

# **NUTRITION IN SURGERY**

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# OUTLINE

- 1. Overview on Basics of Nutrition**
- 2. Importance of Nutrition in Surgical Patient**
- 3. Nutrition Assessment**
- 4. Nutrition Support**
  - ☐ Enteral ☐ Parenteral**
- 5. Take Home Message**

# **BASICS OF NUTRITION**

**☐ Nutrition is the process of providing or obtaining the foods necessary for health and growth.**

**☐ The general indications for nutritional support in surgery are in the prevention and treatment of under nutrition.**

**☐ Normal functioning of human body requires a balance between nutritional intake and metabolism**

**☐ Imbalances will manifest as nutritional deficiencies or excess**

# NUTRITIONAL REQUIREMENTS

☐ Calories provided mainly by carbohydrate and fat

☐ Fat = **9 kcal/ g** ☐ Carbohydrate = **4 kcal/ g**

☐ Protein = **4 kcal/ g**

☐ Daily caloric requirements: **30-35kcal/kg**

☐ Metabolic stress associated with sepsis, trauma, surgery or ventilation lead to increase energy requirement **(35-40kcal/kg/day)**

# **MALNUTRITION**

❑ Malnutrition :

❑ condition that develops when the body does not get the right amount of the vitamins, minerals and other nutrients it needs to maintain healthy tissues and organ function.

❑ Can occur in people who are either **undernourished or over nourished**

# Malnutrition

## ◦ Reduced food intake

- ☐ anorexia
- ☐ fasting
- ☐ pain on swallowing,
- ☐ physical or mental impairment ◦

## **Malabsorption**

- ☐ impaired digestion or absorption
- ☐ excess loss from gut

## ◦ Altered metabolism

- ☐ trauma
- ☐ burns
- ☐ sepsis
- ☐ surgery
- ☐ cancer cachexia

## **❑ Under nutrition:**

- ❑ BMI  $<18\text{kg/m}^2$
- ❑ Weight loss  $>10\text{-}15\%$  within 6 months
- ❑ Serum albumin  $<30\text{g/L}$  (with no evidence of hepatic or renal dysfunction)
- ❑  $<80\%$  of ideal body weight

