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REVIEW ARTICLE

Paving the way to detect adult malnourished patients in resource-limited settings: the first step to the right to nutritional care

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Hospital malnutrition, particularly disease-related malnutrition (DRM), is a significant public health concern associated with increased morbidity, mortality and costs. The recent Global Leadership Initiative on Malnutrition (GLIM) proposed a framework to globally standardise the diagnosis of adult malnutrition (undernutrition), allowing comparison of malnutrition prevalence across clinical and geographical settings and over time. Despite substantial global progress in using screening and diagnostic tools to identify malnourished patients, some countries and institutions lag behind, particularly in relation to malnutrition screening. This is especially of concern in low- and middle-income countries, including South Africa, where socioeconomic factors can exacerbate the occurrence of DRM. From a human rights perspective, the lack of malnutrition screening and diagnosis followed by appropriate nutritional support denies patients their fundamental right to access adequate food, nutritional care and health. This opinion paper highlights the magnitude of DRM and addresses current challenges in identifying DRM within resource-limited healthcare settings, specifically in the South African public health sector. Framing malnutrition as a human rights and ethical issue, it underscores the urgent need for timely and equitable nutritional care and proposes strategies to improve identification practices. Challenges identified comprise inadequate resources and institutional factors. Collaboration between key stakeholders, including the South African National Department of Health (including representatives from the National Health Insurance), policy-makers, medical aids, researchers and professional societies is needed to identify the most feasible malnutrition screening and diagnostic tools for constrained settings, together with a widespread coordinated implementation strategy. Prioritising nutrition as part of the holistic management of all patients will help safeguard against DRM and the associated adverse effects.

Keywords: adults, GLIM, hospital, malnutrition, resource-limited

Introduction

Freedom from hunger and malnutrition is a fundamental right, yet is often disregarded when it comes to disease-related malnutrition (DRM). The recent International Position Paper on clinical nutrition and human rights[1] and the adopted International Declaration on the Human Right to Nutritional Care[2] state that all hospitalised patients should have access to malnutrition screening and diagnosis, followed by optimal and timely evidence-based medical nutrition therapy to combat DRM. The Declaration, which was signed in September 2022 by 75 national societies, including the South African Society of Enteral and Parenteral Nutrition (SASPEN), asserts that access to nutrition care is as much a human right as is the right to food and the right to health. It represents a watershed global agreement that aims to increase awareness of the significance of DRM and draws attention to the lack of nutritional support for those with both acute and chronic illnesses.[2] As stated in Sections 27, 28 and 35 of the South African Constitution,[3] the right to access food must be respected in all contexts. By implication, this right should also include the clinical setting, in which the ill person has a fundamental right to food, including appropriate nutritional care. However, this often does not translate into action by governments and other responsible entities, in particular healthcare institutions. Consequently, optimal nutritional care is often overlooked in clinical practice. This leads to increased morbidity, mortality and costs.[1] In South Africa, where the majority of the population access health services through resource-constrained public clinics and hospitals,[4] both screening and subsequent diagnosis of malnutrition have been reported to be sub-optimal, partly due to a lack of resources, but not limited to this reason only.[5,6] In 2019, the Global Leadership Initiative on Malnutrition (GLIM) proposed a diagnostic framework for diagnosing protein–energy malnutrition (PEM), with the purpose of building a global consensus in the criteria required for diagnosing PEM in the clinical setting.[7] This opinion paper highlights current challenges and proposes strategies to improve the identification of malnutrition in resource-limited healthcare settings, with an emphasis on South Africa. By framing DRM as a human rights and ethical issue in the clinical setting, the article underscores the imperative for timely and equitable access to nutritional care for all individuals in need thereof.

