# APPROACH TO NUTRITIONAL SCREENING AND ASSESSMENT

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## INTRODUCTION

Clinical nutrition is the science that consists of the prevention, evaluation, and management of nutritional and metabolic changes in the body caused by diseases.

There is a large spectrum of diseases related to clinical nutrition.

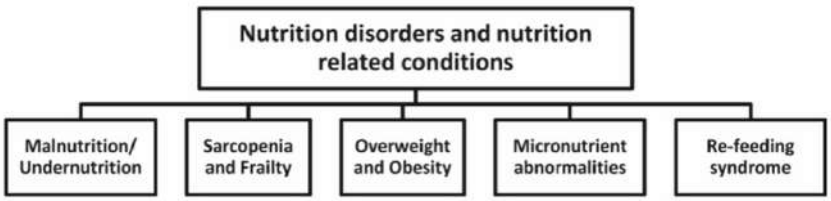



Fig. 1 Spectrum of nutrition-related diseases and conditions[1]

Malnutrition is "a state resulting from lack of intake or uptake of nutrition that leads to altered body composition (decreased fat-free mass) and body cell mass leading to diminished physical and mental function and impaired clinical outcome from disease" [2].

The prevalence of malnutrition/undernutrition among adult hospitalized patients ranges from 30 to 50%[3,4].

There are several categories of Malnutrition/undernutrition.

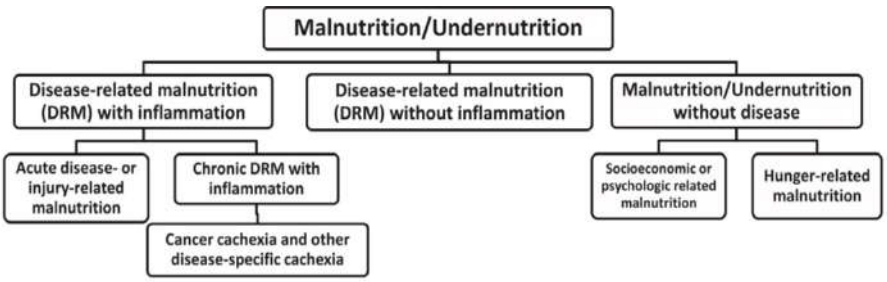



Fig. 2 Categories of Malnutrition.[1]

Malnutrition/Undernutrition should be considered as an additional disease entity. It is an important contributor to comorbidity.

Causes of malnutrition in hospitalized patients are-

- Many disease conditions directly impair the nutritional status of the patient (E.g., bowel ischemia, esophageal stricture). These diseases cause metabolic and psychological disturbances which increase the nutritional demand and decrease food intake.
- There are various examinations and interventions (e.g., endoscopy) to be done in hospitalized patients which require a prolonged fasting period which leads to further reduced food intake.
- Undernutrition in hospitalized patients is also aggravated by inappropriate meal services by Hospital catering which may include inadequate quality or quantity of meals and lack of flexibility.

The consequences of Malnutrition are-

- Poor nutritional status leads to an increase in complications, longer hospital stays, more readmissions, higher mortality, and higher treatment costs.
- Poor nutritional status also influences the efficacy and tolerability of many key treatments, like antibiotic therapy, chemo and radiotherapy, and surgery.

To combat all this there is a nutrition care process that includes the following steps[1]-

- Malnutrition risk screening
- Nutritional assessment
- Diagnostic procedure
- Nutritional care plan
- Nutritional care
  - ➢ Nutrition therapy
- Monitoring and evaluating the effects of nutritional care and therapy
- Documentation

**Nutrition screening** has been defined by the American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.) as "a process to identify an individual who is malnourished or who is at risk for malnutrition to determine if a detailed nutrition assessment is indicated" [5].

**Nutrition assessment** has been defined by the A.S.P.E.N. as "a comprehensive approach to diagnosing nutrition problems that use a combination of the following: medical, nutrition, and medication histories; physical examination; anthropometric measurements; and laboratory data" [5].

## NUTRITIONAL SCREENING AND NUTRITIONAL ASSESSMENT

Every patient admitted to the hospital due to any illness must have their nutritional status recorded by a nutrition support clinician. Evaluation begins with an initial screening procedure and should be followed by a detailed assessment of those patients screened and found to be at risk. The clinical setting, the skill of the nutrition care team, and the availability of resources determine the specific methods to be used for screening and assessment.

Initial screening should be done within the first 24-48 hours once the patient is admitted and thereafter at regular intervals. Patients who are identified as at-risk during screening need to undergo a detailed nutritional assessment.

Nutrition screening and assessments lead to certain recommendations based on which a specific nutritional care plan should be implemented to improve nutritional status of the patient.

There is also provision of reassessment and monitoring methods as a part of overall nutrition care.

