Nutrition, Feeding incl Refeeding Syndrome

Supervisor Dr Ramonate

Presenter Dr Mahlasela

Outline

- Overview of Nutrition
- Definition
- Rationale for nutritional therapy “ A Mixed Bag”
- Nutritional Assessment
- Nutritional Access
- Feeding
- Monitoring
- Complications
- Refeeding Syndrome
- Questions

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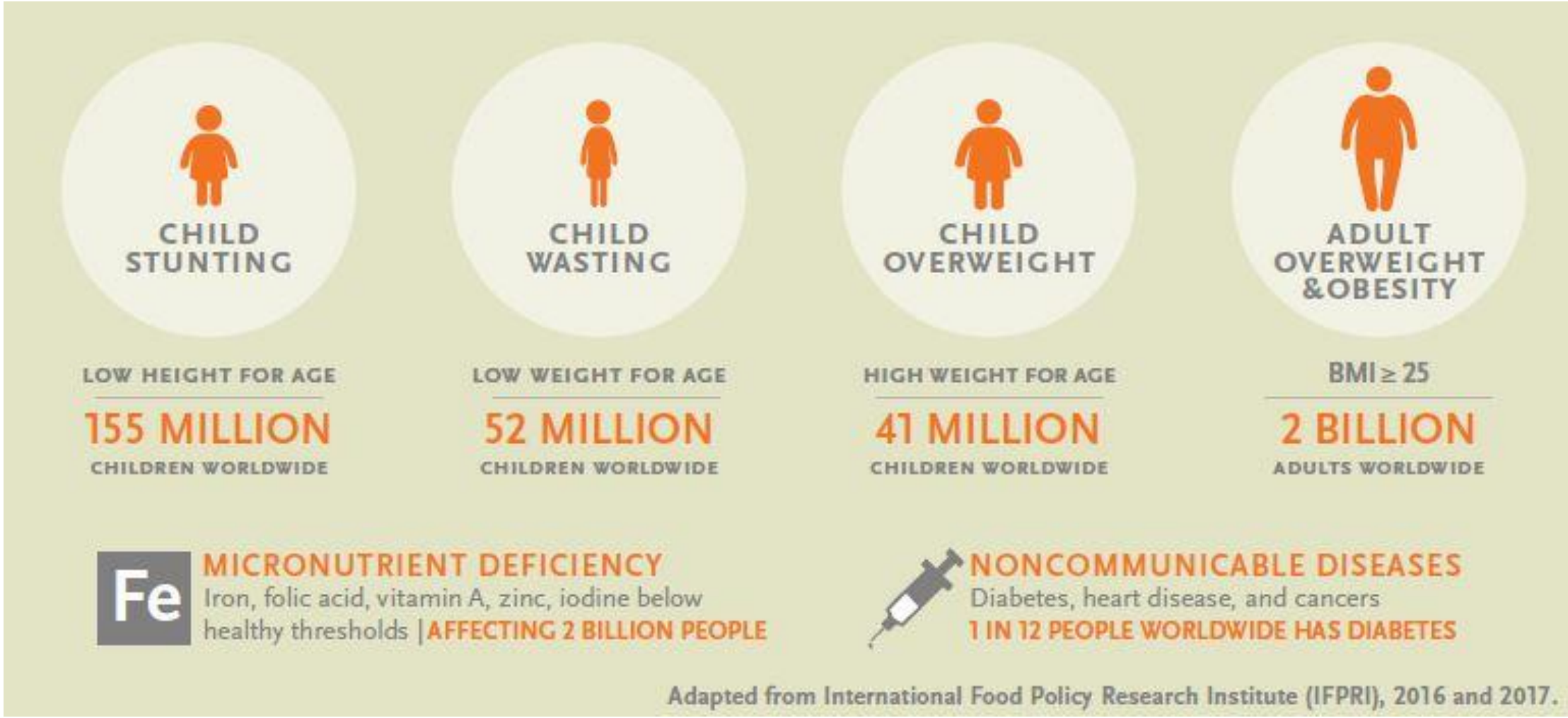

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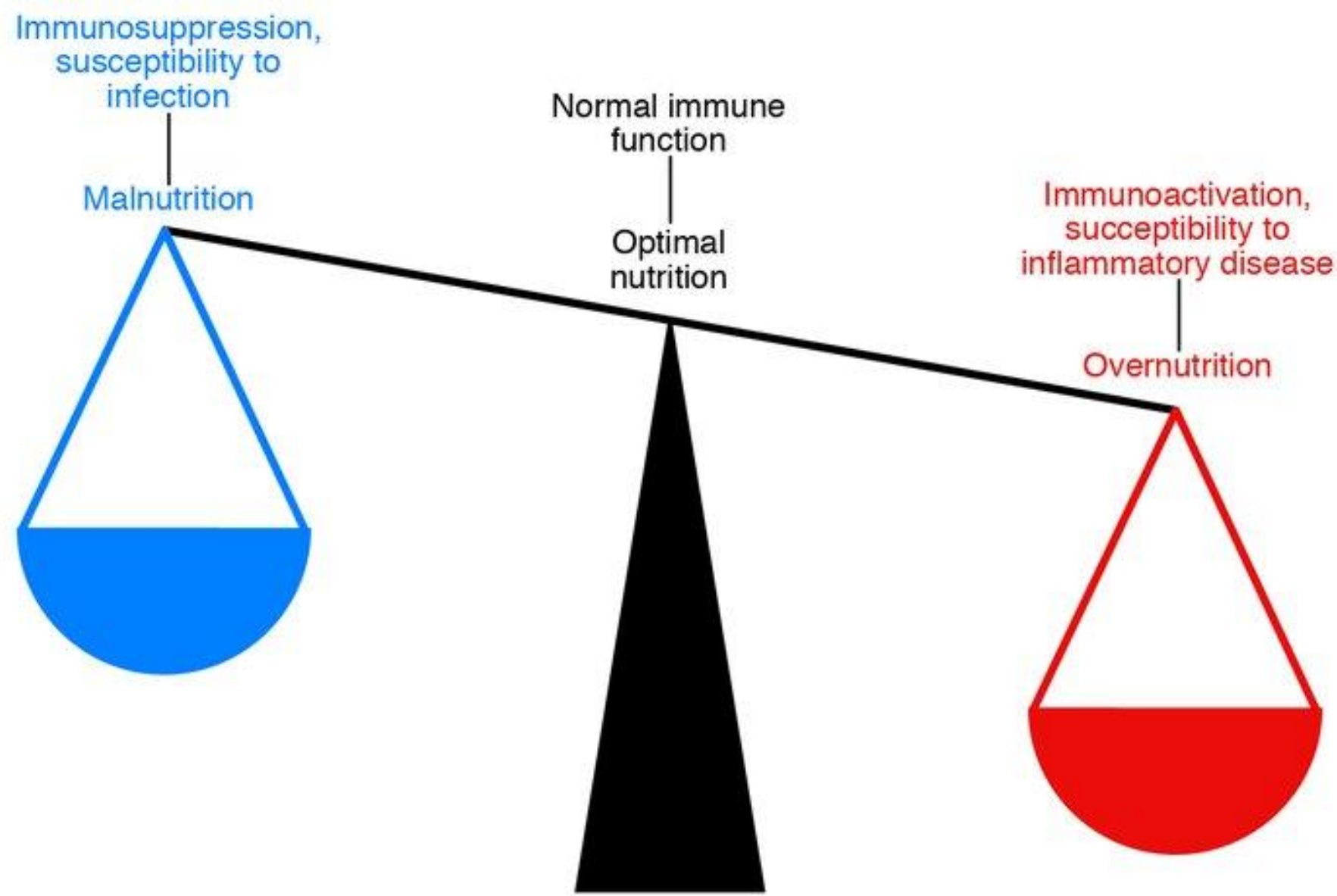

