UNINTENDED WEIGHT LOSS IN THE ELDERLY LIVING AT HOME: THE AGED IN HOME CARE PROJECT (ADHOC)

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Abstract: *Objective:* To describe associations between unintended weight loss (UWL) and characteristics of nutritional status. *Design:* A comparative cross-sectional assessment study at 11 sites in Europe. The target population was a stratified random sample of 4,455 recipients of home care (405 in each random sample from 11 urban areas) aged 65 years and older. *Measurements:* the Resident Assessment Instrument for Home Care, version 2.0. Epidemiological and medical characteristics of clients and service utilisation were recorded in a standardized, comparative manner. UWL was defined as information of 5% or more weight loss in the last 30 days (or 10% or more in the last 180 days). *Results:* The final sample consisted of 4,010 persons; 74% were female. The mean ages were 80.9 ± 7.5 years (males) and 82.8 ± 7.3 years (females). No associations were found between single diagnoses and UWL, except for cancer. Cancer patients were excluded from further analyses. Persons with a Cognitive Performance Scale value (CPS) > 3 (impaired) had increased risk of UWL (OR = 2.0) compared with those scoring $\leq$ 3 (less impaired). Only in the oldest group did we find a significant association between UWL and reduction in ADL and IADL functions, comparing those who scored 3 or less with those who scored more than 3 (disabled). A binary logistic regression model explained 26% of UWL: less than one meal/day, reduced appetite, malnutrition, reduced social activity, experiencing a flare-up of a recurrent or chronic problem, and hospitalisation were important indicators. *Conclusion:* We recommend a regular comprehensive assessment in home care to identify clients with potential risk factors for weight loss and malnutrition, in particular those discharged from hospital, and those with physical dependency or cognitive problems. This study may provide incentives to create tailored preventive strategies.

Key words: Unintended weight loss, cross-sectional study, cross-national comparisons, malnutrition risk factors, aged, home-care population, interRai.

Introduction

Several studies document the elderly as being especially at risk for undernutrition (1-4). A risk assessment or nutrition screening performed in the home might identify those elderly who require more detailed evaluation (5). Wide ranges of risk factors associated with weight loss and/or undernutrition have been identified. Pirlich & Lochs (6) emphasised (a) medical diagnoses such as heart failure, stroke, cancer, Alzheimer´s, and Parkinson´s disease; (b) psychological factors: social deprivation and loneliness, depression, grief and reduced appetite; and (c) oral problems with chewing or swallowing, dry mouth, and dental problems.

Favourable outcomes were reported with good nutritional status. These included improved health, decreased dependence, and reduced time required to recuperate from illness. On the other hand, undernutrition may lead to severe consequences, including reduced self-care, comorbidity (7), infections (8, 9), hospitalisation, and longer stay after admission (10), in addition to increased mortality (11, 12). Poulsen (4) stated that simple questions and clinical examinations at admission to hospital could identify relevant risk factors for undernutrition.

Older individuals who receive home care services have already shown signs of frailty, inasmuch as they have declining functional capacity. To avoid unnecessary further loss of function, it is therefore of great clinical importance to find out whether manifest undernutrition or risk of undernutrition is prevalent in this population.

The aim of the study was to describe the clients aged $\geq$ 65 years with unintentional weight loss in home care, at 11 different sites in Europe. We asked the following questions: What is the prevalence of unintended weight loss (UWL) in the homecare population in 11 localities in different European countries? Which characteristics are related to UWL in older individuals? Which are the possible risk factors of UWL that the HC profession can be taught to identify at an early stage of undernutrition in a home-care setting?

Methods

Populations

The data are derived from a large European study with an overall study population of 4,010 persons aged 65 and over. The sample was collected from urban settings in 11 European countries, among clients who were already receiving home-care services at the start of the study. Criteria for inclusion were that
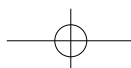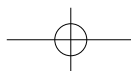
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two-thirds of the informants were supposed to have nursing care and one-third of the informants should only have home services.

