

Diagnosis and Management of Weight Loss in the Elderly

John D. Gazewood, MD, MSPH, and David R. Mehr, MD, MS
Charlottesville, Virginia, and Columbia, Missouri

Weight loss occurs commonly in elderly individuals, and is associated with functional decline and mortality. A 10% loss of body weight over 10 years is consistently associated with increased mortality and functional decline. A 4% body weight loss over 1 year should trigger a search for causes, which commonly include depression, cancers, benign gastrointestinal conditions, and medication toxicity. To evaluate weight loss, physicians should distinguish between four problems: anorexia, dysphagia, weight loss despite normal intake, or socioeconomic problems. In most cases, the cause of weight loss is identified by a thorough history, a targeted physical examination, and a simple laboratory evaluation. Assessment should include evaluation of functional and nutritional status. Management should include correction of potential causes and nutritional supplementation.

KEY WORDS. Weight loss; nutrition; geriatric assessment; diagnosis; epidemiology; family practice. (*J Fam Pract* 1998; 47:19-25)

Beginning at age 60 in men and 65 in women, there is an average 0.5% annual decline in weight.¹ Excessive weight loss may point to serious or fatal illness. In prospective studies, weight loss is consistently associated with mortality and functional decline.^{1,5} Up to 13% of elderly outpatients and 15% to 60% of nursing home residents exhibit important weight loss.^{4,6,7} A systematic approach to the problem can result in cost-effective diagnosis and management.

EPIDEMIOLOGY OF WEIGHT LOSS IN THE ELDERLY

Epidemiological studies show an association between mortality and low body mass index (BMI),^{1,8,9} but the strongest associations with mortality are weight loss of 10% or more over a period of 10 years.^{1,3} After controlling for co-morbid conditions, women who have had a 5% weight loss within the previous 10 years had a twofold increase in the risk of impaired mobility. Women with stable weight and a low BMI³ had the lowest risk of disability.⁵ Thus, the data suggest that excessive weight loss, not low BMI alone, is associated with adverse outcomes in the elderly.

EXCESSIVE WEIGHT LOSS

In a study of male veterans aged 65 years and older, subjects were weighed annually for 2 years, and their out-

comes were tracked for a minimum of 2 years after identified weight loss. A 4% weight loss at 1 year had a sensitivity of 75% and a specificity of 61% for predicting subsequent 2-year mortality. The annual incidence of 4% weight loss was 13%, and weight losers' relative risk of 2-year mortality was 2.43 (95% confidence interval, 1.23-4.41).⁷ These findings support an evaluation of older persons losing 4% or more of body weight over 1 year or less.

WEIGHT LOSS IN THE NURSING HOME

Weight loss also predicts mortality in nursing home patients. In a retrospective study, skilled nursing facility residents losing 10% or more over a period of 6 months to 3 years had a 62% mortality rate over 3 years, compared with 42% among residents not losing weight.⁴ In another study, intermediate-care residents with a 10% weight loss over 6 months had a subsequent 6-month mortality of 62%, compared with 9% in the group with stable weight. In a third study, patients losing over 5% of their body weight in 1 month had a 1-year mortality of 46%, compared with a 1-year mortality of 16% among those with stable weight.¹⁰ While weight loss portends dying sooner in each of these studies, it appears to exhibit a weaker association with mortality in more impaired populations. Physicians should approach weight loss in a nursing home patient in light of the patient's overall health and functional status. It seems reasonable to investigate a 5% weight loss over 1 month or a 10% weight loss over 6 months among less impaired nursing home residents.

ETIOLOGY OF WEIGHT LOSS

Three English language studies describe causes of weight loss among the noninstitutionalized elderly (Table 1). Depression, cancer, and benign gastrointestinal tract diseases are the most common causes.¹¹⁻¹³ The most common malignancies associated with weight loss are lung and

Submitted, revised, May 19, 1998.

From the Department of Family Medicine, University of Virginia Health System, Charlottesville (J.G.) and the Department of Family and Community Medicine, University of Missouri-Columbia (D.R.M.). Requests for reprints should be addressed to John Gazewood, MD, MSPH, Box 414, Department of Family Medicine, University of Virginia Health System, Charlottesville, VA 22908.