## **❑ Over nutrition:**

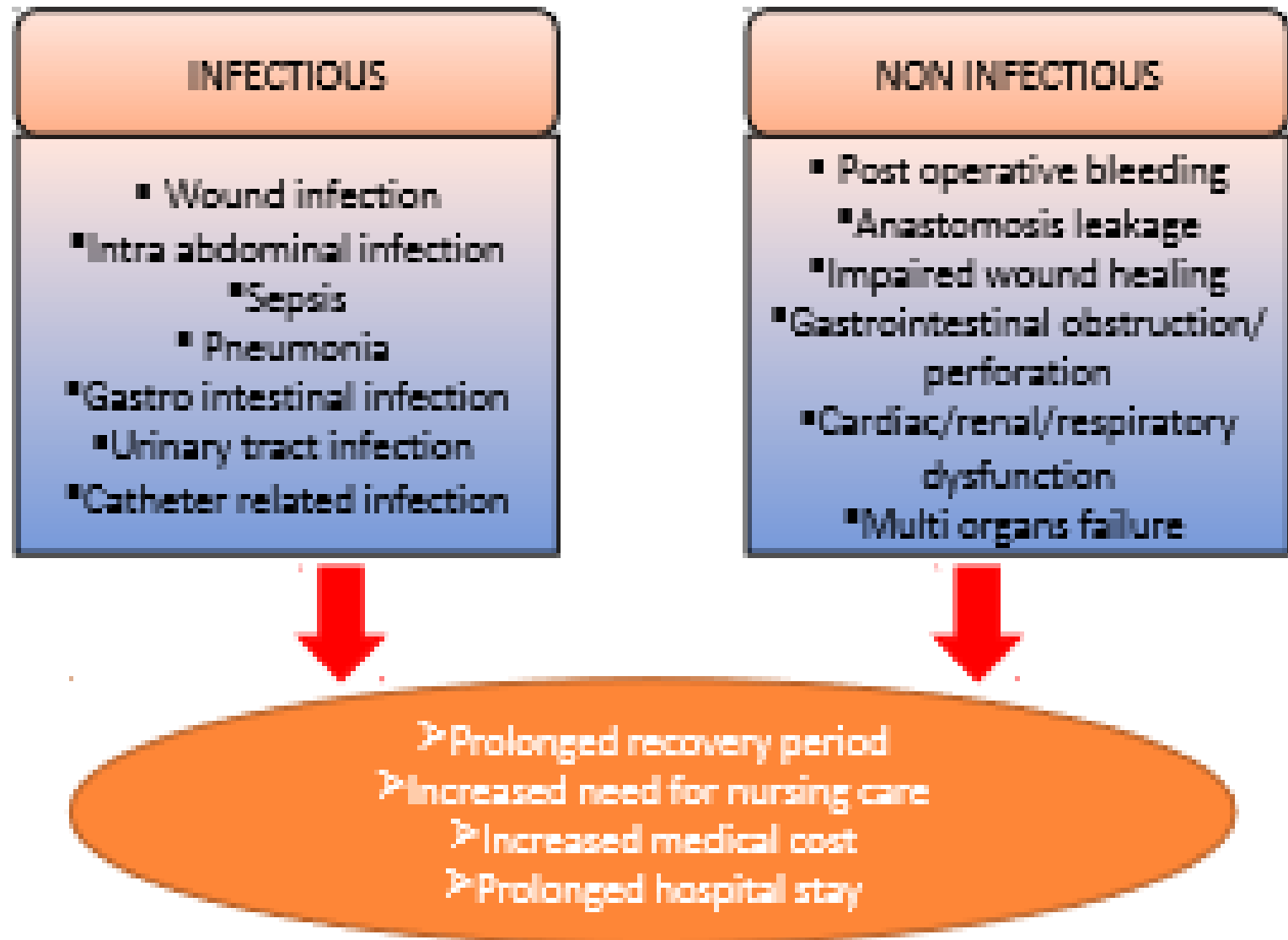
- ❑ BMI  $>30\text{kg/m}^2$
- ❑ Body weight  $>20\%$  from ideal body weight



# BMI

Category	BMI Range (kg/m)
Underweight	<18.5
Normal	18.5 – 23.9
Overweight	24.0 – 26.9
Obese Class I	27.0 – 34.9
Obese Class II	35 – 40
Obese Class III	> 40

# COMPLICATION OF MALNUTRITION



# In trauma/ sepsis..

- Increased counter regulatory hormones
- Increased energy requirement( 15- 25% more)
- Increased nitrogen requirement
- Insulin resistance / stress induced hyperglycemia
- Preferential oxidation of lipids
- Increased gluconeogenesis / protein catabolism
- Loss of adaptive ketogenesis
- Fluid retention with hypoalbuminemia

# **NUTRITIONAL ASSESSMENT**

**❑ History**

**❑ Physical examination**

**❑ Laboratory investigation**

**❑ Nutritional assessment score**

# **history**

- ☐ Presenting Complaints**
- ☐ Vomiting, dysphagia, diarrhea**
- ☐ Co morbidities**
- ☐ Obesity, Malignancy, IBD,**
- ☐ Social & Dietary History**
- ☐ Socio economic background**
- ☐ Intake**
- ☐ Amount**

# Physical Examination

- ☐ **Anthropometric Measurements** o Weight, height & BMI or Skin-fold thickness
- ☐ biceps & triceps o Mid-arm circumference
- ☐ **Signs of Malnutrition** o Hair – easy pluck ability o Face – nasolabial seborrhea, angular fissures of lip o Muscle bulk – temporalis, thenar eminence, lumbricals o Skin – increased fold, hyperkeratosis, non healing ulcers o Limbs – dependent edema

