Review Article

Nutritional Care in Paediatric Oncology: A Narrative Review of Current Guidance and a Conceptual Multidisciplinary Framework

Nooshin Abbasi[1]

1. Independent researcher

Purpose: Malnutrition remains common in paediatric oncology and may affect treatment tolerance, growth, and long-term health. However, available guidance is heterogeneous, with variability in assessment tools, thresholds for intervention, and the level of detail provided for different treatment phases and care settings. This narrative review summarises key international and regional guidance on nutritional care in paediatric oncology, identifies recurring limitations, and outlines a conceptual phase-based framework for future discussion and testing.

Methods: A narrative, non-systematic review of guidance documents, consensus statements, and selected reviews relevant to nutritional care in paediatric oncology was conducted. PubMed and Google Scholar were searched, and the websites of major professional organisations and societies were screened up to March 2026. Documents were prioritised according to specificity to paediatric oncology, methodological strength, recency, and relevance to clinical practice. Because the aim was conceptual synthesis rather than pooled effect estimation, no formal risk-of-bias assessment was performed.

Results: The available guidance consistently recognises nutritional care as an essential component of paediatric oncology, but important gaps remain. These include heterogeneity in screening tools and cut-offs, limited tumour- or phase-specific pathways, variable implementation across settings, and limited clarity regarding multidisciplinary roles. On the basis of this synthesis, a phase-based conceptual framework is proposed, covering diagnosis and early intensive therapy, ongoing treatment, haematopoietic stem cell transplantation, and survivorship, with emphasis on family-centred care and multidisciplinary collaboration.

Conclusion: Current international, regional, and national guidance provides a useful foundation for paediatric oncology nutrition, yet there is substantial room for greater harmonisation and more detailed, phase-specific implementation strategies. The proposed framework should be regarded as a conceptual model intended to support future protocol development, multicentre testing, and implementation research, rather than as a formal clinical guideline.

 doi.org/10.32388/6KD72D

Correspondence: papers@team.qeios.com — Qeios will forward to the authors

1. Introduction

Survival rates for children with cancer have improved substantially in high-income countries, reaching five-year survival rates exceeding 80% for many diagnoses, but this success is accompanied by a high burden of acute and long-term nutritional problems across the cancer continuum. Observational studies and systematic reviews from diverse global settings report that 20–50% of paediatric oncology patients present with some form of malnutrition at diagnosis or during treatment, including underweight, stunting, wasting, sarcopenia, and, increasingly in certain contexts, overweight and obesity. Both under- and over-nutrition have been associated with increased treatment-related toxicity, higher rates of infection and other complications, unplanned hospitalisations, reduced chemotherapy dose intensity, impaired health-related quality of life, and adverse long-term cardiometabolic and endocrine outcomes in survivors[1][2][3][4][5][6][7][8][9].

In adult oncology, frameworks from the European Society for Clinical Nutrition and Metabolism (ESPEN) and national societies have clearly positioned nutrition as a core supportive care domain, with structured algorithms for universal screening, escalation from dietary counselling to oral nutritional supplements (ONS), enteral nutrition (EN), and parenteral nutrition (PN), and an increasing emphasis on patient-facing literacy tools and symptom management. In paediatric oncology, several important documents now address nutritional issues—including international standards of care, low- and middle-income countries (LMIC)-focused frameworks, consensus statements tailored to limited-resource settings, national consensus papers, and high-impact narrative and systematic reviews—but the literature consistently highlights the lack of systematic, harmonised approaches to nutritional screening, assessment, and intervention across centres, countries, and health-system models[3][9][10][11][12][13][14][15].

This narrative review synthesises these international and regional guidelines, consensus statements, and reviews, taking an explicitly global perspective rather than focusing on any single health system. Building on prior work in adult oncology nutrition, where hybrid clinician–patient frameworks and tumour-specific modules have been proposed, this narrative review synthesises international and regional guidance, outlines a conceptual framework tailored to paediatric oncology, and discusses multidisciplinary team structures and context-dependent professional roles.[10][11][16][17].