Malnutrition in the clinical setting

In the context of clinical nutrition, the definition of malnutrition has changed over time, owing to an improved understanding of disease- or injury-related inflammation, and its impact on body composition derangements.[8] Malnutrition is defined here as a subacute or chronic state of undernutrition (which can coexist with overnutrition), in which a combination of varying degrees of inflammatory activity has led to changes in body composition and diminished function.[9] The point at which the severity or persistence of inflammation results in a decrease in lean body mass associated with functional impairment would be considered ‘disease-related malnutrition’.[10] Further, international guideline committees have agreed on the aetiological basis of the undernutrition form of malnutrition, including disease-related malnutrition and malnutrition without disease.[11] In low- and middle-income countries (LMIC), patients in the clinical setting are particularly vulnerable to malnutrition, due to not only the impact of disease, but also malnutrition related to hunger and socioeconomic determinants.

Hospital malnutrition is a significant public health concern worldwide, with global prevalence rates estimated between 15% and 60% among acute-care patients.[12] High-income countries and continents such as the United Kingdom, Europe, the United States and Australia are at the forefront of reporting hospital malnutrition prevalence statistics, with routine screening systems well established.[13] Data from the United States and Europe show that up to one-third of hospitalised patients are malnourished or at risk of malnutrition upon admission.[14] Conversely, there is a scarcity of data on the nutritional status of in-patients from LMIC, including the African continent,[5] who are probably even more vulnerable to malnutrition. A study from Burundi found that almost half of adult in-patients ($n = 226$) admitted to hospital were malnourished (20.8% moderate and 26.5% severe malnutrition), based on unintentional weight loss (moderate malnutrition being 10– ≤ 20% weight loss; severe malnutrition > 20% weight loss).[15] In a regional referral hospital in Uganda, the prevalence of malnutrition risk ($n = 316$) according to Nutrition Risk Screening 2002 (NRS-2002), Mini Nutritional Assessment-Short Form (MNA-SF) and Malnutrition Universal Screening Tool (MUST) was found to be 25%, 47% and 59%, respectively.[16] An African multi-centre study using the NRS-2002, including adult hospital patients from South Africa, Kenya and Ghana, determined that 61% of participants were at risk of malnutrition on admission, which increased to 71% on discharge.[5] Using MUST, a South African study conducted in three hospitals in the Eastern Cape found 48% of participants to be at high risk of malnutrition.[6] A more recent South African study from Gauteng reported that 57% of their study sample met the criteria for a malnutrition diagnosis, using the GLIM criteria.[17] Although direct comparison between these studies is difficult owing to the varying malnutrition assessment tools used, clearly, a significant proportion of South African hospitalised patients are vulnerable to the adverse clinical outcomes associated with malnutrition.

Causes and consequences of disease-related malnutrition

As mentioned, inflammation associated with disease (both acute and chronic) and injury has been implicated in the onset of DRM. Endocrine changes and an increase in cytokines, such as interleukin (IL)-6 and tumour necrosis factor (TNF), are associated with skeletal muscle mass catabolism, decreased appetite and unintended weight loss.[14] In addition, disease-related factors such as gastrointestinal dysfunction, institutional factors including a lack of malnutrition awareness, and role clarity of staff members, understaffing and suboptimal standards of hospital food, including the provision of appropriate therapeutic diets, can intensify the risk of malnutrition.[18,19] At cellular level, malnutrition impairs the body's ability to generate an effective immune response to infection, often making it more difficult to detect and treat.[20] Consequently, malnourished patients are at significantly higher risk of adverse clinical outcomes compared with well-nourished patients, including increased postoperative complications,[21] hospital-acquired infections,[19] functional decline and increased risk of falls.[22] Malnutrition further increases the risk of pressure ulcers, delays wound healing, decreases nutrient intestinal absorption, alters thermoregulation, and compromises renal function; eventually, there is an increased risk of death.[19,23] The increased associated morbidity and mortality associated with malnutrition have been well documented to result in longer hospital stays and concomitant costs for the healthcare institution.[19,24] Studies evaluating the direct healthcare costs associated with malnutrition report estimated annual costs of $9.5 billion to $15.5 billion in the United States (2009–2014) and over €31 billion in Europe (2009).[25–27] A cost-effectiveness model developed by Correia et al. (2017) evaluated the impact of providing nutrition therapy to malnourished patients with regard to costs, length of hospital stay, readmissions, and mortality. Cost savings of $92.24 for each day of hospitalisation avoided, $544.59 for additional patients having access to hospitalisation, $1848.12 for preventing readmissions and $3698.92 for prevented deaths were reported, with the most cost savings achieved by the mean reduction in the length of hospital stay.[23] Although there is a paucity of data on the economic impact of DRM in South African adults, malnutrition has been estimated to depress gross domestic product (2013) by 11% for African countries on average.[28] The increased economic burden of malnutrition in resource-limited countries is therefore likely to place additional strain on the already frail public healthcare services.[29]

