Applied nutritional investigation

Undernutrition in geriatric institutions in South-West France: Policies and risk factors

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Abstract

Objective: This study aimed to describe the nutritional status of geriatric home residents according to their place of dwelling and to identify institutional factors associated with higher rates of undernutrition.

Methods: All institutions (514) in the Aquitaine region were interviewed for staff ratio, nutritional procedures, staff training, and other procedures in the area of nutrition. A stratified random sample of 601 residents in a subsample of 42 institutions underwent Mini-Nutritional Assessment.

Results: The estimated prevalence of undernutrition was 19.1 (95% confidence interval [CI] 14.0–24.2), with a higher rate in long-term care (48.0%, 95% CI 15.9–80.2) than in nursing homes (14.5%, 95% CI 10.6–18.4, \( P < 0.0001 \)). In univariate analyses the risk of undernutrition was higher in long-term care (\( P < 0.0001 \)), in settings with better weighing equipment (\( P < 0.0001 \)), with a higher staff ratio (\( P = 0.0001 \)), and a higher rate of subjects needing help for eating (\( P < 0.0001 \)) and was lower in settings with a higher rate of training in nutritional screening (\( P = 0.0001 \)) and management (\( P < 0.0001 \)). In nursing homes, each item of the Mini-Nutritional Assessment Short Form was independently predictive of undernutrition. In multivariate analyses in nursing homes only, better weighing equipment (adjusted odds ratio 2.34, 95% CI 1.39–4.12, \( P = 0.0017 \)) and higher staff ratio (adjusted odds ratio 1.03, 95% CI 1.00–1.05, \( P = 0.0230 \)) were associated with higher rates of undernutrition.

Conclusion: Undernutrition in institutions was linked to the resident health problems, with little evidence in favor of the influence of institutional policies. © 2009 Published by Elsevier Inc.

Keywords: Mini-Nutritional Assessment; Staff training; Functional dependency; Nutritional supplementation

Introduction

Undernutrition is a major concern in geriatric institutions. Outcomes of undernutrition are reported to be severe, including poor quality of life, functional decline, pressure ulcers, higher risk of hospitalization, and higher mortality [1–3]. Thus, it is of great interest to promote any means likely to lower the rate of undernutrition in geriatric institutions. Indeed, studies using anthropometric criteria or the Mini-Nutritional Assessment (MNA) [4] have estimated the prevalence of undernutrition at 20–40% [4–12]. This prevalence varies according to the kind of institution and could be as high as 70% in long-term care according to MNA assessments [4] or as low as 2% or 6% in some settings [13,14]. Some of these studies, however, did not claim to be representative of the institutionalized population. In fact, one of them included all the geriatric institutions around Helsinki and reported that, according to the MNA score, 29% of residents were undernourished and 60% were at risk for malnutrition [12].

Nevertheless, undernourished patients could be at higher risk of institutionalization than those with adequate nutri-
ional status, mainly due to comorbidity, cognitive and functional impairments, and, in some cases, social isolation. We previously reported that low oral intake is an independent risk factor for institutionalization in hospitalized elderly people [15]. An epidemiologic study in an adult community population also showed that a 10-y weight loss or weight gain was associated with an increased rate of institutionalization [16]. Thus, rates of undernutrition are expected to be higher in geriatric institutions than in the community and this further emphasizes the need for investigations in this area.

Indeed, it has been shown that, within geriatric institutions, risk factors for low body mass index (BMI) or weight loss were an age older than 85 y, a low dietary intake, functional dependency and a bedridden state, depression, and chewing problems [7]. In Finnish institutions, dementia, low dietary intake, functional dependency, and swallowing disorders were also associated with undernutrition [12]. Within nursing homes, low BMI was associated with poorer quality of life [9] and thus should be considered a target for quality improvement.

Progress in this area can come from better prevention, diagnosis, or treatment of undernutrition and its causal factors. Nutritional policies in these establishments have to address the needs of these residents. Among them, staff recognition of nutritional problems [17–19], meal delivery organization [19–23], and access to dental care [13,14,24] have been identified as main targets for improvement.

We aimed to estimate the rate of undernutrition in a representative sample of elderly residents in institutions in Aquitaine (South-West France) and to identify the institutional factors associated with undernutrition in these institutions.