Measurements

The clients were assessed using the Resident Assessment Instrument for Home Care (RAI-HC) (www.interrai.org) version 2.0, which consists of more than 300 items. The instrument has face validity and has good inter-observer reliability (13, 14). The instrument was previously translated, back translated, and examined for face validity in the language of each participating country. All the informants had a full comprehensive geriatric assessment. The assessors were taught to use the instrument during home visits in a standardized manner. The RAI-HC manual gave definitions and examples of how to fill out the assessment (15).

In addition to their clinical observation, the assessor talked with the old people and/or their close family and staff. Information was also checked with documentation in the home-care unit.

Sociodemographic

Site, gender, living alone, ages: < 75 vs. ≥ 75.

Formal and informal services

Visiting nurses or home-care nurses ("registered nurses"): nursing procedures and personal care

Home carers: assist the client with ADL functions

Home help: home-helpers provide mainly assistance with home services, like traditionally housework.

Hospitalisation in last 90 days: the client stayed overnight at least once.

Emergency unit visit: the client needed acute help, but did not stay overnight.

Emergency at home: the client needed help at home, outside the usual schedule, from the visiting nurse, home caregiver, or home helper one or more days during the prior week.

Informal help input of care time: we dichotomized this, with the median value as the cut-off point. For the weekdays, this was < 3 hours vs. ≥ 3 hours, and for the weekends, <1 hour vs. ≥ 1 hour.

Unintended weight loss, nutritional, oral, and gastrointestinal status (GI)

Weight loss was assessed according to information about UWL of 5% or more in the last 30 days (or 10% or more in the last 180 days). The following items were reported.

Severe malnutrition (cachexia): a disorder of nutrition, it may be due to a deficient diet or deficient diet, food processing or utilization.

Problems with food and fluid consumption: during the 3 days prior to the assessment, (a) the client ate one or fewer meals a day, (b) there was a noticeable decrease in the amount of food the client usually ate or fluids usually consumed, or (c) the client's fluid intake was insufficient (the client did not consume all/almost all usual fluids during the last 3 days).

Swallowing included: problem to swallow solid foods and liquids, use of IV or tube feeding.

Oral health included (a) problems chewing or swallowing (e.g., poor mastication, immobile jaw, surgical resection, decreased sensation/motor control, or pain while eating); (b) sensation of the mouth being "dry" when eating a meal; or (c) problems brushing teeth or dentures.

Other indicators of impaired GI-status included (a) reduced appetite, (b) vomiting, (c) constipation, or (d) diarrhoea (during the 3 days prior to the assessment).

### Other health and functional status indicators

Pain included, for example, (a) frequency with which client complains or shows evidence of pain; (b) intensity of pain; (c) from client's point of view, pain intensity disrupts usual activities; (d) character of pain; and (e) from client's point of view, medications adequately control pain); as well as falls during the last 90 days, pressure ulcer (i.e., any lesion caused by pressure or shear forces resulting in damage to underlying tissues). Social functioning indicators included (a) reduced social activity, (b) client feels lonely, and (c) client has not been out of the house in the last week.

Health indicators included "Has conditions or diseases that make cognition, ADL, mood, or behaviour patterns unstable (fluctuations, precarious, or deteriorating)" and "Experiencing a flare-up of a recurrent or chronic problem", and "Worsening of vision as compared to status of 90 days ago" were included (15).

Scales for physical function and cognition can be constructed from the RAI-HC (16, 17). The higher the score, the more disabled the client. For physical functioning, we used an Activity of Daily Living (ADL) index, measuring 8 different functions: mobility in bed, transfer, eating, toilet use, personal hygiene, dressing upper and lower body, locomotion inside and outside home, and bathing. An Instrumental Activity of Daily Living (IADL) index measures 7 different functions: meal preparation, housework, managing medication, managing finance, phone use, shopping and transport. The Cognitive Performance Scale measures the level of cognitive performance; it runs from 0 to 6. The cut-off point of 3 was chosen for all three scales to indicate significant impairment.