TABLE 1

Summary of Studies Describing Causes for Weight Loss in Older Patients

Study	Marton et al ¹⁸	Thompson ²⁰	Rabinovitz et al ¹⁹	Morley ⁶
Design	Prospective	Retrospective chart review	Retrospective chart review	Retrospective chart review
Sample	91 male veterans, both inpatient and outpatient	45 family practice center patients >63 years	154 internal medicine inpatients	185 nursing home patients
Mean age, y	59	72	64	80
Body weight lost / time	>5% / 6 mo	>7.5% / 6 mo	>5% (time unspecified)	>5 lb / 3 mo
Mortality / time	25% / 18 mo	9% / 24 mo	38% / 30 mo	Unspecified
Diagnosis, %				
Cancer	19	16	36	7
Nonmalignant gastrointestinal	14	11	17	3
Psychiatric	17	18	8	58
Neurologic	2	7	5	15
Adverse drug reactions	2	9	NA	14
Other	20	15	11	NA
Unknown	26	24	23	3

gastrointestinal cancers. Peptic ulcer disease and esophageal motility disorders are common nonmalignant gastrointestinal causes of weight loss.^{11,12} Approximately 25% of patients in these studies did not receive a diagnosis despite extensive investigation and lengthy follow-up. In contrast, among nursing home residents, psychiatric and neurologic illnesses account for the greatest proportion of weight loss, and fewer residents have their conditions undiagnosed. The higher percentage of undiagnosed conditions among noninstitutionalized patients may be due to the more rigorous criteria used to determine a cause of weight loss.^{11,12}

To construct a differential diagnosis for an older patient who is losing weight unintentionally, we can group causes into four categories: (1) anorexia; (2) difficulty eating; (3) weight loss despite normal caloric intake; and (4) socioeconomic problems. Multiple causes of weight loss can be present in a single patient.

ANOREXIA

Anorexia can be caused by neuropsychiatric syndromes, drugs, and medical illness. While depression is a well-known cause, other psychological causes of anorexia should be considered. Bereavement causes significant weight loss, more commonly among men than women.¹⁴ Some patients with a prior history of anorexia nervosa relapse in later life: anorexia nervosa developing de novo in the elderly is called *anorexia tardive*. In one study, 60% of undernourished veterans older than 70 displayed abnormal eating behaviors, and 9% of these had an abnormal body image.¹⁵ Alcoholism, frequently overlooked in the elderly, may also cause weight loss.^{11,16} Individuals with paranoid disorders may develop paranoid delusions surrounding food, leading to weight loss.¹⁴

Dementia and delirium also cause weight loss. Weight loss precedes the diagnosis in half of Alzheimer's patients, and may be secondary to anosmia.¹⁷ As dementia pro-

gresses, patients may forget to eat or become unable to prepare food, and thus appear to have a poor appetite; however, not all patients with Alzheimer's disease lose weight.¹⁸ Delirium is a common cause of weight loss in hospitalized patients.¹⁹

Drugs induce anorexia by several mechanisms (Table 2). Digoxin can cause anorexia and weight loss, even if serum levels are in the therapeutic range.¹⁴ Fluoxetine is associated with a marked increase in nausea and weight loss in elderly patients.²⁰ Other selective serotonin reuptake inhibitors appear less likely to cause weight loss than fluoxetine, but should also be monitored closely. Impaired cognition and motivation from psychotropics and sedatives may lead to decreased oral intake.²¹ Nonsteroidal anti-inflammatory agents, iron, and alendronate cause nausea and dysphagia by injuring gastrointestinal mucosa. The use of three or more drugs can decrease a person's ability to taste and can cause anorexia.^{21,22}

Low-fat and sodium-restricted diets do not taste as good to some and can contribute to anorexia and weight loss. Therapeutic diets are associated with weight loss, low albumin, and orthostasis in nursing home patients.^{23,24} Institutional food may be unappealing for some nursing home patients.

Finally, significant medical illness can cause anorexia and weight loss. Interleukins and tumor necrosis factor contribute to anorexia in cancer patients. Patients with benign gastrointestinal disorders, such as peptic ulcer disease, cholelithiasis, or reflux esophagitis, may present with anorexia, early satiety, and weight loss, even when pain and dyspepsia are absent.^{13,25} Other common conditions causing anorexia include: hyperparathyroidism, thyroid disorders, diabetes mellitus, congestive heart failure, chronic obstructive pulmonary disease, intestinal angina, and giant cell arteritis. Other manifestations of these disorders are usually present.