2. Methods

This article is a narrative, non-systematic review aimed at mapping and synthesising existing guidance and key syntheses on nutritional care in paediatric oncology. The focus was on documents that inform clinical nutritional practice in children and adolescents with cancer, rather than on primary intervention trials.

Literature searches were conducted in PubMed and Google Scholar from database inception to March 2024 using combinations of the following core concepts: paediatric oncology, childhood cancer, nutrition, malnutrition, nutritional support, guideline, consensus, and review. These database searches were complemented by targeted screening of the websites of relevant professional organisations and societies, including the European Society for Clinical Nutrition and Metabolism (ESPEN), the European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN), the International Society of Paediatric Oncology (SIOP, including SIOP Europe and SIOP PODC), the International Initiative for Paediatrics and Nutrition (IIPAN), the Pan American Health Organization / World Health Organization (PAHO/WHO), the American Society for Parenteral and Enteral Nutrition (ASPEN), and national paediatric oncology societies.[10][11][12][18][19][20][21][22].

Documents were eligible for inclusion if they met at least one of the following criteria: (i) international or regional standards, guidelines, or consensus statements specifically addressing paediatric oncology nutrition or explicitly including children with cancer; (ii) national paediatric oncology nutrition consensus statements; (iii) major narrative or systematic reviews on nutritional status, assessment, interventions, or multidisciplinary care in paediatric oncology; (iv) implementation or quality-improvement studies that focused on the delivery of nutritional care in paediatric oncology; or (v) general nutrition support or cancer prevention/survivorship guidelines that were judged to be directly informative for paediatric oncology nutritional practice.[3][9][12][13][21][23][24][25]

Non-oncology nutrition guidelines without clear relevance to paediatric cancer, documents that dealt exclusively with adult oncology without applicability to adolescents, and purely opinion-based pieces without reference to clinical practice or guidance were excluded. When multiple documents addressed similar topics, priority was given to the most recent and most specific sources, and to formal guideline or consensus documents over editorials or narrative opinion articles.

Because the objective was to provide a conceptual synthesis of the guidance landscape rather than to estimate pooled effect sizes, no formal risk-of-bias or quality appraisal of individual documents was undertaken. Instead, the review focused on identifying recurrent themes, common gaps, and proposed models across high-income and limited-resource settings, and on organising these elements into a phase-based, conceptually coherent framework for paediatric oncology nutritional care.

3. Existing guidelines, consensus statements, and key reviews in paediatric oncology nutrition

3.1. Global and pan-regional frameworks

The European Standards of Care for Children with Cancer, developed by the European branch of the International Society of Paediatric Oncology (SIOP Europe) in partnership with parent organisations and other stakeholders, define minimum organisational standards for paediatric oncology centres across Europe and are increasingly referenced globally. These standards explicitly require that all children and adolescents with cancer receive care from multidisciplinary teams with access to nutritional expertise, and recognise nutritional support as an integral component of high-quality paediatric oncology care. However, the document does not provide detailed algorithms for nutritional screening, assessment tools, or escalation criteria for ONS, EN, and PN, leaving these operational details to individual centres and national groups[21][26].

For low- and middle-income countries (LMICs), the SIOP Paediatric Oncology in Developing Countries (PODC) group published A Framework for Adapted Nutritional Therapy for Children with Cancer, which proposes pragmatic criteria for identifying and managing malnutrition using simple anthropometric tools such as weight-for-age, height-for-age, and mid-upper arm circumference (MUAC), and leveraging locally available energy- and protein-dense foods while integrating WHO malnutrition management protocols when indicated. This document explicitly situates nutrition within adapted paediatric oncology treatment protocols designed for resource-constrained settings, but is less directly applicable to high-income centres with different infrastructure, workforce, and resource availability[18][27].