Materials and methods

Geriatric institutions

In 2005, the Direction Régionale des Affaires Sanitaires et Sociales (Regional Direction of Health and Social Services) of Aquitaine sent a postal questionnaire to the 514 nursing homes or long-term care homes in the administrative region of Aquitaine. In France, long-term care homes receive elderly people with functional impairment and severe disease requiring continuous medical care, in contrast to nursing homes that do not provide the continuous presence of nurses. The number of available beds was 30 617, for a rate of 42 beds for 1000 subjects older than 60 y. Long-term care homes accommodated 2845 residents and nursing homes 22 772.

Private or public status, category (nursing home or long-term care home), number of staff, and number of available beds in each institution were obtained by file matching with the Fichier National des Etablissements Sanitaires et Sociaux (National File of Social and Health Care Settings). The questionnaire included items describing nutritional policies such as meal schedules, the involvement of a dietician for meal composition, and educational programs for nurses and their assistants concerning recognition and management of undernutrition, dietary recommendations, swallowing disorders, and Hazard Analysis Critical Control Points. Meal schedules were used to calculate the length of the night fasting period. The number of residents needing help for feeding was recorded. The ratio of staff to total residents was also calculated for each home and was termed the staff ratio. The questionnaire also investigated existing written procedures for undernutrition screening including screening at admission, regular weight measurement, dietary intake, and hydration monitoring. The question concerning available weighing scales proposed three levels of weighing equipment: no equipment or only bathroom scales, chair scales or medical-quality scale, and equipment able to weigh everybody including bedridden people. Capacity to offer dental examinations and physical activity was also assessed.

Residents

A stratified random sample of 42 institutions was drawn out of the 514 institutions, taking into account their public or private status, administrative and geographic area, category (nursing-home or long-term care), and number of available beds. In each stratum one institution was randomly selected whenever several were present.

These institutions were visited by a dietician who recorded more in depth the procedures used in the area of nutrition. These included undernutrition screening procedures at admission and follow-up and catering procedures: type (freeze-dried, canned, homemade) of mixed meal preparation and adaptation of meal schedules to residents’ requests. The proportions of residents needing assistance during meals, those fed with mixed meals, or with tube-feeding were also recorded. Capacity to adapt to particular problems was also investigated, such as swallowing rehabilitation and type of adapted hydration in case of swallowing disorders and new nutritional assessment in case of incidental illness.

A random sample of 15 residents present in the institution at the time of the interview was selected in these 42 institutions. If fewer than 15 residents were present, they were all included, leading to a sample of 601 residents. An MNA form was filled in for each of these residents. Subjects were all weighed with the same platform scale. The MNA is an 18-item questionnaire including anthropometric, general, dietary, and subjective assessments; the maximum score is 30, indicating the best nutritional status [4]. A screening subscale of the MNA (MNA Short Form [MNA-SF]) includes six items (appetite, recent weight loss, mobility, recent disease or psychological stress, dementia or depression, BMI), with the maximum score of 14. The threshold for malnutrition screening with the MNA-SF is set at 11 or
below [4]. Only subjects with this score went on to assessment with the full MNA questionnaire, on which a score below 17 indicates undernutrition. The threshold value of BMI for undernutrition definition varies currently from 20 to 22 kg/m² [11,19,25–28]. In accordance with BMI categories used in the MNA [4], we used the BMI threshold of 21 kg/m² to define undernutrition [19].

Analysis

Statistical analysis was performed using SAS 8.2 (SAS Institute, Cary NC, USA). Values are expressed as means ± standard deviations or as percentages. Chi-square tests and t tests were used to compare qualitative or quantitative variables with a threshold of \( P < 0.05 \). We compared the characteristics of the 42 institutions in the random sample with those of the 514 institutions in the area to ensure their representativeness. The proportion of residents screened as at risk of malnutrition according to the MNA-SF and the proportion of subjects undernourished using the MNA were weighted according to Horvitz-Thompson equations to provide estimations of the prevalence in the entire population, taking into account the sampling frame with a 95% confidence interval (CI) [29]. Estimations of these proportions according to category (nursing home or long-term care home, private or public, rural or urban) were also calculated. The association between resident characteristics based on the MNA-SF and risk of undernutrition (MNA <17 points) was estimated by univariate and then multivariate stepwise backward logistic regressions (MNA <17 points) in nursing homes only, given the larger number of residents in them. Several logistic regression models were performed to investigate the association between nursing-home characteristics including nutritional procedures and the risk of having a proportion of undernourished (MNA <17 points) residents above the median of the group. Random effects were used in these models to correct the cluster selection from the randomization method.