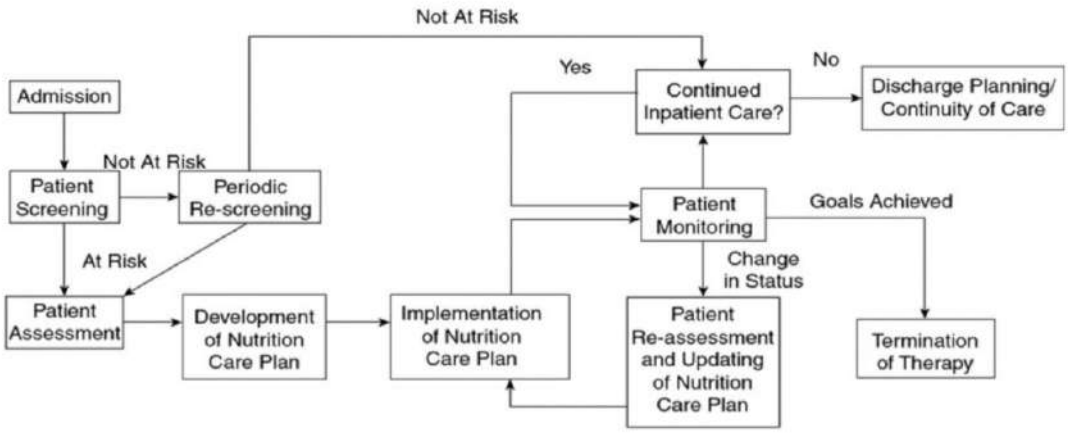



Fig 3. The A.E.S.P.E.N recommended Nutrition care algorithm [6].

## METHODS OF NUTRITIONAL SCREENING

Screening should be simple, rapid, and sensitive. There are several validated screening tools available.

| Instrument | Anthropometry and/or Diet-Related | Severity of Illness | Other (Physical, Psychological Variables or Symptoms) |
|---|---|---|---|
| **Screening tools** | | | |
| Birmingham Nutrition Risk Score | Weight loss, BMI, appetite, ability to eat | Stress factor, (severity of diagnosis) | |
| Malnutrition Screening Tool | Appetite, unintentional weight loss | | |
| Malnutrition Universal Screening Tool | BMI, change in weight | Presence of acute disease | |
| Maastricht Index | Percentage ideal body weight | Albumin, prealbumin, lymphocyte count | |
| Nutrition Risk Classification | Weight loss, percentage ideal body weight, dietary intake | | Gastrointestinal function |
| Nutritional Risk Index | Present and usual body weight | Albumin | |
| Nutritional Risk Screening 2002 | Weight loss, BMI, food intake | Diagnosis (severity) | |
| Prognostic Inflammatory and Nutritional Index | | Albumin, prealbumin, C-reactive protein, α1-acid glycoprotein | |
| Prognostic Nutritional Index | Triceps skin fold | Albumin, transferrin, skin sensitivity | |
| Simple Screening Tool | BMI, percentage weight loss | Albumin | |
| Short Nutrition Assessment Questionnaire | Recent weight history, appetite, use of oral supplement or tube feeding | | |

Fig 4. List of various validated Screening tools recommended by the A.E.S.P.E.N[6].

The European Society for Clinical Nutrition and Metabolism (ESPEN) recommends the following screening tool:

- For general community screening: Malnutrition Universal Screening Tool (MUST)[8]

- For Hospital/ IPD: Nutritional Risk Screening (NRS)[8]

- For Elderly patients: Mini Nutritional Assessment (MNA)[8]

<u>Community: Malnutrition Universal Screening Tool (MUST)[8]</u>

It has 3 components which are BMI, Weight loss, and nutritional intake.

