THE 7TH VITAL SIGN: IDENTIFYING MALNUTRITION

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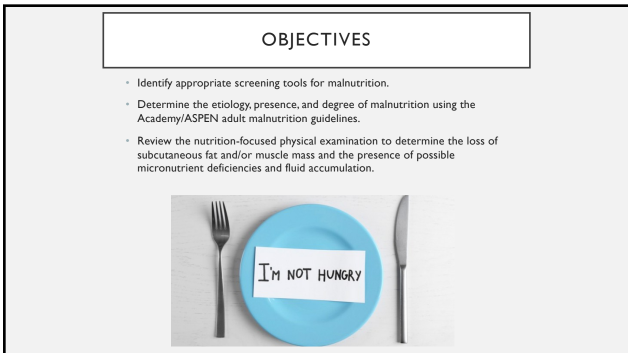
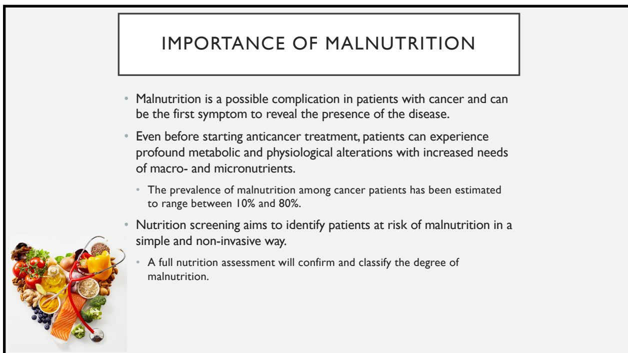
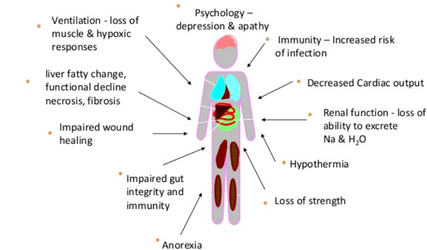




PREVALENCE OF MALNUTRITION

Tumor Site	Prevalence of Malnutrition
Pancreas	80-85%
Stomach	65-85%
Head & Neck	65-75%
Esophagus	60-80%
Lung	45-60%
Colon/Rectum	30-60%
Gynecological	15%
Urological	10%

Stratton et al, eds. Disease-Related Malnutrition: An Evidence-Based Approach to Treatment. CABI Publishing: Wallingford: 2003.



NUTRITION SCREENING

- The Association of Community Cancer Centers 2012 Cancer Program Guidelines
  - "Recommends nutrition screening to identify patients at nutrition risk, patient-specific nutrition assessment, and intervention and education through the cancer treatment process".
- The American College of Surgeons Commission on Cancer 2012 Program Standards
  - "An optimal cancer program encompasses nutrition services, including screening and education across the cancer continuum."

American College of Surgeons Commission on Cancer. *Cancer Program Standards 2012: Ensuring Patient Centered Care.* Chicago, IL: American College of Surgeons; 2011.

The Association of Community Cancer Centers Cancer Nutrition Services: A Practical Guide for cancer Programs, 2012.

NUTRITION SCREENING

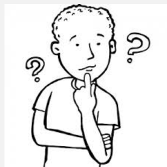
- Nutrition Screening for oncology patients is recommended by:
  - The Academy of Nutrition and Dietetics (AND)
    - "All Patients should be screened for malnutrition risk on entry into oncology services. Early identification and management of malnutrition risk leads to improved outcomes. Re-screening should be repeated routinely throughout treatment to facilitate referral as needed.
  - The Association for Parenteral and Enteral Nutrition (ASPEN)
  - The Oncology Nursing Society (ONS)

http://andevidencelibrary.com/topic.cfm?format_tables=0&cat=5067. Accessed January 29th, 2018.

HOW SHOULD WE SCREEN FOR MALNUTRITION?

TRUE OR FALSE?

- A patient's albumin level is a predictor of malnutrition?



