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**Nutritional status and nutritional
rehabilitation of elderly living in long-term
care**

PhD Thesis
(Summary)

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1. Introduction

More than eighty thousand people are living in long-term care and approximately eighty percent of them are older than sixty years in Hungary.

The residents find security, full boarding and calmness in the long-term residential institutions (or often called social homes). The institute assumes an obligation to provide those who live in social institutes—whose health state does not require regular medical attendance but cannot take care of themselves—among others with at least three meals, and at least one warm meal as a main meal a day. In the residential institutes nutrition is provided in accordance with the age characteristics of the residents and the requirements of a healthy diet and the regulations of social boarding. If the health state of the person fed requires a special diet, based on the advice of the physician (general practitioner), the appropriate diet (e.g. mashed meals, special diet, more frequent meals) should be arranged.

Nutrition has a key role in every age, not only because of its vital importance, but beside its preventive and therapeutic role it is a cornerstone of the rehabilitation of elderly. Nutrition as an intervention of influencing the process of aging is always a specific method in healthy, frail or ill elderly.

The knowledge of nutritional status is informative and authoritative for planning individual care, optimizing nutrition, thus for realization of individual rehabilitation. Due to research of aging, *preventive gerontology* gained priority. *Geroalimatology*, the nutritional science of aging is its important part.

Quality of nutrition and nutritional status influences fundamentally evolution of diseases, and malnutrition can be a consequence of an organic disease, thus can result simultaneously in other diseases and complications. Malnutrition and nutritional disorders developed because of false practice (e.g. absence of screening, incomplete knowledge and attitude of the care personnel about nutrition) require a holistic action plan and changing in approach, thus that will be interdisciplinary regarding the area of social.

Up to now, nutritional screening in Hungarian long-term care institutions was incidental; it was used only if the head of the institution reckoned it important and could fit in the costs of nutrition. Even referable nutritional status assessment with high number of subjects included was not performed in Hungarian social homes before 2004

My aim is not to let starving elderly living in social homes described scientifically in Hungary and similar Central European countries, but to serve prevention (screening of nutritional status) and nutritional rehabilitation with scientific observations utilizable in practice. By this time, the results of last five years can be implemented and used in the everyday

practice: we can give guidance on optimizing nutritional status of elderly living in long-term care institutions.

2. Research

2.1. Aims of the research

In order to be able to improve the nutritional status and to optimize the nutrition of elderly living in long-term care institutions, we aim to answer the following questions:

I.

- a) What is the nutritional status of people older than sixty years (elderly) living in long-term care institutions like?
- b) How is changing the body mass index of elderly living in long-term care institutions?
- c) How did the nutritional status of elderly living in long-term care institutions change during the last half decade?
- d) Which acute and chronic diseases could correlate with nutritional status?
- e) What is the appetite of elderly living in long-term care institutions like? How much do they consume—based on their subjective evaluation—from the food offered? (Based on results from 2008.)
- f) What is the allocation with oral nutritional support formula of elderly living in long-term care institutions like?
- g) Did the subscription of formula change during the last five years?
- h) What is the relationship between the discovered potential influencing factors and nutritional status screened by MUST like?

II.

- i) What kind of opportunities can be found in nutritional rehabilitation of people older than sixty years living in long-term care institutions?
- j) What sort of tool is appropriate to document and follow-up the nutritional status of elderly living in long-term care institutions?

2.2. Time and place of the research

The first survey lasted from July to November, 2004, the second one two years later, lasted from September to November, 2006. The third study took place on 31st of January, 2008 in the framework of nutritionDay 2008 (*nDay2008*).

In the *first survey* 27 Hungarian long-term care institution volunteered to take part, thus thirteen counties and the capital was involved in it. We performed *our second survey* in twenty

volunteer institutions that were also involved in the first survey. In the *third study* 57 volunteer long-term care institutions were involved. The overlap between the institutions involved in 2008 and the previous surveys was 25%.

2.3. Subjects

1601 people older than 60 years (30.1% men and 69.9% women, mean age 73.5 ± 8.9 years) were screened in *our first survey*. The nutritional status of 1381 long-term care resident older than 60 years (28.9% men and 71.1% women, mean age 78.0 ± 8.8 years) was screened in the *2nd survey*. Parameters of 1792 elderly (30.9% men and 69.1% women, mean age 78.1 ± 8.9 years) were evaluated in our *3rd survey*.

2.4. Methods of the studies

We used the MUST and a questionnaire compiled by us based on scientific literature that should be completed by care personnel in 2004 and 2006. In 2008, we used the papers of *nutritionDay 2008* supplemented with the question about the weight-loss in the previous 3 to 6 months. The results of the MUST were analysed according to the evaluation protocol.

