Improving Patient Outcomes: Interdisciplinary Approach to Recognizing & Treating Malnutrition

Gordon L. Jensen, MD, PhD
Professor and Head, Department of Nutritional Sciences
The Penn State University
University Park, PA

Ainsley Malone, MS, RD, CNSC, LD
Nutrition Support Team Dietitian
Pharmacy Dept
Mt. Carmel West Hospital
Columbus, Ohio

Objectives

• Review historical approaches to defining malnutrition
  ‒ Limitations of existing definitions
  ‒ Barriers to early identification of malnutrition
  ‒ Evolution of biomarkers to functional outcomes
• Introduce new etiology driven approach to defining malnutrition that incorporates a modern understanding of inflammation

Limitations of Historic Definitions for Malnutrition

• Diagnostic criteria lack full validity
• Poor specificity, sensitivity, and inter-observer reliability
• Overlapping definitions and misdiagnosis
• Multiple definitions resulting in widespread confusion
• Lack modern appreciation for role of inflammatory response
• Clinically relevant malnutrition is often present before it can be readily detected by routine laboratories or physical findings

Acute Phase Reactants in Inflammation

Body down regulates albumin synthesis so that urgently needed proteins for immune, clotting, and wound healing functions can be made.

• Positive - antibodies, complement, C-reactive protein, and fibrinogen
• Negative - albumin, transferrin, prealbumin, retinol binding protein

Disclosure

• The content of this program has met the continuing education criteria of being evidence-based, fair and balanced, and non-promotional.
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Individuals with marasmus due to pure semi-starvation may exhibit normal visceral proteins (anorexia nervosa).

Obese persons in diet programs with low protein and energy intakes and resulting weight loss may exhibit normal proteins.

Changes in body cell mass correlate poorly with visceral proteins.

Changes in dietary intake correlate poorly with visceral proteins. Sick eat less.

Albumin is a poor indicator of nutritional status

Other disease states impact visceral protein synthesis or losses.

Volume status can limit interpretation.

Protracted half-life of albumin renders it insensitive to measure changes in status.

Prealbumin suffers most of the same limitations but has a shorter half-life.

Major Determinants of Body Composition and Physiologic Function

Assessment of Nutritional Status

Assessment of the adequacy of nutrient intake is vital

An adequate nutrient intake is necessary, but not sufficient, to maintain body mass and normal physiologic function, with additional intake required to replete established deficits

Energy, protein, and micronutrient requirements are influenced by a wide array of factors, including activity level, environment, disease states, medications, and relative intake of other nutrients

Assessment of Nutritional Deficits

Multiple strategies for assessing the adequacy of nutritional state have been promoted, including:

- Body weight and/or its change
- Body composition (absolute or relative) and its change
- Biochemical and immune response measures
- Muscle strength, physical performance, or physical functional

Each approach has advantages and limitations

All must be interpreted within a defined context

Key Insights

Since there is no single biomarker that serves to diagnose malnutrition, a multi-component approach is therefore required to guide screening, assessment, and diagnosis.

Pathophysiology of malnutrition that is associated with disease or injury invariably consists of a combination of varying degrees of under- or over-nutrition and acute or chronic inflammation, leading to altered body composition and diminished biological function.
Endorsed by ASPEN and ESPEN

Jointly published in the March 2010 issues of JPEN and Clinical Nutrition

Proposed Etiology-Based Terminology for Adults in the Clinical Practice Setting

Starvation-related malnutrition
• Chronic starvation without inflammation
  – Anything that limits access to food; for example, anorexia nervosa

Chronic disease-related malnutrition
• Inflammation is chronic and of mild to moderate degree
  – Organ failure, pancreatic cancer, rheumatoid arthritis, or sarcopenic obesity

Acute disease– or injury-related malnutrition
• Inflammation is acute and of severe degree
  – Major infection, burns, trauma, or closed head injury

AND-ASPEN Recommendations

Nutritional Risk Identified
Compromised intake or loss of body mass

Inflammation Present?
No/Yes

NO
Starvation-Related Malnutrition
(Pure chronic starvation, anorexia nervosa)

YES
Chronic Disease–Related Malnutrition
(Organ failure, pancreatic cancer, rheumatoid arthritis, sarcopenic obesity)

