Original Study

nutritionDay in Nursing Homes—The Association of Nutritional Intake and Nutritional Interventions With 6-Month Mortality in Malnourished Residents

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ABSTRACT

Objectives: Malnutrition in older persons is associated with an increased risk of mortality. Useful strategies to counteract malnutrition are nutritional interventions, such as fortified diets, oral nutritional supplements (ONS), tube feeding, and parenteral nutrition. Presently, it is not known if these strategies can reduce mortality risk of nursing home (NH) residents who are malnourished or at risk of malnutrition. Thus, the aim of this study was to investigate if nutritional intake and interventions are associated with mortality in this specific population.
Design: One-day cross-sectional study with outcome evaluation after 6 months, repeated in yearly intervals since 2007.
Setting: A total of 507 NH units from 15 countries.
Participants: NH residents participating in the nutritionDay between 2007 and 2014, aged 65 years or older with a poor nutritional status (body mass index $<$20 kg/m^2 or weight loss $>$5 kg in the last year or at risk of malnutrition or malnourished according to NH staff).
Measurements: Data on resident and unit level were collected on nutritionDay and mortality status was assessed 6 months later. Residents' nutrition (intake at lunch on nutritionDay) and nutritional interventions (diet, use of ONS, supplementary tube feeding, supplementary parenteral nutrition) were of interest as influencing factors of 6-month mortality, adjusted for 23 potential confounders (residents' nutritional status, general residents' characteristics, and unit characteristics). Univariate generalized estimating equations were performed for all variables and significant predictors ($P < .01$) included in a multivariate analysis.
Results: Six-month mortality rate of the included 4857 NH residents was 20.3%. Univariate analysis identified residents' diet, use of ONS, intake at lunch, and 14 confounders as predictors of mortality. Intake at lunch and 7 confounders remained in the multivariate model [area under the receiver operating curve = 0.687; 95% confidence interval (CI) 0.669–0.706; $P < .001$]. The less residents ate for lunch, the higher was the risk of mortality, with the highest odds ratio (OR) for residents who ate nothing (OR 3.38; 95% CI 2.58–4.42). Mortality risk was OR 2.36; 95% CI 1.91–2.92, and OR 1.64; 95% CI 1.29–2.07 times higher for immobile and partially mobile compared with mobile residents. Cancer, dysphagia, weight loss $>$5 kg in the last year, body mass index $<$20 kg/m^2, residents' country region, and increasing age were also associated with a higher mortality risk.
Conclusions: Poor intake at lunch on nutritionDay was a strong predictor of mortality, whereas the use of nutritional interventions was not associated with 6-month mortality in NH residents who are malnourished or at risk of malnutrition. The reasons for these findings need to be clarified.

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Malnutrition is highly prevalent in nursing homes (NHs), with reported rates up to 66.5%[1] and is associated with an increased risk of mortality,[2–10] functional decline,[11] and decreased quality of life.[12]

Fortified diets, oral nutritional supplements (ONS), tube feeding, and parenteral nutrition are useful strategies to increase or insure nutritional intake in malnourished persons.[13] Providing nutritional support to residents who are malnourished or at risk of malnutrition aims to improve or maintain nutritional status and should consequently lead to a better outcome, compared with residents with malnutrition who do not receive specific nutritional care. Benefits of nutritional interventions regarding nutritional intake,[14–20] body weight,[14,15,21] and quality of life[16] have been shown in numerous intervention studies in NH residents at nutritional risk. Beneficial effects on mortality, however, are uncertain and insufficiently addressed in NH residents.

A meta-analysis of 25 randomized intervention studies including 2461 undernourished older persons showed a significantly reduced mortality rate in participants receiving ONS compared with control groups.[22] Of the studies included, 2 studies were conducted in a NH, but without significant effects on mortality risk.[23,24] In a large retrospective cohort study using the Minimum Data Set database, receiving mechanically altered diets was not related to mortality in newly admitted and long-stay American NH residents, and the use of tube feeding was associated with an increased risk of mortality in long-stay but not in newly admitted residents.[7] A smaller cross-sectional study with 6-month and 1-year follow-up showed higher death rates after 12 months in Danish NH residents receiving mechanically altered diets and after 6 months in residents receiving tube feeding.[25] These studies did not specifically focus on residents who were malnourished or at risk of malnutrition.

nutritionDay is a large survey of NH residents from 21 countries worldwide with information on residents' nutrition and nutritional status as well as outcome after 6 months. Thus, the aim of this study was to investigate if nutritional intake and nutritional interventions are related to mortality in NH residents who are malnourished or at risk of malnutrition using the nutritionDay database.

