NUTRITION IN SURGERY

Presenter : **Dr hadi**

OUTLINE

1. Overview on Basics of Nutrition
2. Importance of Nutrition in Surgical Patient
3. Nutrition Assessment
4. Nutrition Support
   - θ Enteral
   - θ Parenteral

1. Take Home Message

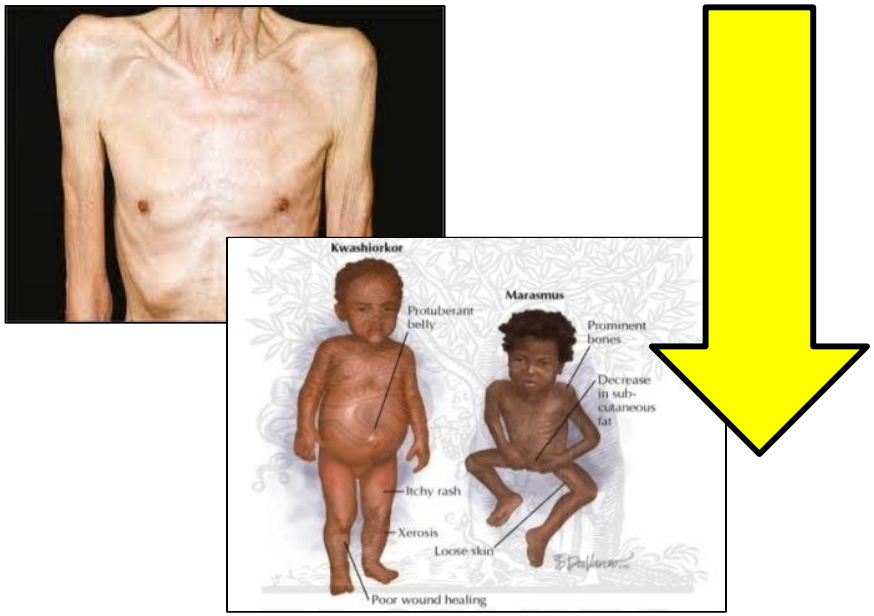
BASICS OF NUTRITION

- 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.

Clinical Nutrition (2003) 22(3): 235–239

- 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)

Medical Nutrition Therapy Guideline (2012)

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

Stratton RJ, Green CJ, Elias M. Disease-related malnutrition: an evidence-based approach to treatment. Oxon, UK: CABI Publishing; 2003 (p. 3). Retrieved on 30th December 2014, from http://espen.info/documents/ENGeneral.pdf

