

Assessing nutritional status

Small group session

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CanMEDS Roles Covered

X	Medical Expert (as <i>Medical Experts</i> , physicians integrate all of the CanMEDS Roles, applying medical knowledge, clinical skills, and professional values in their provision of high-quality and safe patient-centered care. <i>Medical Expert</i> is the central physician Role in the CanMEDS Framework and defines the physician's clinical scope of practice.)
	Communicator (as <i>Communicators</i> , physicians form relationships with patients and their families that facilitate the gathering and sharing of essential information for effective health care.)
X	Collaborator (as <i>Collaborators</i> , physicians work effectively with other health care professionals to provide safe, high-quality, patient-centred care.)
X	Leader (as <i>Leaders</i> , physicians engage with others to contribute to a vision of a high-quality health care system and take responsibility for the delivery of excellent patient care through their activities as clinicians, administrators, scholars, or teachers.)
X	Health Advocate (as <i>Health Advocates</i> , physicians contribute their expertise and influence as they work with communities or patient populations to improve health. They work with those they serve to determine and understand needs, speak on behalf of others when required, and support the mobilization of resources to effect change.)
	Scholar (as <i>Scholars</i> , physicians demonstrate a lifelong commitment to excellence in practice through continuous learning and by teaching others, evaluating evidence, and contributing to scholarship.)
X	Professional (as <i>Professionals</i> , physicians are committed to the health and well-being of individual patients and society through ethical practice, high personal standards of behaviour, accountability to the profession and society, physician-led regulation, and maintenance of personal health.)

Conflict of Interest Disclosure

(Over the past 24 months)

Name: Dre Marie-Pier Bachand

Commercial or Non-Profit Interest	Relationship
Shire	Advisory Board
Abbvie	Advisory Board, speaker
Fresenius Kabi	Speaker
Baxter	Speaker

Conflict of Interest Disclosure

(Over the past 24 months)
Name: Dre Jessie Hulst

Commercial or Non-Profit Interest	Relationship
CMTF	Co-chair pediatric working group

- *At the end of this session participants should be able to:*
 - Describe different tools for nutritional assessment and their validity
 - Understand how to conduct a nutrition examination in pediatric and adult patients
 - Apply nutrition assessment in everyday practice

In other words...

- Why nutrition evaluation is mandatory ?
- What is the difference between screening and assessment ?
- When to screen ?
- Who should conduct nutrition assessment vs screening ?
- How to conduct a nutrition assessment ?
- Where and when to refer ?

- Undernutrition – still the **most prevalent condition** in the hospital and outpatient settings in the world
 - 20-80% (depends on the group of patients evaluated and method used)
- In Canada:
 - Prevalence of malnutrition (SGA B+C) in adults: 45%
 - Longer length of stay
 - Medical stays ↑ by 23% for moderately malnourished patient
 - Surgical stays ↑ by 32% for moderately malnourished patient
 - Costs: 1500-2000\$ per malnourished patient (in 2012)
 - 2x more risk to be readmitted in 30 days
 - Decreased quality of life

Correia and al., Prevalence of hospital malnutrition in Latin America: the multicenter ELAN study. Nutrition.2003;19(10):823-825.

Ferreira et al., Assessment of nutritional status of patients waiting for liver transplant. Clin Transplant. 2011;25(2):248-254.

Russel Ca, Elia M. Malnutrition in the UK: where does it begin? Proc Nutr Soc. 2010;69(4):465-469.

Corkins M and al., Malnutrition diagnoses in hospitalized patients; united states, 2010. JPEN J Parenter Enteral Nutr. 2014;38(2):186-195.

Curtis and al., clinical nutrition, september 2016 DOI 10.1016/j.clnu.2016.09.009
Canadian malnutrition task force (CMTF): nutritioncareincanada.ca

- Children more prone for developing malnutrition
 - Higher energy needs per unit of body mass
 - Increased caloric need for growth
 - Limited stores
- Pediatric prevalences: 2.5-51% in mixed population
- Undernutrition often not recognized at hospital admission or in outpatient settings
- Focus on treatment of disease rather than poor nutritional state
- Lack of nutritional education in medical curriculum

Case 1

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- 45 years old man
- Known for
 - Recurrent acute pancreatitis (auto-immune ?) with chronic pancreatitis
 - Cholecystectomy
 - Ileal Crohn's disease with complex fistula (recent colonoscopy: remission)
 - Failure anti-TNF and anti-IL23
 - Ileocecal resection and many other small bowel resection (short bowel)
 - Spondylitis ankylosing
 - Pulmonary embolism
- Treatment:
 - Narcotic
 - Amitriptyline
 - Vedolizumab
 - Venlafaxine
 - Dexlansoprazole
 - Pancreatic enzyme
 - Warfarin
 - Vitamin B12, D
 - Weekly IV magnesium



Case 1

- Follow-up ambulatory visit for Crohn's disease
- History:
 - Since one month
 - Bloating
 - Nausea and vomiting
 - Abdominal pain
 - Lack of energy (do walking alone. Can't go to the grocery. Sleep +++)
 - Loss appetite (take one meal a day)
 - But 4 stools per day as usual. No new fistula. No fever.
- Physical exam...



Case 2

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- 13 year old girl
- Known with cystic fibrosis
 - Failure to thrive in first months
 - Diagnosis at age 5 months
 - Mutations dF508/ R553X
 - Pancreas insufficient
 - Good clinical condition and lung function
- No weight loss
- GI treatment:
 - PERT
 - Vitamin ADEK
 - ONS
 - PEG 3350



Referral to GI because of low BMI
=> indication for Gtube?

What do you search for?



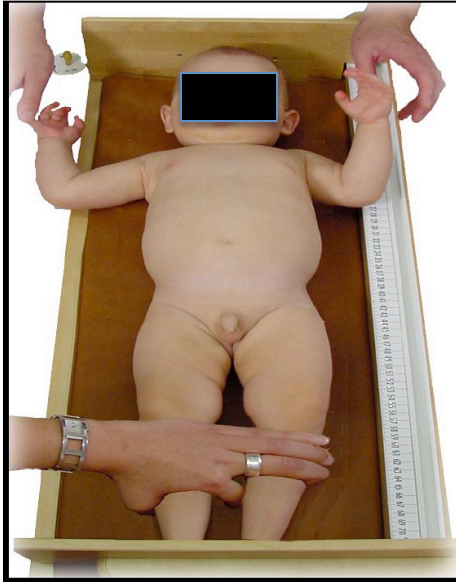
Are these children malnourished?

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What clinical signs you can look for?

- Hypothermia
- Dehydration with low blood pressure, high heart rate
- Persistent fatigue
- Lethargy or unconsciousness
- Dull, dry, thin or discolored hair
- Dental problems
- Mouth sores, thrush or difficulty swallowing
- Dry or flaking skin
- Pallor



What clinical signs you can look for? (2)

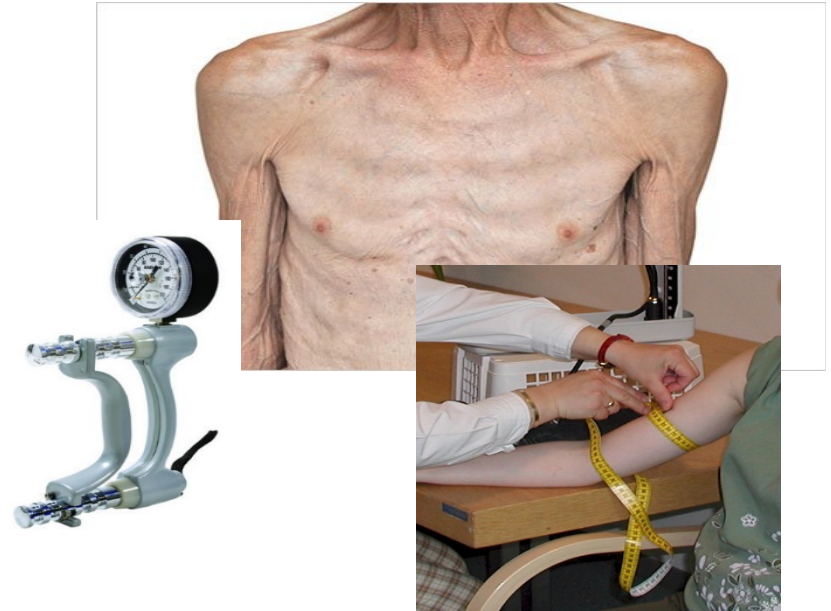
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- Wasting:
 - Reduced fat in the buttocks
 - Loss of muscle bulk around the shoulders, arms and legs
 - Outline of ribs seen easily
 - Hips small compared with chest and abdomen
- Extreme weakness



