Nutrition assessment: the reproducibility of Subjective Global Assessment in patients requiring mechanical ventilation

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Abstract

Background/Objective—The detection of malnutrition in the intensive care unit (ICU) is critical to appropriately address its contribution on outcomes. The primary objective of this investigation was to determine if nutritional status could be reliably classified using Subjective Global Assessment (SGA) in mechanically ventilated (MV) patients.

Subjects/Methods—Fifty-seven patients requiring MV greater than 48 hours in a university-affiliated medical ICU were evaluated in this cross-sectional study over a 3 month period. Nutritional status was categorized independently by two Registered Dietitians using SGA. Frequencies, means (± standard deviations), Chi square and T tests were used to describe the population characteristics; agreement between raters was evaluated using the κ statistic.

Results—On admission, the average patient was 50.4 (± 14.2) years of age, overweight (body mass index: 29.0 ± 9.2), had an APACHE II score of 24 (± 10) and respiratory failure. Fifty percent (n=29) of patients were categorized as malnourished. Agreement between raters was 95% prior to consensus, reflecting near perfect agreement (κ =0.90) and excellent reliability. Patients categorized as malnourished were more often admitted to the hospital floor prior to the ICU

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(n=32; 56%), reported decreased dietary intake (69% vs. 46%, p=0.02) and exhibited signs of muscle wasting (45% vs. 7%, p<0.001, respectively) and fat loss (52% vs. 7%, p<0.001, respectively) on physical exam when compared to normally nourished individuals.

Conclusions—SGA can serve as a reliable nutrition assessment technique for detecting malnutrition in patients requiring MV. Its routine use should be incorporated into future studies and clinical practice.

Introduction

Since malnutrition was first labeled as the 'skeleton in the hospital closet' (Butterworth, 1974), several other investigators have documented its existence and continued high prevalence in numerous hospitalized patients (Kyle et al, 2003; McWhirter & Pennington, 1994; Waitzberg et al, 2001; Corish & Kennedy, 2000). Patients who are malnourished generally have longer hospitalizations and higher morbidity, mortality and costs of care than those who are well nourished (Braunschweig et al, 2000; Fung et al, 2002; Correia & Waitzberg, 2003; Naber et al, 1997). The interrelationships between disease and declines in nutritional status are tightly intertwined making it difficult to depict their independent contributions. That is, improvements in one factor may or may not lead to improvements in the other. Given the undesirable sequelae induced by malnutrition, detection of its occurrence among critically ill patients is even more complex. It was previously shown that patients that remained in the intensive care unit (ICU) beyond a few days experienced significant loss of their skeletal muscle mass estimated at 5–10% per week (Gamrin et al, 1997). This loss was associated with the onset of organ dysfunction and an overall poor prognosis (Giner et al, 1996). It has also been suggested that infectious complications, such as sepsis, are caused by a malnutrition-induced impaired immune function (Giner et al, 1996; Griffiths, 2003). Recently, the contributory role of malnutrition has been implicated in ICU acquired weakness, an increasingly recognized disability among ICU survivors following prolonged admission (de Jonghe et al, 2009; Vincent & Norrenberg, 2009). In addition, the most recent guidelines for nutrition support in adult critically ill patients emphasize the new focus of nutrition support as a *therapy* vs. adjunctive care (McClave et al, 2009). This conceptual switch highlights the advances in our understanding of nutritional modulation of the stress response, which may have even more profound effects on the outcomes of critically ill patients with underlying malnutrition. Jointly these points underscore why detection of malnutrition in ICU populations is paramount.

Traditionally nutritional status has been evaluated using anthropometric, biochemical, clinical and dietary intake data (Lee, 2007). However, in the setting of critical illness, the major anthropometric marker (e.g., weight) and the traditional biochemical indices (e.g., albumin, transferrin, retinol binding protein) become less reliable and often invalid due to the influences of hydration status and inflammation, respectively. Additionally, the need for mechanical ventilation or sedation in the intensive care setting can impede the abilities of nutrition clinicians to obtain important historical data related to nutritional symptomology needed to establish medical nutrition therapy (MNT) goals. Two outcomes studies in geriatric and medical-surgical patients in the critical care setting have recently been published utilizing Subjective Global Assessment (SGA) (Atalay et al, 2008; Sungertken et

al, 2008) reporting mixed results between malnutrition and mortality endpoints. These investigators did not describe modifications made to the SGA tool to enable its use in the critically ill nor did they assess its reliability, thus consistency of categorization between clinicians remains unknown. Therefore, the primary purpose of this study was to evaluate the reproducibility of nutritional status assessment in critically ill patients utilizing SGA and secondarily, to describe the methods utilized to obtain the standard subjective data points in patients with limited communication abilities.

