Chapter 1.4

Institutional causes of undernutrition

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1.4.1 Introduction

In developed countries, food is widely available; nonetheless, undernutrition exists in certain population groups. Those in the institutional setting have been identified as being at particular risk.

The reasons for undernutrition are multifactorial, with both physiological and non-physiological factors (e.g. social or psychological) contributing to its development [1]. Direct consequences of disease such as malabsorption, increased metabolism and catabolism also play a role. Surgery and medical treatments, such as chemotherapy and radiotherapy, may promote the development of undernutrition or further compound pre-existing undernutrition [2]. These contributors to undernutrition are prevalent among patients admitted to hospital and in older people who spend long periods in nursing homes or residential care. There is generally poor awareness of the prevalence and consequences of undernutrition among staff working in these institutions, potentially contributing to its development. Therefore, changes to the education and professional practice of those working within institutional healthcare settings are required in order to address this issue.

An accurate picture of institutional undernutrition prevalence has been hindered by the lack of a gold standard assessment and heterogeneity among those being assessed; nonetheless, recent data worldwide indicate a high prevalence, regardless of the method by which it is identified. Using the Mini Nutritional Assessment (MNA), a large multinational study which evaluated pooled data from 4507 older people in hospital, rehabilitation, nursing home and community settings in 12 countries reported a prevalence of undernutrition of 50.5% in rehabilitation, 38.7% in hospital and 13.8% in nursing home settings [3]. Spanish data on 400 hospitalised patients with a mean age of 67.5 (SD 16.1) years indicated that 31.5%, 34.5%, 35.3% and 58.5% were at risk of undernutrition using the Malnutrition Universal Screening Tool (MUST), the Nutritional Risk Screen (NRS-2002), the Subjective Global Assessment (SGA) and the MNA respectively [4]. A Dutch study using unintentional weight loss and body mass index (BMI) reported that 26% of nursing home rehabilitation patients were severely undernourished and 14% moderately undernourished [5]. Using MUST criteria, UK data on over 8500 individuals showed that 25% of patients in the acute hospital setting, 41% in the care home setting and 19% in mental health units were at risk of undernutrition on admission [6]. The Australian Nutrition Care Day Survey showed that 41% of 3122 acute hospital patients were at nutritional risk using the Malnutrition Screening Tool (MST), while 32% were undernourished when appraised using SGA [7]. The recent Canadian Malnutrition Task Force prospective cohort study of 1022 patients consecutively recruited from 18 hospitals (academic and community) showed that 51% of patients admitted to academic or community hospitals were undernourished using SGA [8].

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1.4.2 Identification and consequences of institutional undernutrition

Identification of institutional undernutrition

The published literature suggests that identification of institutional undernutrition is improving but remains inadequate. UK data indicate that 99% of hospitals have nutrition screening policies and 97% use a nutrition screening tool [6]. Despite this, only 67% of hospitals report weighing, and 60% report recording height, on all wards. This situation is not unique to the UK. A German study of older patients highlighted that clinical judgement was predominantly used to identify undernutrition, BMI was not routinely calculated, and nutritional problems were not adequately documented [8]. In order to identify undernutrition, a definition of treatable under-/malnutrition needs to be established, and screening tools appropriate for each setting identified and used routinely [10,11]. The definition and screening tools used need to consider population trends in overweight and obesity to ensure that patients with weight loss but normal BMI are appropriately identified and managed.

Consequences of institutional undernutrition

Despite the adverse effects of institutional undernutrition being extensively documented in the literature, inadequate appreciation of its effects among healthcare staff may facilitate development of undernutrition. The primary structural and functional consequences are loss of lean and non-lean tissue which present as body weight loss. The clinical consequences of these changes can negatively affect immune function, wound healing, infection rate, risk of pressure ulcers and falls. Furthermore, undernutrition represents an independent and significant risk factor for in-hospital mortality, longer length of hospital stay (LOS) and prolonged rehabilitation [12]. A study of six different screening tools concluded that all independently predicted longer LOS in hospitalised patients despite each tool assessing different dimensions of nutritional status [13]. These negative clinical consequences have substantial cost implications. In the UK, disease-related undernutrition costs over £13 billion, equating to 10% of total UK expenditure on health and social care [14]. Timely identification and intervention for patients at risk of treatable undernutrition could prevent or reduce the manifestation of associated effects, which would in turn potentially result in cost savings.