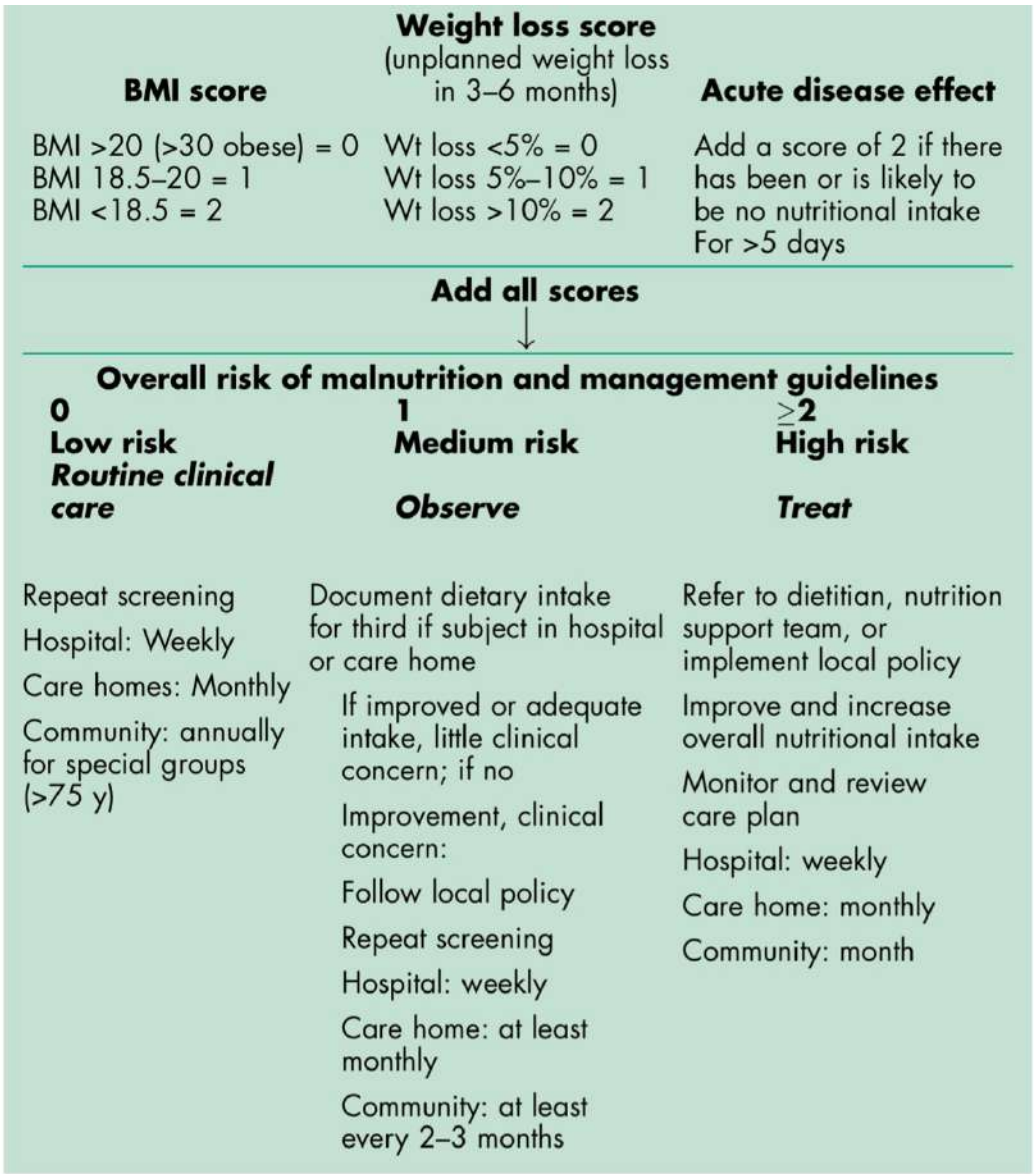



Fig 5. Malnutrition Universal Screening Tool (MUST) [7].

Hospital: Nutritional Risk Screening (NRS)[8]:

It is a two-step procedure

**Nutritional Risk Screening (NRS 2002); Initial screening questions**

| | Initial screening I | Yes | No |
|---|---|---|---|
| 1 | Is BMI <20.5? | | |
| 2 | Has the patient lost weight within the last 3 months? | | |
| 3 | Has the patient had a reduced dietary intake in the last week? | | |
| 4 | Is the patient severely ill? (e.g. in intensive therapy) | | |

**Yes:** If the answer is 'Yes' to any question, the screening in Step 2 is performed.
**No:** If the answer is 'No' to all questions, the patient is re-screened at weekly intervals. If the patient is (e.g.) scheduled for a major operation, a preventative nutritional care plan is considered to try to avoid the associated risk.

**Nutritional Risk Screening (NRS 2002); Final screening**

| **Final screening II** | | | |
|---|---|---|---|
| **Impaired nutritional status** | | **Severity of disease** (≈ increase in requirements) | |
| Absent<br>**Score 0** | Normal nutritional status | Absent<br>**Score 0** | Normal nutritional requirements |
| Mild<br>**Score 1** | Wt loss >5% in 3 months<br>or<br>Food intake below 50-75% of normal requirement in preceding week | Mild<br>**Score 1** | Hip fracture<br>Chronic patients, in particular with acute complications: cirrhosis, COPD<br>Chronic haemodialysis, diabetes, oncology |
| Moderate<br>**Score 2** | Wt loss >5% in 2 months<br>or<br>BMI 18.5 - 20.5 + impaired general condition<br>or<br>Food intake 25-50% of normal requirement in preceding week | Moderate<br>**Score 2** | Major abdominal surgery<br>Stroke<br>Severe pneumonia, hematological malignancy. |
| Severe<br>**Score 3** | Wt loss >5% in 1 months<br>(>15% in 3 months)<br>or<br>BMI <18.5 + impaired general condition<br>or<br>Food intake 0-25% of normal requirement in preceding week | Severe<br>**Score 3** | Head injury<br>Bone marrow transplantation<br>Intensive care patients (APACHE>10). |
| **Score:**<br>**+** | | **Score:** | **= Total score:** |
| **Age** | if ≥ 70 years: add 1 to total score above | | **= age-adjusted total score:** |
| **Score ≥3: the patient is nutritionally at-risk and a nutritional care plan is initiated**<br>**Score < 3: weekly re-screening of the patient. If the patient is (e.g.) scheduled for a major operation, a preventative nutritional care plan is considered to try to avoid the associated risk.** | | | |

Fig. 6 Nutritional Risk Screening (NRS) [8].

