Summary

Introduction

Due to the aging population, the high proportion of older individuals living independently in the community and the increasing prevalence of undernutrition with age, undernutrition is a significant problem in community-dwelling older individuals. Undernutrition can be defined as "a disorder of nutritional status from reduced nutrient intake or impaired metabolism". A feasible and validated instrument for assessing undernutrition in community-dwelling older individuals is needed. Furthermore, insufficient scientific evidence is available for the treatment of undernourished older individuals in primary care. This thesis describes possibilities for the recognition and treatment of undernutrition in community-dwelling older individuals. The aim was to evaluate the effectiveness and cost-effectiveness of a dietetic treatment in primary care of older individuals assessed as undernourished.

Recognition: main findings

Three studies were performed concerning the recognition of undernutrition. We first identified a variety of determinants associated with the development of undernutrition during a 9-year follow-up in a general older population participating in the Longitudinal Aging Study Amsterdam (LASA) in **Chapter 2**. Those reporting a poor appetite and those with functional limitations (reporting difficulty climbing a staircase) had the highest risk to develop undernutrition in the future. Then we developed and validated a quick and easy-to-apply assessment instrument for undernutrition in the community in **Chapter 3**: the Short Nutritional Assessment Questionnaire 65+ ($SNAQ^{65+}$). With the $SNAQ^{65+}$, a distinction can be made between:

1. *Undernutrition*: mid-upper arm circumference (MUAC) <25 cm *or* ≥4 kg unintentional weight loss within the past 6 months
2. *Risk of undernutrition*: poor appetite in the last week *and* difficulty climbing a staircase
3. *No undernutrition*: other

The hazard ratio for 15-year mortality was 2.22 (95% CI 1.83; 2.69) for the undernourished group (1) and 1.57 (1.22; 2.01) for the group wit risk of undernutrition (2). The area under the curve was 0.55. The $SNAQ^{65+}$ can be easily performed in older community-dwelling individuals and shows good face validity and moderate predictive validity. Subsequently, a prevalence study was performed and described in **Chapter 4** to investigate the extent of the problem of undernutrition in the older community. This study showed that undernutrition is a substantial problem in older individuals in the community. The prevalence of undernutrition, assessed with the $SNAQ^{65+}$, was 35% in patients receiving

home care, 12% in general practice patients during the influenza vaccination and 11% in a general older population. The prevalence of the risk of undernutrition in those three samples was 9%, 2% and 11% respectively. The prevalence of undernutrition increased with age in general practice patients and in the general older population. The prevalence in those aged ≥85 year was 23% in general practice and 21% in the general older population. In home care patients, no relationship with age was found.

Treatment: main findings

The effectiveness of the randomized controlled trial (RCT) of a dietetic treatment in 146 older, undernourished, community-dwelling individuals is described in **Chapter 5**. Participants were randomized to either the intervention or control group. The intervention group (*N* 72) was referred to and treated by a primary care dietitian. The control group (*N* 74) was not referred to a dietitian, but received a standard brochure with general information about healthy eating habits. Both groups were prescribed combined calcium plus vitamin D supplements. After 6 months, no statistically significant effect of the intervention was found on the primary outcomes body weight, physical performance and handgrip strength. Also no treatment effect was found on nutritional intake and body composition. Subgroup analyses showed that the treatment was effective on body weight in physically active participants and in participants with a normal appetite. Furthermore, costs were measured from a societal perspective to evaluate the cost-effectiveness of the dietetic treatment in **Chapter 6**. No statistically significant differences between the intervention and control group were found for the effects on body weight change and QALY, and on total costs. The ICER for body weight gain was 2111, and the ICUR for QALYs was not interpretable. No cost-effectiveness of the treatment was shown.

A post-hoc analysis was performed in **Chapter 7**, including only participants from both the intervention and the control group with a repeated body weight assessment at the 6 month follow-up examination (*N* 126). The aim was to develop a prediction model for future body weight loss. During 6 months follow-up, 26% of the study sample lost ≥3% weight and 26% gained ≥3% weight. Positive predictors for losing ≥3% weight in 6 months were poor cognitive status, poor physical quality of life, receiving household care and a higher BMI. The prediction model may provide a helpful tool in identifying those who are likely to experience further weight loss. Targeting treatment to these high-risk individuals may be more cost-efficient than targeting treatment to the whole group of undernourished individuals, as weight regain has been observed in older persons after a period of weight loss.

Conclusions

We conclude that undernutrition is a prevalent problem in community-dwelling older individuals. A dietetic treatment, as currently provided by trained dietitians in primary care, was not effective or cost-effective on body weight and quality of life. Also no effects were found on physical performance, handgrip strength, nutritional intake and body composition.

Future studies should focus on the early detection of individual risk factors associated with the development of undernutrition and investigate possibilities for appropriate prevention strategies. In clinical practice, more attention is needed for the screening of those at high risk for developing undernutrition and for creating awareness in older individuals themselves for health nutrition and prevention of weight loss. Potential underlying causes of undernutrition should be determined better, followed by active treatment of these factors.

Treating specific, individual, underlying determinants and problems associated with the undernourished condition may be an effective strategy to prevent the development of undernutrition in those at risk of undernutrition and may also support in the management of undernutrition. A large multicenter study is needed to enable the execution of predefined subgroup analyses to detecting those older undernourished individuals who will benefit from nutritional treatment (using supplements and/or ordinary food products). A core set of primary outcome measures should be included in all future studies to facilitate pooling of data and performance of meta-analyses. Another challenge is to improve the registration of patient characteristics, provided treatment and treatment results in clinical practice to support better understanding of which treatment elements will be effective in which individuals.