

# NATIONAL GUIDELINE ON ENTERAL NUTRITION 2025-2026

 **SLCNP**



# **National Guideline on Enteral Nutrition 2025 - 2026**

**Developed by**

**Sri Lanka Medical Nutrition Association (SLMNA) &  
Sri Lanka College of Nutrition Physicians (SLCNP)**

**Collaborative societies**

**Sri Lanka College of Surgeons**

**Sri Lanka Society of Gastroenterology**

**College of Anaesthesiologists and Intensivists in Sri Lanka**

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## List of Contributors

Dr. Nalinda Herath - Consultant Nutrition Physician, National Hospital of Sri Lanka

Dr. J.R. Tennakoon Jayaweera - Consultant Nutrition Physician, Colombo South Teaching Hospital

Dr. Shalika Kurukulaarachchi - Consultant Nutrition Physician, National Hospital of Sri Lanka

Dr. Sajitha Mallawaarachchi - Consultant Nutrition Physician, National Cancer Institute Maharagama

Dr. Pearl Mallawaarachchi - Consultant Nutrition Physician, Lady Ridgeway Hospital for Children

Dr. T. Wickramasekara - Consultant Nutrition Physician, Medical Research Institute

Dr. M.P. Gamage - Consultant Nutrition Physician, Nutrition Division-Ministry of Health

Dr. Gowri Samarasekara - Consultant Nutrition Physician, Colombo North Teaching Hospital

Dr. Greata Pigera - Consultant Nutrition Physician, District General Hospital Kegalle

Dr. Kausala Sitharamparapillai - Consultant Nutrition Physician, Lecturer, Teaching Hospital Jaffna.

Dr. Ishan Gamage - Consultant Intensivist, Teaching Hospital Anuradhapura

Dr. V. Vijitharan - Consultant gastroenterologist and Hepatologist, Teaching Hospital Batticaloa

Dr. Vishaka Kaluarachchi - Consultant Nutrition Physician, District General Hospital Monaragala

Dr. Evone Jayaweera - Consultant Nutrition Physician, National Hospital Kandy

Dr. Sajitha Jayasekara - Consultant Nutrition Physician, Teaching Hospital Kurunegala

Dr. Dhammika Rathnayake - Consultant Nutrition Physician, District General Hospital Chilaw

Dr. Upeka Samarawickrama - Consultant Nutrition Physician, District General Hospital Matara

Dr. Wasana Marasinghe - Consultant Nutrition Physician, Teaching Hospital Badulla

Dr. Rajitha Gunawardhana - Consultant Nutrition Physician, National Hospital Galle

Dr. Thakshila Uduwavithana - Consultant Nutrition Physician, District General Hospital Negambo

Dr. Lasith Uyanegge - Consultant Nutrition Physician, Teaching Hospital Peradeniya

Dr. Sugath Peiris - Consultant Nutrition Physician, National Institute for Infectious Diseases

Dr. Dineshya Liyanapathirana - Consultant Nutrition Physician, De Soysa Maternity Hospital

Dr. Himali Dharmaweera – Consultant Nutrition Physician, Navy General Hospital Colombo

Dr. Anushka Wickramarathna - Consultant Nutrition Physician, Teaching Hospital Kulliyapitiya

Dr. Udara Abeywarne - Acting Consultant Nutrition Physician, District General Hospital Trincomalee

Dr. D.S. Diminguarachchi - Acting Consultant Nutrition Physician, Castle Street Hospital for Women

Dr. Ruksha Shammuganathan - Acting Consultant Nutrition Physician

Dr. K.C.D. Karunarathna - Acting Consultant Nutrition Physician, Base Hospital Homagama

Dr. Channa Ilangasinghe - Acting Consultant Nutrition Physician, District Base Hospital, Teldeniya

Dr. R.A.D. Sagali Nayanjana Rupasinghe - Acting Consultant Nutrition Physician, Colombo East Base Hospital.

Dr. S. N. Liyanage - Senior Registrar in Clinical Nutrition, National Hospital of Sri Lanka

Dr. W.A. Kasunika Senanayake - Senior Registrar in Clinical Nutrition, National Hospital of Sri Lanka

Dr. U.D. Hiripitiya - Senior Registrar in Clinical Nutrition, Colombo South Teaching Hospital

Dr. M.S.M. Fernando - Senior Registrar in Clinical Nutrition, Colombo South Teaching Hospital

Dr. I.R. Weerakkody - Senior Registrar in Clinical Nutrition, National Hospital of Sri Lanka

Dr. R.K.C. Roopasinghe - Senior Registrar in Clinical Nutrition, National Hospital of Sri Lanka

Dr. Kosala Piyanandana - Senior Registrar in Clinical Nutrition, National Hospital of Sri Lanka

Dr. R.M.A.P. Rathnayake - Senior Registrar in Clinical Nutrition, National Hospital Kandy

**Cover page design & other contributions**

Dr. H.R.L. Maddumabandara - Lecturer, Department of Biochemistry, Faculty of Medicine, University of Peradeniya

Dr. D.S.B. Wijesundera - Medical Officer in Nutrition, National Hospital of Sri Lanka

Dr. N.C. Liyanage – Medical officer in Nutrition, Colombo South Teaching Hospital

## **Expert Opinion**

Professor Madunil A. Niriella - Professor in Gastroenterology, Department of Medicine, Faculty of Medicine, University of Kelaniya

Dr. Anoma Perera - Senior Consultant Anaesthetist

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## List of Abbreviations

<b>Abbreviation</b>	<b>Definition</b>
BIA	Bioelectrical Impedance Analysis
BMI	Body Mass Index
BTF	Blenderized tube feeding
CHO	Carbohydrates
CIF	Chronic Intestinal Failure
CKD	Chronic Kidney Disease
COPD	Chronic Obstructive Pulmonary Disease
CNP	Consultant Nutrition Physician
CRP	C-reactive protein
DKA	Diabetic Ketoacidosis
D-PEJ	Direct Percutaneous Endoscopic Jejunostomy
DRM	Disease-related malnutrition
EAD	Enteral Access Device
EN	Enteral Nutrition
ESPEN	European Society of Parenteral and Enteral Nutrition
FBC	Full Blood Count
GLIM	Global Leadership Initiative on Malnutrition
HEN	Home Enteral Nutrition
ICU	Intensive Care Unit
LCT	Long Chain Triglycerides
LFT	Liver Function Tests
MCT	Medium Chain Triglycerides
MNA –SF	Mini Nutritional Assessment Short-Form
MND	Motor Neuron Disease
MNT	Medical Nutrition Therapy
MS	Multiple Sclerosis
MUAC	Mid Upper Arm Circumference
MUST	Malnutrition Universal Screening Tool
NCP	Nutrition Care Process
NICE	National Institute for Health and Care Excellence
NRS 2002	Nutritional Risk Screening 2002
NST	Nutrition Support Team
ONS	Oral Nutrition Supplements
PEG	Percutaneous Endoscopic Gastrostomy
PEG-J	Percutaneous Endoscopic Gastrostomy with jejunal extension
PG-SGA	Patient-Generated Subjective Global Assessment
PN	Parenteral Nutrition
PUFA	Polyunsaturated Fatty Acids
RF-HNPT	Royal Free Hospital Nutrition Prioritizing Tool
RFS	Refeeding Syndrome
RTH	Ready to Hang
RQ	Respiratory Quotient
SLCNP	Sri Lanka College of Nutrition Physicians
SLMNA	Sri Lanka Medical Nutrition Association

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## Background

Optimal nutritional support is a cornerstone of comprehensive patient care, particularly among individuals who are critically ill, recovering from major illness, or unable to meet their nutritional requirements through oral intake alone. Enteral nutrition (EN) is widely recognised as the preferred method of nutrition support when the gastrointestinal tract remains functional. EN offers physiological, metabolic, and immunological advantages over parenteral nutrition.

In Sri Lanka, the rising burden of non-communicable diseases, trauma, surgical interventions, malignancies, and critical illness has led to an increasing number of patients requiring structured nutrition support across varied healthcare settings. Despite this rising demand, variations in clinical practice, limited awareness, and resource-related challenges often result in suboptimal nutritional assessment and inconsistent delivery of EN.

The Vienna Declaration on Nutrition and Non-communicable Diseases in the Context of Health 2020 reaffirms that nutrition is a fundamental human right. Everyone has this right, even those who depend on EN to achieve their nutritional requirements. Thus, a vital part of protecting this right is making sure that everyone has fair access to EN that is safe, efficient, and supported by research. In accordance with human rights standards, healthcare systems must guarantee that patients in need of EN receive thorough evaluations, customised treatment programs, and access to the resources they need.

Recognising the need, this guideline was developed to establish uniform, evidence-based standards for adult enteral nutrition practice in Sri Lanka. The guideline is intended to support clinicians, dietitians, pharmacists, and nurses involved in the delivery of EN, ensuring that patients receive safe, effective, and individualised nutrition care based on current scientific evidence and local feasibility.

By aligning with international evidence while adapting to Sri Lankan healthcare realities such as availability of enteral formulas, workforce constraints, and variable infrastructure; this guideline seeks to enhance patient outcomes, reduce complications, and improve the overall quality of nutrition care in hospitals nationwide.

The **objectives** of this guideline are to:

- Provide evidence-based recommendations for the safe and appropriate use of EN in adult patients.
- Standardize assessment, indication, formulation, and monitoring of EN practices across healthcare institutions.
- Minimise EN-related complications through adherence to best practices and multidisciplinary care.
- Improve overall patient outcomes and optimise resource utilisation in hospital nutrition support services.

This guideline provides a concise and comprehensive summary of enteral nutrition.

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## Scope

### **Population covered:**

This guideline applies to adult patients ( $\geq 18$  years) who require EN due to an inability to meet their nutritional requirements via the oral route. It includes individuals with acute or chronic medical, surgical, oncological, or critical illnesses in whom EN is indicated as a part of comprehensive nutritional support.

### **Settings:**

The guideline is intended for use in primary, secondary and tertiary care hospitals across Sri Lanka, including, medical units, surgical units, oncology units, intensive care units or any other units where EN is administered. It may also provide guidance to rehabilitation units on the continuation or transition of EN therapy that was initiated in the hospital setting.

### **Interventions and outcomes considered:**

The guideline provides evidence based recommendations covering the following components of EN practice:

- Nutrition screening and comprehensive nutritional assessment
- Nutritional diagnosis
- Indications, contraindications to EN
- Routes of EN, initiation and maintenance
- Formulation and administration of EN solutions and medications through EN routes
- Management of gastrointestinal, metabolic and tube-related complications
- Monitoring
- Discontinuation criteria for EN
- Referral pathways and multidisciplinary coordination for safe EN delivery

The expected outcomes include:

- Safe and effective delivery of EN
- Prevention of complications, improved nutritional status
- Reduction in hospital morbidity and mortality rates, length of hospital stays, readmission rates, and overall healthcare expenditure
- Establishment of standardised national practice in EN management across health care settings in Sri Lanka.

### **Exclusions:**

This guideline does not cover:

- Pediatric patients ( $< 18$  years)
- Patients receiving oral feeds who require medical nutrition therapy
- Micronutrient supplementation guidelines in patients on enteral nutrition

# Chapter 1

## Process – Nutrition care process

The Nutrition Care Process (NCP) provides a systematic and evidence-based approach to delivering high-quality nutrition care. It comprises four distinct yet interrelated steps.

The flowchart below elaborates the Nutrition Care Process.

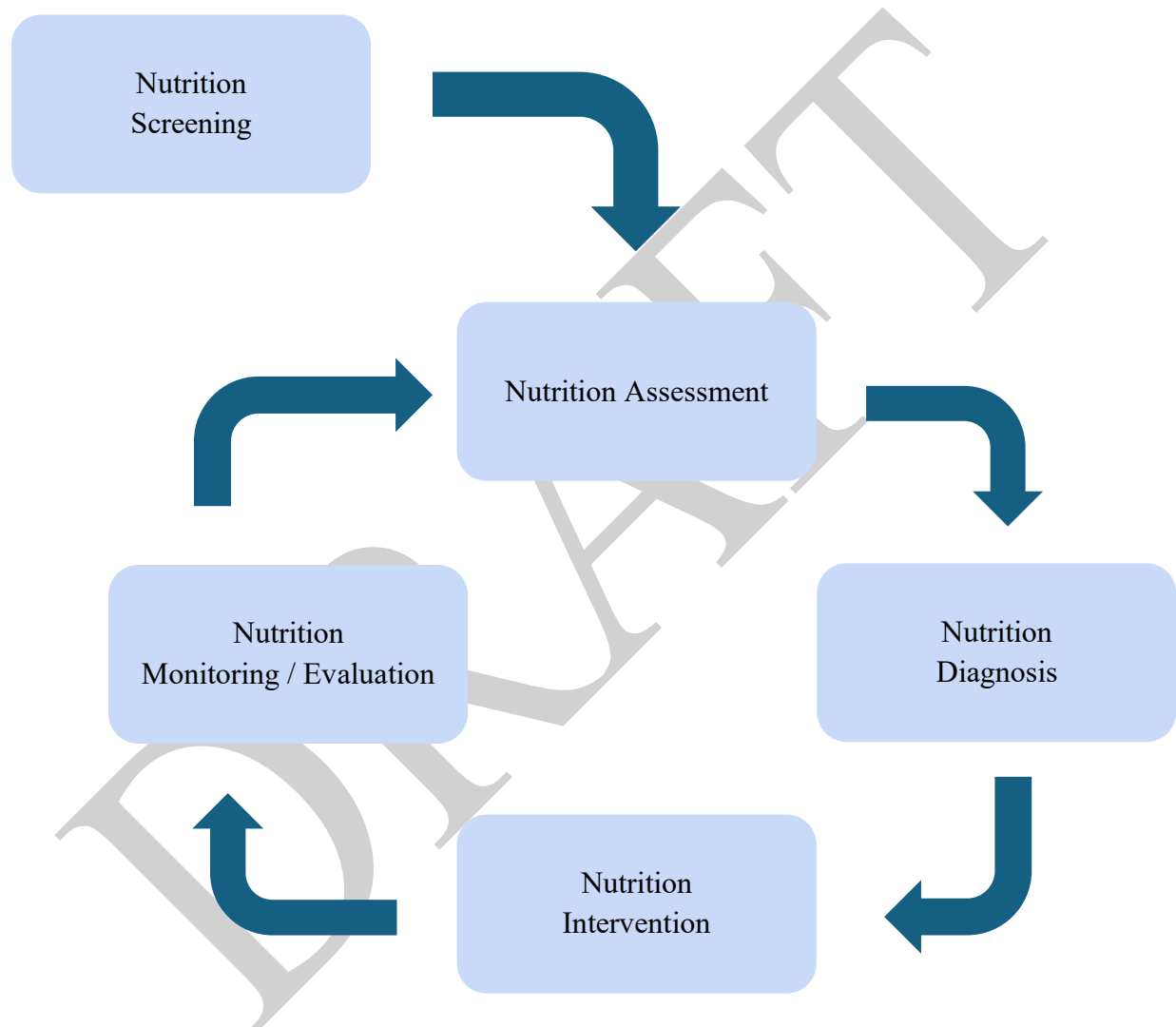


Figure 1.1: Nutrition care process

## Nutrition Screening

Nutrition screening is a simple and rapid process used to identify individuals who may be malnourished or at risk of malnutrition and to determine whether they require a comprehensive nutrition assessment and appropriate intervention. There are simple anthropometric measures and several nutrition screening tools used for nutritional screening.

$$\text{BMI} = \frac{\text{Weight (in kilograms)}}{\text{Height}^2 \text{ (in meters)}}$$

MUAC is a simple, quick measurement of the circumference of the upper arm. A measurement of the circumference of the middle of the upper arm, between the shoulder and elbow is taken using a non-stretchable tape.

BMI and mid upper arm circumference (MUAC) can use as bed side anthropometric measures to screen nutritional status. Local validation of global tools is under process, with efforts to develop culturally specific instruments for better accuracy in diverse Sri Lankan population. It is recommended that a nutrition screening be conducted within 24 hours of hospital admission.

Global nutrition screening tools include,

Table 1: Nutrition Screening Tools

Malnutrition Universal Screening Tool (MUST) - (Annexure 1)	<ul style="list-style-type: none"><li>• Five-step screening tool designed to identify whether an adult is obese, malnourished, or at risk of undernutrition.</li><li>• Management guidelines provided with the tool can be used to develop a care plan.</li><li>• It is intended for use across community, hospital, and other care settings and can be utilized by all caregivers.</li></ul>
Nutrition Risk Screening (NRS) 2002 - (Annexure 2)	<ul style="list-style-type: none"><li>• Used in hospital settings to identify patients at risk of malnutrition</li></ul>
Mini Nutritional Assessment - Short Form (MNA-SF) - (Annexure 3)	<ul style="list-style-type: none"><li>• Simple and quick screening tool designed to identify elderly individuals who are at risk of malnutrition or already malnourished</li></ul>
Royal Free Hospital Nutrition Prioritizing Tool (RFHNPT) - (Annexure 4)	<ul style="list-style-type: none"><li>• Used to assess the risk of malnutrition in patients with liver disease</li></ul>
Renal i-Nut - (Annexure 5)	<ul style="list-style-type: none"><li>• To identify the risk of malnutrition in patients with chronic kidney disease (CKD), those undergoing dialysis or with advanced kidney disease</li></ul>

Patient-Generated Subjective Global Assessment (PG-SGA) – (Annexure 6)	<ul style="list-style-type: none"> <li>• Developed for cancer patients</li> <li>• Includes a patient questionnaire addressing symptoms, weight loss, and dietary intake, along with a clinician’s evaluation of physical examination findings and functional status.</li> </ul>
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## Nutritional Assessment

It is a structured and comprehensive process of collecting and analysing patient data, including medical history, a nutrition-focused physical examination, and relevant investigations, to identify nutrition-related issues that may require intervention. This should be conducted by a qualified Nutrition Support Team (NST) before initiation of EN.