Elderly: Mini Nutritional Assessment (MNA)[8]

**Mini Nutritional Assessment (MNA); Screening**

| | |
|---|---|
| **A** | **Has Food intake declined over the past 3 months, due to loss of appetite, digestive problems chewing or swallowing difficulties?**<br>0 = severe loss of appetite<br>1 = moderate loss of appetite<br>2 = no loss of appetite |
| **B** | **Weight loss during last 3 months?**<br>0 = weight loss greater than 3 kg<br>1 = does not know<br>2 = weight loss between 1 and 3 kg<br>3 = no weight loss |
| **C** | **Mobility?**<br>0 = bed or chair bound<br>1 = able to get out of bed/chair but does not go out<br>2 = goes out |
| **D** | **Has suffered psychological stress or acute disease in the past 3 months?**<br>0 = yes<br>2 = no |
| **E** | **Neuropsychological problems?**<br>0 = severe dementia or depression<br>1 = mild dementia<br>2 = no psychological problems |
| **F** | **Body Mass Index (BMI) [weight in kg] / [height in m]² ?**<br>0 = BMI less than 19<br>1 = BMI 19 to less than 21<br>2 = BMI 21 to less than 23<br>3 = BMI 23 or greater |

**Screening score** (subtotal max. 14 points)

12 points or greater **Normal - not at risk** **-> no need to complete assessment**

11 points or below **Possible malnutrition** **-> continue assessment**

Fig 7. Mini Nutritional Assessment (MNA) [8].

There is another simple tool called the **Geriatric Nutrition Risk Index (GNRI)** specially designed for the prediction of morbidity and mortality in hospitalized elderly patients. It uses two variables, serum albumin and weight loss[7].

$$GNRI = [1.489 \times \text{albumin } (g/L)] + [41.7 \times (\text{weight}/WLo)]$$

Fig. 8 Geriatric Nutrition Risk Index (GNRI) WLo: Weight loss[7].

Depending upon the score it categorizes patients into four categories

Major Risk (GNRI < 82), Moderate Risk (GNRI 82-91),

Low Risk (GNRI 92-98) and no risk (GNRI > 98).

ICU patients: Nutric-Score for Risk Screening in the ICU[8]

**Nutric scoring system**

| Variables in Nutric score | Nutric scoring system Range | Nutric scoring system Points |
|---|---|---|
| Age | <50 | 0 |
| | 50-<75 | 1 |
| | >75 | 2 |
| APACHE II | <15 | 0 |
| | 15-20 | 1 |
| | 20-28 | 2 |
| | >28 | 3 |
| SOFA | <6 | 0 |
| | 6-<10 | 1 |
| | >10 | 2 |
| Co-morbidities | 0-1 | 0 |
| | 2+ | 1 |
| Days from hospital to ICU | 0-<1 | 0 |
| | 1+ | 1 |
| IL-6 | 0-<400 | 0 |
| | 400+ | 1 |

Fig. 9 Nutric-Score for Risk Screening[8].

Nutrition Risk Index (NRI)[7]

In 1991, the NRI was developed mainly to evaluate the efficacy of preoperative total parenteral nutrition in patients undergoing abdominal or thoracic surgery. The NRI uses two variables, serum albumin level and differences in a patient's current and previous body weight[7].

$$NRI = 1.519 \times \text{serum albumin (g/L)} + 0.417 \times (\text{current weight/usual weight}) \times 100$$

No nutrition risk: NRI > 100
Borderline nutrition risk: NRI > 97.5
Mild nutrition risk: NRI 83.5–97.5
Severe nutrition risk: NRI < 83.5

Fig. 10 Nutrition Risk Index[7].

Screening tools are validated by several studies. Kyle et al in their study in 2006 found that the NRI, MUST, and NRS 2002 has a good ability to predict the length of Hospital stay (9). Stratton et al. and Henderson et al. found that the MUST and the Birmingham Nutrition Risk score have the ability to predict outcome or mortality. (10,11)

**Methods for Nutritional Assessment**

After nutritional screening, a detailed nutritional assessment should be done in those patients who are found to be at risk on screening. Nutritional assessment is also required when certain metabolic and functional problems prevent a standard nutritional care plan from being carried out.

The Subjective Global Assessment (SGA) and Mini Nutritional Assessment are two widely accepted tools available. ESPEN recommends the SGA for nutritional assessment[8].

Nutritional assessment is more complex than screening and uses the following principles:

- History
- Clinical findings (Physical examination, Anthropometry, Body composition)
- Functional Assessment
- Laboratory Tests
- Assessment of Food intake and energy expenditure.