Identifying malnutrition using the GLIM diagnostic framework in healthcare settings

The GLIM guidelines proposed a framework to standardise global diagnosis of adult malnutrition and comparison across clinical and geographical settings.[7] It is intended to reflect PEM while being appropriate for diverse settings and contexts, including acute care, outpatient clinics, residential care and community settings.[7,8] The diagnostic framework consists of a two-step process (see Figure 1), starting with nutrition screening using any validated screening tool. A more comprehensive assessment follows in those identified to be at risk of malnutrition. Each of these steps is discussed in more detail below.

Step 1: malnutrition screening

The first step in the evaluation of nutritional status includes malnutrition risk screening to identify those at risk, using any validated screening tool.[22] The consensus-based definition of malnutrition risk screening is a rapid process performed to identify individuals at nutritional risk and should be performed within the first 24–48 hours after first contact, and thereafter at regular intervals. Those at risk then need to undergo a full nutritional assessment.[9] Several valid and reliable screening tools have been developed over the years. The European Society for Clinical Nutrition and Metabolism (ESPEN) recognises the NRS-2002, Mini Nutritional Assessment-Short Form (MNA-SF) and Malnutrition Universal Screening Tool (MUST) for use in hospitals, elderly care and community settings,[9] while the Academy of Nutrition and Dietetics (AND) supports the use of the Malnutrition Screening Tool (MST) to screen adults in all settings, regardless of age or disease status.[30] The National Clinical Nutrition Guide published by the South African National Department of Health in 2021 made reference to the Nutrition Risk Index to classify malnutrition risk in adults, which incorporates albumin and weight in a formula.[31,32] The choice of screening method ultimately relies on factors such as the existing infrastructure and resources, as well as the healthcare setting.[33] In resource-limited settings such as South Africa, the choice of screening tool will depend on who will perform screening, the skills required, and the resources available, such as equipment and time. As professional nurses usually obtain information regarding appetite and feeding requirements on admission, they are in the ideal position to screen patients.[34] A quick and easy, yet valid screening tool may