DIFFICULTY EATING

Some older adults lose weight despite a good appetite. They cannot consume sufficient calories because of oral problems, functional impairments, or swallowing disorders. One recent study found that the number of oral and dental problems was the most important predictor of weight loss over 1 year.²⁶ Drugs with anticholinergic effects can cause xerostomia, and can contribute to eating problems.²⁷ Visual impairment from ophthalmic or central nervous system disorders can limit patients' ability to prepare or eat meals. Some patients with weakness or tremor have difficulty feeding themselves.²⁴

Patients with oropharyngeal dysphagia present with swallowing problems or dysphonia (wet-sounding voice) after swallowing. Clinical evaluation by a speech therapist or a swallowing study or both can help confirm the diagnosis and severity of oropharyngeal dysphagia. Neurologic disorders are the most common causes

TABLE 2

Medications That May Cause Weight Loss

Symptom	Medication
Nausea or vomiting	Antibiotics, nonsteroidal anti-inflammatory agents, dopamine agonists, opiates, hormone replacement therapy
Anorexia	Xanthines, serotonin reuptake inhibitors, decongestants, amantadine, digoxin
Dysgeusia	Angiotension-converting enzyme inhibitors, metformin, iron, metronidazole, calcium antagonists, albuterol, levodopa, allopurinol
Dysphagia	Potassium, iron, nonsteroidal anti-inflammatory agents, alendronate, corticosteroids, anticholinergic medications

Adapted, with permission, from: Drug-induced adverse effects affecting nutritional intake. *Drugs and Aging* 1996; 4:221-5.

(Table 3). Structural lesions are less common causes of oropharyngeal dysphagia, but may be suggested by painful swallowing.²⁸

Patients with esophageal dysphagia complain of discomfort in their retrosternal area. The consistency of foods causing dysphagia, the temporal pattern of dysphagia, and associated symptoms help identify the cause of