Results

Characteristics and nutritional procedures in entire sample

There were 514 geriatric institutions including 469 nursing homes and 45 long-term care homes with mean staff ratios (staff number/number of beds) of 0.3 ± 0.4 in nursing homes and 0.6 ± 0.8 in long-term care homes. Among these institutions, 461 completed the questionnaire, giving a non-response rate of 10.3%. The non-respondents were more likely to be long-term care homes than nursing homes (24% versus 9%, \( P = 0.001 \)), to have no official approval to receive social funds (19.9% versus 6.5%, \( P = 0.006 \)), and to have a smaller mean size than the respondents (\( P = 0.04 \)). There were 288 (62.5%) private and 173 (37.5%) public settings.

Of the 461 respondents, the mean proportion of residents needing help for eating was higher in long-term care homes than in nursing homes (\( P < 0.0001 \); Table 1). A dietician was involved in menu composition in 244 settings (52.9%), with a larger proportion in public institutions (64.0%) than in private institutions (46.2%, \( P = 0.002 \)). However, training for dietary issues, malnutrition screening and management, and swallowing disorders was performed in only one-third to one-half of the settings, with higher rates in long-term care homes. There was also a larger proportion of nursing homes than long-term care homes with no training at all (Table 1). Weighing equipment was poor in 44.3% of nursing homes and in 5.9% of long-term care homes (Table 1).

Only 11.5% of the institutions declared they had no nutritional procedure. The screening of nutritional problems was planned in 38.8% of the 461 institutions at admission and in 49.9% during the stay. Nutritional procedures included weight monitoring in up to 78.1% of settings despite the inadequate weighing equipment. There was no significant difference between nursing homes and long-term care institutions except for training in swallowing disorders, which was twice as frequent in long-term care homes.

The mean night fasting period was 11.77 h and could be as long as 13.75 h in some nursing homes. Access to dental care was available in 60.5% of institutions, with a higher rate in long-term care homes (\( P = 0.007 \)). Physical activity was offered in 75.5% of institutions.

The mean proportion of residents eating regular-texture food was 0.32 ± 0.20 and the mean rate of tube-feeding was 0.05 ± 0.01.

Characteristics of the sample of 42 institutions

The sample consisted of 36 nursing homes and 6 long-term care homes. There were no significant differences between the random sample of 42 and the entire pool of institutions of this region, except for the proportion of institutions declaring they had no procedure, which was smaller in the sample of 42 institutions (Table 1). In this sample, details of procedures were reported: nutritional screening at admission was planned in 23.1% and consisted of seeking weight loss in 57.1% of them, BMI determination in 11.9%, and MNA assessment in 14.3%. These screening procedures also included screening for swallowing disorders in 52.4%, need for help during meals in 53.4%, diagnosis of dementia in 52.4%, and depression in 54.8%. Procedures included an oral examination in 35.7% of settings and a dental checkup in 26.2%. To the question, “If a resident suffers from swallowing disorders, do you propose specific rehabilitation?,” 21.4% said “yes” and 23.8% said that the event never arose. However, 97.3% of 42 institutions said that they adapted hydration techniques in case of swallowing disorders, with 73.8% using only the highest level of liquid thickening. Hypodermoclysis hydration was
also proposed in 97.3% of settings. In 88.3% of them, reassessment of nutritional status was planned in case of incidental illness.

Use of oral nutritional supplements was declared in 41 settings; the proportion of residents taking them every day was 0.14 and the proportion of those with occasional intake was 0.08. The proportion of settings reporting the use of high-protein supplements with lactose, lactose-free high-protein supplements, regular supplements with lactose, and lactose-free high-calorie supplements were 59.5%, 54.8%, 42.9%, and 31.0%, respectively. The rate of non-response varied from 7.1% to 14.3%. The use of pharmaconutriments was declared in 26.2% of settings.

