



## Original article

## Estimating the costs associated with malnutrition in Dutch nursing homes

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## SUMMARY

**Backgrounds & aims:** Malnutrition in western health care involves a tremendous burden of illness. In this study the economic implications of malnutrition in Dutch nursing homes are investigated as part of the Health and Economic Impact of Malnutrition in Europe Study from the European Nutrition for Health Alliance.

**Methods:** A questionnaire was developed, focussing on the additional time and resources spent to execute all relevant nutritional activities in nursing home patients with at risk of malnutrition or malnourished. Results were extrapolated on national level, based on the prevalence rates gathered within the national Prevalence Measurement of Care Problems 2009.

**Results:** The normal nutritional costs are 319 million Euro per year. The total additional costs of managing the problem of malnutrition in Dutch nursing homes involve 279 million Euro per year and are related to extra efforts in nutritional screening, monitoring and treatment. The extra costs for managing nursing home residents at risk of malnutrition are 8000 euro per patient and 10000 euro for malnourished patients.

**Conclusions:** The extra costs related to malnutrition are a considerable burden for the nursing home sector and urge for preventive measures.

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## 1. Introduction

A large number of patients in European healthcare organizations are malnourished.<sup>1–7</sup> Therefore since 2005, the European Nutrition for Health Alliance has raised awareness of malnutrition as a significant public health problem that is extensively under-recognized and under-treated.<sup>1</sup> Malnutrition (meaning undernutrition) is a serious burden, leading to increased mortality, longer hospital stays, more GP visits, more intensive nursing care, increased requirement of nursing home care, decreased quality of life and increased complication rates.<sup>3–8</sup> Both in terms of its impact on individuals' health status and their increased needs for care and social services, malnutrition is a tremendous burden of illness in western societies, leading to costs of billions of euro's every year.<sup>9</sup>

Quantifying this burden is a critical step in improving and completing our understanding of how malnutrition manifests itself amongst people of different age groups and clinical conditions. A

small number of studies have assessed the economic implications of malnutrition related to hospital stay, residential care and community care. A UK study found that malnutrition costs £7.3 billion each year, more than double the projected £3.5 billion cost of obesity.<sup>10</sup> The bulk of these costs arises from the treatment of malnourished patients in hospital (£3.8 billion) and in long-term care facilities (£2.6 billion). Other associated costs arise from GP visits (£0.49 billion), outpatient visits (£0.36 billion), and enteral and parenteral nutrition, tube feeding and oral nutritional supplementation in the community (£0.15 billion).<sup>10</sup> The Erasmus MC University Medical Centre Rotterdam assessed the total additional health care costs of disease related malnutrition in the Netherlands roughly at 1.7million euro, using the prevalence of malnutrition as an indicator for calculating costs.<sup>11</sup> This is equal to 2.8% of the total care costs in the Netherlands and 5.8% of the total costs in hospitals, care homes and home care.<sup>12</sup> Despite this, no published studies exist, involving more precise economic implications of malnutrition in Dutch care homes.

In the Netherlands, long-term institutional care can be divided into residential homes and nursing homes. Residential homes ( $n = 1000$ ) mainly offer assisted living (a safe living environment) to older people who are still able to do a considerable part of their

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ADLs themselves. In our study we focus on nursing homes. There are about 345 nursing homes in the country. Disabled persons with chronic somatic (i.e., physical) diseases or with progressive dementia, mainly elderly who are not able to do their ADLs and who need plural, more complex continuing care and monitoring, which are beyond the range of home care services or the service in residential homes, are often admitted to a nursing home. The nursing home sector has more than 60,000 beds. 27,000 beds in somatic wards, primarily for patients with physical diseases (e.g. stroke, other neurologic disorders like Parkinsonism and multiple sclerosis, problems affecting mobility and malignancies) and 36,000 in psychogeriatric wards for patients with dementia. Approximately 60,000 new patients (mean age 80 years) are admitted every year. Most of the somatic patients are admitted from the hospital (65%) or by their family physician (26%); psychogeriatric patients primarily come from their own home (53%), from a residential home (23%), or from a hospital (20%). Nursing homes employ their own multidisciplinary staff and this team consists, next to physicians and nurses, of physiotherapists, occupational therapists, speech therapists, dietitians, psychologists, social workers, pastoral workers, and recreational therapists.<sup>13</sup>

This study aims to determine the economic implications of malnutrition more precisely in nursing homes in the Netherlands, using the 'bottom-up' approach, in which costs of individual treatments, use of resources and the time spent on nutritional screening, monitoring and treatment of malnutrition are taken into account.