For indicators of depression, anxiety and sad mood, we used 9 different characteristics: a feeling of sadness or being depressed, that life is not worth living, that nothing matters; persistent anger with self or others; expressions of what appears to be unrealistic; repetitive health complaints; repetitive anxious complaints; sad, pained, worried facial expressions; recurrent crying, tearfulness; withdrawal from activities of interest; and   reduced social inter-action. If one or more of the 9 indicators were exhibited in at least on each of last 3 days, they were coded as risk for depression

Further potential nutritional risk factors included were medications (antipsychotics, antidepressants, and antianxiety/hypnotics) (18), cancer, Parkinson's disease, congestive heart failure and stroke, infections and any psychiatric diagnosis (19, 20, 21, 22), including Alzheimer's
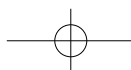
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disease and other dementia (6).

Statistical analyses

Statistics were performed on baseline data, after excluding the informants with a cancer diagnosis. The current analyses were performed using SPSS software version 13 (www.spss.com), and univariate and bivariate methods. Variables previously known to be associated with UWL were extracted from the database. The associates of UWL were identified (chi-square analysis for dichotomous variables). We used Pearson's chi-square and odds ratios (ORs) with 95% confidence intervals (CI) for risk estimates. The variables that were significant at a level below 0.05 are presented in Tables 1, 3, and 4. These variables were entered into stepwise binary logistic regression models (Wald forward). The model only included those variables that gave additional value. The strongest predictors of UWL were entered into the final model with the clinical factors. Carpenter et al. (23) analysed characteristics of the participants. They were able to discriminate three clusters of countries, based on socio-demographic, functional, and clinical variables. Cluster 1 included the Czech Republic, the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden), and the Netherlands. Cluster 2 included Italy and France, and cluster 3 included Germany and the United Kingdom. In our analyses we used these three clusters in order to identify the independent influence of geo-cultural factors on UWL.

Results

The study included 4,010 persons, of whom 74% were female. The mean age of the men was 80.9 ± 7.5 years, and of the women, 82.8 ± 7.3 years.

Prevalence of diseases or health conditions related to unintended weight loss

Table 1 shows the prevalence of selected diagnoses/health conditions. Cancer was the only diagnosis that had a significant association with UWL (OR = 2.0, CI = 1.5-2.7, p < 0.001), so we excluded cancer patients from the rest of the analyses. Health indicators (fluctuations in function and flare-ups of chronic conditions) had a strong association (p < 0.001) with UWL, with OR = 1.4 (CI = 1.2 - 1.7) and OR = 2.2 (CI = 1.7 - 2.9), respectively. The following types of infections were registered among the clients: 201 (5%) had urinary tract infection, 113 (3 %) had pneumonia and 36 (1%) had tuberculoses (data not shown).

Table 1
The prevalence of unintended weight loss (UWL) and its relationship with the selected diagnosis at 11 sites in European countries

	UWL n (%)	OR (CI)	Chi-square
Stroke n=685	91 (13)	1.0 (0.8-1.3)	p=0.83
Congestive heart failure n=948	119 (13)	0.9 (0.8-1.2)	p=0.63
Dementia, all types n=514	63 (12)	0.9 (0.7-1.2)	p=0.58
Parkinson's disease n=200	29 (15)	1.1 (0.8-1.7)	p=0.53
Cancer n=321	71 (22)	2.0 (1.5-2.7)	p< 0.001
Psychiatric diagnosis* n=345	47 (14)	1.1 (0.8-1.5)	p=0.73
Unstable condition** n=1109	179 (16)	1.4 (1.2-1.7)	p<0.0001
A chronic problem*** n=435	100 (23)	2.2 (1.7-2.9)	p<0.0001

n = 4010; * any psychiatric diagnosis; ** has conditions or diseases that make cognition, ADL, mood, or behaviour patterns unstable (fluctuations, precarious, or deteriorating); *** experiencing a flare-up of a recurrent or chronic problem.

