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REVIEW

Nutritional Risk Screening in Oncology: From Diagnosis Through Survivorship

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Abstract

Malnutrition affects a substantial proportion of patients with cancer and is associated with reduced tolerance of anticancer treatment, prolonged hospital stays, poorer quality of life, and worse survival. Despite its clinical importance, nutritional screening is not consistently integrated into routine oncology practice. This narrative review examines the rationale for routine nutritional risk screening, summarizes commonly used screening and assessment tools, and discusses practical approaches to screening across the cancer care continuum, from diagnosis and active treatment to survivorship. The potential role of mobile health (mHealth) technologies in extending nutritional screening and support beyond conventional clinical settings is also considered. The reviewed literature demonstrates considerable variation in the prevalence of malnutrition across tumor types and clinical settings, as well as the absence of a single universally accepted screening tool. Emerging evidence on app-based nutritional support is promising but remains limited. Integrating brief, validated nutritional screening into routine oncology workflows, complemented by appropriate nutritional assessment and emerging digital technologies, may facilitate earlier identification of patients at risk and support timely nutritional intervention throughout the cancer care continuum.

Keywords: Malnutrition, nutritional screening, oncology, cancer, mHealth, survivorship

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Introduction

Malnutrition is a common but frequently under-recognized complication of cancer and its treatment. Its prevalence varies considerably according to tumor type, disease stage, and treatment modality, ranging from approximately 10% to more than 80%, with particularly high rates reported in pancreatic, esophageal, gastric, and head and neck cancers [1, 2]. In patients with cancer, malnutrition is rarely attributable to inadequate food intake alone. Rather, it reflects the combined effects of reduced oral intake, tumor- and treatment-related symptoms, systemic inflammation, and metabolic alterations that promote catabolism and progressive loss of muscle mass and function [2, 3].

Malnutrition may develop gradually but can worsen rapidly during active cancer treatment. Early identification is therefore important because nutritional deterioration can adversely affect treatment tolerance, functional status, quality of life, and clinical outcomes [2, 3]. Professional societies increasingly recommend nutritional risk screening as a routine and repeated component of oncology care rather than an occasional assessment performed only when nutritional problems become clinically apparent [4, 5]. Importantly, nutritional screening should be distinguished from comprehensive nutritional assessment. Screening is a brief, practical process designed to identify patients who may be at nutritional risk and therefore require further assessment and, when appropriate, individualized nutritional intervention.

This review focuses on nutritional risk screening across the cancer care continuum, from diagnosis and active treatment through survivorship. It summarizes commonly used screening and assessment approaches, discusses their applicability and limitations in oncology practice, and considers the emerging role of mobile

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health (mHealth) technologies in extending nutritional monitoring and support beyond conventional clinical settings.

Materials and Methods

A structured narrative literature review was conducted to examine the current evidence on nutritional risk screening in oncology. Relevant peer-reviewed articles, clinical practice guidelines, and systematic reviews published in English were identified through PubMed and Google Scholar using combinations of the following search terms: "malnutrition," "cancer," "nutritional screening," "nutritional assessment," "oncology," "GLIM criteria," "PG-SGA," "mHealth," and "mobile application." Priority was given to guidelines from major nutrition and oncology organizations, including the European Society for Clinical Nutrition and Metabolism (ESPEN), recent systematic reviews and meta-analyses, and studies published within the preceding five years. Earlier foundational studies were also considered when they established or validated commonly used screening instruments.

Articles were selected based on their relevance to nutritional risk screening and assessment in patients with cancer, rather than nutritional treatment or supportive interventions alone. The findings were synthesized narratively, with particular attention to screening tools, their clinical applicability, the timing of screening, and emerging digital approaches. Because this study was designed as a narrative review rather than a systematic review or meta-analysis, no registered review protocol or PRISMA flow diagram was used.

Results

The clinical consequences of unrecognized and untreated malnutrition in patients with cancer are well established. Patients who are malnourished at diagnosis or develop nutritional deterioration during treatment have higher rates of treatment interruption and dose reduction, increased postoperative and treatment-related complications, longer hospital stays, poorer quality of life, and reduced overall survival [1, 6]. These effects may reflect not only inadequate nutritional intake but also the systemic metabolic and inflammatory changes associated with cancer.