More recently, the International Initiative for Paediatrics and Nutrition (IIPAN)—a collaborative network supported by international paediatric oncology and nutrition organisations—issued consensus recommendations for the nutritional management of children with cancer in limited-resource settings, published in 2025. These recommendations provide more detailed guidance on screening approaches, timing and route of feeding (oral, enteral, parenteral), formula selection, and capacity building for multidisciplinary nutrition teams, with an emphasis on feasibility and sustainability in LMIC contexts. Both the SIOP PODC framework and IIPAN consensus strongly endorse systematic screening and proactive integration of nutrition into adapted paediatric oncology protocols, and call for training and support for local multidisciplinary teams[18][27].

3.2. International nutrition society guidelines (adult-focused, with paediatric relevance)

Although the European Society for Clinical Nutrition and Metabolism (ESPEN) guidelines on clinical nutrition in cancer primarily target adult patients, they are frequently cited as background references for adolescents and

young adults with cancer and have influenced paediatric oncology nutrition practice, particularly with regard to principles such as universal screening, preference for the enteral route over parenteral when feasible, contextual recommendations for specific cancer sites (e.g. head and neck, upper GI), peri-operative care and palliative settings. While they clearly move beyond purely generic advice by including some disease- and context-specific sections, they remain largely high-level frameworks rather than fully modular, tumour- and phase-specific pathways. The ESPEN 2017 guideline on nutrition in cancer patients and the 2021 practical guideline provide comprehensive algorithms for adults, and several paediatric centres have adapted these principles for older adolescents[10][11].

Similarly, recommendations from the European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) on paediatric enteral and parenteral nutrition—while not oncology-specific—inform clinical decisions about formula choice (polymeric vs. semi-elemental), prevention and management of refeeding syndrome, and management of gastrointestinal dysfunction in children undergoing intensive chemotherapy, radiotherapy, or haematopoietic stem cell transplantation (HSCT). These ESPGHAN documents are frequently cited in paediatric oncology consensus papers as the evidence base for feeding route and formula decisions[12][13][28].

3.3. National and regional consensus statements

At the national and regional level, several consensus documents address paediatric oncology nutrition more directly, with the involvement of paediatric oncologists, dietitians, and other specialists.

One of the most comprehensive is the consensus statement *Management of Nutritional Needs in Paediatric Oncology*, developed by a multidisciplinary Italian working group and endorsed by the Italian Association of Paediatric Haematology and Oncology (AIEOP) and the Italian Alliance Against Cancer (ACC). This consensus addresses 21 clinical questions related to the assessment and treatment of nutritional problems in children with cancer, summarises epidemiological data on malnutrition prevalence and impact, recommends systematic nutritional assessment at diagnosis and during treatment, and provides practical guidance on when and how to implement counselling, ONS, EN, and PN based on intake adequacy, weight loss, and treatment-related risk factors. The document also highlights the importance of managing overweight and obesity, particularly in contexts with prolonged corticosteroid exposure such as acute lymphoblastic leukaemia (ALL), and calls for closer integration of nutrition into survivorship care to address long-term cardiometabolic risk[2][12].

In Poland, a recent consensus on *Managing Undernutrition in Paediatric Oncology* provides updated, pragmatic recommendations on nutritional assessment (anthropometry, z-scores, body composition), criteria for initiating counselling, ONS, EN, and PN, and practical guidance on formula selection and monitoring, with particular

attention to the prevention of refeeding syndrome and management of gastrointestinal side effects. This consensus reflects European practice patterns and references ESPEN and ESPGHAN documents extensively[13].

Other national efforts include guidance from the Indian Academy of Paediatrics Expert Group on Nutrition (IAPEN) on the nutritional management of paediatric cancer patients, which adapts general principles to the Indian context and resource constraints, addressing issues such as local food availability, cultural feeding practices, and healthcare infrastructure. Regional consensus statements and practice guidelines from other Asian countries, Latin America, and Africa are emerging but are often published in local languages or journals with limited international reach[8][15][19].