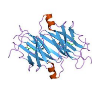
FALSE

- Albumin (and prealbumin) are NOT markers of nutritional status.
- Both lack sensitivity, specificity, and reliability.
- The majority of patients in acute or chronic care setting have underlying inflammatory conditions (disease or injury). Inflammation influences albumin and prealbumin levels.
  - Albumin is a negative acute-phase protein and its pool is affected by a number of inflammatory conditions and drugs, especially those that affect the liver.
  - More than 50% of Albumin's total pool is located in the extravascular compartment while only 5% is produced by the liver daily. Thus, a patient's protein consumption in a day has hardly any effect on a patient's albumin level. (*Half life of Albumin is 20 days).
- Albumin will be low with infection, burns, fluid overload, hepatic failure, CANCER, and nephrotic syndrome.

https://academic.oup.com/gastro/article/4/4/272/2453235. Accessed January 29th, 2018.

PREALBUMIN

- Negative acute-phase protein which is affected by inflammatory states such as infections and liver disease.
- Prealbumin is degraded by the kidneys, consequently any renal dysfunction causes an increase in its serum levels.
- PAB will be **low** in the setting of physiological stress, infection, surgery, and liver dysfunction.
- PAB will be **high** in the setting of corticoidsteroid therapy and renal dysfunction.
- Prealbumin acts as a transport protein for thyroxine.
  - Hyperthyroid decreases PAB
  - Hypothyroid increases PAB



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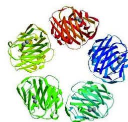
C-REACTIVE PROTEIN (CRP)

- CRP is a positive acute-phase reactant and will be high in times of inflammation.
- However, CRP can be mildly elevated at baseline in approximately 1/3 of Americans.
- Its specificity/sensitivity has not been validated.



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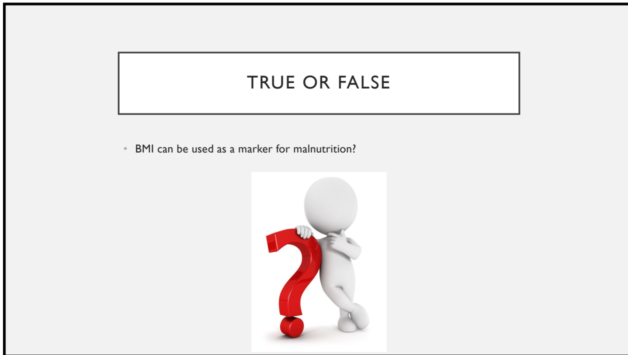

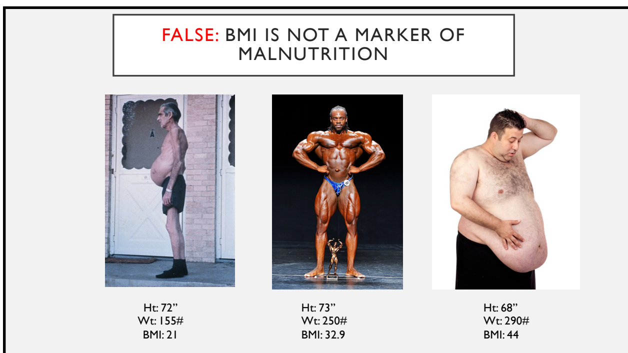

NUTRITION SCREENING: AND RECOMMENDATIONS

- The following have been shown to be valid and reliable for identifying malnutrition risk in adult oncology patients in the **inpatient setting**:
  - Malnutrition Screening Tool (MST)
  - Malnutrition Screening Tool for Cancer Patients (MSTC)
  - Malnutrition Universal Screening Tool (MUST)
- The following has been shown to be valid and reliable for identifying malnutrition risk in adult oncology patients in **the ambulatory/outpatient setting:**
  - MST

https://www.andeal.org/template.cfm?key=4185. Accessed January 29th, 2018.

Malnutrition Screening Tool (MST)

STEP 1: Screen with the MST

❶ Have you recently lost weight without trying?

No	0
Unsure	2

If yes, how much weight have you lost?

2-13 lb	1
14-23 lb	2
24-33 lb	3
34 lb or more	4
Unsure	2

Weight loss score:

❷ Have you been eating poorly because of a decreased appetite?

No	0
Yes	1

Appetite score:

Add weight loss and appetite scores

MST SCORE:

STEP 2: Score to determine risk

MST = 0 OR 1
NOT AT RISK
Eating well with little or no weight loss

If length of stay exceeds 7 days, then rescreen, repeating weekly as needed.