Marked Inflammatory Response
Acute Disease– or Injury-Related Malnutrition
(Major infection, burns, trauma, closed head injury)

Observations

Patients may be diagnosed in one or more of these categories or may change from one to another
• Patients who are overweight or obese may be assigned to any of these categories as appropriate
  – Sarcopenic obesity may represent a chronic low-level inflammatory state

Patients should be evaluated at multiple time points...
early recognition is key
• Acute or chronic disease–related malnutrition that progresses; new acute inflammatory events
• Iatrogenic starvation superimposed over acute or chronic disease–related malnutrition
• Critically ill patients may not be malnourished acutely but warrant early intervention because of acute metabolic dysregulation and associated catabolism that place them at risk

Consensus Statement: The Academy and ASPEN

Characteristics for identification and documentation of adult malnutrition
• Insufficient energy intake
• Weight loss
• Loss of muscle and SQ fat
• Localized or generalized fluid accumulation
• Diminished functional status
Proposed Coding: “Other PCM”

Severe (262.0) vs non-severe degree (263.0)
- Malnutrition in the context of acute illness or injury
- Malnutrition in the context of chronic illness
- Malnutrition in the context of social or environmental circumstances

Criteria
- Energy intake
- Weight loss
- Physical findings (SQ fat, muscle mass, fluid retention, and reduced grip strength)

Proposed Systematic Approach to Assessment

- History and clinical diagnosis
- Clinical signs/physical exam
- Anthropometric data
- Laboratory indicators
- Dietary assessment
- Functional outcomes

Next Steps: Educational Program

- Educational programs: Academy/ASPEN collaboration
- Promote assessment by skilled nutrition practitioners
- Dissemination of consensus diagnostic criteria: co-publication in Academy and ASPEN journals

Next Steps: Testing

- Laboratory, functional, food intake, or body weight criteria in support of these diagnoses will require further development.
- Translation of this diagnostic approach to routine clinical practice will require validation. Trials in development in health care systems. Priority for valid functional outcome measures.
- Approach to pediatric syndromes is in development.

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Nutrition Screening

Process of identifying patients at nutritional risk
- Who would benefit from further nutritional assessment
- Who may need nutritional intervention
- Conducted with timeframe based on clinical risk

Required by the Joint Commission
Desired Characteristics for Malnutrition Diagnosis

- Valid: sensitivity, specificity, reliability
- Simple: extensive training not required
- Flexible: broad applicability
  - Acute/chronic, adult/pediatric, multiple settings
- Diagnose individuals who we can intervene upon and achieve favorable outcomes

Reliability and Validity of Malnutrition Screening Tools

<table>
<thead>
<tr>
<th>Tool</th>
<th>Comparator</th>
<th>Subjects</th>
<th>Number</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Kappa</th>
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<tr>
<td>NRS-2002</td>
<td>SGA, MNA</td>
<td>Hosp 995, 120, 80</td>
<td>30-70%</td>
<td>83-93%</td>
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<tr>
<td>MNA-SF</td>
<td>MNA Ambul</td>
<td>408, 904</td>
<td>98%</td>
<td>70%-100%</td>
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<tr>
<td>MST</td>
<td>SGA Hosp</td>
<td>oncology 2211, 408, 50, 106</td>
<td>74%-100%</td>
<td>76%-93%</td>
<td>0.83-0.88</td>
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<tr>
<td>MUST</td>
<td>SGA Hosp</td>
<td>50, 995</td>
<td>61%</td>
<td>76%</td>
<td>n/a</td>
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<tr>
<td>NST-BAPEN</td>
<td>RD assessment Hosp 166</td>
<td>86%</td>
<td>95%</td>
<td>0.66</td>
<td></td>
<td></td>
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<tr>
<td>2-part tool SGA Hosp 2210</td>
<td>63%</td>
<td>97%</td>
<td>n/a</td>
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</tbody>
</table>

Data Required to Complete Nutrition Screening Tools Evaluated in the Nutrition Screening Evidence Analysis Project