In the Americas, PAHO and WHO have issued a *Nutritional Care Guide for Paediatric Cancer* under the CureAll Americas initiative, providing region-specific guidance on integrating nutrition into paediatric cancer care, including screening, counselling, use of ONS and EN, and survivorship considerations. Additionally, ASPEN/SCCM guidelines on nutrition support in critically ill children, while not oncology-specific, influence decisions about EN and PN in paediatric intensive care and peri-operative settings relevant to oncology. Generally, the American Cancer Society (ACS) and American Institute for Cancer Research (AICR) guidelines on diet and physical activity for cancer prevention and survivorship contribute to the broader evidence base, particularly for long-term cardiometabolic health in survivors, although they are not paediatric oncology-specific[20][23][29][30][31].

To date, no single comprehensive paediatric oncology nutrition guideline analogous to ESPEN cancer guidelines or SIOP Europe standards has been issued by North American paediatric oncology societies; practice is guided by a combination of institutional protocols, regional initiatives such as PAHO/WHO, and general paediatric and oncology nutrition guidance[20][23].

Taken together, these international, regional, and national documents provide a multi-layered guidance landscape that spans high-income and limited-resource settings and various health-system models, offering a broad basis for this review[12][13][18][19][21][27].

3.4. High-impact reviews and narrative syntheses

A growing body of narrative and systematic reviews has synthesised the evidence on nutritional status, assessment methods, and interventions in paediatric oncology, complementing the guideline literature.

Narrative reviews such as *Assessment of Nutritional Status in Children with Cancer: A Narrative Review* and *Malnutrition in Paediatric Oncology: A Review* discuss the strengths and weaknesses of various anthropometric and functional measures, including BMI-for-age z-scores, height-for-age z-scores, Mid-Upper Arm Circumference (MUAC), skinfolds, and emerging body composition techniques such as bioelectrical impedance analysis (BIA) and dual-energy X-ray absorptiometry (DEXA). These reviews emphasise that the choice of assessment method

and cut-off significantly affects estimated malnutrition prevalence and comparability across studies, and they call for greater harmonisation of tools and definitions in paediatric oncology research[3][4][5][6][9].

More recent publications, including editorials and special issues on "nutritional support in paediatric cancer: novel insights and future directions", highlight emerging evidence on the relationship between nutritional status and treatment tolerance, the role of inflammation and the microbiome, body composition changes during therapy, and long-term survivorship outcomes including growth, bone health, fertility, and cardiometabolic risk. Several observational studies from diverse international settings have quantified the prevalence and determinants of both under- and over-nutrition in children with cancer at diagnosis and during therapy, demonstrating substantial global heterogeneity and reinforcing the need for more standardised, multicentre approaches[1][2][4][5][6][7][8][28].

Reviews of multidisciplinary care in paediatric oncology more broadly discuss the importance of integrating nutrition into comprehensive care teams alongside medical, surgical, nursing, psychosocial, and rehabilitative services, although they rarely specify the composition or roles within nutrition teams in detail. Implementation and quality-improvement studies, particularly from LMIC settings, describe efforts to improve the delivery of nutritional care and document persistent barriers such as lack of trained personnel, limited availability of specialised formulas, and inadequate integration of nutrition into routine clinical pathways[14][17][25][32].

As summarised in Table 1, the current guidelines, consensus statements, and reviews show the field now has a solid conceptual and empirical foundation for paediatric oncology nutrition but suffers from fragmented implementation, is only partially tumour- or phase-specific, has limited standardisation of tools and thresholds, and has insufficient clarity regarding multidisciplinary team structures and professional roles—gaps that persist across both high-income and limited-resource settings[9][12][13][14][15].