ESPEN Guidelines 2020

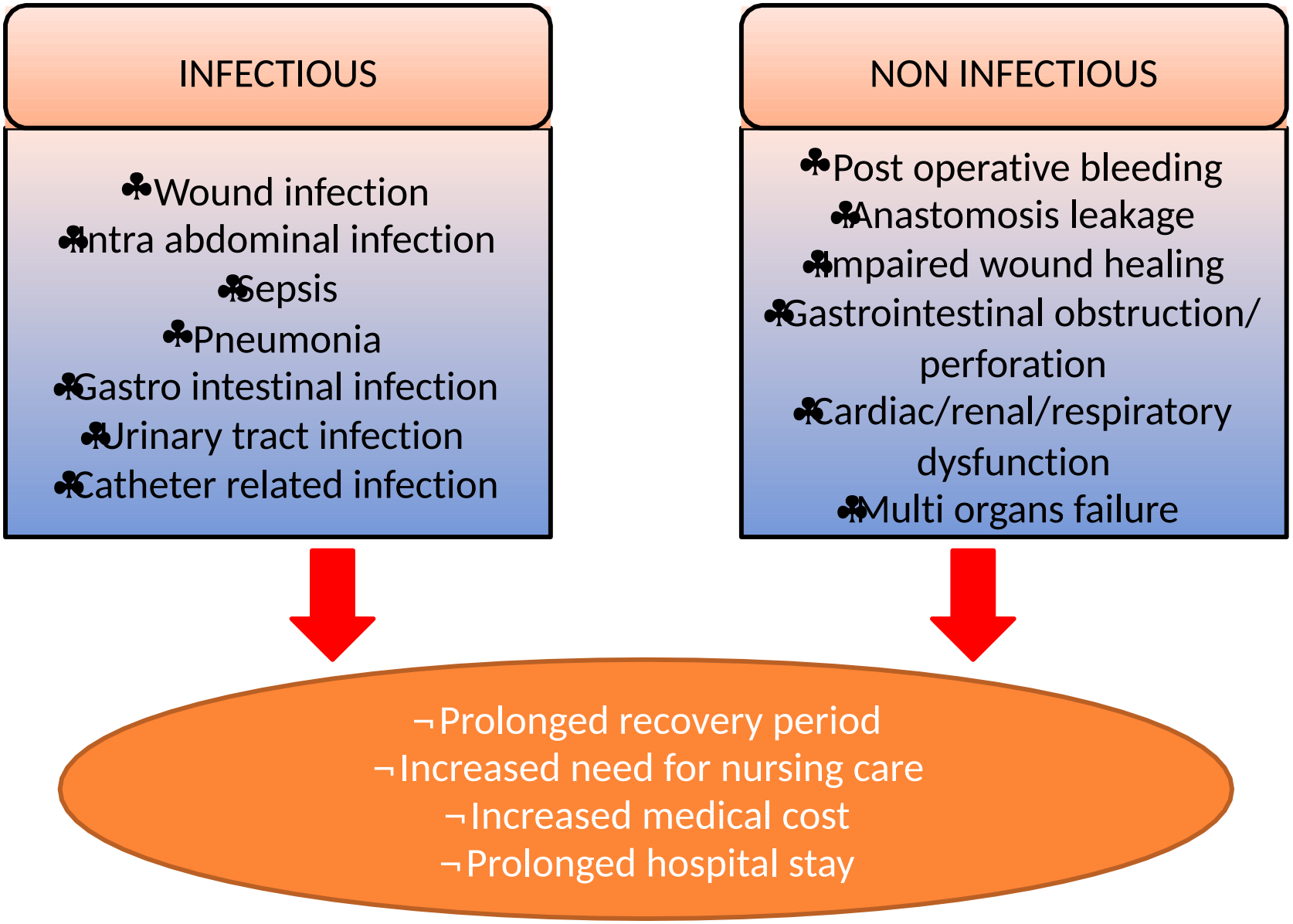
- Under nutrition:
  - BMI <18kg/m2
  - Weight loss >10-15% within 6 months
  - Serum albumin <30g/L (with no evidence of hepatic or renal dysfunction)
  - <80% of ideal body weight

- Over nutrition:
  - BMI >30kg/m2
  - 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



NUTRITIONAL ASSESSMENT

- History
- Physical examination
- Laboratory investigation
- Nutritional assessment score

NUTRITIONAL ASSESSMENT

History

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

NUTRITIONAL ASSESSMENT

Physical Examination

- Anthropometric Measurements
  - Weight, height & BMI, IBW
  - Skin-fold thickness ◊ biceps & triceps
  - Mid-arm circumference

IBW

= (Ht -152.4) x 0.91
+ 50 (male)/45.5 (female)

- Signs of Malnutrition
  - Hair – easy pluckability
  - Face – nasolabial seborrhoea, angular fissures of lip
  - Muscle bulk – temporalis, thenar eminence, lumbricals
  - Skin – increased fold, hyperkeratosis, non healing ulcers
  - Limbs – dependant edema