Prevalence of selected conditions and service-type related to unintended weight loss

Table 2 shows the prevalence of UWL, malnutrition, and the service types and their relationship to UWL at each of the study sites. On average, 20% of the persons had meals on wheels at least once a week. The frequency varied from 1 to 61% among the different sites. Sweden had the lowest prevalence and the Czech Republic had the highest. The frequency of UWL and selected conditions did not fit into the grouping of clusters. In

Table 2
The prevalence of unintended weight-loss (UWL) and its relationship with selected conditions and service types at 11 European sites

	UWL n (%)	Severe malnutrition n (%)	IV fluid n (%)	Tube Feeding n (%)	Meals on Wheels n (%)
Cluster 1					
Czech Republic n = 383	63 (15)	5 (1)	3 (1)	2 (1)	229 (60)
Denmark n = 450	40 (9)	12 (3)	-	-	152 (34)
Finland n =170	3 (2)	4 (2)	-	1 (1)	46 (27)
Iceland n = 375	36 (9)	2 (1)	7 (2)	1(< 1)	82 (22)
Norway n = 359	49 (13)	3 (1)	-	-	22 (6)
Sweden n = 222	25 (11)	3 (1)	-	3 (1)	2 (1)
Netherlands n = 176	28 (14)	8 (5)	9 (5)	-	20 (11)
Cluster 2					
France n = 360	40 (11)	5 (1)	3 (1)	9 (3)	35 (10)
Italy n = 358	67 (19)	5 (1)	4 (1)	13 (4)	5 (2)
Cluster 3					
Germany n = 566	47 (8)	34 (6)	38 (7)	10 (2)	114 (20)
UK n = 270	53 (20)	3 (1)	1(< 1)	2 (1)	21 (8)
Total n = 3,689	451 (12)	84 (2)	65 (2)	41 (1)	728 (20)

* Excluding cancer patients

Cluster 2 France had 11% UWL, and Italy 19% (table 2).

Age and gender, and days of formal home-care service

After excluding the informants with a cancer diagnosis, the age and gender data (n = 3689) changed only slightly. Of the clients, 935 (25%) were men and 2,754 (75%) were women, and the mean age was 82.5 years ± 7.3 (in males, 81.0 ± 7.4 years and in females, 82.9 ± 7.2 years); data not shown.

Table 3
Background data for patients with unintended weight loss (UWL) among home-care clients at 11 European sites vs. background data, use of formal and informal service

Background data	UWL n (%)	OR (CI)
Gender: Male vs. Female n=934	117 (13)	0.97 (0.8-1.2) ns
Age ≥75 years n=3078	391 (13)	1.3 (1.0-1.8)*
Living alone n=2233	259 (12)	0.9 (0.7-1.0) ns
Use of formal services		
Hospitalisation in last 90 days n = 614	147 (24)	2.9 (2.3-3.6)***
Emergency unit visit (no overnight) n = 223	48 (22)	2.1 (1.5-2.9)***
Emergency at home (not on call) n = 290	57 (19)	1.8 (1.3-2.5)***
Visiting nurse once or more a week n = 1296	184 (14)	1.3 (1.1-1.6)**
Informal help last 7 days (hours)		
Weekdays ≥ 3 n=1728	247 (14)	1.4 (1.1-1.7)***
Weekend ≥ 1 n=2058	288 (14)	1.5 (1.2-1.8)***

Excluding cancer patients: n = 3689; *** p < 0.001, **p <0.01, * p < 0.05.

Gender had no relationship to UWL (p > 0.05). There was a significant association (p = 0.05) between UWL and advanced age (more than 75 years). The clients who had UWL had more often received help from a visiting nurse one or more days during the last week than those without UWL. Clients with UWL received more hours of informal help then did those without UWL (Table 3). Recent health service use (hospitalisation, emergency visits and stays) was highly associated with UWL.