### **A. Anthropometric Assessment and Body Composition**

Physical measurements height, weight, BMI, waist-to-hip ratio, MUAC, skinfold thickness, and calf circumference to evaluate nutritional status and body composition. Body composition assessment helps to determine fat mass, fat-free mass, muscle mass, and bone mineral content, expressed as percentages according to the model used. Bioelectrical impedance analysis (BIA) may be employed as a non-invasive, cost-effective method for estimating body composition when clinically feasible.

Some parameters like MUAC and skinfold thickness could be inaccurate in critically ill patients due to oedema formation.

### **B. Biochemical Assessment**

Biochemical investigations are essential to identify existing imbalances and to guide EN formulation. Baseline laboratory investigations should include:

- Full Blood Count (FBC)
- Renal profile: urea, creatinine, electrolytes
- Liver profile
- Bone profile (including calcium, magnesium, phosphate)
- Glycemic status (capillary blood glucose/ random blood glucose/ fasting blood glucose)
- Inflammatory markers (e.g., CRP)
- Plasma protein levels: transthyretin (prealbumin), transferrin (if indicated)
- Micronutrient profile: sodium, potassium, zinc, iron, vitamins (if clinically indicated)

These parameters should be interpreted in the context of disease state, hydration status, and organ function.
---

### **C. Clinical Assessment**

This provides a comprehensive understanding of the patient's overall condition and tolerance to EN. It includes:

- Assessment of disease-related catabolic stress, including tissue trauma, infection, sepsis, or postoperative state, which may increase protein and energy requirements.
- Evaluation of comorbid conditions such as renal or hepatic disease, chronic obstructive pulmonary disease (COPD), or cardiac dysfunction, which may alter nutrient, electrolyte, and fluid requirements.
- Review of post-surgical gastrointestinal anatomy, including the integrity of anastomoses, presence of fistulae or intra-abdominal collections, and assessment of residual bowel length (pre-stoma and total bowel length).
- Detailed medication review, with particular attention to drugs affecting metabolism, gastrointestinal function, and nutrient absorption or utilization.
- Identification of clinical features suggestive of nutritional compromise, including unintentional weight loss, poor appetite, gastrointestinal symptoms (nausea, vomiting, diarrhoea, steatorrhoea), and nutrient losses through wounds, fistulae, or drains.
- Measurement and monitoring of temperature, pulse rate, blood pressure, and blood glucose levels to assess metabolic stability and feeding tolerance.
- Assessment of ventilatory status in critically ill patients, as the level of respiratory support influences energy expenditure, fluid management, and enteral feeding strategy.
- Clinical evaluation of muscle strength and functional capacity, including the patient's ability to handle and administer tube feeds independently, where appropriate.
- Assessment of psychological well-being and cognitive function, as these factors influence understanding, acceptance, adherence, and long-term compliance with enteral nutrition therapy

### **D. Dietary Assessment**

This will identify recent intake patterns and nutrient adequacy including,

- 24-hour dietary recalls, food frequency questionnaires, or food diaries.
- Estimation of caloric and protein intake compared with requirements.
- Documentation of days without sufficient oral feeding to determine urgency and indication for EN initiation.

## E. Environmental and Functional Assessment

It is very important to consider these factors influencing nutrition and EN implementation, such as:

- Socioeconomic and lifestyle factors, access to food, and dietary preferences.
- Cultural aspects and behaviours influencing nutrition.
- An assessment of physical activity levels.

## Nutrition Diagnosis – GLIM

An international consensus on the core standards for diagnosing and assessing the severity of adult malnutrition. It was developed as a diagnostic framework to facilitate global comparisons of the prevalence, management, and outcomes of malnutrition.

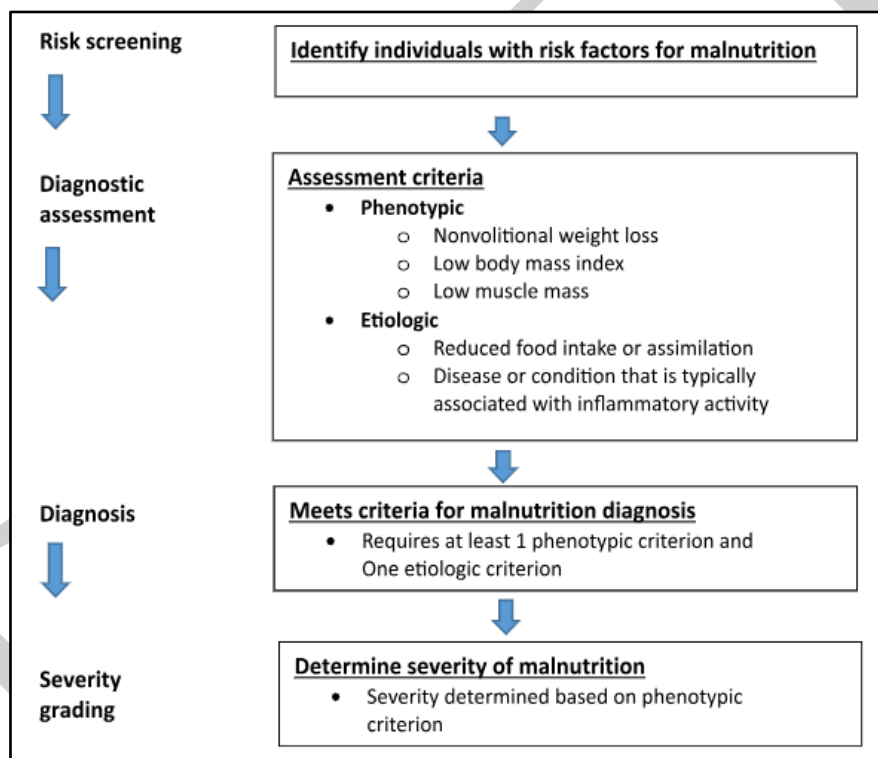


Figure 1.2: GLIM diagnostic scheme for screening, diagnostic assessment and grading of malnutrition<sup>3,6</sup>

Malnutrition diagnosis using GLIM requires at least one phenotypic criterion and one etiologic criterion. Severity grading is completed using only the phenotypic criteria (Annexure 8).

## Chapter 2

### Implementation of Medical Nutrition Therapy

Once the assessment is done medical nutrition therapy can be initiated in the following steps.

The following algorithm can be used for decision-making.

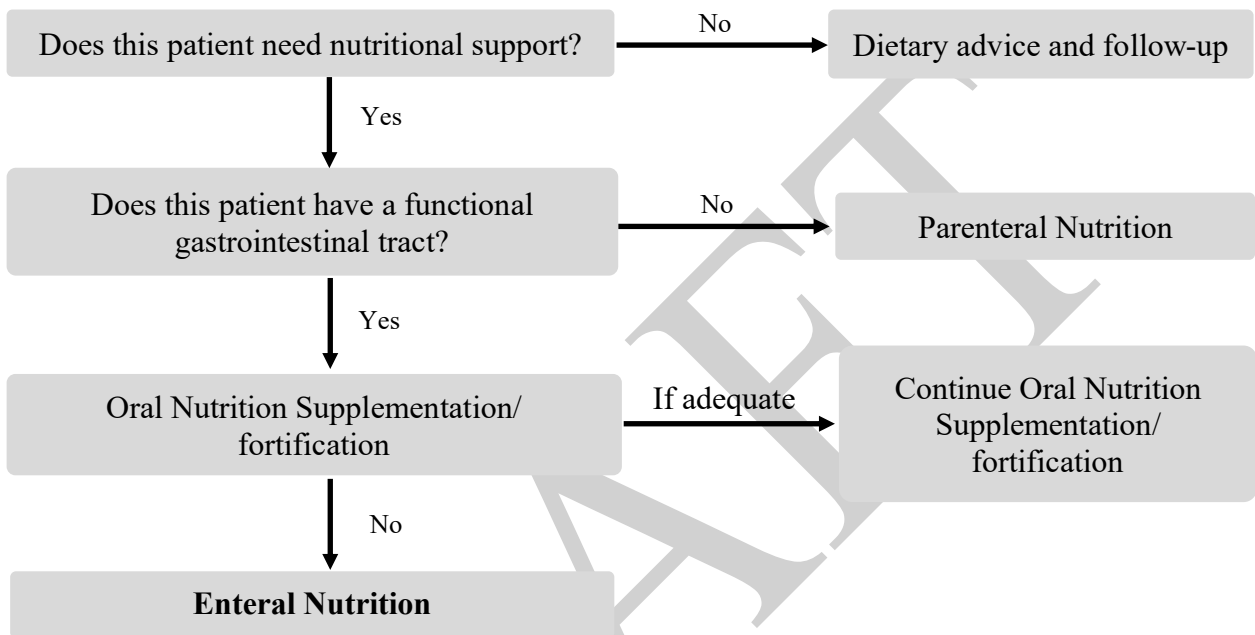


Figure 2.1: Algorithm to decide on enteral nutrition

## Enteral nutrition

According to the European legal regulation outlined in Commission Directive 1999/21/EC of March 25, 1999, the term *enteral nutrition (EN)* refers to all types of nutritional support involving "dietary foods for special medical purposes," regardless of the method of administration. This includes oral nutritional supplements (ONS) and tube feeding via nasogastric, nasoenteral, or percutaneous tubes.

For this guideline, EN is defined as:

*"The delivery of nutrients in an artificial form into the digestive tract via a feeding tube."*

Patient selection for enteral nutrition is a complex clinical decision and should ideally be undertaken within a multidisciplinary team (MDT) framework. The anticipated benefits of enteral access must be carefully balanced against the potential risks and harms associated with the procedure.

### Indications for enteral nutrition

EN is indicated in patients with malnutrition or inadequate oral food intake. Inadequate oral intake is confirmed if patient cannot eat for a week or if energy intake is <60% of the estimated requirement for 1-2 weeks (daily energy intake <10kcal/kg/day or daily energy deficit 600-800kcal)

Table 2.1: Indications for EN

Category	Examples
Unconscious patient	Head injury Ventilated patient
Swallowing disorder	Multiple sclerosis (MS) Motor neuron disease (MND) Bulbar and pseudobulbar palsies after stroke
Chronic organ failure with inflammation and anorexia	Liver disease COPD Renal disease
Increased nutritional requirements	Cystic fibrosis Huntington's disease
Psychological problems (rarely)	Severe depression Anorexia nervosa

Adopted from the Life Long Learning program module, ESPEN

## Contraindications for enteral feeding

Table 2.2: Contraindications for EN

Category	Example
Severe functional disturbances of the bowel	Malassimilation or loss of nutrients (short bowel syndrome, intestinal ischaemia, small bowel mucosal disease, high output intestinal fistula) Severe nausea/vomiting
Gastrointestinal obstruction (ileus)	Peritonitis Stenosis or strictures Inflammatory disease Peritoneal carcinomatosis
Metabolic instability	Diabetic ketoacidosis Diabetic coma Hepatic coma
Circulatory instability	
<ul style="list-style-type: none"><li>If patient on multiple inotropes / escalating doses of inotropes / MAP &lt;65mmHg</li></ul>	Severe acute cardiac insufficiency Shock of any origin

Adopted from the Life Long Learning program module, ESPEN

### How to decide the route of enteral nutrition:

The route of the enteral nutrition depends on the following factors,

- Clinical condition of the patient (type of illness, the current state of health etc.)
- Anatomy of the gastrointestinal tract
- Anticipated duration of tube feeding, and the patient's preferences

Figure 2.1 may elaborate, how to decide the route of enteral nutrition.

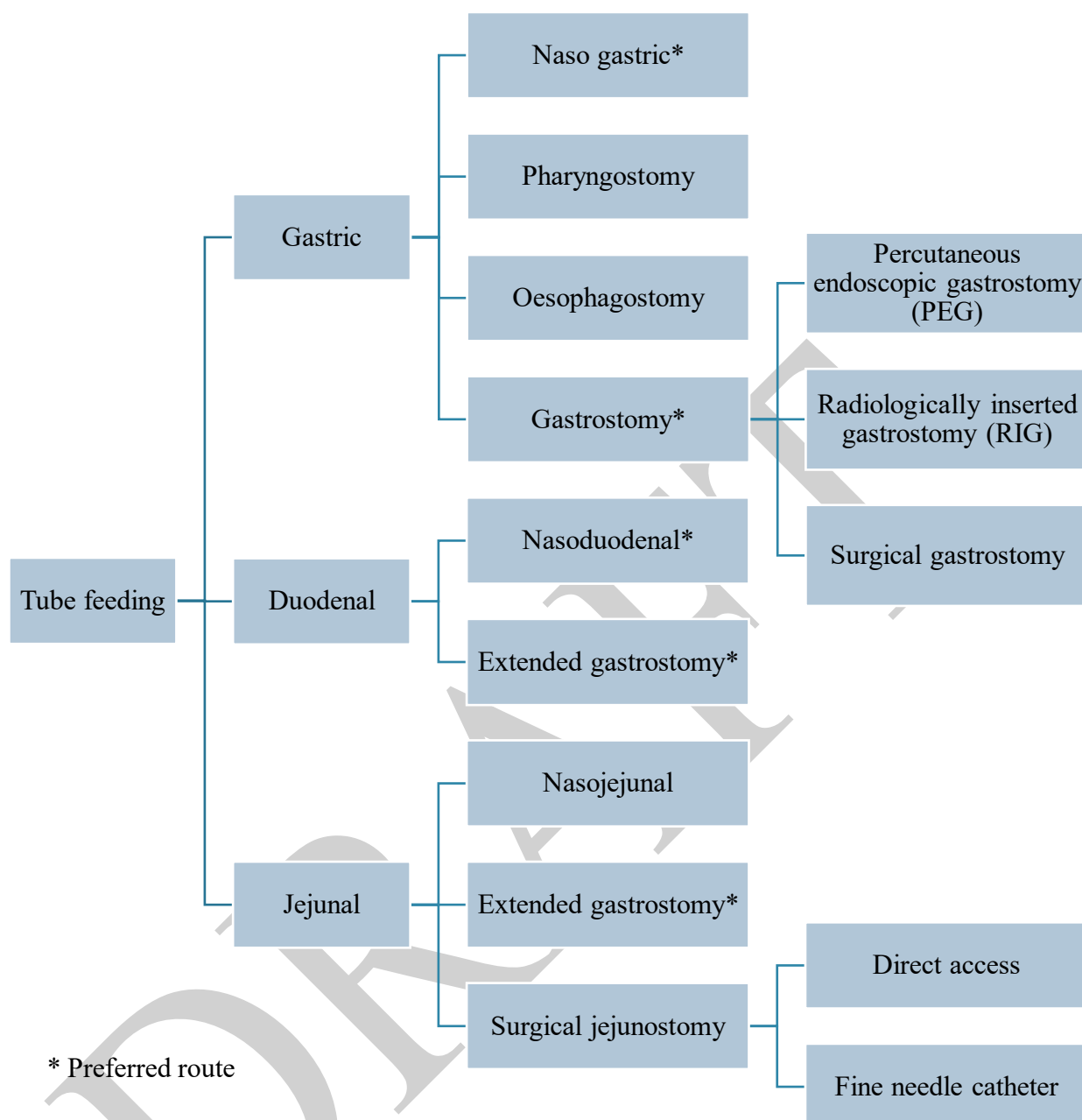


Figure 2.2: Routes of EN

The table 2.3 compares commonly used enteral routes, such as nasogastric, gastrostomy, and jejunostomy, based on factors like timeframe, indication, risk of complications, key intervention and common issues. It highlights the advantages and limitations of each route, aiding clinicians in selecting the most appropriate method for individual patient needs.

