



Unintentional weight loss is a common problem among community-dwelling older adults. Although a slight decline in body weight is considered a normal part of the aging process, clinically significant weight loss (>5% of usual body weight) has harmful consequences on functional status and quality of life, and is associated with excess mortality over a three- to twelve-month period. A variety of physical and psychological conditions, along with age-related changes, can lead to weight loss. In up to one-quarter of patients, there is no identifiable cause. A rational approach to clinical investigation of these patients can facilitate arriving at a diagnosis and minimize unnecessary diagnostic procedures.

Key words: weight loss, older adults, mortality, epidemiology, diagnosis

An Approach to the Diagnosis of Unintentional Weight Loss in Older Adults, Part One: Prevalence Rates and Screening

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Introduction

Unintentional weight loss is described as an involuntary decrease in body weight over time. Although a slight decline in body weight is considered a normal part of aging, clinically significant weight loss (frequently defined as >5% of usual body weight over six to twelve months¹) is a common finding among community-dwelling older adults. Among older adults who receive homecare services, unintentional weight loss is encountered in up to 27% of frail people 65 years of age or older.² Fundamentally, weight loss occurs as a result of inadequate caloric intake given the energy needs of the individual. Among older adults, the causes of weight loss appear to be quite heterogeneous and depend largely on the presence of underlying health problems, poor nutritional status, or both. Weight loss may occur in isolation but is often a symptom of one or more diagnosed or undiagnosed illnesses. Epidemiological studies have consistently found that weight loss in older adults is associated with increased mortality, which can

range from 9% to 38% within 1 to 2.5 years after the weight loss occurred.³⁻⁵ High-risk populations, such as frail older adults,⁶ individuals with low initial body weights,⁶⁻⁸ individuals who have Alzheimer's disease⁹ and older adults recently admitted to hospital, are particularly susceptible to increased mortality.^{10,11} Weight loss is also associated with an increased risk of in-hospital complications,^{12,13} a decline in activities of daily living or physical function,^{14,15} higher rates of admission to an institution^{2,10} and poor quality of life.¹⁶

This article is the first installment of a two-part clinical review of unintentional weight loss in older adults. In this article, the prevalence of weight loss in community-dwelling older adults and the impact of weight loss on morbidity and mortality are reviewed. Screening tools that identify individuals at high risk of malnutrition are also reviewed and several diagnostic aids that may help clinicians distinguish among the different causes of weight loss are highlighted. Portions of this article are reviewed in greater detail elsewhere.¹⁷

The Prevalence of Weight Loss in Community-Dwelling Older People

There is a large body of epidemiological literature examining the prevalence of weight loss in the adult population in general^{18–27} and among older adults (generally defined as 65 years of age or older) in particular.^{7,24,26,28–30} Several important conclusions can be made from these studies. Most adults age 65 or older experience little change in weight, on average, over a period of five to ten years. For example, in Canadian,³¹ European,³² and American¹⁵ prospective studies of community-dwelling older adults, little to no change in group mean body weight or weight change was observed over a three- to five-year period, suggesting reasonably stable body weights in most study participants. However, there was significant heterogeneity in body weight status over time, and a nonnegligible proportion of study participants experienced clinically significant weight loss. The European study reported that 16% of men and 16% of women lost at least 5 kg, whereas 9% of men and 10% of women gained at least 5 kg.³² The American study reported that 16.2% of men and 18.7% of women lost at least 5% of their weight over three years, while 11.1% of men and 15.9% of women gained at least 5% of their weight over three years.¹⁵ Similar results have been demonstrated in other longitudinal studies of older adults.^{28–30,33,34}

These studies also highlight factors associated with weight loss. Among older adults, increasing age, disability, coexisting medical illnesses, prior hospitalization, low income and/or educational attainment, presence of cognitive impairment, low levels of physical activity, smoking, heavy drinking, low body weight, prior unintentional weight loss, and medically or self-prescribed dieting were associated with a higher likelihood of weight loss in various studies.^{28–30,33–36}

Among individuals seeking health care, the incidence of unintentional weight loss is typically lower than the results of longitudinal studies would

suggest. In one study of adults seen in an internal medicine clinic, approximately 8% of 1,200 consecutive patients reported having unintentionally lost at least 2.3 kg (5 lbs) within the last six months.⁴ In three studies of hospitalized adults using slightly different definitions of weight loss, incidence rates varied from 1.3% to 3%.^{3,5,37} In the only study examining rapid and severe weight loss among older adults (age 63 or older), 45 of approximately 10,000 patients (0.45%) had lost at least 7.5% of their baseline body weight within six months and did not have a definitive cause of weight loss recorded at initial presentation.³⁸ These incidence data, in the 1–3% range, contrast sharply with figures from other settings. For example, in a study of community-dwelling older men, the annual incidence of at least a 5% decline in weight was 7.8%.³⁹ In free-living frail older adults receiving community services (n=290), the prevalence of reported unintentional weight loss of more than 5 kg in the previous 12 months was 27%.² This suggests significant differences in the population of older adults with weight loss who come to the attention of health care professionals, with greater vulnerability apparent in those who are already frail (see below).