Subjects and Methods

Design and study population

Prior to initiating a larger nutrition intervention, this cross-sectional study was conducted over a 3 month time period (December, 2008-February, 2009) at a university-affiliated tertiary care medical center. Adult patients (18 years of age) were included if they were admitted to the medical intensive care unit (MICU) and required mechanical ventilation (MV) greater than 48 hours. These criteria were specifically selected reasoning that these patients would be the most difficult to obtain nutrition histories, they would require alterations in methods for obtaining SGA data points and classification reliability would be more complex. The study was approved and deemed exempt by the Institutional Review Board at Rush University Medical Center.

Data collection

The MICU patient census was reviewed daily for eligible patients. Computerized and hard-copy medical records of eligible patients were retrieved and systemically reviewed by two Registered Dietitians (RDs) who previously participated in SGA training (described below.) Patients were assessed and categorized independently by each RD between 48–96 hours of MV. Demographic data (age, sex, race/ethnicity) and clinical variables were gathered from the physician's history and physical and the food and nutrition management software. The Acute Physiology and Chronic Health Evaluation (APACHE) II and IV scores were used to assess severity of illness and were calculated on the first day of ICU admission (Knaus et al, 1985; Zimmerman et al, 2006).

Nutritional status classification and description

Patients were classified utilizing SGA; a nutritional assessment tool developed over 25 years ago by Baker et al (1982). Used collectively and systematically, the SGA tool includes five components of a medical history (weight change, dietary intake, gastrointestinal (GI) symptoms, functional capacity, metabolic stress) and two components of a brief physical examination (signs of fat loss and muscle wasting, alterations in fluid balance). These component results are used to classify patients as "normally nourished," "moderately malnourished" or "severely malnourished" and reflect a reliance on clinical judgment rather than biochemical or other objective markers to categorize nutritional status. Originally used to predict outcomes in surgical patients, SGA has gone beyond this function and population and has been refined and validated internationally for both clinical and research purposes (Waitzberg et al, 2001; Ulander et al, 1993). SGA has also been shown to be strongly predictive of morbidity and mortality, as well as hospital length of stay and resource

utilization in a variety of non-critically ill patient groups (Detsky et al, 1987; Stephenson et al, 2001; Sungertekin et al, 2004; Martineau et al, 2005).

SGA training

Formal training of medical personnel to use SGA is recommended and substantially improves inter-rater concordance (Detsky et al, 1994). Therefore, prior to the study, a critical care RD was trained by a research RD experienced in teaching and utilizing this tool. Training involved 4 phases: article review, open discussion, joint evaluation and independent assessment. In phase 1, the Detsky article describing the SGA technique and its applicability in hospitalized patients was reviewed (Detsky et al, 1994). In phase 2, the RDs met to openly discuss the technique. Focal points for these training discussions included eliciting a history to determine degrees of weight loss and the timing of symptoms (i.e., days, weeks, months), performing the physical exam, assessment techniques for depicting physical signs of weight loss or edema, and differentiating between the three nutrition rankings. Clarification and reinforcement were provided to categorize patients conservatively (i.e., if a patient is borderline malnourished, he/she should be classified as normally nourished), since categorizing borderline patients can be difficult when learning and applying this technique (Detsky et al, 1987). In phase 3, hardcopies of the assessment tool were produced for data recording (Table 1) and five patients were evaluated, discussed and ranked jointly. Reinforcement was provided on how to solicit weight and diet history and how to perform a physical exam assessing edema, fat loss and muscle wasting. In phase four, 10 critically ill patients were randomly selected for evaluation to assess initial level of agreement among raters, and to refine ranking techniques. After autonomous rankings were made, the agreement prior to consensus between RDs was 80% (κ =0.69) symbolizing substantial agreement. This level of concordance was similar to Detsky (1987) and Hirsch (1991).