HISTORY

History of the patient should be obtained to assess any weight loss, Appetite, dietary habits, and gastrointestinal symptoms like diarrhea, constipation, nausea, or vomiting; any history of fever or medical illnesses, symptoms of psychiatric illness which may prevent nutritional intake for food intake (e.g., depression, anorexia nervosa), drug intake (e.g., Methotrexate and phenytoin cause folate deficiency)

CLINICAL FINDINGS

I. PHYSICAL EXAMINATION

Physical examination has to be done using the traditional methods of inspection, palpation, percussion, and auscultation to detect

- any signs of nutrient deficiencies or toxicities (e.g., glossitis, dermatitis, cheilosis, neuromuscular irritability, coarse & easily pluckable hair, etc.)
- tolerance of ongoing nutritional support (e.g., water retention and edema developed due to excessive IV Fluids and TPN therapy)
- Assessment of muscle mass and subcutaneous fat stores;

## II. Body Mass Index (BMI)

BMI (kg/m$^2$) is calculated by measuring the height and weight of the individual. BMI does not reliably indicate the distribution between adipose tissue and lean body mass. As there is a lack of a linear relationship between BMI and body compartments individuals with a high BMI may have a disproportionately low-fat-free mass, and on the contrary, the individual with a low BMI may have an increased fat-free mass. So, a high BMI can be seen in both obese and very muscular athletes. High and low values are associated with increased morbidity and mortality[8].

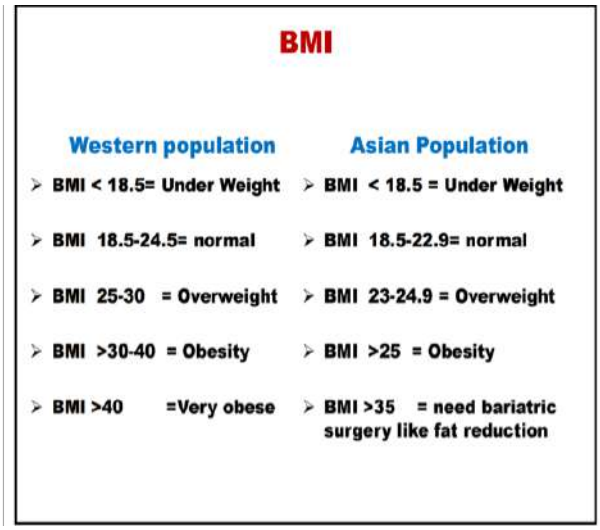



Fig. 11 BMI table

## III. Bedside Anthropometric Measurements

Mid-arm Circumference (MAC)[8]

MAC is measured at the level of mid-point between the acromion process and the olecranon process using a measuring tape.

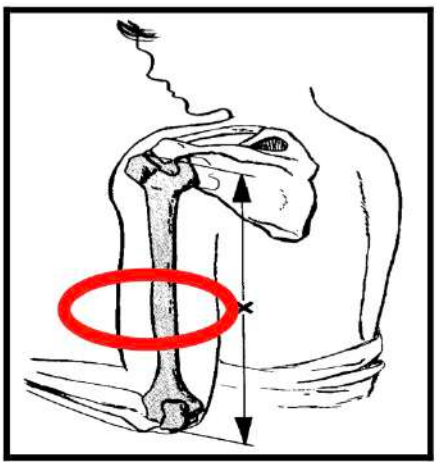


Fig. 12 Measurement of mid arm circumference[8].

Triceps Skinfold Thickness (TSF)[8]

Measured using Harpenden skin fold thickness caliper.

Fig. 13 Measurement of Triceps Skin fold Thickness (TSF)[8].

Creatinine Height Index (CHI)[8]

Creatine is metabolized into creatinine and excreted into urine at a stable rate depending upon the amount of muscle mass in the body. It is different in men and women correlate with lean body mass.

CHI (%) = measured 24hr urinary creatinine x 100/normal 24hr urinary creatinine

A deficit in measured value reflects depletion in muscle mass. 5–15% classed as mild, 15–30% moderate and > 30% as severe depletion.

Renal insufficiency, excessive meat consumption, fever, infections, and strenuous

physical activity influence urine creatinine excretion.

IV. New Tools for Measuring Body Composition

Hydrodensiometry[7]:

Hydrodensitometry, or underwater weighing considered a gold standard for the analysis of body composition in the past. It is based on Archimedes' principle, which states that when an object is submerged completely in water it displaces an equal volume of water from the tank.

To perform hydrodensitometry the subject was weighed in the air suspended from a chair or a frame and then submerged in a temperature-regulated tank. After complete exhalation, the subject is weighed again underwater in the suspended condition. Archimedes' principle is applied by comparing the mass of the subject in air with the mass of the subject in water.

Whole Body Counting and Nuclear Activation[7]:

There are various naturally occurring minerals and substances, such as $^{40}K$, the radiographed decay of such minerals can be measured by shielded whole-body counters. The $^{40}K$ count can be used to determine total body potassium, which in turn can be used to calculate body cell mass and fat-free mass. Presently considered as the gold standard for determining body composition.

Dual Energy X-Ray Absorptiometry[7]:

It was originally used for the determination of bone density and mass, and subsequently found to be very effective for estimating fat and muscle mass of the body.

CT and MRI[7]:

CT and MRI imaging modalities are recently being used for measuring body composition.