1.4.3 Determinants of institutional undernutrition

In order to correctly identify patients who are at risk of institutional undernutrition, it is important to be aware of its main determinants. The factors that can contribute to the occurrence or development of undernutrition within institutional settings are broadly summarised in Box 1.4.1. Factors which have been recognised for over a decade include older age, type of admission/diagnosis, cognition, food service/eating pattern and inadequate nutritional management [15,16]. Factors recently associated with risk of undernutrition in community-dwelling older adults, including inability to go outside, intestinal problems, cancer, eating fewer than three snacks daily, smoking, nausea, osteoporosis, physical inactivity and dependency in activities of daily living (ADL), need to be considered in future studies of older persons in the institutional care setting [17]. Moreover, documentation of undernutrition using a standardised care process and language is increasingly recognised as being important in achieving high-quality nutritional provision [18].

Older age

In the Netherlands, undernutrition in older people is regarded as a geriatric syndrome due to its high prevalence in older populations and the threat it poses to independence and quality of life [19]. The proposed mechanistic explanation for undernutrition as a geriatric syndrome is that the burden of chronic and acute disease multiplies

Box 1.4.1 Factors contributing to undernutrition in the institutional setting

Individual	Institutional
• Older age	• Poor staff education
• Loss of appetite	• Lack of awareness of clinical standards
• Poor oral health	• Inadequate staff:patient ratio
• Poor oral intake	• Inadequate nutritional management
• Tiredness/apathy	• Poor nutrition screening practices
• Dissatisfaction with food quality	• Failure to calculate nutritional requirements accurately
• Lack of consideration of patient/family preferences	• Limited or no access to nutrition support team
• Impaired physical function/immobility	• Poor dining environment
	• Poor-quality food
Disease related	• Timing of meals leading to long periods without food
• Diagnosis, e.g. gastrointestinal or respiratory disease, cancer	• Inappropriate portion sizes
• Multiple comorbidities	• Mealtime interruptions
• Emergency admission	• Missed meals not replaced
• Depression	• Snacks not offered during the day
• Impaired cognition	• Little feeding assistance
• Medical/surgical treatment	• Fasting practices for medical/surgical tests/procedures
• Hospital-acquired infection	• Poor advice on food fortification
• Polypharmacy	• Excessive hygiene regulations
• Malabsorption	• Poor practices around oral nutritional supplement service, e.g. container, temperature
• Swallowing difficulties/dysphagia	• Poor documentation practices
• Early satiety	
• Chemosensory changes	

with increasing age, which directly influences the balance of nutritional needs and intake. This is compounded by anorexia, reduced appetite and sarcopenia; each is affected by both ageing and disease and all are associated with decreased muscle mass and function. The development of numerous morbidities directly relates to the incidence of undernutrition in older people [2].

In Spanish hospitals, older patients were at greatest risk of undernutrition [4]. In the UK, patients aged more than 65 years were at greater nutrition risk compared with younger patients; 34% of those admitted to care of older adult wards were at risk [6]. Women were also at higher risk, particularly if older than 65 years, although this gender bias is not consistently shown in all studies [20].

Diagnosis and severity of medical condition

The type, severity and duration of a patient's medical condition greatly influence risk of undernutrition [21]. Risk of undernutrition on