TABLE 3

Causes of Oropharyngeal Dysphagia

Central Nervous System

Stroke
Parkinson's disease
Polymyositis and dermatomyositis
Multiple sclerosis

Structural Lesions

Goiter
Anterior cervical osteophytes
Tumor
Zenker's diverticulum

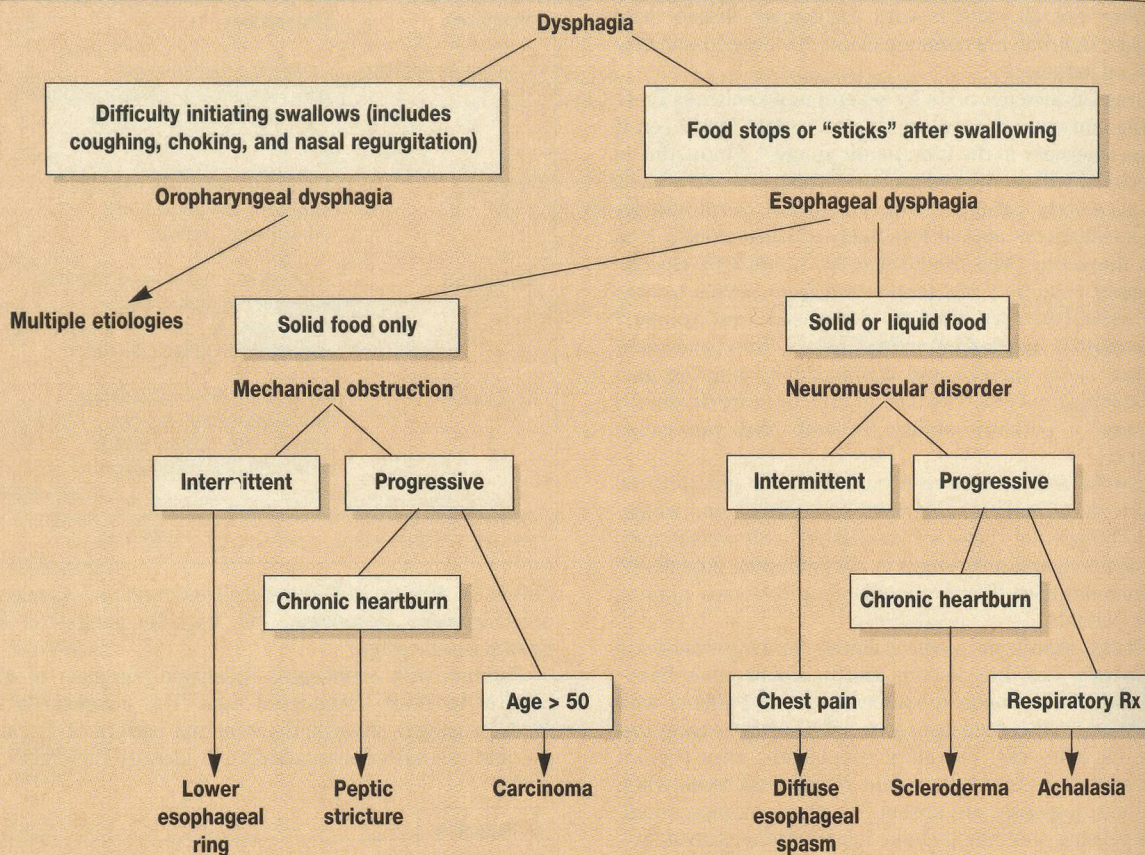
Central Nervous System

Neuromuscular disorders
Amyotrophic lateral sclerosis
Polymyositis and dermatomyositis
Myasthenia gravis
Hypothyroidism or hyperthyroidism

Adapted, with permission, from: Castell, DO. Eating and swallowing disorders. In: Hazzard WR, Bierman EL, Blass JP, Ettinger WH, Halter JB, eds. *Principles of Geriatric Medicine and Gerontology*. 3rd ed. New York: McGraw-Hill; 1995:1259-65.

FIGURE

A diagnostic algorithm for dysphagia



Reproduced, with permission, from: Castell, DO. Eating and swallowing disorders. In: Hazzard WR, Bierman EL, Blass JP, Ettinger WH, Halter JB, eds. Principles of Geriatric Medicine and Gerontology. 3rd ed. New York: McGraw-Hill; 1995.

dysphagia (Figure). An imaging study or endoscopy is necessary to confirm a diagnosis.²⁸

WEIGHT LOSS DESPITE ADEQUATE CALORIC INTAKE

Metabolic disorders and movement disorders can increase caloric demands. Hyperthyroidism occurs in 9% of elderly family practice center patients with weight loss,¹³ and commonly manifests as apathy, weight loss, and tachycardia.²⁹ Movement disorders such as Parkinson's disease and tardive dyskinesia may cause weight loss. Alzheimer's patients who wander or pace have increased caloric demands and frequently lose weight.⁶

Malabsorption in the elderly usually presents nonspecifically with weight loss, evidence of malnutrition, or functional decline.^{30,31} Although diarrhea is common,¹⁶ only one third of patients with diarrhea have malabsorption.³⁰ Positive qualitative fecal fat identifies moderate to severe steatorrhea, but lacks sensitivity for less severe fat malab-

sorption. Three-day quantitative fecal fat collection is sensitive, but is difficult to collect. The 25-gram D-xylose test is dependent on normal urinary excretion of xylose and is usually not helpful in the elderly, although a normal value rules out malabsorption. The 5-gram D-xylose test, which measures 1-hour blood xylose concentration, is a valid test for elderly patients, although it is not widely available.³¹ Consult a gastroenterologist to determine the best test available locally.

The most common causes of malabsorption in the elderly are bacterial overgrowth, pancreatic exocrine deficiency, and celiac sprue.^{16,30} Structural abnormalities, motility disorders of the small intestine, and achlorhydria predispose to bacterial overgrowth of the small bowel.^{16,30,31} The ¹⁴C-xylose breath test may prove useful in identifying small intestine bacterial overgrowth.^{32,33} Pancreatic exocrine deficiency in the elderly is usually idiopathic. Patients typically do not have pain, but many have steatorrhea and one half have pancreatic calcifications.¹⁶ In one

series of elderly patients with malnutrition, sprue caused symptoms related to anemia or bone pain. Only 25% had diarrhea.¹⁶ Diagnosing celiac sprue requires small-bowel biopsy.^{16,34}

SOCIAL FACTORS

Eating is a social behavior; as older patients lose their spouse or other eating companions, eating becomes less pleasurable, and weight loss may ensue. Widowers are particularly at risk for poor intake, as are older adults in lower socioeconomic groups.³⁵ Nursing home residents may avoid meals because of the behavior problems of other residents. Among patients dependent on others for feeding, caregiver changes can lead to weight loss. Consider neglect or abuse when an older person who is losing weight depends on others for food.

