Malnutrition Assessment in Action: The Academy /A.S.P.E.N. Collaboration

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Disclosures

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No commercial relationships relevant to the topic being presented.

Objectives

- Review the development of evidence-informed/consensus derived indicators of adult and pediatric malnutrition
- Promote the standardized use of the indicators in all clinical and community settings
- Collect data to validate these approaches to malnutrition's characterization and diagnosis

Academy/A.S.P.E.N. Adult Malnutrition Work Group/Committee

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Contributors to Adult Malnutrition in Acute Care Settings

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Personal
Age
Dementia/Depression
Disease
Overly restrictive therapeutic diet
Inability to chew/swallow
Limited mobility
Sensory loss
Multiple Medications
Therapies: vents/drains/NPO, etc.

Organizational
Lack of recognition
Lack of screening/assessment
Lack of nutrition education
Confusion re: responsibility
Ht/Wt not measured/recorded
Failure to measure/record food intake
Inadequate nutrients provided
Lack of feeding assistance staff
Lack of care coordination
Nutrition status low priority

Int J Nurs Stud 2007;44(6):1036-54

Pediatric Malnutrition (Undernutrition): US Statistics

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≈1 in 10 households with children struggle with food insecurity [1]

Prevalence of acute/chronic undernutrition unknown. Those presumed to be at risk:

- ≈14% US children with "special needs" [2]
- Those hospitalized with acute/chronic illnesses [3]
- Those who are homeless/live in shelters
- Those in environmental/social situations with limited access to food

1. JAMA 2014; 311(8):86-814; 2. Coleman-Jensen,A. et.al. *Household Food Security in the United States in 2012*, EER-155, USDA Research Service, Sept. 2012; 3. *The National Survey of Children with Special Health Care Needs Chartbook 2005-2006.*Rockville Maryland: DHHS, 2007.

Some Consequences of Unrecognized Adult/Pediatric Malnutrition

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Impaired growth/development
Increased LOS
Impaired wound healing
Increased morbidity/mortality
Increased brain/muscle/function loss
Higher infection rates/complications
Increased admissions/readmissions

Costs
- Human



Inpatient Prospective Payment System MS-DRGs

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1983 –Diagnosis Related Groups (DRGs)

- Malnutrition recognized as a secondary diagnosis or "cc" (complication / co-morbid condition)
- DRG relative weights on estimated hospital costs, rather than charges. (Medicare & Medicaid)

2007 – Medical Severity DRG (MS DRGs)

- Recognize malnutrition as impacting acuity and severity of patients, so reimbursement may be increased due to increased cost of care
- 2010 – Moderate and mild MN designated CCs

Rationale for Developing Academy/A.S.P.E.N Malnutrition Diagnostic Indicators Characteristics

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No standardization
Multiple Definitions
Multiple Diagnostic (ICD-9)Codes
Multiple Characteristics used to Diagnose
Limited evidence base

- ✓ Emerging role of inflammation
- ✓ Influence on assessment parameters
- ✓ Influence on response to nutrition intervention
- ✓ Anti-inflammatory interventions
- ✓ Nutrition interventions outcomes divergence

Academy/A.S.P.E.N. Member Inquiries

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Academy/A.S.P.E.N had received numerous requests from RDNs, physicians, nurses and other professionals:

- How to diagnose malnutrition
- How to document malnutrition (limit audits/paybacks)
- Correlation of current NCPT definitions with existing diagnostic coding terminology
- Which characteristics to use, i.e.:
  - why not serum proteins (albumin/prealbumin, etc.)
  - why not percentiles

National Center for Health Statistics/Centers for Medicare & Medicaid Services (CMS) Inquires

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The National Center for Health Statistics (NCHS) had received multiple requests to clarify the malnutrition diagnosis codes and to determine the proper use of the ICD-9 codes

CMS was concerned by variability in incidence/severity of malnutrition diagnoses within the same state/zip code

ADA and A.S.P.E.N. invited to submit recommendations to help clarify diagnosis and standardize parameters by which malnutrition is assessed

A Vision for the Identification of Malnutrition (Undernutrition) in All Settings

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Wouldn't it be great to have standardized definitions/characteristics and to know the true prevalence of Malnutrition in…

Our Health System

Our World

Our Country

Attributes of Characteristics/Indicators of Adult/Pediatric Malnutrition

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- Evidence informed/consensus derived
- Universally available/easily obtained
- Applied inexpensively in multiple settings
- Reproducible with minimal training
- Support diagnosis/characterize severity
- Reflect change in nutritional status
- Will change over time as evidence of validity accrues