# Laboratory

❑ FBC – Hemoglobin (HCMC anemia), Total Lymphocytes count

❑ LFT – Serum albumin

• Albumin (T<sub>1/2</sub>): 20 days

❑ Serum Transferrin

• Transferrin (T<sub>1/2</sub>): 8-10 days

❑ Serum Prealbumin

• Prealbumin (T<sub>1/2</sub>): 2-3 days

❑ Others

○ Nitrogen balance

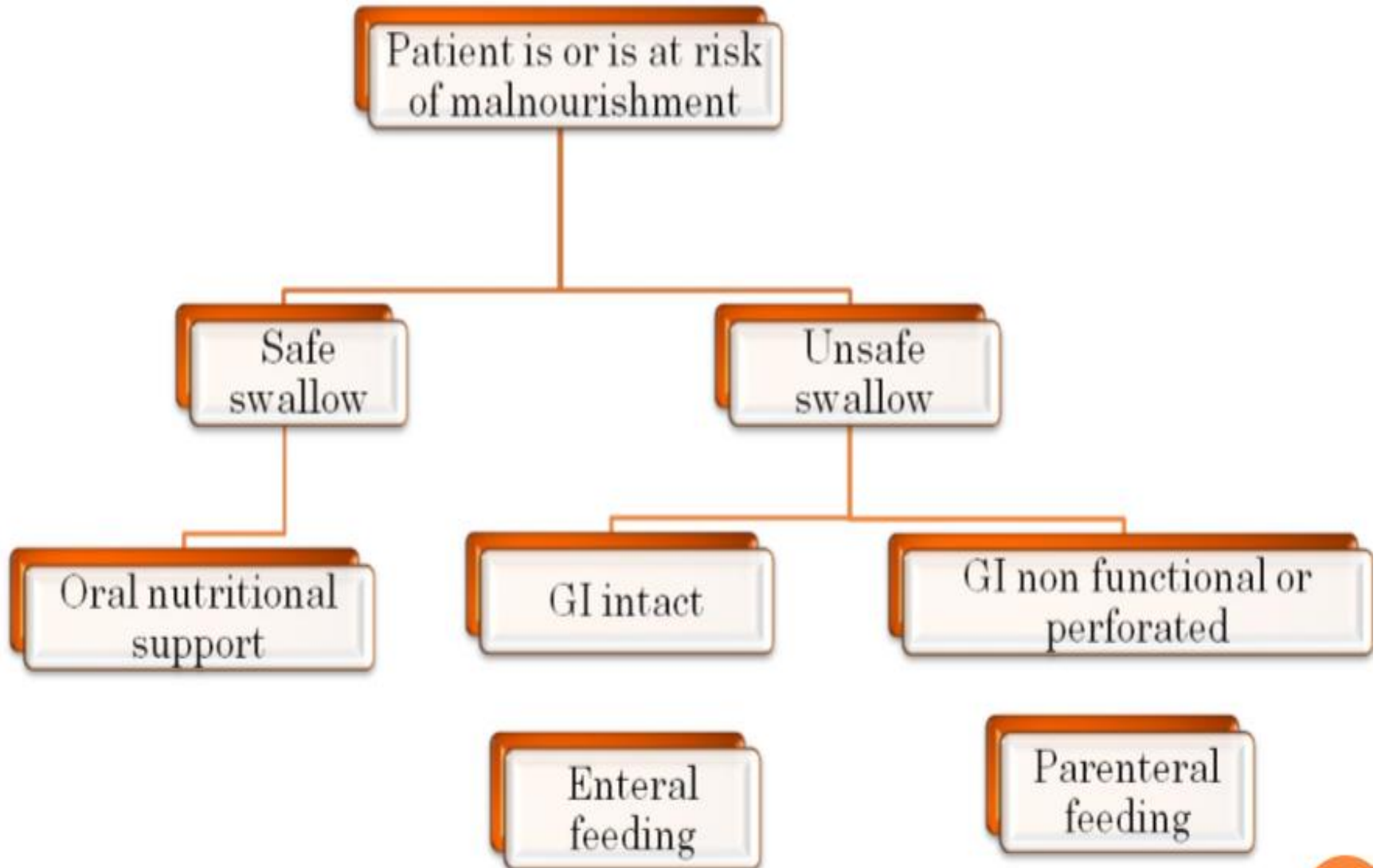
○ Electrolytes/BUSE/ creatinine

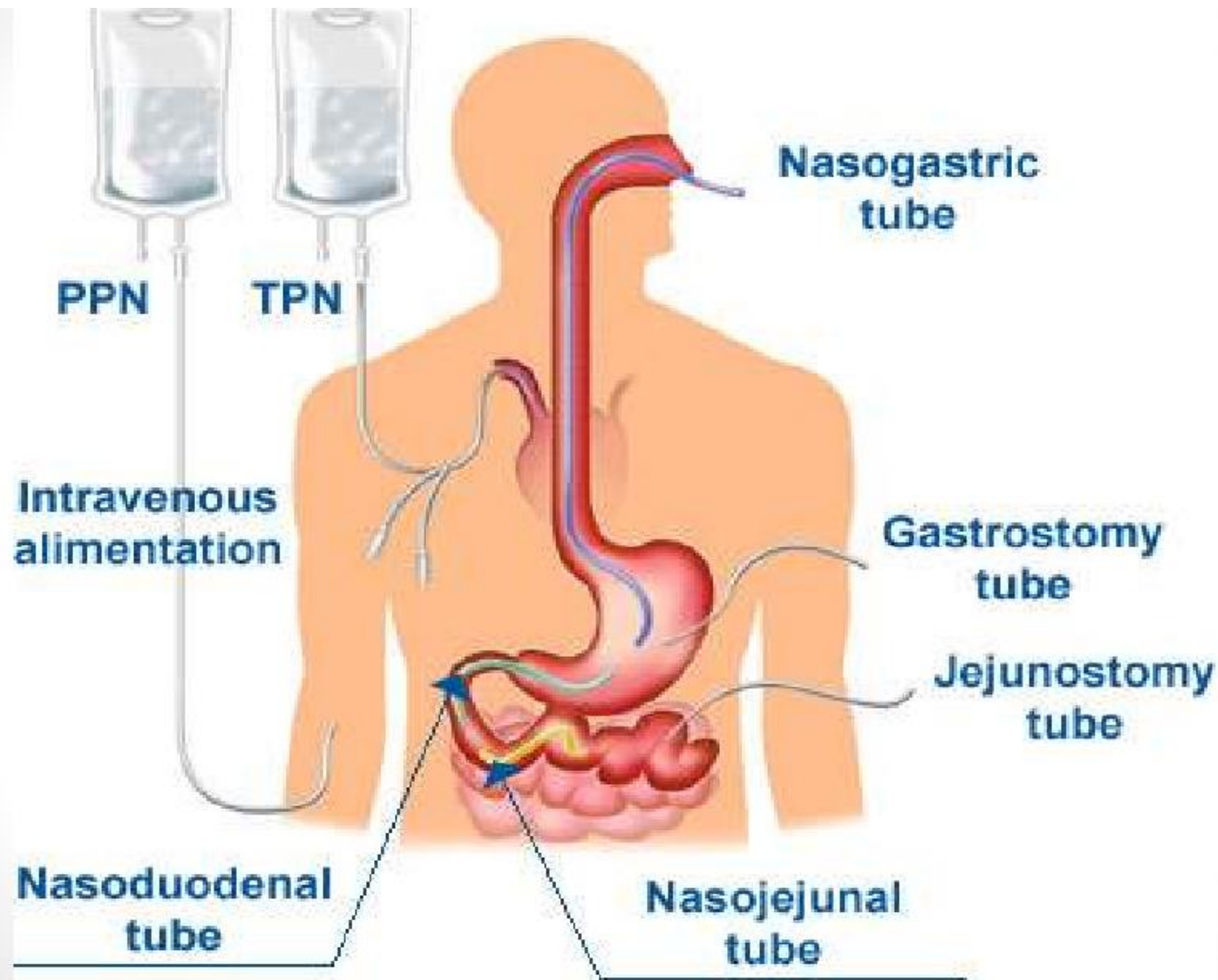
# **STEPS IN NUTRITION SUPPORT**

- ❑ Assessment of Nutrition**
- ❑ Resuscitation**
- ❑ Fluid & electrolytes derangements**
- ❑ Nutritional Requirements**
- ❑ Caloric goal – start with 10-15kcal/kg/d and increased slowly up to 30-35kcal/kg/day**
- ❑ Routes & Methods of Feeding**
- ❑ Oral, enteral, parenteral or combinations**
- ❑ Monitoring**
- ❑ Adequacy, complications**



# INITIATING NUTRITION SUPPORT





# **ENTERAL NUTRITION**

**? Basics of enteral feeding**

**? Indication/Contraindication**

**? Enteral routes**

**? Feeding regime/ Types of formulas**

**? Complication**

# **ENTERAL NUTRITION (EN)**

- ❑ Delivery of nutrient into healthy and functioning GI tract**
- ❑ Most preferred and more physiological**
- ❑ Advantages**
  - ❑ Maintain gut mucosal integrity**
  - ❑ Maintain normal gut flora & pH**
  - ❑ Cheap & easily available**
  - ❑ Less complication**

# Indications and contraindications

## Indications

- Oral intake < 50% of required need for the previous 7-10 days
- Dysphagia or chewing problem due to strokes, brain tumor, head injuries
- Major burns
- Low output GIT fistulas (< 500 mls/day).