Methodological standardization

It was anticipated that alternative methods would be required to obtain the SGA data points for patients requiring mechanical ventilation since these patients would be limited in verbal communication at the time of assessment. To help increase accuracy and precision in the data collection process among raters, methods to standardize the approach for data retrieval were conceived and applied. First, the institution's food and nutrition management software was evaluated for information regarding each eligible patient's weight and diet history. Without having to review multiple aspects of the electronic medical record, this database allowed the clinician to easily and quickly review nutritionally-relevant factors for patients previously admitted to the hospital (e.g., serial body weights, height, prior medical nutrition therapies, frequency of hospitalization, etc.) In addition, this had heightened applicability for assessing the influence of alterations in fluid status on body weight, a common phenomenon in the critical care setting (Plank et al, 1998). Second, the physicians complete history and physical was examined for descriptive statements related to body weight (e.g., "unintentional weight loss," " [specified] weight gain,"), GI symptoms (e.g, "nausea and diarrhea for ~3 weeks", "general anorexia") and visual descriptions (e.g., "obese abdomen," "wasted extremities"). Within the physician's history and physical, the review of systems checklist was also evaluated for other assessments of body weight, GI symptoms, and

functional capacity. Third, the nursing admission assessment was evaluated for indications of weight loss, GI symptoms and issues related to chewing and swallowing. Based on the inherent variability of the admitting physician or nurse, this information may or may not have been present.

After this information was gathered and prior to entering the patient's hospital room, research personnel confirmed the patient's verbal abilities with the nurse on duty or the critical care fellow. If the patient was able to communicate, attempts were made to verify or ascertain the subjective data points. If present at the time of the exam, family members were also probed for this information. Functional capacity was categorized according to noted changes in the week preceding admission to the ICU. Due to the increases in metabolic demand and energy expenditure associated with sepsis (Gottschlich, 2007), metabolic stress was classified as "high" if the patient was admitted with a diagnosis of sepsis or as "low/ moderate" for all other diagnoses. Finally, each patient was physically examined for signs of fat loss, muscle wasting and edema using subjective methods. Specific attention was paid to the temporal, clavicular and costal areas since these would be least affected by fluid fluctuations, but greatly influenced by fat loss or muscle wasting. Weight trends from the nutrition database were used (if available) in conjunction with physical examination findings; specifically, to assess signs and symptoms of weight loss and wasting. General edema and ascites were assessed by visual inspecting the ankles, hands and abdomen, respectively. Sacral edema was ascertained from the nurse on duty, as appropriate.

Statistical analyses

To minimize errors related to data entry, data were double-entered, verified for accuracy and correctly entered using Epi Info (Version 3.5.1, 2008, Centers for Disease Control and Prevention, Atlanta, GA.) Statistical analysis was conducted using the statistical program SAS (Version 9.1, 2002, SAS Institute Inc., Cary, NC). To determine the strength of association between rankings, inter-rater reliability was assessed using the Kappa statistic for the initial individual rankings. This index was used to compare the agreement of SGA ratings between RDs against that which might have occurred by chance. A Kappa = 1.0 represents a perfect agreement; a Kappa = −1.0 represents perfect disagreement; a Kappa of 0 indicates the two raters agree only at the chance level. The parameter cut-points described by Landis and Koch (1997) were used to judge adequacy of agreement (Kappa = 0 poor; 0.01–0.2 slight; 0.21–0.4 Fair; 0.41–0.6 Moderate; 0.61–0.8 Substantial; 0.81–1.0 Almost perfect).

Demographic and clinical characteristics are reported as frequencies, means, standard deviations (SD) and ranges. Students T tests, chi square and Fishers exact test were conducted to assess differences between groups. A p value of 0.05 was considered statistically significant.

Results

Participant description

Most patients were white females admitted from the hospital floor requiring mechanical ventilation primarily due to respiratory failure. The average patient was 50.4 (± 14.2) years of age with an APACHE II score of 24 (± 10), and classified as overweight using admission BMI. There was a relatively high prevalence of cancer and diabetes diagnoses prior to admission (Table 2).

SGA categorizations and agreement

Utilizing multiple sources of information, we were able to obtain the subjective data points for the majority of these participants with limited verbal communication abilities. Greater than 50% (n=29) of the patients in the medical ICU were categorized as "moderate" or "severely malnourished." Agreement between raters was 95% prior to consensus, reflecting near perfect agreement (κ =0.90) and excellent reliability among clinicians.