Near Infrared Interactance[7]:

Based on the principles of light absorption and reflection it was originally designed for the agriculture industry to assess the composition of grains and seeds. Recently it has been used by nutritionists to provide estimates of body fat in patients and athletes.

FUNCTIONAL ASSESSMENT

*Muscle strength*

To assess muscle strength various methods are used which include hand grip strength

assessment, knee extension or hip flexion strength assessment, and peak expiratory flow.

Hand grip strength is popularly used and a good predictor of increased postoperative complications, increased length of hospitalization, higher re-hospitalization rates, and decreased physical status[12]. It is also recommended for use in sarcopenia screening.

Fig. 14 Hand grip dynamometer to assess hand grip[7].

*Cognitive Function*

mood, concentration, and memory are assessed by the MMSE.

*Immune Function*

Total lymphocyte counts (TLC) and delayed hypersensitivity reactivity (DHR) have been used to detect malnutrition-related immunosuppression.

Currently, routine measurement of immune function status is not recommended.

LABORATORY INVESTIGATION

*General Laboratory parameters-*

Full Hematological screen

Liver parameters

Electrolytes, urea, and creatinine

vitamins and minerals

*Measurement of Inflammation-*

Albumin, transthyretin [TTR] formerly prealbumin, transferrin.

## ASSESSMENT OF FOOD INTAKE AND ENERGY EXPENDITURE

*Food intake*[8]*-*

Food intake can be measured by nursing staff or dietitians by using either 3- or 7-day food diaries kept by the patient, or by food intake charts. These charts can also be used to calculate energy and protein intake.

*Nitrogen Balance*[8]*-*

Nitrogen balance is a daily intake of nitrogen minus the daily excretion of nitrogen.

Daily nitrogen balance can be calculated by following formulae:

Estimate 24-hour urinary urea nitrogen and Add 4 g of nitrogen for insensible losses (stool and skin).

24-hour urinary urea nitrogen + 4 g = daily nitrogen needs to maintain a stable nitrogen balance.

Also, estimate daily nitrogen intake through food.

A positive nitrogen balance is essential for faster wound healing and recovery from illness.

*Colorimetry*[7] *and Nutrition-*

Colorimetry is a very essential tool in nutrition science. Direct colorimetry is based on the principle of measurement of total heat loss from the body to assess metabolism.

The indirect method is mostly used to use nowadays and measures total energy production.

REE (Resting energy expenditure) is calculated in indirect colorimetry based on O2 consumption and CO2 production.

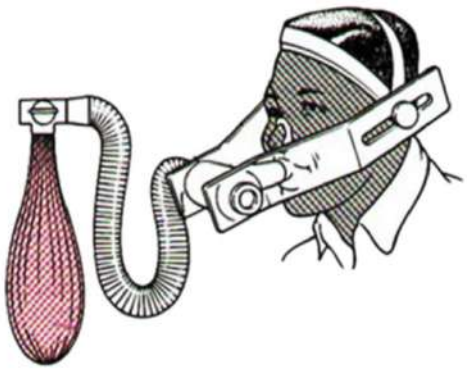
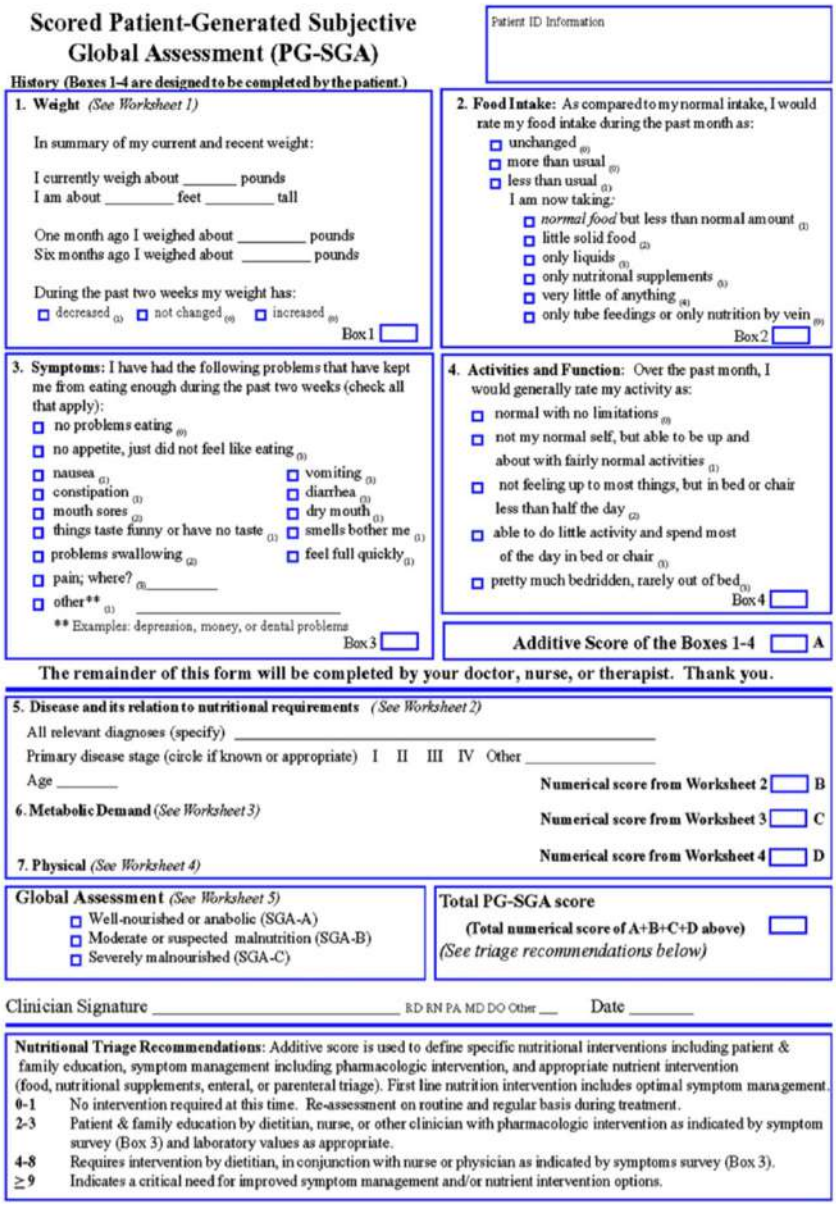