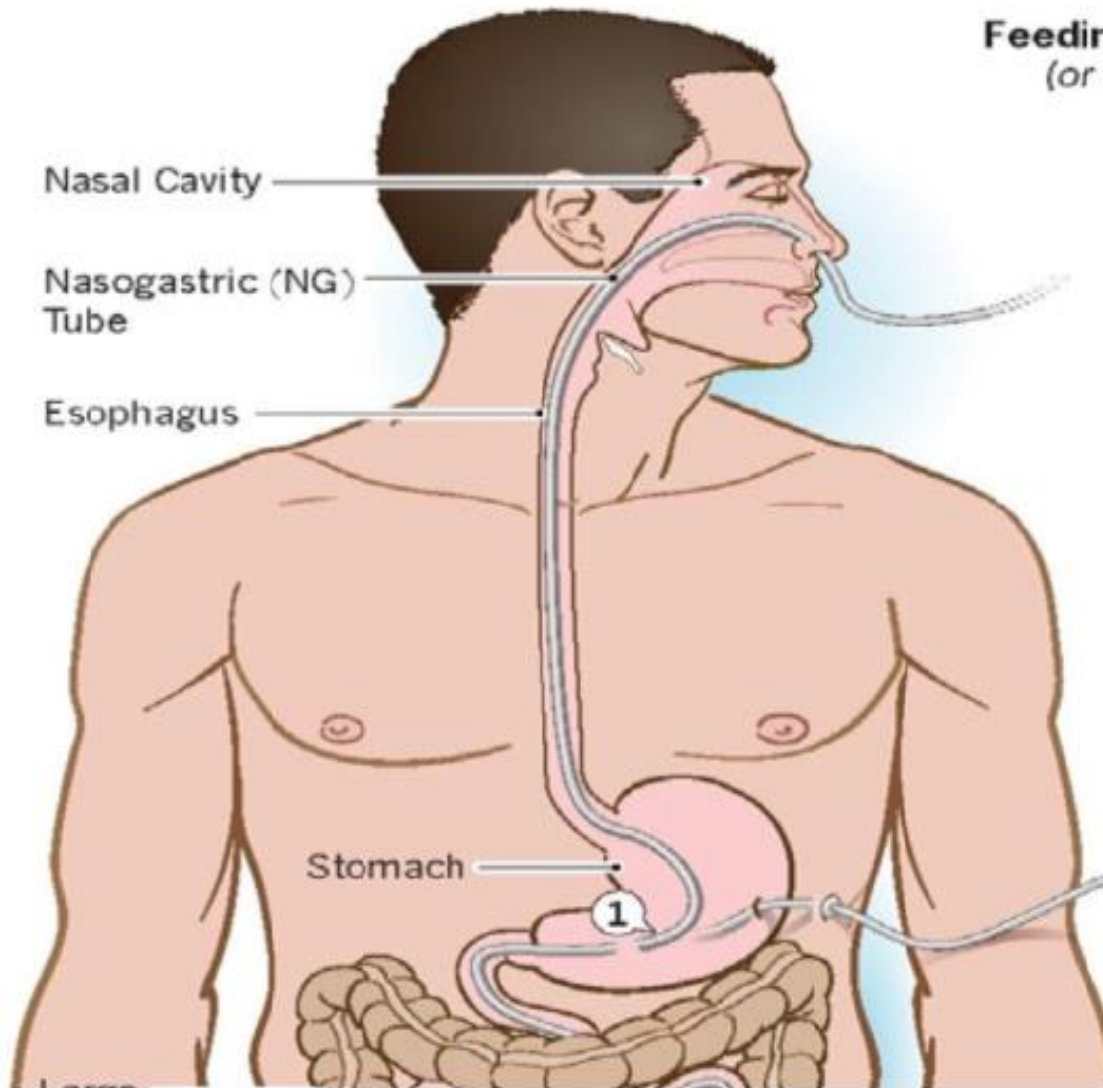
## Contraindications

- Mechanical obstruction of GIT
- Prolonged ileus
- Severe GI hemorrhage
- Severe diarrhea
- Intractable vomiting
- High output GIT fistula (>500ml/day)
- Severe enterocolitis

## Examples of Enteral Access

### Feeding Routes Through The Nose (or alternatively may be oral)

- ① Nasogastric
- ② Nasoduodenal
- ③ Nasojejunal



### Gastrostomy Options\*

- Percutaneous Endoscopic Gastrostomy (PEG)
- Percutaneous Radiologic Gastrostomy (PRG)
- Percutaneous Endoscopic Jejunostomy (PEJ)
- Percutaneous Radiologic Jejunostomy (PRJ)
- Percutaneous Endoscopic Gastrojejunostomy (PEG/J)
- Button
- Surgically placed Gastrostomy



# COMPLICATIONS OF ENTERAL NUTRITION

## Tube related

- Malposition
- Displacement
- Blockage
- Break/leakage
- Local complications (erosion of skin or mucosa )
- Aspiration

## Gastrointestinal

- Diarrhea
- Bloating, nausea, vomiting
- Abdominal cramps
- Constipation

## Metabolic / Biochemical

- Electrolyte disorders
- Vitamin, mineral, trace elements deficiencies
- Drug interactions