Nasogastric tube insertion technique - Annexure 8

Care of gastrostomy tube after insertion – Annexure 9

Care of balloon gastrostomy tube after insertion – Annexure 10

Complications of PEG or gastrostomy and management – Annexure 11

Endoscopic Gastrostomy with jejunal extension (PEG-J) and Direct Percutaneous Endoscopic Jejunostomy(D-PEJ)– Annexure 12

Table 2.3: Commonly used routes of enteral nutrition

<b>Tube type</b>	<b>Time frame</b>	<b>Common indications</b>	<b>Common insertion methods</b>	<b>Key interventions</b>	<b>Common issues and management strategies</b>
Naso-gastric fine bore feeding tubes ≤12fr	Short-term (generally 4-6 weeks)	<ul style="list-style-type: none"> <li>• Early post-stroke</li> <li>• Inadequate oral intake</li> <li>• Acute swallowing problem</li> </ul>	<ul style="list-style-type: none"> <li>• Bedside</li> </ul>	<ul style="list-style-type: none"> <li>• Check pH of aspirate on insertion, then before every tube use/ daily if fed over 24 hours to check tip position.</li> <li>• Also check for,</li> <li>• Any new or unexplained respiratory symptoms or if oxygen saturations decrease.</li> <li>• Episodes of vomiting, retching or coughing spasms</li> </ul>	<ul style="list-style-type: none"> <li>• Repeated displacement - retention devices may be useful</li> <li>• Blockage <ul style="list-style-type: none"> <li>• 50ml enteral syringe + warm water</li> <li>• care with medications</li> </ul> </li> </ul>
Naso-jejunal	Short-term (generally, less than 90 days)	<ul style="list-style-type: none"> <li>• Reduced gastric emptying</li> <li>• Pathology in the oesophagus or stomach</li> </ul>	<ul style="list-style-type: none"> <li>• Bedside magnetic imager</li> <li>• Endoscopy</li> <li>• Radiological screening</li> </ul>	<ul style="list-style-type: none"> <li>• X ray to check tip position - after insertion, if the tube moves or if patient is symptomatic</li> </ul>	<ul style="list-style-type: none"> <li>• Blockage <ul style="list-style-type: none"> <li>• may be kinked if too much tube is inserted - pull back to 80- 100cm at the nose</li> <li>• avoid drugs if possible</li> <li>• 50ml enteral syringe + warm water</li> </ul> </li> <li>• Displacement</li> <li>• Retention devices may be useful</li> </ul>

Gastrostomy	Long- term (generally more than 30 days)	<ul style="list-style-type: none"> <li>• Long- term neurological disease</li> <li>• Oesophageal pathology</li> <li>• Head and neck cancer</li> <li>• Brain injury</li> </ul>	<ul style="list-style-type: none"> <li>• Endoscopy</li> <li>• Radiology – push or pull technique.</li> <li>• Surgery</li> </ul>	<ul style="list-style-type: none"> <li>• Until exit site healed, keep it clean and dry (aseptic wound care) for 5-7days</li> <li>• Advance and pull back/ rotation 1-2 weekly</li> <li>• PH check if tube replaced.</li> <li>• Appropriate post- procedure care</li> </ul>	<ul style="list-style-type: none"> <li>• Displacement <ul style="list-style-type: none"> <li>• If less than 4 weeks post- insertion, great care is needed for replacement</li> <li>• If more than 4 weeks post- insertion, re-insert the spare tube or balloon gastrostomy tube as soon as possible to avoid closure of the tract (Closure of the tract can occur within 4 hours)</li> </ul> </li> <li>• Local leakage <ul style="list-style-type: none"> <li>• Skin protection</li> <li>• Consider whether the bumper is too tight</li> </ul> </li> <li>• Abscess <ul style="list-style-type: none"> <li>• Antibiotics</li> <li>• May need removal of gastrostomy</li> </ul> </li> <li>• Buried bumper <ul style="list-style-type: none"> <li>• To prevent this excessive traction should be avoided</li> </ul> </li> <li>• Damage to the tube</li> <li>• Connections often replaceable</li> </ul>
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Jejunostomy	Long-term (generally over 30 days)	<ul style="list-style-type: none"> <li>• Gastroparesis</li> <li>• As NJ but longer term</li> </ul>	<ul style="list-style-type: none"> <li>• Endoscopy (direct)</li> <li>• Endoscopy (extension via gastrostomy)</li> <li>• Radiology (transgastric)</li> <li>• Surgery</li> </ul>	<ul style="list-style-type: none"> <li>• Until exit site healed, keep it clean and dry (aseptic wound care) for 5-7days</li> <li>• Advance and pull back weekly after tract healed (about one week of insertion)</li> <li>• Should not be rotated</li> </ul>	<ul style="list-style-type: none"> <li>• Displacement <ul style="list-style-type: none"> <li>• If less than 4 weeks post-insertion, great care needed for replacement</li> <li>• If more than 4 weeks post-insertion, re-insert the spare tube or catheter as soon as possible to avoid closure of the tract.</li> </ul> </li> <li>• Blockage <ul style="list-style-type: none"> <li>- 50ml enteral syringe + warm water</li> </ul> </li> <li>• Local leakage <ul style="list-style-type: none"> <li>- Skin protection</li> <li>- Consider whether bumper too tight.</li> </ul> </li> <li>• Abscess <ul style="list-style-type: none"> <li>- Antibiotics</li> <li>- May need removal of jejunostomy.</li> </ul> </li> <li>• Damage to tube. <ul style="list-style-type: none"> <li>• Connections often replaceable</li> </ul> </li> </ul>
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Adopted from BAPEN enteral nutrition guidelines.

## Chapter 3

### Formulae for enteral nutrition.

For most patients, the best options will be determined by local practice, preference, and availability. Enteral formulae usually do not contain lactose, gluten, cholesterol, and purines.

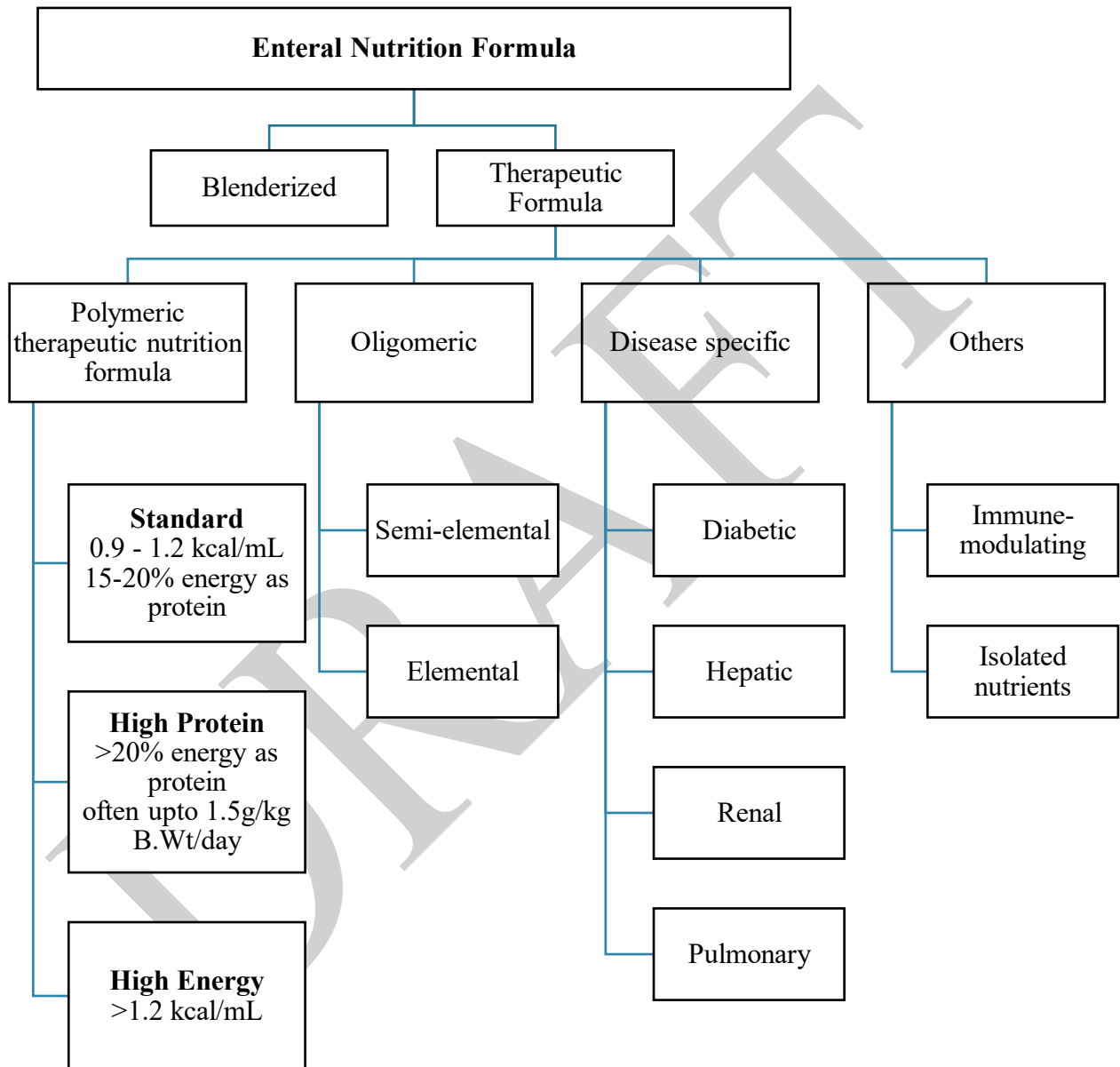


Figure 3: Range of feeds. Adopted from ESPEN guidelines

Table 3: Definitions of therapeutic nutrition formulae:

<b>Recommended term</b>	<b>Definition</b>
Low energy	< 1.0 kcal/mL
Normocalorie	1.0 – 1.2 kcal/mL
High energy	≥ 1.2 kcal/mL
High protein	≥ 20% energy from proteins
High fat	> 40 % of total energy from lipids
MCT-rich	40-75% of total fat as MCTs
High MUFA	≥ 20 of total energy from monounsaturated fatty acids
Immune modulating	Immune modulating substrates e.g. glutamine, arginine, omega-3 fatty acids, dietary nucleotides and antioxidants

### Standard Polymeric Formulae

- 15-20% of energy from whole protein
- ~30% of energy from lipid - predominantly as long-chain triglycerides
- 50-55% of energy from carbohydrates - predominantly of low glycaemic index
- 10-20mg/ml fibre (fibre-free options are also available)
- Full complement of vitamins and trace elements
- Gluten-free and with minimal lactose
- ~85% water
- ~1kcal/ml (normal energy density)

### Semi-element Feeds

These formulae are partially "pre-digested," making them theoretically easier to absorb than whole-protein formulae. They contain nitrogen mainly as peptides (chains of 2-50 amino acids) and provide lipids partially as medium-chain triglycerides (MCTs), which are absorbed more easily without requiring digestion or lymphatic transport. The carbohydrates are less complex, and fibre is excluded.

## Indications for Peptide-Based Oligomeric Formulae

- When whole protein formulae are not tolerated but enteral nutrition is still indicated
- When the capacity for absorption is severely impaired
- In the initial phase after prolonged starvation
- When administration is to the jejunum (in critical care and in severe acute pancreatitis)
- In selected patients with short bowel syndrome
- In selected patients with enterocutaneous fistulae

## Elemental:

Free amino acid formulae, also known as elemental or chemically defined formulae, provide nitrogen in the form of single amino acids. They are rarely needed because oligopeptides are usually absorbed more effectively than free amino acids and have a lower osmolality. Amino acid-based formulae can be useful in specific cases, such as certain metabolic diseases or severe dietary protein allergies. However, they are generally unsuitable for short bowel syndrome, as they may trigger a secretory response that worsens fluid and nutrient balance.

## Isolated nutrient:

- Whey protein
- Casein protein

## Disease-specific formulae:

- Diabetic formulae
  - Classical
    - Classical diabetes formulae are similar to standard formulae, with minor adjustments such as reduced sucrose, added fructose, and increased polysaccharides. However, these small differences typically do not justify their higher cost, as standard formulae are sufficient for managing uncomplicated diabetes
  - High MUFA
    - A newer generation of diabetes formulae has been developed in which polymeric formulae have been adapted to contain up to 35% of energy in the form of mono-unsaturated fatty acids (MUFA), a higher total amount of fat, and less carbohydrate.

- **Liver formulae**

- Liver-specific formulae are low in sodium but energy-dense, usually with a high lipid content, as these patients are often both catabolic and require fluid restriction. They have been modified to contain a higher proportion of branched chain amino acids and reduce the amount of aromatic amino acids compared to standard formulae. Given the high risk of fat malabsorption in cholestatic liver disease, the lipid profile is modified to include more MCTs in liver formulae.

- **Renal formulae**

- Renal formulae are high in energy (often 2 kcal/ml) with low levels of potassium, phosphate, and sodium, the electrolytes most prone to accumulation in renal failure. These formulae may also include specific modifications, such as a reduced amount of vitamin A. Pre-dialytic and dialytic renal formulas are designed to provide stage- appropriate protein delivery, tailored to the patient's nutritional and metabolic needs

- **Pulmonary formulae**

- These formulae typically have a higher fat content to lower the respiratory quotient (RQ) from 1.0 (indicative of carbohydrate metabolism) toward 0.7 (indicative of fat metabolism), thereby reducing carbon dioxide production. Although there are theoretical advantages of pulmonary formulae, ESPEN critical guidance does not recommend use of special formulae.

### Immune modulating formulae:

Immune-modulating formulae, also known as immune-enhancing diets or immunonutrition, are enriched with specific nutrients designed to modulate immune function. These nutrients, provided in supra-physiological amounts, are intended to exert pharmacological or nutraceutical effects.

Key immune-modulating components include:

- **Omega-3 fatty acids:** Improve inflammation control and immune response.
- **Nucleotides:** Support immune cell proliferation and function.
- **Arginine:** Enhances immune function and tissue repair.
- **Glutamine:** Supports gut barrier integrity and immune function.

## Indications

### 1. Cancer patients:

- Recommended for patients undergoing major cancer surgery, especially upper gastrointestinal procedures.
- Proven benefits include fewer post-operative infections, improved immune responsiveness during radiotherapy, and better appetite, lean body mass, and inflammatory control.
- ESPEN guidelines emphasise ensuring adequate nutrition for weight losing cancer patients, with protein intake >1.0 g/kg/day and energy-dense, fat-rich diets.

### 2. Surgical and critical care patients:

- Most effective in malnourished cancer patients in the perioperative period.
- Less evidence supports use for general abdominal surgery; standard feeds are typically recommended in these cases.
- Critical care studies show potential benefits of individual immune-modulating ingredients, though combination feeds require further evidence.
- These formulas are contraindicated in severe sepsis.

## Blenderized Tube Feeding (BTF)

BTF refers to a type of enteral nutrition where whole foods are blended into a liquid form to provide nutrition. This method is typically used for patients requiring enteral feeding who need a more natural or customised nutritional approach compared to therapeutic formulae.

- **Feeding tubes:** For BTF, gastrostomy tubes are usually the preferred option; however, depending on the patient's clinical and social needs, jejunal and nasal tubes may also be utilised.
- **Tube selection and care:** For optimal results, use an enteral access device (EAD) that is 14 French or larger, and ensure proper care to avoid clogging and ensure efficient feeding.
- **Maintenance:** Tube replacement intervals and flushing methods should follow manufacturer recommendations to prevent complications.

### BTF preparation and storage

- Prepared BTF can be frozen or refrigerated but should not be left at room temperature for longer than two hours.
- Blending equipment must be thoroughly cleaned, and strict food safety procedures should be followed to avoid contamination.
- Unused BTF should be discarded per regulations, and thawed batches must be used immediately to maintain quality.

### Equipment and tools for BTF administration

- Essential equipment includes syringes, gravity bags, pumps, and reusable pouches; the choice of devices depends on the patient's needs and the feeding techniques used.
- All equipment must be cleaned and sanitised following the manufacturer's guidelines to ensure safety.
- Pumps must deliver precise feeding rates to optimise nutritional support.

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## Chapter 4

### Methods of Enteral Nutrition Feeding

There are various methods of administering enteral feeding:

- **Bolus feeding:** Resembles the natural process of eating. The rate of feeding should not exceed 30ml/min.
- **Continuous feeding:** Often preferred for critically ill patients. However, the evidence supporting this preference is limited due to variability in studies comparing bolus and continuous feeding methods.

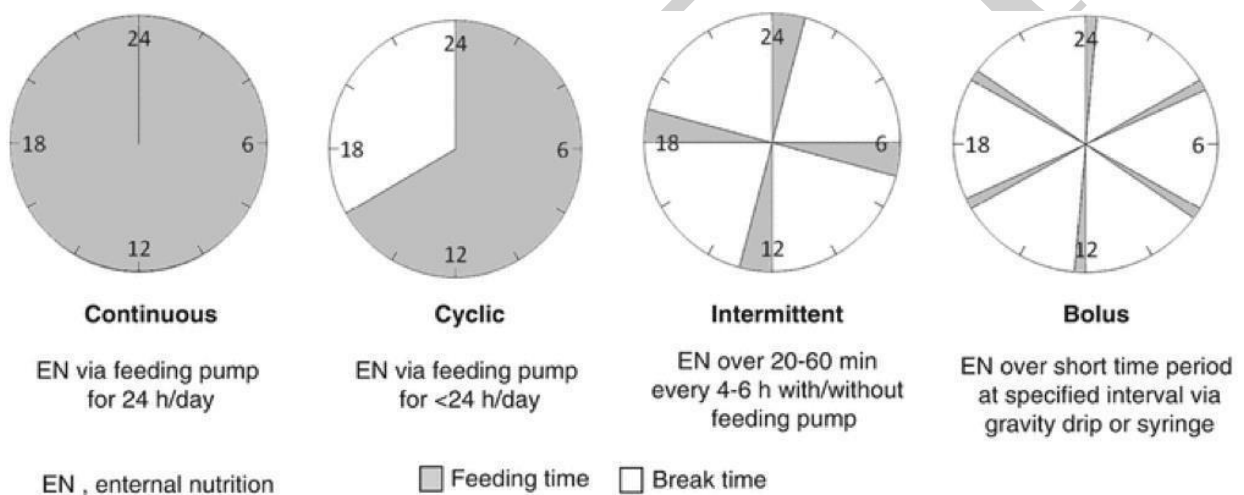


Figure 4: Different methods of enteral nutrition delivery

Table 4: Comparison between different methods of enteral nutrition delivery

Type of EN feeding	Method	Indications and Advantages
Bolus	200-400ml of feeds down a feeding tube over 10-15 min at least every 3 hours during daytime Use a syringe or gravity drip via a feeding container	More physiological Friendly with ambulation May improve quality of life (support the patient's autonomy)
Intermittent	Feed over 20-60 min at least every 3 hours during the daytime Use an infusion pump or gravity-drip	Transition from continuous to bolus feeding When bolus feeding is poorly tolerated
Continuous	24 hours at a steady rate (mL/h) Volume infused varies from < 50 mL/h to > 150 mL/h, depend on patient's requirements and tolerance Use an infusion pump or gravity-drip method	Post-pyloric feeding or small bowel feeding When bolus feeding is poorly tolerated
Cyclic	Similar to continuous feeding but run less than 24 h per day at a higher rate (mL/h) Use an infusion pump or gravity-drip	Friendly with ambulation and improved quality of life Option for nocturnal feeding

## Chapter 5

### Medication administration via enteral tubes

There are many ways in which drugs and nutrients, or nutritional therapy, can interact. Examples include:

- **Chemical interaction:** Binding of the drug, reducing its absorption.
- **Physical interaction:** Blockage of the feeding tube due to incompatibility between the drug and feed formulation, causing the feed to change consistency.
- **Loss of drug effect:** Impaired absorption, increased drug clearance, or blockage of the pharmacological action.
- **Nutrient-drug interaction:** Interaction between the drug and a specific nutrient involved in the drug's metabolism.

#### Guide for the administration of medications via feeding tubes

- **Preferred formulations:** Liquids or soluble tablets are generally preferred for administration via a feeding tube. Exceptions exist, and each medication should be checked individually.
- **Injections:** Some injectable medications can be administered via an enteral tube. A filter needle may be required for medicines provided in glass ampoules.
- **Crushing or opening medications:** Crushing tablets or opening capsules should be considered a last resort and confirmed with the local pharmacy team.

#### Instructions for medication types:

- **Soluble/dispersible tablets:** Dissolve in 10–15 ml of water and administer through the tube.
- **Liquids:** Shake well. For viscous (thick) liquids, dilute with an equal amount of water immediately before administration.
- **Capsules:** Open capsules and tip the powder into a medicine pot.
- **Tablets:** Crush uncoated or sugar-coated tablets using a tablet crusher or suitable device.

