Nutrition Assessment in Surgical Patients

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Introduction

- Surgical patients face many metabolic and physiological challenges that may compromise nutritional status

- Post op nausea, vomiting, anorexia, pain may tax those undergoing surgery.

- Catabolism, infection and wound healing may be additional hurdles

- Of far greater concern for operated patients with nutritional deficit

- Pre op undernourished patients have a significantly greater risk of post op complications and death than those well nourished.
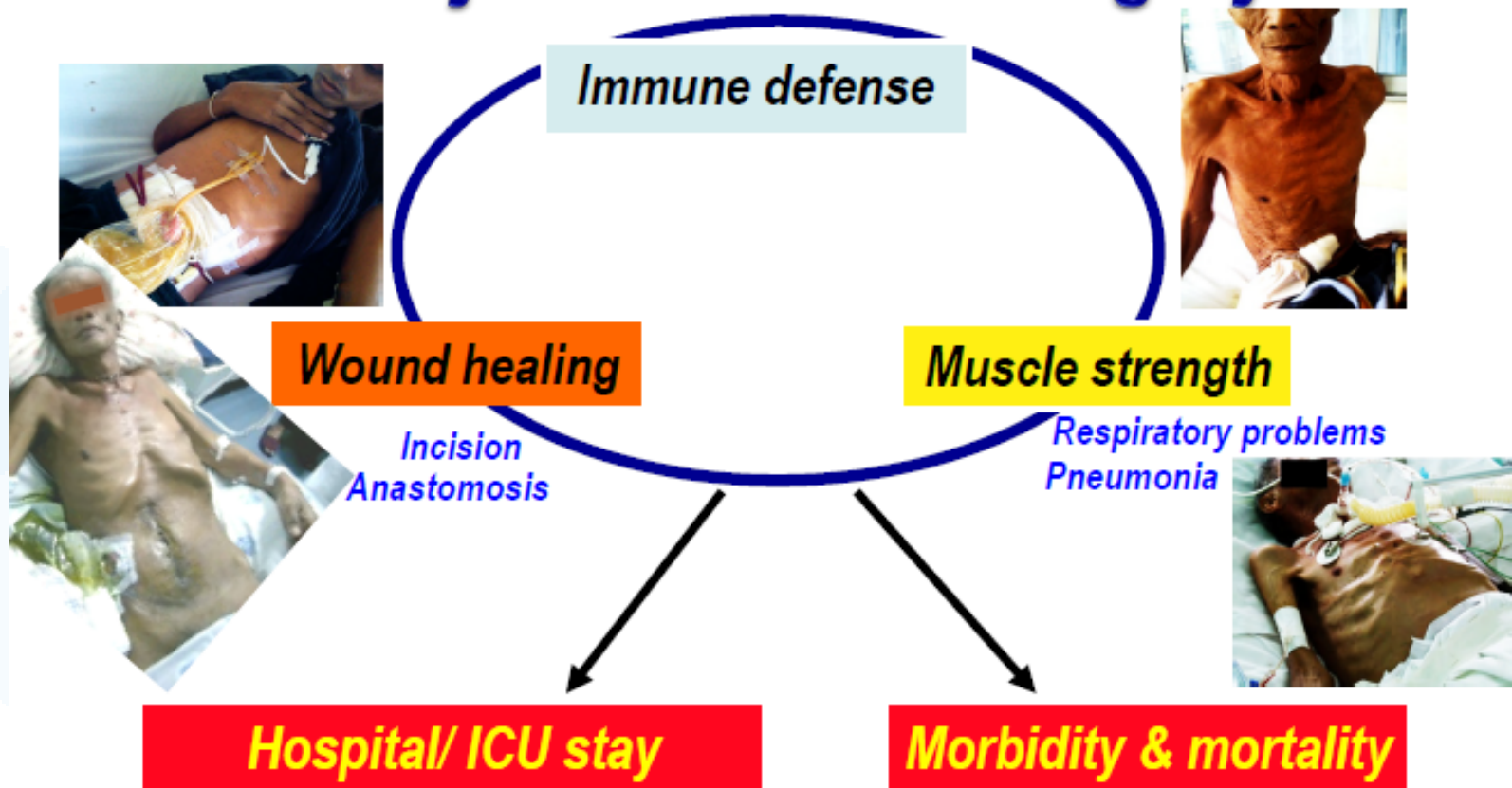
Importance of nutrition therapy in surgical patients
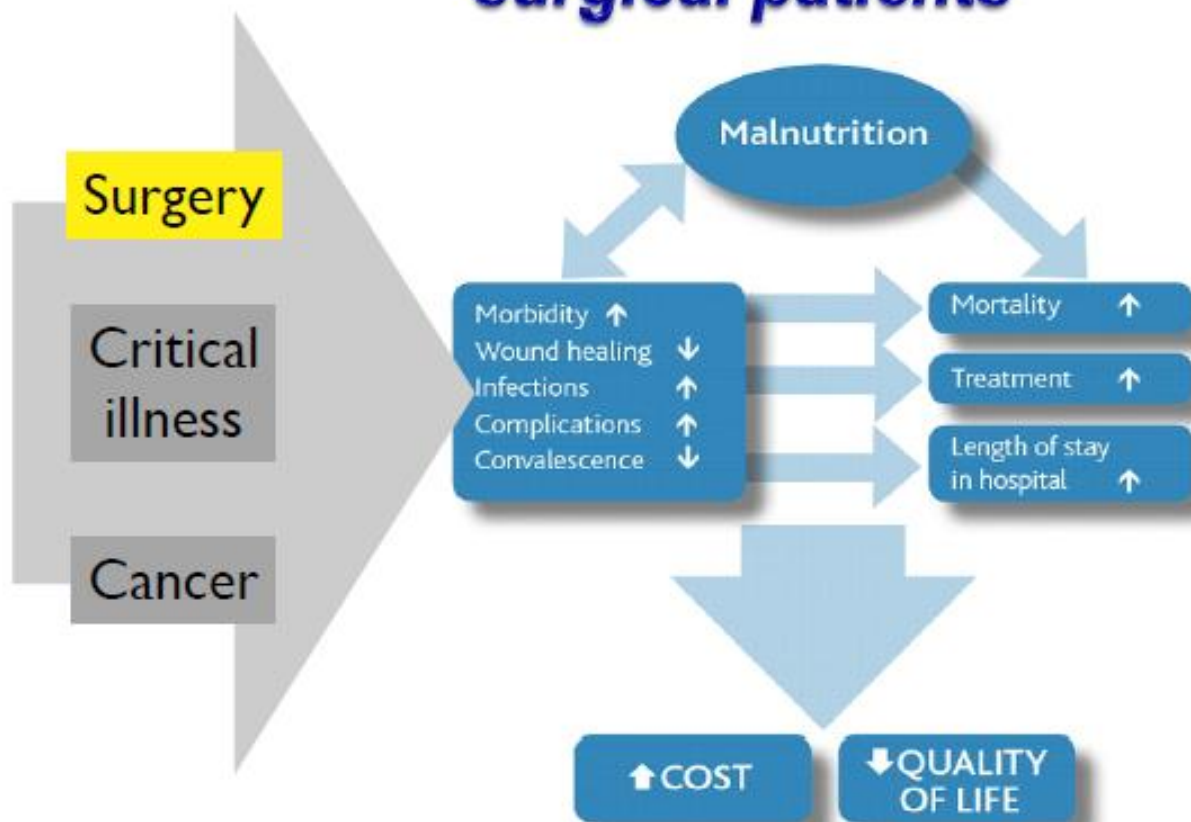
Poor Nutrition