## 2. Materials and methods

In this study the economic costs of malnutrition were calculated for Dutch nursing homes by integrating 4 different approaches. For the calculation of economic costs, data were collected on time spent performing activities such as nutritional screening, diagnostics, monitoring, prevention, treatment, (multidisciplinary) communication and on which disciplines executed the activities (approach 1). To extrapolate these data, further data on at risk of malnutrition or malnourished prevalence (approach 2), salary costs and nutritional support costs (approach 3), were required. Finally to extrapolate the results to the total nursing home population, data on the number of patients that are living in the Dutch nursing homes were obtained (approach 4).

These 4 approaches more precisely included:

1. A questionnaire based on a literature review and open interviews (with ten dietitians specialized in nutritional care for nursing home patients for at least ten years).

This questionnaire was developed to measure all general time and actions taken and involvement of different disciplines in patients that are at risk of malnutrition or malnourished in nursing homes. To map all costs the questionnaire included questions concerning the whole nutritional cycle: nutritional screening, diagnostics, monitoring, prevention and treatment and (multidisciplinary) communication. Monitoring was defined as systematically examining the nutritional status of the patient by examining weight, nutritional as well as fluid intake, reporting of eating or swallowing disorders, repeating nutritional screening. Communication was defined as multidisciplinary meetings in which the assessment results and treatment plan of patients are discussed and evaluated within a group of different disciplines including a nurse, physician, dietician, physiotherapist, speech therapist, occupational therapist etc. General costs include costs of nutritional screening, weight measurements, monitoring weight and nutritional intake and costs for meals. Extra costs include the extra time (costs) spent

on patients at risk of malnutrition or with malnutrition concerning diagnostics, extra monitoring, treatment and communication.

The questionnaire consisted of 41 questions (mostly using Likert scales). In all parts of the questionnaire the questions focused on the time spent to perform activities and on the disciplines executing the activities. The questionnaire consisted of twelve questions on screening at admission, monitoring, diagnosing and screening after admission. A distinction was made between patients at risk of malnutrition and patients with malnutrition. Per part, five extra questions were asked about screening, diagnostics and monitoring. Next to that, four questions were asked about the investment of time and disciplines in multidisciplinary meetings and finally thirteen questions on nutritional interventions/treatment (diets, oral nutritional support, consultation of dietician, weighing policy, nutritional screening, and time spent with help during mealtime etc.) The questionnaire was disseminated as a web-based questionnaire to another 30 dietitians randomly chosen from nursing homes throughout the Netherlands, which participated in the LPZ.

2. Data of the annual independent National Prevalence Measurement of Care Problems of Maastricht University (LPZ: Landelijke Prevalentiemeting Zorgproblemen [www.LPZ-UM.eu](http://www.LPZ-UM.eu)) of 2009 were used to obtain prevalence rates of malnutrition and prevalence rates of patients at risk of malnutrition in nursing homes.<sup>14</sup>

Malnutrition was defined according to one of the three following criteria: 1) BMI  $\leq 20$  kg/m<sup>2</sup>, 2) unintentional weight loss ( $\geq 6$  kg in the last six months or  $\geq 3$  kg in the last month), or 3) no nutritional intake for three days or reduced intake for more than ten days combined with a BMI of 21–23 kg/m<sup>2</sup>. Risk of malnutrition was defined according to one of the two following criteria: 1) BMI of 21–23 kg/m<sup>2</sup>, 2) no nutritional intake for three days or reduced intake for more than ten days. This operationalization was tested positively for face validity and criterion validity.<sup>15</sup>

Furthermore data were also derived from LPZ about the patients' mobility, since mobility influences the time to weigh a patient. Patients were divided in two categories of mobility: being bed/chair bound (0) and walking frequently/occasionally (1). For further nutritional interventions insight was achieved in percentages of patients using nutritional support including enriched foods, nutritional supplements and tube feeding.

3. As personnel costs of the disciplines were required for the costs calculations, the Dutch 2009 national collective labour agreement was used. A standard surcharge of 40% was used for overhead and social insurance costs. Data on costs of oral nutritional support, nutritional supplements, tube feeding, energy and protein enriched diets and snacks were obtained using official 2009 price lists of wholesale and different food companies.
4. To extrapolate the results to the total nursing home population, data on the number of patients living in Dutch nursing homes were gathered by using official Dutch government publications of the Statistics Department Netherlands (CBS) and the National Institute for Public Health and the Environment (RIVM).

## 3. Analysis

Data gathered by these 4 different approaches were combined in one Excel file. Salary costs were calculated per discipline per minute since the information of the time spent to perform activities was registered in minutes. The minutes were extrapolated to years

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