admission to hospital in the UK was estimated at 27% for emergency admissions and 20% for elective admissions [6]. Greater risk of undernutrition has been described in gastroenterology, respiratory and cancer patients [6] and these have been related to increased likelihood of clinical complications and prolonged LOS [22]. Swallowing difficulties and dysphagia are consistently noted to be associated with undernutrition [22]; dysphagia can be due to neurological, physical or psychological causes. Cachexia and precachexia involve an inflammatory response and are common in chronic diseases such as cancer, chronic obstructive airways disease, chronic heart failure, liver disease and rheumatoid arthritis. Not all undernourished patients are cachectic, but all cachectic patients are malnourished to some degree [23]. The Canadian Malnutrition Task Force study of 1022 patients examined factors associated with nutritional decline in medical and surgical patients aged 18 years and over who remained in hospital for 2 or more days [8]. Having controlled for SGA on admission, and the presence of a surgical procedure, this study showed that nutritional decline in hospital was significantly associated with cancer diagnosis, two or more diagnostic categories, illness affecting food intake in medical patients, new in-hospital infection, as well as with lower admission BMI, reduced food intake and dissatisfaction with food quality. Interestingly, for surgical patients in this study, only male sex was associated with nutritional decline.

Polypharmacy

Polypharmacy, or the use of multiple medications, is another factor which may contribute to poor nutritional status by causing impaired swallowing related to xerostomia (dry mouth), loss of appetite, gastrointestinal problems and other changes in body function, potentially resulting in reduced dietary intake, decreased absorption of essential nutrients and increased risk of drug–nutrient interactions [2] (see Chapter 1.2). One issue that is problematic in exploring the relationship between polypharmacy and nutritional status is that polypharmacy does not have a standard definition. Although many studies have described polypharmacy as the regular use of five or more drugs, three or four and more different medications have also been used, and a separate definition of 'excessive polypharmacy', meaning the typical use of nine or more drugs concomitantly, has recently been adopted [24]. A systematic review of 44 studies indicated that up to 91%, 74% and 65% of residents in long-term care facilities take more than five, nine and 10 medications, respectively [25].

A narrative review of the limited evidence from published studies examining the relationship between polypharmacy and nutritional status noted that the studies available for inclusion were predominantly cross-sectional, often without proper adjustment for potential confounders [24]. The studies examined used different markers of nutritional status, including MNA, weight loss or reduced energy and/or nutrient intake, making direct comparisons difficult. The authors suggested that there was growing evidence to support the association between an increase in prescribed medications and undernutrition, particularly in older persons. However, they also emphasised that the prevalence of undernutrition directly attributable to polypharmacy is unknown and that longitudinal studies to elicit the relationship between polypharmacy and undernutrition which allow adjustment for diseases are required.

Furthermore, a recent editorial on the relationship between polypharmacy and frailty, commenting on six cross-sectional studies, concluded that a relationship between polypharmacy and frailty exists with more than six medicines [26]. The authors recommended that all frail older persons have their medications reviewed by a pharmacist with the principle of reducing medications to six or fewer.

The major confounding factors in examining the relationship between polypharmacy and undernutrition is that patients who take more medications may also be more medically unwell and that the eating problems related to the disease itself may be more important than the role of drugs in the development of poor nutritional status [24].

Impaired cognition

Impaired cognition is more common in older populations and is consistently documented as a determinant of nutritional risk in the institutional setting [7,27]. One Italian study of 623 hospitalised older patients who underwent comprehensive geriatric assessment to evaluate their medical, cognitive (normal, mild impairment and dementia), affective and social condition, and MNA to evaluate their nutritional status clearly demonstrated that even patients with mild cognitive impairment had poorer nutritional status than those with normal cognition [28]. This study indicated that as dementia progresses, nutrient intake deteriorates, leading to a progressive decline in nutritional status, associated with increased morbidity and mortality.

Inadequate food intake

Inadequate food intake is common in institutional care and contributes to undernutrition. The recent comprehensive Canadian Malnutrition Task Force study of over 1000 patients admitted to 18 large and small hospitals indicated that reduced food intake during the first week of hospitalisation is an independent predictor of LOS [29]. Furthermore, the common barriers to adequate dietary intake in these patients included not being given food when a meal was missed (69.2%), loss of appetite (63.9%), not wanting ordered food (58%), feeling too sick (42.7%) or tired (41.1%) to eat, and being interrupted at mealtimes (41.8%) [30].

Patients who were already undernourished, women, those with a greater number of comorbidities and those who ate less than 50% of their meal reported the occurrence of several barriers. However, those aged over 65 years compared with those under 65 were less likely to report being disturbed at meals (33.9% versus 44.6%) and to missing a meal for tests (31% versus 39%), perhaps reflecting increased awareness of undernutrition among older people in the hospital setting.