- Can compromise the function of many organ systems including heart, lungs, kidneys and GI tract

- Immune function and muscle strength also impaired, leaving the patients more vulnerable to infectious complications, delayed wound healing, prolonged patient recovery and longer hospital stay

Catabolic stress & nutritional status in major abdominal surgery

Immune defense

Wound healing

Muscle strength

Incision
Anastomosis

Respiratory problems
Pneumonia

Hospital/ ICU stay

Morbidity & mortality

Loss of lean body mass = ↑mortality

Loss of Total LBM	Complications	Associated Mortality
10%	Decreased immunity Increased infections	10%
20%	Decrease in healing, increase In weakness, infection	30%
30%	Too weak to sit, pressure ulcers, Pneumonia, lack of healing	50%
40%	Death, usually from pneumonia	100%

LBM=Lean Body Mass

Demling RH. Nutrition, anabolism, and the wound healing process: an overview. Eplasty 2009;9:e9.

Nutrition intervention _does_ improve clinical outcomes

Impact of preoperative nutritional support on clinical outcome in abdominal surgical patients at nutritional risk

Bin Jie Ph.D. [a,b], Zhu-Ming Jiang M.D. [a,*], Marie T. Nolan Ph.D. [c], Shai-Nan Zhu M.P.H. [d], Kang Yu M.S. [e], Jens Kondrup M.D. [f]

Table 5
Complication rates in preoperative nutrition and control groups in patients with Nutritional Risk Screening Tool score of at least 5
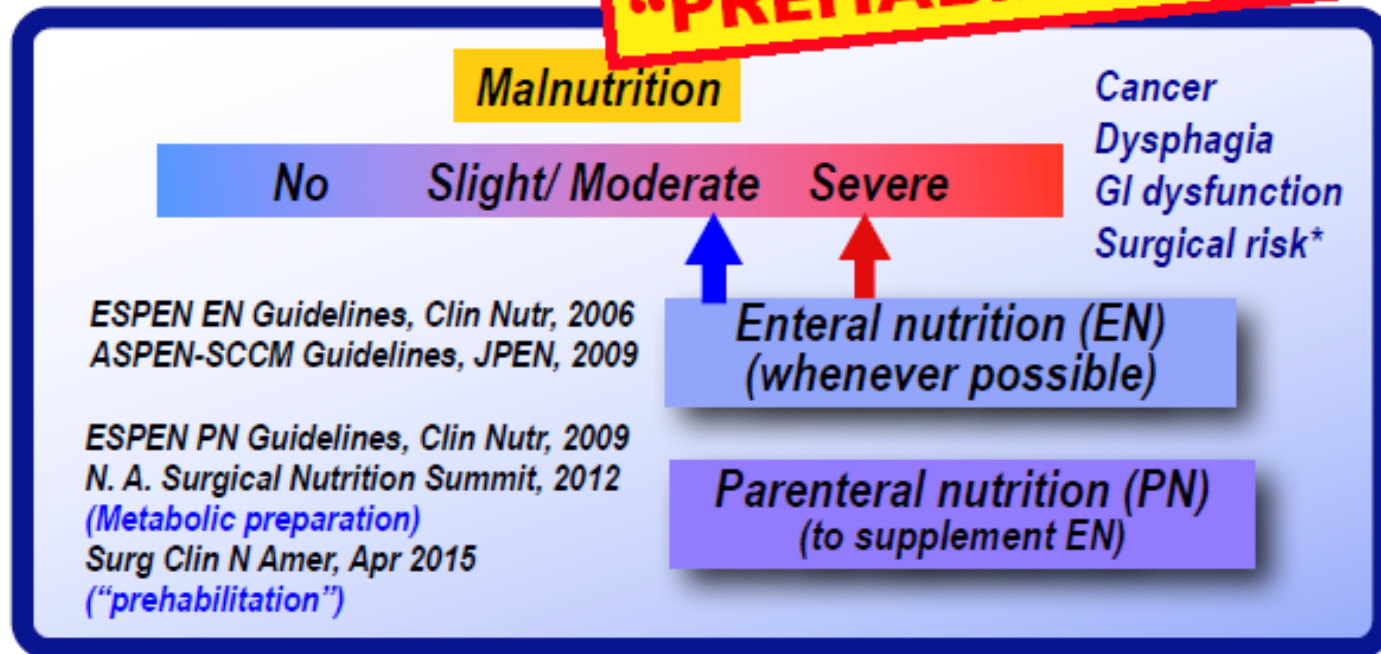
	Preoperative nutrition group ($n = 43$)	Control group ($n = 77$)	P
Overall complication rate	25.6% (11/43)	50.6% (39/77)	0.008
Infectious complication rate	16.3% (7/43)	33.8% (26/77)	0.040
Non-infectious complication rate	18.6% (8/43)	36.4% (28/77)	0.042

High-risk patients benefit from preoperative nutrition

B. Jie et al. Nutrition 28 (Oct 2012) 1022-1027

# Nutrition risk must be part of pre-op evaluation

- Identify patients with nutrition risk that may be optimized

- Patients with severe undernutrition benefit from nutritional support in major surgery even if surgery has to be delayed (Grade A)