EVALUATION AND MANAGEMENT

The first step in evaluating a complaint of weight loss is determining the amount. If serial weights are not available, other clues help identify significant weight loss: clothing becoming too large, a caregiver's confirmation of significant weight loss, or a patient's numeric estimate of weight loss.¹¹ Subsequent evaluation includes a thorough history, targeted physical, functional, and nutritional assessments, and focused laboratory testing (Table 4). In the nursing home, the law requires a staff evaluation using the Resident Assessment Protocol (RAP), which complements the physician's workup.³⁶

HISTORY

The patient's symptoms should guide us to one of the four causal categories: anorexia, difficulty eating, weight loss despite normal intake, and social factors. The review of systems should address prevalent disorders such as cancer, mental illness, and gastrointestinal disease.¹¹⁻¹³ Review the patient's prescription and nonprescription medications, and obtain information about dietary habits and alcohol use. The social history should include information about the patient's financial situation, home environment, support network, and use of transportation. With frail older adults, obtaining a complete history frequently requires interviewing caregivers.

PHYSICAL EXAMINATION

Focus the physical examination on symptomatic organ systems, the oral cavity, and areas commonly affected by cancer, particularly the lungs and the gastrointestinal tract.^{11-13,26} A mental status examination and formal cognitive function testing with a simple instrument such as the Folstein Mini-Mental State Exam helps recognize patients with cognitive impairment.³⁷ Administration of the Geriatric Depression Scale may identify patients with depression.³⁸ Examination of the nervous system

TABLE 4

Important Components in Evaluation of Patient with Weight Loss

History

- Determine symptom pattern
 - Anorexia
 - Difficulty eating
 - Weight loss with normal intake
 - Social problems
- Review medicines, alcohol use, and diet
- Social history
 - Finances, transportation, social support
- Review of systems
 - Prevalent cancers: breast, gastrointestinal, lung, prostate
 - Benign gastrointestinal disorders
 - Depression and other mental illness
 - Hyperthyroidism
 - Cognitive impairment
 - Neurologic disorders
- Functional status

Physical Examination

- Symptomatic organ systems
- Vision
- Mouth and teeth
- Gastrointestinal tract
- Neurologic examination
- Mental state examination (MMSE, GDS)

Laboratory Evaluation

- Complete blood count
- Chemistry profile
- Ultra-sensitive thyroid-stimulating hormone
- Fecal occult blood
- Chest film

MMSE denotes Mini-Mental State Examination³⁷; GDS, Geriatric Depression Scale.³⁸

helps identify movement disorders and other problems that can affect eating.

FUNCTIONAL EVALUATION

Functional assessment may identify functional impairments that contribute to, or result from, weight loss. This includes evaluations of sight, hearing, gait, and self-care ability. Commonly used functional assessment tools include the Katz scale of activities of daily living,³⁹ and the Lawton scale of instrumental activities of daily living.⁴⁰ Others are described in recent reviews.⁴¹⁻⁴³

LABORATORY EVALUATION

While patients with weight loss underwent 15 to 24 laboratory tests in the previously described studies,¹¹⁻¹³ physicians found the cause, in most cases, after the initial history-taking, physical examination, and targeted diagnostic testing. In one study including middle-aged and elderly

TABLE 5

Laboratory Indicators of Malnutrition

Test	Abnormal Value
Serum albumin	<3.4 mg/dL (34 g/L)
Serum prealbumin	<18 mg/dL
Serum transferrin	<200 mg/dL (2.00 g/L)
Total lymphocyte count	<1500/mm ³ (1.5 cells x 10 ⁹ /L)
Total cholesterol	<160 mg/dL (4.1 mmol/L)

patients, 92% of cases with a physical cause were diagnosed after initial evaluation.¹¹ Tests with the highest "yield" were upper gastrointestinal radiography, upper endoscopy, fecal occult blood testing, and thyroid function testing.^{11,13} Normal screening laboratory results (complete chemistry profile, blood count, urinalysis, chest film, and fecal occult blood) were reassuring. All patients with normal laboratory findings in one study were alive and "doing well" 18 months after initial evaluation.¹¹

On the basis of this evidence, laboratory evaluation, in general, should be limited. A complete blood count, chemistry panel, ultra-sensitive TSH, urinalysis, fecal occult blood test, and chest film should be done.^{13,14,44} Since peptic ulcer disease and gastroesophageal reflux may be silent, endoscopic or radiographic examination of the upper gastrointestinal tract should be considered in patients with anorexia, absence of other symptoms, and persistent weight loss.^{11,13} Other testing should be directed by findings on history, physical, or initial laboratory evaluation. Patients with normal physical and laboratory findings are unlikely to have a serious physical illness.