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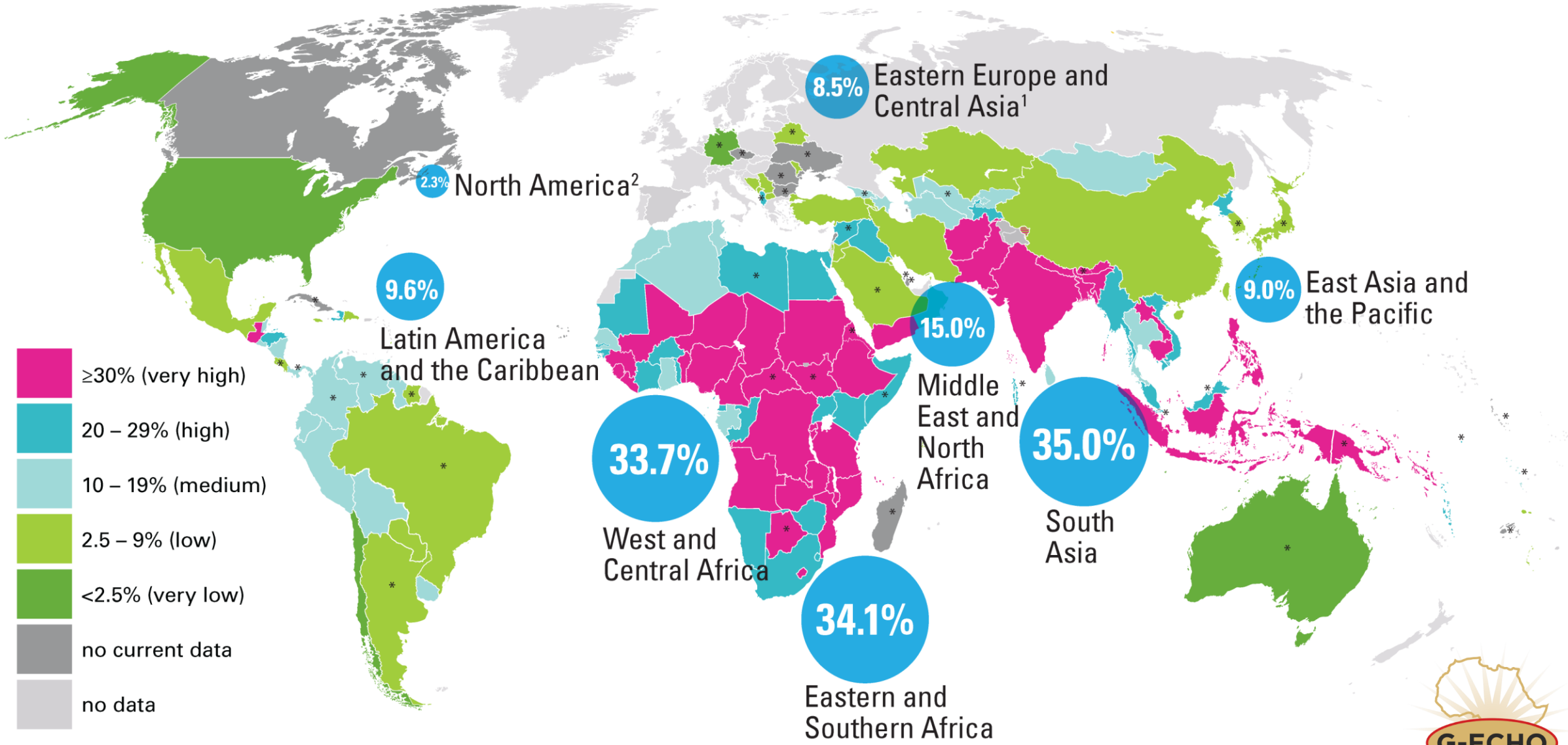

Adapted from: https://www.vistafortifoods.com/solution.php

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From 1990 to 2020, the number of children under 5 years suffering from chronic malnutrition has decreased from 253 million to 144 million – that means that an additional 109 million children could reach their full potential.

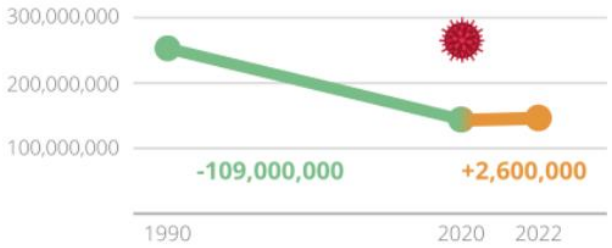
It is estimated that COVID-19 will result in an additional 2.6 million chronically malnourished children by 2022, reversing the decreasing curve for the first time in 3 decades.

Sources:

- UNICEF

As the COVID-19 crisis continues to spread across the world with a heavy toll on human lives and livelihoods, the pandemic's effect on millions of people who are already suffering from hunger and malnutrition is devastating.