"PREHABILITATION"

Malnutrition

| No | Slight/ Moderate | Severe |

Cancer
Dysphagia
GI dysfunction
Surgical risk*

ESPEN EN Guidelines, Clin Nutr, 2006
ASPEN-SCCM Guidelines, JPEN, 2009

Enteral nutrition (EN)
(whenever possible)

ESPEN PN Guidelines, Clin Nutr, 2009
N. A. Surgical Nutrition Summit, 2012
(Metabolic preparation)
Surg Clin N Amer, Apr 2015
("prehabilitation")

Parenteral nutrition (PN)
(to supplement EN)

Nutrition therapy: Part of multi-specialty approach

Multi factor approach to fast track surgery
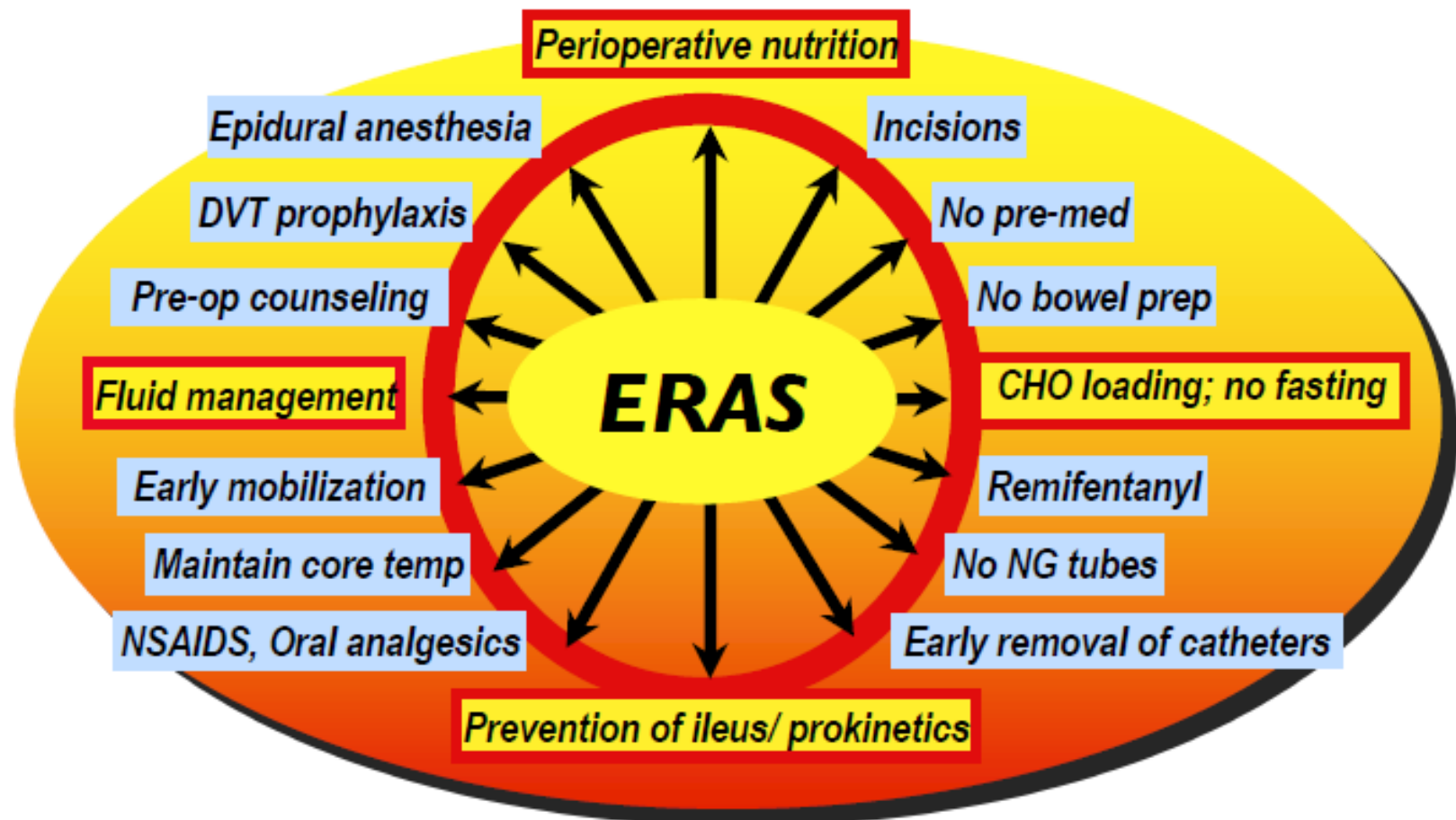
Nutrition screening, assessment and support must become an integral part of the multidisciplinary care of the surgical patients

