



Summary



Introduction

Even though undernutrition has gained more attention in the Western world over the past decades, it remains a significant health care problem affecting one in every four hospitalized patients. Undernutrition can be defined as ‘a disorder of nutritional status resulting from reduced nutrient intake or impaired metabolism’. Early recognition and treatment of undernutrition is essential in preventing a further decline of the nutritional status and associated negative consequences, and requires a multidisciplinary approach. In the past years, screening and treatment of undernutrition in hospital inpatients has been implemented in all Dutch hospitals. As hospital admission time declines, hospital care, including the recognition and treatment of undernutrition, is shifting towards the outpatient setting. This thesis aims to identify barriers and enablers for successful implementation of screening and treatment of undernutrition in hospital inpatients, and to investigate possibilities for early recognition and treatment of undernutrition in (high risk) outpatient departments.

Recognition and treatment of undernutrition in hospital inpatients

In 2007, systematic screening for undernutrition in hospitalized patients was introduced as a performance indicator (PI) within the National Benchmarks on Quality of Care of the Dutch Health Care Inspectorate (HCI), followed by a systematic recording of optimal treatment followed in 2008. Results of the PI undernutrition screening between 2007 and 2010 are described in **Chapter 2**. The number of hospitals reporting data significantly increased over the years, adding up to more than 1 million hospitalized patients screened for undernutrition in the dataset of 2010. Screening percentages increased from 51% in 2007 to 72% in 2010, and are still increasing. In parallel, the results suggest a subtle decline in prevalence of undernutrition from 18% to 15%. Screening results were better in hospitals with more clinical admissions compared to smaller hospitals, in hospitals having regulations on protocol-defined referral to a dietician and in hospitals screening with the SNAQ screening tool compared to the MUST screening tool. Reported barriers and enablers for successful screening were related to engagement with regard to undernutrition of medical staff, screening as a mandatory item in (electronic) patient records, and clear multidisciplinary responsibilities with regard to undernutrition screening and treatment.

Treatment of undernutrition focusses on adequate provision of protein and energy. Patient-related predictors for achieving the recommended protein (≥ 1.2 g protein per kg body weight per day) and energy (according to Harris-Benedict predictive equation + 30% kcals) targets on day 4 of admission are described in **Chapter 3**. Only 26% of

undernourished hospitalized patients met both targets. Protein targets were less commonly met (28%) than energy targets (39%). The presence of nausea, cancer, acute infections, and a higher BMI were identified as factors lowering the likelihood of achieving the protein and energy targets. Higher age, chronic lung disease and use of tube feeding increased this likelihood.

Recognition and treatment of undernutrition in hospital outpatients

Three studies concerning the recognition and treatment of undernutrition in hospital outpatients were performed. Firstly, a cross-sectional multicenter (n=2288) prevalence study was performed to gain insight in the prevalence of undernutrition in the outpatient setting and to establish high-risk departments (**Chapter 4**). The overall prevalence of severe undernutrition was estimated to be 5% and moderate undernutrition 2%. The highest prevalence of undernutrition was observed in the departments of oral maxillofacial surgery (17%) and oncology (16%). Only one in six undernourished patients received dietetic treatment.

Secondly, the diagnostic accuracy of the MUST and SNAQ screening tools to recognize undernutrition in the outpatient setting was assessed (**Chapter 5**). The validity of both MUST and SNAQ was found to be insufficient in a large outpatient sample, with overestimation according to MUST (positive predictive value: 43-59%), and underestimation according to SNAQ in general (sensitivity: 42-45%) and MUST for older individuals (sensitivity: 58%). Post-hoc, combining SNAQ with BMI resulted in good to excellent diagnostic values (89-100%). However, this combination resembles the used reference method and thus cannot be considered a screening tool. It is therefore advised to use BMI and unintentional weight loss to assess undernutrition in the outpatient setting.

Thirdly, the effect of an early nutritional intervention in the high-risk head and neck cancer department in a comparative study in **Chapter 6**. Patients receiving early individualized dietary counseling initiated at their first outpatient visit were compared to a historical control group receiving usual care. No statistically significant differences between groups could be demonstrated for weight change, major postoperative complications, (chemo)radiotherapy complications or length of hospital stay. However, patients receiving early individualized dietary counseling had a statistically significant lower rate of minor postoperative complications compared to usual care.

Conclusions and recommendations

Screening at hospital admission has significantly improved since the introduction of the performance indicator, which has proven to be a valuable tool to ensure optimal screening. Yet, the treatment of undernutrition still needs improvement. The identification of enablers and barriers for achieving the protein and energy targets provides opportunities for improving nutritional care. Moreover, logistic factors and attitudes of medical staff should be addressed both bottom-up and top-down to improve nutritional care in the hospital setting. A RCT including three treatment arms (i.e. 0.8 g/kg, 1.2 g/kg and 1.5 g/kg) could provide solid evidence which protein level is optimal for undernourished hospital patients with regard to short-term and long-term outcomes.

New opportunities should be explored in outpatient screening as health care is shifting from clinical hospital care towards outpatient care. Even with a rather low prevalence of undernutrition, the number of undernourished outpatients adds up to thousands of undernourished patients per year. Future research should concentrate on validity and feasibility of self-screening with (self-reported or measured) BMI and weight loss in order to identify undernourished patients; in addition optimal multidisciplinary treatment strategies should be developed for different 'patient routings'. Introducing mandatory screening in several high-risk outpatient departments as a performance indicator is a first step towards optimal undernutrition recognition and treatment care in hospital outpatients.