Nutritional Deficiencies in Long-Term Care

Part I

Detection and Diagnosis

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Part II

Management of Protein Energy Malnutrition and Dehydration

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Part III

OBRA Regulations and Administrative and Legal Issues

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Nutritional Deficiencies in Long-Term Care

Part I – Detection and Diagnosis

By John E. Morley, MB, BCh, David R. Thomas, MD, and Hosam Kamel, MD

Abstract

Nutrition is a key component of nursing home resident care. This article highlights the importance of anorexia and weight loss in the nursing home and discusses the problems associated with diagnosing protein-energy malnutrition. Weight loss and albumin are the key indications of malnutrition in the nursing home environment, and the Mini-Nutritional Assessment appears to be the most appropriate screening instrument for this condition. (*Annals of Long-Term Care* 1998; 6[5]:183-191)

Introduction

Weight loss is a key indicator of poor performance in the nursing home. The majority of persons with weight loss in a nursing home either have protein-energy malnutrition or dehydration. The appropriate recognition and management of protein-energy malnutrition in nursing homes remains one of the major challenges for all health professionals.

In this series of three articles, we will discuss the common nutritional problems that occur in nursing home residents and the approach to their diagnosis (Part I), the management of nutritional problems in the nursing home (Part II), and the requirements of state and national regulations on approaches to nutritional problems in nursing homes (Part III).

Physiologic Anorexia of Aging

It is now clearly established that there is a decline in food intake throughout the life span.[1] This decline occurs despite the fact that weight increases in middle age, suggesting that much of this weight gain is due to the decline in resting metabolic rate and physical activity that occurs with aging. In the old-old (over age 85), there is a tendency to lose weight and adipose tissue mass.[2] These physiologic changes mean that older persons are particularly at risk for developing severe anorexia and weight loss when they contract diseases.

Changes in the hedonic qualities of food occur universally with aging. These changes are due particularly to declines in olfaction[3] and taste[4] that occur with aging. Whereas the ability to smell declines in all individuals, the changes in taste are more variable. Individuals who have smoked are more likely to experience declines in taste. The major change in taste is the increase in the threshold at which one can recognize a taste. The primary factors involved in altering taste with aging are the effects of drugs and diseases on taste rather than the physiologic changes of aging (Table I). van Starven et al [5] demonstrated that nursing home residents preferred foods that had flavor enhancers added, which produced a tendency for them to ingest greater quantities of food.

These changes in taste and smell are extremely important in nursing home residents. Residents commonly complain about

Table I

Major Pathologic and Iatrogenic Causes of a Decline in Taste or Smell

Central Nervous System Disorders
- Dementia
- Parkinson's disease
- Head trauma

Metabolic Disorders
- Addison's disease (adrenocortical insufficiency)
- Diabetes mellitus
- Hypothyroidism

Systemic Disorders
- Cirrhosis of the liver
- Zinc deficiency
- Chronic renal failure
- Cancer

Psychological Disorders
- Depression

Local Conditions
- Radiation
- Sinusitis
- Sjögren's syndrome
- Rhinitis

Medications
- Cholesterol-lowering drugs
- Antihistamines
- Antibiotics
- Antiasthmatics
- Antihypertensives
- Diuretics

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the quality of food in nursing homes. Much of this dissatisfaction is due to the physiologic alterations in taste and smell that make food appear less "tasty" as humans age. Alterations in the ability to appreciate the taste of food (most of which are due to decreased olfaction) mean that in the nursing home, food presentation and food choice play a more important role than the actual taste of the food. In Finnish nursing homes, residents are involved in the preparation of their own food. Such an approach is further likely to decrease the complaints about food quality (personal communication, 1997).

Many older persons are unable to eat the same quantity of food at a single meal as they ate when they were younger. This early satiation appears to be secondary to a diminished ability of the fundus of the stomach to display appropriate adaptive relaxation at the presence of food.[6] This results in food passing more rapidly from the fundus to the antrum of the stomach. Food in the antrum causes increased antral stretch, which is a major signal for fullness.[7]

With aging, there is an increase in the levels of cholecystokinin (CCK), a gastrointestinal hormone involved in producing physiologic satiation.[8] This increase in CCK levels is more marked in malnourished older individuals. In addition, animal studies suggest that CCK may be more effective at producing satiation in older compared to younger rodents.[6]

Previous human studies have suggested that older persons are less likely than young individuals to be satiated when food is delivered directly into the duodenum.[9] This finding can be important in the management of malnutrition because it suggests that the liquid caloric supplements that pass rapidly into the duodenum may be better for caloric supplementation than caloric-fortified solid foods in this population. Preliminary data suggest that having healthy older persons ingest a liquid supplement 60 minutes before a meal does not alter the number of calories eaten at the subsequent meal.[10] In addition, liquid supplements where the calories are supplied by glucose rather than fat are less likely to interfere with subsequent satiation because fat, but not glucose, slows gastric emptying.[11]

Leptin is a hormone produced by fat cells. It decreases food intake and increases metabolism. Leptin levels decline with age in women but not in men. The failure of leptin to decline with age in men is most probably due to the decline in testosterone levels with aging.[12] Whether or not the increased leptin levels in males play a role in the greater degree of physiologic anorexia seen in older males compared to females has not yet been elucidated. In addition to leptin, circulating cytokines, such as tumor necrosis factor alpha (cachectin), also reduce food intake, produce muscle wasting, and inhibit albumin synthesis.[13]

Within the central nervous system, numerous neutrotransmitters regulate food intake. At present, no human studies have been undertaken to determine whether alterations in these neurotransmitters caused by aging play a role in anorexia associated with aging. Animal studies have suggested that alterations in the endogenous opioid feeding drive may result in a decline in fat intake with aging.[14] A single human study found that older persons lose their endogenous opioid drive to drink and that this loss may play a role in the hypodipsia of aging.[15]

Overall, the accumulated data suggest that aging is associated with declines in the drive to eat and drink. Numerous factors appear to be involved in producing these physiologic age-related changes. In part, they occur to offset the decrease in resting metabolic rate and physical activity that occur as people age. Whatever the physiologic mechanisms responsible for these changes, they place older people at major risk for developing malnutrition and dehydration when they are in the nursing home.[16]

Prevalence of Malnutrition

The prevalence of protein-energy malnutrition (PEM) varies with the population observed and the definition of malnutrition. In the United States, health care professionals estimate that 40% of nursing home patients and 50% of hospitalized patients over the age of 65 are malnourished. Forty-four percent of home health patients are estimated to be malnourished.[17] These subjective estimates are close to prevalence results reported in clinical trials. Among patients newly admitted to a long-term care setting, a point prevalence of 54% malnutrition was observed.[18] In a Swedish study, 29% of newly admitted patients at a long-term care geriatric hospital were malnourished on admission.[19] The range for PEM in nursing home residents varies from 23% to 85%.[20,21] By comparison, the prevalence of PEM ranges from 32% to 50% in acutely hospitalized patients.[22,23] Other reports confirm that malnutrition is a major problem among residents in long-term care facilities.[24-26] The high prevalence of malnutrition in nursing homes may in part reflect transfer of malnourished patients from acute care hospitals to long-term care facilities following an acute illness.

The prevalence varies also with the criteria used to define malnutrition. The diagnosis of PEM in elderly populations is difficult. Anthropometric and biochemical measurements are usually performed to define type and severity of malnutrition, but there is no "gold standard" for diagnosis. Body weight, weight/height (body mass index), triceps skinfold thickness, arm circumference, arm muscle area, and arm fat area are the most commonly used anthropometric variables.[18] A broad panel of biochemical variables has been advocated to provide useful nutritional information. Serum albumin concentration is the single most commonly recommended parameter,[27] although lymphocyte count and concentrations of hemoglobin, prealbumin, transferrin, and retinol binding protein are also recommended. No single biologic parameter is satisfactory as a predictor of residents at risk for PEM.[28] The discriminant cutoffs for each variable continue to be disputed.[29-31]

Little is known about whether PEM persists or improves after admission to a long-term care facility. Studies in an

academic nursing home have shown that 60% of residents experienced a net weight loss following admission.[20] Dietary interventions and nutritional supplements may improve malnutrition in long-term care settings. Weight gain occurred in 50% of malnourished patients, compared to weight gain in 58% of nonmalnourished patients (odds ratio, 0.70; 95% confidence; limits, 0.14, 3.46). Improvement in PEM occurred in 63% of the initially malnourished residents. However, 37% of residents remained malnourished.[18]

The number of malnourished patients in hospital settings may be decreasing over time as nutritional awareness increases. Using the same assessment scale at one institution, 38% of hospitalized patients were found to be at risk for malnutrition in 1988, compared to 48% of patients in 1976.[32] Patients admitted to rehabilitation centers following acute hospitalization remain profoundly malnourished. Almost one-third (29%) of the patients were malnourished and almost two-thirds (63%) were at risk of malnutrition. Thus, >91% of subjects admitted to a subacute care facility are either malnourished or at risk of malnutrition.[33]

Diagnosis of Malnutrition

As alluded to in the previous section, making the diagnosis of malnutrition in an older person is often extremely difficult. All the so-called "gold standards" have ultimately had an element of "fool's gold" mixed in. Thus, the eye of the astute, nutritionally aware physician remains perhaps the best means of recognizing impaired nutritional assessment (Table II).