Document /Organisation	*Region / Scope*	*Population focus*	*Main focus*	*Tumour-specific content*	*Phase specific content*	*Main strengths*	*Main gaps*
SIOP Europe Standards	Europe	Paediatric	Org. standards	No	No	mandates nutrition teams	No screening algorithms
SIOP PODC Framework	LMICs	Paediatric	Malnutrition management	No	Limited	LMIC-adapted, pragmatic	HIC relevance limited
IIPAN Consensus	LMICs	Paediatric	Screening & feeding	No	Partial	Team capacity building	Generic by tumour phase
ESPEN Cancer Guidelines	Global (adult)	Adult (AYA use)	Screening, ONS/EN/PN	Partial	Partial	Clear algorithms	Adult-focused
ESPGHAN EN/PN	Global	Paediatric	Formula/refeeding	No	No	Paediatric EN/PN evidence	Not oncology-specific
AIEOP/ACC Consensus	Italy/EU	Paediatric	21 clinical questions	Limited	Partial	Practical triggers	National scope
Polish Undernutrition	Poland/EU	Paediatric	Assessment/intervention	No	Limited	Refeeding prevention	Undernutrition focus
IAPEN India	India	Paediatric	Local adaptation	No	Limited	Cultural/ resource fit	Limited visibility
PAHO/WHO Paediatric Cancer	Americas	Paediatric	Regional integration	No	Limited	CureAll framework	High-level guidance
ASPEN/SCCM Critical Care	Global	Critically ill kids	EN/PN in PICU	No	Partial	ICU nutrition protocols	Not oncology-specific
ACS/AICR Diet Guidelines	Global	Survivors	Prevention/ survivorship	No	No	Long-term lifestyle	Not paediatric oncology

Table 1. Key guidance documents on paediatric oncology nutrition and related areas

Table 1 Key guidance documents on paediatric oncology nutrition and related areas. Documents are organised from most specific (paediatric oncology standards) to more general (critical care, survivorship). Tumour-specific = tumour-by-tumour recommendations; Phase-specific = organised by treatment phase (diagnosis, therapy, HSCT, survivorship).

This narrative review suggests that nutritional care in paediatric oncology is increasingly recognised as an essential component of supportive care, but the current guidance landscape remains fragmented. Rather than revealing a single dominant model, the documents reviewed here highlight variability in terminology, assessment tools, intervention thresholds, and the level of detail devoted to different phases of care and clinical scenarios. The conceptual framework proposed in this article should therefore be understood as an attempt to organise and make explicit these recurring patterns, rather than as a new evidence-based solution to the challenges of paediatric oncology nutrition.

From an innovation perspective, the contribution of this review lies primarily in the synthesis and organisation of existing guidance into a phase-based structure that explicitly incorporates family-centred care and multidisciplinary collaboration. The four-phase arrangement itself is not new, but the explicit mapping of current recommendations and gaps across these phases may support future work on tumour- and context-specific protocols.

4. Cross-cutting limitations of current paediatric oncology nutrition guidance

Despite substantial progress, recurrent gaps and limitations emerge when international and national guidelines and consensus statements are examined together. These limitations transcend individual health systems and represent opportunities for future development and research.

4.1. Heterogeneity in definitions, tools, and thresholds

Studies report widely varying prevalence of undernutrition and overnutrition in paediatric cancer populations, partly due to differences in assessment methods (BMI z-scores vs. weight-for-height, MUAC, body composition), cut-offs (e.g., z-score < –1 vs. < –2), and timing of evaluation (at diagnosis, during therapy, at the end of treatment). Some documents and research groups favour BMI-for-age and height-for-age z-scores as primary screening tools, others include MUAC or skinfolds, and body composition techniques such as BIA or DEXA are not uniformly available or standardised, particularly in LMIC settings[3][4][5][6][7][9][12][13].

Similarly, thresholds for initiating ONS, EN, or PN—such as percentage of estimated energy or protein needs achieved, duration of inadequate intake, degree of weight loss, and presence of specific risk factors—are not universally standardised for children and are often extrapolated from adult oncology practice or general paediatric nutrition guidelines. This heterogeneity makes inter-study comparisons and benchmarking across centres and countries difficult, and may contribute to delayed or inconsistent interventions[4][9][10][12][13][14][18].

4.2. Limited tumour- and phase-specific algorithms

While adult oncology nutrition guidelines increasingly acknowledge tumour/disease- and context-specific needs —for example, distinct recommendations for pancreatic cancer, head and neck cancer, peri-operative pathways, and palliative care—they remain largely generic and high-level. By contrast, paediatric documents are even more global and mostly address recommendations for "children with cancer" without detailed differentiation by tumour type, treatment protocol, or specific high-risk scenarios. For example, acute lymphoblastic leukaemia (ALL), central nervous system (CNS) tumours, neuroblastoma, and HSCT share some common nutritional challenges but also differ substantially in side-effect profiles, exposure to corticosteroids, risk and severity of mucositis, gastrointestinal toxicity, and long-term metabolic sequelae[1][2][10][11][12][13][15].