Clinical signs

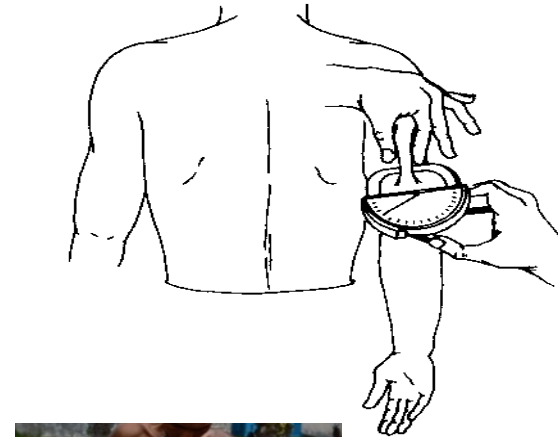
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- Lack fat under the skin
- Swollen gums
- Bilateral pitting edema (hypoalbuminemia)



Aibolita.com
Lematin.ch
En.wikipedia.org

Clinical signs - pediatrics

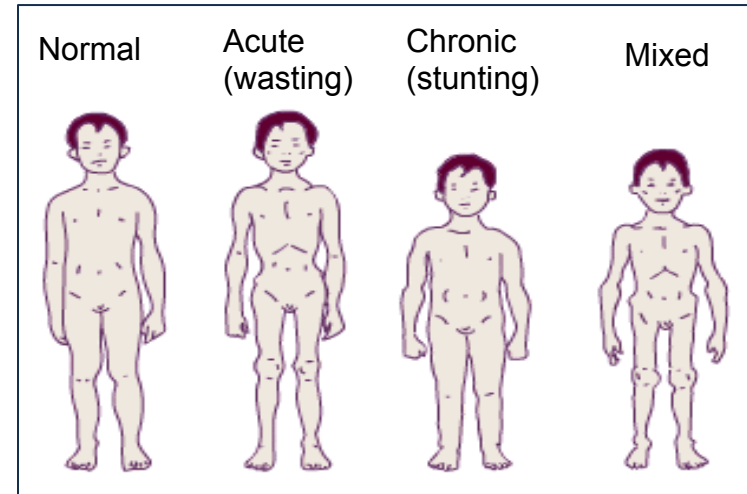
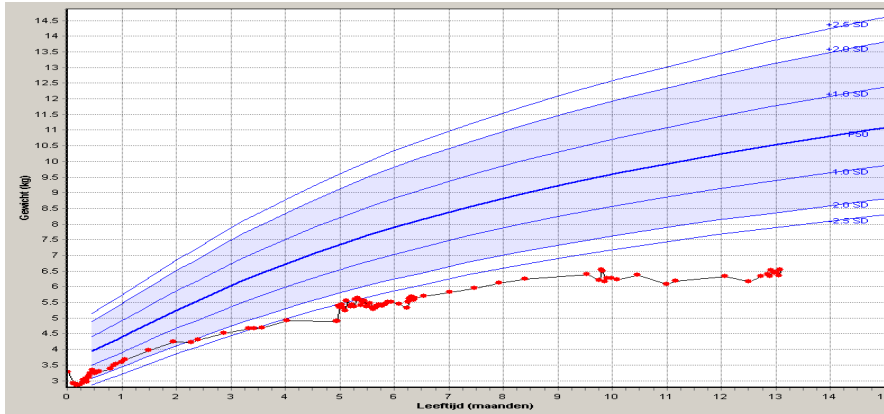
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- Assess Growth chart!
- Use evolution of weight and height over time
=> assess deviations



Academy of Nutrition and Dietetics/ASPEN 2014 Pediatric Malnutrition Consensus Statement

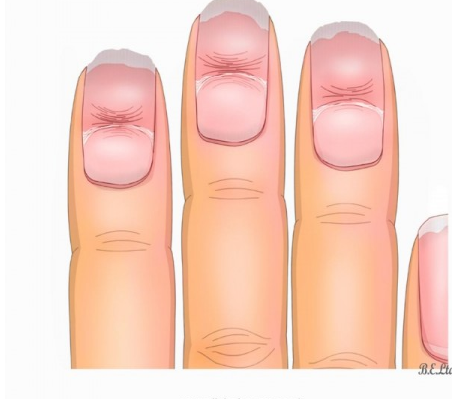
Interpreting Malnutrition with z-scores (single data point available)

Indicator (z-score)	Mild Malnutrition	Moderate Malnutrition	Severe Malnutrition
Weight for Height	-1 to -1.9	-2 to -2.9	-3 or less
BMI for age	-1 to -1.9	-2 to -2.9	-3 or less
Length/Height for age	No Data	No Data	-3 or less
Mid-upper Arm Circumference	-1 to -1.9	-2 to -2.9	-3 or less

Pediatric malnutrition indicators (2)

Interpreting Malnutrition (when 2 or more data points available)			
Indicator	Mild Malnutrition	Moderate Malnutrition	Severe Malnutrition
Weight gain velocity (<2 years)	<75% of norm	<50% of norm	<25% of norm
Weight loss (2-20 years)	5% UBW	7.5% UBW	10% UBW
Decline in weight for length/height z-score	↓ of 1 z-score	↓ of 2 z-scores	↓ of 3 z-scores
Inadequate nutrient intake	51-75% estimated energy/protein	26-50% estimated energy/protein	≤25% estimated energy/protein

Abnormal nails



transverse ridges, horizontal
grooves on the nail:
Beau's lines

Zinc, hypocalcemia



Muehrcke's lines
transverse white lines

Malnutrition, hypoalbumemia

Eye problems

Dry eyes

Night blindness



Bitot spot

Vitamin A



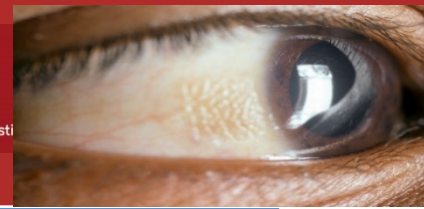
Angular
blepharitis

Riboflavin,
biotin, vitamine
B6, zinc

Micronutrients deficiency: physical exam

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Signs	Micronutrients/nutrients deficiency
Alopecia	Iron, zinc, protein
Depigmentation, color change	Protein-calorie malnutrition, manganese, selenium, copper
Corkscrew hair, unemerged coiled hairs	Vitamine C
Flag sign (alternate banding of dark and light colors in hair-lack of melanin)	Protein-calorie
Lanugo	Calorie
Pale conjunctiva	Vitamine B6, vitamine B12, folate, iron, copper, anemia
Angular blepharitis (inflammation of eyelids)	Riboflavin, biotin, vitamine B6, zinc
Night blindness, dry membrane, dull cornea, ulcerated eye - keratomalacia	Vitamin A
Bitot's spot	Vitamine A
Ophtalmoplegia	Thiamin, phosphorous
Pallor	Iron, folate, vitamin B12, vitamin C
Hyperpigmentation (sun-exposed-skin)	Niacin
Goiter	Iodine

Micronutrients deficiency



Signs	Micronutrients/nutrients deficiency
Angular stomatitis or cheilitis	Ribboflavin, Niacin, Iron, Vitmain B6, B12
Burning, soreness mouth	Riboflavin
Smooth, beefy red tongue	Niacin, vitamin B12
Gingivitis, bleeds easily, spongy and swollen gums	Vitmain C, niacin, folate, zinc
Hypogeusia, dysgeusia	zinc
Beau's line (transverse ridges, horizontal grooves on the nail)	Zinc, hypocalcemia, protein
Muehrcke's lines (transverse white lines)	Malnutriiton, hypoalbuminemia
Koilonychia (spoon-shaped nail)	Iron, protein, anemia
Brittle, soft, dry split easily nails	Magnesium, severe malnutrition
Slow wound healing	Zinc, vitamin C, protein, hydratation
Eczema	Biotin, zinc
Follicular Hyperkeratosis	Vitamin A and C
Petechia	Vitamin C, vitamin K



- Physical exam:
 - Pale, look tiredness, dryness of mouth mucosa
 - BP 106/67, T 36,8, HR 90
 - Weight 56,2 kg (usual weight: 60 kg 3 months ago): 6% loss
 - Height 1m 68 BMI: 19,9
 - Right hypochondrial pain at palpation
 - See ribs easily
 - Pitting edema of leg and pre-sacral
 - Difficult to stand up from the chair