Number of chronically malnourished (stunted) children under 5



More facts and figures.pdf

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Reference: https://www.unitlife.org/impact-of-covid-19-on-malnutrition

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Food Security

Digestion
Absorption

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Why does it matter

- Increased hospital stay
- Increased complication rate
- Increased ICU days

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Why does it Matter?

- 2010 Uk report “A Mixed Bag”
  - Good Practice was in 19% of cases (171/877)
  - Inadequate consideration was given to enteral nutrition in a third
  - 30% received PN for an inadequate indication
  - Need for PN recognized late in 16% (121)
  - Delay in administration in 9% (71)
  - Deficiencies in monitoring and assessment of 54% (399)
  - Metabolic complications in 40% of which half of these were avoidable
  - Poor documentation of nutritional notes

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Who Needs Nutritional Intervention?

- Patients at high nutritional risk
  - Hospitalized patients that are at greatest need for nutritional therapy and would have clinical improvement with aggressive nutritional therapy.

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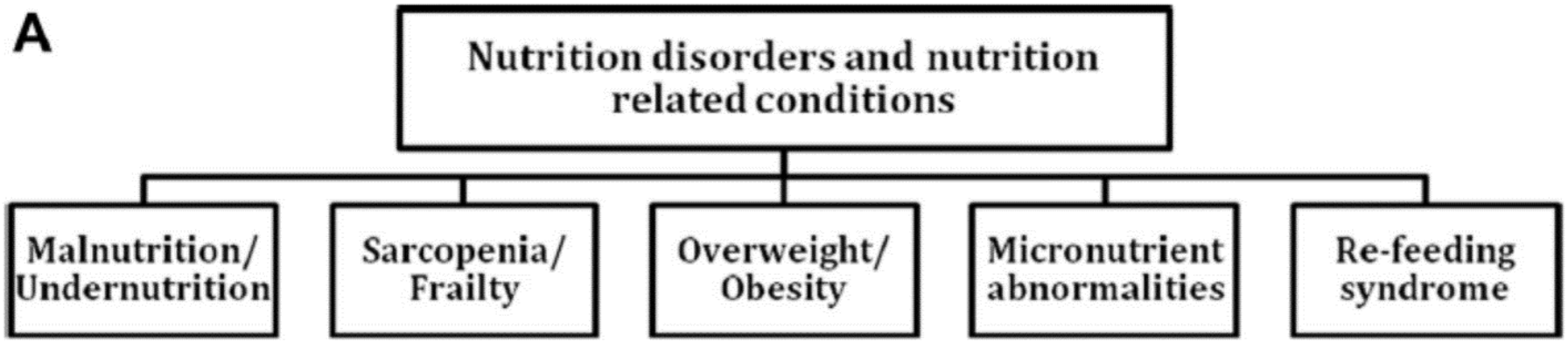

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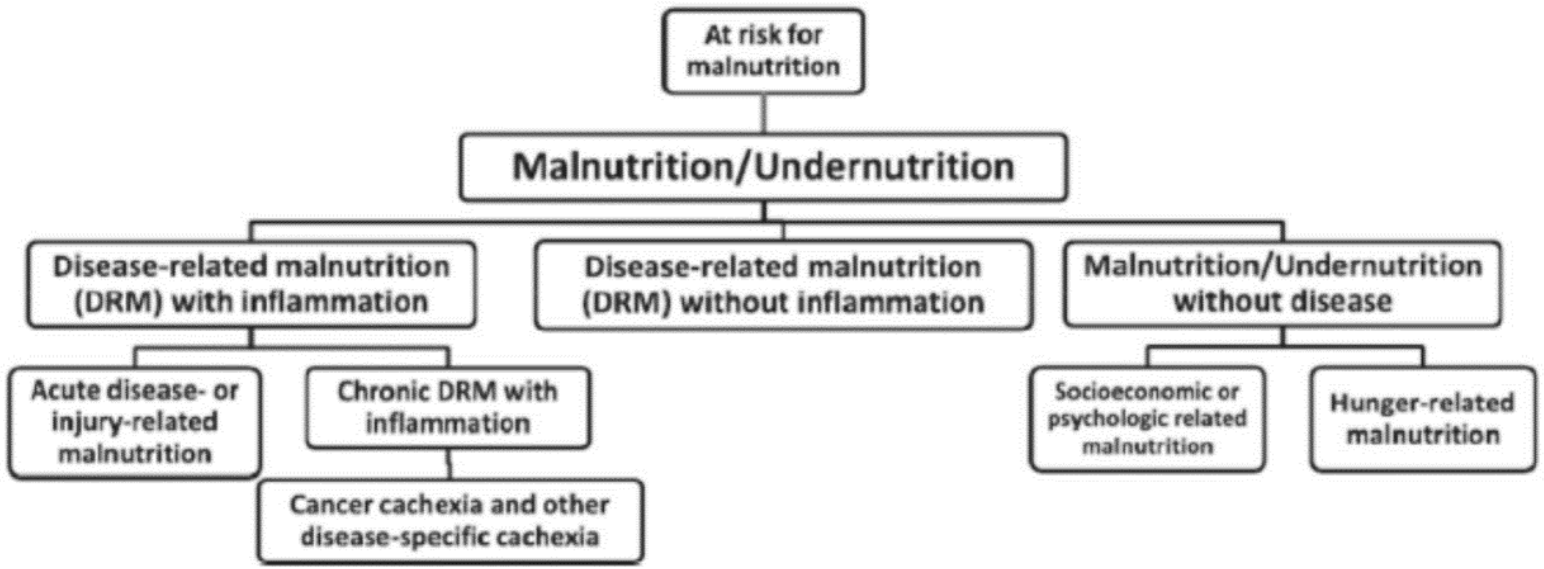

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Nutritional Assessment

- General Clinical Assessment:
  - Unintentional weight loss
  - Baseline or deterioration thereof prior to admission
  - Body composition
  - Muscle mass and strength
- Malnutrition:
  - BMI < 18.5
  - Unintentional weight loss >10% or >5% in last 3 months

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Nutritional Assessment

The NUTRIC Score is designed to quantify the risk of critically ill patients developing adverse events that may be modified by aggressive nutrition therapy. The score, of 1-10, is based on 6 variables that are explained below in Table 1. The scoring system is shown in Tables 2 and 3.