Residents’ characteristics and risk of undernutrition in the 42 institutions

The sample included 601 subjects, 148 men and 453 women with a mean age of 84.2 ± 9.3 y (Table 2). Subjects 80 y and older accounted for 75.4% of the population. The oldest subjects were mainly in nursing homes (Table 2).

Comparison of the distribution of responses to the six items of the MNA-SF between nursing homes and long-term care showed that subjects in the former were less often restricted for mobility, had lost weight less often during the previous 3 mo, had had acute stress or disease less frequently, and fewer of them had severe depression or dementia (Table 2). However,
there was no overall significant difference in BMI distribution according to type of setting. When using a BMI threshold lower than 21 kg/m² for defining undernutrition status, the proportions of undernourished subjects were 23.8% in nursing homes and 31.0% in long-term care. Taking the sampling frame into account, the estimated prevalence of malnutrition in Aquitaine using the criterion BMI lower than 21 kg/m² was 24.7% (95% CI 20.9–28.4).

The association between residents’ characteristics and risk of undernutrition is presented in Tables 3 and 4. In nursing homes (Table 3), each item of the MNA-SF was strongly predictive of undernutrition in univariate and multivariate analyses. In the long-term care homes (Table 4), among MNA-SF items only recent decreased food intake, recent disease or psychological stress, and lower BMI were risk factors for undernutrition, but the limited number of subjects in this setting did not allow valid multivariate analysis to be performed.

**Institutional characteristics, procedures, and risk of undernutrition**

In univariate analyses conducted in the entire sample of 42 institutions, the risk of undernutrition (MNA <17 points) was higher in subjects living in long-term care (odds ratio [OR] 4.95, 95% CI 3.00–8.18, P < 0.0001), in settings with better weighing equipment (OR 2.70, 95% CI 1.70–4.30, P < 0.0001), with a higher staff ratio (OR 1.02, 95% CI 1.01–1.03, P = 0.0001), and with a higher rate of subjects needing help for eating (OR 1.02, 95% CI 1.01–1.03, P < 0.0001) and was lower in settings with higher percentages of training in nutritional screening (OR 0.43, 95% CI 0.28–0.07, P = 0.0001) and management (OR 0.40, 95% CI 0.26–0.61, P < 0.0001).

In univariate analyses in nursing homes, the risk of undernutrition was higher in subjects living in settings with better weighing equipment (OR 2.53, 95% CI 1.47–4.35, P = 0.0008), with a higher staff ratio (OR 1.03, 95% CI 1.00–1.05, P = 0.0102), and with a higher rate of subjects needing help for eating (OR 18.27, 95% CI 7.9–42.2, P < 0.0001). This risk was lower in settings with a higher rate of training for undernutrition screening (OR 0.54, 95% CI 0.32–0.91, P = 0.020), malnutrition management (OR 0.53, 95% CI 0.31–0.92, P = 0.0247), and management of swallowing disorders (OR 0.33, 95% CI 0.34–0.95, P = 0.0325). In multivariate analyses, we found an association only between a higher risk of undernutrition and better
weighing equipment (OR 2.34, 95% CI 1.39–4.12, \( P = 0.0017 \)) and a higher staff ratio (OR 1.03, 95% CI 1.00–1.05, \( P = 0.0230 \)).

In long-term care homes, the risk of undernutrition in univariate analysis increased in settings with a higher staff ratio (OR 1.01, 95% CI 1.00–1.05, \( P = 0.0136 \)) and with longer fasting at night (OR 1.00, 95% CI 1.00–1.00, \( P = 0.0125 \)).

In nursing homes we compared the characteristics of the 18 institutions in which the proportion of undernourished residents was smaller than the median (22.25%) with those of the 18 others (Table 5). Recourse to a dietitian for menu supervision was less frequent in settings with a higher proportion of undernourished subjects (\( P = 0.009 \)). All other characteristics were similar in both categories.

### Discussion

This study demonstrates large differences in the prevalence of undernutrition according to type of institution. The prevalence was three times higher in long-term care homes compared with nursing homes. In both kinds of settings the main risk factors for undernutrition were linked to the subjects themselves. However, in nursing homes, univariate analysis showed that lower rates of undernutrition were associated with higher rates of nutritional care and prevention.