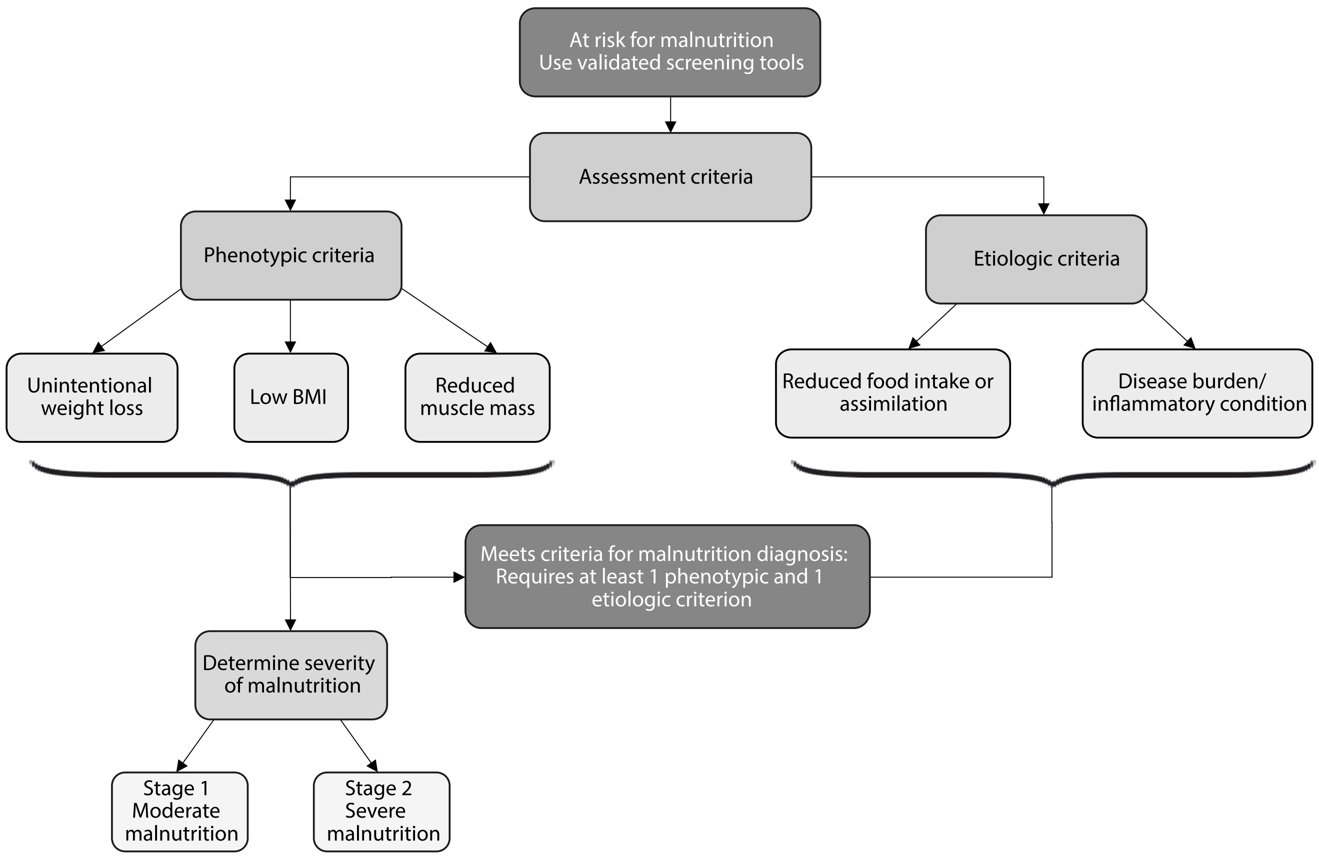

Figure 1: GLIM diagnostic framework (adapted from Cederholm et al., 2019[7]). BMI: body mass index; GLIM: Global Leadership Initiative on Malnutrition.

then be more realistic to implement in this first stage of evaluating nutritional status. Further, those who have been identified as at risk of malnutrition should then be referred to a trained nutrition professional, such as a dietitian, who can conduct a more comprehensive diagnostic assessment required in Step 2 and determine whether specialised nutrition intervention is required.

Step 2: diagnostic assessment

The second step of the GLIM diagnostic framework consists of assessing five objective criteria, that is, three phenotypic (weight loss, BMI, muscle mass) and two aetiologic (food intake/assimilation and inflammation/disease burden). A malnutrition diagnosis requires at least one phenotypic criterion and one aetiologic criterion. Finally, the severity grading is determined, using the cut-off points of the phenotype criteria.

Implementing routine malnutrition screening to identify and refer those at risk for further evaluation and the need for nutritional support will honour all patients' right to food and nutritional care, and that protection against hunger is safeguarded in healthcare settings. Although significant progress in this regard has been made in many parts of the world, others are lagging behind, with malnutrition screening practices often few and far between. Several challenges have been reported as obstructing these practices, some of which are highlighted below.

