

# Dietetic Management of Children with Neurological Impairments (NI)

NI relates to disorders of the central nervous system, affecting: speech, motor skills, vision, memory, muscle actions, learning abilities. Cerebral palsy is also considered within this guide as a major subgroup of NI.

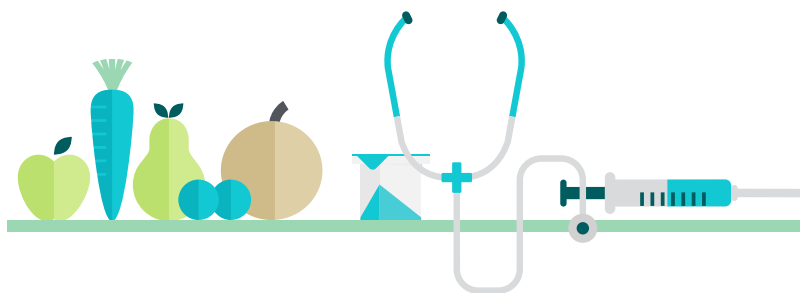
NI frequently causes GI problems in children, most notably those with oral motor function and motility conditions and can be extremely complex to manage.



In children with cerebral palsy, as many as 92% suffer from serious GI symptoms.

Such conditions can lead to insufficient caloric intake, a broad spectrum of GI and nutritional complications and associated clinical conditions, including respiratory infections and chronic aspiration, as well as a significant impact on quality of life for the patient and carer.

Oral feeding is preferred in children with NI. The duration of a trial of oral feeding though depends on the child's age and severity of malnutrition.



## Type of Diet

The optimal energy content of oral feeds differs according to impairment, mobility and other factors.

To increase total energy content of meals without excessively increasing volume, additional fat or oils, dry milk powders, cream or ice cream may be supplemented.

Fibre intake should be normal e.g age plus 5 g/day in children older than 2 years.

Composition of the diet should be discussed with specialist dietitians to modify textures and ensure safe and efficient food intake.

This guide, produced by the European Society of Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN), provides recommendations and a systematic approach for the care of paediatric patients with NI and should be read in conjunction with the ESPGHAN Clinical Advice Guides on:



**Methods and Recommendations for Nutritional Management and Requirements for Children with Neurological Impairments**



**Common Gastrointestinal Issues for Children with Neurological Impairments: Evaluation, Treatment and Monitoring**

Feeding must be safe, so if severe OPD is associated with repeated pulmonary aspirations, pneumonias, dehydration and/or life-threatening events, then an early switch to partial or full enteral feeding is advocated

**Follow-up** every 1 to 3 months is usually sufficient although infants and severely malnourished patients need to be seen more frequently. Older children can be seen at least annually.

**Enteral nutrition** is recommended if the length of feeding times are impacting on the patient's rehabilitation as well as theirs and their carers quality of life.

The choice of formula depends on the child's age, their energy requirements and mode of enteral access. Most are designed to meet all essential nutrient requirements. Attention also needs to be paid to hygiene during handling.

For severely undernourished children, additional protein (2.0g.kg-1.day-1) and energy (additional 20% increase in energy intake) may be required for 'catch up' growth.

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## Whey-based Formulas

ESPGHAN recommends a trial in children with poor feed tolerance because of delayed gastric emptying as whey-based formulas have been shown to reduce gagging and retching in children with severe NI.

The addition of any modular nutrients, needs to be made with the help of a dietitian to ensure the final diet composition is adequate.

A combination of nocturnal continuous feeds with daytime bolus feeds is preferred for children with high-caloric needs or poor tolerance to volume.

## ESPGHAN RECOMMENDATIONS

Oral feeding is recommended in children with NI if it is nutritionally sufficient, safe, stress-free and feeding time is not prolonged

Enteral feeding to be used if total oral feeding time exceeds 3 hours per day

Before 12 months of age, an infant formula can be used. For children older than 1 year a standard (1.0kcal/mL) polymeric age-appropriate formula including fibre is recommended.