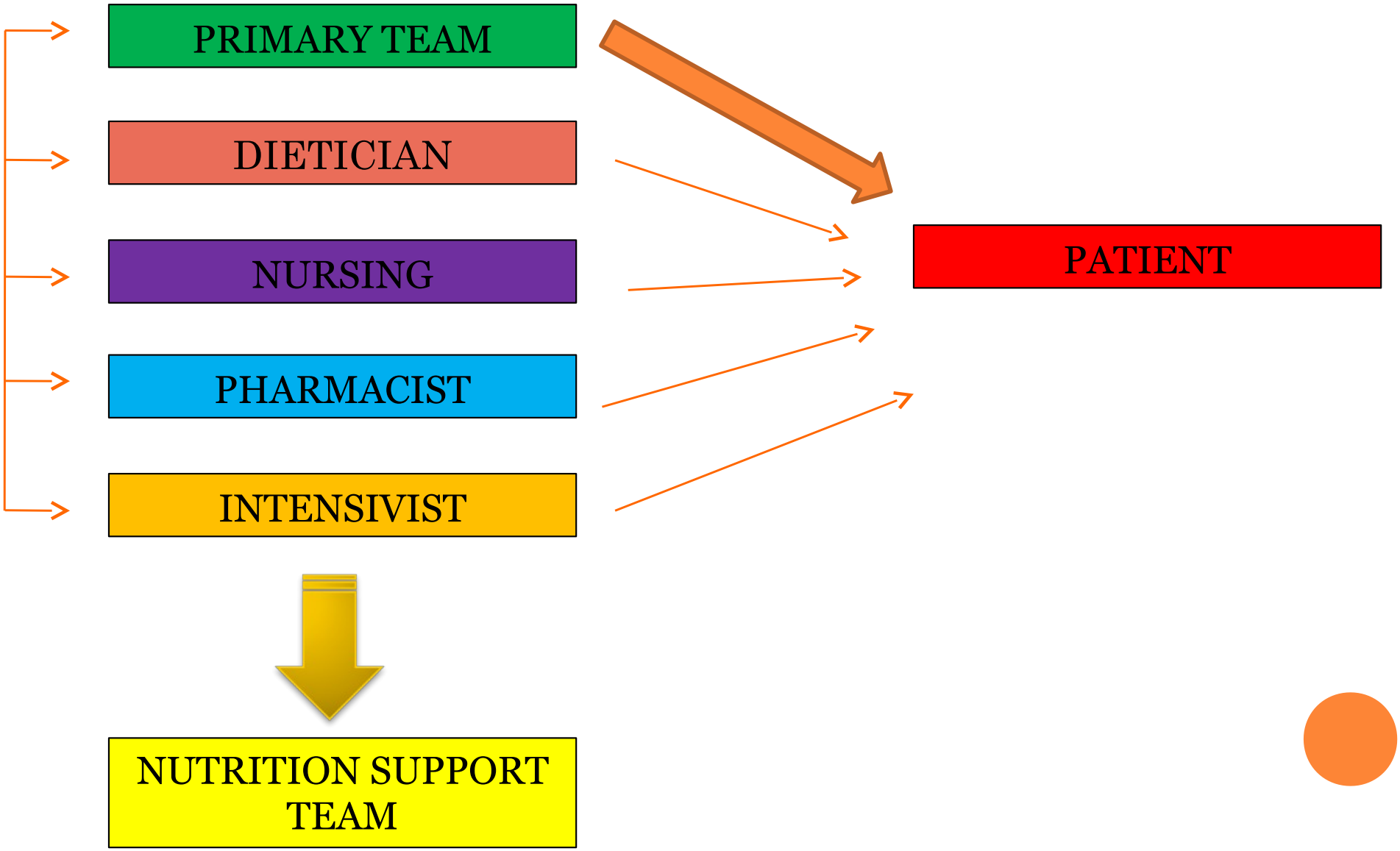
NUTRITIONAL ASSESSMENT

Laboratory

- FBC – Hemoglobin (HCMC anemia), Total Lymphocytes count
- LFT – Serum albumin
- Serum Transferrin
- Serum Prealbumin
- Others
  - Nitrogen balance
  - Electrolytes/BUSE/ creatinine

- **Albumin (T½): 20 days**
- **Transferrin (T½): 8-10 days**
- **Prealbumin (T½): 2-3 days**

MULTIDISCIPLINARY APPROACH



Nutritional risk screening

E. Subjective global assessment (SGA)

I Patient's history

(weight loss, change in dietary intake, gi-symptoms,

II functional capacity)