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Adult Malnutrition

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Characteristics/Indicators of Adult Malnutrition

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- Unable/unwilling to eat (caloric deficit)
- Unintended weight change
- Changes in Body Composition
  - Muscle loss
  - Subcutaneous Fat loss
  - Fluid Accumulation
- Decline in Functional Status
  - Handgrip strength

Any 2 or more characteristics identify adult malnutrition

Unable/unwilling to eat

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- Compromised nutrient intake of varying degree and duration
  - Includes acute/chronic disease/condition; inadequate access to food for any reason, i.e.
    - abuse, neglect, depression, frailty, homelessness, poverty, immigration from poorly resourced country
  - Acute time frame < 3 months
  - Chronic time frame ≥ 3 months
  - *avoid contributing to iatrogenic malnutrition in these patients

Unintended Weight Change

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Unintended weight loss:
In order to determine the percentage of weight change and to interpret the significance of weight change:

- Height, weight should be routinely measured
- Typical weight should be obtained

Changes in Body Composition

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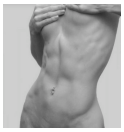
- Loss of Subcutaneous Fat
  - » orbital, triceps, fat overlying the ribs
- Muscle Loss
  - » Loss of lean mass at temples (temporalis muscle); clavicles (pectoralis & deltoids); shoulders (deltoids); interosseous muscles; scapula (latissimus dorsi, trape-zius, deltoids); thigh (quadriceps) and calf (gastrocnemius).



Changes in Body Composition (con't.)

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Fluid accumulation##

- Localized (hand, lower extremity or scrotal edema)
- Generalized fluid accumulation - clinically evident
  edema on examination

##May mask weight loss, might be reflected as weight gain

Changes in Body Composition (con't.)

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Assessing Edema, 2 methods:

1+ Mild pitting, slight indentation, no perceptible swelling of the extremity
2+ Moderate pitting, indentation subsides rapidly
3+ Deep pitting, indentation remains for a short time, extremity looks swollen
4+ Very deep pitting, indentation lasts a long time, extremity is very swollen

Or

1+ if the pitting lasts 0 to 15 sec
2+ if the pitting lasts 16 to 30sec
3+ if the pitting lasts 31 to 60sec
4+ if the pitting lasts >60sec

Changes in Body Composition (con't.)

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Assessing/Documenting Changes in Body Composition:
(for each trait specify: 0 = normal, 1+ = mild, 2+ = moderate, 3+ = severe)

_____loss of subcutaneous fat (triceps, ribs, orbital)

_____muscle wasting (quadriceps, deltoids, etc.)

_____extremity edema (hand/arm, ankle/leg)

_____scrotal edema

_____generalized edema

Measure of Functional Status

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Hand Grip Strength *
- Dynamometer
- Standards (excellent, good, average, fair, poor) for dominant hand by gender and age
- Maximum reading (kg) from 3 attempts, allow 1 minute rest between attempts

3 or 6 minute walk
Stair climbing
Peak Expiratory Flow
Short Physical Performance Battery (NIA-geriatrics)

** Strongest correlation to date with muscle mass and nutritional status*

Severe Malnutrition in Adults

J Acad Nutr Diet. 2012;112(5): 730-738

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For Example: ICD-9 Code 262*	Acute Illness/Injury	Chronic Illness	Social/Environmental
Weight Loss	>2%/1 week >5%/1 month >7.5%/3 months	>5%/1 month >7.5%/3 months >10%/6 months > 20%/1 year	>5%/1 month >7.5%/3 months >10%/6 months > 20%/1 year
Energy Intake	≤ 50% for ≥ 5 days	≤ 75% for ≥ 1 month	≤ 50% for ≥ 1 month
Body Fat	Moderate Depletion	Severe Depletion	Severe Depletion
Muscle Mass	Moderate Depletion	Severe Depletion	Severe Depletion
Fluid Accumulation	Moderate → Severe	Severe	Severe
Grip Strength	Not Recommended in ICU	Reduced for Age/Gender	Reduced for Age/Gender

* 2012 ICD-9-CM Physician Volumes 1 and 2. American Medical Association

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Non-Severe Malnutrition in Adults