Only 3 patients were classified as "severely malnourished" with a mean BMI of 19.4, requisite tissue wasting and a noted pattern of on-going weight loss. The majority of patients malnourished patients were considered "moderately malnourished" (n=26). Therefore to enhance interpretation, data were stratified and presented as "normally nourished" vs. "malnourished." No significant differences were detected for most clinical characteristics in Table 2; however, patients classified as malnourished had significantly less direct admissions to the ICU (p=0.05) with resultant longer hospitalizations prior to ICU admission (p=<.0001). The frequencies of nutritional symptoms are presented in Table 3. Thirty percent (n=17) of all patients reported weight loss prior to admission, 61% (n=35) had decreased dietary intake, and 60% (n=34) reported one or more GI symptoms. Further, decreases in functional capacity were observed in 74% (n=42) of all participants, and given the disease acuity of the patient population, metabolic stress was present in each individual. Physical examinations findings revealed the presence of muscle wasting and fat loss in 26% (n=15) and 30% (n=17) of patients, respectively, as well as edema (42%, n=24). In addition, "malnourished" patients had significantly pronounced muscle wasting and fat loss (p=<. 001), a higher occurrence of cancer history (p=0.02), as well as diarrhea (p=0.05) and anorexia (p=0.03). Weight loss over the last 6 months was significantly more prevalent among those categorized as malnourished vs. normally nourished (15 vs. 3 patients; p<. 0001), but was difficult to obtain or assess in 17 (30%) patients.

Discussion

The first step in planning the nutritional care of all hospitalized patients is the determination of nutritional status (Lacey & Pritchett, 2003). This baseline assessment allows clinicians to plan appropriate medical nutrition therapies, tailor nutrition prescriptions, allocate clinical efforts and establish goals for monitoring and evaluation of nutrition care outcomes. SGA has been used in general care patients for over 25 years. It has been shown to predict various nutrition-associated complications including infections, use of antibiotics, and length of hospital stay (Ulander et al, 1993; Detsky et al, 1987). However, until now, its reliability in

ICU populations had not been reported. This study demonstrated excellent reliability for nutritional categorization using SGA in the critical care setting revealing a high occurrence of malnutrition in this patient population. Admission to the hospital prior to the ICU and physical examination findings of muscle wasting and fat loss were significantly more common in patients classified as malnourished. These results provide an important translational tool to expand the medical care and standardized language between clinicians, as well as between investigators.

Theoretically, SGA (i.e., the test method) should be compared to a nutritional status "gold standard" to establish its relative validity; yet there is no "reference" method to compare studies in which SGA is employed. The Malnutrition Universal Screening Tool (Stratton et al, 2004) and the Malnutrition Screening Tool (Ferguson et al, 1999) are measures used to assess *nutritional risk* or *risk of malnutrition*, not current nutritional status. The popular Nutrition Risk Screening (NRS 2002) tool developed by Kondrup et al (2003) classifies patients nutritional risk using scores for both, nutrition status (0–3) and severity of disease (0–3). The general purpose of this tool is to identify when to initiate nutrition support. When applied to the participants in this study, 91% (n=52) were classified as 'at nutritional risk' and in need of nutrition support based on APACHE score alone. Alternatively, SGA is a nutrition status classification system that emphasizes physical examination findings and comprehensive nutrition symptomology. It provides the unique advantage of being able to demonstrate nutritional trajectories and the incidence or resolution of symptoms over time.

Two prior studies have utilized SGA with various modifications in critically ill populations; however, reliability of the tool was not assessed by either investigator and both studies incorporated other markers of nutritional status that are inappropriate for these populations. Atalay et al (2008) examined the prevalence of malnutrition in critically ill geriatric (>65 years) patients. Nutritional status was assessed utilizing a combination of SGA and serum proteins measurements (serum albumin, serum prealbumin.) Application of serum proteins to assess nutritional status in the face of acute illness are inappropriate due to the metabolic consequences that accompany the inflammatory process (Gabay & Kushner, 1999). Thus, serum proteins are inappropriate markers of nutritional status during acute illness (Fuhrman et al, 2004), and are not a valid standard for comparison of the study's findings regarding SGA. In addition, the inability of their SGA assessments to depict untoward events is inconsistent with previous studies and likely reflects insufficient power to detect a significant difference due to the relatively small sample of malnourished patients (n=40) for outcomes assessment. More recently, Sungurtekin et al utilized SGA to assess the nutritional status of 124 critically ill medical and surgical patients (2008). They found that 38% of patients were malnourished and that SGA positively correlated with mortality and serum albumin. Modifications needed to apply the SGA technique in this unique setting were not described, metabolic stress was not addressed and the nutritional categorizations were completed by one individual, thus the reliability of their tool could not be assessed. Further, participants' anthropometric measurements (e.g., tricep skin folds, midarm circumference, midarm muscle circumference, BMI) were correlated with their SGA rankings, presumably to determine comparability between the two independent nutritional assessment measurements. The most recent guidelines for nutritional support in the critically ill state