Physical examination

(muscles, subcutaneous fat, ascites)

edema,

. . . . • Clinician's overall judgement

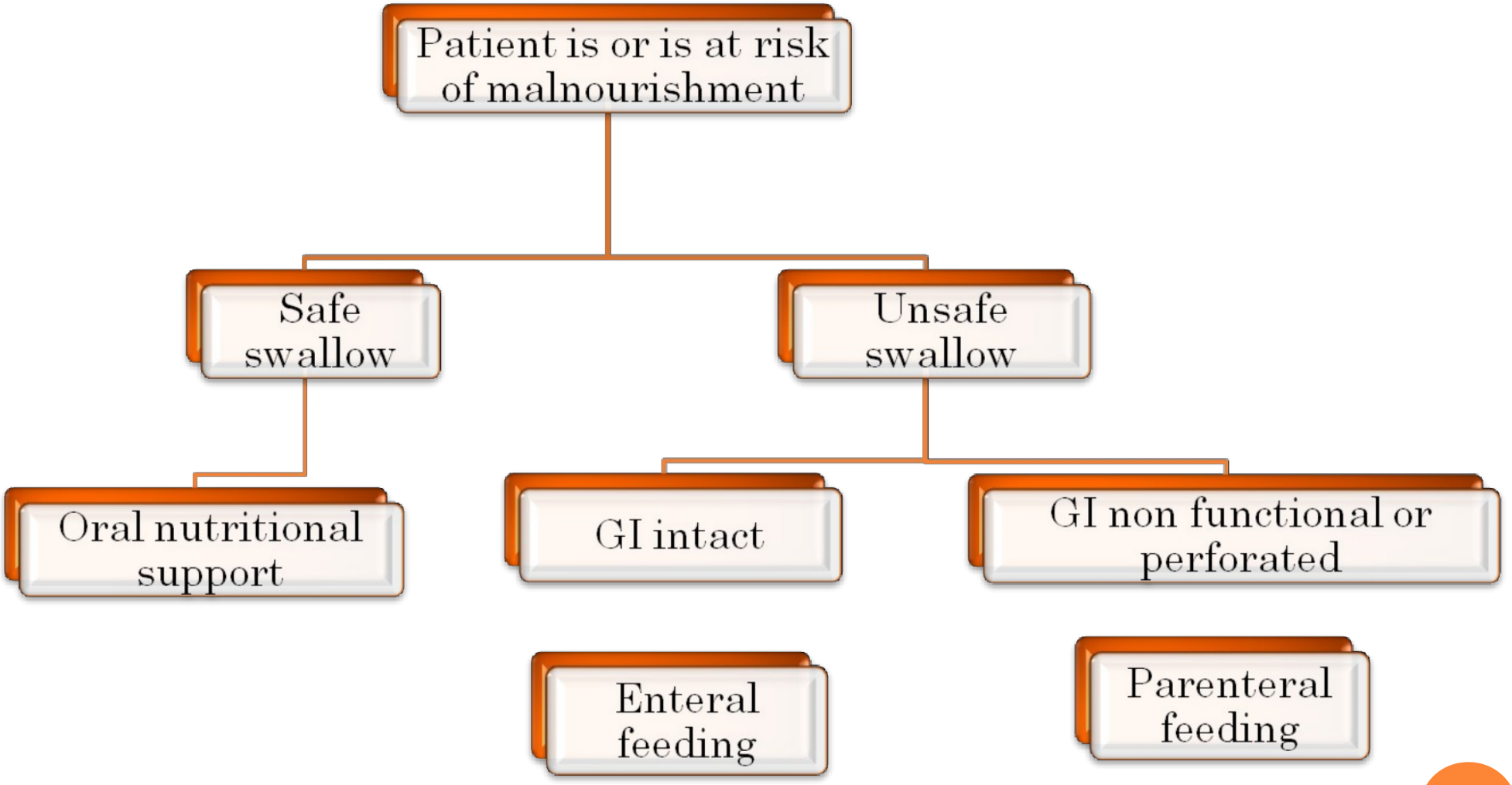
- mildly normal nutritional status
- Significantly malnourished