Few guidelines offer fully worked, stepwise decision trees for distinct phases such as induction vs. consolidation vs. maintenance therapy in ALL, conditioning vs. early post-transplant vs. long-term follow-up in HSCT, or specific management of dysphagia and aspiration risk in CNS tumours. As a result, actual management remains highly centre-dependent and influenced by local custom, individual clinician preference, and resource availability, rather than by standardised, evidence-based protocols[1][12][13][14][15][18].

4.3. Incomplete integration of nutrition into routine paediatric oncology protocols

Although international standards of care and national consensus statements emphasise that nutrition should be part of standard supportive care for all children with cancer, implementation studies and surveys show that nutritional screening and assessment are not yet consistently embedded in daily paediatric oncology practice across centres and countries. A multicentre survey of current practices in Europe reported substantial variability among centres in[14][15][25]:

- whether nutritional assessment is performed systematically at diagnosis for all patients,
- the frequency of reassessment during therapy and follow-up,
- the personnel responsible for performing assessment and providing counselling,
- the criteria and pathways for referral to specialised nutrition services or dietitians[13][14].

In many settings—particularly but not exclusively in LMICs—nutritional interventions are initiated reactively in response to overt weight loss, feeding difficulties, or clinical deterioration, rather than proactively based on

standardised screening at diagnosis and predefined triggers during therapy. This reactive approach may miss opportunities for early intervention and contribute to worse nutritional and clinical outcomes[1][3][4][14][15][18][25].

4.4. Undefined composition and roles within multidisciplinary nutrition teams

Most paediatric oncology guidelines and consensus statements refer generically to "dietitians", "nutrition specialists", "nutrition support teams", or "multidisciplinary teams with nutritional expertise", rarely specifying the minimal composition, required competencies, or division of responsibilities within these teams. In practice, team composition and structure vary widely across institutions and countries, reflecting differences in national regulatory frameworks governing health professions, workforce availability, historical development of professions, and resource constraints[12][13][14][21][24][25].

“Some countries also recognize additional nutrition science professionals (for example, biologist-nutritionists or equivalent roles), but current paediatric oncology guidelines rarely describe their potential contributions in detail.”

5. A hybrid clinical–family framework for paediatric oncology nutrition

Given the cross-cutting gaps identified in current guidance, this review outlines a phase-based conceptual framework that adapts principles from adult oncology nutrition to the paediatric context, while highlighting family involvement, developmental appropriateness, and cultural sensitivity. The framework is not intended as a formal guideline but as a structured way of organising existing recommendations and identifying areas where more detailed, tumour- and phase-specific pathways are needed.

5.1. Phases of care and nutritional objectives

The framework organises nutritional care into four broad phases, each associated with distinct challenges, objectives, and opportunities for intervention[1][2][12][13].

Phase 1: Diagnosis and early intensive therapy (e.g., induction chemotherapy in ALL, initial cycles for solid tumours, pre-transplant conditioning)

- Objectives: Rapid identification of pre-existing under- or over-nutrition using standardised screening tools; prevention of acute nutritional deterioration during intensive treatment; early family and patient education and counselling.
- Key actions: Baseline nutritional assessment (weight, height, BMI z-score, diet history, feeding behaviours); identification of high-risk groups (very young children, advanced disease, specific tumour types with high metabolic demand); initiation of proactive counselling and symptom management strategies.

