Malnutrition in surgical patients

Surgical Nutrition Training Module
Level 1
Philippine Society of General Surgeons
Committee on Surgical Training

- Malnutrition in surgical patients.
- This reality has not been given emphasis in the past surgical training modules thus it was decided by the Committee on Surgical Training of the Philippine Society of General Surgeons to develop a surgical nutrition training module for all residents, fellows, and consultants in general surgery in order to include the surgical nutrition care process in the daily practice of the general surgeon.
- This is the basic surgical nutrition training module which is the first part and the second part is the advanced surgical nutrition training module.
Objectives

- To define malnutrition and discuss its impact on the surgical patient
- To identify malnutrition in hospitalized surgical patients

The objectives of this presentation are:
- To define malnutrition and discuss its impact on the surgical patient
- To identify malnutrition in hospitalized surgical patients

Malnutrition is a syndrome. It is a collection of signs and symptoms that depicts the over-all manifestation of malnutrition which is either undernutrition or overnutrition.
These are the features of the malnutrition syndrome:

- Wasting / marasmus
- Cachexia
- Protein-energy malnutrition
- Sarcopenia
- Failure to thrive
- Obesity

Malnutrition syndrome: features

- **Wasting/marasmus**
  - Loss of body cell mass without underlying inflammatory condition; Pure starvation

- **Cachexia**
  - Loss of body cell mass with underlying inflammatory condition; Cytokine mediated
  - Cancer: moderate to advanced stage

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Cancer cachexia is induced by two areas:

- The tumor which produces two identified tumor derived enzymes
  - Proteolysis inducing factor (PIF) which causes proteolysis from the muscle stores thus losing amino acids
  - Lipid Mobilizing Factor (LMF) which causes lipolysis from the fat reserves resulting to fatty acid utilization
- The normal tissues which induce increased inflammation due to either cell ischemia or destruction which release cytokines like TNFα or pro-inflammatory interleukins

These are the inflammatory cytokines released both by the cancer and normal cells
- Pro-inflammatory: interleukin 1, interleukin 6, interleukin 8, and TNFα
- Anti-inflammatory: interleukin 4, interleukin 10, TGF

The end result is an increase in the loss of protein and fat which are ultimately converted to energy which is reflected by an increased energy expenditure
The overall effect is an increase in the complication rate
Malnutrition syndrome: features

• Protein-energy malnutrition
  – In modern healthcare this is often acute metabolic derangement driven by pro-inflammatory state; not classic PEM with clinical and metabolic evidence for reduced intake of protein and energy


Protein-energy malnutrition
• Today this is attributed to acute metabolic derangement driven by pro-inflammatory state; not classic PEM with clinical and metabolic evidence for reduced intake of protein and energy
Malnutrition syndrome: features

- Sarcopenia (mostly geriatric)
  - Age related loss of muscle; often with inflammation / cachexia overlap

- Failure to thrive
  - Classic pediatric growth failure syndrome
  - Now also applied in clinical practice to undernourished older persons in functional or cognitive decline (Alzheimer’s disease)


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This presentation of the progression of sarcopenia when the patient ages and the succeeding complications of effect of disuse and disease shows the effects on malnutrition development on both function and status.

Malnutrition syndrome: features

- Obesity: WHO (World Health Organization) criteria
  - BMI (Body Mass Index) = Weight in kg / Height in meter / Height in meter
    - 30 - 34.9 Obese class 1
    - 35 - 39.9 Obese class 2
    - 40 and above Obese class 3
    - 40 - 50 Morbidly Obese
    - > 50 Super-Obese

Obesity: WHO (World Health Organization) criteria
BMI (Body Mass Index) = Weight in kg / Height in meter / Height in meter

BMI values and nutritional status:
- 30 - 34.9 Obese class 1
- 35 - 39.9 Obese class 2
- 40 and above Obese class 3
- 40 - 50 Morbidly Obese
- > 50 Super-Obese
This summary of the malnutrition syndrome shows the two major types of body composition abnormalities:
- Undernutrition – with or without inflammation
- Overnutrition – with or without metabolic syndrome
  Both may have either macro or micronutrient deficiency

Hegazi R et al. TNT version 3, 2011.
Malnutrition process

- It is a continuum
  - Starts with poor intake
  - Effect of initiation and progress of the disease process: severity of disease and adequacy of intake
  - Effect of efforts to correct both body composition and disease process

The malnutrition process is a continuum

- Starts with poor intake
- Effect of initiation and progress of the disease process: severity of disease and adequacy of intake
- Effect of efforts to correct both body composition and disease process

This shows the need to intervene nutritionally as soon as possible in order to avoid more serious complications
Malnutrition concerns

- Lean body mass
  - Structure and function
  - Body composition capacity for healing and recovery
  - Quality of life
- Energy reserves
  - Function
  - Optimal utilization of substrates and protein synthesis

Malnutrition concerns (major areas for intervention)
- Lean body mass
  - Structure and function
  - Body composition capacity for healing and recovery
  - Quality of life
- Energy reserves
  - Function
  - Optimal utilization of substrates and protein synthesis
These are the effects of the malnutrition syndrome:

- Loss of lean body mass
- Structural and functional impairment
- Energy utilization problems
- Antioxidant capabilities
- Increased complications and mortality
What are the effects of surgery on the patient?