Use high-energy density formula (1.5 kcal/mL) containing fibre for cases of poor volume tolerance, provided hydration is carefully monitored

Human milk, a standard infant formula or nutrient dense infant enteral formula to be used as clinically indicated in infants

Low-fat, low-calorie, high-fibre and micronutrient-replete formula for the maintenance of enteral tube feeding after nutritional rehabilitation in immobile children

Pureed food should be used cautiously for enteral tube feeding due to concerns regarding nutritional adequacy and safety

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## Enteral Tube Feeding Modality

Enteral tube feeding is recommended in cases of unsafe or inefficient oral feeding, preferably before the development of undernutrition.

Continuous feeding is the preferred method, although bolus feeding allows more freedom and encourages the opportunity for the development of hunger before oral meals.

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## Which Type of Tube to Use?

Percutaneous endoscopic gastrostomy (PEG) has been found in adults to be associated with a lower probability of intervention failure, is more comfortable and convenient, and has less impact on social activities. This suggests that a gastrostomy may be more effective and safe than a nasogastric tube.

Evidence also suggests that children with NI receiving a gastrostomy experience an increase in weight gain, improved health overall and a significant reduction in feeding time with no increase in respiratory infections. A gastrostomy is the preferred way to provide intragastric access for long-term tube feeding in children with NI. Care needs to be taken to prevent common complications such as; minor site infections and granulation tissue.

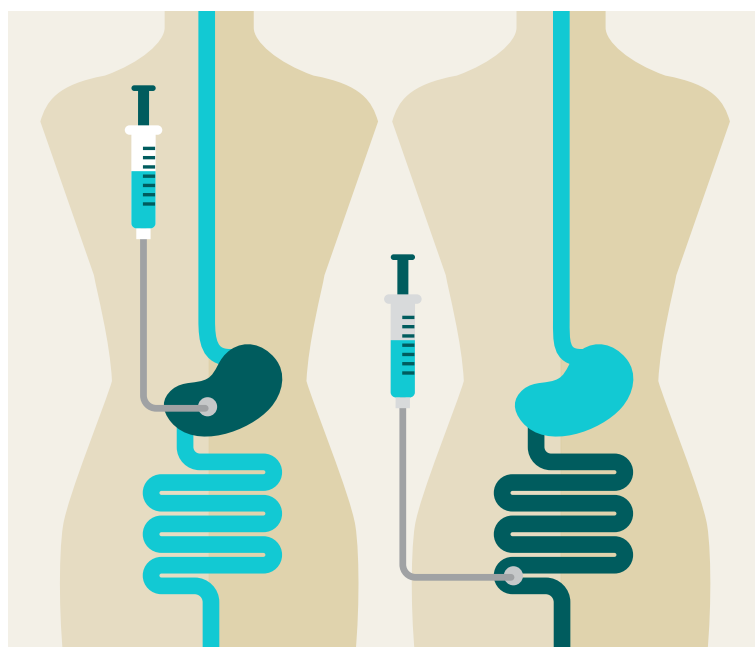
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## Jejunal Feeding

Jejunal feeding is recommended in cases of aspiration due to GORD, refractory vomiting, retching and bloating in children with NI.

A jejunal tube needs to be positioned distal to the Treitz ligament to prevent retrograde filling of a dysfunctional stomach. Jejunal access can be provided by a nasojejunal tube, jejunal tube introduced through a gastrostomy or surgical transcutaneous jejunostomy.

The combination of gastric decompression via PEG and simultaneous jejunal nutrition has been shown to provide clinical benefit in patients with NI. Jejunal tubes introduced through the gastrostomy often migrate back to the stomach and the average functional duration in children is 39 days.



A PEG is a feeding tube that is placed into the stomach (see diagram on left). If the tube can't be placed into the stomach, it may be placed into the jejunum, which is the second part of the small intestine. The feeding tube can either be placed into the jejunum via the stomach (a PEJ or PEG-J) using endoscopy or X-ray guidance, or directly by surgery (surgical jejunostomy; see diagram on right).