Challenges and potential strategies in performing malnutrition screening and assessment in resource-limited settings

Many challenges to successfully implementing malnutrition screening and subsequent diagnostic practices in clinical practice have been reported, particularly in resource-limited settings, including South Africa. Some are highlighted below, with proposed strategies to address some of these issues.

Anthropometric measurements and evaluations

Some of the parameters required in many screening and diagnostic tools, including BMI, unintentional weight loss and low muscle mass, may be considered relatively straightforward in countries where it is common practice for these to be obtained by frontline healthcare professionals, such as nurses. However, it is problematic for many low- and middle-income countries, including South Africa, where resources are limited, and adult malnutrition screening and diagnostic practices are scarce.[5,6] Adequate access to resources, including the availability of equipment such as scales and stadiometers, staff to obtain and record measurements, and competency in basic anthropometric skills, such as calculating BMI and percentage weight loss, have been reported as barriers in these settings.[6] Previous South African studies reported that less than half of hospital wards (44–49%) reported not weighing patients on admission; even fewer (11% and 34%) measured height on admission, while percentage weight loss could not be calculated in 45–47% of patients, due to usual weight not being known.[6] Often the recorded height and weight are guessed by the attending nurse.[35] Furthermore, up to a third of hospitalised patients are immobile or have a reduced mental status, in which case anthropometric measurement such as weight, height and BMI need to be obtained through indirect measures.[36,37] These techniques require more advanced anthropometric skills, in which non-nutritional health professionals, such as nurses, are not specifically trained.[38]

The use of valid surrogate measurements could be considered, when it is not possible to obtain some of the more challenging parameters required in many malnutrition screening and diagnostic tools. Potential surrogates for BMI, percentage weight loss and muscle mass are discussed below.

Body mass index

Weight and height measurements are needed for the calculation of BMI, which is a relatively simple and useful clinical calculation to classify body size in relation to height,[39] and is used in many malnutrition screening and assessment tools.[36,38,40] However, challenges in obtaining the weight and height measurements in ill patients, as well as a reported lack of confidence among nurses in both the calculation and interpretation thereof, may limit its use.[6,38]

Mid-upper arm circumference (MUAC) has been shown to correlate well with BMI, and may be a useful alternative in patients who are not mobile, in those who have fluid retention or in low-resource settings where both equipment and skills to calculate BMI may be limiting factors.[36,41] MUAC cut-off points have been proposed in the literature to identify a low BMI ($< 18.5\ kg/m^2$). A previous South African study in the same setting determined the optimal cut-off point as 23.7 cm.[38] This finding aligns with cut-off points from other international research, including Chakraborty et al.[42] (< 24 cm in males), Sultana et al.[43] (< 25 cm in males and < 24 cm in females) and Benítez Brito et al.[36] (≤ 22.5 cm).

Unintentional weight loss

Unintentional weight loss is a well-validated indicator of malnutrition and is related to morbidity and mortality.[7,44] If it is not possible to obtain an accurate usual weight, subjective measures such as a change in clothing size, corroboration of weight loss by a relative or friend, or a numerical estimate of weight loss provided by the patient are suggestive enough of true weight loss.[45] However, such methods mostly do not quantify the weight lost, as required by many nutrition screening and assessment tools. Another potential surrogate for unintentional weight loss includes the use of BMI-based figure rating scales (FRSs). The BMI-based FRS developed by Harris et al. comprises 10 individual body images representing women and men ranging from underweight ($BMI < 18.5\ kg/m^2$) to Class III obese ($BMI \geq 40\ kg/m^2$). The extent of weight change can be gauged by asking individuals to select an image that best resembles their current and usual body size.[46] A South African study in a multi-ethnic population group ($n = 196$), found a positive correlation between the measured current ($r^2 = 0.80$; $p < 0.001$) and usual BMI ($r^2 = 0.71$; $p < 0.001$) of patients, with the corresponding image selected, using the BMI-based FRS.[47] Further research is, however, needed to validate the use of BMI-based FRS as an adjunctive aid to gauge weight change in clinical practice.

