# Weight Loss in Nursing Home Patients: Prognostic Implications

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*Weight loss is commonly used as a screening tool to assess quality of care and nutritional status in the nursing home setting. To evaluate the prognostic value of weight loss, the charts of 199 nursing home patients (414 nursing home patient years; mean age 87 years) were reviewed over a 3-year period. Weights recorded at nursing home admission and during the study period were compared with weights at the time of acute care hospitalization, transfer between levels of nursing home care, change in level of functional status, and death. There were no significant changes in weight before acute care hospitalizations, although patients who died lost an average of 10% of their body weight from the time of nursing home admission ($P < .001$). In addition, weight loss was associated with decreased functional ability and transfer to a higher level of nursing home care. Despite the association of weight loss with subsequent morbidity and mortality, moderate weight loss of up to 20% was a poor predictor of mortality. Although weight loss is routinely used as a screening tool in the nursing home setting, it is not a sensitive marker for underlying disease. The efficacy of active intervention in nursing home patients who lose weight requires further study.*
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Despite the ever-increasing number of nursing home residents and the complexities of their medical care, little attention has been directed to medical practices in the chronic care setting, particularly in relationship to health maintenance and disease prevention. Unfortunately, much of the screening that does take place in nursing homes is not based on empirical evidence or even reasonable physician judgment.[1–3] For example, weight change, or more specifically weight loss, is at times employed by nursing home staff, dieticians, and government regulating agencies as a screening tool to assess quality of patient care and nutritional status. Although weight loss has the advantages of easy assessability, consistent monitoring, and low cost, its prognostic implications in the nursing home setting have yet to be determined. Weight loss in the nursing home is clearly multifactorial, reflecting a unique interplay between disease and behavioral changes that may not necessarily indicate systemic illness in need of treatment.[4–11] Furthermore, until the risks and benefits of intervention and investigation of the causes of weight loss in nursing home patients are clear, caution should be exercised in using weight loss as a screening tool.

In view of the need to define more clearly the value of screening for weight loss in the nursing home, this study examined the relationship between weight change and morbidity (ie, functional decline and hospitalization) and mortality in a group of nursing home residents over a 3-year period. The purpose was not to examine nutritional status as such in nursing home residents, but rather to clarify the prognostic implications of one of the most commonly used markers for nutritional status and patient well-being. To this end, a predictive value analysis was employed. If weight loss is in fact a valuable screening test, it should demonstrate high test sensitivity (ie, the ability to detect disease when truly present). If, however, high test sensitivity cannot be demonstrated, the use of weight loss for screening purposes needs to be reexamined carefully.

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## METHODS

A retrospective analysis was performed on all residents of a 166-bed nonproprietary nursing home (Rosa Coplon Jewish Home and Infirmary, Buffalo, NY), consisting of 55 intermediate care and 111 skilled nursing beds. The records of all patients in residence from May 1, 1982, until April 30, 1985, were reviewed.

During the study period, patients were routinely weighed each month, and functional status and overall care requirements were assessed by means of a Department of Medical Sciences (DMS-1) score.[12] The DMS-1 score quantitated nursing care requirements, functional ability, and mental status, and was in widespread use by the New York State Health Department as a tool to evaluate patients for long-term care placement in the 1980s. A higher score indicated more disability and dependency, with 180 points necessary for admission to a skilled nursing facility and 60 points needed for intermediate care placement. Increasing functional dependence requires more labor for nursing home personnel and implies a decreased quality of life for residents.

Nursing home charts were reviewed, and the following data were extracted: age at entrance into study, admission date and weight, medical diagnoses, monthly weights during the study period, hospitalization dates and diagnoses, transfers to different levels of nursing home care, dates and causes of death, and DMS-1 scores at admission and throughout the study period. Medications that might potentially alter patient weights such as diuretics or steroids were also noted. Meals, although kosher, did not vary in nutritional content from the typical nursing home diet.

The relationship between change in weight and subsequent morbidity or mortality was analyzed by paired *t* tests and chi-square tests of significance with the alpha level set at 0.05. Predictive value analysis was performed according to the methods of Galen and Gambino.[13] Data were evaluated at the time of admission to the nursing home and throughout the study period. Morbidity endpoints included hospitalization, transfer to a higher level of nursing home care, and increase in functional dependence, defined as an increase of the DMS-1 score by 20% or greater. Weight change was calculated from weight at nursing home admission to weight at 6-month intervals, at morbidity endpoints, and at death. Differences in weight were measured by changes in mean weight or body mass index (weight/height$^2$),[14–16] and by percentages of weight change (weight at specific time/weight at nursing home admission).

