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Disease-related malnutrition and nutritional assessment in clinical practice

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General Introduction

Disease-related malnutrition

Malnutrition has been defined as “a state resulting from lack of intake or uptake of nutrition that leads to altered body composition (decreased fat-free mass) and body cell mass leading to diminished physical and mental function and impaired clinical outcome from disease”.¹ The prevalence of malnutrition in hospital populations is reported to vary between 11-45%, however, these prevalence rates are based on screening rather than diagnoses based on nutritional assessment.²⁻⁴ The prevalence of malnutrition primarily depends on the following factors: type of patient population, implementation of standard nutritional screening and assessment, and the instrument that is used.⁵

Clearly, to prevent or treat malnutrition, early recognition of the (risk for) malnutrition is necessary. Whereas malnutrition may be disease-related, it is not a disease-specific condition. However, the prevalence of malnutrition, its characteristics, and the subsequent necessary interventions may vary in different patient populations. Therefore, it is necessary to assess the prevalence of (risk for) malnutrition and determine which patients are specifically at risk per population so that a more comprehensive screening can occur. In addition, there is a need for determining the characteristics of (risk for) malnutrition that can be intervened upon such as nutrition impact symptoms, e.g., nausea or pain, decreased nutritional intake, and/or limitations in functionality and activity.

Nutritional assessment

Nutritional assessment differs from nutrition screening regarding the depth of the information that is obtained that allows the dietitian to make a diagnosis. Through nutritional assessment, the dietitian is able to diagnose a nutrition(-related) disorder/condition to determine the severity of malnutrition or nutrition-related condition, to plan adequate intervention, and to evaluate the effectiveness of the therapy.⁵ As (risk for) malnutrition cannot be recognized at first glance, there appears to be a strong need to perform comprehensive screening to quickly screen for, assess, and intervene upon malnutrition.⁵ To be able to timely identify and address the nutritional problems underlying (risk for) malnutrition in each patient individually, the Scored Patient-Generated Subjective Global Assessment (PG-SGA) and its Short Form (PG-SGA SF) were the selected methods to respectively assess and screen for malnutrition in the studies included in this thesis. The PG-SGA (SF) is one of the few instruments covering all domains of the malnutrition definition and has demonstrated high specificity and sensitivity for assessing (risk for) malnutrition in different patient populations.⁶⁻¹⁰ The PG-SGA includes four Boxes designed to be completed by the patient. Box 1 addresses the history of weight loss; Box 2 evaluates changes in food intake; Box 3 addresses the presence of nutrition impact symptoms (NIS); and Box 4 evaluates activities and function. In addition to this patient-generated component of the PG-SGA, the second component is completed by the professional. This professional component addresses conditions that increase nutritional requirements (Worksheet 2), metabolic stress (Worksheet 3),

and a physical examination of body composition (Worksheet 4). Based on the four Boxes and the physical exam, patients are categorized as well nourished (PG-SGA A), moderate or suspected malnutrition (PG-SGA B), or severely malnourished (PG-SGA C).⁷

To be able to recognize and adequately intervene upon malnutrition or a nutrition-related condition, healthcare professionals in general and dietitians in specific need sufficient knowledge of the different nutrition (-related) disorders/conditions.¹¹ Therefore, the aim of the third study was to determine whether dietitians have sufficient knowledge regarding malnutrition and nutrition-related conditions, i.e., starvation, cachexia, and sarcopenia, and whether they use the related terminology in the documentation of their daily clinical work. In addition, in the fourth study, the aim was to review whether, in a population with a very high prevalence of malnutrition, i.e., in patients with tuberculosis,¹² researchers operating in the field of nutrition and tuberculosis display knowledge regarding nutritional assessment and implications of malnutrition.

To diagnose malnutrition, measurement of body composition, i.e., muscle mass, and function is necessary by definition.¹³ However, as feasible direct methods to determine the exact body composition are lacking, adequately measuring muscle mass is still challenging. Methods to measure body composition, for example, are dual-energy absorptiometry (DXA) that can assess lean mass and bioelectrical impedance analysis (BIA) that can provide estimates of fat-free mass, lean mass, or muscle mass. The DXA is a valid and reliable method but is expensive, and limited access to the instrument hinders its use in clinical practice.¹⁴ BIA is a reliable method but whereas its validity may be adequate on the group level depending on the equation used, its validity on the individual level may be limited in clinical populations due to changes in hydration status.^{15,16} Ultrasound measurement may add to the possibilities of measuring muscle mass as ultrasound is a valid and reliable method that facilitates both quantification and qualification of peripheral muscles.^{17,18} Thus, the aim of the fifth study was to explore the added value of ultrasound measurement of muscle mass in patients with COPD.