Weight Loss and the Associated Risks

Given that weight loss is reasonably common among older adults, when does weight loss become a clinically significant condition that requires intervention by health care professionals? The clinical importance of unintentional weight loss can be demonstrated by its association with increased mortality risk, need for increased health care, and adverse consequences on physical function and quality of life. Prospective studies report that weight loss of 4–5% or more of body weight within one year, or 10% or more over five to ten years or longer, is associated with increased mortality or morbidity or both.^{7,28,36,39,40} This association has also been seen in numerous epidemiologic and clinical studies that adjusted for age, gender, comorbidities, disability,

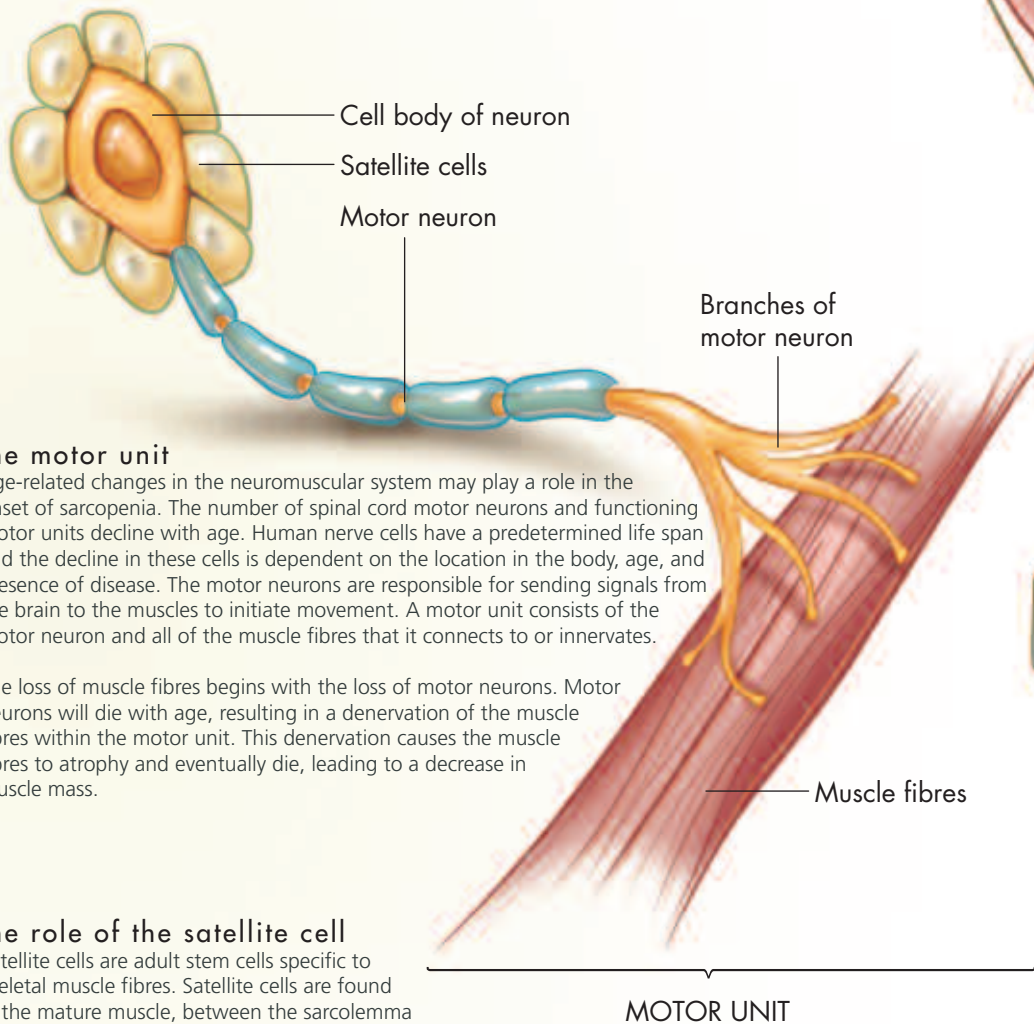
smoking, alcohol use, or level of physical activity and that excluded deaths within the first few years of weight loss to account for undiagnosed illness. In addition, recent weight loss has been associated with increased in-hospital mortality and one-year mortality in several groups of older adults admitted to hospital.^{10,11,13,41} Among surgical patients 60 years of age or older undergoing a variety of surgical procedures, weight loss of at least 10 lbs within six months prior to surgery was associated with an 11-fold increased mortality risk.¹² Weight loss has also been associated with an increased risk of in-hospital complications,¹³ decline in activities of daily living or physical function,^{14,15,42} increased likelihood of institutionalization² and poor quality of life.¹⁶ Adverse effects of weight loss are particularly significant among individuals with low body weight.^{7,16,19,22,23,25,26,40,43–45} In frail older populations, even a small degree of weight loss (e.g., 1 kg,⁴⁶ or 3% of body weight⁴²) may be significant. Evidence that weight loss per se, irrespective of its origins, is harmful comes from studies demonstrating that even voluntary weight loss among older adults is associated with increased risk of death and of hip fracture, which highlights the importance of maintaining weight with age.⁴⁷