**TABLE 1. CLINICAL OUTCOMES OF THE STUDY POPULATION (N = 199)**

| Clinical Outcome of Subjects | No. (%) |
|---|---|
| Hospitalized | 99 (49.7)* |
| Transferred to higher level of care | 38 (19.1)* |
| Died | 91 (45.7) |

**These numbers reflect the first hospitalization or transfer during the study period for each patient.*

## RESULTS

Over a total of 414 patient years, 199 patients (56 men and 143 women) with a mean age of 87 years (SD = 6.6 years) were studied. The mean height was 61.5 in (1.53 m; SD = 3.3 in), and the mean weight was 123.13 lb (56 kg; SD = 24.8 lb). There was an average of 4.8 medical diagnoses per patient, with cardiac disease (n = 89, 45%) and dementia (n = 82, 41%) the most common diagnoses. Thirty-two patients (16%) had a history of cancer. Morbidity and mortality, as seen in Table 1, were substantial. Subjects resided in the nursing home an average of 4.75 years (57 months) and were followed for an average of 2.08 years (25 months) during the study period.

The mean weights, body mass indices, and DMS-1 scores are displayed in Table 2. When compared with weights at nursing home admission, the 108 subjects who survived throughout the study period experienced a mean weight loss of 0.4%. Twenty-five percent (27/108) of these patients lost more than 10% of their weight, whereas 23% (25/108) gained more than 10% of their weight. There was no significant change in body mass index during the study period, nor was there any relationship between body mass index and clinical outcome. Of the 32 patients with the diagnosis of cancer, 19 (59%) lost weight.

### The Association of Weight Change and Clinical Outcome

Functional status generally declined for those who survived throughout the study. The average DMS-1 score increased by 148% for these individuals, indicating decreased functional ability. Sixty-three percent of those who were alive at the end of the study had a greater than 20% increase in their DMS-1 scores compared with scores at admission. There was a significant association between functional decline (measured by an increase in DMS-1 score of greater than 20%) and weight loss of more than 10% ($\chi^2[1] = 8.2$, $P < .005$). No association was found between weight loss and hospitalization. The mean weight increased by 0.9% ($P = .68$, $t = 0.4$) from admission to the nursing home until the first hospitalization during the study period.

During the study period 47 patients (24%) changed to a

TABLE 2. CHANGES IN MEAN WEIGHT, BODY MASS INDEX (BMI), AND FUNCTIONAL STATUS (BY DMS-1 SCORE)*

| | Mean Weight† lb (kg) | BMI‡ (kg/m²) | DMS-1 Score | Number of Patients |
|---|---|---|---|---|
| Admission | 125 (57) | 23.18 | 240 | 199 |
| Start of study (5/82) | 123 (56) | 22.87 | 338 | |
| First hospitalization | | | | |
| Before | 127 (58) | 23.48 | 338 | 99 |
| After | 121 (55) | 22.54 | 383 | |
| Second hospitalization | | | | |
| Before | 123 (56) | 22.95 | 301 | 38 |
| After | 119 (54) | 22.13 | 426 | |
| Transfer to higher care | | | | |
| First transfer | 124 (56) | 22.96 | 299 | 38 |
| End of study (4/85) | 122 (55) | 23.34 | 317 | 166 |
| Death | 111 (50) | 20.26 | | 91 |

*See text under Methods for explanation of DMS-1 Score.
†Weight range at admission was 75–205 lb (34–93 kg); SD = 25 lb (11 kg).
‡BMI range, 13–46; SD = 4.

different level of care within the nursing home; 38 (81%) of these patients transferred to a higher level of care. Subjects transferred to a higher level of care experienced significant weight loss, averaging 5 lb (2 kg; $t = 2.0$, $P < .05$) from time of nursing home admission to transfer. No significant weight change occurred between subsequent transfers. Those residents with a 10% or greater weight loss were no more likely to be transferred than residents without weight loss.