The results of the MNA-SF showed very large differences in the distribution of mobility dependency, mental problems, and acute morbidity according to facility. In the area of nutrition, the proportion of residents needing help for eating was also very different between the types of settings. Dependency for eating puts the resident in the category of severe dependency [30]. These differences in functional dependency were expected due to the different assignments given to these settings and to the recruitment choice for residents. The estimated prevalence of malnutrition in Aquitaine using the MNA (19.1%) is in the lowest part of the prevalence range found in other studies [4–12]. Using the BMI threshold of 21 kg/m\(^2\) [19], the estimated prevalence was slightly higher but remained among the lowest values. In Danish nursing homes [5], prevalence of a BMI lower than 20 kg/m\(^2\) was as high as 33% compared with 24.7% in this study with a BMI lower than 21 kg/m\(^2\). In the long-term care homes, more subjects were undernourished, but the proportion of subjects with a BMI lower than 21 kg/m\(^2\) was still smaller (31%) than in the Danish study [5].

In a large sample of nursing-home residents in the United States (6832 subjects), weight loss occurred in 9.9% of subjects and 25% of residents had a BMI lower...
intake of malnourished subjects according to the MNA. Furthermore, it was previously shown that the energy those included in the MNA and most in the MNA-SF. et al. [7], items predicting weight loss or low BMI were sample of residents. Indeed, in the large sample of Blaum of the MNA-SF strongly predicted undernutrition in our suggesting that a multidimensional measurement of under-

proportion would have been much larger; conversely, if we had used the BMI, it would have been smaller, sug-

know,” thus under- or overestimating the score on this MNA-SF item to an unpredictable extent. If we had

does not go out

Bedridden or chair-bound 88.9 56.3

Psychological stress or acute disease during previous 3 mo (%) No weight loss 41.7 75

1–3 kg 25.0 16.7

Does not know 0 2.1

>3 kg 33.3 6.2

Mobility (%) Goes out 0 8.3

Able to get out of bed/chair but does not go out 11.1 35.4

Severe dementia or depression 66.7 29.2

BMI (%) ≥23 kg/m² 30.6 77.1

21–<23 kg/m² 8.3 14.6

19–<21 kg/m² 22.2 6.3

<19 kg/m² 38.9 2.1

BMI, body mass index; MNA, Mini-Nutritional Assessment; MNA-SF, Mini-Nutritional Assessment Short Form

than 19.4 kg/m² [7]. With the MNA-SF, we found that weight loss occurred in almost 30% of the residents and that the proportion of them with a BMI lower than 21 kg/m² was 23.8%. Furthermore, the proportion of weight losers was very different according to the type of setting, in contrast to BMI distribution, which was similar with only a trend for a higher proportion of very low BMI (<19 kg/m²) in long-term care homes. Conversely, in settings without adequate weighing equipment, the response to the question of weight loss was likely “do not know,” thus under- or overestimating the score on this MNA-SF item to an unpredictable extent. If we had defined undernutrition on the basis of weight loss, the proportion would have been much larger; conversely, if we had used the BMI, it would have been smaller, suggesting that a multidimensional measurement of undernutrition is necessary. Low-value responses to each item of the MNA-SF strongly predicted undernutrition in our sample of residents. Indeed, in the large sample of Blaum et al. [7], items predicting weight loss or low BMI were those included in the MNA and most in the MNA-SF. Furthermore, it was previously shown that the energy intake of malnourished subjects according to the MNA was below their needs, in contrast to subjects with an MNA score above 24 points [31]. This was confirmed elsewhere using other undernutrition criteria [12,32].

Associations between undernutrition and impaired function or high need of care, dementia, swallowing difficulties, constipation, and agitation were also evident [12,31]. Demented patients seem to shift their best energy intake to breakfast, particularly if they have behavioral disturbances [33], thereby confirming the impact of agitation on malnutrition risk [12].