A number of mechanisms have been suggested to explain the association between weight loss and various adverse outcomes. Weight loss exacerbates loss of fat-free mass, known as sarcopenia (Figure 1), associated with aging,⁴⁸ leading to decreased functional capacities^{49,50} and increased probability of mobility disability and osteoporotic fractures.⁵¹ Many older patients with unintentional weight loss experience concomitant malnutrition^{52–54} and thereby have cachexia.⁵⁵ Cachexia is associated with a disproportionate loss of skeletal muscle rather than body fat, even in the absence of weight loss and is generally defined as a profound and marked state of constitutional disorder, general ill health, and malnutrition. A decline of 10% of skeletal muscle mass may be associated with a decline in physical function (e.g.,

Figure 1:
Physiology of Sarcopenia

sarcopenia

Sarcopenia is the age-related loss of muscle mass, strength, and function. It may also accompany diet-induced weight loss. With aging and inactivity, the most atrophy is seen in the fast-twitch fibres that are recruited during high-intensity, anaerobic movements. Although sarcopenia is mostly seen in physically inactive individuals, it is also evident in individuals who remain physically active throughout their lives.



the motor unit

Age-related changes in the neuromuscular system may play a role in the onset of sarcopenia. The number of spinal cord motor neurons and functioning motor units decline with age. Human nerve cells have a predetermined life span and the decline in these cells is dependent on the location in the body, age, and presence of disease. The motor neurons are responsible for sending signals from the brain to the muscles to initiate movement. A motor unit consists of the motor neuron and all of the muscle fibres that it connects to or innervates.

The loss of muscle fibres begins with the loss of motor neurons. Motor neurons will die with age, resulting in a denervation of the muscle fibres within the motor unit. This denervation causes the muscle fibres to atrophy and eventually die, leading to a decrease in muscle mass.

the role of the satellite cell

Satellite cells are adult stem cells specific to skeletal muscle fibres. Satellite cells are found in the mature muscle, between the sarcolemma and basement membrane of the muscle fibres. These cells are involved in the normal growth of muscle, as well as regeneration following injury or disease. They are able to proliferate in response to injury and give rise to regenerated muscle and to more satellite cells.

The biological mechanism of sarcopenia appears to be in the decreased ability of satellite cells to propagate themselves. Satellite cells are required to fuse into skeletal muscle fibres, and help in settings where repair and regeneration are required. Therefore aging muscle loses its ability to respond to anabolic stimuli.

Diagnosis of Unintentional Weight Loss

decreased exercise tolerance or difficulty performing activities of daily living).⁵⁶ In addition, cachexia is associated with a systemic inflammatory response, elevated cytokine levels, and compromised immunity, all of which are thought to contribute to adverse outcomes, including early death.^{57,58}

Approach to Diagnosis of Clinically Significant Weight Loss

In general, causes of weight loss among older adults can be classified as organic (e.g., neoplastic, nonneoplastic, and age-related changes), psychological (e.g., depression, dementia, anxiety disorders) or nonmedical (e.g., socioeconomic conditions) (Table 1). Up to one-quarter of all cases have no identifiable cause, despite extensive investigation. People with no known cause of weight loss generally have a better prognosis than people with known causes, particularly when the cause is neoplastic.