Table 1: NUTRIC Score variables

Variable	Range	Points
Age	<50	0
	50 - <75	1
	≥75	2
APACHE II	<15	0
	15 - <20	1
	20-28	2
	≥28	3
SOFA	<6	0
	6 - <10	1
	≥10	2
Number of Co-morbidities	0-1	0
	≥2	1
Days from hospital to ICU admission	0 - <1	0
	≥1	1
IL-6	0 - <400	0
	≥ 400	1

Table 2: NUTRIC Score scoring system: if IL-6 available

Sum of points	Category	Explanation
6-10	High Score	➢ Associated with worse clinical outcomes (mortality, ventilation). ➢ These patients are the most likely to benefit from aggressive nutrition therapy.
0-5	Low Score	➢ These patients have a low malnutrition risk.

Table 3. NUTRIC Score scoring system: If no IL-6 available*

Sum of points	Category	Explanation
5-9	High Score	➢ Associated with worse clinical outcomes (mortality, ventilation). ➢ These patients are the most likely to benefit from aggressive nutrition therapy.
0-4	Low Score	➢ These patients have a low malnutrition risk.

*It is acceptable to not include IL-6 data when it is not routinely available; it was shown to contribute very little to the overall prediction of the NUTRIC score.[2]

https://www.criticalcarenutrition.com/resources/nutric-score

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Nutritional Risk Screening (NRS 2002)

Nutritional status

None ○

Mild ●

- Weight loss > 5 % in 3 months or
- 50 – 75 % of the normal food intake in the last week

Moderate ●●

- Weight loss > 5 % in 2 months or
- BMI 18.5 – 20.5 kg / m² and reduced general conditions or
- 25 – 50 % of the normal food intake in the last week

Severe ●●●

- Weight loss > 5 % in 1 month (>15% in 3 months) or
- BMI < 18.5 kg / m² and reduced general conditions or
- 0 – 25 % of the normal food intake in the last week

Severity of the disease (stress metabolism)

None ○

Mild ●

Hip fracture, chronic disease especially with complications, e.g. liver cirrhosis, COPD, diabetes, cancer, chronic hemodialysis

Moderate ●●

e.g. stroke, hematologic malignancy, severe pneumonia, extended abdominal surgery

Severe ●●●

e.g. head traumas, hematopoietic stem cell transplantation, intensive care patients (APACHE-II > 10)

Advanced age ● Age ≥ 70 years

0 – 2 points
Repeat screening weekly.

3 – 7 points
Patient is at nutritional risk. Nutritional care plan should be set up.

NRS 2002, Adapted from Kondrup et al.

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Nutritional Assessment

- Co-morbid conditions
- Function of the gut
- Risk of aspiration, refeeding syndrome
- Discourage the use of:
  - Anthropometric measures
  - Biomarkers
- Recommend Indirect Calorimetry (IC) to accurately assess nutritional requirements
- In absence of IC then weight based equations or VO2 (O2 consumption) or VCO2 (CO2 production)
- Not all Macronutrients are equal

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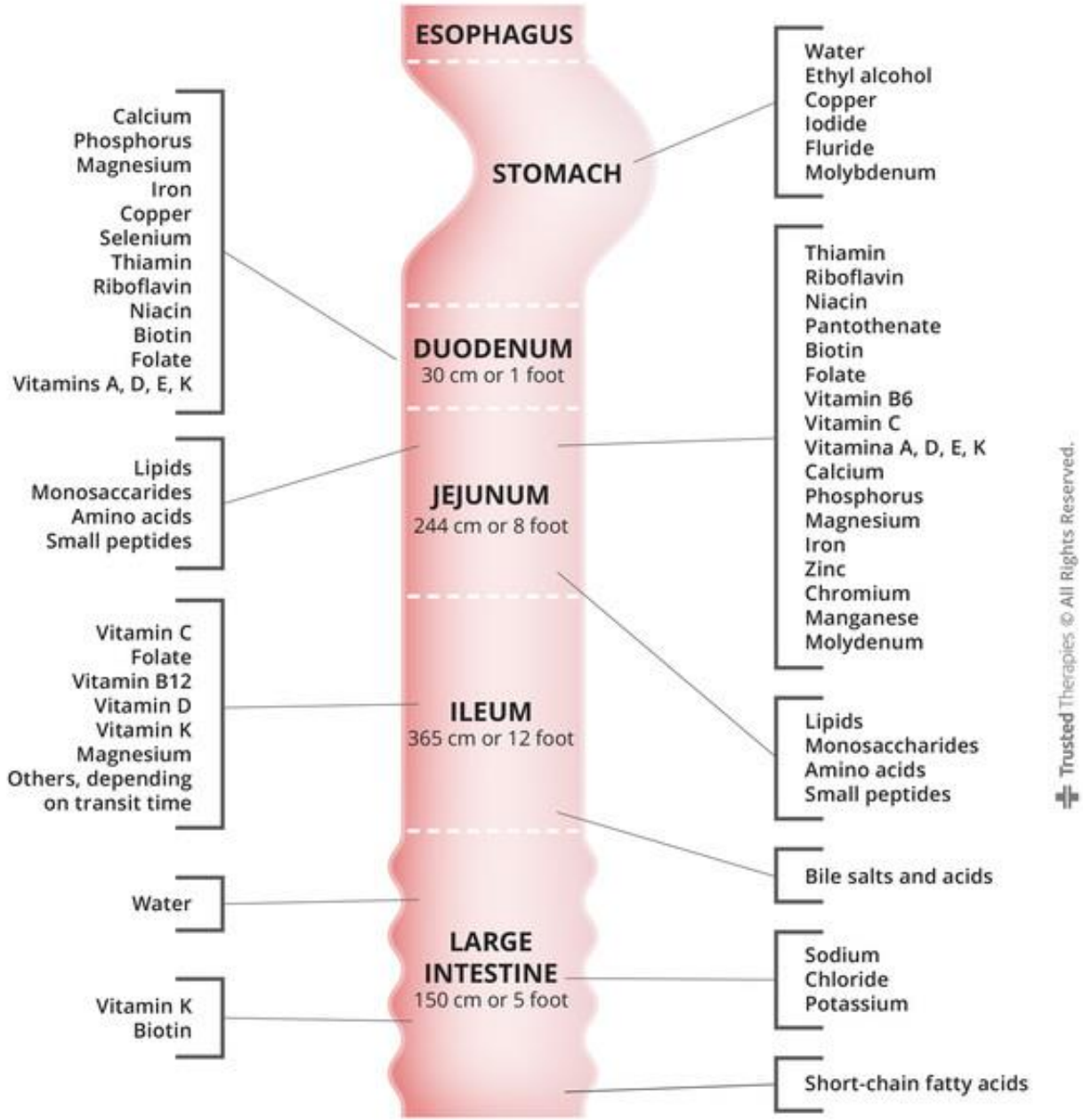

Note: The duodenum, jejunum and ileum make up the small intestine.