Risk factors for unintended weight loss

In those clients with UWL, all the other signs of malnutrition were present significantly more often, whereas the opposite was true for those without UWL. People who had reduced appetite and vomiting ate less. Constipation was related to UWL.

The concentration of home-care clients who had eaten one or fewer meals/day, with reduced appetite and/or intake of smaller amounts of food and fluids, was significantly increased in the group with UWL. Self-reported poor health, physical dependency, impaired cognition, falls, pain, and pressure ulcers were significantly more frequent in clients with UWL. Prognosis of less than 6 months was associated with UWL. The

persons who had feeding tubes had a higher prevalence of UWL.

Table 4
Characteristics of patient with unintended weight loss (UWL) among home-care clients at 11 European sites.

Characteristic	UWL, n (%)	OR	95% CI
Nutrition data			
Severe malnutrition n=84	50 (60)	11.7	7.5 - 18.4
Less than 1 meal/day n=155	86 (56)	10.8	7.7 - 15.1
Insufficient food and fluid intake n=140	78 (56)	10.7	7.5 - 15.2
Insufficient fluid intake n=239	72 (31)	3.5	2.6 - 4.7
Oral problems with swallowing food n=354	86 (24)	2.6	2.0-3.4
Pain in the mouth during eating n=542	113 (21)	2.2	1.7-2.8
Dry mouth n=308	75 (24)	2.6	1.9-3.4
Tube feeding n=41†	15 (37)	4.3	2.2-8.1
Gastrointestinal data			
Reduced appetite n=340	123 (36)	5.2	4.1-6.7
Vomiting n=98	28 (29)	3.0	1.9-4.7
Constipation n=256	68 (27)	2.9	2.1-3.9
Diarrhoea n=170	31 (18)	1.6	1.1-2.5
Other symptoms			
Daily pain n=1538	233 (15)	1.6	1.3-1.9
Pain disrupts normal activity n=1317	194 (15)	1.4	1.2-1.7
Fall last 90 days n=948	175 (19)	2.0	1.6-2.5
Pressure ulcers n=269	72 (27)	2.9	2.2-3.9
Vision decline during last 90 days n=652	115 (18)	1.7	1.4-2.2
Physical functioning			
IADL dependency >3 (index 0 -7) n=2498	349 (14)	1.7	1.4-2.2
ADL dependency >3 (index 0 - 8) n=917	156 (17)	1.7	1.4-2.1
Social functioning and depression			
Reduced social activity n=1250	245 (20)	2.6	2.1-3.2
Feels lonely n=774	118 (15)	1.4	1.1-1.8
Not out of house in last week n=1301	218 (17)	1.9	1.5-2.3
Risk of depression ≥ 1(index 0-9) n=1672	269 (16)	1.9	1.6-2.4
Cognition			
CPS > 3 (hierarchy scale 0 - 6) n=400	81 (20)	2.0	1.5-2.6
Personal reflection of health status			
Self reported bad health n=1069	174 (16)	1.6	1.3-2.0
Terminal prognosis < 6 month n=17†	7 (41)	5.1	1.9-13.4
Cluster 2* n=715	107 (15)	1.3	1.1-1.7

Excluding cancer patients: n = 3689; †small number; * Italy and France

With regard to the different sites, we noticed a significantly higher prevalence of UWL in cluster 2 (Italy and France).

Independent predictors of unintended weight loss

In order to identify independent predictors of UWL, a logistic model was implemented. The variables from Table 4 were included in the model, using a forward selection method.
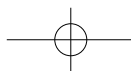
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Also included were those variables that had significant values in Tables 1 and 3. Gender and age group were included. Table 5 displays the final model, showing significant predictors at a level of 5%, applying forward conditional selection. The variables are listed in the order in which they were included in the final model (step 12). The final model confirms the strong association between UWL and oral or gastrointestinal symptoms or conditions. In addition, reduced social activity, hospitalisations, falls, daily pain, and pressure ulcers were accepted in the model. The model summary gave an explanatory value of 26% (Table 5). The three different clusters of sites gave no additional explanatory value. We excluded first malnutrition and then both malnutrition and "fewer meals" from the regression model, reducing the explanatory value to 24% and 22%, respectively.