Often a combination of factors,

rather than a single cause, will lead to weight loss in older adults, particularly frail individuals 75 years or older. Studies suggest that when a definitive diagnosis can be established, the most common causes of unintentional weight loss include depression, gastrointestinal illnesses (e.g., peptic ulcers or motility disorders), and cancer.¹ Many factors contributing to weight loss are not associated with traditional medical diseases (see “Meals on Wheels” sidebar), while other factors may be related to age-associated physiologic changes, collectively known as the “anorexia of aging.” The importance of medications in contributing to weight loss cannot be overstated. Many older adults take medications, mostly for chronic conditions, which may have a variety of side effects that hinder their desire and/or ability to eat (Table 2).

In clinical practice, it is important to establish first the presence of weight loss. A significant proportion of older adults with documented weight loss may not complain about losing weight or, less

commonly, may mistakenly attribute weight loss to successful diet or lifestyle modifications. Furthermore, disturbed eating behaviours and negative body image (e.g., anorexia nervosa) among some older individuals may lead them to regard weight loss as desirable and therefore not worth reporting. Conversely, up to half of people who claim to have lost weight have no documented evidence of weight loss.⁴ If it is not possible to measure weight directly, true weight loss can be qualitatively established by a change in clothing size, corroboration of weight loss by a relative or friend, or a numerical estimate of weight loss provided by the patient. A careful medical history

Table 1: Common Causes of Unintentional Weight Loss in Older Adults

Cause	Range of occurrence (%)
Malignant disease	16–36
Psychiatric disorder (especially depression)	9–42
Gastrointestinal disease	6–19
Endocrine disorder (especially hyperthyroidism)	4–11
Cardiovascular disease	2–9
Nutritional disorders or alcoholism	4–8
Respiratory disease	~6
Neurologic disorder	2–7
Chronic infection	2–5
Renal disease	~4
Connective tissue disease	2–4
Drug-induced weight loss (medication side effect)	~2
Unknown	10–36

Source: Alibhai SMH et al., 2005.¹⁷ Reprinted with permission of the publisher. © 2005 Canadian Medical Association

“Meals on Wheels”: A Mnemonic for Common Treatable Causes of Unintentional Weight Loss in Older Adults

M	Medication effects
E	Emotional problems, especially depression
A	Anorexia nervosa (nervosa), alcoholism
L	Late-life paranoia
S	Swallowing disorders
O	Oral factors (e.g., poorly fitting dentures, caries)
N	No money
W	Wandering and other dementia-related behaviours
H	Hyperthyroidism, hypothyroidism, hyperparathyroidism, hypoadrenalism
E	Enteric problems (e.g., malabsorption)
E	Eating problems (e.g., inability to feed self)
L	Low-salt, low-cholesterol diets
S	Social problems (e.g., isolation, inability to obtain preferred foods)

Source: Morley JE et al, 1995.⁶⁸ Reprinted by permission of Annals of Internal Medicine.

may elicit localizing symptoms (e.g., changes in defecation frequently imply involvement of the gastrointestinal tract) that may guide further investigations in almost half of patients.^{3,59} All older adults experiencing unintentional weight loss should undergo screening using common assessment tools for dementia (e.g., the Mini-Mental State Examination)⁶⁰ and depression (e.g., the Geriatric Depression Scale).⁶¹ Specific features on physical examination, such as cachexia, lymphadenopathy, or palpable masses, may suggest a physical cause of weight loss (e.g., malignant disease).^{3,4} The diagnostic utility of the medical history and physical examination in identifying the cause of weight loss, however, has not been adequately evaluated.

Although few studies have systematically evaluated the utility of screening methods for weight loss, the most useful noninvasive procedures appear to include a complete blood count, tests of liver enzyme levels (including alkaline phosphatase and bilirubin), measurement of lactate dehydrogenase level, and

chest radiography. Individuals with iron-deficiency anemia or symptoms likely originating in the gastrointestinal tract, and individuals with elevated liver enzyme levels on initial screening, should undergo investigation of their gastrointestinal tract (either endoscopy or upper gastrointestinal series) or an abdominal ultrasound, respectively.

Three scoring systems have been developed to help clinicians identify which patient with weight loss is likely to have a physical^{3,4} or malignant⁶² cause as opposed to a psychological or unknown cause. None of these scoring systems has been validated in independent populations presenting with weight loss. As such, none can be recommended presently for routine clinical use.