MST = 2 OR MORE
AT RISK
Eating poorly and/or recent weight loss

Rapidly implement nutrition interventions. Perform nutrition consult within 24-72 hrs, depending on risk.

STEP 3: Intervene with nutritional support for your patients at risk of malnutrition.

Notes:

Ferguson, M et al. *Nutrition* 1999 15:458-464

- **Check weight trends**
  - Weight 1/5/18 was 320#
  - Weight 4/5/18 was 290#
  - Lost 30 pounds
- **Check appetite trends**
  - 1/5/18 was consuming 3 meals and 2 snacks daily
  - 4/5/18 has been skipping breakfast, skipping both snacks, and eating smaller portion at dinner

Malnutrition Screening Tool (MST)

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No	0
Unsure	2

If yes, how much weight have you lost?

2-13 lb	1
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24-33 lb	3
34 lb or more	4
Unsure	2

Weight loss score: 3

❷ Have you been eating poorly because of a decreased appetite?

No	0
Yes	1

Appetite score: 1

Add weight loss and appetite scores

MST SCORE: 4

STEP 2: Score to determine risk

MST = 0 OR 1
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Eating well with little or no weight loss

If length of stay exceeds 7 days, then rescreen, repeating weekly as needed.

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NOW WHAT?

- The patient has been screened by the MST and has been determined to be "At-Risk" for malnutrition and referred to the Registered Dietitian for nutrition assessment and intervention.
  - How does a patient move from "At-Risk" to being fully classified as malnourished?
    - ASPEN criteria for malnutrition

CLASSIFYING SEVERITY OF MALNUTRITION

- The ASPEN severity of malnutrition scale is based on **six characteristics**, and the patient **must meet two of the six**:
  - Insufficient energy intake
  - % Weight loss
  - Loss of muscle mass
  - Loss of subcutaneous fat
  - Localized or generalized fluid accumulation (may sometimes mask weight loss)
  - Diminished functional status as measured by hand grip strength

CLASSIFYING THE CONTEXT OF MALNUTRITION

- The other aspect is the idea of "context" in the new criteria. The 3 contexts are:
  - Chronic Illness
    - The National Center for Health Statistics defines "chronic" as a disease/condition lasting 3 months or longer
  - Social/environmental circumstances
  - Acute illness or injury (duration < three months)

ASPEN GUIDELINES

*MUST MEET 2 OUT OF 6

Malnutrition Context	Acute Injury or Illness (< 3 months)		Chronic Illness (> 3 months)		Social or Environmental	
Malnutrition Severity	Moderate	Severe	Moderate	Severe	Moderate	Severe
Energy Intake	<75% est. energy needs for >7 days	</= 50% est. energy needs for >/= 5 days	<75% est. energy needs for > 1 month	</= 75% est. energy needs for >/= 1 month	<75% est. energy needs for > 3 months	</=50% est. energy needs for >/= 1 month
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Muscle Loss	Mild	Moderate	Mild	Severe	Mild	Severe
Fluid Accumulation	Mild	Moderate to Severe	Mild	Severe	Mild	Severe
Reduced Grip Strength * Using a Dynamometer	N/A	Measurably Reduced	N/A	Measurably Reduced	N/A	Measurably Reduced

ASPEN GUIDELINES

Type of Malnutrition	Acute Injury or Illness		Chronic Illness (> 3 months)		Social or Environmental	
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ENERGY INTAKE

- Malnutrition is the result of inadequate food and nutrient intake or assimilation. Recent intake compared to estimated requirements is a primary criterion defining malnutrition.
- The RD reviews the food and nutrition history, estimates optimum energy needs, compares them with estimates of energy consumed, and reports it in a percentage of estimated energy requirements over time.

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WEIGHT LOSS BY THE NUMBERS

- 40% of patients experience anorexia and weight loss ***prior*** to diagnosis
  - 80% of upper GI cancer patients and 60% of lung cancer patients have already experienced significant weight loss at time of diagnosis
- 40-80% of patients are expected to experience malnutrition ***during*** treatment
  - As little as a 6% weight loss predicts a reduced response to treatment, reduced survival, and a reduced quality of life

UNINTENTIONAL WEIGHT LOSS

- In one study, 13% of renal cell cancer patients had dose reductions, while 21% had treatment termination due to unintentional weight loss
- Body weight & lean body mass are considered risk factors for chemotherapy tolerance & survival in gastric cancer.
- Toxicity from radiation can lead to unplanned treatment breaks that result in lower loco-regional control and survival rates in patients with head and neck cancer

Antoun et al. Low body mass index and sarcopenia associated with dose-limiting toxicity of sorafenib in patients with renal cell carcinoma. *Annals of Oncology*. 2010.