- Surgery is an injury process.
- Injury causes the inflammatory process to be activated in the local and systemic areas thus involving the cellular metabolism and functions that are programmed to bring about healing.
- The availability of the needed nutrients with interactions with other components of care (fluids and antibiotics) play a major role in the quality of recovery or healing especially the presence or absence of complications.
Surgery, wound healing, and nutritional status

The inflammation status during and after surgery brings about increased nutrient and energy requirements which are the reflections of cellular multiplication and tissue anabolism. Nutritional status is a major factor in the healing process with malnutrition resulting to poor healing and increased complications.

↑Energy needs = ↑ free radicals

Wound healing is an energy requiring process which is increased and the mitochondria and all of the cellular organelles which are involved in energy production and utilization will produce a lot of free radicals which if not neutralized will cause cell death. Thus antioxidants are found in every corner of the cell which make the healing process optimal and effective.
Role of nutrition in surgery

These are the areas where a lot of activity is happening during the process of healing after injury. Inflammation involves the complement, hemopoietic and immune system which are fully dependent on the major reserves (fat and protein) for full function. Keeping all the nutrients flowing will ensure the completion of the healing process which also includes resolution of any complication that arise.

Nutrition and wound healing

To summarize, the outcome of surgery is mainly dictated by the amount of reserves the body has which is quantified by the process of nutritional assessment. The quality of outcome, morbidity or mortality is mainly influenced by the patient’s nutritional status.
Malnutrition in surgical patients

**Surgical patients**
- 9% of moderately malnourished patients → major complications
- 42% of severely malnourished patients → major complications
- Severely malnourished patients are four times more likely to suffer postoperative complications than well-nourished patients

Detsky et al. *JAMA* 1994
Detsky et al. *JPEN* 1987

FOR EXAMPLE: In 1987, Detsky published a study of 202 patients hospitalized for major gastrointestinal tract surgery. Twenty seven percent (27%) of these patients had some degree of malnutrition, and 9% suffered from severe malnutrition.

This suggests that despite medical and technological progress, the prevalence of malnutrition among hospitalized patients is still consistently and significantly present. These data may be old (1987) but the situation continues to be consistent throughout the world. (1)

In Detsky’s study of surgical patients, 42% of those severely malnourished and 9% of those moderately malnourished suffered major complications.

References:
Malnutrition and costs

Malnutrition is associated with increased cost and the higher the risk the higher the number of complications plus cost.


Finally malnutrition and increased cost due to increased complications and length of hospital stay is one of the major reasons why nutrition should be a major component of surgical care.
To appreciate the value of nutritional assessment we need to know the consequences of malnutrition: These are:

1. Slow wound healing which results to complications and longer hospital stay
2. Reduced muscle strength which also leads to longer hospitalization
3. Decrease in respiratory muscle strength with slower recovery due to poor tissue oxygenation
4. Impaired cardiac function which leads to hypoperfusion, weakness and slow recovery
5. Immune hypofunction and dysfunction leading to increased infection and complications
6. Higher morbidity and mortality which is the result of the above conditions
7. Poor quality of life which is the ultimate complaint of the patient

Thus knowing that a patient has a poor nutritional status will guide us in avoiding the above complications of malnutrition
What is the prevalence of malnutrition in the hospital? Among surgical patients? Which are the severely malnourished and how did they fare after surgery? Is malnutrition a major factor in the outcomes?

Malnutrition detection for patients on admission or for surgery is currently based on two processes:
- Nutrition screening – rapid and encompassing
- Nutrition assessment – rapid and substantial
This is the Nutrition Assessment and Risk Level form.

Global hospital malnutrition as shown from 1974 to 1997 ranges between 27% to 50% emphasizing the problem of malnutrition in the patient care institutions.
Malnutrition is present in every hospital which reported their prevalence of malnutrition to the Philippine Society of Parenteral and Enteral Nutrition (PHILSPEN). Note the undernutrition or overnutrition prevalence, but what is significant here is the presence of severe malnutrition in 42% of patients in the country’s biggest government hospital.

The prevalence of malnutrition in the surgical and oncology sections is substantial in the different time frames of examination – 52% and 25% in the surgical unit and 64% to 53% in the cancer center.
The prevalence of malnutrition determination showed that every unit has a malnourished patient and this includes the cancer, general surgery, and orthopedic units.

Nutritionally high risk patients identified through a nutrition assessment process include cancer and surgical patients.

WHAT IS THE PREVALENCE OF MALNUTRITION AMONG SURGICAL PATIENTS IN YOUR CENTER?

This is the crux of the matter – what is the prevalence of malnutrition among surgical patients in your institution?
Malnutrition

- Is a syndrome
- Its presence in surgical patients influences outcome
- Detection and management is a priority in surgical patients
- Is prevalent in the surgical patient population

In conclusion:
- Malnutrition is a syndrome
- Its presence in surgical patients influences outcome
- Detection and management of malnutrition is a priority in surgical patients
- Malnutrition is prevalent in the surgical patient population