When weight loss is apparent in an older individual with no evidence of an organic disorder, primary malnutrition (i.e., resulting from inadequate food intake) must be considered as a contributor. In general, older adults are at increased risk of malnutrition due to insufficient food intake (quantity) rather

than inappropriate food selection (quality). Two screening tools, ENS (www.dietitians.ca/seniors/content/other/clsc_overview.asp) and SCREEN (www.dietitians.ca/seniors/index.asp), have been developed and validated in Canada to identify community-dwelling older adults who are at risk of malnutrition. The Mini Nutritional Assessment (www.mna-elderly.com) and the Nutrition Screening Initiative (www.aafp.org/x16081.xml) are two other assessment tools designed for nutritional assessment of older adults. All four of these assessments are freely available online. While the Canadian-developed screening tools are questionnaire-based, the other assessment tools are of varying complexity and attempt to identify multiple factors associated with nutritional status. Under investigation are even simpler tools, such as the short, appetite-specific questionnaire the Simplified Nutritional Appetite Questionnaire (SNAQ), which appears to reliably predict weight loss in older, community-dwelling individuals.⁶³ The

Table 2: Side Effects of Drugs and Supplements that Can Contribute to Weight Loss

Side effect	Drug or supplement
Anorexia	Amantadine, amphetamines, antibiotics (e.g., atovaquone), anticonvulsants, benzodiazepines, decongestants, digoxin, gold, levodopa, metformin, neuroleptics, nicotine, opiates, SSRIs, theophylline
Dry mouth	Anticholinergics, antihistamines, clonidine, loop diuretics
Dysgeusia or dysosmia or both	Acetazolamide, alcohol, allopurinol, amphetamines, ACE inhibitors, antibiotics (e.g., atovaquone, ciprofloxacin, clarithromycin, doxycycline, ethambutol, griseofulvin, metronidazole, ofloxacin, pentamidine, rifabutin, tetracycline), anticholinergics, antihistamines, calcium-channel blockers, carbamazepine, chemotherapeutic agents, chloral hydrate, cocaine, etidronate, gold, hydralazine, hydrochlorothiazide, iron, levodopa, lithium, methimazole, metformin, nasal vasoconstrictors, nitroglycerin, opiates, penicillamine, pergolide, phenytoin, propranolol, selegiline, sodium cromoglycate, spironolactone, statins, terbinafine, tobacco products, triazolam, tricyclics
Dysphagia	Antibiotics (e.g., doxycycline), anticholinergics, bisphosphonates, chemotherapeutic agents, corticosteroids, gold, iron, levodopa, NSAIDs, potassium, quinidine, theophylline
Nausea or vomiting or both	Amantadine, antibiotics, bisphosphonates, digoxin, dopamine agonists, hormone replacement therapy, iron, levodopa, metformin, metronidazole, nitroglycerin, opiates, phenytoin, potassium, SSRIs, statins, theophylline, tricyclics

Note: SSRI = serotonin-specific reuptake inhibitor, ACE = angiotensin-converting enzyme, NSAID = nonsteroidal anti-inflammatory drug.

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Key Points

Clinically significant weight loss (frequently defined as $\geq 5\%$ of usual body weight over six to twelve months) is a common finding among community-dwelling older adults.

Among older adults, the causes of weight loss appear to be quite heterogeneous and depend largely on the presence of underlying health problems, poor nutritional status, or both.

Weight loss in older adults is associated with increased mortality, an increased risk of in-hospital complications, a decline in activities of daily living or physical function, higher rates of admission to an institution, and poor quality of life.

Common causes of weight loss include cancer, benign gastrointestinal illness, depression, and a variety of other medical conditions. However, up to one-quarter of all cases have no identifiable cause, despite extensive investigation.


Contributing factors to weight loss include disease and age-associated physiologic changes; another important source are medications, which may have a variety of side effects that hinder many older adults' desire and/or ability to eat.

All older adults experiencing unintentional weight loss should undergo screening, using common assessment tools, for dementia and depression.

Routine nutritional screening is an effective way to identify those at nutritional risk and may aid in timely intervention, which has the potential to prevent higher health care costs associated with malnutrition-related morbidity.

routine use of nutritional screening, especially with those tools that are solely questionnaire-based and can be completed by the patient, such as the SCREEN and SNAQ, or by field clinical staff, such as ENS, provides an effective way to identify those at nutritional risk and may aid in timely nutritional intervention. Early nutrition intervention has the potential to prevent higher health care costs associated with malnutrition-related morbidity.

Conclusion

Unintentional weight loss is common in older adults and is associated with significant adverse health outcomes, increased mortality and progressive disability. The differential diagnosis is broad, ranging from reduced food intake to organic causes to psychological disorders, such as dementia and depression. Medications may also contribute to weight loss, as may social or economic factors. In up to one in four older adults with unintentional weight loss, there will be no obvious medical cause. In others, a limited set of initial symptom-oriented investigations may reveal the underlying causes. In part two of this review, nonpharmacological and pharmacological strategies to counter unintentional weight loss among older adults in clinical practice will be discussed. 

No competing financial interests declared for all authors.

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