Reduced muscle mass

Lean tissue, of which skeletal muscle is a major component, is a key parameter of nutritional status and plays a central role in the body's ability to respond to acute and chronic illness.[48] Hospitalised patients are particularly prone to low muscle mass due to immobility and catabolic conditions that lead to muscle loss when protein degradation pathways become active.[49] Low muscle mass is increasingly recognised as an important predictor of negative health outcomes, and has become an integral part in the diagnosis of malnutrition.[8,49] Early detection and intervention are therefore key to preserve or minimise degradation of muscle mass in these patients. Several body composition techniques are available to measure or estimate muscle mass. Each technique has its own advantages, limitations, and factors that need to be considered. The GLIM group recently published a guidance document on the assessment of muscle mass required in the GLIM criteria. The use of technologies such as computed tomography (CT), dual-energy X-ray absorptiometry (DXA) and bioelectrical impedance analysis (BIA) is supported, subject to availability and the necessary expertise for its operation. When these are not available or feasible, the use of anthropometric measures can be used.[50] These are often a reality in resource-constrained settings, with a subsequent demand for simple tools to estimate muscle mass in routine clinical practice.[51]

CT is used to estimate lean tissue in clinical research and involves exposure to high-dose radiation. It yields a highly accurate quantitative and qualitative image of skeletal muscle and has been shown to indicate important losses of muscle mass and subcutaneous tissue, as well as the presence of intramuscular adipose tissue.[48,52] Single-slice CT images of skeletal muscle at L3 (erector spinae, quadratus lumborum, psoas, transverse abdominis, internal and external obliques, and rectus abdominis) have been shown to be highly representable of whole-body skeletal muscle volume. However, this method is not routinely available, as analysis is time consuming and requires specialised software, which limits the wide applicability of this tool.[53]

DXA provides an accurate measurement of body composition and relies on the property of X-rays to be attenuated in proportion to the composition and thickness of the material through which the beam is passed.[48,50] Fat and lean soft tissue can be determined by this method, although skeletal muscle mass is not directly measured, but estimated from appendicular lean soft tissue. The main disadvantage of DXA is that it is not portable, is relatively expensive and not typically available for routine use in the clinical setting.[48,54]

Segmental multi-frequency BIA provides an inexpensive, non-invasive and simple method to assess body composition[48] and remains one of the few portable bedside options available to clinicians.[48] It measures whole-body impedance, the opposition of the body to alternating current consisting of two components: resistance (R) and reactance (Xc). Resistance is the decrease in voltage reflecting conductivity through ionic solutions. Reactance is the delay in the flow of current measured as a phase shift, reflecting dielectric properties, i.e. capacitance of cell membranes and tissue interfaces.[55,56] Although BIA is not a direct method of body composition, it offers reliable information provided that suitable (i.e. age-, sex- and population-specific) equations for the calculation of body compartments are applied.[56]

Muscle ultrasonography (U/S) provides information on the thickness and the cross-sectional area of individual muscles.[48] U/S-derived thicknesses of the upper arm and upper thigh have been shown to correlate well with muscle mass obtained from CT scans, suggesting it is a suitable, radiation-free alternative.[57] In addition, U/S can also detect muscle echo intensity as a measure of muscle composition in terms of fatty infiltration and the presence of fibrous tissue.[49] As a portable, readily available device, with excellent intra- and inter-rater reliability, U/S may be a promising tool for muscle mass assessment in clinical practice.[48,49] More research is needed to develop reference cut-off values to identify low muscularity and identify risk of malnutrition.[49] Further research is also needed in terms of the optimal patient position, landmarking, consistent image acquisition, and use of minimal or maximal compressions of the ultrasound probe.[48]