INTERPRETATION OF WEIGHT LOSS

- The RD evaluates weight in light of other clinical findings including the presence of under- or over- hydration.
- The RD assesses weight change over time as a percentage of weight lost from baseline.

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ASPEN GUIDELINES

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FAT LOSS

- Nutrition Focused Physical Assessment
- Loss of subcutaneous fat
  - Orbital: region surrounding the eye
  - Upper Arm: triceps/biceps
  - Thoracic & Lumbar Region: ribs, lower back, midaxillary line

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Fat Loss	Mild	Moderate	Mild	Severe	Mild	Severe

ORBITAL FAT LOSS

- View patient when standing directly in front of them, touch above the cheekbone
- Well Nourished
  - Slightly bulged fat pads. *Fluid retention may mask loss
- Mild-Moderate Malnutrition
  - Slightly dark circles, somewhat hollow look
- Severe Malnutrition
  - Hollow Look, depressions, dark circles, loose skin

UPPER ARM REGION

- Have patient's arm bent, roll skin between fingers, do not include muscle in pinch
- Well Nourished
  - Ample fat tissue is obvious between folds of skin
- Mild-Moderate Malnutrition
  - Some depth, but not ample
- Severe Malnutrition
  - Very little space between folds, fingers touch

THORACIC AND LUMBAR REGION

- Have patient press hands hard against a solid object
- Well Nourished
  - Chest is full, ribs do not show, Slight to no protrusion of the iliac crest
- Mild-Moderate Malnutrition
  - Ribs apparent, depressions between them less pronounced. Iliac crest somewhat prominent.
- Severe Malnutrition
  - Depression between the ribs very apparent. Iliac crest very prominent.

ASPEN GUIDELINES

*MUST MEET 2 OUT OF 6

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MUSCLE LOSS
*NUTRITION FOCUSED PHYSICAL ASSESSMENT

- Muscle loss or wasting
  - Temple Region: Temporalis muscle
  - Clavicle Bone Region: Pectoralis Major, Deltoid, Trapezius muscles
  - Clavicle and Acromion Bone Region: Deltoid Muscle
  - Scapular Bone Region: Trapezius, Supraspinus, Infraspinus muscles
  - Dorsal Hand: Interosseous muscle
  - *Patellar Region
  - *Anterior Thigh Region
  - *Posterior Calf Region