Detsky et al, JPEN, 1984

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



Stu BMJ (2009) Publishing group LTD Medscape

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 & CONTRAINDICATIONS

Indications	Contraindications
• 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).	• 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)

- Nasogastric
- Nasoduodenal
- Nasojejurial

Gastrostomy Options*

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

Jejunostomy

- Gastrostomy *and* jeJunostomy tubes may *be placed endoscopically, radiologically, or surgically.*

FEEDING REGIME

Method	Criteria	Advantages
Continuous	• to start from 20-50 ml/H • ↑ 10-25 ml/H q8-24H till desired volume achieved.	- ↓ abdominal cramping, aspiration, diarrhea, gastric distension, nausea, vomitting
Intermittent/bolus	• to start with 50ml isotonic formula q3-4H • ↑ 50ml q8-12H as tolerated	-Approximates meal pattern - easy to administer

FORMULAS AVAILABLE IN HTAA

Types of formula	Indications	Energy (kCal)
Standard • Ensure	Normal digestive & absorption capacity	1 kcal/ml
Fiber containing • Jevity powder	Constipation, diarrhea	1 kcal/ml 4-20g fiber/L
Condition specific • Nutren Diabetik • Glucerna SR • Nepro • Pulmocare	 Glucose >10mM/L ARF/CRF + dialysis COAD	 1 kcal/ml 2 kcal/ml 1.5 kcal/ml
Elemental • Peptamen	↓ digestive & absorption capacity	1 kcal/ml
Modular • Myotein	Single nutrient supplement	28 kcal/scoop

COMPLICATIONS OF ENTERAL NUTRITION

Metabolic / Biochemical

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

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

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

EARLY EN VS DELAYED EN

- Initiate nutritional support (by the enteral route if possible) without delay:
  - Even in patients without obvious under nutrition, if it is anticipated that the patient will be unable to eat for more than 7 days
  - In patients who cannot maintain oral intake above 60% of recommended intake for more than 10 days.

ESPEN Guidelines on Enteral Nutrition 2006

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
  - Peripheral line

INDICATIONS

- 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

- 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, NEC

PRE OPERATIVE PN

Indicated in :

- Severely undernourished patients who cannot be adequately enterally fed

Studies have shown that :

- Inadequate oral intake of >14 days = higher mortality

- 7-10 days of preoperative PN = improves postoperative outcome in severe undernourished patient

ESPEN Guidelines of Parenteral Nutrition 2009

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.

ESPEN Guidelines of Parenteral Nutrition 2009

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

NUTRITION

Total Parenteral Nutrition	Partial Parenteral Nutrition
Supplies all daily nutritional requirement	Only part of the daily nutritional requirements supplied, supplementing oral intake ~ 50-70% of patient's energy needs
Central line	Peripheral line
Long term support (>10 days)	Short term support (10-14 days)
Hypertonic solutions with high osmolarity	Formulation with low osmolarity (< 900mOsm/L)

CALORY REQUIREMENT

Estimating energy requirement

(Harris- Benedict Equation)

- Men BMR =66.47 + 13.7 wt + 5.0 ht - 6.76 age
- Women BMR =65.5 + 9.56 wt + 1.85 ht - 4.68 age