Methods

Study Design

The nutritionDay in NHs project is a 1-day cross-sectional survey with an outcome evaluation after 6 months. It was conducted annually in NHs worldwide since 2007 with the primary aim to increase awareness for malnutrition and to enhance the quality of nutritional care for NH residents.[26] The project is promoted by the European Society for Clinical Nutrition and Metabolism, national nutritional societies, and national project coordinators via emails, newsletters, journal reports, and flyers that are distributed at congresses (such as ESPEN Congress or EUGMS Congress).

Participation is open to any NH unit that registers on the nutritionDay homepage (www.nutritionday.org), and center and unit codes are allocated to ensure anonymous participation. Data on resident and NH characteristics are obtained from 5 questionnaires that are available online. Data collection and online data entry into the nutritionDay database are performed by local NH staff that is provided with detailed descriptions and instructions in advance on how to fill out the questionnaires and to enter the data. Participating NHs receive an automatically generated report on their results immediately after data entry completion.

The nutritionDay project was approved by the ethical committee of the Medical University of Vienna, Vienna, Austria, by the Friedrich-Alexander Universität Erlangen-Nürnberg, Nuremberg, Germany, and by local ethical committees if required by national rules. Written or oral consent was given by the residents ahead of participation.

Participants

The present analysis is based on data of NH residents participating in nutritionDay between 2007 and 2014, with available 6-month outcome data, aged 65 years or older, and with poor nutritional status, defined as body mass index (BMI) <20 kg/m^2, weight loss >5 kg in the last year, or being at risk of malnutrition or categorized as malnourished according to NH staff. Obese residents (BMI >30 kg/m^2) were excluded because of a well-known protective effect of obesity regarding mortality. Residents receiving tube feeding or parenteral nutrition as the only source of nutrition were excluded because of suspected severe underlying illness also having profound impact on mortality. Residents from Japan were excluded for being the only country representing the Asian region.

Outcome

Outcome is mortality 6 months after the nutritionDay (dichotomous: yes, no), determined by the question about the residents' habitation (still in NH, transferred to another NH, discharge home, or death).

Residents' Nutrition

Residents' nutrition is of interest as potential predictor of 6-month mortality. It is assessed by the following 5 variables: (1) diet (normal/special diet, mechanically altered, fortified, unknown), (2) ONS (yes, no), (3) supplementary tube feeding (yes, no), (4) supplementary parenteral nutrition (yes, no), and (5) portion of lunch eaten on nutritionDay assessed by plate diagrams (all, half, quarter, nothing, missing or do not know).

Potential Confounders

The following 23 variables at resident and NH unit level were considered as potential confounders. All variables except age were categorical variables.

Residents' nutritional status is characterized by (1) BMI, calculated as body weight (kg)/height^2 (m) and categorized in underweight (BMI <20 kg/m^2)[13] and normal weight/overweight (BMI ≥20–29.99 kg/m^2),[27] (2) weight loss >5 kg in the last year (yes, no), and (3) nutritional status according to NH staff (normal nutritional status, at risk of malnutrition, malnourished).

General residents' characteristics included 18 variables: age, sex (female, male), cognitive impairment (none, slight to moderate, severe), mobility (mobile, partially mobile, immobile), dysphagia (yes, no), chewing problems (yes, no), dehydration (yes, no), number of drugs (categorized as less than 5 and 5 or more), intake of antibiotics (yes, no), opiates (yes, no), and psychoactive substances (yes, no), having neurologic, musculoskeletal, cardiovascular, endocrine, digestive diseases, and cancer (yes or no, respectively). Residents' countries of origin were grouped into geographic subregions in accordance with the World Health Organization: Western Europe including Austria, Switzerland, France, Germany, United Kingdom, and Belgium; Northern Europe including Denmark, Finland, Norway, and Sweden; Eastern Europe including Czech Republic, Hungary, and Poland; Southern Europe including Spain, Italy, Portugal and Turkey; and North America including Canada and the United States.[28]

Unit characteristics were availability of a nutritional expert (dietitian and/or person responsible for nutritional care) (yes, no) and weighing of residents and/or screening for malnutrition at least once per month (yes, no).