Table 5
Final model from binary logistic regression (Wald forward): explanatory variables in predicting unintended weight loss (UWL) among home-care clients at 11 European sites.

Explanatory variables ranged after entering the model	OR (95% CI)
1. Less than one meal/day	4.2 (2.8-6.4)***
2. Reduced appetite	2.5 (1.9-3.4)***
3. Severe malnutrition	7.1 (4.2-11.9)***
4. Reduced social activity	2.0 (1.6-2.5)***
5. Hospitalisation in last 90 days	2.1 (1.6-2.7)***
6. Eating less	2.8 (1.8-4.4)***
7. Constipation	1.9 (1.3-2.7)***
8. Falls	1.5 (1.2-1.9)**
9. Oral problem swallowing food	2.8 (1.8-4.4)**
10. Flare-up of chronic disease	1.5 (1.1-2.1)**
11. Pressure ulcers	1.5 (1.2-1.9)**
12. Daily pain	1.3 (1.0-1.6)*

*** $p < 0.001$, **$p < 0.01$ * $p < 0.05$; r2 = 0.26 (Nagelkerke); Excluding cancer patients: n = 3689

Discussion

This study focused on identifiable conditions and characteristics of the home-care clients at sites in 11 European countries and the occurrence of UWL.

Characterisation of elderly subjects with unintended weight loss

According to the definition in the RAI-MDS manual, we found that, on average, 12% of the home-care clients suffered from UWL, and that the occurrence varied from 2% (Finland) to 19% (Italy). The site-to-site variation in occurrence was not significant after adjusting for confounding variables such as diseases, cognition, and functional status. Finland had the highest frequency of elderly living alone, 84% (23), but had the lowest prevalence of UWL. The sample from Denmark held the oldest population, but only 9% of the patients had UWL. The reason for these findings is most likely the selection of the clients, as 1–20% of the elderly population is included in the different countries, with according increases in needs. We know that home-care clients in the Nordic countries were a lighter case-mix than those residing in Southern parts of Europe (23). With that, it is peculiar that UWL is so little affected by locality. The risk for malnutrition or UWL in the North was only slightly less than in the South (OR = 1.3).

We did control for cognition and functional capacity as confounding factors. However, there might be other influencing factors that our method was incapable of detecting.

Reduced appetite may be the first subjective and clinical sign that leads to UWL (24). There was a significant correlation between reduced appetite and UWL. However, in our study the weight-losers were a composite group, and many already showed signs of malnutrition and dehydration.

Health, cognition, and function in relation to UWL

Overall, the distinct solitary diagnoses, except for cancer, gave no simple explanation for UWL. Unintended weight loss was instead related to complex comorbidity and frailty independent of specific organ diagnoses (7). We found that health indicators such as "Has conditions or diseases that make cognition, ADL, mood, or behaviour patterns unstable (fluctuations, precarious, or deteriorating)" and "Experiencing a flare-up of a recurrent or chronic problem" were significantly associated with UWL. Persons who had Alzheimer's or another type of dementia did not have significantly more problems with nutrition than other persons; the data did not support the findings of Pirlich & Lochs (6). However, clients with cognitive dysfunction, independent of diagnostic work-up to identify their type of dementia, had an increased risk of UWL (OR = 2.0) in our study. We found significantly lower IADL/ADL function in clients with UWL (OR = 1.7 and 1.7, respectively). This finding is in good agreement with previous findings (3, 31). Those clients who UWL had needed more frequent help with meal preparation, shopping, help in locomotion in the home, or help with eating. Poulsen et al. (4) found "received no help with cooking" to be an important factor in a predictive model for low BMI; other factors were poor appetite and advanced age.