Case 2

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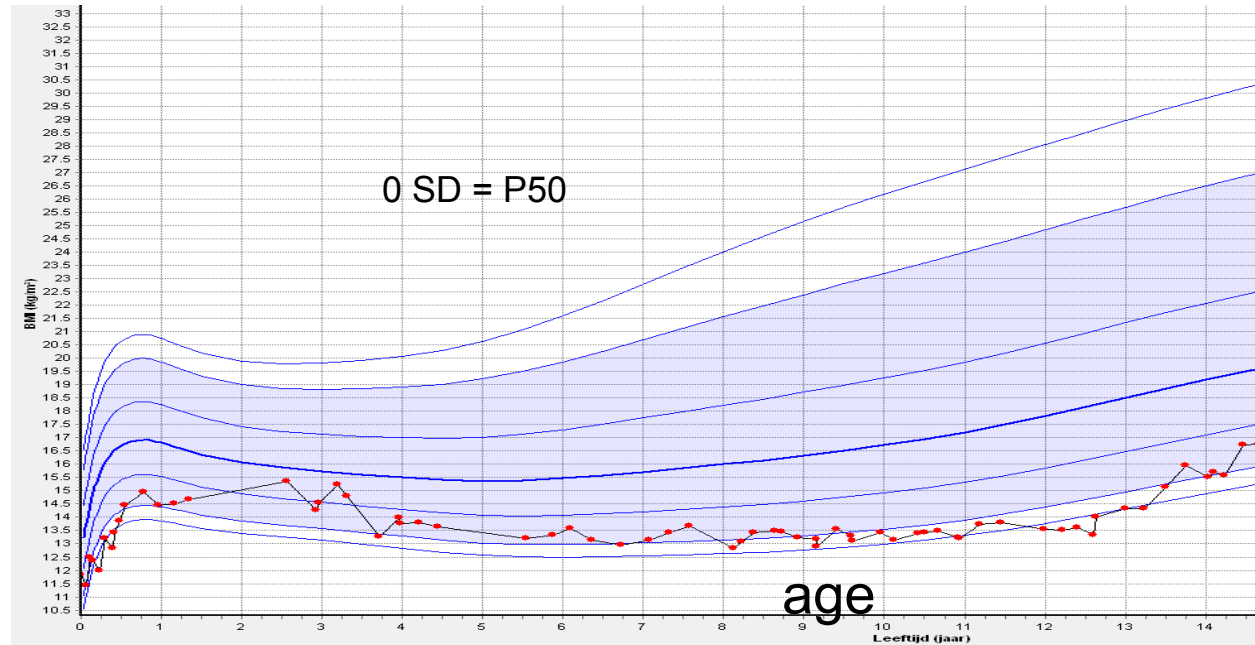
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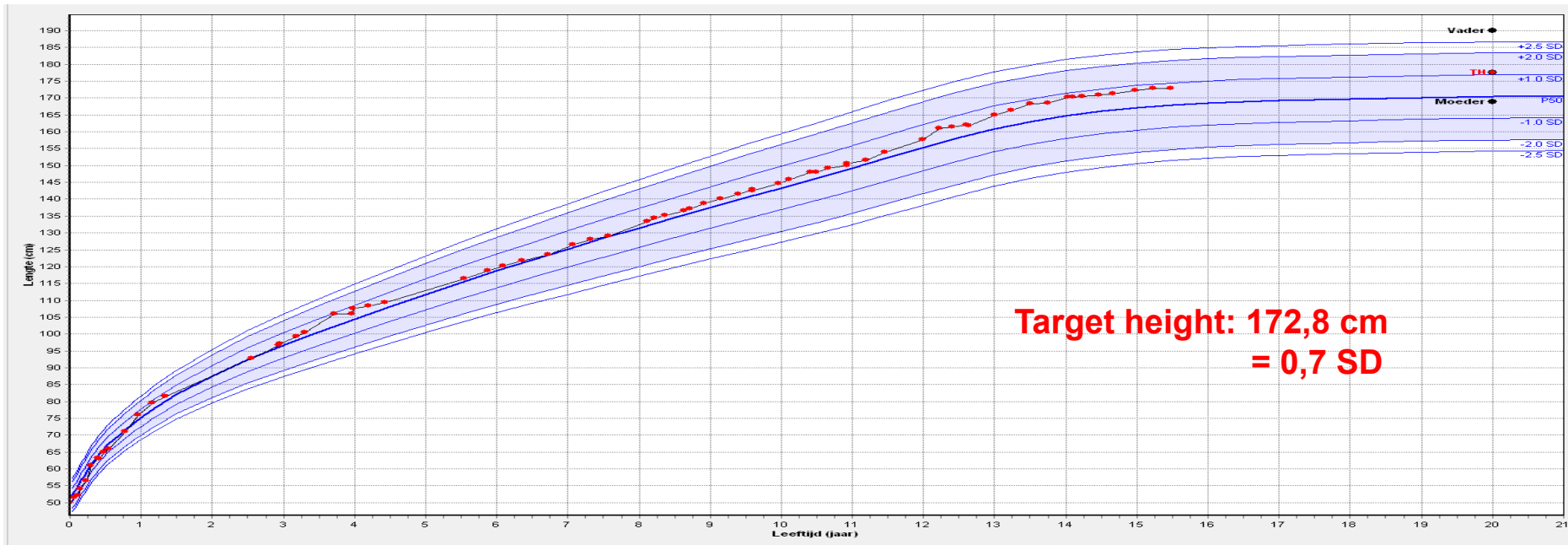
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Physical exam and growth curve assessment

- Looks well
- Tall, muscular
- Limited subcutaneous fat
- No edema, normal skin
- Normal pubertal development



Case 2: height-for-age



Questions

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- What is the difference between nutrition screening and assessing?
- How do you screen this patient?
- What to do with this patient in your office?



- Malnutrition: obesity and **undernutrition**
 - **REMEMBER:** Unintentional loss of body weight is the basis characteristic of undernutrition
 - caused by decreased food intake - lack of appetite, alone or with inadequate utilization of nutrients or increased losses as well as requirements.
- Screening:
 - A process to identify an individual who is at risk of undernutrition
- The main risk factors leading to undernutrition:
 - Chronic or acute disease state per se alone or in conjunction with
 - social segregation (elderly, psychological diseases)
 - low economic status
 - lack of medical awareness
 - longer hospitalizations

- Purpose of screening tools: to early identify patients who may benefit from further assessment and nutritional intervention which is likely to influence **outcome**
- Patients in actual normal nutritional status with a condition or circumstances that **increase** can also be identified!



- Age > 70 years old
- Cancer
- Sepsis
- Chronic illness:
 - Digestive, organic insufficiency, neuromuscular disease, diabetes, inflammatory syndrome
- HIV, AIDS
- Major digestive surgery (short bowel, Whipple, gastrectomy, bariatric surgery)
- Persistent symptoms
 - Dysphagia, pain, nausea, vomiting, diarrhea, dyspnea



- Young age
- Multiple diagnoses/complex care
- Critically ill
- Chronic conditions:
 - Neurological impairment
 - CF
 - Cancer
 - Congenital heart disease
- Prolonged hospital stay



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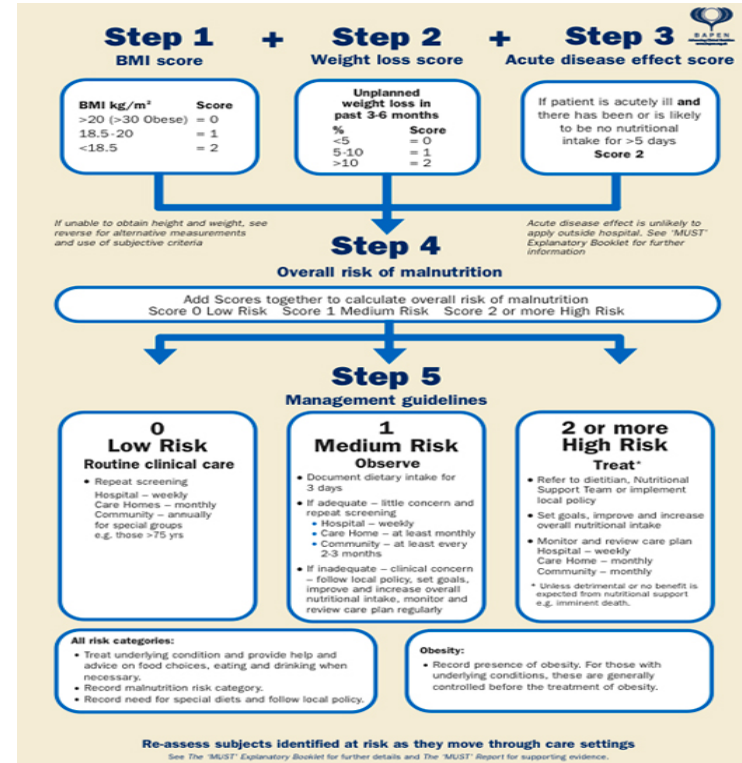
Who should be screened?

- Everyone: Should be part of the evaluation of a patient
 - Unfortunately: not a world-wide mandatory process
- Professional society guidelines recommend:
 - Routine nutrition screening at hospital admission
- In your office:
 - Think about risk factors
 - Don't forget to obtain measurements (every visit)
 - Weight: adults and children
 - Height: children



NST layout

- Questionnaire form
- Outline predictors of undernutrition
- Each step bears a numeric score
- Overall score reflects malnutrition risk
=> low, medium, high
- A defined action plans follows
 - No action, observation, dietetic referral/ involvement



- The ideal screening tool:
 - Easy
 - Quick
 - High sensitivity and specificity with good accuracy in detecting the nutrition risk while identifying nutrition-related outcomes
- Validity of screening tools - adults
 - Systematic review (van Bokhorst et al)
 - 83 studies (32 screening tools):
 - None performed consistently well
 - New tools: redundant

Van Bokhorst-de van der Shueren and al., nutrition screening tools: does one size fit all ? A systematic review of screening tools for the hospital setting. Clin nutr., 2014,33 (1): 39-58.

