.
- Less frequently for older children but at least annually to perform anthropometrics, check on supplies, and assess nutrition intake.
- Laboratory evaluation with special attention to micronutrients at least annually, especially iron, calcium, and vitamin D because children with NI, especially those who are not weight bearing and who are on multiple anticonvulsants, are at risk of osteopenia.



## Coverage and Reimbursement



Failure to Thrive is an antiquated term, now at times called Faltering Growth, and is often used interchangeably with malnutrition. Despite this, there remains a billable ICD-10 code for Failure to Thrive (R62.51). Some insurance providers will reimburse EN with this diagnosis, however, it may only be covered up to a certain age after which the insurance provider will deny coverage.

It is important to understand the clinical etiology for malnutrition as there is often a ‘better’ diagnosis for coverage of EN. Malnutrition in a child is a secondary diagnosis to another problem that is truly causing the growth failure.

For optimal reimbursement of EN, the primary diagnosis should be the one that is causing the growth failure such as developmental delay, cerebral palsy, chromosome abnormalities, GI disorders, or neurologic impairment.

**Note:** This tool is based on a podcast by Melanie Newkirk, DCN, RDN, CSP, LD, Gina Rempel, MD, FRCPC, FASPEN, and Kelly Kinnare, MS, RD, LDN, CNSC, given during ASPEN Malnutrition Awareness Week 2023. To access the podcast, go to [nutritioncare.org/ENChildrenPodcast](https://nutritioncare.org/ENChildrenPodcast).

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