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Enteral Access

- NGT should be first preference, confirm position with CXR
- Post pyloric tube should be used if ngt is inadequate or patient is high aspiration risk
- Small bowel feeding superior to Gastric feeding in patients with higher APACHE II score (>20)
- GI feeding vs Small Bowel for other patients
- PEG should be placed if patient will require feeding for more than a month

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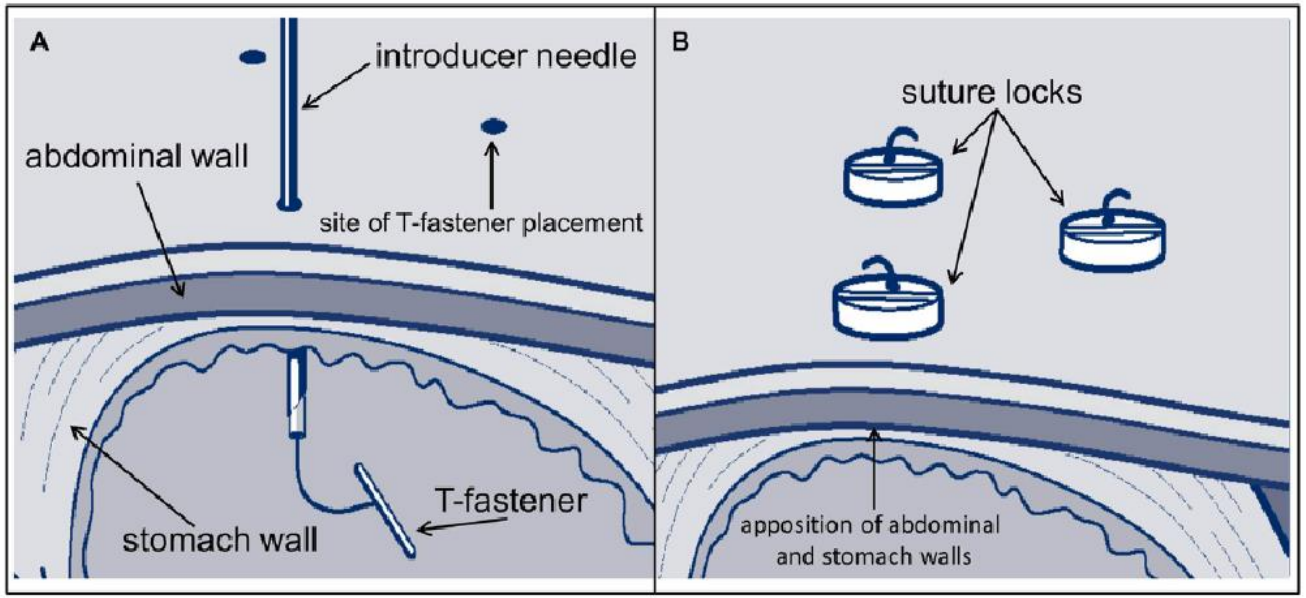
Enteral Access

- Placement of the PEG
  - Antrum
  - Right of midline close to Umbilicus
  - Use of T- Tacks to keep the tube in place.



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Initiating Feeds

- Aim to initiate feeding early
- Continuous vs Bolus Feeding
- Establish tolerance then advance to goal within 72hrs
- Permissive Underfeeding
  - Obese
  - ALI/ARDS
  - PN on the first week
- An immune modulating formular should be used for post surgical and pts in surgical ICU but not routinely in pts in medical ICU

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PN vs EN

- EN should be initiated early during hospital stay ideally within the first 24hrs.
- EN superior to PN with respect to
  - Infection
  - Complications
  - Length of Hospital Stay
  - Cost
  - Taste
- Early studies, now gap is narrowing
- PN should be considered as first option if there are CI to EN, or if patient cannot meet nutritional target with EN.

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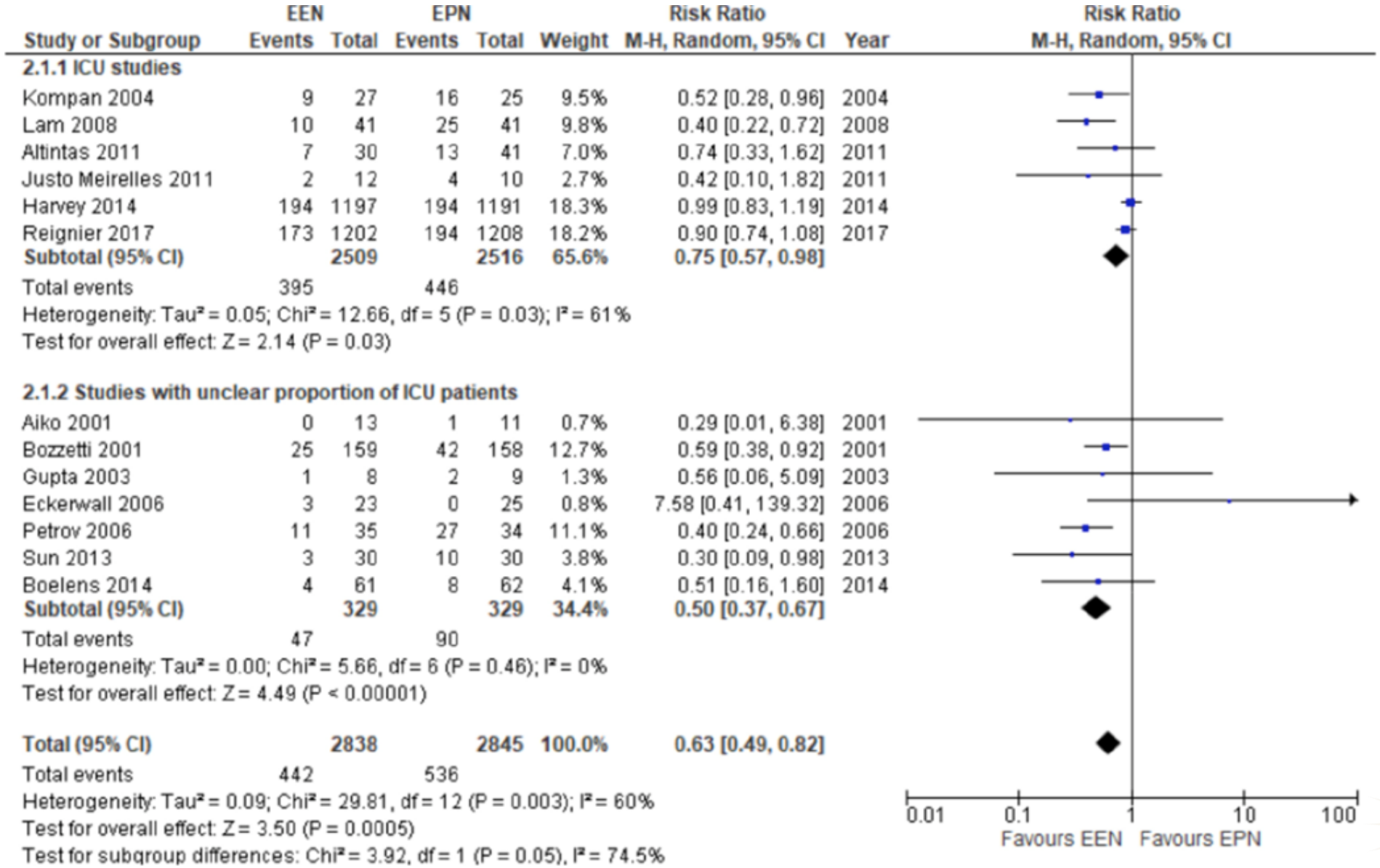