Sarcopenia, characterized by the loss of skeletal muscle mass and function, frequently accompanies cancer-related malnutrition and is an independent predictor of adverse outcomes, including chemotherapy toxicity, postoperative complications, functional decline, and mortality [3]. Importantly, nutritional risk cannot be reliably identified by body mass index (BMI) alone. Patients with a normal or elevated BMI may have substantial muscle depletion and remain at significant nutritional risk, particularly when weight loss is masked by adiposity or fluid retention.

This limitation highlights the importance of a broader approach to nutritional screening and assessment. Current guidance supports screening patients irrespective of BMI and emphasizes the need to consider recent weight change, dietary intake, disease-related symptoms, muscle mass and function, systemic inflammation, and other indicators of nutritional status [4, 5]. Routine screening can therefore provide an early opportunity to identify patients who require comprehensive nutritional assessment and timely intervention before nutritional deterioration compromises cancer treatment or clinical outcomes.

The prevalence of malnutrition varies substantially according to primary tumor site, reflecting differences in tumor-related symptoms, nutritional impact, disease burden, and treatment intensity. Cohort studies and reviews consistently identify pancreatic, esophageal, gastric, and head and neck cancers as among the tumor types associated with the highest nutritional risk, whereas breast and colorectal cancers generally show lower prevalence, although malnutrition remains clinically relevant in both groups [1, 2, 6]. These differences support the need for risk-based clinical vigilance while maintaining routine screening across all oncology populations. Figure 1 summarizes commonly reported prevalence ranges across major tumor types.

Overview of Available Screening Tools

Several validated instruments are available for nutritional screening and assessment in patients with cancer. These tools differ in their intended populations, administration time, clinical complexity, and whether they are designed primarily for screening or for comprehensive assessment and diagnosis. Table 1 summarizes commonly used instruments and their principal characteristics.

The Patient-Generated Subjective Global Assessment (PG-SGA) is the principal tool developed specifically for patients with cancer and is widely used for nutritional assessment in oncology [7]. Although more comprehensive

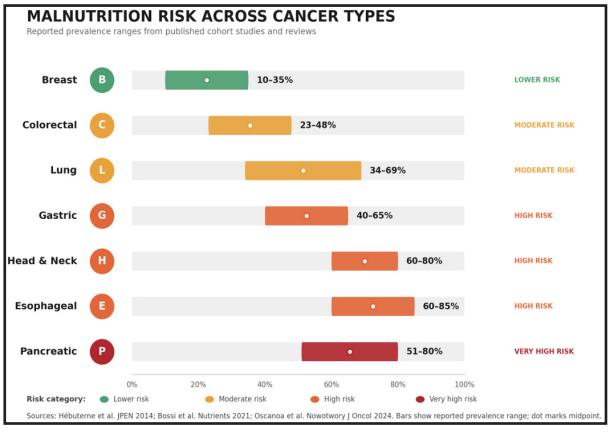

Figure 1. Reported Prevalence Ranges of Malnutrition across Selected Cancer Types, Based on Published Cohort Studies and Reviews [1, 2, 6]. The bars represent reported prevalence ranges, while the white dots indicate approximate midpoint values. The figure illustrates the substantial variation in nutritional risk across tumor sites, with the highest reported prevalence generally observed in pancreatic, esophageal, gastric, and head and neck cancers. Because estimates vary according to population characteristics, disease stage, treatment status, and the nutritional assessment method used, the ranges should be interpreted as approximate rather than directly comparable across tumor types.

Table 1. Commonly Used Nutritional Screening and Assessment Tools in Oncology.