Validated nutrition screening tools ADULT PATIENTS

- Hospital use
 - Malnutrition screening tool (MST)
 - Mini nutritional assessment short form (MNA-SF)
 - Nutritional risk screening 2002 (NRS 2002)
 - Malnutrition Universal screening tool (MUST)
 - Short nutritional assessment questionnaire (SNAQ)
 - Canadian nutrition screening tools (CNST)

SNAO

Short Nutritional Assessment Questionnaire

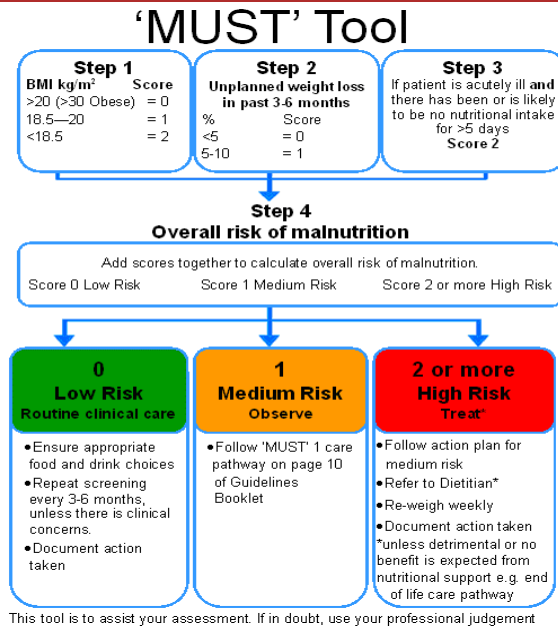
- Did you lose weight unintentionally?
More than 6 kg in the last 6 months
More than 3 kg in the last month
- Did you experience a decreased appetite over the last month?
- Did you use supplemental drinks or tube feeding over the last month?



- no intervention
- moderately malnourished; nutritional intervention
- severely malnourished; nutritional intervention

Malnutrition Screening Tool (MST)

- Has the resident **lost weight recently** without trying ?
 - No 0
 - Yes, how much (kg)?
 - 1-5 1
 - 6-10 2
 - 11-15 3
 - >15 4
 - Unsure 2
- Has the resident been **eating poorly** (for example less than ¾ of usual intake) because of a decreased appetite?
 - No 0
 - Yes 1



This tool is to assist your assessment. If in doubt, use your professional judgement

Nutrition: NRS, 2002 ESPEN Guideline

Score	Impaired Nutritional Status	Severity of disease (increase in requirements)
Absent Score 0	Normal nutritional status	Absent Score 0
Mild Score 1	Wt loss >5% in 3 mos or food intake below 50-75% of normal requirement in preceding week	Mild Score 1 Hip fracture, Chronic patients in particular with acute complications: cirrhosis, COPD, chronic hemodialysis, diabetes, oncology
Moderate Score 2	Wt loss >5% in 2 mos or BMI 18.5-20.5 = impaired general condition or food intake 25-40% of normal requirement in preceding week	Moderate Score 2 Major abdominal surgery, Stroke, Severe Pneumonia, hematologic malignancy
Severe Score 3	Wt loss >5% in 1 mo or BMI <18.5 = impaired general condition or food intake 0-25% of normal requirement in preceding week	Severe Score 3 Head injury, Bone marrow transplantation, intensive care patients (APACHE >10)
Score	++	Score
Age	If >=70 years old, add 1 to total score = age adjusted total score	
Score >=3:	the patient is nutritionally at risk and a nutritional care plan is initiated	
Score <3:	weekly re-screening of the patient. If the patient e.g. is scheduled for a major operation, a preventive nutritional care plan is considered to avoid the associated risk status.	

Mini Nutritional Assessment MNA[®]

Nestlé Nutrition Institute

Last name: _____ First name: _____

Sex: _____ Age: _____ Weight, kg: _____ Height, cm: _____ Date: _____

Complete the screen by filling in the boxes with the appropriate numbers. Total the numbers for the final screening score.

Screening

A Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?
 0 = severe decrease in food intake
 1 = moderate decrease in food intake
 2 = no decrease in food intake

B Weight loss during the last 3 months
 0 = weight loss greater than 3 kg (6.8 lb)
 1 = does not know
 2 = weight loss between 1 and 3 kg (2.2 and 6.6 lb)
 3 = no weight loss

C Mobility
 0 = bed or chair bound
 1 = able to get out of bed / chair but does not go out
 2 = goes out

D Has suffered psychological stress or acute disease in the past 3 months?

E Neuropsychological problems
 0 = severe dementia or depression
 1 = mild dementia
 2 = no psychological problems

F1 Body Mass Index (BMI) (weight in kg) / (height in m²)
 0 = BMI less than 16
 1 = BMI 16 to less than 21
 2 = BMI 21 to less than 23
 3 = BMI 23 or greater

* IF BMI IS NOT AVAILABLE, REPLACE QUESTION F1 WITH QUESTION F2. DO NOT ANSWER QUESTION F2 IF QUESTION F1 IS ALREADY COMPLETED.

F2 Cell circumference (CC) in cm
 0 = CC less than 31
 1 = CC 31 or greater

Screening score (max. 14 points)

12-14 points: Normal nutritional status
 8-11 points: At risk of malnutrition
 0-7 points: Malnourished

Fightmalnutrition.eu
 Pinterest.com
 Slideshare.net
 Mna-eldery.com

- Validated and tested in 3 Canadian hospitals (n=140)
- Sensibility 73% and specificity 86% Kappa 0,88
- Screening by nursing personnel

Admission

Nutrition Screening at Admission

Complete the Canadian Nutrition Screening Tool (CNST):

1. Have you lost weight in the past 6 months WITHOUT TRYING to lose this weight?
2. Have you been eating less than usual FOR MORE THAN A WEEK?

Screening tools

- 2 queries:
 - 1- Unintentional recent weight loss (around 5-10%)
 - 2- Inadequate food intake in the last 1-2 weeks
- Positive answer to 2 of them:
 - Need further and deeper evaluation



Validated nutrition screening tools PEDIATRIC PATIENTS

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NRS

(Reilly et al 1995)



PNRS

(Sermet Gaudelus et al 2000)



SGNA?

(Secker et al 2007)



(McCarthy et al 2008)



STRONG_{kids}

(Hulst et al 2010)



PYMS

(Gerasimidis et al BJN 2010)



PNST

(White et al 2015)



PeDiSMART

(Karagiozoglou-Lampoudi et al 2015)

Validated pediatric NST's

aims

validation

components

Screening tool	Need for anthropometric measurements	Tied to action plan	Predict outcome without intervention	Validated in different populations	Accounts for current nutritional status	Accounts for weight loss/recent changes	Accounts for anticipated decline/reduced intake	Accounts for disease severity
NRS	Yes	Yes	No	No	Yes	Yes	Yes	Yes
PNRS	No	Yes	Yes	No	No	No	Yes	Yes
STAMP	Yes	Yes	No	Yes	Yes	No	Yes	Yes
PYMS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
STRONG _{kids}	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PeDiSMART	Yes	Yes	No	No	Yes	Yes	Yes	Yes
PNST	No	Yes	No	No	Yes	Yes	No	No

Canadian nutrition screening tools PEDIATRIC PATIENTS

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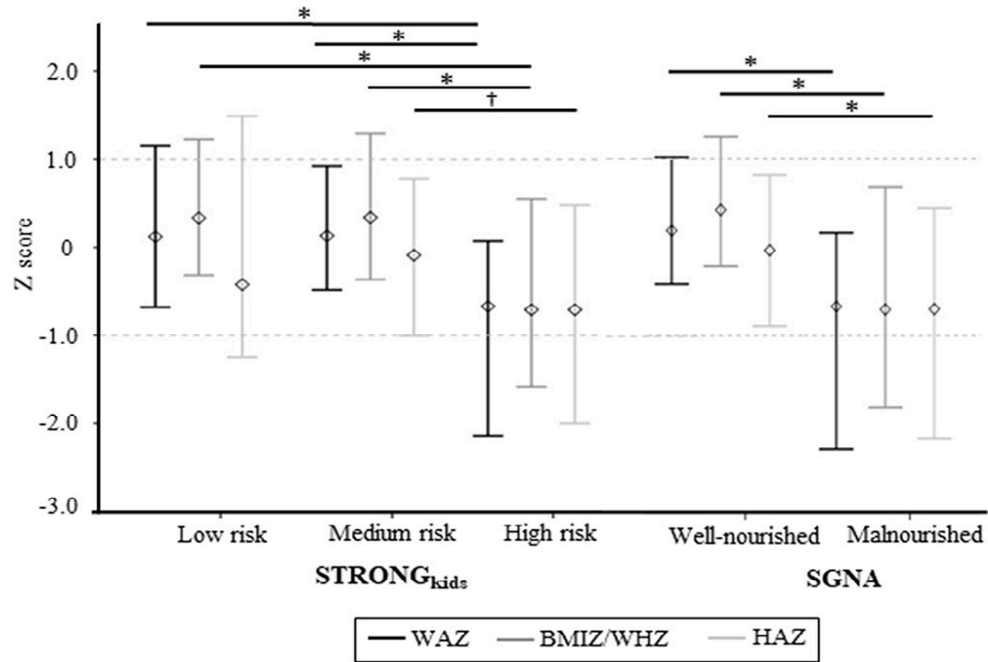
- No specific tool developed yet
- STRONGkids used in 5 hospitals vs. SGNA
- STRONGkids and PNST tested in 1 hospital