Jeejeebhoy et al[34] have attempted to quantify the factors that a nutritionist uses to recognize malnutrition. This attempt has led to the development of the subjective global assessment (SGA). Persons with severe nutritional deficits (grade C) are those with changes in dietary intake and body mass (greater than 10% weight change over the last 6 months) and poor functional status. Grade B is scored when there is evidence of food restriction and functional changes but minimal weight change. Grade A is minimal or no changes in food intake, improving body weight, and minimal change in function. This method has a reasonable interobserver agreement rate of 81% to 91%. Grade C is associated with a 7-fold increase in the likelihood of complications in patients undergoing gastrointestinal surgery.[35] The SGA appeared to be better than any single objective nutritional parameter in assessing the likelihood that a person will develop nutrition-related complications. However, the SGA has not been validated in the nursing home environment.[36]

Food intake represents a potentially important tool in monitoring persons at risk for malnutrition in the nursing home. Unfortunately, recent studies have suggested that the recording of the

Table II

Clinical Signs of Nutritional Deficiencies

Protein-Calorie Malnutrition	B-Complex Vitamins	Vitamin C	Zinc
Weight loss	Ophthalmoplegia (thiamine)	Calf tenderness and swelling	Dysgeusia Acrodermatitis Enterohepatica
Muscle wasting -temporalis muscle	Decreased position and vibration sense	Petechiae Purpura	Poor wound healing
-between thumb and index finger -calf	Ataxia (B_{12}) Cheilosis	Arthralgias	Night blindness
Subcutaneous loss of fat	(B_6, niacin, riboflavin)	Wound breakdown	
Sparse, dull hair Orthostasis Edema Poor wound healing Decreased food intake	Glossitis (Niacin, folate, B_{12}) Dermatitis Pellagra High output failure (thiamine)		
Hepatomegaly Pallor (anemia)	Delirium (B_{12}, folate, thiamine)		
Cognitive impairment Parotidomegaly	Angular fissures periorally		
Weak cough Decreased grip strength	(B complex) Macrocytic anemia (B_{12}, folate)		

amount of food eaten in nursing homes is highly inaccurate.[37] Although counting calories by weighing all food before and after the meal would be more accurate, it is rarely feasible in the long-term care setting. Nurse's aides can be trained to be more accurate in estimating the amount of food ingested, but doing so requires a substantial time investment.

Weight loss remains one of the best indications of nutritional risk in nursing homes. All nursing homes should have a flow chart giving monthly weights in each resident's record. Because scales in nursing homes often malfunction, it is helpful if the persons responsible for recording residents' weights actually weigh themselves each day on each scale. Residents need to be weighed at the same time of the day each month, dressed in a minimal amount of clothing and without shoes. Obviously, both congestive heart failure and dehydration can alter weights. Height needs to be obtained on admission and reobtained yearly to allow identification of height loss due to osteoporosis.

A variety of other anthropometric tools are available to measure nutritional status. Overall, these tools have not been proven very useful in the nursing home. Of the skinfold thicknesses, the triceps measurement is most useful in females, and the subscapular measurement is more accurate in males. Mid-arm circumference or mid-arm muscle circumference can be a useful measurement in residents with major alterations in water metabolism. In these residents, mid-arm circumference needs to be recorded alongside the resident's weight. The former will be a more accurate indicator of protein loss from muscle.

Whereas measurements of circulating proteins can be useful to judge the degree of protein malnutrition, multiple nonnutritional factors can interfere with their levels. Albumin has a long half-life (21 days), making it less useful as a measurement of acute nutritional status. Two factors often associated with illness can, however, produce acute changes in albumin levels. Recumbency is associated with an increased intravascular volume, and the dilutional effect can lower serum albumin levels by as much as 0.5 mg/dL.[38] Cytokine release not only inhibits albumin synthesis but also causes extravasation of albumin from the intravascular to the extravascular space.[39] These 2 factors explain the rapid decline in albumin levels that are often experienced when older patients are admitted to the hospital. Nevertheless, albumin levels of 3.2 g/dL or less

Table III

Comparison Between Marasmic and Kwashiorkor Types of Protein-Energy Malnutrition*

	Marasmus	Kwashiorkor
Pathophysiology	Decreased calories	Decreased protein intake Cytokine release due to acute and/or chronic stress
Energy needs	Decreased	Increased
Clinical	Weight loss Loss of subcutaneous fat Decreased mid-arm muscle circumference Less than 90% of standard weight for height Ketones in urine	Appear well-nourished or obese Edema Hair loss No ketones
Biochemical	Albumin > 3.2 g/dL	Albumin < 3.2 g/dL Anergy Lymphocytes < 1200/mm^3 Decreased CD_4 cells
Response to illness	Albumin may drop precipitously Responds adequately to infection Mortality low	Immunocompromised High rate of infections Poor wound healing Mortality high
Metabolism	Decreased proteolysis Increased glycogenolysis and lipolysis Decreased insulin	Rapid proteolysis Increased glycogenolysis and lipolysis Insulin resistance
Respiratory quotient	0.75 (lipids)	0.85 (mixed fuel source)
Total body water	Decreased	Increased
Response to feeding	Anabolism	Catabolism difficult to reverse

**Many nursing home residents have a mixed presentation.*

TABLE IV

MINI-NUTRITIONAL ASSESSMENT

Last Name: _____ First Name: _____ M.I. _____ Sex: _____ Date: _____

Age:_____ Weight (kg): _____ Height (cm): _____ Knee Height (cm): _____

Complete the form by writing the numbers in the boxes. Add the numbers in the boxes and compare the total assessment to the Malnutrition Indicator Score.

Anthropometric Assessment	Points
1. Body Mass Index (BMI) (weight in kg)/(height in m)^2 a. BMI< 19 = 0 points b. BMI 19 to < 21 = 1 point c. BMI 21 to < 23 = 2 points d. BMI >23 = 3 points	
2. Mid-arm circumference (MAC) in cm a. MAC < 21 = 0.0 points b. MAC 21 ≤ 22 = 0.5 points c. MAC > 22 = 1.0 points	
3. Calf circumference (CC) in cm a. CC < 31 = 0 points b. CC > 31 = 1 point	
4. Weight loss during last 3 months a. weight loss greater than 3 kg (6.6 lb) = 0 points b. does not know = 1 point c. weight loss between 1 and 3 kg = 2 points d. no weight loss = 3 points	
General Assessment	
5. Lives independently (not in a nursing home or hospital) a. no = 0 points b. yes = 1 point	
6. Takes more than 3 prescription drugs per day a. yes = 0 points b. no = 1 point	
7. Has suffered psychological stress or acute disease in the past 3 months a. yes = 0 points b. no = 1 point	
8. Mobility a. bed or chair bound = 0 points b. able to get out of bed/chair but does not go out = 1 point c. goes out = 2 points	
9. Neuropsychological problems a. severe dementia or depression = 0 points b. mild dementia = 1 point c. no psychological problems = 2 points	
10. Pressure sores or skin ulcers a. yes = 0 points b. no = 1 point	
Dietary Assessment	
11. How many full meals does the patient eat daily? a. 1 meal = 0 points a. 2 meals = 1 point a. 3 meals = 2 points	

	Points
12. Selected consumption markers for protein intake • At least one serving of dairy products (milk, cheese, yogurt) per day Yes ☐ No ☐ • Two or more servings of legumes or eggs per week Yes ☐ No ☐ • Meat, fish, or poultry every day Yes ☐ No ☐ a. 0 or 1 yes = 0.0 points b. 2 yes = 0.5 points c. 3 yes = 1.0 points	
13. Consumes two or more servings of fruits or vegetables per day a. no = 0 points b. yes = 1 point	
14. Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties? a. severe loss or appetite = 0 points b. moderate loss of appetite = 1 point c. no loss of appetite = 2 points	
15. How much fluid (water, juice, coffee, tea, milk . . .) is consumed per day? (1 cup = 8 oz.) a. less than 3 cups = 0.0 points b. 3 to 5 cups = 0.5 points c. more than 5 cups = 1.0 points	
16. Mode of feeding a. unable to eat without assistance = 0 points b. self-fed with some difficulty = 1 point c. self-fed without any problem = 2 points	
Self-Assessment	
17. Do they view themselves as having nutritional problems? a. major malnutrition = 0 points b. do not know or moderate malnutrition = 1 point c. no nutritional problem = 2 points	
18. In comparison with other people of the same age, how do they consider their health status? a. not as good = 0.0 points b. do not know = 0.5 points c. as good = 1.0 points d. better = 2.0 points	
Assessment Total (max. 30 points)	

Malnutrition Indicator Score

☐ ≥ 24 points = well-nourished ☐ 17 to 23.5 points = at risk of malnutrition ☐ < 17 points = malnourished

remain an excellent predictor of morbidity and mortality in older persons.[40]

Proteins with a shorter half-life, such as prealbumin (2 days) and retinol binding protein (RBP; 2 hours), are occasionally useful to determine response to nutritional supplementation. Prealbumin levels are subject to all the vagaries experienced by albumin. In addition, levels are increased with decreased creatinine clearance because the kidney is the major metabolic site. RBP is a glycoprotein that has its levels altered by vitamin A, zinc, or carbohydrate in the diet and by renal disease.