Study or Subgroup	EEN Events	EEN Total	EPN Events	EPN Total	Weight	Risk Ratio M-H, Random, 95% CI	Year
2.1.1 ICU studies							
Kompan 2004	9	27	16	25	9.5%	0.52 [0.28, 0.96]	2004
Lam 2008	10	41	25	41	9.8%	0.40 [0.22, 0.72]	2008
Altintas 2011	7	30	13	41	7.0%	0.74 [0.33, 1.62]	2011
Justo Meirelles 2011	2	12	4	10	2.7%	0.42 [0.10, 1.82]	2011
Harvey 2014	194	1197	194	1191	18.3%	0.99 [0.83, 1.19]	2014
Reignier 2017	173	1202	194	1208	18.2%	0.90 [0.74, 1.08]	2017
Subtotal (95% CI)		**2509**		**2516**	**65.6%**	**0.75 [0.57, 0.98]**	
Total events	395		446				
Heterogeneity: Tau² = 0.05; Chi² = 12.66, df = 5 (P = 0.03); I² = 61%							
Test for overall effect: Z = 2.14 (P = 0.03)							
2.1.2 Studies with unclear proportion of ICU patients							
Aiko 2001	0	13	1	11	0.7%	0.29 [0.01, 6.38]	2001
Bozzetti 2001	25	159	42	158	12.7%	0.59 [0.38, 0.92]	2001
Gupta 2003	1	8	2	9	1.3%	0.56 [0.06, 5.09]	2003
Eckerwall 2006	3	23	0	25	0.8%	7.58 [0.41, 139.32]	2006
Petrov 2006	11	35	27	34	11.1%	0.40 [0.24, 0.66]	2006
Sun 2013	3	30	10	30	3.8%	0.30 [0.09, 0.98]	2013
Boelens 2014	4	61	8	62	4.1%	0.51 [0.16, 1.60]	2014
Subtotal (95% CI)		**329**		**329**	**34.4%**	**0.50 [0.37, 0.67]**	
Total events	47		90				
Heterogeneity: Tau² = 0.00; Chi² = 5.66, df = 6 (P = 0.46); I² = 0%							
Test for overall effect: Z = 4.49 (P < 0.00001)							
Total (95% CI)		**2838**		**2845**	**100.0%**	**0.63 [0.49, 0.82]**	
Total events	442		536				
Heterogeneity: Tau² = 0.09; Chi² = 29.81, df = 12 (P = 0.003); I² = 60%							
Test for overall effect: Z = 3.50 (P = 0.0005)							
Test for subgroup differences: Chi² = 3.92, df = 1 (P = 0.05), I² = 74.5%							

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Benefits of Early Enteral Nutrition

- Non Nutrient
  - GIT
  - Immune Response
  - Metabolic Responses
- Nutritional Benefits

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Nutrients

- Protein 1.3g/kg/day
- Carbohydrates 5mg/kg/day
- Lipids 1.5g/kg/day
- Glutamine
- Micronutrients
  - Nutritional aspects
  - Anti-oxidant aspects

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Monitoring Tolerance and Adequacy of EN

- Daily Clinical Examination
- Determination of Caloric need and Caloric deficit
- Cautious feeding of patients at risk of refeeding syndrome
- Nursing Driven Protocols
- GRV measurement is not recommended
- Monitor Electrolytes

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Complications

- Diarrhoea
  - Common and usually self-limiting
  - May result in dehydration, electrolyte imbalances, skin breakdown, wound contamination
  - Most commonly related to sorbitol containing medication, Infections such as C Diff,
  - Add non fermentable soluble fibre to feed
- Aspiration Pneumonia
  - Position patient higher up
  - Continuous feeding
  - Lower position of the ET
  - Initiating prokinetic agents
  - Chlorhexidine mouthwash
  - Simultaneous aspiration/decompression of the stomach with small bowel feeding

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Complications

- Tube site clean and ensure correct positioning
- Tube Blockage
- Inadvertent dislodging of Enteral Tube
- Increased drainage, leaking from EN site
- Fungal Infection

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Contra-Indications to EN

- Critically ill patients with uncontrolled shock
- Uncontrolled hypoxemia and acidosis
- Uncontrolled UGIB
- Gastric Aspirate >500mls/ 6hr
- Bowel Ischemia
- Bowel Obstruction
- Abdominal Compartment Syndrome
- High Output fistula without distal feeding access

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Parenteral Nutrition

- Patients at low nutritional risk do not require feeding in the first week in hospital
- Peripheral PN should not be used
- High nutritional risk patients that cannot tolerate EN, should be started on PN.
- Patients on EN not meeting target should get supplemental PN
- Permissive Underfeeding for first 7-10 days
- Peripheral PN should not be used
- PN should be stopped when EN provides 60% of nutrients

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Nutritional Therapy at End of Life

- Ethical issue
- PN is strongly discouraged
- Gastrostomy is preferred method of feeding
- Nutrition should not be denied

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Refeeding Syndrome

When food can kill – a lesson from WWII

Shane Daly September, 2020

"They were put on a rich diet and began to recover and put weight on but then they died suddenly." –Laurie Pettit

Refeeding syndrome for many centuries was an unknown entity and remained somewhat of a myth until the liberation of the Nazi concentration camps in 1945; it is also possibly the least talked about cause of fatality in the Second World War.