#### Do NOT crush:

- Enteric-coated (EC) medicines.
- Modified release (MR, SR, LA, XL) medicines.
- Hormone preparations.
- Cytotoxic medications.

**Flushing guidelines:**

- If administering more than one medicine, flush the tube with at least 10 ml of water between medicines to ensure the previous medication is cleared from the tube.
- After administering the last medicine, flush the tube with at least 30 ml of water.

Annexure 15 – Clinically important drug and food interactions.

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## Chapter 6

### Complications of Enteral Nutrition

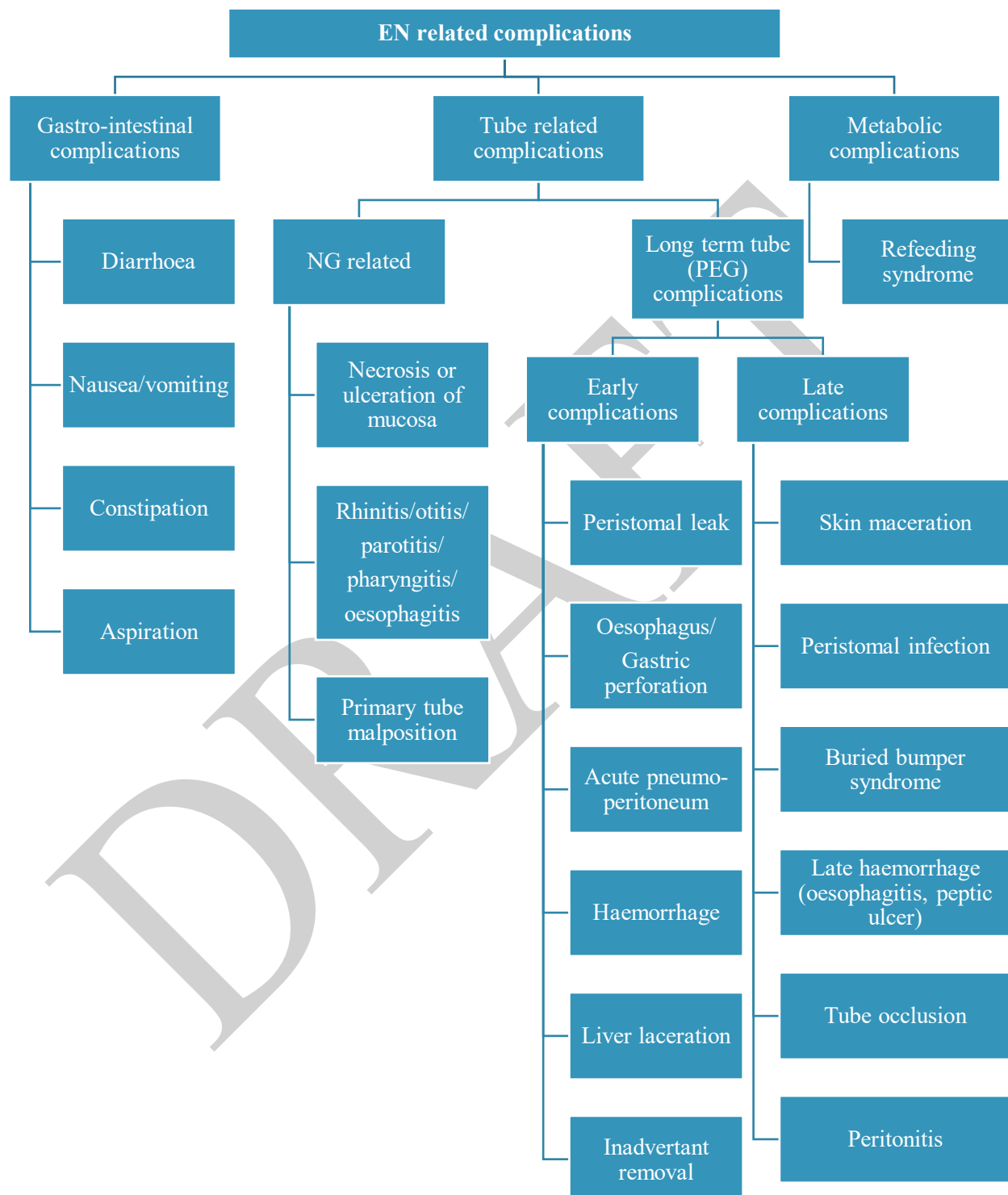


Figure 6.1: Complications of EN

## 6.1 Gastro-intestinal complications

### 6.1.1 Gastric intolerance

Gastric residual volume (GRV) refers to the amount of stomach contents aspirated after giving enteral feeds. A GRV of  $\leq 500$  ml every 6 hours is considered safe and indicates normal gastrointestinal function. While most patients can handle enteral nutrition (EN) through a gastric tube, some may experience delayed stomach emptying and higher GRVs due to factors like sedation, pain medications, immobility, hypothermia, or critical illness. Feeding intolerance is defined as having more than one GRV reading above 500 ml over 6 hours. Although GRV measurement is commonly used in ICU nutrition management, there is limited evidence supporting its effectiveness.

Table 6.1.1: Causes of gastric intolerance

<b>Reason for impaired gastric emptying</b>	<b>Examples</b>
Preexisting disease	Diabetes mellitus Vagotomy Systemic scleroderma Myopathies
Acute disease related.	Pain and stress Pancreatitis Extensive trauma, abdominal surgery, burn/spinal cord injury
Medication	Opioids Anticholinergics

### **Management of gastric intolerance**

Make sure the patient is fed sitting up straight or at a minimum angle of 30 to 45 degrees to avoid reflux or vomiting.

If vomiting is a persistent problem:

- Maintain an accurate record documenting the frequency and volume of vomiting and the surrounding events
- Check the appropriateness of the feeding regimen including method, volume, rate and concentration of feed
- Check the temperature of feed
- Check for medications that may cause vomiting or that may reduce vomiting/reflux

Confirm the position of the feeding tube especially if naso-jejunal/ naso-gastric/ percutaneous endoscopic gastrostomy with jejunal extension (PEGJ)

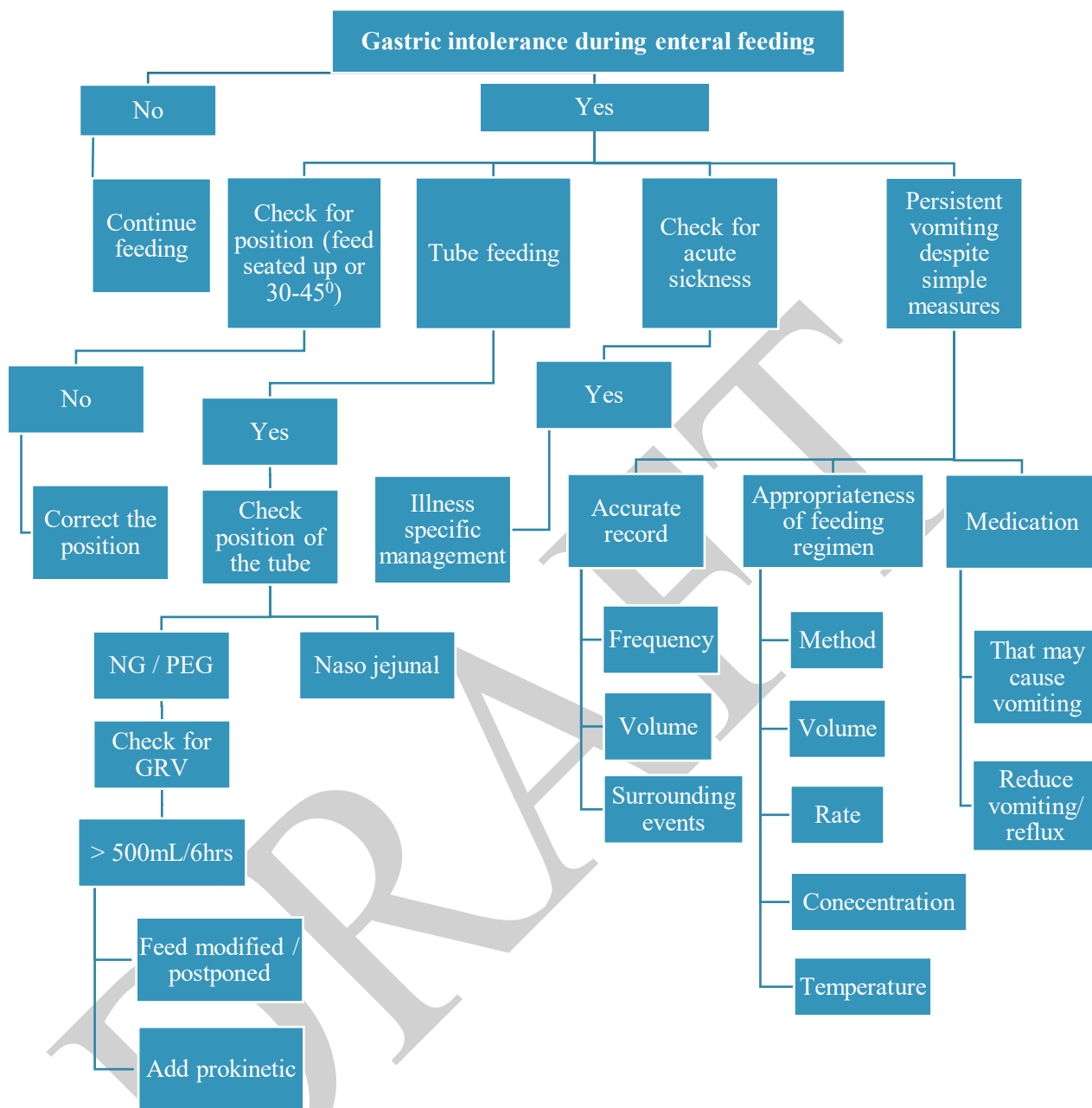


Figure 6.1.1: Causes of gastric intolerance and management

## 6.1.2 Diarrhoea

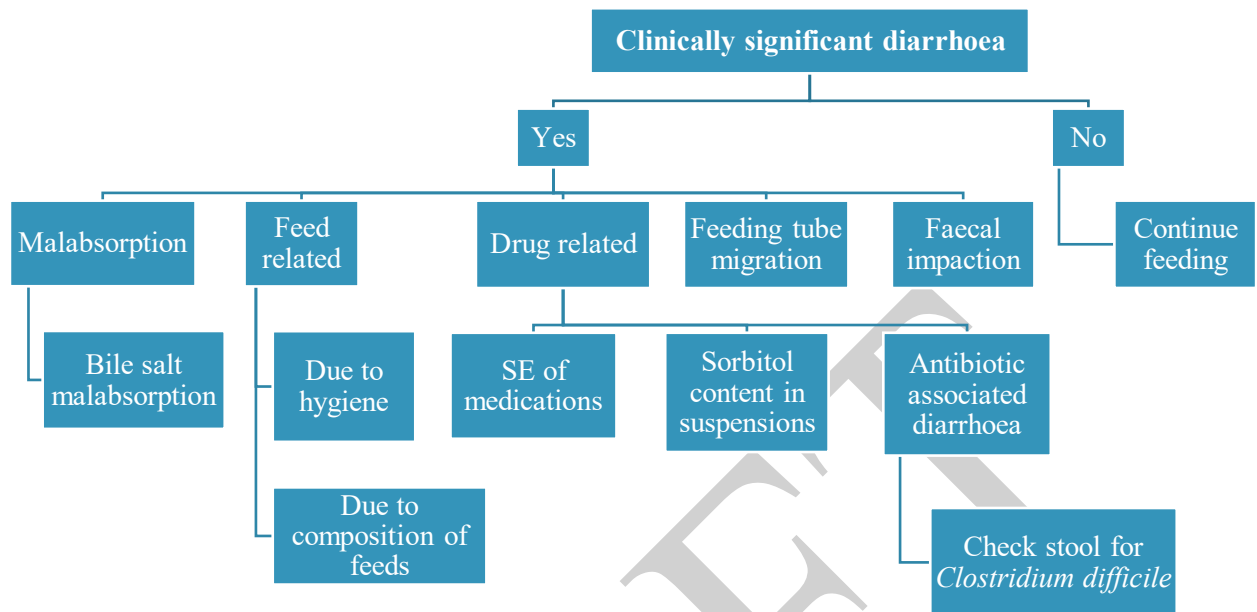


Figure 6.1.2: Causes of EN associated diarrhoea

If the patient develops diarrhoea while on EN, the following must be considered and managed accordingly.

- Bolus intolerance – change to infusion feeds
- High delivery rate – reduce the feeds by half (120mL/hour is equivalent to the physiologic flux into the duodenum from the stomach)
- High osmolality – use an isotonic solution
- Antibiotic associated diarrhoea (e.g. *Clostridium difficile*)
- Bacterial contamination and gastrointestinal infections – Take universal precautions to prevent infections
- Dietary intolerances – Consider Low FODMAP / lactose free / gluten-free diet
- Malabsorption
- Iatrogenic diarrhoea – Review drug list to detect any diarrhoea causing preparations (antibiotics, magnesium antacids, sorbitol, etc.)

### Supportive measures

- Maintain ideal temperature of feed (avoid cold feeds)
- If on fiber-free formula, change to fiber included formula and vice versa. But, avoid soluble or insoluble formulae in patients with high risk of gut ischemia or severe dysmotility.
- No clinical evidence with probiotics. Therefore, probiotics are not routinely indicated.

### Annexure 14 – Preventing infections associated with EN

### 6.1.3 Constipation

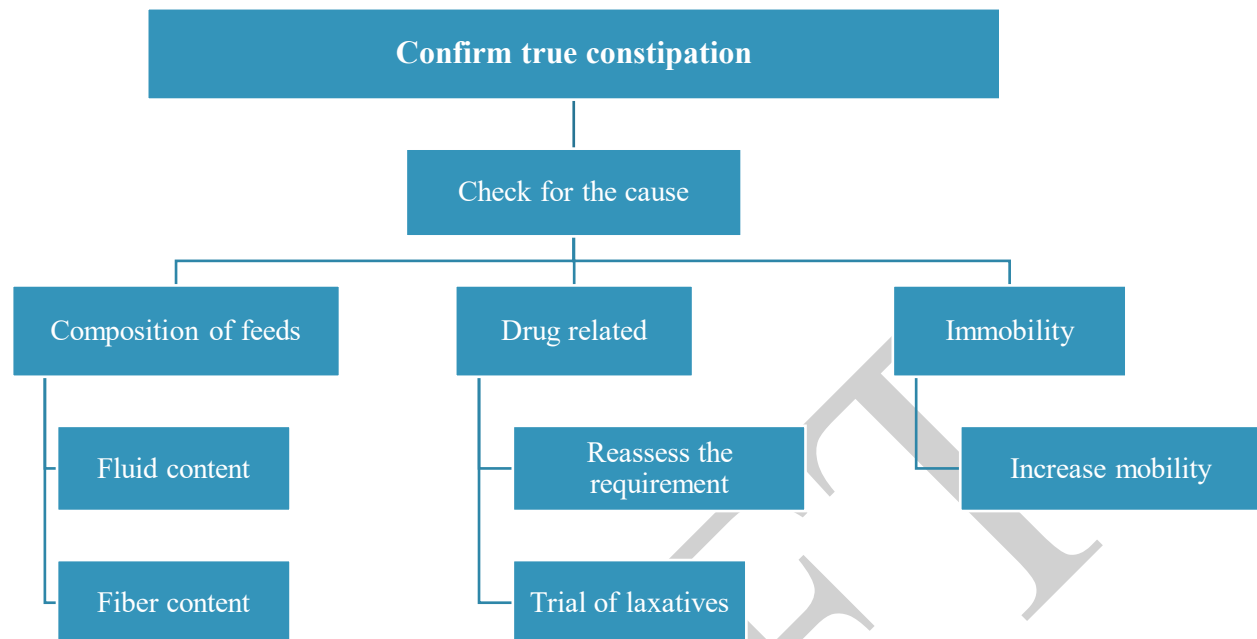


Figure 6.1.3: Causes of EN associated constipation

Constipation is less common in patients with EN. It is more common in patients on long term EN mostly due to inadequate fluid intake, clinical condition and functional status of the patient.

Once bowel obstruction is ruled out, the following should be considered:

- Regular bowel pattern before constipation.
- Medical history including any pre-existing bowel disorders.
- Medications that may be causing constipation (e.g. analgesics) or that can relieve it.
- Fiber intake.
- Fluid intake.
- Changes in mobility.

## 6.2 Tube related complications

Most common tube related complication is tube occlusion.

### 6.2.1 Tube occlusion

When the tube is occluded,

- Use a 30- or 60-mL syringe to inject warm water into the EAD, then gently move the syringe's plunger back and forth.
- Can use bicarbonate solution/ citrus fruit juice / vinegar
- In the absence of the clog zapper feeding tube cleaner kit, use an uncoated pancreatic enzyme solution by crushing one uncoated pancreatic enzyme tablet and one 325-mg sodium bicarbonate tablet combined with 5 mL of water if a water flush is unable to clear the obstruction. Clamp the feeding tube for a minimum of half an hour after adding the solution to the clog. The solution should be taken out of the tube and replaced with a new combination if the blockage is not eliminated in 30 minutes.

### 6.2.2 Gastrostomy tube occlusion – Annexure 11

### 6.2.3 Gastrostomy tube displacement – Annexure 11

### 6.2.4 Complications of fine needle catheter jejunostomy (FNCJ) – Annexure 12

## 6.3 Metabolic complications

### **Refeeding syndrome – Annexure 16**

#### **Fluid requirement**

Fluid requirements should be calculated based on the individual's total intake and ongoing losses, with an estimated average of 30–35 mL/kg/day as a general guide. When determining daily fluid needs, all sources of fluid—including maintenance fluids, medications, and enteral or oral intake—must be considered. Because fluid balance can change rapidly, patients should be monitored closely to prevent both dehydration, dehydration related complications (constipation) and fluid overload.