Acute phase reactants, such as fibronectin, have also been used to identify malnourished patients, but they are clearly more related to disease than to nutritional status. Recently, soluble interleukin-2 receptors have been shown to be a good correlate of outcomes in malnourished hospitalized patients.[41] They appear to be a good marker of catabolic states.

Low total cholesterol levels are also a measure of nutritional status. However, like albumin, the cholesterol level is altered by cytokines. Levels of cholesterol below 156 mg/dl are highly predictive of poor outcomes in nursing homes.[42]

Leptin levels are an excellent marker of total body fat.[43] As such, they have major potential as a nutritional marker. Anemia is often due to protein-energy malnutrition, and successful nutritional rehabilitation can reverse much of the anemia of chronic disease. Lymphocytopenia and, in particular, low CD4 cell levels are good indicators of malnutrition.[44] Anergy to delayed cutaneous hypersensitivity testing for common antigens, such as Candida, is seen in malnourished persons. It can be reversed with nutritional support[45] and is related to increased septicemia and mortality.[46]

Malnutrition results in atrophy of muscle fibers and 2-band degeneration, which presents physiologically as the inability to maintain tetonic contractions, delayed relaxation rate, and reduced force generation. Clinically, it can be examined by measuring grip strength with a dynamometer. A decline in respiratory muscle function can be suspected in persons who have a weak cough.

In the nursing home, measurements of body composition can be obtained utilizing bioelectrical impedance with appropriate formulae.[47] However, other factors, such as dehydration and altered height secondary to osteoporosis, make the reliability of this technique highly suspect in the nursing home. The use of other techniques for measuring body composition are either not suitable for the majority of nursing home residents or are predominantly used for research purposes (eg, stable isotopes or underwater weighing).

Two types of protein-energy malnutrition exist—namely, marasmus and kwashiorkor (Table III). Marasmus is characterized by weight loss, whereas kwashiorkor shows a specific rapid decline in serum albumin levels. Marasmus is predominately due to poor food intake, whereas kwashiorkor is usually precipitated by cytokine release associated with an acute stressor.

The Nutritional Screening Index was developed to identify persons at risk for malnutrition.[48] It has poor sensitivity and specificity.[49] It should not be used in the nursing home environment.

The Mini-Nutritional Assessment (MNA) is the best validated of the nutritional screening tools,[50,51] and it is appropriate for use in nursing homes. Its major advantage is that it does not use laboratory tests, and so it is highly cost-effective. In the authors' experience, it is an excellent tool for screening persons on admission to nursing homes. The MNA form is shown in Table IV.

SCALE (Table V) was developed by the authors for identification of malnutrition in the outpatient setting.[52] SCALE has been cross-validated with the MNA (Miller DK and Morley JE, unpublished data, 1997). This assessment tool is appropriate for use in the nursing home, although the shopping/food preparation criteria are dropped. SCALE appears to be a useful method for detecting early malnutrition risk in nursing homes.

An algorithm for the assessment of undernutrition in long-term care settings has been developed by the Council for Nutritional Strategies in Long-Term Care.[53] This algorithm addresses the diagnosis of undernutrition in this population and suggests treatment options.

It should be clear that the assessment of nutritional deficiency in the elderly population is extremely difficult. No single measurement is ideal. Clinical judgment remains the "gold standard." The second part of this series will discuss the causes of nutritional deficiencies and their appropriate management.

TABLE V

SCALE: AN INSTRUMENT FOR THE DETECTION OF MALNUTRITION IN NURSING HOMES

Sadness (Geriatric Depression Scale)

Cholesterol less than 160 mg/dL

Albumin less than 3.5 mg/dL

Loss of 5% of body weight

Eating problems (physical or cognitive)

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Nutritional Deficiencies in Long-Term Care

Part II – Management of Protein Energy Malnutrition and Dehydration

By David R. Thomas, MD, Hosam K. Kamel, MD, and John E. Morley, MB, BCh

Abstract

The careful assessment of potential nutrition problems is key to improving outcomes for persons residing in nursing homes. The second installment of this 3-part article series highlights the different causes of, and available means to, manage protein energy malnutrition in nursing home residents. The management of dehydration is also reviewed in this article. (*Annals of Long-Term Care* 1998;6[8]:250-258)

Introduction

Protein energy malnutrition (PEM) in nursing home residents may be caused by a variety of interacting factors, although a single cause can be found in most cases.[1] The most common, treatable causes of PEM appear in Table I, using the mnemonic MEALS-ON-WHEELS that was developed by Morley et al.[2] An algorithm for the assessment of undernutrition in long-term care settings has been developed by the Council for Nutritional Strategies in Long-Term Care.[3] This algorithm addresses the diagnosis of undernutrition in this population and suggests treatment options.

Depression is an important cause of weight loss in nursing home residents. Two epidemiologic studies in nursing homes have found depression to be strongly associated with weight loss.[4,5] Morley and colleagues[1] found depression to be the most common cause of weight loss in nursing home residents. Depression is present in 8% to 38% of these residents.[6] Treatment of this disease has been shown to result in the regaining of lost weight.[7] Tricyclic antidepressants and monoamine oxidase inhibitors are more likely to produce weight gain than the selective serotonin reuptake inhibitors or the newer antidepressants. Mirtazapine appears to be particularly useful in stimulating appetite.[8] Clinical trials report weight gain as the most common side effect of mirtazapine.[9] Whether this effect can be translated into long-term care settings for the treatment of depression in older adults with weight loss has not been studied.

Dementia is another condition commonly associated with weight loss. Nursing home residents with dementia often forget to eat, and feeding can become a time-consuming process. Excessive wandering, psychotropic medications, paranoid ideation, and associated depression are other factors that contribute to weight loss in these patients. Some residents with dementia develop apraxia of swallowing and must be reminded to swallow after each mouthful of food.[10] Late-life paranoia, late-life mania, and anorexia nervosa are other psychological conditions that may contribute to malnutrition in nursing home residents.

Several medical conditions can result in PEM in nursing home residents (Table II). These can lead to weight loss by 1 or more of the following mechanisms: hypermetabolism, anorexia, swallowing difficulty, and/or malabsorption. Infections are an important cause of PEM, occurring in 15% to 20% of nursing home residents.[11] It is estimated that the average nursing home resident acquires a new acute infection every 3 months.[12] Infection may result in confusion, anorexia, and negative nitrogen balance, all of which contribute to PEM.[13] Other medical conditions that may cause PEM in nursing home residents include cancer, chronic obstructive pulmonary disease, congestive heart failure, malabsorption, hyperthyroidism, and hyper-

Table I

Meals on Wheels: Treatable Causes of Malnutrition in Nursing Home Residents

Medication
Emotional problems (depression)
Anorexia tardive (nervosa); Alcoholism
Late-life paranoia
Swallowing disorders
Oral factors
No money (insufficient funds in Medicaid facilities for palatable individualized diets and consultant dietitian)
Wandering and other dementia-related behavior
Hyperthyroidism, hyperparathyroidism, hypoadrenalism
Enteric problems (malabsorption)
Eating problems (inability to feed oneself)
Low-salt, low-cholesterol diets
Stones

Source: Morley JE, Silver AJ. Nutritional issues in nursing home care. Ann Intern Med *1995;123:850-859.*

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Table II

Medical Conditions Associated With Protein Energy Malnutrition in Nursing Home Residents

Medical Condition	Mechanism(s)			
	Increased Metabolism	Anorexia	Swallowing Difficulties	Malabsorption
Cardiac disease	x	x		x
Cancer	x	x	x	x
Pulmonary disease	x	x		x
Infection(s)		x		x
AIDS	x	x	x	x
Alcoholism	x	x		x
Rheumatoid arthritis	x	x	x	x
Tuberculosis	x	x		
Gallbladder disease		x		
Esophageal candidiases		x	x	
Hyperthyroidism/ hyperparathyroidism	x	x		
Parkinson's disease	x			
Essential tremors	x			
Malabsorption syndromes				x

parathyroidism. Acquired immunodeficiency syndrome (AIDS) and rheumatoid arthritis have been shown to cause PEM by increasing the levels of circulating cytokines leading to increased resting energy expenditure and decreased serum albumin levels.[14]

Polypharmacy is also a common cause of malnutrition in nursing home residents. Numerous medications have been linked to PEM in these residents. Those most frequently implicated include digoxin, theophylline, nonsteroidal anti-inflammatory drugs, iron supplements, and psychoactive drugs, particularly fluoxetine, lithium, and phenothiazines. A number of studies have suggested that therapeutic diets should be avoided in nursing homes. [2,15,16] Unnecessary dietary restrictions in nursing homes may also contribute to the development of PEM.