Soviet soldiers upon the liberation of WWII camps were met by thousands of men, women and children who had been in a state of medical starvation for months on end. The well-meaning soldiers – met at the gates of the camps by POWs with their ribs and sternum protruding from their bodies and chests and obviously in need of medical care – took food such as biscuits and chocolate bars from their own government-issued ration supplies and gave them to the prisoners, not knowing that it would lead to their almost immediate death. It is estimated that 500 POWs from Auschwitz concentration camp and as many as 14,000 from the Belsen concentration camp – most famously known as the site where Anne Frank's family died upon capture – died of refeeding syndrome.

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Definition

- Refeeding syndrome can be described as a syndrome:
  - Occurs in the Undernourished
  - Potentially fatal fluid and electrolyte shifts including K, but more importantly Phosphate
  - Changes are driven by Nutrition whether enteral or parenteral
- This definition does not:
  - Include other Vitamin Deficiencies,
  - Role of Hormones
  - Weigh the different features

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Incidence

- Depends on Population Group
- In 10197 hospitalized patients the incidence was 0.43%
- In critically ill patients in the ICU the incidence was found to be 34%
- In a local study they looked at 200 patients admitted to the Surgical ICU although 146 of these patients needed electrolyte supplementation, the incidence was 12.5%

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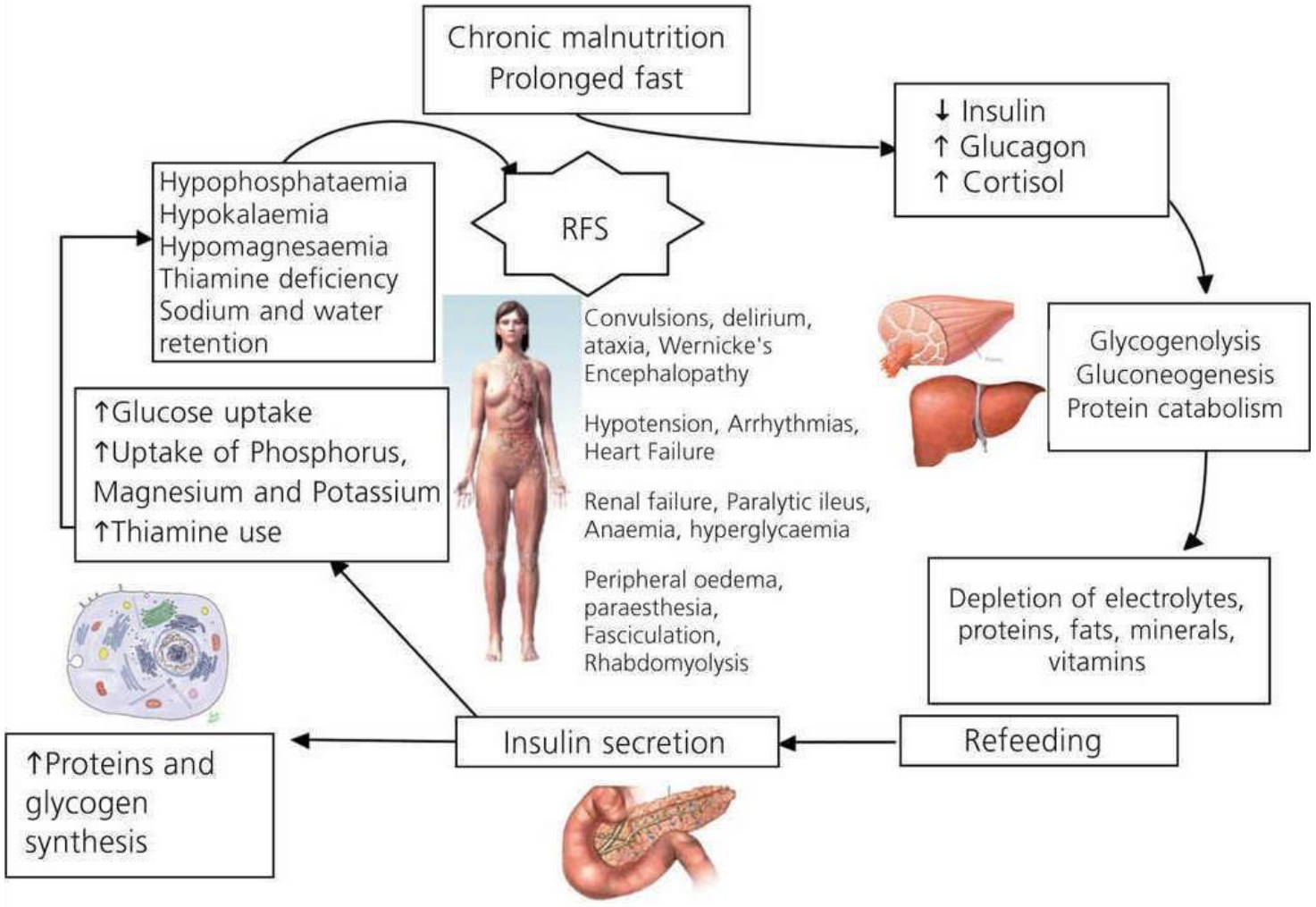
Pathophysiology



Adapted from: https://www.revistanefrologia.com/en-hydroelectrolytic-disorders-secondary-refeeding-syndrome-articulo-X2013251413002771

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Who develops RFS

Table 2 Patient characteristics that have been associated with increased risk of developing refeeding syndrome

- Anorexia nervosa
- Chronic alcohol abuse
- Elderly patients, especially nursing home residents
- Poorly controlled diabetics (likely to be fluid and electrolyte depleted)
- Patients with chronic malnutrition (marasmus)
- Morbid obese patients with rapid/profound weight loss
- Chronic malabsorptive disease states such as Crohn's disease, cystic fibrosis, short bowel syndrome
- Chronic diseases associated with undernutrition such as cancer, severe obstructive airways disease, liver cirrhosis
- Long-term users of diuretics (electrolyte depleted)
- Long-term users of antacids (phosphate binders)