Malnutrition and Frailty

Frailty is a nutrition-related condition and is considered a “multidimensional clinical state, in which an individual’s vulnerability for dependency on care, or mortality, is increased when exposed to a stressor, due to a lack of reserve capacity”.^{13,19} Frailty is a dynamic system in which causes and consequences have yet to be clarified. In different domains, various factors of frailty exist such as nutritional status, mobility, energy, strength, cognition, mood, social relations and support, and relationships between these factors may contribute to the level of frailty.²⁰ Due to a lack of consensus or gold standard for measuring frailty, many different methods for assessment of frailty are used, which contributes to the widely differing prevalence rates of frailty.²⁰ Another factor that contributes to the wide range in prevalence rates is the use of terminology regarding frailty. Frailty is often used to describe measures of

the construct of physical frailty. This construct is based on factors in solely the physical domain that relate to muscle mass and muscle function, i.e., weakness, slowness, exhaustion, poor endurance, and weight loss, as first operationalized by Fried et al.²¹ In contrast, the multidimensional construct of frailty comprises the cognitive and psychosocial domains as well and provide a more comprehensive representation of the patient's well-being.

Malnutrition and frailty may be overlapping syndromes since both are, to a large extent, defined by a decrease in muscle mass and functional performance as well as adverse clinical outcome.^{22,23} Furthermore, these conditions share social, demographic, and cognitive risk factors.^{22,23} However, the underlying mechanisms differ as malnutrition is primarily caused by an imbalance between nutritional intake and nutritional requirements, and frailty is predominantly caused by immobility, ageing, and psychosocial impediments.²⁴ Insight into the coexistence and correlation between these conditions in patients with COPD, as an example of a chronic disease, may help to identify required interventions to improve the patient's health status.

Although frailty is likely to occur with ageing, it has been suggested that chronic illness itself, and possibly related malnutrition, accelerate the process of biological ageing.²⁵ Frailty may then also be present in younger but chronically ill patients such as in patients with COPD. In community-dwelling older adults and geriatric outpatients, malnutrition has been associated with physical frailty.^{26,27} Coexistence of malnutrition and frailty, however, has not yet been explored in clinical populations. Therefore, in the sixth study, the objective was to study their coexistence in patients with COPD.

Dietary resilience

Resilience is defined as “a dynamic process encompassing positive adaptation within the context of significant adversity”.²⁸ According to the transtheoretical model of behavior change, the development of strategies to overcome barriers is crucial to the conviction that one can attain a goal.^{29,30} Dietary resilience is described as the “development and use of adaptive strategies that enable an individual to maintain an adequate diet despite facing dietary challenges”.³¹ However, dietary resilience may not per se result in a healthy diet as developed strategies do not necessarily lead to the attainment or maintenance of a healthy diet.³²

Dietary resilience, nevertheless, could be one of the missing links in addressing food-related challenges that may otherwise lead to malnutrition such as in patients with a chronic disease that face barriers in different domains of their daily activities. For example, patients with COPD

experience symptoms such as breathlessness and fatigue that may impact grocery shopping, cooking, and eating.³³ A dry mouth, stomach ache, and other pain may affect appetite and, therefore, hinder food intake in this patient population.³⁴ The prevalence of malnutrition in this patient population varies between 11% to 62%, depending on disease severity.^{35,36} To prevent malnutrition, it is of major importance to learn about strategies

and motivational resources that patients with COPD use to overcome food-related barriers. Being aware of how and why strategies are applied by a patient might be beneficial for helping another patient. This knowledge could enhance further development of professional nutritional care for patients with COPD. Therefore, the aim was to learn from the seventh study what strategies are used by patients with COPD to overcome specific food-related challenges and to identify the key themes of motivation for the process of dietary resilience.