Data from the *1st* and the *second survey* are comparable, because the same persons used the same tool (MUST) in the same institutions. The results from the *3rd study* are only partly comparable with the previous results, considering that there were identical, similar and totally different questions compared to the first two surveys.

For data analysis we calculated means, standard deviations, minimum and maximum values, and their variance. Data analysis was performed with comparing 95% CIs, Student's t-test, univariate and multivariate regression analysis.

We evaluated the parameters on only in the whole population, but also in the different age categories.

3. Results

3.1. Body mass index

The BMI of elderly was 24.6 ± 5.3 in 2004 and 24.8 ± 5.33 [kg/m^2] in 2006. On the day of *nutritionDay2008* the mean of body mass index was 25.5 ± 5.4 [kg/m^2].

Comparing the changes in BMI in the 3 surveys: the ratio of malnutrition was 7.3%, 6.3% and 9.7% in the 3 years, respectively. The ratio of malnutrition increased 1.5 fold ($p < 0.01$).

3.2. Involuntary weight-loss

According to our results, residents lost 1.04 ± 2.60 kg on average 3-6 months before the *first survey* and 1.05 ± 2.6 kg on average 3-6 months before the *second survey*.

The degree of involuntary weight-loss in 5 years before the *3rd study* was five to ten percent in 9.0% of the men and in 7.5% of the women.

Comparing the changes in involuntary weight-loss in the 3 surveys: huge differences can be observed in all three categories (<5%, 5-10% and >10% of the initial weight) in 2008. Change less than 5% was detected in significantly ($p < 0.05$) lower ratio of the residents. Significant difference was not present in the 5-10% category, while the ratio of residents that lost more than 10% increased significantly ($p < 0.05$) in the previous 5 years. Therefore realignment can be observed between small and high degree of weight-loss. The reason for this could be the drastic decrease in the consumption of oral nutritional supplements.

3.3. Effect of acute diseases on the nutritional status

Some kind of disease or status that could influence eating and nutritional status has been detected in 19.6% of the residents in 2004 and in 18.9% of the residents in 2006. Only one negative, moderately strong, significant relationship was found between the cardiovascular-lung diseases group in the *third study*.

3.4. Results of the MUST

The risk of malnutrition according to MUST criteria was low in 64.1%, moderate in 9.1% and high in 26.8% of the residents in the *first survey*. Taking into account only the BMI, even according to the latest categories, 16.2% of the whole population is classified erroneously instead of high risk into normal or obese categories. All the residents with moderate risk of malnutrition would be misclassified, thus the 25.3% of the whole and 70% of the moderate or high risk population would lose the chance for nutritional rehabilitation as a consequence of not seen by a dietitian.

The risk of malnutrition according to MUST criteria was low in 65.2%, moderate in 8.8% and high in 26.0% of the residents in the *second survey*. Taking into account only the BMI, even according to the latest categories, 16.2% of the whole population is classified erroneously instead of high risk into normal or obese categories. All the residents with moderate risk of malnutrition would be misclassified, thus the 25.0% of the whole and 72% of the moderate or high risk population would lose the chance for nutritional rehabilitation as a consequence of falling out of the sight of the dietitians.

The risk of malnutrition according to MUST criteria was low in 19.1%, moderate in 3.9% and high in 77.0% of the residents in the *third survey*. We also asked the reason for not eating all the

food provided in 2008. Food was judged adequate by 12.3% of the residents, but quality and timing problems were indicated also by the same ratio of the people. One quarter of the residents felt that the portions were too big, and they could not eat so much at a time. 14.8% of residents needed help in eating, and the vast majority of them got this.

Data from 2008 show significantly ($p < 0.001$) higher BMI and points for acute diseases compared to 2004 and 2006. Weight-loss before the study period was higher (1.7 kg) in 2008, the difference is significant ($p < 0.01$). Prevalence of pressure sore, dysphagia, nausea and vomiting, chewing problems, dementia, limited mobility and loss of appetite was significantly higher. These together are accountable for 53% of the MUST final score in 2004 and 2006 and for 15% in 2008, respectively. Prevalence of loss of appetite was increased from 10% (2004) to 15% in 2008.

MUST scores are significantly ($p < 0.01$) higher in 2008.

Taking the year 2004 as baseline, incidence of moderate risk decreased with 50% that of low risk decreased with 70%, while that of high risk increased to 287%. This could mean that residents from low and moderate categories due to their declining status got into high risk category, and they get into the social care system already in bad nutritional status.

3.5. Oral nutritional supplements (ONS) in social homes

Evaluation of ONS subscribing practice returned depressing results. The consumption of supplements decreased significantly in 2008.

Subscription of ONS in the high risk category decreased by 90% compared to 2004, and residents in the moderate risk group do not receive ONS at all (16.4% in 2004). Results from 2006 are slightly, but not significantly worse than in 2004.