## Chapter 7

### Monitoring

Monitoring is a key factor in safe and effective delivery of EN. The main goals of monitoring are:

- Preventing complications
- Verifying nutritional efficacy
- Verifying clinical efficacy

To these goals, clinical, nutritional, functional and laboratory indices should be used.

#### 1. Clinical parameters

- Temperature, pulse rate, respiration, blood pressure
- Oedema, dehydration, sepsis and wound healing
- Enteral tube site should be inspected at regular intervals for signs of inflammation or infection.
- Assessment of feeding tolerance

#### 2. Food charts and fluid balance charts

- Assesses the medications given, IV fluids, feed flushes, oral feeds, urine output
- Helps to assess hydration status, compare the delivered feeds against requirement, transition between EN support and oral nutrition

#### 3. Nutrition Indices

- Body weight
- Mid Upper Arm Circumference
- Hand grip dynamometry
- Micronutrient status

#### 4. Investigations

- Serum electrolytes – Daily in initial period
- Calcium, phosphate, magnesium
- Blood glucose at least twice daily.

Table 7.1: Clinical monitoring guide for patients on EN

Parameter	Frequency	Rationale
Food chart (if appropriate)	Daily	To compare intake with requirements and aid transition between nutrition support and oral intake
Fluid balance charts	Daily in acute setting including fluid delivered by other routes e.g. medications/ IV fluids/ feed flushes and oral fluids. Urine frequency and colour should be monitored in community patients.	Help assess hydration status. To compare feed given with feed prescribed To assess fluid volume prescribed with volume given To assess if feed rest periods are adhered to.
Weight / BMI	Weekly / every second week Monthly for established home enteral feeding If weight difficult to obtain use mid-arm circumference and triceps' skinfold thickness	To assess changes on hydration and body composition over time.
Temperature / pulse / respiration	Daily when in acute unit	To monitor overall condition and monitor for signs of infection/dehydration.
Bowels	Daily	To monitor bowel function and tolerance of enteral feed.
Capillary blood glucose	Random / daily initially until stable. Four hourly if unstable or has diabetes mellitus.	To detect hyper/ hypoglycaemia To ensure timing of feed and medication optimal for blood glucose control.
Medication	Daily	To ensure potential side effects and drug-nutrient interactions are identified and prevented. Ensure drugs are in an appropriate presentation for tube administration and absorption.
Nausea and vomiting	Daily	Monitor tolerance of feed.

Gastric residual volumes	4-hourly where clinically indicated in acute setting. appropriateness of increasing feed rate.	In some units used to assess gastric emptying and ascertain appropriateness of increasing feed rate
Feeding tube position	NG tubes before each feed, fluid or medication administration. Long-term feeding tubes (gastrostomy/ jejunostomy) before each feed begin noting external bumper markings.	To confirm gastric position and prevent feed aspiration. To ensure feeding tube has not migrated from/into stomach.
Feeding tube insertion site	Daily	To check for infection/ soreness/ leakage. Check for nasal erosion with nasal placed tubes To ensure tube appropriately secured
Tube integrity	Daily	To ensure tube is safe to use and prevent leakage.
Gastrostomy rotation	Daily	To prevent buried bumper syndrome. To prevent tube displacement.
Gastrostomy progression	Weekly	
Balloon water volume checked in balloon retained tubes	Weekly	
General clinical condition of patient	Daily	To ensure feed is tolerated and that feeding and feeding route remain appropriate.
Oral health	Daily	To optimise oral hygiene and reduce risk of aspiration pneumonia.
Aims and objectives of feeding/route/risk/benefit.	As appropriate for aim and duration of nutrition support.	To ensure progression towards agreed objectives of nutrition support. To ensure feeding remains appropriate
Hand grip strength	Weekly	

Table 7.2: Biochemical monitoring guide for patients on enteral nutrition

Parameter	Frequency	Rationale
Sodium Urea Creatinine	Daily until stable then as clinically indicated	Assess fluid status Detect electrolyte or metabolic abnormalities Assess renal function
Potassium Phosphate Magnesium Corrected calcium	Daily if refeeding risk; then three times a week until stable; then as clinically indicated.	To detect electrolyte/ metabolic abnormalities Monitor for refeeding syndrome
Glucose	Baseline measurement followed by twice daily, if indicated	To ensure optimum glycaemic control
Liver function tests	Baseline then weekly until stable then as needed	To detect overfeeding
C-reactive protein	Twice weekly until stable	To assess acute phase response and assist
Albumin Prealbumin	Weekly until stable then as clinically indicated	Aids interpretation of minerals. Low albumin reflects disease not protein status
Full blood count	Twice weekly until stable then as when clinically indicated	To monitor for infection and anaemia
Zinc Copper Selenium	When clinically indicated	Deficiency common with increased losses but results can be difficult to interpret as altered by disease, infection and trauma
Folate B12	Baseline if indicated and if there is a clinical concern	Deficiency common in certain disease states
Vitamin D	6 monthly on long term nutrition or if deficiency suspected	Often low in housebound patients

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## Chapter 8

### EN in special clinical situations

**Practical recommendations in enteral feeding in the prone position** (May need to adjust according to the clinical circumstances)

- 1) Before proning
  1. Cease feed 1 hour before proning (Ensure to cease insulin infusion simultaneously if the patient was on it)
  2. Aspirate the NG tube directly before proning and discard the contents.
- 2) Best bed position
  1. Place the bed in reverse Trendelenburg position (30° head up) unless contraindicated.
- 3) Tube position
  1. The NG tube should be the first choice for enteral feed
  2. NG tube insertion should only be done in the supine position
  3. NJ tube feeding is also possible in the enteral feeding in the prone position
  4. The NJ tube should be inserted in supine position
- 4) Before feeding
  1. Recheck the position of the NG tube
  2. If safe to use, reconnect and resume enteral feed
- 5) Feed delivery
  1. Best practice would be to use enteral feeding pumps to give continuous feeding when restarting feed
  2. The maximum rate for safe feeding during the prone position is 65 – 85ml/hour according to available evidence. Should not give a higher rate than this.
  3. Gravity feeding should be avoided where possible. But if no feeding pumps are available, this method can be used.
  4. Bolus feeding should **NOT** be attempted while in the prone position.
- 6) Choice of feed
  1. To balance between optimum feed tolerance and fluid management, 1.5kcal/ml feed should be utilised.
  2. If further fluid restrictions are there, 1.5 – 2 kcal/ml feed can be considered with extra care for vigilant gastric tolerance.

7) Monitoring feed tolerance

1. NG tube should be aspirated 4 – 6 hourly to check the Gastric Residual Volume (GRV)
2. In all prone patients maximum GRV should be considered as 300ml per 4-6 hours
3. Up to 250ml of GRV can be returned to the patient and the rest should be discarded

8) Managing feed intolerances

1. If GRV exceeds the threshold at any time, commence prokinetics
2. If GRV remains high after 12-24 hours of commencing prokinetics, a second line of feeding should be considered
  - a) If possible, to insert the NJ tube (Post pyloric feeding)
  - b) If the NJ tube cannot be placed or has not improved feed tolerance, parenteral nutrition should be considered after 72 hours

9) Before deproning

1. Cease feed ideally 1 hour before deproning (discontinue insulin infusion simultaneously if patient was on it)
2. Aspirate the NG tube directly before deproning and discard the contents

10) Once deproned

1. Recheck position of the enteral tube as per local guidelines (e.g. marking at the nare/lip)
2. If safe to use, resume enteral feeding

## Chapter 9

### Termination of enteral nutrition

EN should be terminated when the desired weight has been reached and the patient's oral intake matches his/her maintenance needs.

Enteral nutrition may be discontinued in the following situations:

- Successful return to at-least 60% oral intake
- Development of severe complications such as intractable diarrhoea or aspiration pneumonia
- End-of-life care
- Emergence of clinical conditions that contraindicate enteral nutrition (high output fistula, intestinal ischaemia, anastomotic leak)

However, the decision to terminate enteral nutrition is highly individualised, taking into account patient-specific factors, environmental considerations, and other relevant clinical variables.

#### **Patient transfer**

1. Determine the safest and most effective mechanism for communicating the EN care plan.
2. Involve representatives of the discharging site (nutrition support clinician, case manager, or prescriber) and the accepting site or home care team (nutrition support clinician, home supply company, home health agency) in planning the care transition.
3. Transfer the EN prescription and regimen to the accepting home care team (nutrition support clinician) to all healthcare providers and suppliers associated with the patient before discharge.
4. Communicate the EN regimen to the home care team caring for the patient.

## Referral procedure

When EN is started, the indication should be clearly mentioned.

### Nutrition support team

1. Consultant Nutrition Physician – Head of the team.
2. Senior Registrar in Clinical Nutrition
3. Registrar in Clinical Nutrition
4. Medical Officer in Nutrition
5. Nursing officer
6. Pharmacist
7. Other supportive teams

### Role of the MNT

1. Nutrition assessment of the ward referral and all ICU patients
2. Deciding the best route of nutrition in consultation with the primary medical/surgical/gastroenterology team and ICU team (in case of ICU) patients.
3. Liaise with the Medical/Surgical/ICU team regarding the total volume
4. Determining the nutritional requirements. (Energy and protein)
5. Determining the correct type of EN
6. Determining the correct rate of infusion
7. Determining the correct duration of infusion.
8. Daily review to see the tolerance and metabolic changes
9. Ordering relevant investigations with the relevant team members.
10. Correction of micronutrient deficiencies

### Role of the medical/surgical team

1. Nutrition screening
2. Referral of patients with nutrition concerns to Medical Nutrition Team.
3. Liaise with MNT, anaesthesia team, surgical team, gastroenterology team Biochemistry team and pharmacy.
4. Monitoring for features of refeeding syndrome, other metabolic derangements and tube-related complications.
5. Correction of electrolyte abnormalities
6. Informing the MNT if metabolic derangement is detected.

### Role of the ICU team

1. Liaise with MNT, Surgical/ Medical team, Biochemistry team and Pharmacy.
2. Monitoring for features of re-feeding syndrome, other metabolic derangements and tube related complications.
3. Correction of electrolyte abnormalities

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## Home Enteral Nutrition (HEN)

HEN should be administered to those patients unable to meet their nutritional requirements via the oral route and who can be safely managed outside of the hospital.

HEN can be identified in the following situations.

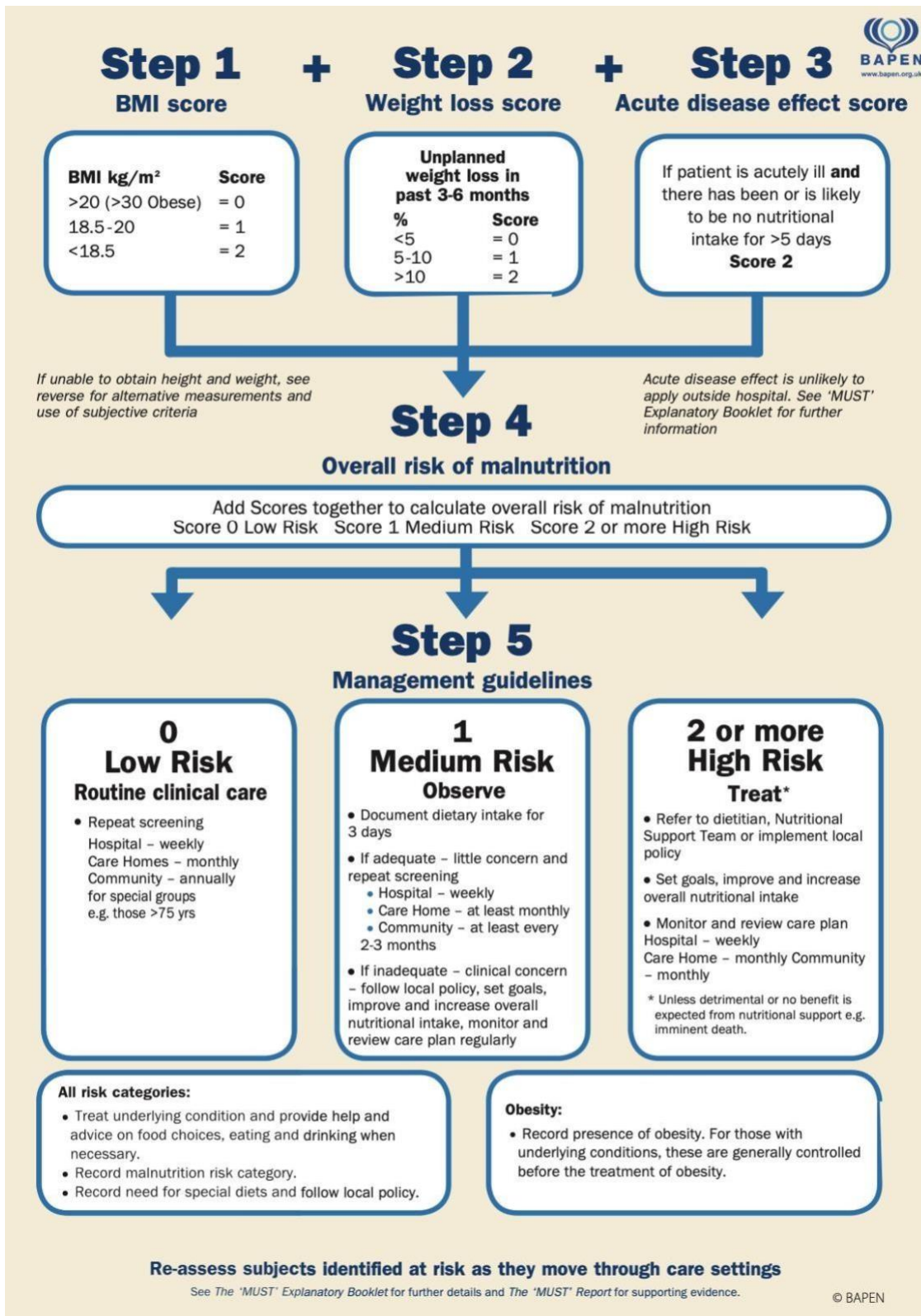
- At nutritional risk or malnourished who cannot meet their nutrient requirements by normal dietary intake
- Who have a functioning gastrointestinal tract
- Who can receive therapy outside of an acute care setting
- Who agree and are can comply with HEN therapy to improve body weight, functional status or quality of life

For a safe HEN program,

- the patient and/or the patient's legal representative have to give fully informed consent to the treatment proposed.
- the patient has to be sufficiently metabolically stable outside the acute hospital setting
- the patient's home environment has to be adequate to safely deliver the therapy proposed
- the patient and/or the caregiver have to be able to understand and perform the required procedures for the safe administration of therapy

# Annexes

## Annexure 1: MUST



## Annexure 2: NRS 2002

		Yes	No
1	Is BMI <20.5?		
2	Has the patient lost weight within the last 3 months?		
3	Has the patient had a reduced dietary intake in the last week?		
4	Is the patient severely ill ? (e.g. in intensive therapy)		

**Yes:** If the answer is 'Yes' to any question, the screening in Table 2 is performed.  
**No:** If the answer is 'No' to all questions, the patient is re-screened at weekly intervals. If the patient e.g. is scheduled for a major operation, a preventive nutritional care plan is considered to avoid the associated risk status.

Impaired nutritional status		Severity of disease (≈ increase in requirements)	
<b>Absent Score 0</b>	Normal nutritional status	<b>Absent Score 0</b>	Normal nutritional requirements
<b>Mild Score 1</b>	Wt loss >5% in 3 mths or Food intake below 50-75% of normal requirement in preceding week	<b>Mild Score 1</b>	Hip fracture* Chronic patients, in particular with acute complications: cirrhosis*, COPD*. <i>Chronic hemodialysis, diabetes, oncology</i>
<b>Moderate Score 2</b>	Wt loss >5% in 2 mths or BMI 18.5 – 20.5 + impaired general condition or Food intake 25-60% of normal requirement in preceding week	<b>Moderate Score 2</b>	Major abdominal surgery* Stroke* <i>Severe pneumonia, hematologic malignancy</i>
<b>Severe Score 3</b>	Wt loss >5% in 1 mth (>15% in 3 mths) or BMI <18.5 + impaired general condition or Food intake 0-25% of normal requirement in preceding week in preceding week.	<b>Severe Score 3</b>	Head injury* Bone marrow transplantation* <i>Intensive care patients (APACHE&gt;10).</i>
<b>Score:</b>	+	<b>Score:</b>	= <b>Total score</b>
<b>Age</b>	if ≥70 years: add 1 to total score above	<b>= age-adjusted total score</b>	
<b>Score ≥3:</b> the patient is nutritionally at-risk and a nutritional care plan is initiated			
<b>Score &lt;3:</b> weekly rescreening of the patient. If the patient e.g. is scheduled for a major operation, a preventive nutritional care plan is considered to avoid the associated risk status.			

NRS-2002 is based on an interpretation of available randomized clinical trials. An asterisk (\*) indicates that a trial directly supports the categorization of patients with that diagnosis. Diagnoses shown in italics are based on the prototypes given below. Nutritional risk is defined by the present nutritional status and risk of impairment of present status, due to increased requirements caused by stress metabolism of the clinical condition.

A nutritional care plan is indicated in all patients who are (1) severely undernourished (score=3), or (2) severely ill (score=3), or (3) moderately undernourished + mildly ill (score 2 + 1), or (4) mildly undernourished + moderately ill (score 1 + 2).

### Prototypes for Severity of Disease

**Score=1:** a patient with chronic disease, admitted to hospital due to complications. The patient is weak, but out of bed regularly. Protein requirement is increased, but can be covered by oral diet or supplements in most cases.

**Score=2:** a patient confined to bed due to illness, e.g. following major abdominal surgery. Protein requirement is substantially increased, but can be covered, although artificial feeding is required in many cases.

**Score=3:** a patient in intensive care with assisted ventilation etc. Protein requirement is increased, and cannot be covered, even by artificial feeding. Protein breakdown and nitrogen loss can be significantly attenuated.