According to recommendations for food and nutritional care in European hospitals, in order to achieve adequate food intake, eating episodes should be spread throughout the day [31]. This will ensure sufficient time between each meal to allow between-meal snacks in the morning, afternoon and late evening to meet energy and nutrient requirements. In the Nordic countries, these recommendations are even more specific, stating that the overnight fast should not exceed 11 hours in older people, and that the individual should have at least four eating episodes a day [32]. A Swedish cross-sectional study of 1771 patients aged ≥65 (mean age 78) years admitted to internal medicine, surgical or orthopaedic wards that used the MNA to determine nutritional status reported that 35.5% were well nourished, 55.1% were at risk of undernutrition and 9.4% were malnourished. Overnight fasts exceeding 11 hours, fewer than four eating episodes a day and not cooking independently prior to admission to hospital were associated with both increased prevalence of undernutrition and risk of undernutrition [33]. The study showed that 78% of patients in the hospital setting exceeded an 11-hour overnight fast and 49% had fewer than four eating episodes daily.

An Australian nutrition survey that investigated the association between suboptimal food intake and undernutrition risk in over 3000 hospital patients reported that 25% of those who were undernourished were not offered snacks throughout the day [7]. Another Australian qualitative paper discussed the difficulty residents in aged care facilities experience in receiving adequate and acceptable food and fluids [34]. Unacceptable dining room experiences, poor-quality food and excessive food hygiene regulations contributed to iatrogenic undernutrition and dehydration. Meal service and even the method by which oral nutritional supplements (ONS) are served can influence food and fluid intake [35,36].

These findings have implications for staffing, clinical supervision, education of carers and the impact of negative attitudes to older people. Hospital food service (catering) is internationally recognised as a key component of good clinical care of patients and has the potential to provide a population approach to managing undernutrition. Although clinical standards have

been established in many countries, audits have focused on processes being in place and not on patient outcomes. A recent study evaluating food provision and consumption over 24 hours in inpatients 65 years and older in postacute geriatric orthopaedic wards in National Health Service hospitals in Scotland, UK, showed that food provision was significantly less than standards set for energy and protein provision for 'nutritionally well' patients; patients consumed approximately three-quarters (74%) of the food provided. Higher provision of both energy and protein was associated with more adequate consumption [37].

1.4.4 Causes of undernutrition in long-term care

A systematic review of the factors most consistently associated with undernutrition in nursing home patients concluded that depression, poor oral intake, swallowing issues and eating/chewing dependency were associated with weight loss [38]. Sixteen studies met the inclusion criteria as they contained prevalence data for general nursing home populations on at least one of the following: weight loss, low BMI, MNA or other measure of undernutrition, poor oral intake or dependency for feeding. The factors most consistently associated with weight loss were depression, poor oral intake, swallowing issues and eating/chewing difficulties. The factors most consistently associated with low BMI included immobility, poor oral intake, chewing problems, dysphagia, female gender and older age. Those most consistently associated with poor nutrition included impaired function, dementia, swallowing/chewing difficulties, poor oral intake and older age. Staffing factors were associated with weight loss in most of the studies included in this systematic review, though the relationship between staffing and undernutrition is not consistently observed in all institutional settings [39].

An Australian study, carried out as part of a larger project on aged care facility residents, was undertaken with the 76 staff caring for the study residents. This study identified the barriers to promoting optimal nutrition as being insufficient time to observe residents (56%), being unaware of residents' feeding issues (46%), poor nutritional knowledge (44%) (for example, staff were unaware of the need for increased energy and protein in residents with pressure ulcers and few exhibited correct knowledge of fluid requirements) and unappetising appearance of the food served (57%) [40]. Furthermore, while nutritional assessment was considered an important part of practice by 83% of respondents, just 53% indicated that they actually carried out such assessments.

There is a need to build a comprehensive picture of the determinants of undernutrition, define treatable undernutrition and identify screening tools applicable within different settings which can characterise those who are able to positively respond to nutritional treatment in order to effectively tackle undernutrition in the institutional setting.

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