4. Conclusion and discussion

Our first eye-catching result was the gender ratio: that of those living in long-term care institutions is not similar to the whole population of the same age, but evaluation of this was not subject of our research.

Although exact definition of body composition and frame is a demand of therapy and rehabilitation (ergonomics), routine estimation of body height and weight of amputated persons is not prevailing in long-term care and generally in hospital care. We did not found use of these, even accidentally, during our research.

Prevalence of malnutrition depends upon the studied parameters and their number. Our results are similar to international data. The difference in results from 2008 can be explained with the change in the current status and diseases of the residents and the alterations in the study protocol compared to the 2004 and 2006 survey. Another explaining can be that the study

was performed not in the same institutions like the first two ones. The aim of the 3rd study was not to define risk according to the MUST protocol, but from the uniform European protocol we could extract the parameters needed to the MUST. Data collection in all the three cases was randomised, so we did not have influence on the gender ratio.

There is a much stronger relationship between the different conditions and MUST final score than that of diseases and MUST final score. In all the three studies there was a significant correlation between the nutritional status and dysphagia, chewing problems, dementia and loss of appetite. Although in 2008 we could not collect data on fever and both in 2004 and 2006 this had also significant correlation with malnutrition risk, it is advisable to follow-up regularly beside the four above-mentioned conditions also the fever as a status. Number of patients with loss of appetite also increased significantly.

Significant changes were not detected in risk of malnutrition neither according to the BMI nor to the weight-loss, nor on the whole during two years. In contrast to this, results are totally different in 2008. The reasons for this: residents lost more weight, their score for weight-loss was higher on average, and they had more diseases that could influence nutrition. As the prevalence of those conditions that are accountable for the final score of MUST (53% in 2004, 15% in 2008) increased significantly, presumably this is the background of the increase of prevalence of high risk.

The age group above ninety years needs more attention, therefore the staffing and direct financial expenditure should be higher.

We have found significant ($p < 0.0001$) difference between the low and high risk groups in the number of underlying diseases. This result is identical to results of *Feldblum* and co-workers. At the same time neurological diseases correlated significantly with nutritional status in all the three surveys. The prevalence of neurological diseases increased significantly ($p < 0.05$) to 2008.

The BMI of elderly significantly rose to 2008. A shift can be found towards obesity according to prevalence of different BMI categories.

Malnutrition makes rehabilitation slower, thus nutritional screening is crucial in long-term care in order to save the rehabilitation capacity. Our research demonstrates—concordant to the literature—that measuring only body weight and height and calculating only BMI is not enough for this.

Although the BMI was in the optimal range in 2004, 2006 and also 2008, even so one third of the residents in 2004 and 2006 and two thirds of them in 2008 was moderately or highly endangered from point of malnutrition. Their rehabilitation in lack of nutritional therapy will be much longer or even may become impossible. At the same time, those with low risk of malnutrition cannot be regarded surely as well rehabilitating people, because there are diseases and conditions that can rapidly deteriorate the good nutritional status. We could demonstrate

the effect of surgical treatment in 2004 and 2006. Residents are affected mainly by surgical treatment of hip fracture. In their case it was demonstrated earlier that nutritional therapy has beneficial effect on rehabilitation and quality of life. It is obvious that chewing problems determine the quality and quantity of the food that a resident can consume. Chewing problems affects almost half of the residents, from them the status and thus the rehabilitation capacity of even the low risk ones can deteriorate rapidly.

Declining in the cognitive function also makes, statistically demonstrated, worse the nutritional status. Considerable numbers of residents are affected by moderate or serious decline in function. Anorexia linked to decline in cognitive function has negative effect on quality of life, and at the same time malnutrition aggravates further the decline. Nutritional therapy is an important part of the therapy of cognitive function declining in order to save the rehabilitation capacity. Along the international literature we also demonstrated that decline in cognitive function determines risk of malnutrition. Limited mobility is also a condition that is related with nutritional status and affects high number of residents. Aggravating limited mobility is attached to higher risk of malnutrition. The majority of residents with hardly limited mobility belongs to the high risk group, therefore all the residents with limited mobility needs great attention to the success of rehabilitation. 5-10% of the residents suffer from dysphagia and swallowing difficulties, but this prevalence increased almost two-folds in half a decade. Dysphagia is one of the important causes of malnutrition, thus it should be followed-up during the nutritional rehabilitation. Quantity and quality of food and individualizing the serving time should be emphasized, because only from this can be expected that the resident will ingest the necessary nutrients. Oral nutritional supplements should be prescribed if despite every effort is done, the nutritional status cannot be improved.

Residents who need liquid or mashed diet should be treated with attention, because the nutritional status of the majority is deteriorated.

One of the important tasks of the workers in the social field is to create lifelong maintainable health and the best possible quality of life that can be achieved with the contribution of nutritional science (dietetics). The knowledge of nutritional status is informative and authoritative for planning individual care, optimizing nutrition, thus for realization of individual rehabilitation. Documentation of nutritional status should be a mandatory part of it.