## Annexure 3: MNA SF

Last name:	<input type="text"/>	First name:	<input type="text"/>
Sex:	<input type="text"/>	Age:	<input type="text"/>
Weight, kg:	<input type="text"/>	Height, cm:	<input type="text"/>
Date:	<input type="text"/>		

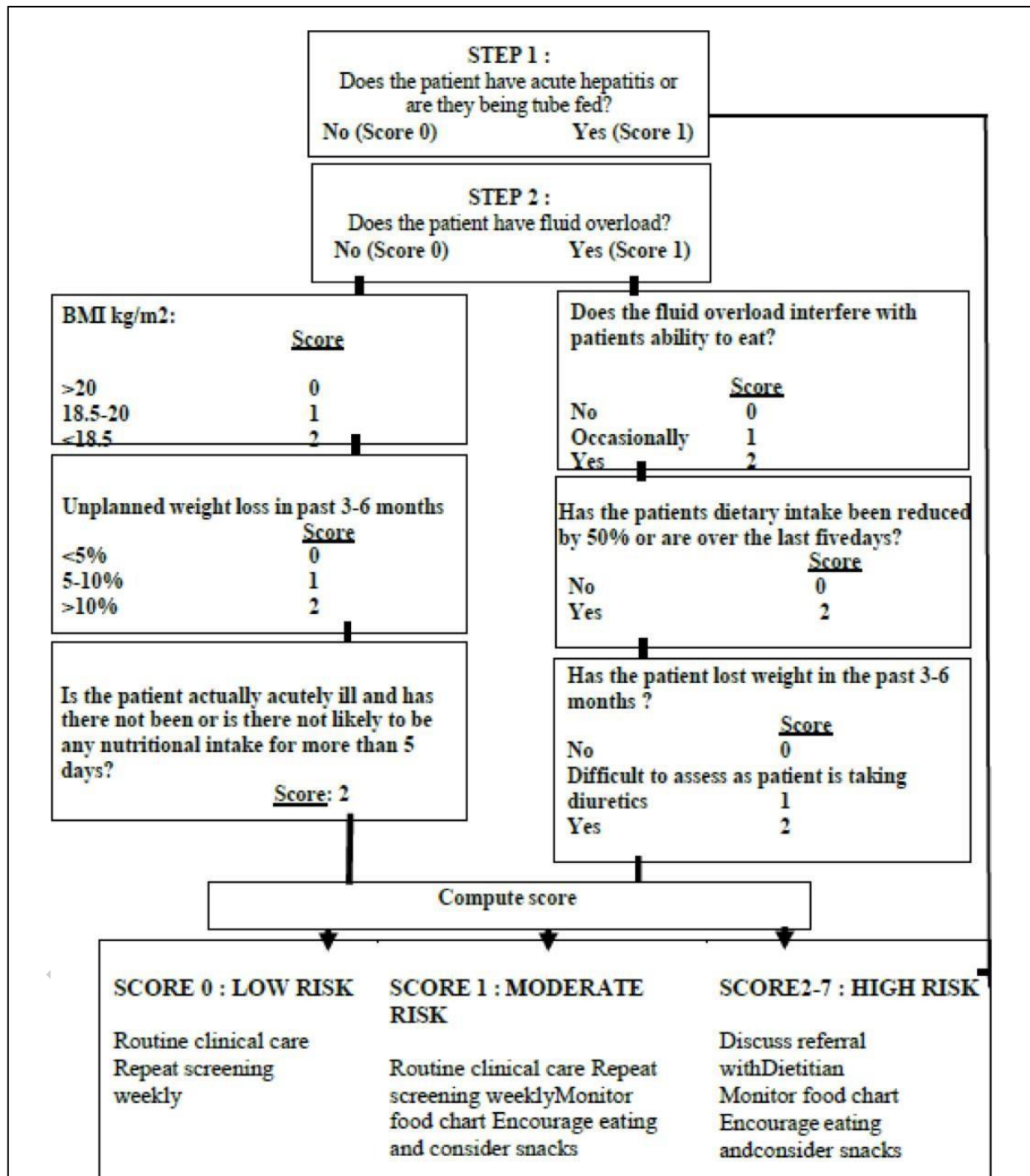
Complete the screen by filling in the boxes with the appropriate numbers. Total the numbers for the final screening score.

Screening	
<b>A Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?</b> 0 = severe decrease in food intake 1 = moderate decrease in food intake 2 = no decrease in food intake	<input type="checkbox"/>
<b>B Weight loss during the last 3 months</b> 0 = weight loss greater than 3 kg (6.6 lbs) 1 = does not know 2 = weight loss between 1 and 3 kg (2.2 and 6.6 lbs) 3 = no weight loss	<input type="checkbox"/>
<b>C Mobility</b> 0 = bed or chair bound 1 = able to get out of bed / chair but does not go out 2 = goes out	<input type="checkbox"/>
<b>D Has suffered psychological stress or acute disease in the past 3 months?</b> 0 = yes      2 = no	<input type="checkbox"/>
<b>E Neuropsychological problems</b> 0 = severe dementia or depression 1 = mild dementia 2 = no psychological problems	<input type="checkbox"/>
<b>F1 Body Mass Index (BMI) (weight in kg) / (height in m)<sup>2</sup></b> <input type="checkbox"/> 0 = BMI less than 19 1 = BMI 19 to less than 21 2 = BMI 21 to less than 23 3 = BMI 23 or greater	<input type="checkbox"/>

IF BMI IS NOT AVAILABLE, REPLACE QUESTION F1 WITH QUESTION F2.  
DO NOT ANSWER QUESTION F2 IF QUESTION F1 IS ALREADY COMPLETED.

<b>F2 Calf circumference (CC) in cm</b> 0 = CC less than 31 3 = CC 31 or greater	<input type="checkbox"/>
<b>Screening score</b> (max. 14 points)	<input type="checkbox"/> <input type="checkbox"/>
<b>12-14 points:</b> <input type="checkbox"/> Normal nutritional status	<a href="#">Save</a>
<b>8-11 points:</b> <input type="checkbox"/> At risk of malnutrition	<a href="#">Print</a>
<b>0-7 points:</b> <input type="checkbox"/> Malnourished	<a href="#">Reset</a>

Annexure 4: Royal Free Hospital Nutrition Prioritising Tool (RFHNPT)



## Annexure 5: Renal i-Nut

<b>Information to record</b>	
1. Admission weight (kg)	
2. AND 'dry weight' i.e. most recent post dialysis or edema-free weight target (dialysis patients) OR reported usual weight (non-dialysis patients)	
3. Height (m)	
4. Body Mass Index (kg/m <sup>2</sup> ) using the lowest of the two weights documented	
<b>Admission screening questions</b>	<b>Scoring system</b>
1 Has the patient unintentionally lost weight from their target OR usual weight?	No = 0, Yes = 1
2 Does the patient look malnourished OR have a BMI 20kg/m <sup>2</sup> or less?	No = 0, Yes = 1
3 Is the patient already on nutritional supplements?	No = 0, Yes = 1
4 Compared to usual, how is the patient's food intake?	better/similar = 0, worse = 1
5 Compared to usual, how is the patient's appetite?	better/similar = 0, worse = 1
<b>Total score</b>	<b>Action Plan</b>
0	Continue screening weekly
1	Monitor patient at risk (Local monitoring and nurse intervention protocols stated)
2 or more	Refer to dietitian (Local referral procedures stated)

# Annexure 6: Patient-Generated Subjective Global Assessment (PG-SGA)

## Scored Patient-Generated Subjective Global Assessment (PG-SGA)

**History: Boxes 1 - 4 are designed to be completed by the patient.**  
[Boxes 1-4 are referred to as the PG-SGA Short Form (SF)]

**1. Weight (See Worksheet 1)**

In summary of my current and recent weight:

I currently weigh about \_\_\_\_\_ kg  
I am about \_\_\_\_\_ cm tall

One month ago I weighed about \_\_\_\_\_ kg  
Six months ago I weighed about \_\_\_\_\_ kg

During the past two weeks my weight has:

decreased (1)    not changed (0)    increased (0)

**Box 1**

**2. Food intake:** As compared to my normal intake, I would rate my food intake during the past month as

unchanged (0)  
 more than usual (0)  
 less than usual (1)

I am now taking

normal food but less than normal amount (1)  
 little solid food (2)  
 only liquids (3)  
 only nutritional supplements (3)  
 very little of anything (4)  
 only tube feedings or only nutrition by vein (0) **Box 2**

**3. Symptoms:** I have had the following problems that have kept me from eating enough during the past two weeks (check all that apply)

no problems eating (0)

no appetite, just did not feel like eating (3)    vomiting (3)

nausea (1)    diarrhea (3)

constipation (1)    dry mouth (1)

mouth sores (2)    smells bother me (1)

things taste funny or have no taste (1)    feel full quickly (1)

problems swallowing (2)    fatigue (1)

pain; where? (3) \_\_\_\_\_

other (1)\*\* \_\_\_\_\_

\*\*Examples: depression, money, or dental problems **Box 3**

**4. Activities and Function:**

Over the past month, I would generally rate my activity as:

normal with no limitations (0)

not my normal self, but able to be up and about with fairly normal activities (1)

not feeling up to most things, but in bed or chair less than half the day (2)

able to do little activity and spend most of the day in bed or chair (3)

pretty much bed ridden, rarely out of bed (3) **Box 4**

**Additive Score of Boxes 1-4**  A

**5. Worksheet 2 – Disease and its relation to nutritional requirements:**

Score is derived by adding 1 point for each of the following conditions:

Cancer    Presence of decubitus, open wound or fistula

AIDS    Presence of trauma

Pulmonary or cardiac cachexia    Age greater than 65

Chronic renal insufficiency

Other relevant diagnoses (specify) \_\_\_\_\_

Primary disease staging (circle if known or appropriate) I II III IV Other  B

**Numerical score from Worksheet 2**  B

The remainder of this form is to be completed by your doctor, nurse, dietitian, or therapist. Thank you.

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## Scored Patient-Generated Subjective Global Assessment (PG-SGA)

**Additive Score of Boxes 1-4 (See Side 1)**  A

**Worksheet 1 – Scoring Weight Loss**

To determine score, use 1-month weight data if available. Use 6-month data only if there is no 1-month weight data. Use points below to score weight change and add one extra point if patient has lost weight during the past 2 weeks. Enter total point score in Box 1 of PG-SGA.

Weight loss in 1 month	Points	Weight loss in 6 months
10% or greater	4	20% or greater
5-9.9%	3	10- 19.9%
3-4.9%	2	6- 9.9%
2-2.9%	1	2- 5.9%
0-1.9%	0	0- 1.9%

**Numerical score from Worksheet 1**

**6. Worksheet 3 – Metabolic Demand**

Score for metabolic stress is determined by a number of variables known to increase protein & caloric needs. **Note:** Score fever intensity or duration, whichever is greater. The score is additive so that a patient who has a fever of 38.8 °C (3 points) for < 72 hrs (1 point) and who is on 10 mg of prednisone chronically (2 points) would have an additive score for this section of 5 points.

Stress	none (0)	low (1)	moderate (2)	high (3)
<b>Fever</b>	no fever	> 37.2 and < 38.3	≥ 38.3 and < 38.8	≥ 38.8 °C
<b>Fever duration</b>	no fever	< 72 hours	72 hours	> 72 hours
<b>Corticosteroids</b>	no corticosteroids	low dose (< 10 mg prednisone equivalents/day)	moderate dose (≥ 10 and < 30 mg prednisone equivalents/day)	high dose (≥ 30 mg prednisone equivalents/day)

**Numerical score from Worksheet 3**  C

**7. Worksheet 4 – Physical Exam**

Exam includes a subjective evaluation of 3 aspects of body composition: fat, muscle, & fluid. Since this is subjective, each aspect of the exam is rated for degree. Muscle deficit/loss impacts point score more than fat deficit/loss. Definition of categories: 0 = no abnormality, 1+ = mild, 2+ = moderate, 3+ = severe. Rating in these categories is not additive but are used to clinically assess the degree of deficit (or presence of excess fluid).

Muscle Status	0	1+	2+	3+
temples (temporalis muscle)	0	1+	2+	3+
clavicles (pectoralis & deltoids)	0	1+	2+	3+
shoulders (deltoids)	0	1+	2+	3+
interosseous muscles	0	1+	2+	3+
scapula (latissimus dorsi, trapezius, deltoids)	0	1+	2+	3+
thigh (quadriceps)	0	1+	2+	3+
calf (gastrocnemius)	0	1+	2+	3+
<b>Global muscle status rating</b>	0	1+	2+	3+

Fat Stores	0	1+	2+	3+
orbital fat pads	0	1+	2+	3+
triceps skin fold	0	1+	2+	3+
fat overlying lower ribs	0	1+	2+	3+
<b>Global fat deficit rating</b>	0	1+	2+	3+

Fluid status	0	1+	2+	3+
ankle edema	0	1+	2+	3+
sacral edema	0	1+	2+	3+
ascites	0	1+	2+	3+
<b>Global fluid status rating</b>	0	1+	2+	3+

**Numerical Score for Worksheet 4**  D

**Worksheet 5 – PG-SGA Global Assessment Categories**

Category	Stage A	Stage B	Stage C
<b>Weight</b>	Well-nourished	Moderate/suspected malnutrition	Severely malnourished
<b>Nutrient intake</b>	No weight loss OR recent non-fluid wt gain	≤ 5% loss in 1 month (≤ 10% in 6 months) OR Progressive weight loss	> 5% loss in 1 month (> 10% in 6 months) OR Progressive weight loss
<b>Nutrition Impact</b>	None	Presence of NIS (Box 3 of PG-SGA)	Presence of NIS (Box 3 of PG-SGA)
<b>Functioning</b>	No deficit OR Significant recent improvement	Moderate functional deficit	Severe functional deficit
<b>Physical Exam</b>	No deficit OR chronic deficit but with recent clinical improvement	Evidence of mild to moderate loss of muscle mass &/or muscle loss on palpation &/or loss of SQ fat	Obvious signs of malnutrition (e.g., severe loss muscle, fat, possible edema)

**Nutritional Triage Recommendations:** Additive score is used to define specific nutritional interventions including patient & family education, symptom management including pharmacologic intervention, and appropriate nutrient intervention (food, nutritional supplements, enteral, or parenteral triage).

**First line nutrition intervention includes optimal symptom management.**

**Triage based on PG-SGA point score**

0-1 No intervention required at this time. Re-assessment on routine and regular basis during treatment.

2-3 Patient & family education by dietitian, nurse, or other clinician with pharmacologic intervention as indicated by symptom survey (Box 3) and lab values as appropriate.

4-8 Requires intervention by dietitian, in conjunction with nurse or physician as indicated by symptoms (Box 3).

≥ 9 Indicates a critical need for improved symptom management and/or nutrient intervention options.

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email: [faithottervmdphd@gmail.com](mailto:faithottervmdphd@gmail.com) or [info@pt-global.org](mailto:info@pt-global.org)

**Total PG-SGA Score (Total numerical score of A+B+C+D)**

**Global PG-SGA Category Rating (Stage A, Stage B or Stage C)**

## Annexure 7: GLIM CRITERIA

	PHENOTYPE CRITERIA			ETIOLOGY CRITERIA	
	Weight loss (%)	Body mass index (kg/m <sup>2</sup> )	Muscle mass <sup>a</sup>	Food intake, malabsorption or GI symptoms	Disease burden/ inflammation
STAGE 1/ MODERATE MALNUTRITION (REQUIRES 1 PHENOTYPIC AND 1 ETIOLOGIC CRITERION)	5 - 10% within the past 6 mo, or 10-20% beyond 6 mo	<20 if <70 yr, <22 if ≥70 yr Asia: <18.5 if <70 yr, <20 if ≥70 yr	Mild to moderate deficit (per validated assessment methods - see below)	Any reduction of intake below ER for >2 weeks, or moderate malabsorption symptoms <sup>b</sup>	Acute disease/injury <sup>d</sup> , or chronic disease related <sup>e</sup>
STAGE 2/ SEVERE MALNUTRITION (REQUIRES 1 PHENOTYPIC AND 1 ETIOLOGIC CRITERION)	>10% within the past 6 mo, or >20% beyond 6 mo	<18.5 if <70 yr, <20 if ≥70 yr Asia: TBD	Severe deficit (per validated assessment methods - see below)	50% intake of ER for >1 week, or severe malabsorption/GI symptoms <sup>c</sup>	Acute disease/injury, or chronic disease related <sup>e</sup>

GI = gastro-intestinal, ER = energy requirements, yr = year, mo = month.

<sup>a</sup>For example, fat-free mass index (FFMI, kg/m<sup>2</sup>) by dual-energy absorptiometry or corresponding standards using other body composition methods like bioelectrical impedance analysis (BIA), CT or MRI. When not available or by regional preference, physical exam or standard anthropometric measures like mid-arm muscle or calf circumferences may be used. Thresholds for reduced muscle mass need to be adapted to race (Asia). Functional assessments like hand-grip strength may be used as a supportive measure.

<sup>b</sup>Gastrointestinal symptoms of moderate degree - dysphagia, nausea, vomiting, diarrhoea, constipation, or abdominal pain.

<sup>c</sup>Gastrointestinal symptoms of severe degree - dysphagia, nausea, vomiting, diarrhoea, constipation, or abdominal pain.

<sup>d</sup>Acute disease/injury-related with severe inflammation. For example, major infection, burns, trauma or closed head injury.

<sup>e</sup>Chronic disease-related with chronic or recurrent mild to moderate inflammation. For example, malignant disease, chronic obstructive pulmonary disease, congestive heart failure, chronic renal disease, or any disease with chronic or recurrent Inflammation. CRP may be used as a supportive laboratory measure.