Phase 2: Ongoing chemotherapy and/or radiotherapy (e.g., consolidation and maintenance in ALL, adjuvant therapy for solid tumours)

- Objectives: Maintain adequate energy and protein intake to support growth and immune function; minimise the impact of treatment-related side effects (nausea, vomiting, mucositis, altered taste, constipation, diarrhoea); prevent excessive weight gain in corticosteroid-treated regimens (e.g., ALL maintenance); monitor growth trajectories.
- Key actions: Regular monitoring of intake, weight, and symptom burden; stepped escalation from counselling to ONS to EN based on predefined thresholds; clear, practical guidance for families on managing common feeding challenges; early involvement of speech and swallowing specialists if indicated.

Phase 3: Haematopoietic stem cell transplantation (HSCT) and other highly intensive treatments

- Objectives: Proactively manage the very high risk of severe mucositis, gastrointestinal toxicity, anorexia, and infection; ensure timely use of EN and PN when oral intake is insufficient; prevent refeeding syndrome in malnourished patients; support immune reconstitution and recovery.
- Key actions: Pre-transplant nutritional optimisation; protocolised criteria for initiating EN (e.g., nasogastric or gastrostomy feeding) and PN based on oral intake adequacy, duration of aplasia, and gastrointestinal function; individualised formula selection (polymeric vs. semi-elemental, consideration of Medium-Chain Triglycerides (MCT) content); close monitoring of electrolytes, glucose, and fluid balance; gradual transition back to oral feeding as tolerated.

Phase 4: Follow-up and survivorship

- Objectives: Normalise growth trajectories (catch-up growth in previously malnourished children); optimise body composition (prevent sarcopenia, manage overweight/obesity); reduce long-term cardiometabolic, endocrine, and bone health risks through age-appropriate, culturally adapted dietary patterns and physical activity; address psychosocial aspects of eating and body image in adolescent and young adult survivors.
- Key actions: Periodic reassessment of anthropometry, body composition, and diet quality; integration of nutrition into comprehensive survivorship clinics alongside endocrine, cardiac, and psychosocial assessments; family and survivor education on healthy eating, physical activity, and long-term health promotion; research on optimal dietary patterns for specific survivor populations.

For each phase, the framework suggests coupling:

- a clinician-facing decision algorithm (screening intervals, thresholds for escalation of support, monitoring parameters, referral pathways); and

- a family- and patient-facing "package" (educational materials tailored to age and literacy level, symptom management tips, simple intake and symptom diaries, culturally adapted recipes and meal plans, and potentially digital tools such as apps or web portals for remote monitoring and support)[1][12][24].

This hybrid framework may provide a structure to explore potential solutions that align evidence-based clinical practice with the real-world needs and capacities of families and patients, acknowledging that adherence to nutritional interventions in paediatrics is heavily dependent on family understanding, resources, and engagement[1][12][25].

5.2. Detailed text-based tumour/setting-specific modules: ALL and HSCT

To move from general principles to actionable protocols, tumour- and setting-specific modules can be developed as prototypes for future multicentre testing. Two examples are outlined here.

5.2.1. Acute lymphoblastic leukaemia (ALL)

ALL is the most common paediatric cancer in many countries and has distinct nutritional challenges related to prolonged corticosteroid exposure, risk of both under- and over-nutrition, and long treatment duration[2][12].

a. At diagnosis and during induction:
   i. Comprehensive baseline nutritional assessment including anthropometry (weight, height, BMI z-score), dietary history, and assessment of feeding behaviours and family food security.
   ii. Identification of pre-existing overweight/obesity and sarcopenia risk in the context of anticipated high-dose glucocorticoid exposure.
   iii. Early counselling for families on maintaining adequate protein intake to preserve lean mass, while avoiding an excessive calorie surplus that exacerbates steroid-related weight gain and metabolic complications.

b. During intensive consolidation blocks:
   i. Regular monitoring of intake (food diaries, 24-hour recalls) and weight at each clinic visit or hospitalisation.
   ii. Proactive management of side effects (nausea, mucositis, altered taste) with clear, practical tips for families on energy-dense but nutrient-rich food choices, avoiding reliance on ultra-processed "comfort" foods that may worsen metabolic risk.
   iii. Stepped escalation to ONS or EN if oral intake falls below protocol-defined thresholds.

c. Maintenance therapy and early survivorship:
   i. Quarterly reassessment of growth (height velocity, BMI z-score trajectory) and body composition where feasible.

ii. Gradual transition to long-term, age-appropriate healthy eating patterns aligned with general paediatric dietary guidelines, with attention to reducing the intake of added sugars and saturated fats to mitigate cardiometabolic risk.

iii. Integration with physical activity recommendations and monitoring of bone health, given the risk of reduced bone mineral density from corticosteroids and reduced activity during treatment.