Fig 15 Indirect Colorimetry[7].

Widely used tools for Nutritional Assessment are-

Subjective Global Assessment (SGA)[8]

Kyle et al and Wakahara et al reported that the SGA score can predict the length of Hospital stay[9,13]. Atalay et al in their study demonstrated the ability of SGA ability to predict mortality[14]. However, it is very complex and time-consuming to perform and requires patients' recall capability.



**Scored Patient-Generated Subjective Global Assessment (PG-SGA)**

Patient ID Information

**History (Boxes 1-4 are designed to be completed by the patient.)**

**1. Weight** *(See Worksheet 1)*

In summary of my current and recent weight:

I currently weigh about _____ pounds
I am about _____ feet _____ tall

One month ago I weighed about _____ pounds
Six months ago I weighed about _____ pounds

During the past two weeks my weight has:
☐ decreased (3) ☐ not changed (6) ☐ increased (6)

Box 1

**2. Food Intake:** As compared to my normal intake, I would rate my food intake during the past month as:
☐ unchanged (6)
☐ more than usual (6)
☐ less than usual (3)
I am now taking:
☐ *normal food* but less than normal amount (3)
☐ little solid food (2)
☐ only liquids (3)
☐ only nutritonal supplements (3)
☐ very little of anything (4)
☐ only tube feedings or only nutrition by vein (6)

Box 2

**3. Symptoms:** I have had the following problems that have kept me from eating enough during the past two weeks (check all that apply):
☐ no problems eating (6)
☐ no appetite, just did not feel like eating (3)
☐ nausea (1)
☐ constipation (1)
☐ mouth sores (2)
☐ things taste funny or have no taste (1)
☐ problems swallowing (2)
☐ pain; where? (3)_____
☐ other** (1) _____
☐ vomiting (3)
☐ diarrhea (3)
☐ dry mouth (1)
☐ smells bother me (1)
☐ feel full quickly (1)
** Examples: depression, money, or dental problems

Box 3

**4. Activities and Function:** Over the past month, I would generally rate my activity as:
☐ normal with no limitations (0)
☐ not my normal self, but able to be up and about with fairly normal activities (1)
☐ not feeling up to most things, but in bed or chair less than half the day (2)
☐ able to do little activity and spend most of the day in bed or chair (3)
☐ pretty much bedridden, rarely out of bed (3)

Box 4

**Additive Score of the Boxes 1-4** ☐ **A**

**The remainder of this form will be completed by your doctor, nurse, or therapist. Thank you.**

**5. Disease and its relation to nutritional requirements** *(See Worksheet 2)*

All relevant diagnoses (specify) _____

Primary disease stage (circle if known or appropriate) I II III IV Other _____

Age _____

**Numerical score from Worksheet 2** ☐ **B**

**6. Metabolic Demand** *(See Worksheet 3)*

**Numerical score from Worksheet 3** ☐ **C**

**7. Physical** *(See Worksheet 4)*

**Numerical score from Worksheet 4** ☐ **D**

**Global Assessment** *(See Worksheet 5)*
☐ Well-nourished or anabolic (SGA-A)
☐ Moderate or suspected malnutrition (SGA-B)
☐ Severely malnourished (SGA-C)

**Total PG-SGA score**
**(Total numerical score of A+B+C+D above)** ☐
*(See triage recommendations below)*

Clinician Signature _____ RD RN PA MD DO Other ___ Date _____

**Nutritional Triage Recommendations**: Additive score is used to define specific nutritional interventions including patient & family education, symptom management including pharmacologic intervention, and appropriate nutrient intervention (food, nutritional supplements, enteral, or parenteral triage). First line nutrition intervention includes optimal symptom management.

| | |
|---|---|
| **0-1** | No intervention required at this time. Re-assessment on routine and regular basis during treatment. |
| **2-3** | Patient & family education by dietitian, nurse, or other clinician with pharmacologic intervention as indicated by symptom survey (Box 3) and laboratory values as appropriate. |
| **4-8** | Requires intervention by dietitian, in conjunction with nurse or physician as indicated by symptoms survey (Box 3). |
| **≥ 9** | Indicates a critical need for improved symptom management and/or nutrient intervention options. |

Fig. 16 Subjective Global Assessment scale[7].