MANAGEMENT

Management follows appropriate diagnosis. Withdraw unnecessary medications that may cause weight loss. Treat patients with depression or other psychiatric disorders. In severe cases of weight loss resulting from depression, electroconvulsive therapy may benefit patients not responding to medical therapy.⁴⁵ Gastrointestinal disorders are likely to respond to specific therapies, such as cholecystectomy for cholelithiasis,²⁵ or antibiotic therapy for small-intestine bacterial overgrowth syndrome.^{33,46} Oropharyngeal dysphagia from a stroke may respond to limited speech therapy.⁴⁷ Patients with Parkinson's disease may benefit from therapy with levodopa and carbidopa.⁴⁸ It is also important to address the malnutrition commonly associated with weight loss in elderly persons. Often unrecognized, malnutrition is common in clinical settings,^{15,49,50} and is associated with increased morbidity and mortality.⁵¹⁻⁵³ Physicians often fail to recognize malnutrition.⁵⁰ Traditional anthropometric measurements, such as triceps skin-fold thickness, are not reliable in the elderly.²⁴ Laboratory measures of malnutrition (Table 5) are neither

specific nor sensitive for accurately identifying malnutrition. A tool that may be a helpful guide to physicians in assessing nutritional status is called the Subjective Global Assessment, which uses pattern-of-weight change, changes in dietary intake, gastrointestinal symptoms, functional capacity, and physical findings such as muscle wasting. This method accurately and reliably identifies moderately to severely malnourished patients at increased risk for poor outcomes.⁵⁴ Discontinuing therapeutic diets, allowing patients free access to favorite foods, and adding flavor enhancers to foods may increase intake.^{55,56} Total daily caloric requirements average 30 to 35 kcal/kg for ambulatory elderly and 40 kcal/kg for malnourished elderly and those with mild to moderate illnesses.⁵⁷ Supplemental oral or short-term nasogastric feedings in malnourished elderly patients have been shown to improve outcomes.⁵⁸⁻⁶⁰ A palatable supplement meeting patients' needs can be found from the variety of enteral supplements differing in caloric, protein, and fiber content that are available. A dietitian can help to assess nutritional status and recommend an appropriate supplement.

CONCLUSIONS

Weight loss in the elderly poses a challenging diagnostic problem to the clinician. A thorough history, physical examination, and simple laboratory evaluation will yield a diagnosis in the great majority of patients. For a substantial number there will be no diagnosis after initial evaluation. If the initial evaluation is normal, these patients can be observed. Nutritional supplementation should be offered to all patients with weight loss.

ACKNOWLEDGMENTS

Dr Gazewood is a Harrison Medical Teaching Professor in Generalist Medicine. This work was partially funded by the National Research Service Award 5-T32-P#17001-08.

Dr Mehr is a Robert Wood Johnson Foundation Generalist Physician Faculty Scholar.

The authors wish to thank Steven Zweig, MD, MSPH, for editorial assistance.

REFERENCES

1. Coroni-Huntley JC, Harris TB, Everett DF, et al. An overview of body weight of older persons, including the impact on mortality. The National Health and Nutrition Examination Survey I—Epidemiologic Follow-up Study. *J Clin Epidemiol* 1991; 44:743-53.
2. Murden RA, Ainslie NK. Recent weight loss is related to short-term mortality in nursing homes. *J Gen Intern Med* 1994; 9:648-50.
3. Losonczy KG, Harris TB, Coroni-Huntley J, et al. Does weight loss from middle age to old age explain the inverse weight mortality relation in old age? *Am J Epidemiol* 1995; 141:312-21.
4. Chang JI, Katch PR, Ambrose P. Weight loss in nursing home patients: prognostic implications. *J Fam Pract* 1990; 30:671-4.
5. Launer LJ, Harris T, Rumpel C, Madans J. Body mass index, weight change, and risk of mobility disability in middle-aged and older women. The epidemiologic follow-up study of NHANES I. *JAMA* 1994; 271:1093-8.
6. Morley JE, Kraenzle D. Causes of weight loss in a community nursing home. *J Am Geriatr Soc* 1994; 42:583-5.