Belanger et al. J of Pediatrics 2019
Carter et al. Nutrition in Clinical Practice, 2019

Assessment of Malnutrition Risk in Canadian Pediatric Hospitals: A Multicenter Prospective Cohort Study

Véronique Bélanger, RD, MSc^{1,2,*}, Andrea McCarthy, RD, MSc^{1,2,*}, Valérie Marcil, RD, PhD^{1,2}, Valérie Marchand, MD³,
Dana L. Bactor, MD⁴, Mohsin Rashid, MD, MEd⁵, Angela Noble, MD⁶, Vishal Avinashi, MPH, BSc, MD⁷,
Bridget Davidson, MHSc⁸, Véronique Groleau, MD³, Schohraya Spahis, MSc^{1,2}, and Emile Levy, MD, PhD^{1,2}

- Multicenter trial (5 centers)
 - BC, NS, ON, QU, AL
 - 2012-2016
 - Coordinated by the Canadian Nutrition Society (CNS)
- n= 371, median age 5.3 y, median LOS 5 days



- N= 371, 1 m-18 y
- Prospective cohort study
- 5 Canadian centers

Both STRONG_{kids} and SGNA classifications were associated with baseline nutritional status.

- Provides diagnosis and clarify processes (inflammation, reduced intake) and reasons (nausea, dysphagia...)
 - All screening tools have false positives
- More complex, longer time
- Several methods (sophisticated, expensive tools to less complicated and available methods)
 - Gold standard:
 - Sensitive and specific enough to predict outcomes related to nutrition status
 - Be able to show changes in the status of individual after any nutrition intervention

- Anthropometry
 - BMI, weight loss, mid-upper arm circumference, skin folds...
- Biochemical
 - Albumine, micronutrients...
- Clinical
 - Edema, wasting, micronutrients deficiencies...
- Dietary
 - 24h recall
 - Food frequency questionnaire...
- Tools
 - Subjective Global assessment (SGA)
 - ASPEN/AND tools...



SUBJECTIVE GLOBAL ASSESSMENT RATING FORM		
Patient Name:	ID #:	Date:
HISTORY		
WEIGHT/WEIGHT CHANGE: <i>(Included in K/DOQI SGA)</i>		Rate 1-7
1. Baseline Wt: _____ (Dry weight from 6 months ago)		
Current Wt: _____ (Dry weight today)		
Actual Wt loss/past 6 mo: _____ % loss: _____ (actual loss from baseline or last SGA)		
2. Weight change over past two weeks: _____ No change _____ Increase _____ Decrease		
DIETARY INTAKE No Change _____ (Adequate) No Change _____ (Inadequate)		
1. Change: Sub optimal Intake: _____ Protein _____ Kcal _____ Duration _____		
Full Liquid: _____ Hypocaloric Liquid _____ Starvation _____		
GASTROINTESTINAL SYMPTOMS <i>(Included in K/DOQI SGA-anorexia or causes of anorexia)</i>		
Symptom:	Frequency: ^a	Duration: ^b
_____ None	_____	_____
_____ Anorexia	_____	_____
_____ Nausea	_____	_____
_____ Vomiting	_____	_____
_____ Diarrhea	_____	_____
Never, daily, 2-3 times/wk, 1-2 times/wk > 2 weeks, < 2 weeks		
FUNCTIONAL CAPACITY		
Description		Duration:
_____ No Dysfunction		_____
_____ Change in function		_____
_____ Difficulty with ambulation		_____
_____ Difficulty with activity (Patient specific "normal")		_____
_____ Light activity		_____
_____ Bed/chair ridden with little or no activity		_____
_____ Improvement in function		_____
DISEASE STATE/COMORBIDITIES AS RELATED TO NUTRITIONAL NEEDS		
Primary Diagnosis _____ Comorbidities _____		
Normal requirements _____ Increased requirements _____ Decreased requirements _____		
Acute Metabolic Stress: _____ None _____ Low _____ Moderate _____ High		
PHYSICAL EXAM		
_____ Loss of subcutaneous fat (Below eye, triceps, _____ Some areas _____ All areas biceps, chest) <i>(Included in K/DOQI SGA)</i>		
_____ Muscle wasting (Temple, clavicle, scapula, ribs, _____ Some areas _____ All areas quadriceps, calf, knee, interosseous) <i>(Included in K/DOQI SGA)</i>		
_____ Edema (Related to undernutrition/use to evaluate weight change)		
OVERALL SGA RATING		
Very mild risk to well-nourished = 6 or 7 most categories or significant, continued improvement.		
Mild-moderate = 3, 4, or 5 ratings. No clear sign of normal status or severe malnutrition.		
Severely Malnourished = 1 or 2 ratings in most categories/significant physical signs of malnutrition.		

- Gold standard
- SGA predicts nutrition related outcomes (length of stay, readmission)
- Trained professionals
 - Food intake
 - GI symptoms
 - Functional status
 - Body composition
 - Physical exam:
 - Loss subcutaneous fat, muscle wasting, edema



Researchgate.com
 Allard and al. JPEN 2016;40(4):487-97.
 Jeejeebhoy and al. AJCN 2015.

A (no malnutrition)	B (mild/moderate malnutrition)	C (severely malnourished)
no decrease food intake	Decrease food intake	Severe deficit of intake
< 5% weight loss	5-10% weight loss (no stabilization)	> 10% weight loss (ongoing)
No or minimal symptoms	Mild/some symptoms affecting food intake	Significant symptoms
No deficit in function	Moderate functional deficit or recent deterioration	Significant functional deficits
No wasting	Mild/moderate loss fat and/or muscle	Severe wasting
(or a B with recent gain or stabilization of weight and better food intake)	Or SGA C but with improvement (but not adequate) of oral intake, recent stabilization of weight, decrease in symptoms affecting oral intake...	Or recent significant deterioration obvious signs of fat and/or muscle loss

SGNA - pediatric nutritional assessment tool (applied by dietitians)

No scoring

Nutrition-related medical history

- Linear growth, parental height
- Weight history
- Dietary intake
- GI symptoms
- Functional ability
- Metabolic stress

Physical examination

- Fat loss
- Muscle wasting
- Edema

Results

Low risk

Moderate risk

High risk

Moderate and severe risk associated with longer hospital stay + increased risk of infection

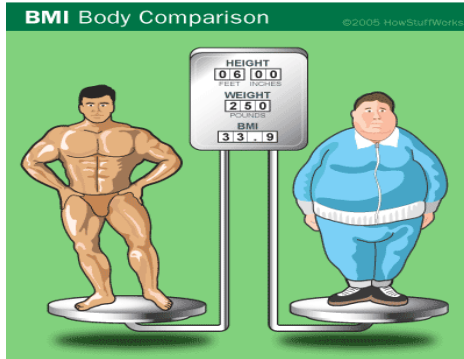
- **More sophisticated tools**
 - CT, ultrasound, MRI
 - BIA
 - Dual energy X-ray absorptiometry...
 - Handgrip dynamometry
 - Exercise testing for hearth rate, respiratory muscle strength

Functional status
(muscle)*

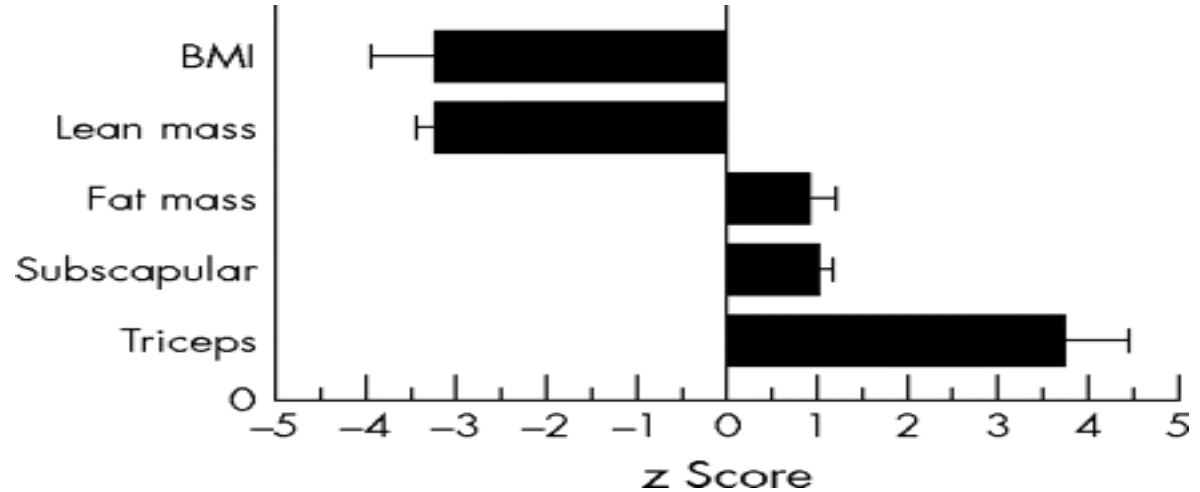
*Functional decline may precede body composition alterations, which are often underdiagnosed