<table>
<thead>
<tr>
<th>Evaluation Item</th>
<th>NRS-2002</th>
<th>MNA-SF</th>
<th>MST</th>
<th>MUST</th>
<th>NST/BAPEN</th>
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<tbody>
<tr>
<td>Recent Unintentional Weight Loss</td>
<td>xx</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Appetite</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td>Body Mass Index</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
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<tr>
<td>Disease Severity</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
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<tr>
<td>Age &gt;70 y</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Weight</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
</tr>
<tr>
<td>Height</td>
<td>x</td>
<td></td>
<td></td>
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<tr>
<td>Weight Gain or Loss</td>
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<td>x</td>
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<tr>
<td>Subcutaneous Fat Loss</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
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<td>Impaired General Condition</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
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<tr>
<td>Inability to Obtain Food</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
</tr>
<tr>
<td>Meal Preparation Habits and Eating Alone</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
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<tr>
<td>Dementia or Depression</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
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<tr>
<td>Food Intake or Eating Problem; Skipping Meals</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
</tr>
<tr>
<td>Ability to Eat and Retain Food</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
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<tr>
<td>Intake of Fluids/Fruits and Vegetables</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
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</tbody>
</table>

MNA-SF=Mini-Nutritional Assessment–Short Form; MST=Malnutrition Screening Tool; MUST=Malnutrition Universal Screening Tool; NRS=Nutritional Risk Screening; NST/BAPEN4=Nutrition Screening Tool/British Association of Parenteral and Enteral Nutrition; SCREEN-II AB=Seniors in the Community: Risk Evaluation for Eating and Nutrition, Version II, abbreviated version.

Nutrition Screen - MST
**Patient Case Application**
Nutrition Screening, Assessment and Intervention

**M.S. – Nutrition Data**
- Ht: 64"
- Admitting weight: 146#
- Usual weight: 204#
  - 3.5 months prior to admission
- Positive nutrition screen
  - Weight loss
  - Poor nutrient intake
- RD – Patient seen on hospital day #1 for assessment
  - MS reports eating less than normal due to abdominal pain
  - Between half and ¾’s of normal meals for previous month
  - Refused oral supplement when previously recommended
  - Usual weight verified – 28% loss over 3.5 months

**Our Patient - M.S.**
- MS, 64 yr female, admitted with abdominal pain and diarrhea
- Recent hospital admission for pneumonia, sepsis and UTI
  - c/o abdominal pain – workup for superior mesenteric artery syndrome negative
  - Transferred to skilled nursing facility
- Medical and surgical history
  - Diabetes mellitus, chronic obstructive pulmonary disease, hypertension
  - Total abdominal hysterectomy, cholecystectomy
- Differential diagnosis of acute intermittent polyphylia or retroperitoneal fibrosis

**Severe Malnutrition in Adults**

| For Example:  
<table>
<thead>
<tr>
<th>ICD-9 Code 262*</th>
<th>Acute Illness/Injury</th>
<th>Chronic Illness</th>
<th>Social/Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight Loss</td>
<td>&lt;50% for &gt; 5 days</td>
<td>&lt;75% for &gt; 1 month</td>
<td>&lt;50% for &gt; 1 month</td>
</tr>
<tr>
<td>Energy Intake</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body Fat</td>
<td>Moderate Depletion</td>
<td>Severe Depletion</td>
<td>Severe Depletion</td>
</tr>
<tr>
<td>Muscle Mass</td>
<td>Moderate Depletion</td>
<td>Severe Depletion</td>
<td>Severe Depletion</td>
</tr>
<tr>
<td>Fluid Accumulation</td>
<td>Moderate - Severe</td>
<td>Severe</td>
<td>Severe</td>
</tr>
<tr>
<td>Grip Strength</td>
<td>Not Recommended in ICU</td>
<td>Reduced for Age/Gender</td>
<td>Reduced for Age/Gender</td>
</tr>
</tbody>
</table>

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

- Nutrition Diagnosis
  - Severe malnutrition related to chronic disease or acute illness/injury
- Current diet – Nothing by mouth/liquids
- Diarrhea continues
- Registered Dietitian referred patient to Nutrition Support Team for probable parenteral nutrition initiation
- Parenteral nutrition initiated on hospital day #2
- Parenteral nutrition continued until oral diet advanced as gastrointestinal dysfunction resolved
  - Patient agreeable to begin oral supplement
  - Abdominal pain improving
- Patient discharged home on hospital day #12