# **PARENTERAL FEEDING**

**? BASIC OF PARENTERAL FEEDING**

**? INDICATIONS**

**? CONTRAINDICATIONS**

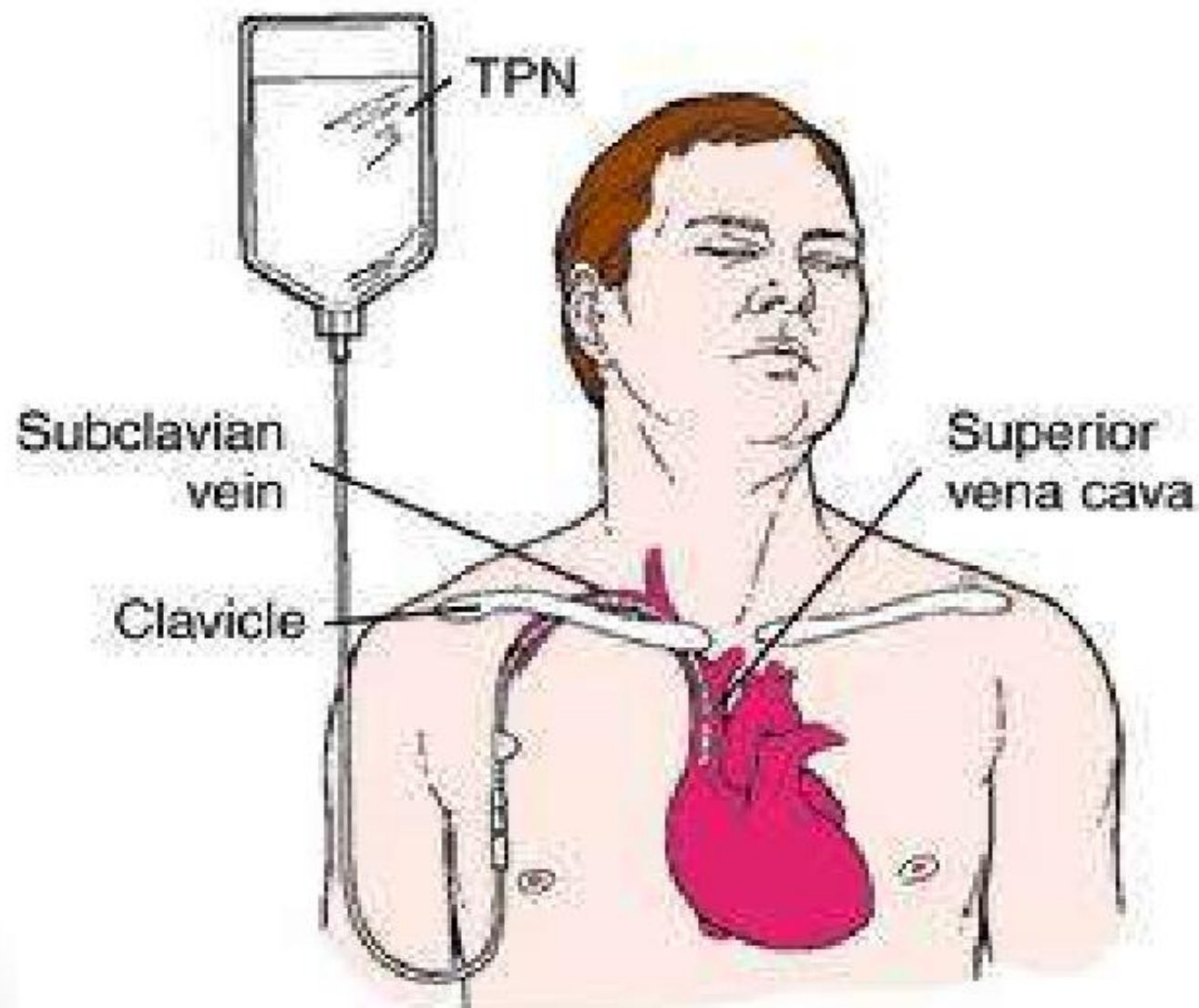
**? TYPES OF PARENTERAL NUTRITION**

**? CALORY REQUIREMENT**

**? COMPLICATIONS**

**? MONITORING PATIENT WITH PN**





# **BASICS OF PARENTERAL FEEDING**

- ☐ Delivery of all nutritional requirements by IV route without the use of GIT (bypass GIT)**
- ☐ Sterile liquid chemical formula**
- ☐ May be delivered via : - Central line (total parenteral nutrition)**
  - Peripheral line**