Tool	Typical Setting	Key Features	Notes
PG-SGA (Patient-Generated Subjective Global Assessment)	General oncology; applicable across tumor sites	Patient-completed and clinician-assessed components covering weight loss, dietary intake, symptoms, functional status, and physical findings	Developed specifically for oncology; widely used as a reference assessment tool, but more time-consuming than brief screening instruments
MST (Malnutrition Screening Tool)	Outpatient and inpatient oncology	Two-item screen addressing recent weight loss and reduced appetite	Rapid and low burden; suitable for first-line screening
MUST (Malnutrition Universal Screening Tool)	General hospital and community settings	Incorporates BMI, unintentional weight loss, and acute disease-related effects	Not cancer-specific but widely validated and practical for routine screening
G8	Older adults with cancer; geriatric oncology	Eight-item screening tool incorporating nutritional status, weight loss, mobility, neuropsychological factors, and age	Particularly useful for identifying older patients who require comprehensive geriatric assessment
GNRI (Geriatric Nutritional Risk Index)	Older adults with cancer	Based primarily on serum albumin and the ratio of actual to ideal body weight	Objective and relatively simple; may be useful when patient-reported information is limited
CONUT (Controlling Nutritional Status)	Inpatient oncology; prognostic assessment	Combines serum albumin, total lymphocyte count, and total cholesterol	Used primarily for nutritional-risk and prognostic stratification across several cancer types
GLIM (Global Leadership Initiative on Malnutrition) criteria	Confirmatory assessment after a positive nutritional-risk screen	Combines phenotypic criteria (weight loss, low BMI, reduced muscle mass) with etiologic criteria (reduced food intake/assimilation and disease burden or inflammation)	Not a screening tool; used to diagnose and grade malnutrition after initial screening

and time-consuming than brief screening instruments, it incorporates patient-reported symptoms, dietary intake, weight history, functional status, and clinical findings. Simpler instruments, such as the Malnutrition Screening Tool (MST) and the Malnutrition Universal Screening Tool (MUST), require less time and may be more suitable for routine initial screening across large oncology populations. In older adults with cancer, tools such as the G8 and Geriatric Nutritional Risk Index (GNRI) may provide additional information and can be integrated with comprehensive geriatric assessment when appropriate.

The Global Leadership Initiative on Malnutrition (GLIM) criteria serve a different purpose. Rather than functioning as a brief screening instrument, GLIM provides a framework for confirming and grading malnutrition after nutritional risk has been identified. Diagnosis requires at least one phenotypic criterion, such as weight loss, low body mass index, or reduced muscle mass, together with at least one etiologic criterion, such as reduced food intake or assimilation or disease burden/inflammation [8]. Distinguishing screening from diagnostic assessment is therefore important when selecting an appropriate tool for clinical practice.

mHealth Interventions: From Screening to Management

An expanding body of research has investigated mobile health (mHealth) technologies as a means of extending nutritional screening and support beyond scheduled clinical encounters. Smartphone applications can potentially integrate several components of the nutritional care pathway within a single platform, including administration of brief screening questionnaires at predefined intervals, monitoring of dietary intake and body weight, delivery of individualized dietary education, communication with dietitians, and identification of symptom changes that may indicate nutritional deterioration and require clinical follow-up.

Early intervention studies are encouraging but remain limited. A randomized controlled trial involving patients with pancreatic ductal adenocarcinoma receiving chemotherapy evaluated a smartphone application that incorporated meal and activity logging with dietitian feedback and reported improved nutritional outcomes compared with usual care [10]. More recent pilot studies have also demonstrated the feasibility and acceptability of mobile nutrition applications among cancer survivors, with some reporting favorable changes in dietary behaviors and nutritional outcomes [11]. However, differences in study populations, intervention components, outcome measures, and follow-up periods limit direct comparison across studies. Further adequately powered trials are needed to determine whether mHealth-based nutritional screening and management can produce sustained improvements in clinically meaningful outcomes and whether these approaches can be effectively integrated into routine oncology workflows.

A 2025 systematic review and meta-analysis of mobile app-based dietary interventions among cancer survivors concluded that these interventions show promising, although still evolving, evidence for improving dietary behaviors [10-12]. Beyond individual dietary interventions, mHealth platforms are increasingly being incorporated into broader digital nutrition care pathways that integrate validated screening instruments, GLIM-based diagnostic criteria, and objective indicators such as body mass index, weight change, functional status, and inflammatory markers within structured workflows that can be linked to electronic health records and patient-reported outcome systems [13].