Beside measuring body weight and height and calculating BMI, involuntary weight-loss and affecting conditions should be followed-up and evaluated at least every three months, optimally monthly during documenting and monitoring nutritional status.

5. Summary

Elderly are the only segment of the whole population where high increase can be expected in the next decades. There are more than two million people older than 60 years in Hungary, making up more than one fifth of the population. From them, 84 thousands are living in the 1500 long-term or temporary care institutions.

Our aim was to map the most important factors related to the nutrition of the people living in long-term care institutions, in order to give guidance on optimizing nutritional status of residents, to raise the awareness of the care personnel concerning the role of nutritional therapy, and to map the possibilities of nutritional rehabilitation.

The first step was to screen and assess the nutritional status of residents of social homes. We did the follow-up in every second year since 2004. The thesis summarizes the results of these three surveys (2004, 2006 and 2008). In the course of these we screened the nutritional status of altogether 4774 elderly long-term care residents. The ratio of men was 28.9-30.9% that of women was 69.1-71.19%; their mean age was 77.8 ± 8.9 years. We used the MUST and a questionnaire compiled by us for the first two surveys. We used the papers of nutritionDay 2008 in our third study. Such study has never been done before in residents of social homes in Hungary and Central-Eastern-Europe.

We have found out that the prevalence of risk of malnutrition in long-term care institutions is high: it is between 26.0% and 77.0% depending on the criteria used. Our results show, that for assessing the nutritional status it is not enough to evaluate one parameter: more criteria should serve as a source to establish the overall and real situation.

This is the first research about which acute and chronic diseases what kind of role play in the nutritional status, and how they form a parameter in the effectiveness of nutritional therapy.

Malnutrition is always co-morbid factor that worsens the status of patients and residents. Nutritional status influences—among others—risk for infections, susceptibility for pressure sores, drug utilization and also morbidity. One must be aware of the fact, that consequences of malnutrition increase care expenses. Screening (as a part of prevention) and employment of nutritional expert adds to the cost-effectiveness of an institution (e.g. depressible additional care expenses, drug expenses), therefore nutritional assessment of those living in long-term care institutions is not only a basic economic interest, but it is a moral duty in the spirit of “not only to feed, but to nourish”. Nutrition determines quality of life, mood and at last but not at least, the way residents of long-term care institutions feel, therefore the work of personnel responsible for nutrition has an important role. According to our results, in line with literature, adherence to the decree, employment of competent nutritional expert (dietitian) towards meeting demands for special nutrition increases the quality of care. Well defined tasks—also in

the field of nutrition—contribute to raise the level of care that serves the health and quality of life of the residents.

One of the important tasks of the workers in the social field is to create lifelong maintainable health and the best possible quality of life that can be achieved with the contribution of nutritional science (dietetics), too. The knowledge of nutritional status is informative and authoritative for planning individual care, optimizing nutrition, thus for realization of individual rehabilitation.

New scientific results

1. Due to the results of our research, risk of malnutrition is high (26.8-77.0%) in social homes.
2. It is not enough to evaluate one parameter or to answer one or two questions to assess nutritional status: more criteria should serve as a source to establish the overall and real situation, because nutritional status is complicated, it has numerous parameters, thus it is necessary to use more methods at the same time.
3. Assessment of nutritional status of the residents is done four times a year or even more rarely in almost one third (29.5%) of them.
4. Acute and chronic diseases, their stability (dynamic parameters) and also the potential decline in the situation should be part of an exact method. It is necessary to screen, assess, document and continuously follow-up and improve the nutritional status of residents in long-term care for individual, optimized nutrition.
5. Our results show the multifactorial feature of nutritional status. Lots of factors—even such we do not assume about—determines the nutritional status (e.g. limited mobility, fever). Loss of appetite and swallowing difficulties are 2.5-fold, limited mobility, dementia and missing teeth are almost two-fold (1.6-1.7) more frequent in the group of high risk elderly than in the elderly living in social homes.
6. Conditions (chronic diseases) are in closer relationship than acute diseases with final score of MUST. Assessment of nutritional status should be extended with informations about chewing difficulties, dysphagia, dementia and loss of appetite.
7. Neurological diseases are in a significant correlation with nutritional status. Incidence of neurological diseases increased significantly in the last years.
8. Different risk factors should be followed-up with great attention in every resident. Residents with multiple risk factors should be monitored by all the members (physician, nurses, dietitian, social worker, etc.) of the nutritional team.
9. Residents older than ninety years need more attention, therefore the staffing and direct financial expenditure is higher.
10. Residents who need liquid or mashed diet should be treated with great attention, because the nutritional status of the majority is deteriorated.

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