Importance of body composition



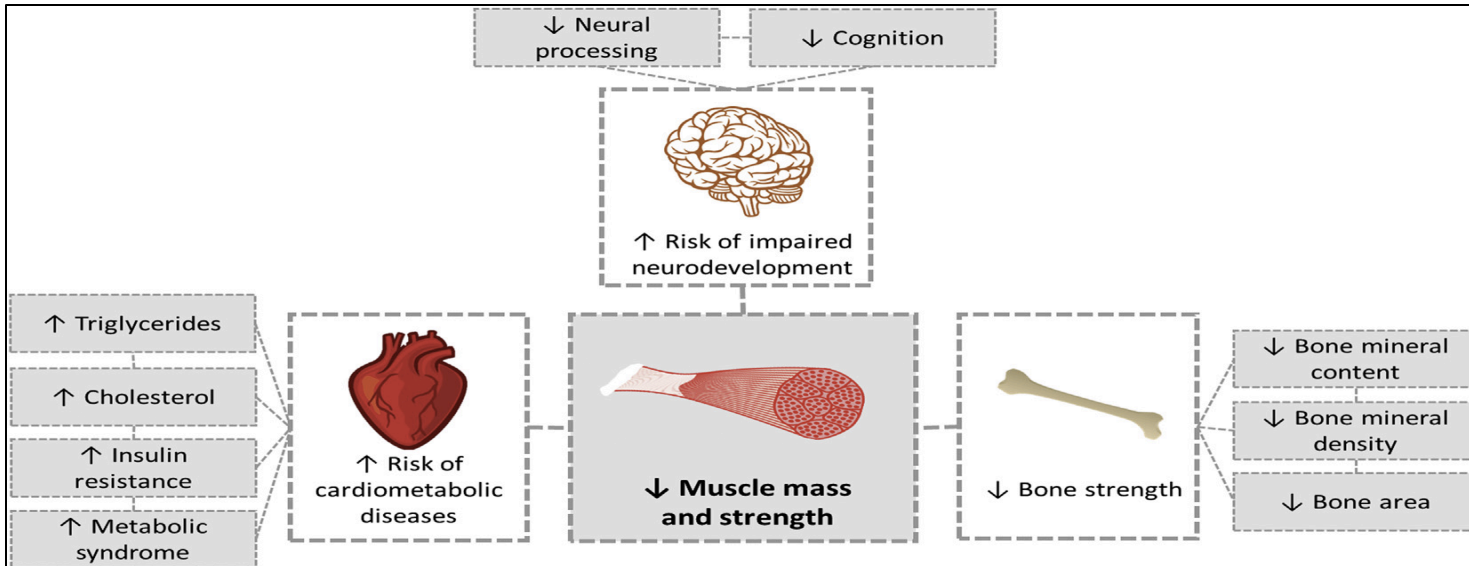
A low BMI with low LBM can mask a high fat mass



Wells & Fewtrell, Arch Dis Child 2006

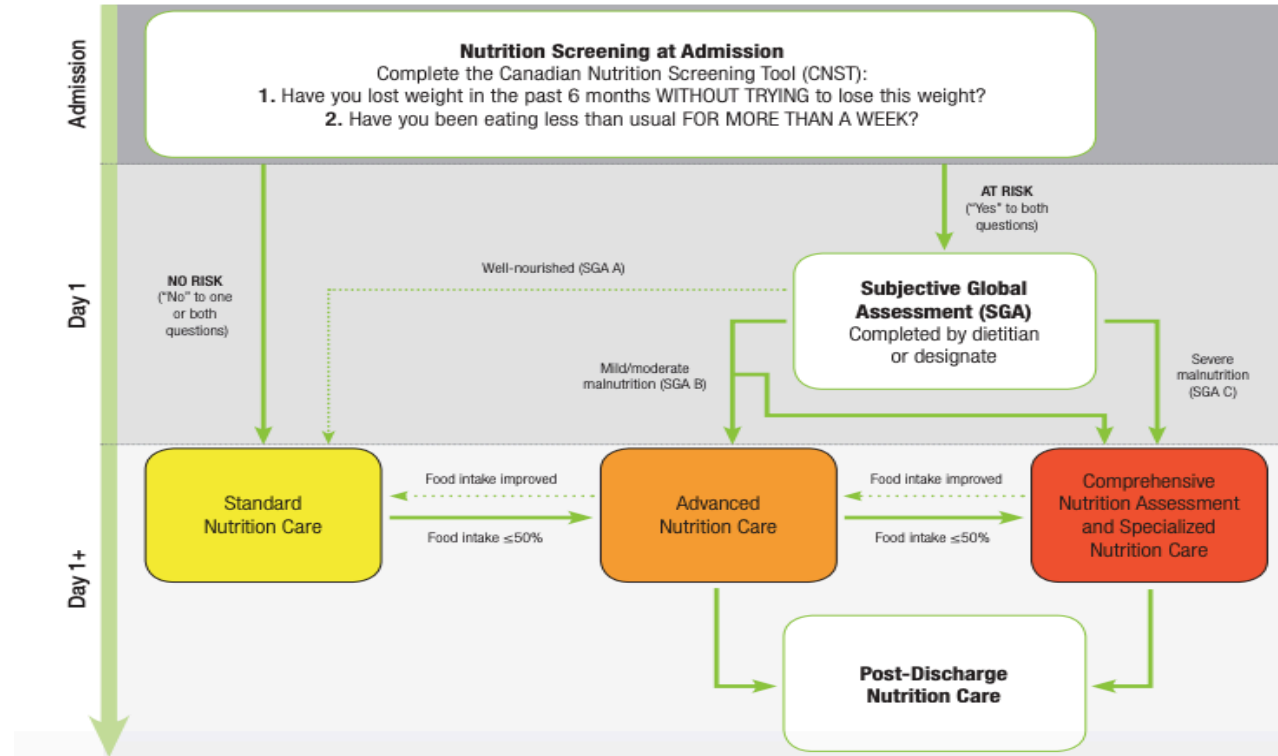
Importance of body composition (2)

Chronic diseases \Leftrightarrow sarcopenia – muscle wasting (mass and strength) \Rightarrow adverse outcome



INPAC (the integrated nutrition pathway for acute care)

www.nutritioncareinCanada.ca



Standard Nutrition Care

- Sit patient in chair or position upright in bed
- Ensure vision and dentition needs are addressed
- Address nausea, pain, constipation, diarrhea
- Confirm food is available between meals
- Ensure bedside table is cleared for tray set-up, open packages, provide assistance and encouragement to eat
- Encourage family to bring preferred foods from home
- Monitor and report key clinical observations/measurements:
 - Food intake
 - Duration of NPO/clear fluid intake
 - Hydration status
 - Body weight (preferably at admission and weekly)
 - Signs of dysphagia

NPO=nil per os (nothing by mouth).