Management of PEM in the Nursing Home

Management of PEM entails both early detection and management of treatable disorders. Body weight should be measured monthly, and serum albumin as well as cholesterol should be checked at least once a year.[17] Special attention should be paid to treating depression and eliminating anorexigenic drugs or unnecessary dietary restrictions. Assistance with feeding is often the key to maintaining food intake in residents with dementia or other functional disabilities. (This will be discussed further in the next section of this article.) In addition, it is important to note ethnic food preferences of nursing home residents and to involve them in menu revision and food selection.

Dysphagia is an important cause of PEM in nursing home residents. The presence of dysphagia and the degree of aspiration risk can usually be determined by a bedside swallowing evaluation performed by a speech pathologist. People with dysphagia can be taught the correct swallowing techniques and the appropriate positioning for swallowing safety. Dietary manipulation (eg, use of thickened liquids) is an important component of dysphagia management.

Feeding Techniques

Careful attention to the needs of nursing home residents at each mealtime remains a key to the maintenance of high nutritional states in the nursing home. Feeding of residents with dementia and/or dysphagia is a time-consuming, labor-intensive process. Utilizing semicircular tables in which 1 aide can feed 3 to 5 residents can be an extremely effective method. As mentioned, some individuals with dementia develop apraxia of swallowing and need to be reminded to swallow with each mouthful of food. Segregating persons who need special help with feeding or modification of food texture often ensures that these residents receive the special attention they require at mealtimes. In the Veterans Administration (VA) nursing homes, the use of volunteers to feed residents has proven to have a positive effect on the residents' quality of life.[18] In the *Silver Spoons* program, volunteers provide supervised feeding. The Centers for Medicare & Medicaid Services has recently published revised rules for paid feeding assistants in long-term care settings. In persons with dysphagia, appropriate positioning and tilting of the head are essential. Some patients must be taught to double swallow and/or cough after swallowing to clear their throats. Unfortunately, interventions to improve dysphagia are limited in effectiveness.[19] In many cases, the consistency of the resident's food simply needs to be modified. Thickened liquids are used for persons with poor oral control and weak tongue movements. When a resident has an impaired chewing mechanism but adequate tongue strength, smooth blended foods (eg, pudding and gelatin) can be used. Residents with intact chewing mechanisms may need finely chopped or minced meats as well as puréed products. In some cases, all consistencies may be acceptable, but they cannot be given to the patient together. Foods that poorly form boluses (eg, ice) should be avoided.[20]

Part II – Management of Protein Energy Malnutrition and Dehydration

Nutrition Therapy

The administration of nutrition therapy to nursing home residents can be in 1 of 3 forms: oral supplementation, tube feeding, and parenteral feeding.

Oral Supplements

When a patient's intake of protein and calories is insufficient, the provision of concentrated feeding formulas is often prescribed. The logic seems to be that patients who cannot or will not consume an adequate usual diet can consume enough low-volume, concentrated supplements to meet protein and calorie needs.

This logic of oral supplements has been tested in several studies. In a long-term care geriatric hospital, 115 out of 435 newly admitted patients (29%) were malnourished by index score.[21] Patients randomly received either a standard diet or a standard diet plus twice-daily nutritional supplementation. Thirty-nine intervention patients refused to take the supplement, and 8 control patients received a supplement. At 8 weeks, 41% of malnourished patients who received dietary supplements improved; only 18% of malnourished patients who did not receive nutritional supplements improved. Although improvement was demonstrated, 59% of patients receiving supplements did not improve during follow-up. This failure rate may be higher, because patients who were offered supplementation but refused ingestion were not included. Both experimental and control groups showed a decrease in weight index, triceps skin fold thickness, and mid-arm circumference after 26 weeks, although the initially nonmalnourished group who received supplemental feedings showed less decline. There were no differences in prealbumin, albumin, or antitrypsin levels between groups. The mortality rate was higher (19% versus 9%) in the initially malnourished group.

In another geriatric hospital, 87 consecutive medical patients were randomized into a placebo-controlled trial of a supplemental glucose drink plus vitamin A, B_1, B_2, B_3, and B_6 supplements.[22] Compliance with the supplement was poor, with only one third of subjects consuming more than 50% of the offered drink. Even when the analysis was limited to compliant subjects, there was no beneficial effect observed. Severely malnourished patients (body mass index less than 15 kg/m2) were excluded from this study.

There is evidence, however, that oral supplementation may improve outcomes in persons with hip fractures,[23] pressure ulcers,[24] and chest infections.[25] Some nursing homes now give liquid caloric supplements as the necessary fluid to accompany medicines administered to persons with weight loss. The validity of this approach has not been determined. Other data suggest that liquid supplements given 60 minutes before a meal produce an increased total caloric intake.[26] There are currently many commercially available formulas. These differ in caloric density, osmolality, lactose content, protein source, and cost. Most formulas provide 1 kcal/mL. The total number of calories equals the volume of feeding. When water restriction is necessary, as in the syndrome of inappropriate antidiuretic hormone (ADH) secretion, increased calories can be given with formulas that provide 1.5 to 2.0 kcal/mL. Nutrient-dense formulas are hyperosmolar and may increase the incidence of diarrhea. Specialized formulas or formula modifications are necessary for specific disease states, such as pulmonary disease (decreased carbohydrates), liver disease (increased branched chain amino acids), renal disease (decreased protein), or gastrointestinal malabsorption (use "elemental" formula based on free amino acids and monosaccharides).[17,27] Residents with lactase deficiency may benefit from lactose-free formulas. Similarly, residents with constipation may benefit from formulas with added fiber. Supplements should be given between meals and at least 1 hour before the next meal.[12] The product choice depends on the condition of the gut and the expected degree of digestion required.

Overall, routine nutritional supplementation was associated with weight gain, (weighted mean difference 2.06%, 95% confidence intervals 1.63, 2.49), and reduced case fatality rate by 34% (odds ratio 0.66, 95% confidence interval 0.48, 0.91).[28]

Tube Feeding

The indication for enteral nutrition by feeding tube generally falls into 1 of 3 categories. First, neuromuscular disease may impair swallowing or gag reflexes. Second, patients exhibiting an increased metabolic rate may be unable to meet their nutritional needs through eating alone, as evidenced in patients with cancer or cachexia. Finally, an underlying condition may prevent eating, such as in postoperative patients or those using ventilators. The only contraindication to enteral feeding is mechanical obstruction. Diarrhea, vomiting, fistulae, and aspiration represent problems that complicate feeding; however, these are not contraindications.

Access to the gut can be achieved by nasogastric (NG), nasointestinal, percutaneous gastric, or percutaneous jejunal routes. Each route is associated with benefits and risks, but percutaneous endoscopic gastrostomy (PEG) is the most common and, arguably, the most preferred route. Most oral medication cannot be used with jejunal intubation, and long-term nasogastric intubation may be uncomfortable for the patient.

Aspiration is the most serious among the complications of tube feedings. As high as 40% of deaths associated with tube feedings result directly from aspiration pneumonia. Risk factors for aspiration include such conditions as diabetes, pancreatitis, vagotomy, and malnutrition. Certain drugs may also inhibit gastric emptying. Feeding-associated risks include high-nutrient density formulas,[29] hypo- and hyperosmolar solutions,[30] and cold formulas. There have been suggestions that the type of tube affects the rate of aspiration. It has been concluded that PEG tubes convey some protection over NG tubes and that jejunostomies eliminate the risk.[31] However, aspiration occurs with 44% of NG tubes and 56% of PEGs

Table III

Class of Nutrition Products by Protein Source and Degree of Digestion

Class	Protein Source	Digestion
Intact nutrients	Puréed beef and calcium caseinate	Requires normal pancreatic enzymes
Lactose-free	Soybean, caseinates, delactosed lactoalbumin	Requires normal pancreatic enzymes except lactose
Hydrolyzed proteins	Whey, meat, soy	No digestion, intact absorption
Crystalline amino acids	All amino acids	No digestion, passive absorption
Incomplete amino acids	Only branched-chain remains	Hepatic or renal failure

used in a long-term setting. Duodenally placed tubes are not better than PEG tubes. Jejunal tubes placed distally to the ligament of Tritz are theoretically superior to other tubes in prevention of aspiration. In one study, the only risk factor associated with subsequent aspiration in gastrostomy tubes was previous pneumonia.[32] Age, mental status, or method of feeding (intermittent versus continuous) were not associated with subsequent risk.

Selecting an enteral product should not be difficult. All formulas contain protein, fat, and carbohydrates. The numerous formulas currently on the market have caused each manufacturer to offer a complete line of products across the spectrum of nutritional indications. In similar categories, there is very little difference between products. Products differ in sources of protein and in the degree of digestion; as the required degree of digestion lessens, the cost rises considerably. The choice of a product depends on the condition of the gut and the expected degree of digestion required (Table III).