*Lower body less sensitive to change

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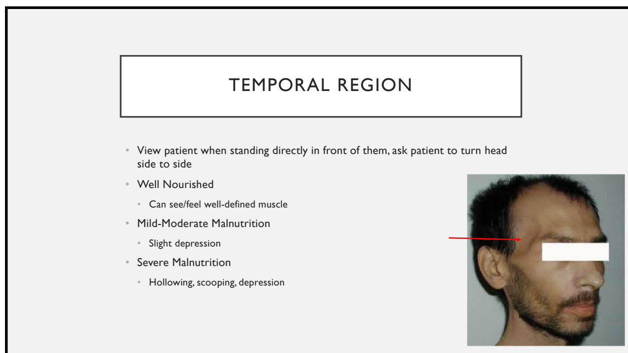
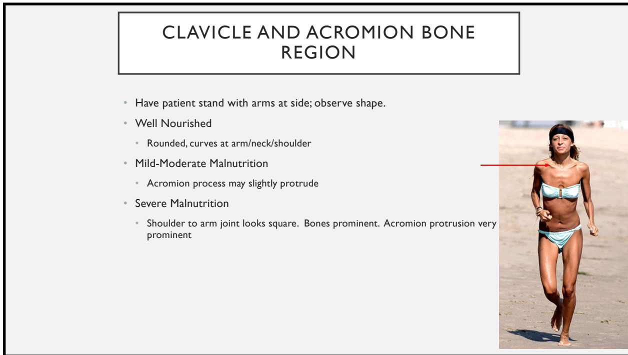
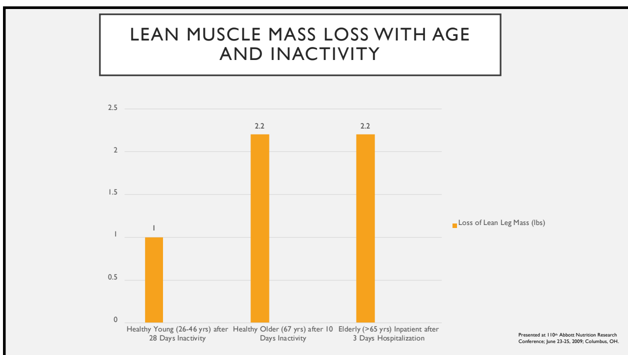
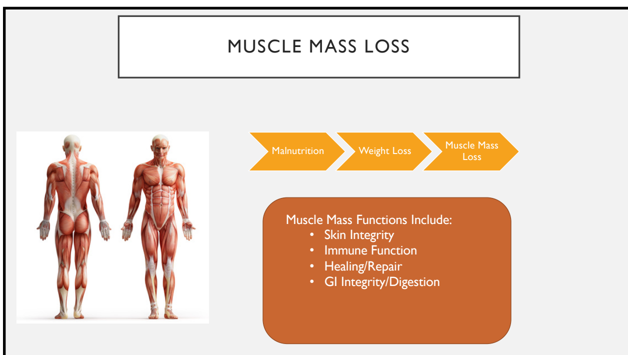



CLAVICLE AND ACROMION BONE REGION
Have patient stand with arms at side; observe shape.
Well Nourished
Rounded, curves at arm/neck/shoulder
Mild-Moderate Malnutrition
Acromion process may slightly protrude
Severe Malnutrition
Shoulder to arm joint looks square. Bones prominent. Acromion protrusion very prominent


LEAN MUSCLE MASS LOSS WITH AGE AND INACTIVITY
2.5
2
1.5
1
0.5
0
1
2.2
2.2
Healthy Young (26-46 yrs) after 28 Days Inactivity
Healthy Older (67 yrs) after 10 Days Inactivity
Elderly (>65 yrs) Inpatient after 3 Days Hospitalization
Loss of Lean Leg Mass (lbs)
Presented at 110th Abbott Nutrition Research Conference; June 23-25, 2009; Columbus, OH.


MUSCLE MASS LOSS
Malnutrition
Weight Loss
Muscle Mass Loss
Muscle Mass Functions Include:
Skin Integrity
Immune Function
Healing/Repair
GI Integrity/Digestion

LOSS OF MUSCLE MASS

- Patients with muscle mass loss have greater toxicity and shorter survival
  - Median survival of patients with low muscle density vs. high muscle density:
    - 14 vs. 20 months (p=0.0001)
- Shortest survival times are among obese patients with sarcopenia
  - Patients are more prone to toxic effects during chemotherapy, requiring dose reductions or treatment delays

Tan, et al. *Clinc Ca Res* 2009;15:6973-6379.
Antoun, et al. *Cancer* 2013;19:3377-3384

ASPEN GUIDELINES

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FLUID ACCUMULATION

*NUTRITION FOCUSED PHYSICAL ASSESSMENT

- Rule out other causes of edema, determine "Dry Weight" as weight loss is often masked by generalized fluid retention.
- The RD evaluates generalized of localized fluid accumulation in extremities/ascites.
  - Severe= Deep pitting edema, indentation lasts 31-60 seconds
  - Moderate= Slight swelling, indentation lasts 0-30 seconds
  - Well Nourished= No signs of edema
- Third-spacing, prolonged periods of nutrient inadequacy.