The mean age at death was 88 years. Ninety-one of 199 subjects (45.7%) died during the study period. Eight (9%) died at home, 59 (65%) in the hospital, and 24 (26%) in the nursing home. Death was related to weight loss since admission ($t$ [89] = 6.5, $P < .001$), with an average weight loss of 11.5 lb (5.2 kg). Of those subjects who died, 40 (44%) lost more than 10% of their body weight. Sixty percent of patients with a 10% or greater weight loss died compared with 42% of those patients without such a weight loss. These results remained the same even when accounting for weight loss secondary to medications (ie, diuretics) and for patients with a diagnosis of cancer.

The sensitivity, specificity, and positive predictive value of different percentages of weight loss as predictors of mortality are displayed in Table 3. At no time does sensitivity reach 45%, although specificity (the proportion of subjects who lived and did not lose weight) increases to 99% with higher percentages of weight loss. The positive predictive value of weight loss (the proportion of those with weight loss who died) exceeds 70% only when a weight loss of 30% is achieved.

TABLE 3. SENSITIVITY, SPECIFICITY, AND POSITIVE PREDICTIVE VALUE OF WEIGHT LOSS FOR MORTALITY

| Percent Weight Loss | Sensitivity | Specificity | Positive Predictive Value |
|---|---|---|---|
| 10 | .43 | .72 | .59 |
| 15 | .31 | .83 | .62 |
| 20 | .21 | .92 | .70 |
| 30 | .80 | .99 | .89 |

## DISCUSSION

Unintentional weight loss, often considered a manifestation of underlying systemic illness, may be a prelude to extensive medical evaluation.[17,18] The present study, however, raises a cautionary note regarding the intensive and potentially costly investigation of weight loss in nursing home patients (eg, gastrointestinal radiography, endoscopy, enteral feeding). In this study, unless weight loss is severe (ie, >30% from time of nursing home admission), it does not appear to be an accurate predictor of death, subsequent hospitalization, or decline in functional status and level of care. Although previous studies have suggested that weight loss does in fact presage death in nursing home residents, none of these studies adjusted for medication use or determined the predictive value of weight loss in the nursing home setting.[19,20]

The lack of a strong association between weight loss and subsequent morbidity and mortality is understandable if one considers the multifactorial nature of weight change in the institutional setting. In addition to functional disability (40% need assistance with feeding[21]), nursing home residents manifest a wide range of age-related impairments that could well have an impact on overall nutrition.[4] Changes in dentition, gastrointestinal motility, absorption, taste, and vision may all contribute to a decline in both the

intake and assimilation of nutrients.[5–8] Chronic disease states, such as cardiovascular insufficiency, depression, hypothyroidism, and cancer, may all result in significant weight loss, as might the interaction between multiple medications commonly employed in the nursing home setting.[8–11] In addition to these factors, the social and physical environment of the chronic care institution may have a negative impact on food intake.

Weight gain exceeding 10% of admission weight was not uncommon in the present series, occurring in 23% of all surviving residents. Similar results have been reported in a Veterans Administration–based nursing home care unit.[20] Presumably weight gain in nursing home residents is multifactorial, much like weight loss, invariably reflecting excessive caloric intake relative to level of activity.

Certain problems with study design must be considered before these results can be generalized to other nursing home populations. Unfortunately, the various causes of weight change in the study population or the effects of either medical or psychological interventions on nutritional status were not addressed. In addition, since underlying medical diagnoses were dependent on chart review, other conditions having a potential impact on nutritional status may have been inadvertently omitted. Although the data were reanalyzed with respect to diuretics, steroids, and neoplastic disease, the complex relationship between multiple diseases and medications could not be accurately assessed. None of these factors, however, detracts from this analysis. Except for religious affiliation, this study population did not differ appreciably from the average nursing home resident in the United States. Furthermore, sensitivity and specificity, as calculated in the present series, are stable test properties and do not change when different proportions of diseased and well patients are tested. In the final analysis, although poor nutrition may be associated with adverse outcome, weight loss as such is not a sensitive marker for serious underlying disease in nursing home residents.

Future prospective studies of weight loss are needed to clarify the risks and benefits of nursing and medical interventions in the elderly nursing home patient. Although weight loss in the nursing home patient is a cause for concern, investigation and intervention must be considered against potential adverse effects on both quality and duration of life.

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