Advanced Nutrition Care

- Continue **Standard Nutrition Care** practices **AND**
- Assess and address barriers to food intake
 - Promote intake with 1 or more of:
 - Nutrient dense diet (high in energy, protein, micronutrients)
 - Liberalized diet
 - Preferred foods
 - High energy/protein shakes/drinks (at/or between meals or as 'medpass', a small amount provided at each medication administration)

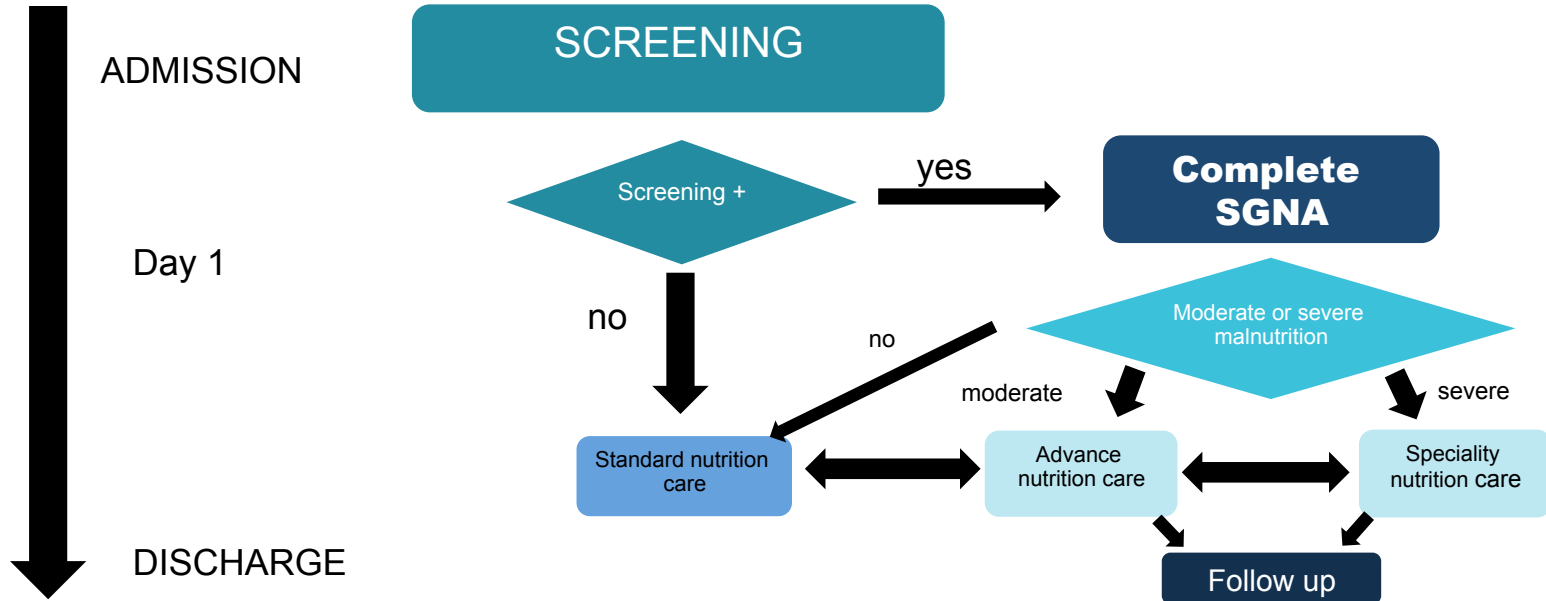
Comprehensive Nutrition Assessment and Specialized Nutrition Care

- Continue **Standard & Advanced Nutrition Care** strategies where appropriate. Patient will undergo a comprehensive nutrition assessment completed by the dietitian, which involves:
- More detailed assessment of nutrition status using physical examination, body composition, food intake, clinical history, and biochemical markers
 - Further identification of barriers to food intake (e.g., medication side effects, depression, etc.)
 - Identification of eating behaviours that will support food intake
 - Individualized treatment and monitoring
 - Enteral and/or parenteral nutrition

Post-Discharge Nutrition Care

- If patient is malnourished (SGA B or C) upon admission or during hospitalization, nutrition is an active issue in the discharge summary note (completed by dietitian, physician or nurse)
- Education provided to patient and family
 - Referral to community resources (e.g., meal programs, grocery shopping)
 - Send discharge summary with patient and a copy to family physician/care provider in the community; refer to appropriate resources in the community

Draft Pediatric INPAC



Come back to the case:

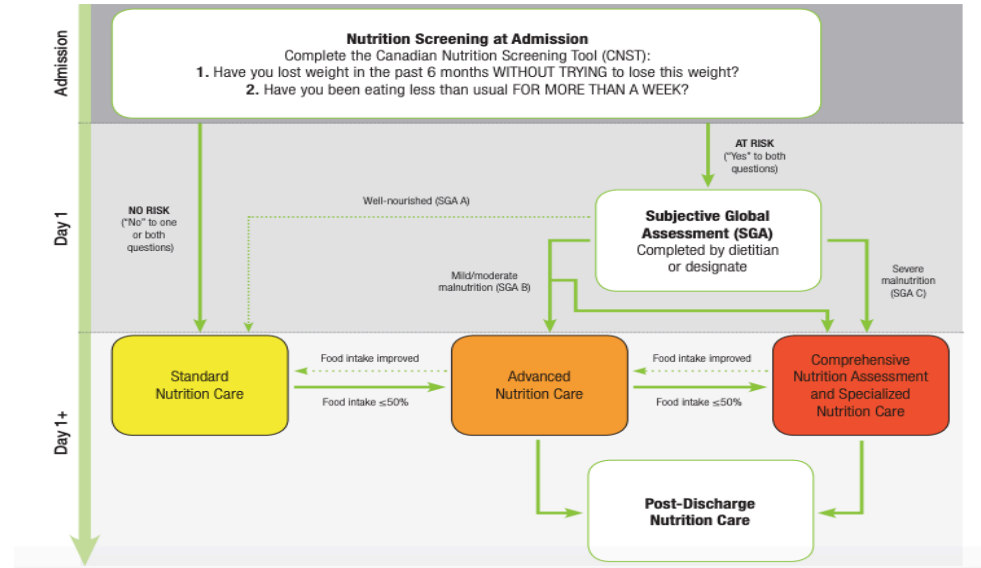
- 45 years old man
- Screening:
 - At risk patient:
 - Chronic disease: chronic pancreatitis, crohn disease, short bowel
 - Digestive symptoms: nausea and vomiting
 - Loss appetite, unintentional loss of weight



At risk patient: Have to be screened every visit in your office

Come back to the case

- Assessment
– SGA



- 6% weight loss (decrease)
(be careful: edema can mask the magnitude of weight loss)
- Inadequate dietary intake
- GI sympoms: nausea and vomiting every day
- Capacity:
 - Light activity
 - Change in function since 1 month
- Disease state:
 - Crohn, CP, short bowel
 - Increased requirements
- Physical exam:
 - Edema, muscle wasting

SGA C: You should do something for this patient

SUBJECTIVE GLOBAL ASSESSMENT RATING FORM		
Patient Name:	ID #:	Date:
HISTORY		
WEIGHT/WEIGHT CHANGE: <i>(Included in K/DOOL SGA)</i>		Rate 1-7
1. Baseline Wt: _____ (Dry weight from 6 months ago)		
Current Wt: _____ (Dry weight today)		
Actual Wt loss/past 6 mo: _____ % loss: _____ (actual loss from baseline or last SGA)		
2. Weight change over past two weeks: _____ No change _____ Increase _____ Decrease		
DIETARY INTAKE No Change _____ (Adequate) No Change _____ (Inadequate)		
1. Change: Sub optimal Intake: _____ Protein _____ Kcal _____ Duration: _____		
Full Liquid: _____ Hypocaloric Liquid _____ Starvation _____		
GASTROINTESTINAL SYMPTOMS <i>(Included in K/DOOL SGA-anorexia or causes of anorexia)</i>		
Symptom:	Frequency:	Duration:
_____ None	_____	_____
_____ Anorexia	_____	_____
_____ Nausea	_____	_____
_____ Vomiting	_____	_____
_____ Diarrhea	_____	_____
Never, daily, 2-3 times/wk, 1-2 times/wk > 2 weeks, < 2 weeks		
FUNCTIONAL CAPACITY		
Description		Duration:
_____ No Dysfunction		_____
_____ Change in function		_____
_____ Difficulty with ambulation		_____
_____ Difficulty with activity (Patient specific "normal")		_____
_____ Light activity		_____
_____ Bed/chair ridden with little or no activity		_____
_____ Improvement in function		_____
DISEASE STATE/COMORBIDITIES AS RELATED TO NUTRITIONAL NEEDS		
Primary Diagnosis: _____ Comorbidities: _____		
Normal requirements _____ Increased requirements _____ Decreased requirements _____		
Acute Metabolic Stress: _____ None _____ Low _____ Moderate _____ High		
PHYSICAL EXAM		
_____ Loss of subcutaneous fat (Below eye, triceps, _____ Some areas _____ All areas		
_____ biceps, chest) <i>(Included in K/DOOL SGA)</i>		
_____ Muscle wasting (Temple, clavicle, scapula, ribs, _____ Some areas _____ All areas		
_____ quadriceps, calf, knee, interosseous) <i>(Included in K/DOOL SGA)</i>		
_____ Edema (Related to undernutrition/use to evaluate weight change)		
OVERALL SGA RATING		
Very mild risk to well-nourished = 6 or 7 most categories or significant, continued improvement.		
Mild-moderate = 3, 4, or 5 ratings. No clear sign of normal status or severe malnutrition.		
Severely Malnourished = 1 or 2 ratings in most categories/significant physical signs of malnutrition.		

Case 1: What to do next?