Calf circumference (CC), as a surrogate measure of muscle mass, has been positively correlated with appendicular skeletal muscle mass index (ASMMI) measured by DXA.[51,58] In adults, more skeletal muscle mass and less fat mass is found in the lower extremities compared with the upper extremities,[59] which provides an advantage using calf circumference compared with MUAC. Nonetheless, a recent study by Gonzalez et al. reported evident differences in CC values between BMI categories, and published adjustment factors for the different BMI categories, using North American population representative data. The rounded CC cut-off values they proposed for moderately and severely low CC are 34 and 32 cm for males, and 33 and 31 cm for females, respectively.[51] This is similar to the cut-offs proposed in the 2019 consensus by the Asian Working Group for Sarcopenia, which are < 34 cm for men and < 33 cm for women.[60]

The use of MUAC has also shown acceptable accuracy for identifying low skeletal muscle mass.[61] MUAC measurements are less affected by fluid retention compared with CC, making it a useful indicator of muscle mass and nutritional status.[62] Hu et al. determined the optimal MUAC cut-off values to predict low muscle mass as $\leq$ 28.6 cm for men and $\leq$ 27.5 cm for women, respectively.[61] The relative higher fat mass found at this site can be corrected for by calculating the arm muscle area (AMA) or corrected AMA,[62] which have been significantly correlated with DXA-measured lean body mass.[62]

Circumference measurements (i.e. MUAC and CC) are relatively easy to obtain, although both still require appropriate training to be valid and reliable[63] for their application in screening and diagnostic tools. MUAC in particular has the added advantage as a potential surrogate to identify both a low BMI and muscle mass. Circumference measurements may provide a feasible opportunity in resource-limited settings, as they require little equipment and calculations, and are transportable and inexpensive.[64]

Institutional and policy-related factors

Institutional factors have been identified as a barrier in performing nutrition-related activities in the clinical setting, including but not limited to an unclear assignment of responsibility in performing these activities, insufficient institutional procedures or guidelines, or their being regarded as a low priority.[65] It is the responsibility of duty- bearers to fulfil the right to nutritional care for all patients who need it, which is a matter of quality, ensuring equality, improved outcomes and best patient experience.[66] The duty-bearers include not only national government and policy-makers, but also institutional managers and healthcare givers.[1] Health institutions should make nutrition a priority and create a culture that follows an interdisciplinary approach to ensure all patients at nutritional risk are identified and treated.[1] Formal training of non-nutrition healthcare professionals (i.e. doctors and nurses), including malnutrition awareness and competency in basic anthropometric skills, should be upscaled in both undergraduate and in-service training, in order to prioritise nutritional care among the competing priorities within patient care.[1,44] Dietitians should regularly lead knowledge-improvement initiatives, where information and education on malnutrition are shared in an attempt to bridge the knowledge gap for non-nutritional staff. Such practices have been shown to increase early identification and diagnosis rates among patients.[67] Formation of interprofessional ward-based teams that conduct regular ward rounds should be formed where malnourished patients are identified, and their nutritional care plans discussed and monitored. At management level, nutrition steering committees should implement policies relating to the identification and treatment of malnutrition at hospital level, which should be monitored by audits on a regular basis. At national level, clinicians, researchers and policy-makers need to work together to translate evidence-based medical nutrition therapy into such policies, and be considered as part of the holistic approach for all patients who are in need thereof.[1] National datasets based on adult malnutrition indicators should be created, and statistics should be completed at ward and institutional level. Ideally, this should form part of the appraisal process of staff, as well as the accreditation of facilities.