J Acad Nutr Diet. 2012;112(5): 730-738

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For Example: ICD-9 Code 263.0 *	Acute Illness/Injury	Chronic Illness	Social/Environmental
Weight Loss	1-2%/1 week 5%/1 month 7.5%/3 months	5%/1 month 7.5%/3 months 10%/6 months 20%/1 year	5%/1 month 7.5%/3 months 10%/6 months 20%/1 year
Energy Intake	< 75% for > 7 days	< 75% for ≥ 1 month	< 75% for ≥ 3 months
Body Fat	Mild Depletion	Mild Depletion	Mild Depletion
Muscle Mass	Mild Depletion	Mild Depletion	Mild Depletion
Fluid Accumulation	Mild	Mild	Mild
Grip Strength	Not Applicable	Not Applicable	Not Applicable

* 2012 ICD-9-CM Physician Volumes 1 and 2. American Medical Association

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Pediatric Malnutrition

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Diagnostic Indicators of Pediatric Malnutrition (undernutrition) (ages 1 month-18 years)

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- Weight Gain Velocity
- Adequacy of Food/Nutrient Intake & Utilization
  - Energy & Protein needs assessment
- Mid Upper Arm Circumference (MUAC)
- Handgrip Strength (ages 6+)
- Tanner Stage
  - Should be tracked in all pre-teens/adolescents
  - Utility as a nutritional marker limited by the significant variability (up to 5 years) in genetic determinants for onset of puberty

Adequacy of Macronutrient Intake

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Food / nutrient intake & utilization

- Primary determinants of nutritional status
- Accuracy of estimation critical
  - Magnitude of deficit
  - Extent and acuity of deficit
- Is current intake adequate to meet needs in context of current clinical situation, stage of growth, developmental level?
  - History
  - Direct observation

Assessment of Energy/Protein Needs

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ENERGY

- Indirect calorimetry – most precise
- Estimated (based on "healthy" populations)
  - Standard equations
    - FAO/WHO; Schofield, etc.
  - 1989 RDA
  - 2005 DRI

PROTEIN

- DRI
  - Consider clinical status, i.e. major surgery, burns, infection, catch-up growth, renal function, etc.
  - Establish estimated needs as a starting point
  - Monitor and adjust, monitor, and adjust, etc.

Assessment of Growth Parameters

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Measure every time a child presents for any care in all settings.

WHO comparative data charts **birth to age 2**

- Length-for-age
- Weight-for-age
- Head circumference-for-age
- Weight-for-length

CDC comparative data charts ages **2-20 years**

- Standing height-for-age
- Weight-for-age
- BMI-for-age

Assessment of Growth Parameters: *Z Score* versus Percentile

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Z Score
- How a single data point compares to the norm, and if that point is above/below "average", how "atypical" the measure is.

Percentile
- Portion of the reference population whose measurement lies above or below that of the child being measured

***Z Score* comparisons preferred**

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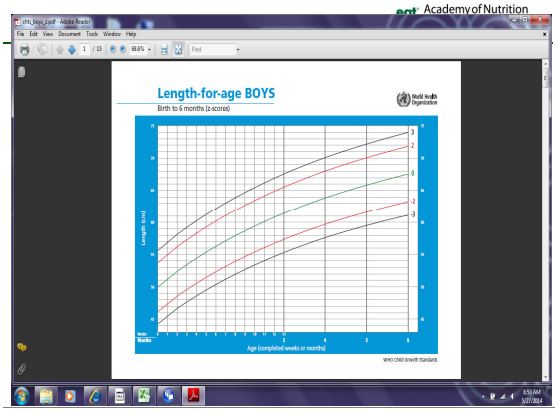

Weight Gain Velocity

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Average daily/monthly rates of weight gain that facilitate a stable pattern of growth

Very low weight velocity – best predictor of mortality[1]

Considerable plasticity in growth in short term
- Adaptive response to illness/injury
- Adequate nutrient intake → catch-up growth

[1] *J Nutr 2012 Mar;142(3):520-525*

Mid Upper Arm Circumference (MUAC)

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- Independent anthropometric assessment
  - Children ages 6-59 months
- Correlates with BMI but more sensitive to changes in muscle & fat mass
- Percentile guidelines available for ages 1-79 years[1]
- Especially important in presence of edema, ascites, steroid use that may impact fluid status
- Sensitive indicator of malnutrition-related mortality

[1] *Am J Clin Nutr. 1981; 34:2540-2545.*

Mid-Upper Arm Circumference

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- Comparative standards for MUAC use right arm
- Left arm may be used if it is the dominant arm or if the right arm has a shunt or port
- Equipment: firm, non-stretchable measuring tape

Mid-Upper Arm Circumference

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Procedure

- Remove clothing from arm to be measured
- Place child in seated position, facing forward. Infants may be held on lap.
- Place child's right arm with right hand on hip at a right (90°) angle
- Measure the length of the arm from the acronium process of the scapula to the olecranon (elbow tip). Mark mid point with washable pen.
- Measure around the arm at the level of the mark with firm contact without compression
- Note & record the measurement to the nearest 0.1 cm.