that anthropometric measurements are not reliable in ICU settings (McClave et al, 2009). Jointly, these issues limit the interpretations of these results.

There are several limitations to the present study that should be considered. First, this study was conducted in the medical ICU and included only patients requiring MV; therefore results cannot be extrapolated to all critically ill populations and larger studies should be conducted in broader ICU populations in greater numbers. Second, the influence of edema and obesity, common ICU occurrences, may have masked physical exam findings of fat loss or muscle wasting thereby decreasing the sensitivity of SGA and falsely lowering these malnutrition findings. Third, this study was completed to assess the reliability of conducting SGA within a critically ill medical population at one institution between two individuals. Not all data were available for all patients and a comparator for SGA was not included. Emphasis was placed on agreement among raters for final classifications due to the inherent reliability on judgment when using SGA; thus the validity of SGA has yet to be established.

Conclusions

We found excellent reliability of SGA of nutritional status categorization for patients in the ICU requiring MV and found that malnutrition was a common occurrence in this population. The decision to categorize a patient as "moderately" or "severely malnourished" was clinically motivated first by the severity and timing of weight loss; second, by the physical examination findings of muscle wasting and fat loss; and lastly, by the length of time in the hospital prior to the ICU. Although the original SGA tool includes three levels of categorization, thought should be given to dichotomizing this tool in this setting. Due to the influences of edema and the rising tide of obesity, it can be extremely difficult to recognize the required anthropometric changes needed to appropriately categorize patients as "severely" malnourished, especially in patients with limited verbal abilities. Physicians and other clinicians should be encouraged to incorporate this assessment technique into the admitting history and physical, since nearly all of the SGA components are embedded within this initial assessment and after initial training, would only require a few additional minutes to synthesize and document. Future studies are needed to establish the predictive validity of SGA on adverse events, to develop bedside body composition techniques for assessing acute changes in lean mass, and to explore the prevalence of malnutrition in other critically ill populations.

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Table 1

Features of the Subjective Global Assessment[1]

Height:_____   Admit weight:_____   Body mass index:_____
A. History
1. Weight (wt) change:
In the past 2 weeks, weight has: Increased/Decreased/Not changed
Overall weight loss in the past 6 months: _____ kg: _____%.
2. Change in dietary intake (relative to normal intake): circle
No change   Borderline/poor   Unable to eat
If intake has decreased, for how long:_____weeks.
3. Gastrointestinal Symptoms (>2 weeks): circle all that apply
None   Nausea Vomiting   Diarrhea   Anorexia
4. Functional capacity: circle
No change   Decreased activities of daily living   Bed ridden
5. Metabolic stress: circle
No stress   Low/moderate stress   High stress
B. Physical Examination: check all that apply
_____ Triceps and chest subcutaneous fat loss
_____ Quadriceps and deltoid muscle wasting
_____ Ankle edema
_____ Sacral edema
_____ Ascites
C. SGA rating: check one
_____ A = well nourished
_____ B = moderately malnourished
_____ C = severely malnourished

[1] Adapted from Detsky et al. (1987).

Table 2

Admission clinical characteristics for participants requiring mechanical ventilation