7. Wallace JI, Schwartz RS, LaCroix AZ, et al. Involuntary weight loss in older outpatients: incidence and clinical significance. *J Am Geriatr Soc* 1995; 43:329-37.
8. Rosenberg IH. Nutrition and aging. In: Hazzard WR, Bierman EK, Blass JP, et al, eds. Principles of geriatric medicine and gerontology. 3rd ed. New York, NY: McGraw-Hill, 1994:49-59.
9. Tayback M, Kumanyika S, Chee E. Body weight as a risk factor in the elderly. *Arch Intern Med* 1990; 150:1065-72.
10. Ryan C, Bryant E, Eleazer P, et al. Unintentional weight loss in long-term care: predictor of mortality in the elderly. *South Med J* 1995; 88:721-4.
11. Marton KI, Sox HC Jr, Krupp JR. Involuntary weight loss: diagnostic and prognostic significance. *Ann Intern Med* 1981; 95:568-74.
12. Rabinovitz M, Pitlik SD, Leifer M, et al. Unintentional weight loss. A retrospective analysis of 154 cases. *Arch Intern Med* 1986; 146:186-7.
13. Thompson MP, Morris LK. Unexplained weight loss in the ambulatory elderly. *J Am Geriatr Soc* 1991; 39:497-500.
14. Morley JE. Anorexia in older patients: its meaning and management. *Geriatrics* 1990; 45:59-62, 65-6.
15. Miller DK, Morley JE, Rubenstein LZ, Pietruszka FM. Abnormal eating attitudes and body image in older undernourished individuals. *J Am Geriatr Soc* 1991; 39:462-6.
16. Montgomery RD, Haboubi NY, Mike NH, et al. Causes of malabsorption in the elderly. *Age Ageing* 1986; 15:235-40.
17. Barrett-Connor E, Edelstein SL, Corey-Bloom J, Wiederholt WC. Weight loss precedes dementia in community-dwelling older adults. *J Am Geriatr Soc* 1996; 44:1147-52.
18. Wang SY, Fukagawa N, Hossain M, Ooi WL. Longitudinal weight changes, length of survival, and energy requirements of long term care residents with dementia. *J Am Geriatr Soc* 1997; 45:1189-95.
19. Berlin RM. Psychiatric consultation for elderly patients who refuse to eat [letter]. *Am J Psychiatry* 1990; 147:812.
20. Brymer C, Winograd CH. Fluoxetine in elderly patients: is there cause for concern? *J Am Geriatr Soc* 1992; 40:902-5.
21. Carr-Lopez SM, Phillips SK. The role of medications in geriatric failure to thrive. *Drugs Aging* 1996; 9:221-5.
22. Schiffman SS. Taste and smell losses in normal aging and disease. *JAMA* 1997; 278:1357-62.
23. Buckler DA, Kelber ST, Goodwin JS. The use of dietary restrictions in malnourished nursing home patients. *J Am Geriatr Soc* 1994; 42:1100-2.
24. Morley JE, Silver AJ. Nutritional issues in nursing home care. *Ann Intern Med* 1995; 123:850-9.
25. Lisssoos TW, Hanan IM, Blackstone MO. Anorexia and weight loss as the solitary symptoms of choledocholithiasis. *South Med J* 1993; 86:239-41.
26. Sullivan DH, Martin W, Flaxman N, Hagen JE. Oral health problems and involuntary weight loss in a population of frail elderly. *J Am Geriatr Soc* 1993; 41:725-31.
27. Hoffman N. Diet in the elderly. Needs and risks. *Med Clin North Am* 1993; 77:745-56.
28. Castell DO. Eating and swallowing disorders. In: Hazzard WR, Bierman EL, Blass JP, et al, eds. Principles of geriatric medicine and gerontology. 3rd ed. New York, NY: McGraw-Hill, 1994:1259-65.
29. Trivalle C, Doucet J, Chassagne P, et al. Differences in the signs and symptoms of hyperthyroidism in older and younger patients. *J Am Geriatr Soc* 1996; 44:50-3.
30. McEvoy A, Dutton J, James OF. Bacterial contamination of the small intestine is an important cause of occult malabsorption in the elderly. *BMJ* 1983; 287:789-93.
31. Holt PR. Diarrhea and malabsorption in the elderly. *Gastroenterol Clin North Am* 1990; 19:345-59.
32. King CE, Toskes PP. Comparison of the 1-gram ¹⁴C-xylose, 10-gram lactulose-H₂, and 80-gram glucose-H₂ breath tests in patients with small intestine bacterial overgrowth. *Gastroenterology* 1986; 91:1447-51.
33. Donald IP, Kitchingman G, Donald F, Kupfer RM. The diagnosis of small bowel bacterial overgrowth in elderly patients. *J Am Geriatr Soc* 1992; 40:692-6.