Simple nutritional calculations are necessary to determine the total volume required to deliver adequate protein, calories, and water. Proteins are a critical component. For most institutionalized patients, an enteral protein intake should be 1.2 to 1.5 gm/kg/day. However, half of all chronically ill elderly persons are unable to maintain nitrogen balance at this level.[28] Controversy exists over the percentage of total caloric requirement derived from protein. Generally, formulas contain about 7% to 16% of total calories from protein. Adjusting the percentage upwards may have some benefit in special patients, such as those with chronic wounds.[21] However, increasing the total protein percentage may simply supply calories from protein rather than from carbohydrate sources, and this may dehydrate the patient.

Caloric requirements can be met at 30 to 35 kcal/kg per day. Various formulas, including the Harris–Benedict equation, can be used to predict caloric requirements, but controversy exists over accuracy in obese or severely malnourished individuals.[34] Other formulas have been adjusted for severely stressed hospitalized subjects.[35] Considerable debate exists over whether to use ideal body weight or adjusted body weight. Most feeding formulas contain 1 kcal/mL. Carbohydrates in feeding formulas derive from many sources including starch, polysaccharides, disaccharides, and monosaccharides. The chief difference among formulas is whether the source includes milk, and thus lactose. The majority of formulas are lactose-free. All products require an intact intestinal brush border for absorption. Alternative calories per unit volume are available, ranging from 0.5 to 2.0 kcal/mL. As caloric density increases, gastric motility and emptying decrease; this may increase the risk of aspiration.

Free water requirements are 30 to 35 mL/kg per day. Each product varies in the amount of free water per unit volume, but in most products it is about 80% to 85% of volume. The product's free water should be subtracted from the total calculated daily water requirement. Water flushes of the tube can be adjusted to meet free water requirements. Using a low-calorie formula results in a higher volume requirement to meet caloric needs, which results in increased fluid intake. When 2.0 kcal/cc density formulas are used, the volume necessary to meet caloric needs decreases and the amount of free water decreases. This can be useful when fluid restriction is necessary in certain clinical conditions, such as in inappropriate ADH secretion or congestive heart failure. A number of enteral formulas contain inadequate salt concentrations; thus, when hyponatremia develops, salt must be added.

Fats are added to formulas for additional calories, for flavor, and for absorption of fat-soluble vitamins. The amount of fat and source of fat differ from product to product. The percentage of fat should be about 30% of calories, but an exact requirement is not known.

Numerous studies have attempted to characterize the benefits of tube feeding. In an analysis of 434 tube-fed residents on the Wisconsin Minimum Data Set sample, Grant et al[36] found that 51% of the residents had a diagnosis of stroke; 36% of the residents were diagnosed with dementia; only 10% of the residents ambulated independently; and 74% of the residents were incontinent of either urine or feces. Only one third of those residents assessed could communicate adequately. Mitchell et al,[37] in a study of 1386 nursing home residents

with cognitive impairment, found no evidence that tube feeding prolonged survival. The most common reasons for choosing tube feeding were aspiration risk, dysphagia, presence of pressure ulcers, stroke, lack of dementia, younger age, and a lower level of activity of daily living impairment. Weaver et al,[38] in a small study of the quality of life in patients being tube fed, found no improvement in their quality of life. Forty-nine percent of family members responded that they would not have chosen a feeding tube under other circumstances. O'Brien et al[39] found that 25% of patients surveyed would have refused feeding tubes if they had known that they might be restrained. This study also revealed that males and African-Americans were more likely to choose tube feeding than other groups. In another study, tube feeding was associated with better wound healing and a lower rate of late mortality.[40] In this study, 80% of those assessed had cutaneous complications, 39% had pulmonary aspiration, 15% had vomiting, and 20% attempted to withdraw the tube.

Overall, these studies suggest that tube feeding is not a panacea. [41] Only a small subset of nursing home residents benefit from tube feeding. The decision to tube-feed patients depends as much on the desires of the residents and their families as it does on therapeutic efficacy. Further studies are required to determine which residents can significantly benefit from this active intervention.

Peripheral Parenteral Nutrition

A high percentage of patients are extremely malnourished when they are discharged from the hospital. Often, they are incapable of ingesting adequate calories to restore their nutritional state. These residents require short-term tube feeding or peripheral parenteral nutrition (PPN). The latter is particularly useful in persons recovering from a stroke, because these individuals often have some degree of dysphagia. Sitzman.[42] found that patients with dysphagia with nasoenteric tubes had a 10% complication incidence resulting in a 30% mortality rate. Those patients with nasoenteric tube feeding had a significantly higher death and complication rate than patients requiring PPN.

Peripheral parenteral nutrition can be given overnight, allowing residents to eat to their limit during the day and to take part in physical therapy and other activities. Table IV compares the advantages of PPN with tube feeding for select residents.

Pharmacologic Interventions

Megestrol acetate has been shown to stimulate appetite and promote weight gain in patients with AIDS[43] and cancer-related cachexia.[44,45] Castle and colleagues[46] administered 400 mg per day of megestrol acetate to 4 nursing home residents between 72 and 103 years of age with severe weight loss. Of the 4 residents, 2 experienced weight gain, but only 1 completed the course of therapy. The treatment was complicated by the development of some degree of delirium in 3 of the 4 patients. Megestrol acetate at the 160-mg dosage was shown to prevent nutritional deterioration in older males with head and neck cancer receiving either radio- or chemotherapy.[45] Megestrol acetate also improved performance in patients receiving cancer therapy.[47] Additionally, megestrol acetate increased albumin in malnourished patients on dialysis.[48]

Megestrol acetate has been evaluated in two long-term care settings. In a prospective trial, 69 patients in a Veterans Nursing home were randomized to receive 800 mg of megestrol acetate or placebo for 12 weeks. Forty-four patients completed a 25-week evaluation. Weight gain occurred in 68% of treated subjects. The treatment group gained 1.1 kg compared to 0.9 kg in the control group at 12 weeks. By 25 weeks, the treatment group continued to gain weight (3.0 kg) compared to a weight loss (0.5 kg) in the control group.[49] In another study of 13 elderly nursing home residents who were losing weight and refused enteral feeding, megestrol acetate was prescribed. All residents showed improvement in food intake, body mass index, and serum albumin. One patient had an exacerbation of congestive heart failure.[50] The data are suggestive that megestrol may have some effect in producing weight gain in nursing home residents.

The short-term use of a human growth hormone (GH), although extremely expensive, may be promising in severely cachectic nursing home residents. Kaiser and colleagues[51]

Table IV

Comparison of Nasogastric Tube Feeding and Peripheral Parenteral Nutrition

	NG Tube Feeding	PPN
Ease of initiation	Difficult	Easy
Side effects of placement	Multiple	Mild
Patient comfort	Poor	Good
Ease of maintenance	Problematic	Relatively easy
Calories delivered per 24 hours	Variable	Known amount
Interferes with satiation	Yes	No
Aspiration risk	Increased (possibly)	No effect
Allows oral feeding	Throat discomfort; may interfere	Yes

NG = nasogastric; PPN = peripheral parenteral nutrition.

demonstrated that a 3-week course of GH therapy in older malnourished patients enhanced weight gain without notable adverse effects. Prolonged administration of GH is complicated by the development of carpal tunnel syndrome, gynecomastia, and hyperglycemia.[52]

Oxandrolone, an oral anabolic steroid with potent anabolic activity and minimal androgenic effects, was shown to have a positive impact on weight gain in patients with AIDS-wasting myopathy[53] and alcoholic hepatitis.[54] The authors report that the use of oxandrolone in several severely malnourished patients was generally well tolerated and had a positive impact on weight gain. Additionally, they have used testosterone in males with low weakly bound testosterone levels to increase strength and food intakes in nursing home residents (HKK, DRT, and JEM, unpublished data, 1998).

Table V

Drugs Available for the Treatment of Weight Loss

Megestrol acetate
Dronabinol
Testosterone
Oxandrolone
rh-Growth hormone

Ornithine oxoglutarate, a drug available only in Europe, appears to be a promising drug for older persons with PEM. Brocker and colleagues,[55] in a double-blind randomized study involving 194 patients older than 65 years, have shown that ornithine oxoglutarate improved appetite, weight gain, and quality of life.

Dronabinol is an antiemetic that promotes food intake. It has been shown to promote mild weight gain in patients with cancer or AIDS.[56] Dronabinol has been shown to cause nausea, dizziness, somnolence, and cognitive impairment.[10] Volicer et al[57] utilized a placebo crossover design of 6 weeks for each treatment in patients with Alzheimer's disease. Dronabinol increased weight more than placebo and decreased the severity of the disturbed behavior. Adverse effects seen with dronabinol included euphoria, somnolence, and tiredness. Potential drugs available to treat PEM in nursing home residents are listed in Table V.