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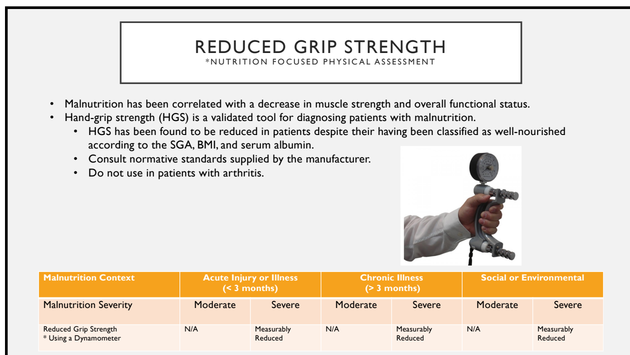
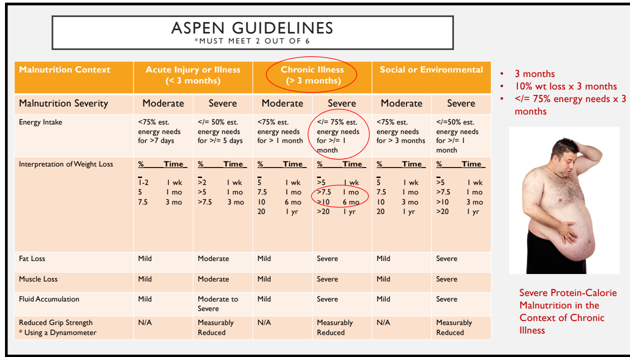
Fluid Accumulation	Mild	Moderate to Severe	Mild	Severe	Mild	Severe
Reduced Grip Strength * Using a Dynamometer	N/A	Measurably Reduced	N/A	Measurably Reduced	N/A	Measurably Reduced





ASPEN GUIDELINES

*MUST MEET 2 OUT OF 6

Malnutrition Context	Acute Injury or Illness (< 3 months)		Chronic Illness (> 3 months)		Social or Environmental	
Malnutrition Severity	Moderate	Severe	Moderate	Severe	Moderate	Severe
Energy Intake	<75% est. energy needs for >7 days	</= 50% est. energy needs for >/= 5 days	<75% est. energy needs for > 1 month	</= 75% est. energy needs for >/= 1 month	<75% est. energy needs for > 3 months	</=50% est. energy needs for >/= 1 month
Interpretation of Weight Loss	% Time 1-2 1 wk 5 1 mo 7.5 3 mo	% Time >2 1 wk >5 1 mo >7.5 3 mo	% Time 5 1 wk 7.5 1 mo 10 6 mo 20 1 yr	% Time >5 1 wk >7.5 1 mo >10 6 mo >20 1 yr	% Time 5 1 wk 7.5 1 mo 10 3 mo 20 1 yr	% Time >5 1 wk >7.5 1 mo >10 3 mo >20 1 yr
Fat Loss	Mild	Moderate	Mild	Severe	Mild	Severe
Muscle Loss	Mild	Moderate	Mild	Severe	Mild	Severe
Fluid Accumulation	Mild	Moderate to Severe	Mild	Severe	Mild	Severe
Reduced Grip Strength * Using a Dynamometer	N/A	Measurably Reduced	N/A	Measurably Reduced	N/A	Measurably Reduced

- 3 months
- 10% wt loss x 3 months
- </= 75% energy needs x 3 months

Severe Protein-Calorie Malnutrition in the Context of Chronic Illness

CODING FOR MALNUTRITION

- Severe malnutrition in adults associated with any etiology type-acute/chronic disease, starvation related-correlates with ICD-10 code E43.
- Non-Severe malnutrition in adults similarly associated with any etiology type correlates with ICD-10 code E44.

FUTURE THOUGHTS TO PONDER

- Nutritional supplements such as Ensure and Boost are not cures or fixes for malnutrition.
- What is the root cause of the weight loss and decreased energy intake?
  - Taste Changes
  - Nausea
  - Diarrhea
  - Fear
  - Fatigue
  - Missing meals while at treatment

WHAT DID SHE SAY?

- Serum proteins such as albumin and PAB are not included as defining characteristics of malnutrition because evidence shows that serum levels of these proteins do not change in response to changes in nutrient intake.
- Malnutrition comes in all sizes, BMI is not a marker of malnutrition.
- MST is a validated screening tool for malnutrition in outpatient oncology patients.
- ASPEN criteria for malnutrition requires 2 out of 6 characteristics present.
  - Weight loss, energy intake, muscle mass loss, fat mass loss, fluid accumulation, HGS
- Nutritional Supplements are not a one stop shop. Fix the underlying problem.