Handgrip Strength

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Simple, non-invasive, low cost
Muscle function reacts earlier to changes in nutritional status than does muscle mass
- May more accurately measure response to nutrition intervention than lab/anthropometrics

Procedure standardization; adequate staff training necessary
Reference range device dependent

Functional Outcomes Potentially Impacted by Malnutrition

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Lean Body Mass Measurement
Muscle Strength
Neurocognitive Outcomes
- IQ decrease of 4.2 in FTT infants in meta analyses but not helpful in the individual child

Immune Function
- Increased infection rate if increased exposure

Duration of illness

Primary Indicators (1 data point available): Pediatric Malnutrition

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Indicator (z score)	Mild	Moderate	Severe
Weight for height	-1 to -1.9	-2 to -2.9	-3 or more
BMI for age	-1 to -1.9	-2 to -2.9	-3 or more
Length/height	No data	No data	-3
MUAC	-1 to -1.9	-2 to -2.9	-3 or more

Primary Indicator (2 or more data points available): Pediatric Malnutrition

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Indicator	Mild	Moderate	Severe
Weight gain Velocity (< 2y of age)	< 75% of norm	< 50 % of norm	< 25% of norm
Weight Loss (2-20y of age)	5% usual body wt	7.5% usual body wt	10% usual body wt
Deceleration in wt for length/height	Decline of 1 z score	Decline of 2 z score	Decline of 3 z score
Inadequate protein/energy intake	51-75% estimated needs	26-50% estimated needs	≤ 25% estimated needs

Evaluation

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Initial Documentation

1. Underlying disease/condition ± inflammation
   Acute vs chronic (< or > 3 months)
2. Anthropometrics
3. Estimated intake/estimated protein-energy needs
4. Tanner stage (if applicable)
5. Handgrip strength (if applicable)

If criteria met, document malnutrition

GOAL: Prevent complications/improve outcomes

Monitoring

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Follow response and reassess

- Monitor and adjust, monitor and adjust…

Continuity of Care???

Monitoring Frequency??

Nutrition Surveillance

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Bright Futures* *(healthy children, malnourished TBD)*

Infancy
- 2 to 5 Day (First Week) Visit; 1 Month Visit; 2 Month Visit; 4 Month Visit; 6 Month Visit; 9 Month Visit

Early Childhood
- 12 Month Visit; 15 Month Visit; 18 Month Visit; 2 Year Visit; 2 1/2Year Visit; 3 Year Visit; 4 Year Visit

Middle Childhood
- 5 Year – 10 Years, Annual Visit

Adolescence
- 11 Year – 21 Years, Annual Visit

*http://brightfutures.aap.org/pdfs/Other%203/Bright%20Futures%20Kit%20contents%20&%20development.pdf

What You/Your Staff Can Do NOW

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- Read consensus statement & related documents
- Create awareness and provide literature/ discussion/opportunities, encourage uniform implementation by
  - Nutrition staff
  - Medical/Nursing/Pharmacy Staff
  - HIM and coders
- Participate in Academy/A.S.P.E.N. / AAP research networks / registries as they become available for data entry
- Watch for future Academy / A.S.P.E.N. / AAP educational opportunities

Academy/A.S.P.E.N. Malnutrition Consensus Statements Caveats

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Characteristics/Indicators to Diagnose Malnutrition

- **Work in progress**
- Parameters may change over time
- Evidence to support their appropriateness
  - Must be collected and evaluated in a standardized manner to identify:
    - Diseases/conditions/circumstances routinely associated with MN's development – all settings
    - Resources utilization/revenue generation
    - Human/financial costs of care

References

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1. *J Acad Nutr Diet* 2012;112(5):730-738*; JPEN J Parenter Enteral Nutr.* 2012;36(3):275-283.
2. *J Acad Nutr Diet 2014;114(12):1988-2000; Nutr Clin Pract. 2015;30(1):147-161, first published on November 24, 2014 doi 10.1177/0884533614557642.*