# Why we choose PN

## **☐ GIT Malfunction**

**OBSTRUCTED** - Ca esophagus/stomach, stricture

**FISTULATED** - post op enterocutaneous fistula, high output fistulas

**INFLAMMED** - small bowel disease ex, crohn's disease, acute severe pancreatitis

**TOO SHORT** - massive resection, short gut syndrome

# INDICATIONS

- ❑ **Pre operative** : build up of malnourished patient
- ❑ **Failure enteral feeding to meet caloric requirement** - major polytrauma, major burns
- ❑ **Cancer** : complication of chemotherapy, radiotherapy
- ❑ **Newborns** - GIT anomalies, NE

# **PRE OPERATIVE PN**

**Indicated in :**

- ☐ Severely undernourished patients who cannot be adequately enterally fed**
- ☐ Inadequate oral intake of >14 days = higher mortality**
- ☐ 7-10 days of preoperative PN = improves postoperative outcome in severe undernourished patient**

# POST OPERATIVE PN

Indicated in:

☐ **Undernourished patients** = enteral nutrition is not feasible / not tolerated

☐ **Patients with postoperative complications** = impairing gastrointestinal function -> unable to receive and absorb adequate amounts of oral/enteral feeding for at least 7 days

Post operative PN is life saving in patients with prolonged gastrointestinal failure.

# **PN IS CONTRAINDICATED IN:**

- ❑ Functional and accessible GI tract**
- ❑ Patient is taking orally**
- ❑ Prognosis does not warrant aggressive nutrition support (terminally ill patients)**
- ❑ Risk exceeds benefit**
- ❑ Patient expected to meet needs within 14 days**

# CALORY REQUIREMENT

## Estimating energy requirement ( Harris-Benedict Equation)

☐ **Men**       $BMR = 66.47 + 13.7 \text{ wt} + 5.0 \text{ ht} - 6.76 \text{ age}$

☐ **Women**    $BMR = 65.5 + 9.56 \text{ wt} + 1.85 \text{ ht} - 4.68 \text{ age}$

Wt = weight in kg, ht = height in cm      BMR= Basal Metabolic Rate

☐ Total calorie need = BMR x Activity factor x Injury factor  
for practical purpose: 30-35kcal/kg/day



# MONITORING PATIENTS ON PN

Parameter	Daily	Frequency 3x/week	Weekly
Glucose	Initially	√	
Electrolytes, FBC	Initially	√	
Phos, Mg, BUN, Cr, Ca		Initially	√
TG			√
Fluid- I/O	√		
Temperature	√		
T. Bili, LFT		Initially	√

# **COMPLICATIONS OF** **PARENTERAL NUTRITION**

# Acute

- ❑ Refeeding syndrome
- ❑ Expansion of extracellular volume, fluid overload
- ❑ Hyper/hypoglycemia
  - ❑ Fluid or electrolyte abnormalities
  - ❑ Catheter leak
- ❑ Air embolism
- ❑ Catheter related sepsis

# Late

- ☐ Metabolic bone diseases : osteoporosis**
- ☐ Hepatic complications : fatty liver, liver failure, hyperammonemia**
- ☐ Gallbladder complications: cholestatic jaundice**
- ☐ Venous thrombosis**
- ☐ Catheter related sepsis**
- ☐ Vitamin and traced element deficiency**

# **TAKE HOME MESSAGES**

- 1. Malnutrition leads to prolong stay, prolong recovery period and increased medical cost**
- 2. Normal caloric requirement = 30-35kcal/kg/day**  
**Metabolic stress = 35-40kcal/kg/day**
- 3. Use enteral feeding unless contraindicated**
- 4. Low osmolarity PN (<900mOsm/L) given via peripheral line**
- 5. In high risk patient to develop re feeding syndrome, we should start with low calories**
- 6. Parameters that required daily monitoring are glucose, electrolytes, FBC, I/O and temperature**

# Home work

Write about the compositions of enteral feeding and parenteral nutritional solutions ?

What's the difference between central and peripheral nutrition ?