Interdisciplinary Coordination

Critical for malnutrition recognition and subsequent intervention

Key Team Members: Stake Holders

Barriers to Recognition of Malnutrition

- Improper/invalid screening tools
- Lack of automated triggers
- Overreliance on paper charting and phone calls to trigger nutrition consultation
- Insufficient staffing of RNs (Prioritized screening by RNs)
- Variability in recognizing malnutrition
Barriers to Implementation

- Delays in line/tube placement
- Physician orders
  - Untimely delays
  - Ignore RD/team recommendations
  - Errors
- Lack of nutrition monitoring
- Lack of nutrition education
- Absence of nutrition support team to oversee the process

Malnutrition Study at Johns Hopkins

JCAHO requires dietary assessment within 48 hours of admission; screening by nurses within 24 hours of admission

- Food and Nutrition Dept
  - Consulted on 22.6% of malnutrition patients
  - Time to consultation: 4.1 ± 6.25 days from admission (n=46)

Recognition: Johns Hopkins Hospital nursing assessment form: malnutrition patients

- 43.7% had either no form or the nutrition screen was not filled out (87/199), while 112/199 (56.3%) were screened
- 80 of 112 who were screened (71.8%) were identified as at risk for malnutrition and were NOT referred for consultation

Effect of Nutrition Intervention on Clinical Nutrition Department Consultation Days

<table>
<thead>
<tr>
<th>LOS Primary Variable</th>
<th>Clinical Nutrition Department Consult Days</th>
<th>Ward A</th>
<th>Ward B</th>
<th>Ward A</th>
<th>Ward B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Phase 1</td>
<td>Phase 2</td>
<td>Phase 1</td>
<td>Phase 2</td>
</tr>
<tr>
<td>Mean</td>
<td>4.3</td>
<td>3.7</td>
<td>2.3</td>
<td>3.3</td>
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<tr>
<td>SD</td>
<td>6.5</td>
<td>5.1</td>
<td>1.7</td>
<td>5.7</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>29</td>
<td>26</td>
<td>67</td>
<td>21</td>
<td></td>
</tr>
</tbody>
</table>


Ongoing Monitoring, Assessment and Re-Screening is Essential

- Post critical care admission
  - Oral intake one week after extubation failed to exceed 50% of estimated requirements
  - 44% of patients admitted to ICU were malnourished (SGA)
- Patients with longer length of stay (LOS)
  - Malnutrition incidence higher with > LOS (SGA)²
  - 42.5% for LOS 14-27 days
  - 51.5% for LOS ≥28 days
  - Malnutrition on admission: 19.7%
  - LOS an independent predictor of malnutrition

Successful Multi-Disciplinary Intervention

- Effectiveness of a multi-disciplinary intervention program
  - Nutrition intake, nutrition status and quality of life
  - Control Group = standard nutrition care
  - Study Group = multi-disciplinary care during admission and at discharge

Practice Differences

- Higher incidence of malnourished patients (p=0.019)
- Greater decline in QOL (p=0.039)

47 Hoekstra J Clin Nutr 2011;30:455
Summary

- Simple, accurate screening of patients is necessary as one tool to identify patient at nutrition risk.
- Subsequent assessment and intervention is empowering to show treatment of malnutrition is cost-effective and a critical tool to enhance health of patients.
- Screening for malnutrition in the hospital setting along with intervention is critical to optimal patient care and is a multidisciplinary team effort.

Malnutrition Education Resource Destinations

www.anhi.org/malnutrition

- High-quality Malnutrition Education Destination for complimentary CE, CME, and Resource Centers

Malnutrition Resource Centers

JAND Resource Center
- Journal of the Academy of Nutrition and Dietetics Malnutrition Resource Center
- JAND peer-review published article collection on malnutrition; all articles “open access”
- Over 50 reference articles on malnutrition from other healthcare journals and websites

JNP Resource Center
- The Journal for Nurse Practitioners Malnutrition Resource Center
- Complimentary CE self-study courses

Acknowledgements


Acknowledgements