Management of Dehydration

Elderly residents of nursing homes have a high plasma osmolality and associated mortality.[58] Management of dehydration requires both fluid and sodium replacement. Prevention plays a key role in the management of dehydration. Residents should be carefully monitored, and when the nurse believes that residents are not ingesting fluids, they should be checked for orthostasis. The diagnosis of dehydration in elderly subjects is difficult.[59] Blood urea nitrogen (BUN) and creatinine should also be measured. Ratios of BUN/creatinine greater than 20:1 are highly suggestive of dehydration. Armstrong-Esther et al[60] have found that, in general, nurses' knowledge of the signs and complications of dehydration and the fluid requirements of the elderly are inadequate. In patients who can drink, mild dehydration may be corrected using oral fluids. In the hot summer months, fluids should be regularly offered. It is important to recognize that elderly individuals have a relative hypodypsia and often fail to recognize their need for fluids. Hypodermoclysis—subcutaneous infusion of parenteral fluids—is a minimally invasive procedure and ideal for use in nursing home settings. Infused fluids should be isotonic to avoid undue soft tissue irritation. Sites such as thigh and abdomen, with a large surface area, are preferred for use. The addition of hyaluronidase to the infusion fluid may further facilitate absorption.[61]

Conclusion

Much of the protein energy malnutrition present in nursing home residents is treatable. Unless ethical considerations call for an alternate approach, physicians must be more aggressive in recognizing and treating PEM in nursing home residents.

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Nutritional Deficiencies in Long-Term Care

Part III – OBRA Regulations and Administrative and Legal Issues

By David R. Thomas, MD, Hosam K. Kamel, MD, and John E. Morley, MB, BCh

Abstract

Among other rules, this article reviews federal regulations on dietary services, food preparation, therapeutic diets, and frequency of meals, as well as guidelines on tube feeding. The authors also discuss possible prosecution for false, fictitious, or fraudulent claims regarding nutritional services. Finally, the authors cover the evolving Prospective Payment System and consolidated billing in relation to these services.
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Introduction

Two Congressional acts, the Omnibus Budget Reconciliation Act of 1987 (OBRA '87) and the Balanced Budget Act of 1997 (BBA '97), contained regulations governing practices in the nursing home. OBRA '87 had a major impact on general nursing care, including the Minimum Data Set (MDS), requirements for a medical director, and reduction of physical and chemical restraints. Regulations based on BBA '97 initiate the Prospective Payment System and consolidated billing. These federal regulations have impacted nutritional status and created the standard of care in nursing facilities. Most of the confusion among physicians concerning compliance with these regulations stems from unfamiliarity with the regulations themselves.

The regulations resulting from OBRA '87 are divided into two parts. First, the law is stated. These statements are labeled by "F-tags" and a number. An "F-tag" is jargon for the actual law published in the *Federal Register*. Second, an interpretive guideline follows the regulation. The guidelines comprise the instructions used by surveyors to determine compliance with the law.

The regulations themselves are very simple. The interpretive guidelines explain the details. For example, the first nutrition-related regulation states that residents in nursing homes should not lose weight. However, weight loss does occur in large numbers of residents.[1] Thus, the regulation explains that the resident's clinical condition may make weight loss unavoidable. Yet, which conditions make weight loss unavoidable? The interpretive guidelines tell the surveyors how to look for clinical conditions that might make weight loss unavoidable.

The focus of this review is to examine the three nutrition-related categories in the OBRA regulations. Poor nutritional status, at least as defined by commonly used physiologic parameters, is consistently associated with risk of future complications. Severe protein-calorie malnutrition alters tissue regeneration, inflammatory reaction, and immune function.[2] Patients with severe malnutrition are at a higher risk for death, sepsis, infections, and increased length of hospital stay.[3] Malnourished patients are more likely to have postoperative complications than well-nourished patients.[4] The identification of persons at risk for malnutrition in elderly populations implies that a correctable condition exists. The goal of nutritional assessment assumes that identification of depleted nutritional markers will lead to improvement of adverse outcomes. Table I provides a list of the nutritional issues identified by the MDS.

Logically, correction of undernutrition seems simple. Because the problem is assumed to be inadequate intake of protein and calories, replacement of adequate nutrients should reverse the process. Therefore, nutritional support should reduce complications. The proof of this reasoning remains elusive.[5,6]

Malnutrition

F-tags 325-326 state that, based on a resident's comprehensive assessment, the facility must ensure (1) that a resident maintains acceptable parameters of nutritional status, such as body weight and protein levels, unless the resident's clinical condition demonstrates that this is not possible; and (2) that a resident receives a therapeutic diet when there is a nutritional problem.

What Are Acceptable Parameters of Nutritional Status in Long-Term Care?

There is no adequate gold standard for determining nutritional status. Several tools have been proposed, including the Nutritional Screening Initiative,[7] the Mini-Nutritional Assessment (MNA),[8] and the Subjective Global Assessment.[9] Of these, only the MNA has been validated in long-term care (LTC) settings.

Problems With the Diagnosis of Malnutrition

Two methods have been used for the diagnosis of malnutrition. The first, arguably the gold standard, uses in vivo neutron activation analysis and tritiated water dilution techniques to define body composition. These techniques are costly and not readily available in nursing homes. A second method uses physiologic parameters, such as protein synthesis,

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Table I

Data Collected by the Minimum Data Set 2.0 (MDS 2) Related to Nutritional Status

Section B: Cognitive Patterns
Variety of information assessing memory, need for cues/supervision, and presence of delirium

Section E: Mood and Behavior
E1: Assesses presence of depression
E4: Assesses behavioral symptoms, including wandering (increased energy utilization; patient smeared/threw food, or resisted taking medicines or eating)

Section G: Physical Functioning and Structural Problems
1h. Eating: Whether the resident requires help with eating or drinking (includes intake by tube feeding, total parenteral nutrition)

Section J: Health Conditions
1.Indicators of fluid status:
- weight gain or loss of 3 lb in a 7-day period
- dehydration (output exceeds input)
- not consuming all or almost all liquids provided during last 2 days
- edema
- fever
- recurrent lung aspiration
- vomiting

Section K: Oral/Nutritional Status
Chewing or swallowing problem or mouth pain
Height/weight: weight measured in a.m. after voiding, before meal, with shoes off, and in night clothes
Weight change: loss or gain of 5% or more in 30 days; 10% or more in 180 days
Complaints of taste of food, regular complaints of hunger, leaving 25% or more of food uneaten at most meals
Nutritional approaches: parenteral/IV nutrition, feeding tube, mechanically altered diet, syringe feeding, therapeutic diet, dietary supplementation between meals, plate guard, stabilized built-up utensil, planned weight change program
Total calories (%) received through parenteral or tube feedings
Fluid intake (cc's) by IV or tube

Section L: Oral/Dental Status
Dentures, tooth loss, carious teeth, gum disease

Section M: Skin Condition
Pressure ulcers

Section P: Special Treatments and Procedures
Training in shopping skills
Restorative care for eating or swallowing

IV = intravenous.
Note: The MDS can trigger the need to complete a Resident Assessment Protocol (RAP). Three of the 18 RAPs are nutritionally oriented: No. 12 (Nutritional Status), No. 13 (Feeding Tubes), and No. 14 (Dehydration/Fluid Maintenance).

serum albumin level, lymphocyte count, body weight, wound healing, muscle strength, or respiratory function. These measures of physiologic function are attractive because they are readily available in clinical situations.

When physiologic functions, such as albumin level or body weight, are used to diagnose malnutrition, error may be introduced. Serum albumin acts as an acute phase reactant.[10] Physiologic stress (such as from surgical operations), cortisol excess, and hypermetabolic states reduce serum albumin even in the presence of adequate protein intake. Large reductions in body weight may indicate cachexia associated with disease rather than impaired intake alone. Therefore, poor nutritional status defined by these variables may indicate poor health rather than poor nutrient intake. Weight loss and serum albumin level may be independent markers for poor outcome regardless of nutrient intake.

Some investigators have suggested that clinical judgment in assessing nutritional status may be as good as objective measurements,[11] but other investigators conclude that malnourished individuals cannot be identified by clinical examination alone.[12] Although clinical judgment works extremely well at identifying patients with clearly established malnutrition, it is less efficacious at identifying patients who have a lesser risk. Patients who have reversal of nutritional problems are easily identified. In addition, nevertheless, many physicians have had inadequate training in nutrition, and a number of studies have demonstrated that physicians fail to diagnose or treat patients with protein-energy malnutrition.