Research objectives/aims

Although not always curative, improved treatment is currently available for an increasing number of diseases. As a consequence, a large group of people are now living with one or more chronic diseases.³⁷ Diseases such as cancer, heart failure, chronic kidney disease, and HIV often require intense treatment modalities such as chemotherapy, radiation, surgery, transplantation, chronic use of immunosuppressants, corticosteroids, antibiotics, and antiretroviral drugs. As a side-effect to diseases and their treatments, patients often become at risk for malnutrition.¹ Nutrition impact symptoms such as fatigue and loss of appetite are common during illness. Due to insufficient nutritional intake and immobility, patients may consequently lose weight, in particular muscle mass, which may negatively influence physical functioning.¹ Reduced functioning impacts daily activities such as getting dressed or grocery shopping and other muscle-related functions, such as the immune system.³⁸⁻⁴⁰ As a consequence, loss of functioning may impact psychosocial domains since patients may be unable to attend social events and maintain friendships. In current healthcare, the focus is to address the disease of the patient and not so much the ‘collateral damage’ of insufficient nutritional intake and immobility that is caused by the disease and its treatment. (**Figure 1**) This may not only impact the patient’s functioning but also clinical outcome.⁴

This thesis aims to provide new insights and knowledge with regard to the (risk) assessment of disease-related malnutrition and its implications for healthcare professionals in order to improve their care for patients in daily clinical practice. The objectives were to contribute to the current knowledge on identifying patients in need of a nutritional intervention and the associations of (risk for) malnutrition with clinical outcome. In addition, aims were to identify knowledge gaps with regard to recognition of malnutrition and nutritional assessment among healthcare professionals and to explore the experiences of patients with regard to food-related activities when these are becoming challenging. In these studies, the focus was on clinical populations that were suspected to be at increased risk for malnutrition. Both quantitative and qualitative methods were used. A qualitative exploration was performed to disclose specific thoughts and feelings on food-related experiences and thereby with a profound view on the topic of dietary resilience. These different methods add to the depth of the investigations and provide more context and possibilities to solve the problems that are experienced with recognizing (risk for) disease-related malnutrition and performing adequate screening and assessment. Therefore, this research specifically aimed to:

- 1) Assess risk for malnutrition in patients prior to vascular surgery (Chapter 2)
- 2) Determine whether vascular surgery patients at risk for malnutrition have an increased risk for postoperative complications (Chapter 3)
- 3) Test knowledge and use of terminology regarding malnutrition, starvation, cachexia, and sarcopenia among dietitians (Chapter 4)
- 4) Perform a review on assessment and implications of disease-related malnutrition in adult tuberculosis patients (Chapter 5)
- 5) Explore the added value of ultrasound measurements in patients with COPD (Chapter 6)
- 6) Assess coexistence of malnutrition, frailty, physical frailty, and disability in patients with COPD starting a rehabilitation program (Chapter 7)
- 7) Explore dietary resilience in patients with severe COPD at the start of a pulmonary rehabilitation program (Chapter 8)

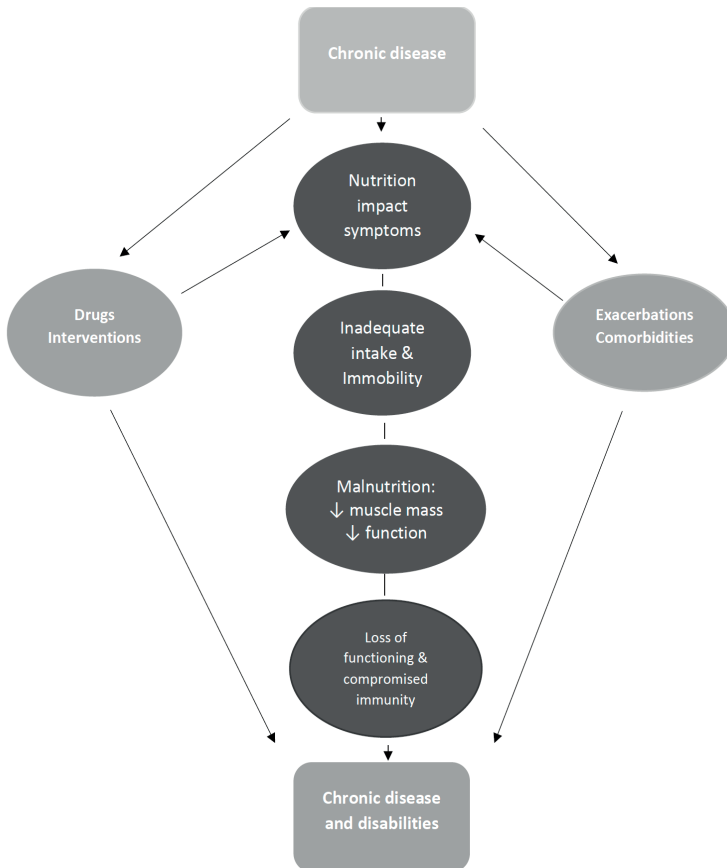


Figure 1. Schematic example of losing functioning in chronic disease, with the current focus of healthcare in lighter shade of grey

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