## Annexure 8: Nasogastric tube insertion procedure

- Prepare the patient.
- Introduce the necessity of the tube and its function. Arrange a signal by which the patient can communicate if he/she want the nurse to stop.
- Explain how it will feel. Assist the patient to sit upright and support him/her with pillows. Aid relaxation of the patient.
- Explain the importance of not tilting the head backwards. If the patient is sedated, it may not be appropriate to sit him/her up.
- Inspect the nostril, checking to see which is clear. Ask the patient is sedated, it may not be appropriate to sit him/her up.
- The nurse/doctor should wash his/her hands and put on a clean disposable apron. Ensure that paper towels are placed comfortably around the patient's neck. A vomit bowl should be at hand.
- Measure the tube prior to placement using the NEX measurement – measure the distance on the tube from the patient's tip of the nose to the earlobe plus the distance from the earlobe to the bottom of the xiphisternum.
- Dip the end of the nasogastric tube in sterile water. This activates the coating on the tip of the tube and assists with intubation. If the patients is conscious, is not NBM and has a safe swallow, allow them to drink and provide them with a glass of water and a straw. This will promote passage of the tube into the oesophagus.
- Insert the tube into the nostril, slide it backwards and inwards, and as the tube passes through the nasopharynx ask the patient to sip water if this is appropriate and the patient can to do so. The swallowing action closes the glottis and assists the tube to pass into the oesophagus.'
- Maintaining a calm manner and encouraging the patient to take slow even breaths, advance the tube down the oesophagus until it reaches the stomach to the cm marking measured on the tube.
- If you are unable to pass the tube, try the other nostril. If you are unable to place the tube, seek advice from a senior colleague.
- When conventional nasogastric tube placement is difficult or unsuccessful, assistance from the ENT team may be sought; in selected cases, gastroenterology support with endoscopic guidance may be required.
- If at any time during or following the procedure signs of nasal haemorrhage, respiratory distress, e.g. cyanosis or gasping occur, or if the tube meets any resistance the tube should be withdrawn.
- Once the tube is inserted safely and correctly, it can be secured to the nose or side of the face with a small piece of non-allergenic tape. Take care not to cover the cm marking at the nostril.
- An abdominal X-ray can be used to confirm the tip of the tube position
- Aspirate the tube with minimum of 1ml and check the pH of the aspirate using pH indicator paper which has 0.5 increments. pH reading must be between 1 and 5.5 to confirm placement.

Aspirate not obtained?

Try each of these techniques to help gain aspirate.

- If possible, turn the adult to the left lateral side.
- Inject 10 – 20 ml of air into the tube using a 50 ml syringe.
- Wait for 15 – 30 minutes before aspirating again.
- Advance or withdraw the tube by 10 – 20 cm.
- Do not use water to flush.

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## Annexure 9: Post insertion gastrostomy tube care

- Keep nil by gastrostomy tube for 6 hours following insertion.
- Ensure the patient has a feeding regimen prescribed by the nutrition support team.
- Before commencing feed ensure electrolytes, phosphate, and magnesium are within normal limits. 'In the first three days port insertion, if there is pain on feeding, external leakage of gastric contents or feed, or fresh bleeding, stop the feed immediately, seek urgent surgical review.
- Ensure the patient is positioned at greater than a 30-degree angle when receiving feed. (including in bed if fed overnight)
- Ensure the gastrostomy tube is flushed with 30mls of sterile water before and after every feed. And between each medication administration, flush with a minimum of 10 ml sterile water using a 50 ml syringe.
- Give medication in dissolvable or syrup form where possible.
- Do not put crushed tablets down the tube unless no other drug format is available.
- If the tube becomes blocked follow the guidelines for unblocking the gastrostomy tube
- Stoma dressing has to be kept for 24 hours.
- No need to re-dress unless medically decided to do so.
- Stoma site has to be cleaned and kept dry for 7-10 days.
- Ensure the site is cleaned daily including the feeding port and fixing plate and the stoma site condition is checked and documented in the nursing charts. (observe for signs of infection, over-granulation)
- Ensure the fixator plate is loosened daily for cleaning of the stoma and replaced 1cm from the stoma site.
- Ensure the clamp is used only when required and not left on when tube is not in use.
- Ensure oral hygiene is maintained.
- Avoid getting the stoma site wet during bathing or showering for the first 14 days following gastrostomy insertion.
- Showering may be resumed thereafter; however, submersion in water (e.g., bathing, swimming pools, ponds) should be avoided for 4–6 weeks post-insertion
- Do not bathe for 4-6 weeks after insertion (shower only)
- Advance 1-2 weekly and rotate the tube daily to maintain freedom of movement and to reduce the risk of a buried bumper.
- If the patient is to be discharged with the gastrostomy tube, then the discharge risk assessment should be completed.

Steps to safely advance and rotate the tube from 07 days post insertion.

1. Clean the external fixation plate
2. Open the friction catch and detach the tube from the groove of the fixation plate.
3. Move the plate away from the skin, clean the tube and the stoma area and the underside of the palate
4. Push the tube 2-3 cm into the stomach and rotate 360 degrees
5. Gently pull back into place until resistance is felt.
6. Place the fixation plate back to the original position (1cm away from the skin), reinsert it into the groove and close the fixation catch.
7. Ensure the fixation plate is not too tight or too loose as this could cause granulation and buried bumper syndrome.

Please note that if the above procedure causes an excessive of pain and /or the tube does not turn STOP the procedure and contact the medical team.

## Annexure 10: Care of the balloon gastrostomy tube after insertion

Apart from the procedures already described for gastrostomy, the following additional steps should be undertaken after inserting a balloon gastrostomy. The water in balloon gastrostomies needs to be changed according to the manufacturer's instructions.

This can be as frequently as weekly and involves completely removing the water in the balloon and replacing this with either sterile water in the hospital or cooled boiled water in the community.

In the community the balloon gastrostomy tube will be routinely replaced by a trained member of staff who has completed the competency training in replacing a balloon gastrostomy. The life of the tube varies depending on the type of tube.

Usually, the balloon can be changed in the patient's own home.

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## Annexure 11: Percutaneous endoscopic gastrostomy (PEG)

Feeding tubes placed percutaneously into the stomach with endoscopic guidance (PEG), allow an alternative route for enteral feeding. PEG is never an emergency procedure and cannot be undertaken until the patient has been assessed by a member of the Nutrition team and the consultant performing the procedure. Appropriate patient selection is essential.

There are many ethical issues, which need to be considered before embarking on artificial nutrition via PEG. Therefore, consent should be obtained before inserting the PEG tube. For patients who lack the capacity to consent themselves, caretaker or the referring consultant MUST do so on their behalf.

Patients should be referred to Gastroenterologist or Gastrointestinal surgeon whenever available and possible for PEG insertion. If gastroenterology services are not available, general surgeon with experience can perform the procedure and aftercare.

Prior to referral for percutaneous endoscopic gastrostomy (PEG) insertion, patients must be assessed for procedural suitability. This includes confirmation that coagulation parameters are within acceptable limits (INR < 1.3 and platelet count > 100 × 10<sup>3</sup>/μL), absence of active infection or severe hypoalbuminaemia, and the presence of an intact and functional gastrointestinal tract. Additionally, conditions such as gastric malignancy, gastric outlet obstruction, or small bowel obstruction must be excluded, and the patient's overall fitness to undergo an endoscopic procedure must be confirmed.

For the procedure, a peripheral venous cannula (PVC) should be in place, and the patient should be kept NBM/tube-fed for 6 hours prior.

### Complications following PEG insertion

If any of the following symptoms occur within this time period, the PEG must not be used and urgent surgical attention must be sought to rule out haemorrhage and peritonitis:

- Increased pain when flushing or using the PEG
- Severe/disabling abdominal pain
- Severe bleeding from the PEG site.

Complications of PEG are most often:

- Bleeding 0.6% - 1.2%
- Tube site infection 3% - 30%
- Intraperitoneal leakage and peritonitis
- Perforation of small/large bowel
- Tube blockage
- Tube fracture
- Tube leakage
- Metastatic head and neck cancer to the PEG exit site (< 1%)
- "Buried bumper" migration of the internal disc or bumper into the gastric wall

## Management of displaced gastrostomy tube in the community

If a gastrostomy tube falls out the tract will begin to close immediately, and it is therefore essential that steps are taken to preserve the tract to enable re-insertion of a tube.

When inserting an ENPLUG or temporary tube to maintain tract patency the following should be adhered to.

- Use lubricating gel to ease insertion and to reduce the risk of tract trauma.
- Do not use excessive force to enter the ENPLUG or tube.
- Insert ENPLUG to fit flush against the skin, and a tube to approximate 10cm.
- Secure the ENPLUG or temporary tube with tape and a dressing to prevent displacement.
- DO NOT FEED or FLUSH via the temporary tube.

## Replacement procedure for a balloon gastrostomy tube

Replacement of a blocked or displaced balloon gastrostomy tube must only be completed using the following procedure by a competent practitioner.

The tract must be mature enough to attempt bedside placement (6 weeks from initial insertion)

If the tract is <6 weeks from initial insertion, then attempt to intubate the tract with a catheter to maintain tract patency (secure with a dressing, do not inflate the balloon); refer to radiology for a replacement (if a catheter will not fit into the tract, an 8fr NG tube can be used without the guide wire)

### Equipment required

- 12fr CE marked balloon gastrostomy tube
- Basic dressing pack
- Lubricant
- Two 10ml sterile luer slip syringes to deflate/inflate balloon.
- 5ml sterile water to inflate the balloon.
- PH indicator strips
- Enteral syringe 50ml to check gastric aspirate.
- An enteral syringe 50 ml and sterile water (minimum of 20 ml) to flush gastrostomy tube on confirmation of position post placement

Procedure (aseptic precautions must be used)

1. Patient must lie in semi-prone position.
2. Open the dressing pack onto a clean surface and put all the equipment onto it.
3. Check whether the new gastrostomy tube is in working order before insertion:
  - Check the mobility of the fixation device by moving up and down the tube.
  - Close the feeding end of the tube.
  - Inflate and deflate the balloon with sterile water to the recommended volume (usually 5 ml)
  - Lubricate the proximal end of the tube using water-based lubricant.
4. Prefill one luer slip syringe with 5ml sterile water ready for balloon inflation
5. Check tube site and clean stoma tract.
6. Removal of existing tube
  - If previous tube is blocked and remains in the tract move the external fixation device of the existing tube away from the abdomen
  - Mobilize the existing tube in and out of the tract.
  - Note the cm measurement marker (if still visible) closest to the abdomen.
  - Use the empty syringe to deflate the balloon fully in the existing gastrostomy tube or the catheter inserted to maintain tract patency if inflated
  - Remove the tube: using one hand apply gentle countertraction to the skin around the tube entry site while gently withdrawing the tube with the other hand. There may be some bleeding and trauma from pulling the deflated balloon through the tract.
7. Inserting the new tube
  - Gently insert the gastrostomy tube into the stoma following the stoma tract. Do not use force.
  - If the passage of the gastrostomy tube is difficult because of a deviated tract gently rotate the tube to encourage it to follow the established path. Do not use force. (if unsuccessful reinsert a smaller catheter/ NG tube without the guide wire into the tract, and refer to radiology/ Surgical team for a replacement with dilatation of the tract)
  - Once inserted past the cm marker recorded on the previous tube, inflate the balloon using the prefilled slip syringe in the inflation valve.
8. Check the position of the tube to confirm gastric placement
  - PH should be 5.5 or below to confirm gastric position.
  - If unable to gain an aspirate repositions the patient and retry
  - If position unable to be confirmed via pH a tubogram via radiology will be required before the tube can be used.
9. Secure new gastrostomy tube by sliding the external fixator down the length of the tube so it sits to 2-3mm from the abdomen, and note the cm.

10. Once the gastric placement is confirmed flush the tube with minimum 20ml sterile water to clear the tube.

11. Document the following details

- Reason for tube change: is the tract 6 weeks mature
- Condition of stoma site: any treatment required
- Measurement at the stoma site pre- tube change if available, volume of water removed from the balloon, and any complications
- Tube inserted (type and size)
- Lot no:
- Expiry date:
- Volume of water inflating the balloon
- Measurement at stoma site
- pH recorded after tube change
- Any complications
- Whether the tube is safe to use

### Prevention and management of blocked gastrostomy tubes

Common causes:

1. Omission of adequate fluid flushes immediately before and after feeding and administration of any medications via gastrostomy tube.
2. Use of inappropriate medications e.g. crushed tablets.
3. Coagulation of feed with medications or gastric secretions in the tube (avoided by thorough flushing with water).
4. Administration of multiple medications at one time.

Preventative measures:

1. Ensure regular flushing of the gastrostomy tube with a minimum of 25 ml water immediately before and after any feed and a minimum of 10 ml between each medication administered.
2. Consult with a pharmacist for advice on appropriate suspensions of medications.
3. Avoid unnecessary use of the clamp on the gastrostomy tube. Always leave the clamp off when the end of the tube is closed.
4. Avoid kinks in the tube.

## Steps in the management of Blocked Gastrostomy Tubes:

1. Wash your hands and wear apron and gloves. This should be a clean procedure.
  2. Ensure the clamp is not on the gastrostomy tube and that there are no visible kinks in the tube.
  3. Check the external fixator is positioned correctly and not causing an occlusion.
  4. Inspect the tube along its entire length including the entry port for any signs of blockage.
  5. Where an obvious blockage is identified massage the tube around this area to loosen the blockage.
  6. Milk the tube by gently squeezing upwards from the patient to the exit port to remove any feed medication debris.
  7. Flush the tube with 25ml of sterile water (freshly drawn tap water in the community) using a 60ml enteral syringe. If still no improvement, use the gentle plunging and aspirating technique for a few minutes.
- Note: Do not force fluids down the tube.

If unsuccessful:

1. Flush the tube with 25ml of warm sterile water (Warmed boiled water in the community) using a 60ml enteral syringe using a gentle plunging and aspirating technique for a few minutes.
  2. Fill the gastrostomy tube to the point of blockage with warm sterile water (warm boiled water in the community) and leave in place for 30 minutes Clamp and close the end of the tube if desired.
- Note: A warm flannel/ cloth can be gently wrapped around the gastrostomy tube to allow it to expand.
1. A solution of a teaspoon of bicarbonate of soda mixed with 50mls of warm sterile water (warm boiled water in the community) in a 60ml enteral syringe can also be used to repeat the step.
  2. If unsuccessful perseverance and repeating the steps above is recommended.

Please Note:

- Do not use fruit juices, fizzy or carbonated drinks as this will exacerbate the blockage as the acid in the drinks can react with feed / medication and cause damage to the tube.
- Do not use any implements that can be forced down the tube.
- Do not use smaller volume syringes (unless trained) as this practice can lead to ruptured tubes due to the excess pressure.

## Treatment of an over-granulated gastrostomy stoma

Over granulation of the gastrostomy stoma site is commonly seen. The following steps must be adhered to:

1. Ensure that PEG Balloon Gastrostomies are turned at least once per week, but no more than once per day.
2. Ensure that the stoma site is kept clean and dry. Wash the stoma with warm soapy water and clean with soft non-woven gauze or wipe. Rinse the stoma with warm water and dry with clean gauze or wipe.
3. The external fixation plate needs to be approximately 1 cm away from the skin. If the external plate is too tight this can cause buried bumper syndrome and allow moisture to collect underneath the plate, which increases the risk of over-granulation. If the fixation plate is loose the weight of the tube is solely on the stoma area.

If the over granulation of the stoma continues the following steps must be adhered to:

1. Excilion AMD antimicrobial drain and IV sponge dressings must be applied and changed every two days, the stoma must continue to be dressed for 2 weeks.
2. If the above is not successful 1% Hydrocortisone Cream could be used (under medical guidance). This needs to be applied twice per day for two weeks.

## Treating an infected gastrostomy stoma

Diagnosing infection should be made on clinical grounds (i.e. presence of signs of inflammation or pus). Swab results can be irrelevant, Treat the infected stoma with antibiotics (systemic antibiotics are more effective than topical).

Note: Ensure that the stoma has also been swabbed for possible fungal infection. If positive, ask Microbiology for advice.

## Annexure 12: Percutaneous Endoscopic Gastrostomy with Jejunal extension (PEG-J) and Direct Percutaneous Endoscopic jejunostomy (D-PEJ)

In patients who have not tolerated pre-pyloric enteral tube feeding it is appropriate to use percutaneous post-pyloric feeding if long-term feeding is required. This can be achieved with a jejunal extension of an already established PEG (PEG-J) or by direct percutaneous endoscopic jejunostomy (D-PEJ). Potential indications for PEG-J or D-PEG are:

<b>PEG-J</b>	<b>D-PEJ</b>
Vomiting	Gastric resection
Aspiration	PEG not possible
Gastro-oesophageal feed reflux	Recurrent dislocation of PEG-J
Gastroparesis	Gastric outlet stenosis

A PEG-J involves passing a 9-12 Fr jejunal feeding tube through a pre-placed PEG tube into the stomach, then advancing it beyond the ligament of Treitz radiologically or endoscopically to reduce retrograde migration. However, retrograde migration remains common due to tube kinking or obstruction. Securing the tube tip with endoscopically placed Hemoclips® can reduce migration, though obstruction risk persists due to the small lumen.

Alternatively, a D-PEJ can be performed. After advancing an enteroscope to the jejunum, diaphanoscopy and finger indentation confirm positioning, followed by needle aspiration testing. A trocar needle provides access, a guidewire is inserted, and the D-PEJ tube (18-20 Fr) is placed using a pull technique.

Serious complications include intestinal perforation, jejunal volvulus, major bleeding, and aspiration, with obesity negatively affecting D-PEJ success. Compared to PEG-J, D-PEJ tubes have lower reintervention rates, less migration and clogging, and greater longevity.

Surgical techniques for enteral feeding are required when percutaneous endoscopic placement is not possible, often due to tumour obstruction. Common methods for open surgical access to the stomach or jejunum include the Stamm or Witzel techniques, while laparoscopic gastrostomy and jejunostomy options are also available.

A frequently used alternative is the fine needle catheter jejunostomy (FNCJ), particularly during abdominal surgeries like gastrectomy. In this method, a large-bore needle tunnels subserosally into the jejunal lumen, where a feeding catheter is inserted and secured with a purse-string suture.

The catheter is then exteriorised through the abdominal wall using another large-bore needle, with the optimal entry site being the mid-third of the line between the umbilicus and the left costal arch. Finally, the jejunal loop with the 8-9 Fr catheter is fixed to the abdominal wall for stability.