Wt = weight in kg, ht = height in cm

BMR= Basal Metabolic Rate

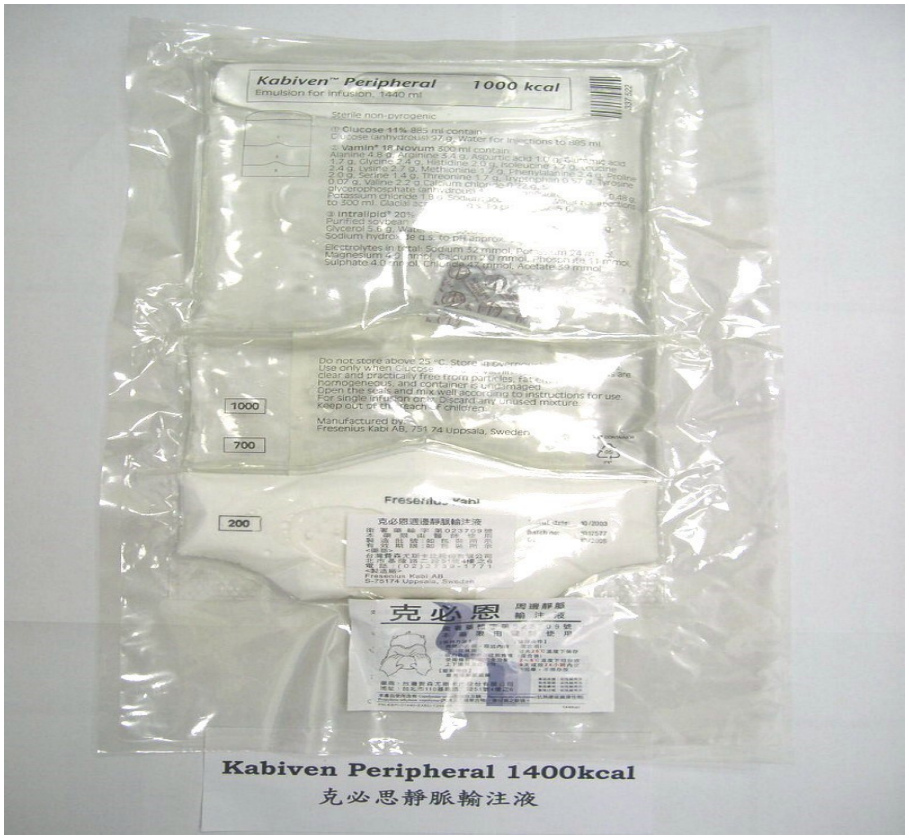
- **Total calorie need = BMR x Activity factor x Injury factor**

for practical purpose: 30-35kcal/kg/day

FORMULAS AVAILABLE AT HTAA

- 2-in-1 mixtures : glucose + protein aggregate
  (Nutriflex Peri, Nutriflex Plus)
- 3-in-1 mixtures : glucose + lipids + proteins

  (NuTRIflex Lipid Peri, NuTRIflex Lipid Plus, Kabiven range)



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

COMPLICATIONS OF PARENTERAL NUTRITION

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

REFEEDING SYNDROME

- Metabolic complication = in severely malnourished patients

- Potentially fatal condition - may be successfully managed
  - prevented if detected early

Pathophysiology

- Metabolism shifts : catabolic -> anabolic state

- Insulin is released - triggering cellular uptake of K+, PO4, Mg

- Profound depletion those electrolyte extracelullarly
  -hypo PO4, hypo Mg, hypo K+, hypo Ca ◊ multiorgan dysfunction

- PN initially delivered = maximum of 10 kcal/kg/day
  = raised gradually to full needs within a week

Ways to wean off TPN

- PN may rapidly discontinued ◊ patient tolerating tube feeding
- Reduced PN volume by 1/2 for 1-2 H before discontinued it ◊ minimize rebound hypoglycemia
- Enteral feeding initiated ◊ patient's GIT function resume
- Initiation enteral feeding ◊ GIT function
  ◊ minimal risk of aspiration
  ◊ patient motivation.

COMBINATIONS OF ENTERAL AND PARENTERAL FEEDING

- >60% of energy needs cannot be met via the enteral route, e.g. in high output enterocutaneous fistulae

- partly obstructing benign or malignant gastrointestinal lesions which do not allow enteral feeding.

ESPEN Guidelines of Parenteral Nutrition 2009

ENTERAL NUTRITION VS PARENTERAL NUTRITION

Studies have shown that:

- There are no significant differences in mortality rate
- There are no significant differences regarding length of hospital stay.

Enteral feeding	Parenteral feeding
Lower risk infection	Higher risk infection
Decreased cost	Increased cost
Lower incidence hyperglycemia	Higher incidence hyperglycemia

ESPEN Guidelines on Enteral Nutrition 2006

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/0 and temperature

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