Admission to French long-term care homes is primarily granted to the most functionally dependent patients and those who need more medical care due to severe chronic disease apart from dementia, such as heart failure, cancer, and chronic obstructive respiratory disease. These conditions seem to increase particularly the risk of undernutrition in these settings, as shown in the present report. In the nursing homes, the rates of dependency, recent acute diseases, or psychological stress were much lower, and all items of the MNA-SF remained independently associated with the risk of undernutrition. It seems at first glance that a higher rate of procedures, organization, and equipment was associated with a higher rate of undernutrition. This could simply reflect the particular selection of the patients with a higher level of health problems in the best-qualified settings. Only in nursing homes would it seem that inadequate recourse to the services of a dietitian and lower rate of procedures were linked to a higher rate of undernutrition.

Although nutritional procedures existed, the rate of malnutrition was still high. Organizational factors causing malnutrition were described in the review by Cowan et al. [20]. We explored only procedures concerning screening, prevention, or treatment of malnutrition and means in terms of staff ratio and recourse to a dietitian. There was no precise information about the content and quality of the procedures and our data were only declarative. Nor did we investigate performances and rates of use of these procedures. In this study, the declared procedure of weight monitoring was certainly not correctly applied when considering the poor quality of the weighing equipment. It has also been shown that, in the case of dependency for eating, the main consequence of a lack of time was reduced food intake by residents [17]. Another point to comment on is the finding that the weighing equipment was of better quality when the prevalence of undernutrition was higher. This could reflect the better awareness of the problem in these settings as discussed above, but with no apparent effect on undernutrition rate. It is noticeable that weight monitoring such as food intake assessment is an efficient tool for undernutrition prevention and thus should be performed even in homes with lower rates of undernutrition and included as a basic standard of care.

In contrast, lack of procedures was likely associated with poor nutritional management. Hydration procedures were present in a large majority of institutions, probably owing to government requirements after the 2003 heat wave, which led to a high mortality rate in French nursing homes. The reported great use of hypodermoclysis was clearly resulting from rec-
ommended preventive procedures against dehydration in functionally dependent patients. Thus, a strong collective will seems able to lead to a high rate of procedure implementation.

Staff knowledge about undernutrition in the elderly was also identified as important for the prevention of undernutrition and the care of undernourished subjects. Years as a nurse or as a nurse’s assistant did not seem to positively influence knowledge, which was best improved by specific training [18]. Training and procedures in nutrition were associated with an increased rate of undernutrition, suggesting that most of the institutions were aware of the problem. However, there is much scope for improvement because only 56% of long-term care homes were conducting training in nutrition (Hazard Analysis Critical Control Points excluded).

Among the organizational factors described by Cowan et al. [20], staff communication and enforcement of regulations are necessary to enforce these procedures. In nursing homes it has been clearly shown that weight loss and the observation of large amounts of food remaining on plates were related to decreased energy and protein intake [25,34]. Informal observation of residents during meals can help staff specifically to prevent malnutrition. For this purpose, it is possible to establish the typical profile of would-be undernourished residents by noting the degree of assistance in feeding, swallowing disorders, inappropriate food texture, and subjects’ agitation [35].

Our indicators on diet quality were insufficient, in particular those concerning the taste of food and adaptation to chewing or swallowing problems, which would have necessitated face-to-face interviews. Evans and Crogan [36,37] developed a food questionnaire that could be used in this institutionalized population. To what extent institutional adaptation to the expectations of residents can be implemented and what the resulting efficiency could be on residents’ nutritional status deserves further investigation. An anthropologic study has shown that providing homelike meals in nursing homes could enhance residents’ and staff satisfaction [38]. One randomized study has shown a positive effect of these family-style meals on energy intake and MNA scores in nursing homes [38].

Treatment of undernutrition and its efficiency have been less documented. It seems possible to improve the energy intake of undernourished nursing-home residents by using enriched food [6]. However, one audit of oral liquid supplements in nursing homes showed that they could be frequently used without prior investigation of the causal factors of subjects’ undernutrition [39]. In our study we also found discrepancies between the declared procedures for the screening of swallowing disorders and what was proposed when the problem actually occurred. Although 50% of the institutions used screening, only half of that percentage claimed that rehabilitation was required, with the others considering that there was no