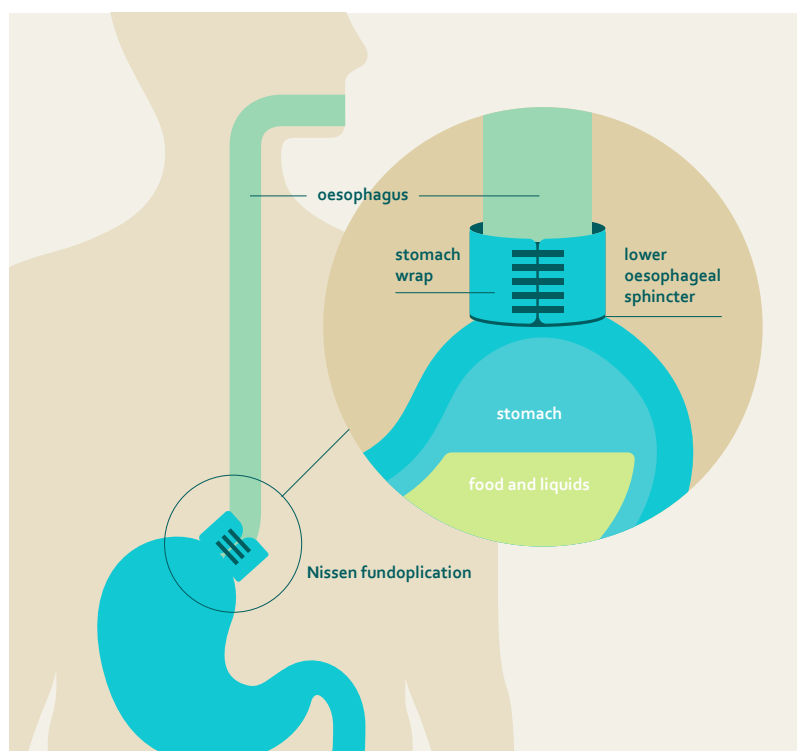
## Nissen Fundoplication : When and How?

Investigations are required before surgery to confirm GORD and assess any potential complications.

Among the children requiring PEG, those with NI are more likely to require a subsequent anti-reflux procedure. One of the main benefits of associating gastrostomy to fundoplication is to prevent inhalation and the respiratory complications of enteral feeding, but antireflux surgery can also expose patients to significant complications including gas bloat syndrome, dysphagia and dumping syndrome.

### What is Nissen fundoplication?

During fundoplication surgery, the upper section of your stomach is wrapped around your oesophagus to form a collar. This tightens your lower oesophageal sphincter to stop acid moving back out of the stomach.



## ESPGHAN RECOMMENDATIONS

Upper GI endoscopy with biopsies should be performed before fundoplication in NI children. Other investigations (eg. Contrast studies, gastric emptying studies, and pH+/- impedancemetry) may also be indicated

A routine antireflux procedure should not be performed at the time of PEG placement in children with NI because it could add significant morbidity

Fundoplication to be considered in cases of failure of optimised medical therapy for GORD in children with NI

Surgical alternatives to fundoplication are more invasive and require longer periods of rehabilitation. Indication for total oesophagogastric disconnection and Roux-en-Y oesophagojejunostomy should therefore be restricted to selected cases

### Disclaimer

ESPGHAN is not responsible for the practices of physicians and provides guidelines and position papers as indicators of best practice only. Diagnosis and treatment are at the discretion of physicians. This advice guide is produced and published by the European Society of Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) and authored by members of the society's Gastroenterology Committee. Full references for the advice within this guide can be found within the following paper, which this guide is based upon: Romano, Claudio, et al. "Evaluation and Treatment of Gastrointestinal and Nutritional Complications in Children With Neurological Impairment." (Journal of Pediatric Gastroenterology and Nutrition 2017;65: 242–264).

1. Del Giudice E. et al. Gastrointestinal manifestations in children with cerebral palsy. Brain and Development 21(5):307-11 · August 1999