The OBRA guidelines offer two suggestions for monitoring nutritional status: body weight and serum albumin level. However, there are no ideal weight tables for institutionalized patients. An analysis of weight loss or gain should be examined in light of the individual's former life style as well as the current diagnosis. Suggested parameters for evaluating the significance of unplanned and undesired weight loss are given in Table II. Surveyors are instructed to use the following formula to determine the percentage of loss:

% of body weight loss =
(usual weight - actual weight/usual weight) x 100

Table II

Parameters of Weight Loss in Institutionalized Patients

Interval	Significant Loss	Severe Loss
1 month	5%	> 5%
3 months	7.5%	> 7.5%
6 months	10%	> 10%

Table III

Suggested Laboratory Values for Malnutrition

Albumin > 60 yr: 3.4-4.8 g/dL
Plasma Transferrin > 60 yr: 180-380 g/dL
Hemoglobin
- Males: 14-17 g/dL
- Females: 12-15 g/dL

Potassium: 3.5-5.0 mEq/L
Magnesium: 1.3-2.0 mEq/L

Table IV

Risk Factors for Malnutrition

Drug therapy that may contribute to nutritional deficiencies, such as:
- cardiac glycosides
- diuretics
- anti-inflammatory drugs
- antacid overuse
- psychotropic drug overuse
- anticonvulsants
- antineoplastic drugs
- phenothiazine
- oral hypoglycemics

Poor oral health status or hygiene, eyesight, motor coordination, or taste alterations

Depression or dementia

Therapeutic or mechanically altered diet

Lack of access to culturally acceptable foods

Slow eating pace, resulting in food becoming unpalatable or staff removing the tray before the resident has finished eating

Cancer

Table V

Clinical Conditions Demonstrating That the Maintenance of Acceptable Nutritional Status May Not Be Possible

Refusal to eat/refusal of other methods of nourishment

Advanced disease (eg, cancer, malabsorption syndrome)

Increased nutritional/caloric needs associated with pressure sores and wound healing (eg, fractures, burns)

Radiation or chemotherapy

Kidney disease

Alcohol/drug abuse

Chronic blood loss

Hyperthyroidism

Gastrointestinal surgery

Prolonged nausea, vomiting, or diarrhea not relieved by treatment given according to accepted standards of practice

Patients with acceptable reasons for weight loss include those on a calorie-restricted diet, obese patients now on a normal diet, edematous residents who experience diuresis with treatment, and residents who refuse food. The physician and the dietitian must document the reason for food refusal and exclude such causes as depression and anorexia nervosa.

Laboratory values are also suggested as a guide to detecting malnutrition. The suggested laboratory values are given in Table III. Surveyors are warned to check the laboratory "normal" range. Additional guidelines include warnings that some healthy elderly people will have abnormal laboratory values either because of a disease process or for an unexplained reason. There is no requirement that facilities order any of the suggested tests. Altered iron status in many nursing home residents makes the transferrin level a questionable measure of nutritional status in this setting.

When Is It Impossible to Maintain Weight and Protein?

In some residents who have inadequate nutrition, the underlying cause is clearly unavoidable. In these residents, the facility is obligated to have identified the resident as at risk and to trigger appropriate Resident Assessment Protocols. For these patients, the provision of an adequate diet, nutritional supplements, monitoring of food eaten, and periodic changes of diet may be used to try to correct the problem. It is important that the strategies used to encourage the resident to eat are clearly documented in the chart.

What Risk Factors Contribute to Malnutrition?

The causes of malnutrition are numerous. (These causes were discussed in detail in Part II of this series.) Table IV lists the causes commonly encountered in the nursing home. Depression is one of the most common reversible causes of weight loss in the nursing home. An analysis of 6832 Minimum Data Sets from 202 nursing homes in seven states showed that depression was associated with weight loss.[13] Clinical conditions for malnutrition appear in Table V.

Dietary Services

F-tags 360-366 deal with dietary services. The facility must provide each resident with a nourishing, palatable, well-balanced diet that meets the daily nutritional and special dietary needs of each resident. There must be a full- or part-time dietitian and sufficient staff to serve food. The menus must meet the Recommended Dietary Allowances of the National Academy of Sciences, be prepared in advance, and be followed.

Food preparation (F-tags 364-366) must conserve nutritive value, flavor, and appearance. Food must be palatable, attractive, and at the proper temperature and be prepared in a form designed to meet individual needs. Substitutes must be offered of similar nutritive value to residents who refuse food served.

All therapeutic diets must be prescribed by the attending physician (F-tag 367). "Therapeutic diet" means a diet ordered by a physician as part of treatment of a disease or clinical condition in order to eliminate or decrease certain substances in the diet (eg, sodium); to increase certain substances in the diet (eg, potassium); or to provide food that the resident is able to eat (eg, a mechanically altered diet).

Therapeutic diets—such as diabetic, low-salt, and low-cholesterol diets—are often unpalatable and have been shown to be associated with weight loss, low albumin levels, and orthostasis in nursing home settings.[13,14] In the nursing home, special diets should, therefore, be avoided whenever possible.[15]

Tariq et al.,[16] in a prospective study involving 18 nursing home residents with non–insulin-dependent diabetes mellitus, reported that the short-term substitution of a regular diet for a diabetic diet resulted in increased caloric intake without causing significant deterioration in glycemic control. Nursing home residents with diabetes may be placed on a regular diet with no concentrated sweets. In the authors' experience, prescribing a regular diet to hypertensive residents or those with stable congestive heart failure (CHF) did not result in a significant worsening in their condition. However, a small group of residents with such conditions as advanced CHF or chronic renal failure may need to be placed on special diets.

Diets with different consistency, such as puréed and mechanical soft diets, are sometimes prescribed to nursing home residents who have difficulty chewing. In general, changing diet consistency was not shown to have a significant effect on nutrient intake.[17]

The frequency of meals is regulated by F-tag 368. Each resident must receive at least three meals daily, at regular times comparable to normal mealtimes in the community. There must be no more than 14 hours between a substantial evening meal and breakfast the following day, except as provided below. The facility must offer snacks at bedtime daily. When a nourishing snack is provided at bedtime, up to 16 hours may elapse between a substantial evening meal and breakfast the following day, provided that a resident group agrees to this meal span and that a nourishing snack is served.

The regulations do not meet the normal eating patterns of many Americans, and more institutional flexibility in matching meal schedules to residents' needs would seem appropriate. Although it is not legislation, the American Dietetic Association recently issued an important position statement that should be invaluable in discussions with nursing home surveyors: "The quality of life and nutritional status of older residents in long-term care facilities may be enhanced by a liberalized diet. The Association advocates the use of a qualified dietetics professional to assess, monitor, and evaluate the need for medical nutrition therapy according to each person's needs and rights."

Tube Feeding

F-tags 320-322 state that, based on the comprehensive assessment of a resident, the facility must ensure that (1) a resident who has been able to eat enough alone or with assistance is not fed by nasogastric tube unless the resident's clinical condition demonstrated that use of a nasogastric tube was unavoidable; and (2) a resident who is fed by a nasogastric or gastrostomy tube receives the appropriate treatment and services to prevent aspiration pneumonia, diarrhea, vomiting, dehydration, metabolic abnormalities, and nasalpharyngeal ulcers, and to restore, if possible, normal eating skills.

What Is an Unavoidable Tube Feeding?

The guidelines suggest that a nasogastric tube may be unavoidable in patients with certain conditions. These conditions include an inability to swallow without choking or aspiration (in cases of Parkinson's disease, pseudobulbar palsy, or esophageal diverticulum, for example); lack of sufficient alertness for oral nutrition (the resident is comatose, for example); and malnutrition that is not attributable to a single cause or causes that can be isolated and reversed. The facility must document that it has not been able to maintain or improve the resident's nutritional status through oral intake. It is equally important to document the discussions with the resident and the family that may have led to a decision not to accept tube feeding. This recognition of the patient's autonomy to refuse tube feeding is quite acceptable and within the province of the tenets of the Patient Self-Determination Act. When conflict exists between the resident, his or her family members, and/or the staff, it is important to consider the involvement of the institution's ethics committee.

Complications and Prevention of Tube Feeding

The intent of F-tags 320-322 is that a nasogastric tube feeding is utilized only after adequate assessment and when the resident's clinical condition makes this treatment necessary. This requirement is also intended to prevent the use of tube feeding when ordered over the objection of the resident. Any decisions about the appropriateness of tube feeding for a resident must be developed with the resident or his or her family, surrogate, or representative.

Complications of tube feeding are extremely common, with up to 40% of patients dying of complications within one year.[18] In general, enteral feedings are associated with poor outcomes in long term care residents.[19] The guidelines suggest that complications in tube feeding are not necessarily the

Table VI

Probes for Avoiding Complications of Tube Feeding

Is the tube properly placed?

Are staff responsibilities for providing enteral feedings clearly assigned (ie, who administers the feeding, formula, amount, feeding intervals, flow rate)?

Do staff members monitor feeding complications (eg, diarrhea, gastric distention, aspiration) and administer corrective actions to allay complications (eg, changing rate of formula administration)?

Are there negative consequences of tube use (eg, agitation, depression, self-extubation, infections, aspiration, and restraint use without a medical reason for the restraint)?

When long-term use is anticipated, is gastrostomy tube placement considered?

Table VII

Complications of Tube Feedings

Complication	Intervention
Aspiration pneumonia	Check tube placement before commencing feeding Elevate head properly while feeding Adjust feeding rate to minimize gastric distention
Diarrhea	Switch to a different formula or dilution Administer kaolin-pectin suspension, paregoric, diphenoxylate, or codeine
Hyponatremia	Decrease water flushes Add sodium chloride to the formula Switch to a nutrient-dense formula
Skin irritation around tube site	Use cleansing mechanical barriers Use H2-blockers to decrease gastric acidity

result of improper care, but the facility is responsible for providing assessment aimed at preventing complications. Probes for tube feeding complications are shown in Tables VI and VII. Guidelines for preventing complications are given in Table VIII.