34. King D, Smith ML, Chapman TJ, et al. Fat malabsorption in elderly patients with cardiac cachexia. *Age Ageing* 1996; 25:144-9.
35. Davis MA, Murphy SP, Neuhaus JM, Lein D. Living arrangements and dietary quality of older US adults. *J Am Diet Assoc* 1990; 90:1667-72.
36. Natick M. Long term care facility Resident Assessment Instrument (RAI) manual. Eliot Press, 1995.
37. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state." A practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res* 1975; 12:189-98.
38. Yesavage JA, Brink TL, Rose TL, et al. Development and validation of a geriatric depression screening scale: a preliminary report. *J Psychiatr Res* 1982; 17:37-49.
39. Katz S, Downs TD, Cash HR, Grotz RC. Progress in development of the index of ADL. *Gerontologist* 1970; 10:20-30.
40. Lawton MP, Brody EM. Assessment of older people: self-maintaining and instrumental activities of daily living. *Gerontologist* 1969; 9:179-86.
41. Fleming KC, Evans JM, Weber DC, Chutka DS. Practical functional assessment of elderly persons: a primary-care approach. *Mayo Clin Proc* 1995; 70:890-910.
42. Applegate WB, Blass JP, Williams TF. Instruments for the functional assessment of older patients. *N Engl J Med* 1990; 322:1207-14.
43. Lachs MS, Feinstein AR, Cooney LM Jr, et al. A simple procedure for general screening for functional disability in elderly patients. *Ann Intern Med* 1990; 112:699-706.
44. Wise GR, Craig D. Evaluation of involuntary weight loss. Where do you start? *Postgrad Med* 1994; 95:143-6, 149-50.
45. Prudic J, Haskett RF, Mulsant B, et al. Resistance to antidepressant medications and short-term clinical response to ECT. *Am J Psychiatry* 1996; 153:985-92.
46. Toskes PP. Bacterial overgrowth of the gastrointestinal tract. *Adv Intern Med* 1993; 38:387-407.
47. DePippo KL, Holas MA, Reding MJ, et al. Dysphagia therapy following stroke: a controlled trial. *Neurology* 1994; 44:1655-60.
48. Bushmann M, Dobbmeyer SM, Leeker L, Perlmutter JS. Swallowing abnormalities and their response to treatment in Parkinson's disease. *Neurology* 1989; 39:1309-14.
49. McWhirter JP, Pennington CR. Incidence and recognition of malnutrition in hospital. *BMJ* 1994; 308:945-8.
50. Manson A, Shea S. Malnutrition in elderly ambulatory medical patients. *Am J Public Health* 1991; 81:1195-7.
51. Chandra RK. Effect of vitamin and trace-element supplementation on immune responses and infection in elderly subjects. *Lancet* 1992; 340:1124-7.
52. Herrmann FR, Safran C, Levkoff SE, Minaker KL. Serum albumin level on admission as a predictor of death, length of stay, and readmission. *Arch Intern Med* 1992; 152:125-30.
53. Sullivan DH, Walls RC, Lipschitz DA. Protein-energy undernutrition and the risk of mortality within 1 y of hospital discharge in a select population of geriatric rehabilitation patients. *Am J Clin Nutr* 1991; 53:599-605.
54. Detsky AS, Smalley PS, Chang J. Is this patient malnourished? *JAMA* 1994; 271:54-8.
55. Schiffman SS, Warwick ZS. Flavor enhancement of foods for the elderly can reverse anorexia. *Neurobiol Aging* 1988; 9:24-6.
56. Winograd CH, Brown EM. Aggressive oral refeeding in hospitalized patients. *Am J Clin Nutr* 1990; 52:967-8.
57. Likpin EW. Enteral/parenteral alimentation. In: Hazzard WR, Bierman EL, Blass JP, et al, eds. Principles of geriatric medicine and gerontology. 3rd ed. New York, NY: McGraw-Hill, 1994:333-42.
58. Delmi M, Rapin CH, Bengoa JM, et al. Dietary supplementation in elderly patients with fractured neck of the femur. *Lancet* 1990; 335:1013-6.
59. Breslow RA, Hallfrisch J, Guy DG, et al. The importance of dietary protein in healing pressure ulcers. *J Am Geriatr Soc* 1993; 41:357-62.
60. Bastow MD, Rawlings J, Allison SP. Benefits of supplementary tube feeding after fractured neck of femur: a randomised controlled trial. *BMJ* 1983; 287:1589-92.