Nutritional assessment

Comprehensive approach to defining nutritional status that uses –

- Medical, nutritional and medication histories,
- Physical examination, anthropometric measurements,
- Laboratory data and
- Personal judgement.

Purposes of Assessment

- ► Confirm malnutrition
  - ► All screening tools will have false positives= people who triggered risk but are not malnourished
- ► Clarify processes → inflammation and/or intake as root causes of wasting and weight loss
- ► Identify potential reasons for poor food intake e.g. nausea, dysphagia, self-feeding difficulties
- ► Identify intervention modes, best approaches
- ► Monitor intervention success – compare to a baseline

Keller, H.H. Aging Well with Nutrition. Second Edition. 2009

History

- Eating patterns
- Dietary restrictions
- Weight changes
- Any influences on nutritional intake or absorption

Anthropometric measurement

- Body weight and weight history
- BMI
  - More optional nutritional indicator
  - Useful tool particularly for the subset of surgical patients

- Mid arm circumference and mid arm muscle circumference
  - Provides measure of muscle mass

- Triceps and subscapular skinfold thickness
  - Provides an excellent index of body fat

Basic data requirements

Do a Nutrition Screen

Height (meters)
+
Weight (kg)
↓
Body Mass Index (BMI)
Wt (kg) / [Height (meters)]²

< 18.5	underweight
18.5 – 25	normal
25.1 – 30	overweight
>30	obese

- ▶ Body Mass Index
  - ▶ <18.5   underweight
  - ▶ 18.5 – 24.9 normal
  - ▶ 25 – 29.9   overweight
  - ▶ 30+   obese
- ▶ Severe weight loss
  - ▶ >5%   in 1 month
  - ▶ >7.5%   in 3 months
  - ▶ >10%   in 6 months
- ▶ Mid Arm Circumference
  - ▶ Male: <17.6 cm
  - ▶ Female: <17.1 cm

Height and weight taken from regularly calibrated instruments

Measurement of Organ Function

- Malnutrition leads to impaired muscle strength

- Hand grip dynamometry
- Respiratory function tests

- Results are influenced by Nutrition state, cooperation and pulmonary disease

Bioelectrical Impedance Analysis

- Non invasive method
- Based on differences in conductivity of fat and fat free mass
- Impedance of the body to an electrical current is measured
- Resistance between right wrist and right ankle is measured
- Calculate the conductivity

Immunological assessment

- Malnutrition leads to anergy
- Loss of cutaneous responses to antigens traditionally determined by Mantoux response
- Total lymphocyte count is depressed

Laboratory Tests

Albumin

- Traditionally used as nutritional marker and prognostic indicator
- Normal – 3.5 – 5.0 g/dL
- Half-life – 20 days

Prealbumin

- Transthyretin – a transport protein for thyroid hormone

- Normal – 16-40 mg/dL

- >16 mg/dL are associated with malnutrition

- Half-life – 2 – 3 days

- More reliable marker of acute change in nutritional status

Transferrin

- Transport protein for iron

- Relatively long half-life 8-10 days

- Influenced by several factors (liver disease, fluid status, stress and illness)

- Unreliable in assessment of malnutrition

- Expensive

Subjective Global Assessment (SGA)

- Certain components of nutritional assessment have been combined into clinical tool described as SGA

- Combines data from weight and dietary histories with physical examination, observation

- Subjectively classified patients as well nourished, moderately malnourished and severely malnourished

- SGA is fairly simple, inexpensive and easily be taught to a variety of clinicians

- Trained professionals assess food intake, functional status, and body composition.