A gastric tube or IV fluid was seldom used—on average only 1% and 2%, respectively. The data do not explain why the people in Germany and the Netherlands used IVs in, respectively, 7% and 5% of the cases, while in Italy 4% used tube feeding. Other authors have described different practices in feeding tube use in nursing homes in different regions and countries (26, 27). In these samples from the five Nordic countries, only in Iceland was IV fluid used by persons at home. IV fluid is sometimes used at the end of life, and sometimes hospital-at-home activities take place. However, there was no additional documentation related to these issues.
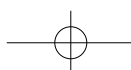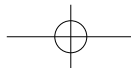
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Identifying signs of an early stage of undernutrition in a home-care setting

Nurses are major observers of eating habits in elderly people. The use of a standardized assessment tool may identify people at risk at an early stage and hence prevent severe nutritional problems (31). The nurses in home care may identify markers or predictive factors for patients at risk through the use of the RAI-HC instrument. The importance of early detection of predictors of potential future malnutrition is even greater in the light of some recent research findings. Beck, Ovesen & Schroll (32), after 6 months' prospective follow-up of patients aged 65 years and older from general practice, concluded that a high percentage of the old, especially those initially malnourished, will not benefit from nutritional support if the basic causes of their malnutrition are not identified. Faxen-Irving et al. (25) carried out a study in a group home for demented elderly, in community-assisted housing. The nutritional treatment did not affect the rate of decline in cognitive function or Katz' ADL index.

Observations of changes in nutrition status from home helpers or nurses who are seeing clients at least weekly can help identify early signs of nutritional risk, including reduced appetite, insufficient fluid intake, or neglect of meals. Constipation was associated with UWL ($p < 0.001$). Constipation could lead to reduced appetite, and lack of food and fluid could lead to constipation. Vision decline during last 90 days was associated with UWL. We have not noticed this connection in previous studies. The findings imply that staff should be aware of clients' status of vision.

When nutritional problems are suspected, the person's nutritional state has to be further assessed through biomedical and psychosocial as well as more strictly food- and intake-related observations. Such observations may be compiled through a comprehensive instrument such as the RAI-HC. To be able to observe a change, the nurses have to record the patient's daily diet at the first assessment visit. Together with a receipt for whether the patient has had a balanced diet, the height and weight should be documented and the BMI calculated. Because weighing is heavily resisted by most home-care agencies, it was not obligatory in the use of the RAI-HC. Our findings indicate that weighing nevertheless has to be an obligatory part of any adequate home-care assessment instrument.

Several studies have documented hospitalisation as an important risk factor for UWL (12, 33, 34), a finding that may indicate a special nutrition-directed home nurse visit after discharge. We noticed that the meals-on-wheels activity was the same regardless of weight loss, so the simple addition of meals on wheels is not enough to ensure that lost weight is regained.

The final model that summarises the independent importance for UWL of appetite and constipation, pain, flare-up of chronic diseases, and recent hospitalization may accelerate development of a new approach to detecting undernutrition among home-care clients. Sufficient guidelines are needed, eventually in the form of Client Assessment Protocols (CAPs) related to the RAI-HC.

Limitations and strengths of the study

The limitation of the study was the highly reduced set of variables measuring nutrition embedded in the RAI-assessment form. The aim of the questionnaire was to capture the minimum information needed in every necessary area when assessing the frail elderly. Thus, in this study, there were no BMI measurements or data on protein intake, for example, and the nutritional assessment mainly addressed caloric intake.

A common problem in comparing prevalence in different studies is the lack of common definitions and settings. The strengths of this study were the large sample size, the high number of participating sites in different countries, and the use of same assessment tool cross-nationally in a home-service setting for people of the same age (23).

Conclusion

Concurring results from 11 European countries lead us to recommend regular comprehensive assessment in home care, to identify clients with potential risk.

Home-care personnel may identify clients with potential risk factors for weight loss and malnutrition, particularly those discharged from hospital, or who are physically dependent or have cognitive problems. They should be followed up in order to detect early signs of potential nutritional problems and start individualised preventive measures.

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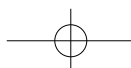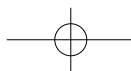
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