The characteristic complications of FNCJ are:

- Tube obstruction due to the small lumen (only 8 to 9 Fr)
- Wound infection
- Peritoneal leakage
- Very rarely volvulus
- Rarely necrosis of the small bowel
- Rarely peritonitis
- Rarely ileus
- Unintentional removal

DRAFT

### Annexure 13: Delivery of enteral nutrition **Bolus feeding**

Bolus feeding is indicated for agitated, confused patients or patients who do not wish to be attached to an enteral feeding pump most of the day. Please note that bolus feeding can be very time consuming if the patient has a 9fr gastrostomy tube in situ. This procedure should only be attempted following consultation and using a regimen from the NST

Essential Items:

1. Feeding bag or Feed in carton bottle format
2. 60ml enteral purple syringe if available or appropriate syringe (single use in hospital or multi use in community)
3. Sterile water (hospital) Fresh tap water (community)
4. Sterile dressing towel tissues for spillages

Steps:

1. Wash hands as per the hand hygiene policy
2. Draw up 25ml of water (as above) in a syringe or other volume specified by the nutrition team.
3. Close the clamp on the gastrostomy feeding tube (where one is available)
4. Open the end of the gastrostomy feeding tube
5. Attach the filled water syringe to the end of the gastrostomy tube
6. Open the clamp on the gastrostomy tube
7. Administer the water and close the clamp
8. Remove the syringe
9. Draw up feed in the syringe to the 50ml increment marker. Reconnect the syringe to the end of the gastrostomy tube. Remember to open the clamp. Slowly administer the feed over about 5 minutes and then repeat the above procedure until the prescribed volume of feed has been administered.

NB: Avoid allowing the syringe to become completely empty, as this is likely to allow air into the feeding tube.

10. Following the feed, immediately administer any additional prescribed water using the same method as above.
11. Re-clamp the tube and disconnect the syringe and close off the end of the gastrostomy tube.
12. Finally, unclamp the tube.

Additional information for community setting:

- All feed equipment should be washed thoroughly after each use, including gastrostomy extension sets if used by the patient.
- Any unused feed should be stored in the fridge and discarded 24 hours after opening.
- All feed administered should be at room temperature. Remove any refrigerated feed from the fridge half an hour before the feed is due and let it return to room temperature.

Additional information in hospital:

- All feed equipment and feed should be discarded after every use.

### Pump Feeding

Essential Items:

1. Feed (in ready to hang (RTH) format)
2. 60ml Enteral syringe (single use in hospital or multi use in community)
3. Sterile water (hospital) / Fresh tap water (community)
4. Giving set
5. Feeding pump and stand or portable pump

Steps:

1. Wash hands as per hand hygiene policy.
2. Draw up 25ml of water (as above) in syringe or other volume specified by the NST
3. Close the clamp on the gastrostomy feeding tube where one is available
4. Open the end of the gastrostomy feeding tube
5. Attach the filled water syringe to the end of the gastrostomy tube
6. Open the clamp on gastrostomy tube
7. Administered the water and close the clamp
8. Remove the syringe
9. Set feed, giving set and pump as per manufacturer's feeding guidelines
10. Commence pump feeding
11. Following feed, immediately administer a minimum of 25ml of water to prevent tube blockage, plus any additional prescribed water using the method above.
12. Re- clamp tube and disconnect the syringe and close of the end of the gastrostomy tube.
13. Finally, unclamp the tube.

## Managing pump related problems

Should the enteral feeding pump alarm check the following areas in a stepwise manner. Work from the top i.e. the bag of feed, down the giving set and pump until you finally check the patient.

- Is the feed container empty?
  - To continue feeding, flush the tube. Change the feed and make sure the giving set is primed and installed correctly.
  - To discontinue feeding: Turn off the pump using the off key.
- If still alarming: check whether the giving set tube blocked or kinked?
  - Straighten the giving set line. If blocked flush the tube with sterile water. If the giving set will not unblock then use a new giving set.
- If still alarming: is the pump standing on a level surface?
  - The pump must stand on a level surface otherwise the alarm may sound.
- If still alarming. is the pump insert empty of feed?
  - Make sure the giving set is primed and installed correctly.
- If still alarming; is the feeding tube blocked?
  - Use a 60ml enteral syringe to flush the feeding tube with 30-50mls of warm sterile water / freshly drawn tap water (Community). DO NOT FORCE THE WATER.
- If still alarming
  - Refer to pump operator / training manual. If unable to resolve refer pump for repair.

## Annexure 14: Preventing Infections in Enteral Feeding

Contamination is a key concern in enteral feeding as it has been found that more than 30% of feeds in hospital and home are contaminated with a variety of microorganisms. This is largely due to the preparation or administration of feeds and has been linked to serious infection (NICE, 2003). The rates of contamination are highest in the home setting. Therefore, staff/patient/care giver must adhere to the following to minimize the risk.

### Training:

1. All patients, carers and staff should undergo appropriate training and be competent to safely prepare and administer feeds.
2. All patients and carers need to be trained in hand hygiene before discharge from hospital.
3. All staff must undertake yearly updates on infection control as per requirements.
4. Follow up training and ongoing support for patients and carers should be available.

### Storage and preparation of feeds:

1. Feed and enteral feeding equipment should be stored in a clean, cool area. out of direct sunlight.
2. Patients /staff or carers should ensure stock rotation and check expiry dates before use.
3. Use pre-packed and ready-to-hang feeds where possible (only decant with guidance of the Dietitian).
4. When decanting, reconstituting or diluting feeds, a clean working area should be prepared and only equipment dedicated to enteral feeding should be used.
5. Feeding systems should require minimal hand handling to assemble and be compatible with the patient's enteral feeding tube.
6. If any enteral feeds need to be mixed, freshly opened sterile water (hospital) or cooled boiled water (community) should be used, and a minimal handling and aseptic non- touch technique needs to be adhered to.

### Administration of feeds

1. Wash hands as per the hand hygiene policy before setting up the feeds.
2. Minimal handling and a non-touch technique should be used to connect the giving set to the enteral feeding tube. If the administrator of the feed has cuts or abrasions on their hands, gloves should be worn.
3. A ready-to-hang feed should be administered within 24hrs. A reconstituted feed should be administered within 4 hours.
4. A ready-to-hang opened feed can be left hanging for a maximum 4hrs without being attached to the enteral feeding tube.

5. In community opened feed should be stored in the refrigerator and used within 24Ahrs. In hospital it should be discarded.
6. Opened feed should be labelled with the patient's name and the date and time opened.
7. No part of the feeding system should be in direct contact with unwashed hands, skin, clothes, bed linen and other surfaces.

### Flushing the tube:

1. Sterile water (hospital) or clean fresh tap water (community) should be used to flush gastrostomy feeding tubes.
2. Immunosuppressed patients should use freshly opened sterile water (hospital) or cooled boiled water (community). In community water should be stored in the fridge in a clean container and changed every 24hrs.
3. A minimum of 25ml of water is required to flush enteral feeding tubes.
4. The enteral tube should continue to be flushed with 1 x 25ml flush per day even when patient not using the enteral feeding tube as this practice will reduce the risk of microbial colonization.

### Enteral feeding equipment:

1. Giving sets and flexitainers need to be discarded after 24hrs.
2. Extension kits commonly used by patients who have a balloon gastrostomy in situ should be washed in warm soapy water and rinsed with cool water after every use. Extension kits in the community need to be changed every 2 weeks.
3. Syringes need to be ENFIT- compatible, and indicated for enteral use only
4. Syringes are for single patient use.
5. Syringes need to be changed after each use in the hospital and changed at least once per week in the community

### Cleaning syringes:

The following needs to be always adhered to in patient's homes.

1. Syringes need to be cleaned immediately after each administration using fresh, warm, soapy water. It is essential to draw the plunger in and out several times until all traces of the feed medicines are removed from the inside of the tip, the barrel and from the plunger.
2. Separate the barrel and the plunger and wash both thoroughly in warm, soapy water ensuring all traces of feed are removed from the tip, barrel and plunger.
3. Rinse under a cold tap and shake off excess water.
4. Wipe dry with a clean paper towel.
5. Store in a clean, dry container and reassemble when required. In a nursing home the syringe should be kept in the patient's own room.

### Syringe adapters:

1. The use of syringe adapters and three-way taps is not recommended (NPSA. 2008).
2. If syringe adapters are required, the nutrition specialist will carry out an individual risk assessment form.

### Tube cleaning:

1. Wash hands as per hand hygiene policy before touching the tube or the stoma site.
2. The end of the enteral feeding tube should be cleaned prior to connecting feed. Warm water should be used to clean around the end; new connectors can be fitted if required by appropriately trained staff.

### Stoma cleaning:

1. Wash hands as per the hand hygiene policy
2. All stoma sites should be cleaned daily with disposable paper towel, before touching the tube or the stoma site. Warm soapy water and dried thoroughly with a disposable paper towel.

Annexure 15: Clinically important drug and food interactions:

Drug	Interaction	Ways to solve interaction
Acenocoumarol	Vitamin- K containing feeds can potentially decrease the anticoagulant effect of Acenocoumarol	Separate the administration of Acenocoumarol and enteral feeds, where possible, by stopping the feed (perhaps for one hour) either side of the Acenocoumarol dose.
Aluminium hydroxide/ aluminium containing antacids	Aluminium hydroxide increases the risk of blocked enteral or nasogastric tubes when given with feeds. Aluminium compounds can interact with high-protein liquid enteral feeds within the oesophagus to produce an obstructive plug that can block an enteral or nasogastric tube.	It has been suggested that if an aluminium compound is needed, it should be given some time after the nutrients and the tube should be vigorously flushed beforehand.
Ciprofloxacin	Enteral feeds decrease the exposure to ciprofloxacin.	Monitor for ciprofloxacin efficacy and consider increasing the dose or temporarily stopping the feed (a 2-hour separation has been suggested).
Phenindione	Vitamin - K containing feeds can potentially decrease the anticoagulant effect of Phenindione	Separate the administration of phenindione and enteral feeds, where possible, by stopping the feed (perhaps for one hour) either side of the phenindione dose.
Phenytoin	Enteral feeds decrease the absorption of phenytoin.	Give phenytoin diluted in water 2 hours after stopping the feed, flushing with 60 mL of water, and waiting another 2 hours before restarting the feed. Monitor the outcome carefully and adjust the phenytoin dose if necessary

<p>Sucralfate</p>	<p>Sucralfate increases the risk of blocked enteral or nasogastric tubes when given with enteral feeds. Sucralfate can interact with high-protein liquid enteral feeds within the oesophagus to produce an obstructive plug that can block an enteral or nasogastric tube.</p>	<p>Separate administration of drug and enteral feed by 1 hour.</p>
<p>Theophylline</p>	<p>Enteral feeds produce clinically relevant reductions in theophylline levels.</p>	<p>Avoid giving enteral feeds for one hour either side of theophylline dose. Theophylline dose adjustments might be required.</p>
<p>Warfarin</p>	<p>Vitamin- K containing feeds can potentially decrease the anticoagulant effect of Warfarin.</p>	<p>Separate the administration of warfarin and enteral feeds, where possible, by stopping the feed (perhaps for one hour) either side of the warfarin dose.</p>

## Annexure 16: Refeeding syndrome

Refeeding syndrome (RFS) is defined as a range of metabolic and electrolyte alterations occurring as a result of the rapid reintroduction and/or increased provision of calories after a period of decreased or absent caloric intake which is a life-threatening situation.

This is not an unusual complication, with an incidence of 15% of the geriatric population, 25% of cancer patients and 28% of anorexia nervosa patients. In the case of a malnourished catabolic patient on artificial feeding (EN/PN) this incidence rises to 50%, especially within the first three days after starting the nutritional support (EN/PN).

RFS may manifest in a wide variety of severities, from slight, clinically insignificant decrements in electrolyte levels to severe and sudden decreases, which lead to, or risk development of, end organ failure if not pre-empted or corrected. Decrement of any of the phosphate, potassium or magnesium may signal total-body deficit and requires monitoring or intervention.

### RFS diagnostic criteria are outlined as follows:

A decrease in any of three electrolytes (serum phosphorus, potassium, and/or magnesium) levels by 10%–20% (mild RS), 20%–30% (moderate RS), or >30% and/or organ dysfunction resulting from a decrease in any of these and/or due to thiamine deficiency (severe RS). And occurring within 5 days of reinitiating or substantially increasing energy provision.

### Criteria for the determination of patients at risk of RFS.

<b>One of the following</b>	<b>Two of the following</b>
BMI < 16kgm <sup>-2</sup>	BMI < 18.5kgm <sup>-2</sup>
Unintentional weight loss >15% in the past 3-6 months	Unintentional weight loss >10% in the past 3-6 months
Very little or no nutritional intake for > 10days	Very little or no nutritional intake for > 5 days
Low levels of serum magnesium, phosphate, or potassium before feed	History of alcohol or drug abuse including insulin, chemotherapy, antacids or diuretics

(Adopted from NICE Guideline on Refeeding Syndrome)

Diseases and clinical conditions associated with an increased risk of refeeding syndrome.

- Acquired immunodeficiency syndrome
- Chronic alcohol or drug use disorder
- Dysphagia and oesophageal dysmotility (e.g., eosinophilic esophagitis, achalasia, gastric dysmotility)
- Eating disorders (e.g., anorexia nervosa)
- Food insecurity and homelessness
- Failure to thrive, including physical and sexual abuse and victims of neglect (particularly children)
- Hyperemesis gravidarum or protracted vomiting
- Major stressors or surgery without nutrition for prolonged periods of time
- Malabsorptive states (e.g., short-bowel syndrome, Crohn's disease, cystic fibrosis, pyloric stenosis, maldigestion, pancreatic insufficiency)
- Cancer
- Advanced neurologic impairment or general inability to communicate needs
- Post-bariatric surgery
- Postoperative patients with complications
- Prolonged fasting (e.g., individuals on hunger strikes, anorexia nervosa)
- Refugees
- Protein malnourishment

### General recommendations

- Identify patients at risk and perform adequate assessment.
- Carefully restore circulatory volume according to the hydration state.
- Energy intake should be instituted carefully and gradually.
- Empirical supplementation of electrolytes can be started before initiation of feeding. (unless serum levels are high)
- IV/ oral thiamine 200-300mg, at least 30 minutes before feeding.

### Macronutrient provision

#### Day 1-3

- Start feeding (by all routes), at 10 kcal/kg/day and slowly increase to 15kcal/kg/day.
  - Carbohydrate 50-60%
  - Fat 30-40%
  - Protein 15-20% (1-1.5g/kg/day)
- For high-risk patients such as BMI <14kgm<sup>-2</sup>, food intake <25% of requirement > 15 days or weight loss >20 of body weight, start feeding more carefully with only 5kcal/ kg/day.

### Day 4-6

- Increase energy up to 10-20kcal/kg/day.

### Day 7- 10

- Energy increases to 20 to 30kcal/kg/day.

## Electrolytes

Measure baseline serum level

D1 -D3	<ul style="list-style-type: none"><li>• Supplement</li><li>• Monitor every 12 hours for the first 3 days in high-risk patients</li></ul>
D4 -D6	<ul style="list-style-type: none"><li>• Supplement</li><li>• Monitor every 2<sup>nd</sup> day</li></ul>

If  $PO_4 < 0.6$  mmol/L, replace 30 -40(max)mmol phosphate intravenously over 12-24 hours. If the oral route is used, it should be given in divided doses.

Should stop the infusion pump 4 hours before serum phosphate levels.

Potassium  $< 3.5$  mmol/L supplement 20-40 mmol KCL intravenously over 4-8 hours. Magnesium  $< 0.5$ mmol/L, give 6g  $MgSO_4$  intravenously over 3-6 hours, afterwards 5g over 12-24 hours intravenously. Oral magnesium should be given in divided doses.

If electrolytes become difficult to correct or drop precipitously during the initiation of nutrition, decrease calories/grams of dextrose by 50% and advance the dextrose/calories by approximately 33% of the goal every 1–2 days based on clinical presentation.

## Fluids

Restrict to maintain a zero balance.

- Sufficient to maintain renal function and normal urine output(15ml/kg/day)
- Replace deficit or losses.
- Avoid weight gain.

Usual requirement in D1 to D3	20 - 25ml/kg/day.
D4 to D6	25 - 30 ml/kg/day
D7 to D10	30 - 35ml/kg/day.

## Salt

- Restrict sodium to <1mmol/kg/day.
- If oedema develops, reduce further.

## Vitamin

- 200% of RDI, except iron.
- Special attention to thiamine
- Iron should be supplemented from day 7 onwards.

## Monitor

<b>Parameter</b>	<b>D1 - D3</b>	<b>D4 - D6</b>	<b>D7 - D10</b>
Body weight	daily	daily	twice weekly
Oedema	daily	daily	daily
Blood pressure, Pulse rate, Hydration state	daily	daily	daily
Electrolytes	daily	once in two days	twice weekly

## Annexure 17: Enteral nutrition education

1. Begin the referral process once the decision for EN therapy is made.
2. Begin education for the patient receiving EN at home before placement of the EAD.
3. Provide patient and caregiver education that is comprehensive, includes education materials related to EN therapy, and uses a standard checklist.
4. Provide the patient and caregiver with verbal and written education that covers the following topics:
  - a. Reason for EN and short-term and long-term nutrition goals (i.e. weight goal)
  - b. Feeding device, route and method, formula, and feeding regimen
  - c. Identify the necessary supplies needed to administer enteral tube feedings at home
  - d. Use and cleaning of equipment, including administration/feeding set, infusion pump and syringe.
  - e. When to stop using the tube, what actions to be taken when complications are noticed
  - f. Care of the feeding tube and access site such as securing, flushing, and unclogging the tube and stoma care
  - g. Nutrition and hydration guidelines: feeding plan/ regimen, water flushes, hydration monitoring.
  - h. Weight schedule, lab work recommendations
  - i. Safe preparation and administration of formula
  - j. Safe preparation and administration of medications
  - k. Proper position during and after feedings
  - l. Recognition and management of complications (mechanical, gastrointestinal, and metabolic)
  - m. Available resources, emergency care plan, and healthcare contacts
5. Use education to assess comprehension. demonstration and teach-back method for the patient.
6. Use various methods of education for EN to consider various learning styles.
7. Implement an EN education checklist to assist with the discharge coordination process.

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