Variable	All patients N=57	Normally nourished n=28	Moderate or Severely malnourished n=29
Females – n (%)	30 (53)	14 (50)	16 (55)
Age (years) – mean ± SD	50.4 ± 14.2	51.3 ± 12.5	49.6 ± 15.8
range	(19.1–76.0)	(19.1 – 68.3)	(21.7–76.0)
Race/Ethnicity			
White- n (%)	24 (42)	15 (54)	9 (31)
Black- n (%)	22 (39)	11 (38)	11 (38)
Hispanic- n (%)	7 (12)	1 (4)	6 (21)
Other- n (%)	4 (7)	1 (4)	3 (10)
Diagnosis			
Respiratory failure - n (%)	36 (63)	17 (60)	19 (66)
Sepsis - n (%)	10 (18)	5 (18)	5 (17)
Stroke/Seizure - n (%)	9 (16)	6 (21)	3 (10)
Pneumonia - n (%)	4 (3)	0 (0)	2 (7)
APACHE II - mean ± SD	24 ± 10	24 ± 9	24 ± 10
range	(5 – 43)	(5 – 39)	(5 – 43)
APACHE IV - mean ± SD	87 ± 29	88 ± 34	87 ± 24
range	(30 – 153)	(30 – 153)	(50 – 141)
Diabetes history - n (%)	14 (25)	5 (18)	9 (31)
Cancer history - n (%)	23 (40)	7 (25)	16 (55)[1]
Body mass index			
mean ± SD	29.0 ± 9.2	31.1 ± 9.4	27.0 ± 8.6
range	(12.0 – 65.5)	(21.2 – 65.5)	(12.0 – 54.3)
Direct ICU admission - n (%)	25 (44)	16 (57)	9 (31)
Pre-ICU length of stay - n (%)	32 (56)[2]	12 (43)	20 (69)
mean ± SD - days	6.3 ± 11.3	6.4 ± 4.8	14.0 ± 15.6[3]
range - days	(0–59)	(1–16)	(1–59)

Abbreviations: Acute Physiology and Chronic Health Evaluation (APACHE); standard deviation (SD); Intensive care unit (ICU)

[1] p=0.02

[2] p=0.05

[3] log transformed for normality; p=<0001

Table 3

Frequency of Subjective Global Assessment characteristics on admission to the medical intensive care unit in patients requiring mechanical ventilation

Variable	All patients N=57	Normally nourished n=28	Moderate or Severely malnourished n=29
In the past 2 weeks weight has:			
No change - n (%)	28 (49)	7 (61)	11 (38)
Decreased - n (%)	17 (30)	5 (18)	12 (41)
Increased - n (%)	4 (7)	1 (4)	3 (10)
Unable to obtain/assess changes - n (%)	8 (8)	5 (18)	3 (10)
Weight loss in the last 6 months			
No – n (%)	22 (39%)	18 (64%)	4 (14%)
Yes – n (%)	18 (30%)	3 (11%)	15 (52%)[1]
Unable to obtain/assess changes - n (%)	17 (31%)	7 (25%)	10 (34%)
Change in dietary intake			
No change - n (%)	17(30)	12 (43)	5 (17)
Borderline/poor - n (%)	33 (58)	13 (46)	20 (69)[2]
Unable to eat - n (%)	2 (3)	0 (0)	2 (7)
Unable to obtain/assess changes- n (%)	5 (9)	3 (11)	2 (7)
Gastrointestinal Symptoms			
None - n (%)	23 (40)	19 (68)	4 (14)[1]
Nausea - n (%)	11 (19)	4 (14)	7 (24)
Vomiting - n (%)	5 (9)	1 (4)	4 (14)
Diarrhea - n (%)	13 (23)	3 (11)	10 (34)[3]
Anorexia - n (%)	11 (19)	2 (7)	9 (31)[4]
Unable to obtain/assess changes- n (%)	5 (9)	2 (7)	3 (10)
Functional capacity			
No change - n (%)	11 (19)	10 (36)	1 (3)
Decreased ADLs - n (%)	32 (56)	15 (54)	17 (59)
Bedridden - n (%)	10 (18)	1 (4)	9 (31) [5]
Unable to obtain/assess changes - n (%)	4 (7)	2 (7)	2 (7)
Metabolic Stress			
Low/Moderate - n (%)	47 (82)	23 (82)	24 (83)
High - n (%)	10 (18)	5 (18)	5 (17)
Physical Exam			
Signs of muscle wasting - n (%)	15 (26)	2 (7)	13 (45)[6]
Signs of fat loss - n (%)	17 (30)	2 (7)	15 (52)[6]
Signs of edema (ankle, sacral or ascites) - n (%)	24 (42)	10 (36)	14 (48)

*1*p<.0001

*2*no change vs. borderline/poor/unable to eat, p=0.02

*3*p=0.05

*4*p=0.03

*5*no change vs. decreased ADL/bedridden, p=0.002

*6*p<0.001