Outcomes From Nutritional Interventions

It is difficult, if not impossible, to differentiate undernutrition from cachexia by clinical evaluation. Provision of a diet to suspected undernourished patients that is complete in nutrient requirements provides the optimum environment for recovery. When the patient fails to improve despite provision of adequate protein and calories, the underlying problem may be irreversible.[2]

Extensive data from the literature suggest that cachexia may not be reversible even though adequate nutritional support is given.[21,22,23] This confounding factor may be the reason why so few outcomes studies of nutritional interventions have shown positive benefits.

In a long-term care geriatric hospital, 501 newly admitted malnourished patients were randomized to receive either a regular diet or a regular diet plus twice- daily nutritional supplementation.[24] Both experimental and control groups showed a decrease in weight index, triceps skinfold thickness, and mid-arm circumference. There were no differences between groups in prealbumin, albumin, or alpha1- antitrypsin levels. Most (59%) of the patients receiving supplementation did not improve during follow-up. The failure rate may be higher because the patients who were offered supplementation but refused are not included.

Enteral tube feedings demonstrate few long-term benefits, except in the case of malnourished hospital patients following a hip fracture.[25] Only 6% of tube-fed, institutionalized residents ever gained weight over 11 months of observation.[18] In this study, wide fluctuations in serum albumin levels occurred, but serum albumin was not normalized. Mean hemoglobin concentration did not increase. Aspiration pneumonia probably contributed to death in 40% of patients.

In a study of total parenteral nutrition (TPN), the outcome in elderly patients was dismal. In the 179 patients over the age of 65 years, no statistically significant improvement in body weight, body fat, lean body mass, extracellular mass, or body cell mass occurred after feeding. In a subset of 33 severely malnourished patients, there was suggested benefit.[6] TPN is associated with a high complication rate. Peripheral parenteral nutrition has a lower complication rate and may be particularly appropriate for use in long-term care.

Table VIII

Procedures to Reduce Complications of Tube Feeding

- Use a small-bore, flexible nasogastric tube, unless contraindicated.
- Attach the tube securely to the nose/face.
- Check for correct tube placement prior to beginning a feeding or administering medications and after episodes of vomiting or suctioning.
- Check a resident with a newly inserted gastric tube for gastric residual volume every 2-4 hours, until the resident has demonstrated an ability to empty his or her stomach.
- Elevate the resident's head properly.
- Provide the type, rate, and volume of the feeding as ordered.
- Use universal precautions and clean technique as per the facility and the manufacturer's directions when stopping, starting, flushing, and giving medications through the tube.
- Use hang-time recommendations of the manufacturer to prevent excessive microbial growth.
- Implement procedures to ensure cleanliness of supplies (eg, irrigating syringes changed on a regular basis as per facility policy; it is not necessary to change the irrigating syringe each time it is used).
- Use a pump equipped with a functional alarm (an alarm that sounds when a pump is used).
- Use the facility's criteria for determining whether a resident may be able to return to eating by mouth (eg, a resident whose Parkinson's disease has been controlled).

Medicolegal Aspects of Nutrition

Novel theories of prosecution have been developed to address nutritional status in long-term care settings. Although the survey process with fines and sanctions has been in place for some time, the new approaches stem from the False Claims Act. Specifically, the government alleges that false, fictitious, or fraudulent claims are submitted for nutritional services when these services are not rendered.[26] The clinical basis for the false claim was that decline in weight and failure of albumin level to improve occurred despite provision of 1560 calories and 97 grams of protein daily by gastrostomy tube. In a second resident, enteral feedings of 1500 kcal and 63 grams

of protein were judged to be inadequate, because the calculated value was 2060 kcal and 103 grams of protein. In both these cases, excellent documentation of intake was provided, but this documentation was judged to be fraudulent because the patient did not gain weight or show improved serum albumin level.

The major implication of this approach to prosecution is that the charges are felony violations, subject to prison terms and/or fines. The result is an escalation in the importance of nutrition in long-term care settings. Civil suits for pressure ulcers and falls are becoming more common, and nutrition is often implicated in both of these conditions. Malnourished persons are at risk for falls,[27] and postprandial hypotension is not a rare cause of falls in nursing homes.[28] There is a need for controlled studies to examine nutritional outcomes when causes of malnutrition are vigorously treated and to look for the utility of orexigenics.

The Prospective Payment System and Nutrition

The Prospective Payment System (PPS) was created by the Balanced Budget Act of 1997 in response to the perception that the system was producing spiraling costs that were difficult to monitor and were associated with significant fraud and abuse. The main feature of PPS is that skilled nursing facilities will no longer be paid "in accordance with the present reasonable cost-based system but rather through per diem prospective case-mix adjusted payment rates applicable to all SNF [skilled nursing facility] services."

Consolidated billing is a comprehensive billing requirement under which the SNF is responsible for billing Medicare for virtually all of the services that the residents receive. These services include emergency department and doctor's office visits, as well as transport for visits for care identified as being in response to a preexisting care plan diagnosis.

The basic allocation of cost reimbursement is based on the Resource Utilization Groups (RUG-III) patient classification system. The grouping into which a specific resident fits will be determined by the Minimum Data Set instrument. RUG-III is driven by the need for help with basic activities of daily living (ADLs) for five of its seven major categories. It assesses performance on "late loss" ADLs, one of which is the ability to eat independently.

The Extensive Services Category is one of the two RUG-III categories that is not ADL-driven, provided that the ADL score is at least seven. One of the services included in this category is intravenous feeding.

The Special Care Category is divided into three groups dependent on the resident's ADL score. A number of nutrition or nutrition-related conditions place a resident in the Special Care Category. These conditions include dehydration, tube feedings, weight loss, and two or more skin lesions. In the case of enteral feedings, the resident needs to receive at least 26% of the caloric requirements and 501 ml per day through the tube. The new system will only reimburse for dehydration treated by hypodermoclysis when intravenous fluid administration is required. This would appear to be an extremely shortsighted and onerous rule.

Consolidated billing requires that all services are included in a single bill from the SNF. All nutritional supplements, placement and maintenance of intravenous lines, and orexigenic drugs will be billed by the facility.

Whereas failure to provide appropriate care under PPS will be considered Medicare fraud, numerous potential problems exist both for obtaining appropriate reimbursement and for providing care. For nonfraudulent reimbursement to occur, all physicians', nurses', and dietitians' notes to document the problem will be required, and this documentation must then be appropriately reflected in the MDS. A new MDS will need to be filled out for each change of status, and a physician's note will need to justify this change.

Table IX

Nutritional Components of the Prospective Payment System

Extensive Services Category
(includes intravenous feeding)

Special Care
dehydration (hyperdermoclysis not reimbursed)
tube feedings (providing 26% of calories and 501 ml fluid/day)
weight loss
two or more skin ulcers

RUG-III
assistance with eating is one of four basic ADLs for assignment

RUG = Resource Utilization Group; ADLs = activities of daily living.

Another example of a potential problem is when the care plan documents weight loss as a problem. A physician would decide to insert a gastrostomy tube as an outpatient procedure. Under the present regulations, it is likely that the entire cost would be assessed to the nursing facility. Such would not be the case if the resident had been admitted to the hospital for the procedure.

We are learning to live with PPS and consolidated billing. The major nutritional components of PPS are summarized in Table IX.

Conclusion

Overall, the regulations address most of the concerns about nutritional support in the nursing home. The survey process is essentially document-driven rather than outcomes-driven. Physicians tend to be outcomes-driven. Thus, problems with surveyors occur when the record does not provide documentation of the process of care, even though there may have been

adequate compliance with all the regulations. When the documents do not address these components, the process may be cited. The criminalization of nutritional support intensifies the need to examine and document fully. The impending PPS will focus on the need for awareness of the regulations. Awareness of the regulations and simple documentation should provide for better patient care and fewer compliance problems. Similarly, PPS places a premium on documentation to allow nursing homes to be appropriately reimbursed.

Finally, it should be recognized that the nutritional status in a facility can be compared to regional, state, and national performance levels, utilizing the On-line Survey of Certification And Reporting Systems (OSCAR) reports. The OSCARs are based on reporting to the state through the MDS forms. Thus, they are only as accurate as the MDS reporting. However, PPS reimbursement demands accurate reporting. Table X gives an example of nutritional data that can be abstracted from the OSCAR reports.

Table X

Abstraction of Nutritional Data Available on the OSCAR Reports

(Based on Reporting From 3/16/98)

	State Missouri (%)	Region St. Louis (%)	Nation (%)
Eating			
independent residents	58.0	60.6	53.5
residents assisted by staff	25.1	26.5	25.4
residents dependent on staff	16.8	15.4	21.0
Special Care			
residents receiving tube feedings	5.0	6.6	7.3
residents receiving mechanically altered diets, including puréed and all chopped food	36.8	35.2	38.5
residents using assistive devices while eating	8.7	10.8	8.7
Other			
residents with unplanned significant weight loss/gain	8.6	8.4	7.5

OSCAR = On-line Survey of Certification and Reporting Systems.

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