Subjective Global Assessment: Components

History: Changes in dietary intake
Gastrointestinal and other symptoms that impair food intake/absorption
Functional capacity
Potential stress of disease and/or cachexia
Changes in weight over past 6 months
Tragedy of recent changes

Physical: Loss of subcutaneous fat: triceps, chest, trunk
Muscle wasting: deltoids, quadriceps, biceps, …
Edema: ankle, sacral, ascites; clarifies potential cause of weight changes

Detsky et al.1987 *JPEN*

SGA A (Well Nourished)

- no decrease in food intake
- < 5% weight loss
- no/minimal symptoms affecting food intake
- no deficit in function
- no deficit in fat or muscle mass

OR

An individual with some criteria for SGA B or C but with recent adequate food intake; non-fluid weight gain; significant recent improvement in symptoms allowing adequate oral intake; significant recent improvement in function; and chronic deficit in fat and muscle mass, but with recent clinical improvement in function.

SGA B (Moderately Malnourished)

- definite decrease in food intake
- 5% - 10% weight loss without stabilization or gain
- mild/some symptoms affecting food intake
- moderate functional deficit or recent deterioration
- mild/moderate loss of fat and/or muscle mass

OR

An individual meeting criteria for SGA C but with improvement (but not adequate) of oral intake, recent stabilization of weight, decrease in symptoms affecting oral intake, and stabilization of functional status.

SGA C (Severely Malnourished)

- severe deficit in food/nutrient intake
- > 10% weight loss which is ongoing
- significant symptoms affecting food/nutrient intake
- severe functional deficits

OR

Recent significant deterioration obvious signs of fat and/or muscle loss.

Subjective Global Assessment of Nutritional Status
Surgical Ward, New Yangon General Hospital

Name..   ... .   Age/Sex....   .. . .   RN.................... ..

A.History

1. Weight Change

Overall loss(past 6 months):	
Percent loss:	
Change in past 2 weeks:	
Increase	
No change	
Decrease	

2.Dietary intake change relative to normal

No change:	
Change:	
Duration	(weeks)
	(months)
Type:	
Suboptimal solid diet	
Full liquid diet	
Hypocaloric liquid diet	
Starvation	

3.Gastrointestinal symptoms
(Persisting more than 2 weeks)

None	
Nausea	
Vomitting	
Diarrhoea	
Anorexia	

4.Functional capicity

No dysfunction:	
Dysfunction:	
Duration	(weeks)
	(months)
Type:	
Working suboptimally	
Ambulatory	
Bedridden	

5. Disease and its relationship to nutritional requirements

Primary diagnosis:	
Metabolic demand/stress:	
None	
Low	
Moderate	
High	

B. Physical Examination

For each specify:	0 = normal
	1+ = mild
	2+ = moderate
	3+ = severe
Loss of subcutaneous fat (triceps, chest)	
Muscle wasting (quadriceps, deltoids)	
Ankle edema	
Sacral edema	
Ascites	

C. Subjective Global Assessment Rating

A. Well nourished	
B. Moderately (or suspected of being) malnourished	
C. Severely malnourished	

Height	
Weight	
BMI	

Surgical ward, NYGH

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Onodera's Prognostic Nutritional Index (OPNI)

- In 1984, Onodera et al. first reported the validity of the OPNI to predict prognosis in 189 GI surgical patients who were malnourished and treated by TPN.

- This index provided an accurate, quantitative estimate of operative risk.

Prognostic Nutritional Index

10 x serum albumin (g/dL) + 0.005 x Total lymphocyte count in peripheral blood (/mm^3)

▶ NPI < 46 → malnutrition

▶ NPI ≥ 46 → adequate nutrition

- The index exhibits predictive capabilities for the stratification of patients at increased risk of postoperative morbidity and mortality

- Moreover, this index may be of use in identifying candidate patients who would benefit from perioperative nutritional support to improve surgical outcomes.

Conclusion

- Perioperative nutrition is very important in surgical patient care, nowadays

- From the nutritional assessment, patients can be provided preoperative nutritional support

- Complication rate of the surgical patients can be reduced with perioperative nutritional support, ultimately

- SGA is now used for diagnosing malnutrition in hospital.
- SGA predicts a variety of nutrition related outcomes and this has been demonstrated in several studies worldwide

Thanks for kind attention!