Addressing malnutrition: an ethical obligation and a human right

The International Declaration on the Human Right to Nutritional Care affirms the human right to nutritional care for all individuals with or at risk of disease-related malnutrition, emphasising the importance of human dignity, justice, equality, life and fundamental freedoms in line with international human rights and bioethics standards.[68] Human rights norms are intended to guide government actions and policies, while healthcare ethics address the specific actions, motivations and responsibilities of individual health professionals, researchers, and organisations.[69] When human rights principles are combined with healthcare ethics, they create a powerful synergy that strengthens each framework. From a human rights-based approach, healthcare professionals carry an ethical obligation to deliver timely, optimal nutritional care to those in need within available resources.[2] Similarly, governments, healthcare institutions and medical aids have a responsibility to allocate financial resources based on distributive justice, ensuring that nutritional care reaches such vulnerable persons within the limits of available resources.[2] To realise justice and equity in nutritional care, public and private health agendas must promote fair, inclusive and evidence-based access to safe nutritional care as a protected standard.[70] Ultimately, government, including the South African National Department of Health, bears the responsibility to guarantee this right through sound policies and sufficient resource allocation. Protecting the right to nutritional care supports global health goals, including the United Nations Sustainable Development Goal of ending all forms of malnutrition. Upholding this right is central in addressing disease-related malnutrition and promoting dignity-centred nutritional care.

The way forward

To safeguard the fundamental right of patients in South African healthcare institutions to be free from hunger and malnutrition, while promoting their right to health, all patients should have access to malnutrition screening and diagnosis, followed by optimal and timely nutritional care. This is critical in the prevention and treatment of DRM and for improved clinical outcomes. Duty-bearers, including the National Department of Health (including representatives from the National Health Insurance), policy-makers, medical aids, researchers and professional societies need to collaborate to:

1. identify the most suitable malnutrition screening tool(s) for South African healthcare settings, taking into consideration ease of use, skills and resources required;

2. develop and implement policies that mandate routine malnutrition screening within 24–48 hours of admission to healthcare facilities and on a regular basis (i.e. weekly) thereafter. These should include referring all 'at-risk' patients to a nutritional healthcare professional, such as a dietitian, for a more comprehensive assessment and the appropriate nutritional care when needed;
3. ensure adequate availability of basic anthropometric equipment at institutional level, such as weighing scales, stadiometers and measuring tapes, to facilitate the measurements required for malnutrition screening and assessment;
4. upscale undergraduate and in-service training of healthcare professionals, particularly nurses and doctors, to identify and manage malnutrition or the risk thereof. This should include, but is not limited to, competency in basic anthropometric skills, nutrition screening and malnutrition diagnosis, knowledge regarding appropriate intervention approaches, ethics in medical nutritional treatment and when to refer to a dietitian;[71]
5. promote a culture in healthcare institutions where nutrition is prioritised and considered as part of the holistic management of all patients.

Ultimately, these actions could contribute to optimising the health and well-being of South African healthcare users, as per the Sustainable Development Goals,[72] while saving costs for the Department of Health (public sector) and medical aids (private sector). Alleviating the incidence of malnutrition in the clinical setting may promote faster recovery and discharge from healthcare institutions, enabling individuals to return to work earlier, thereby strengthening the economy of South Africa as per the National Bio-economy Strategy.[73]

Conclusion

Widespread adoption and implementation of validated malnutrition screening and diagnostic tools on a global scale will assist in compiling international comparable data on malnutrition prevalence, interventions and outcomes. Further, the timely identification of malnutrition or risk thereof can safeguard patients' right to food, nutritional care and health, while protecting them against the associated negative clinical outcomes. Many barriers have been reported to the successful implementation of malnutrition screening in settings with limited resources, especially in LMICs like South Africa. Collaboration between key stakeholders is needed to identify the most feasible malnutrition screening and diagnostic tools for constrained settings, together with a widespread coordinated implementation strategy. Further research to adapt such tools according to regional p reference and context is recommended. A human rights-based approach in the field of clinical nutrition could promote access to nutritional care for all those who need it, especially the vulnerable sick admitted to healthcare institutions.

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