Nutrition needs also change after completion of

active cancer treatment, with the focus shifting from preventing acute weight and muscle loss to supporting long-term health, functional recovery, and potentially recurrence-free survival. The American Cancer Society guideline on nutrition and physical activity for cancer survivors recommends a dietary pattern rich in vegetables, fruits, and whole grains, while limiting red and processed meat, sugar-sweetened beverages, and alcohol. It also emphasizes achieving and maintaining a healthy body weight and engaging in regular physical activity. Adherence to these behaviors after treatment has been associated with more favorable long-term outcomes [14]. Loss of lean muscle mass during and shortly after treatment can be substantial; in some cancer populations, muscle loss during the first year after diagnosis may approximate the amount expected over several years of normal aging [14]. This finding underscores the importance of adequate protein intake, appropriate physical activity, and resistance exercise during the transition from active treatment to survivorship. Despite the available evidence, adherence to recommended dietary and lifestyle behaviors remains suboptimal, highlighting survivorship as an important phase in which nutritional screening and counseling should continue rather than end with completion of anticancer treatment.

Discussion

Nutritional risk is dynamic throughout the cancer care continuum, and screening should therefore be repeated at clinically relevant time points rather than performed only once. At diagnosis, an initial screen establishes a nutritional baseline and identifies patients who may benefit from early intervention or prehabilitation before surgery or systemic therapy. During active treatment, repeated screening can facilitate early detection of nutritional deterioration associated with treatment-related toxicity, reduced intake, or disease progression. In the perioperative setting, nutritional screening can inform prehabilitation and enhanced recovery strategies. In advanced disease, screening remains relevant but should be interpreted in the context of prognosis, treatment goals, symptom burden, and overall goals of care [4, 5]. After completion of active treatment, the focus of nutritional care shifts toward long-term dietary quality, healthy weight management, preservation or restoration of muscle mass, and physical activity. Survivorship care should therefore incorporate continued assessment of weight trajectory, dietary patterns, and functional status, with counseling aligned with established survivorship recommendations [9, 14]. This continued approach is important because treatment-related effects and changes in body composition may persist long after active therapy has ended, while adherence to healthy post-treatment behaviors may contribute to better long-term health outcomes [14].

Despite the availability of several validated instruments, no single tool performs optimally across all cancer types, treatment settings, and patient populations, and no universally accepted screening standard has yet been established [6]. Important implementation gaps also remain. Nutritional screening may be performed inconsistently, positive results may not be systematically linked to referral or intervention pathways, and responsibility for screening may not be clearly assigned within multidisciplinary oncology teams. Although mHealth-based nutritional interventions are promising, the current evidence is still derived largely from pilot studies and single-center trials with relatively small sample sizes. Important questions also remain regarding long-term adherence, equitable access to digital technologies, data integration, and incorporation of mHealth tools into established clinical workflows [10-13].

Based on the current evidence, a pragmatic approach to nutritional screening in oncology should include the following: (1) screening all patients for nutritional risk at diagnosis, irrespective of BMI or documented weight loss; (2) using a brief, validated screening instrument appropriate to the clinical setting as the initial step, followed by comprehensive assessment, such as PG-SGA or application of GLIM criteria, when nutritional risk is identified; (3) repeating screening at clinically relevant intervals throughout treatment; (4) using geriatric-specific instruments, such as G8, when appropriate for older patients; (5) clearly assigning responsibility for screening within the multidisciplinary team and establishing defined referral pathways to dietitians or nutrition-support services; (6) considering mHealth applications as complementary tools for monitoring and dietary support between clinical visits; and (7) transitioning patients to structured survivorship nutrition counseling based on established guidelines after completion of active treatment, rather than discontinuing nutritional follow-up at the end of therapy [14].

In conclusion, nutritional risk screening is a relatively simple and low-burden component of cancer care that can facilitate early identification of patients who may require comprehensive nutritional assessment and intervention. Malnutrition is associated with poorer treatment tolerance, reduced quality of life, and adverse clinical outcomes, yet nutritional screening remains inconsistently implemented across oncology settings. The absence of a single universally accepted screening instrument should not prevent routine screening; rather, tools should be selected according to the clinical setting, patient population, and available resources.

Embedding brief, validated screening within routine oncology workflows and repeating it across the cancer care continuum, from diagnosis through active treatment and survivorship, offers a practical strategy for identifying nutritional deterioration earlier. Emerging mHealth technologies may further extend screening and nutritional support beyond conventional clinical encounters, although stronger evidence regarding long-term effectiveness, accessibility, and integration into routine care is still needed. Overall, combining systematic screening with appropriate assessment, timely referral, and continued survivorship support may help narrow the gap between nutritional care recommended by clinical guidance and the care delivered in everyday oncology practice.

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