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Adapted from: Walmsley, R.S. (2013), Refeeding syndrome in parenteral feeding. J Gastroenterol Hepatol, 28: 113-117. https://doi.org/10.1111/jgh.12345

Risk Factors

Table 3 Risk factors for developing refeeding syndrome

Major risk factors	Minor risk factors
• BMI < 16 kg/m^2 • Unintentional weight loss > 15% in previous 3–6 months • Little/no nutrient intake for > 10 days • Low levels of potassium, phosphate, magnesium prior to any feeding	• BMI < 18.5 kg/m^2 • Unintentional weight loss > 10% in previous 3–6 months • Little or no nutritional intake for > 5 days • History of alcohol misuse or drugs, including insulin, chemotherapy, antacids, or diuretics

One major risk factor or two minor risk factors suggests that the patient is at a high risk.[11]
BMI, body mass index.

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Diagnosis

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Refeeding

- Not without its complexities:
  - French cohort of patients with Anorexia Nervosa
  - 41 patients, average BMI was < 11.0
  - In this cohort 1 death, 2 AMI, 2 Pancreatitis, 5 Confusion
- Feeding should start at 10 kCal/kg/day increasing to full feeds over 4 days
- Thiamine should be supplemented 200mg – 300mg per day
- Keep close eye on Electrolytes
- If RFS develops then stop nutrition and correct electrolytes and try again, slowly.

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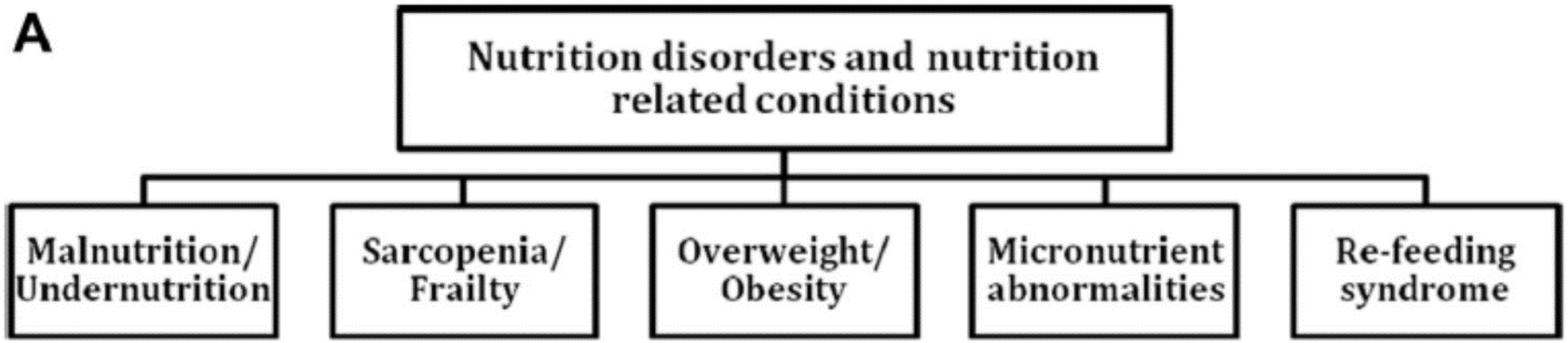

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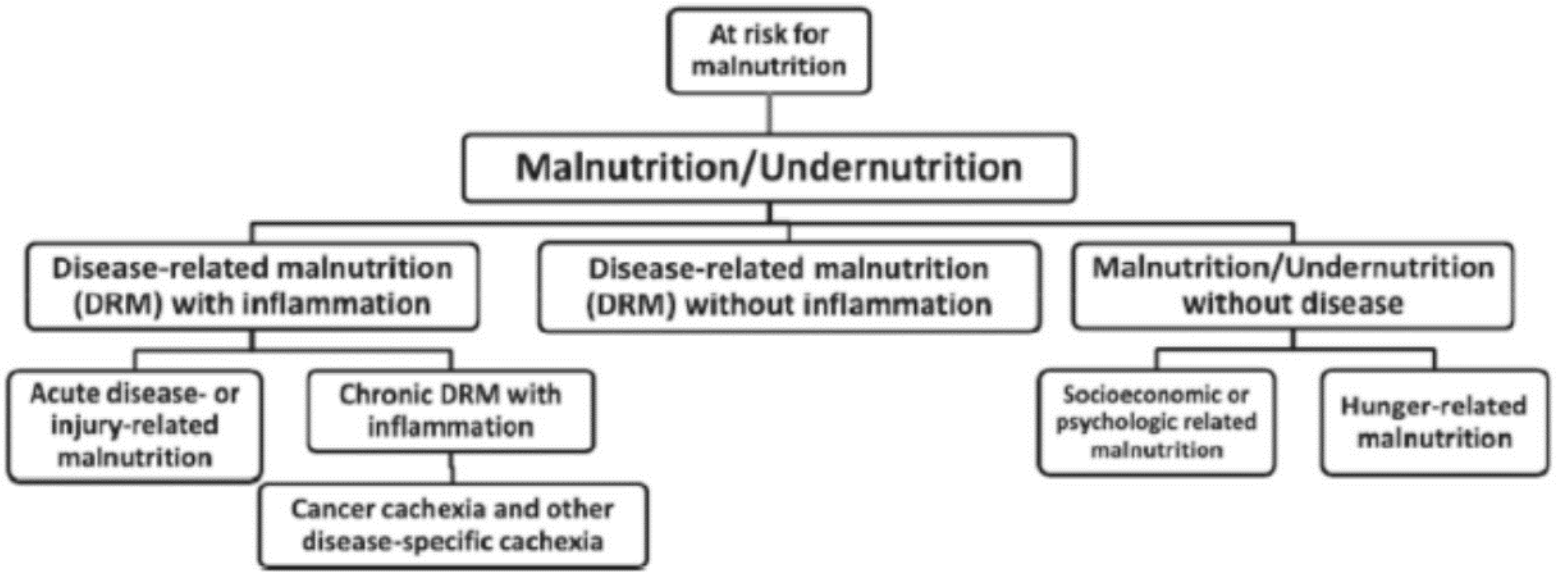

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