SCMD

Semaine canadienne des maladies digestives™

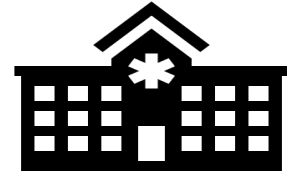
CDDW

Canadian Digestive Diseases Week™

- Hospitalisation is mandatory for this patient
- Refer to dietitian mandatory

- Treat Nausea and vomiting
- Start enteral nutrition with nasogastric tube
- Follow weight, nutritional status twice weekly

- Recent colonoscopy: normal
- Gastroscopy with biopsy: normal
- Ct scan:
 - Diffuse edema of the GI tractus
 - No active crohn disease



- Hemoglobine 104, white blood cell 8,2 Lymphocyte normal
- Liver enzyme normal except alkaline phosphatase 212. Lipase normal
- **Creatinine 90 $\mu\text{mol/L}$** (usual 62) Na 135 mmol/L K 4.0 mmol/L
- **Albumin 17 g/L**
- Glucose 4,2
- **Vitamin D 30 nmol/L**
- **Phosphore 0,70 nmol/L**
- **Magnesium 0,31 mmol/L**
- **Ferritine 756 $\mu\text{g/L}$**
- INR 3,4
- Adjusted calcium 2,34 mmol/L
- **Vitamin A 0,14**
- **Zinc 8,1**
- Vitamin B12 1000 pmol/L



What do you think about biochemistry for nutrition evaluation ?



- Many problems with biochemistry
- Influenced by:
 - Disease
 - Infection
 - Hepatic or renal disease
 - Laboratory analysis
- Example:
 - Hepatic markers:
 - Albumin level
 - Transferrin
 - Retinal binding protein
 - Prealbumin
 - Micronutrients dosage

- Low albumin:
 - Associated with morbidity and mortality
 - Represent equilibrium between hepatic synthesis and serum degradation and losses from the body
 - Halflife: 21 days
 - Pitfalls:
 - **Chonic malnutrition: plasma serum level often normal** (compensatory effect: lower degradation)
 - Acute illness: decreased synthesis and increased degradation, transcapillary losses
 - Altered in other situations: hepatic, protein losses, and acute infection or inflammation.
- Same thing for
 - 24h urinary creatinine excretion, nitrogen balance
 - Diagnosis bias
 - Altered with renal disease, age, stress, diet



A low albumin doesn't mean
undernutrition and normal albumin
doesn't mean no undernutrition

Come back to case 2..

Screening STRONGkids

Screening risk of malnutrition: once a week in children aged 1 month – 18 years	Score → points	
Is there an underlying illness with risk for malnutrition (<i>see list</i>) or expected major surgery?	No	Yes → 2
Is the patient in a poor nutritional status judged with subjective clinical assessment?	No	Yes → 1
Is one of the following items present? <ul style="list-style-type: none">▪ Excessive diarrhoea (≥ 5 per day) and/ or vomiting (> 3 times/ day)▪ Reduced food intake during the last few days▪ Pre-existing nutritional intervention▪ Inability to consume adequate nutritional intake because of pain	No	Yes → 1
Is there weight loss or no weight increase (infants < 1 year) during the last few week-months	No	Yes → 1

TOTAL SCORE: 3 points => moderate risk

Come back to Case 2

Screening PNST

Nutrition screening questions

- | | | | |
|---|---|--------------------------------------|-------------------------------------|
| 1 | Has the child unintentionally lost weight lately? | <input type="radio"/> Yes | <input checked="" type="radio"/> No |
| 2 | Has the child had poor weight gain over the last few months? | <input type="radio"/> Yes | <input checked="" type="radio"/> No |
| 3 | Has the child been eating/feeding less in the last few weeks? | <input type="radio"/> Yes | <input checked="" type="radio"/> No |
| 4 | Is the child obviously underweight? | <input checked="" type="radio"/> Yes | <input type="radio"/> No |

If 'yes' to two or more of the above:

- refer the child for further nutrition assessment (see contact details)
- check if child is known to a dietitian
- measure weight and length/height
- commence food and fluid intake record.

Come back to Case 2

Assessment and management:

- At risk patient!
- Following the criteria => wasting
- But normal growth and no stunting
- Normal height cf target height

- Other causes of low weight (celiac disease, diabetes) excluded
- Dietary assessment: adequate intake of energy, protein, fat, carbohydrates and micronutrients

=> Low weight fits family habitat => no tube feeding, follow-up.

- Aggressive nutritional support to increase BMI primarily restores fat mass, and not LBM
- Reports on overweight-obesity within CF populations emerge
 - Adults: up to 18%
 - Children: up to 23%
- Excess fat => metabolic and clinical consequences

King et al Nutrition 2010; Panagopoulou et al Pediatr Int 2014; Hanna Pediatr Pulmonol 2015; Stephenson et al AJCN 2013

- *Stephenson et al AJCN 2013:*

Longitudinal trends in nutritional status – relation between LF and BMI

- ⇒ low Lean BMI associated with worse lung function
- in males irrespective of BMI > or < p50
 - In females in those with suboptimal BMI

- *Alvarez et al Nutrition 2016:*

Body composition and lung function in 32 adults

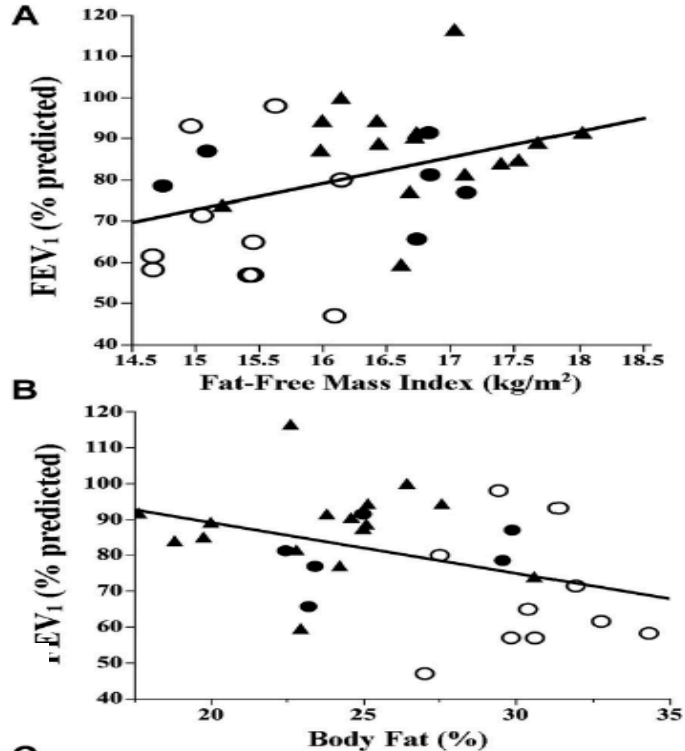
- NWO = normal weight obesity: BMI < 25, FM > 30% (F) or > 23 %(M)

Results:

In CF:

- lower BMI and FFM
- same % of BF
- 30% NWO

CF and BMI



Excess adiposity, particularly in the form of NWO, was inversely associated with lung function in CF

Alvarez et al Nutrition 2016

Normal BMI is no guarantee for good nutritional status and outcome, be aware of

- **chronic undernutrition (stunting)**

but also

- **excess fat mass (NWO)!**

As the lifespan of individuals with CF increases, nutrition screening protocols, which rely primarily on BMI, may require reassessment

TOOLS to help you implement

SCMD

Semaine canadienne des maladies digestives™

CDDW

Canadian Digestive Diseases Week™

- Canadian Malnutrition Task Force (CMTF)
 - www.nutritioncareincanada.ca
 - Statistics, interesting tools (INPAC), poster



www.nutritioncareincanada.ca

- **Why nutrition evaluation is mandatory ?**
 - Deficient nutrition status still underdiagnosed but highly prevalent
 - Undernutrition associated with higher risk of morbidity, mortality, increased hospital stay and readmission
- **What is the difference between screening and assessment ?**
 - Screening and assessment are 2 approaches
 - Screening: quick, first step
 - Ask patient: unintentional lost of weight and lost appetite
 - Weight patient in your office
 - Identify patient at high risk
 - Assessment: more complex approach.
 - Have a referral/treatment algorithm in place (including follow-up)
 - SG(N)A and other approach

Take home messages

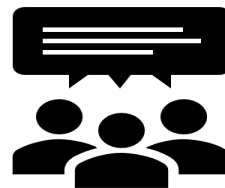
- **When to screen ?**
 - Nutrition screening and assessment should be part of integral care
- **Who should conduct nutrition assessment vs screening ?**
 - Screen:
 - At admission: nursing, resident, doctor, ...
 - In ambulatory: Doctor...
 - Assessment:
 - Dietitian, trained personnel

- **How to conduct a nutrition assessment ?**
 - Anthropometric (be careful with BMI, weight changes) – **WEIGH YOUR PATIENT IN YOUR OFFICE**
 - Clinical evaluation (important step)
 - SGA (learn how to do it)
 - Biochemistry (be careful with albumin and other micronutrients)
- **Where and when to refer ?**
 - Have a referral/treatment algorithm in place in your hospital
 - Patient identified to have severe undernutrition: hospitalisation and dietitian
 - Patient identified to have mild/moderate undernutrition: ask advice by dietitian
 - **FOLLOW YOUR PATIENT...**

Thank you

- For your attention
- Thank you to CAG

Please, tell us what you do in your hospital!



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