Mini Nutritional Assessment[8]

It has two parts. Screening which has been discussed earlier and assessment if the patient is screened at risk.

It is used in patients over 65 years of age.

**Mini Nutritional Assessment (MNA); Assessment**

| | |
|---|---|
| G | **Lives independently (not in a nursing home or hospital)?**<br>0 = no 1 = yes |
| H | **Takes more than 3 prescription drugs per day?**<br>0 = yes 1 = no |
| I | **Pressure sores or skin ulcers?**<br>0 = yes 1 = no |
| J | **How many full meals does the patient eat daily?**<br>0 = 1 meals 1 = 2 meals 2 = 3 meals |
| K | **Selected consumption markers for protein intake?**<br>At least one serving of dairy products (milk, cheese, yoghurt) per day yes? no?<br>Two or more serving of legumes or egg per week yes? no?<br>Meat, fish or poultry everyday yes? no?<br>0.0 = if 0 or 1 yes 0.5 = if two yes 1.0 = if 3 yes |
| L | **Consumes two or more servings or fruits or vegetables per day?**<br>0 = No 1 = Yes |
| M | **How much fluid (water, juice, coffee, tea, milk... ) is consumed per day?**<br>0.0 = less than 3 cups 0.5 = 3 to 5 cups 1.0 = more than 5 cups |
| N | **Mode of feeding?**<br>0 = unable to eat without assistance<br>1 = self-fed with some difficulty<br>2 = self-fed without any problems |
| O | **Self view of nutritional status?**<br>0 = view self as being malnourished<br>1 = is uncertain of nutritional status<br>2 = views self as having no nutritional problem |
| P | **In comparison with other people of the same age, how do they consider their health status?**<br>0.0 = not as good 0.5 = does not know<br>1.0 = as good 2.0 = better |
| Q | **Mid – arm circumference (MAC) in cm?**<br>0.0 = MAC less than 21 0.5 = MAC 21 to 22 1.0 = MAC 22 or greater |
| R | **Calf circumference (CC) in cm?**<br>0 = CC less than 31 1 = CC 31 or greater |

**Assessment score** (max. 16 points)
**Screening score** (max. 14 points)
**Total assessment** (max. 30 points)
**Malnutrition Indicator Score**
**17 to 23.5 points** **-> at risk of malnutrition**
**Less than 17 points** **-> malnourished**

Fig 17 Mini Nutritional Assessment[8].

The MNA has a shorter and simpler version known as the Mini Nutritional Assessment Short Form (MNA- SF) also used for nutritional assessment in older population. It consists of 6 items.

**Mini Nutritional Assessment Short Form (MNA-SF)**

| |
|---|
| **A. Has food intake declined over the past 3 months, due to loss of appetite, digestive problems, chewing or swallowing difficulties?** |
| 0 = severe loss of appetite |
| 1 = moderate loss of appetite |
| 2 = no loss of appetite |
| **B. Weight loss during last 3 months?** |
| 0 = weight loss greater than 3 kg |
| 1 = does not know |
| 2 = weight loss between 1 and 3 kg |
| 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 distress or acute disease in the past 3 months?** |
| 0 = yes |
| 2 = no |
| **E. Neuropsychological problems?** |
| 0 = severe dementia or depression |
| 1 = mild dementia |
| 2 = no psychological problems |
| **F1. BMI** |

| |
|---|
| 0 = BMI less than 19 |
| 1 = BMI 19 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 IS QUESTION F1 IS ALREADY COMPLETED |
| **F2. Calf circumference** |
| 0 = CC less than 31cm |
| 1 = CC 31cm or greater |

**Screening score** (max 14 points)

12 - 14 points: **normal nutritional status**
8 - 11 points: **at risk of malnutrition**
0 - 7 points: **malnourished**

Fig 18 Mini Nutritional Assessment short form (MNA-SF)[8].

## SUMMARY

The nutritional status of all the patients should be recorded at hospital admission. A two-step procedure should be followed in doing so, First Nutritional screening to be done by a rapid and simple tool for the evaluation of patients at risk and then nutritional assessment for those patients screened at risk.

The ESPEN recommends the MUST for community screening, the NRS-2002 for hospitalized patients, and the MNA for elderly patients for screening. SGA should be used for Nutritional assessment.

A complete nutritional assessment includes a combination of various subjective and objective parameters which consists of patient history, physical examination and body composition, food intake, functional assessment, and laboratory tests.

The main goal is to identify the patients who are at risk of malnutrition and to start adequate nutritional intervention immediately.

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