Table 5
Characteristics of nursing homes in relation to proportion of undernourished residents (n = 36)*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Proportion of undernourished residents below median (n = 18)</th>
<th>Proportion of undernourished residents at least at median (n = 18)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of available beds</td>
<td>81.4 ± 43.3</td>
<td>64.2 ± 28.3</td>
<td>0.17</td>
</tr>
<tr>
<td>Staff ratio</td>
<td>0.34 ± 0.13</td>
<td>0.30 ± 0.17</td>
<td>0.45</td>
</tr>
<tr>
<td>Proportion of residents needing help during meals</td>
<td>0.27 ± 0.19</td>
<td>0.19 ± 0.16</td>
<td>0.18</td>
</tr>
<tr>
<td>Meals prepared in institution</td>
<td>88.9</td>
<td>100.0</td>
<td>0.48</td>
</tr>
<tr>
<td>Menu supervision by dietician</td>
<td></td>
<td></td>
<td>0.009</td>
</tr>
<tr>
<td>Yes, a staff member</td>
<td>5.6</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Yes, external provider</td>
<td>72.2</td>
<td>27.8</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>22.2</td>
<td>72.2</td>
<td></td>
</tr>
<tr>
<td>HACCP training</td>
<td>88.9</td>
<td>83.3</td>
<td>0.46</td>
</tr>
<tr>
<td>Malnutrition screening training</td>
<td>33.3</td>
<td>38.9</td>
<td>0.76</td>
</tr>
<tr>
<td>Malnutrition management training</td>
<td>27.8</td>
<td>16.7</td>
<td>0.35</td>
</tr>
<tr>
<td>Diet training</td>
<td>55.6</td>
<td>44.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Swallowing disorders training</td>
<td>44.4</td>
<td>16.7</td>
<td>0.07</td>
</tr>
<tr>
<td>Weighing equipment</td>
<td></td>
<td></td>
<td>0.92</td>
</tr>
<tr>
<td>None or bathroom scales</td>
<td>33.3</td>
<td>33.3</td>
<td></td>
</tr>
<tr>
<td>Chair scales or medical scales</td>
<td>38.9</td>
<td>33.3</td>
<td></td>
</tr>
<tr>
<td>Special equipment for bedridden people</td>
<td>27.8</td>
<td>33.3</td>
<td></td>
</tr>
<tr>
<td>Malnutrition screening procedure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At admission</td>
<td>38.9</td>
<td>33.3</td>
<td>1.00</td>
</tr>
<tr>
<td>During stay</td>
<td>44.4</td>
<td>50.0</td>
<td>0.74</td>
</tr>
<tr>
<td>Hydration follow-up procedure</td>
<td>77.8</td>
<td>88.9</td>
<td>0.66</td>
</tr>
<tr>
<td>Weight follow-up procedure</td>
<td>83.3</td>
<td>83.3</td>
<td>1.00</td>
</tr>
<tr>
<td>Dietary intake follow-up procedure</td>
<td>77.8</td>
<td>94.4</td>
<td>0.15</td>
</tr>
<tr>
<td>Night fasting period (h)</td>
<td>11.51 ± 0.63</td>
<td>11.73 ± 0.63</td>
<td>0.30</td>
</tr>
<tr>
<td>Availability of</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dental care</td>
<td>77.8</td>
<td>55.6</td>
<td>0.16</td>
</tr>
<tr>
<td>Physical activities</td>
<td>72.2</td>
<td>88.2</td>
<td>0.16</td>
</tr>
</tbody>
</table>

HACCP, Hazard Analysis Critical Control Point
* Mean ± SD or percentage of patients.
problem. In contrast, almost all the institutions had suitable hydration procedures.

Clinical guidelines for nutritional management are of great help in implementing the training and organization of communication of staff members and physicians to improve undernutrition screening and for undertaking suitable measures for particular intake problems, such as dependency, chewing and swallowing problems, and behavioral disturbances [19].

In conclusion, the main factors of undernutrition in the institutions surveyed were linked to the residents’ health problems, with little evidence suggesting the detrimental influence of institutional policies. No studies to date have shown that better management of nutritional problems can decrease the rate of undernutrition in residents. However, a large scope for improvement in nutritional care was evident. Other endpoints such as quality of life associated with better nutritional care therefore need to be explored.

References


[34] Beck AM, Ovesen L. Skipping of meals has a significant impact on dietary intake and nutritional status of old (65+ y) nursing home residents. J Nutr Health Aging 2004;8:390–4.