5.2.2. Haematopoietic stem cell transplantation (HSCT)

HSCT recipients face a very high nutritional risk due to conditioning regimen toxicity, prolonged aplasia, graft-versus-host disease (GVHD), and long-term complications[1][13].

- Pre-transplant (evaluation and conditioning):
  - Risk stratification for nutritional compromise based on disease status, prior therapy intensity, and existing anthropometric and biochemical data.
  - Optimisation of nutritional status using intensive dietary counselling, ONS, and, where indicated based on intake adequacy and timeline to transplant, early initiation of EN via a nasogastric or gastrostomy tube[12][13][24].
- Conditioning and early post-transplant (aplasia and acute GVHD):
  - Protocolised thresholds for initiating EN and PN, including clear plans for managing severe mucositis, nausea, vomiting, diarrhoea, and gastrointestinal GVHD.
  - Consideration of formula type (polymeric vs. semi-elemental) and composition (e.g., inclusion of medium-chain triglycerides (MCT)) based on individual gastrointestinal function and tolerance[12][13].
  - Close monitoring for refeeding syndrome in previously malnourished patients, with careful electrolyte supplementation and a gradual increase in caloric delivery[13][28].
  - Integration with infection control measures, with evidence-based guidance on a neutropenic diet (avoiding overly restrictive practices not supported by current evidence)[12].
- Mid- and long-term post-transplant (chronic GVHD and survivorship):
  - Regular monitoring of growth (particularly in younger children), bone health, endocrine function, and body composition.
  - Tailored dietary strategies for chronic gastrointestinal GVHD, including management of malabsorption, lactose intolerance, and food intolerances.
  - Integration of nutrition into comprehensive survivorship clinics with cardiometabolic, endocrine, pulmonary, and psychosocial assessments, given the high burden of late effects in HSCT survivors[1][2][13].

These ALL and HSCT modules should be viewed as conceptual prototypes, not as prescriptive, ready-to-use clinical algorithms. Their value lies in providing a structure and rationale for future multicentre development,

piloting, and formal testing in observational studies or randomised trials, rather than as definitive, universally applicable protocols[1][12][13].

6. Multidisciplinary paediatric oncology nutrition teams: composition, functions, and emerging roles

6.1. Core team composition and functions

In many documents, nutritional care is attributed broadly to "dietitians" or "multidisciplinary teams with nutritional expertise," without specifying minimum team composition or detailed role descriptions. In some healthcare systems, additional nutrition science professionals, such as biologist-nutritionists or equivalent roles, may contribute to assessment, staff education, implementation of local protocols, audit, and research. The precise composition of multidisciplinary teams is therefore likely to vary according to national regulations, training pathways, and resource availability, and the present review does not propose a single universal model [2][12][14][18][25][27].

In line with SIOP Europe standards, IIPAN recommendations, and national consensus statements, paediatric oncology nutrition should be delivered by multidisciplinary teams that combine medical, dietetic, nursing, psychosocial, and, where available and appropriate, specialist nutrition science expertise. Core functions of such teams include[12][13][14][18][21][32]:

- Systematic screening and assessment using harmonised tools and thresholds appropriate for paediatric oncology populations.
- Development and adjustment of individualised nutrition care plans based on tumour type, treatment phase, side-effect profile, growth needs, and family circumstances.
- Integration of nutrition into chemotherapy, radiotherapy, surgical, and HSCT pathways, including proactive planning for high-risk periods and clear escalation criteria.
- Education and counselling for families and, where developmentally appropriate, patients, including practical symptom management strategies, myth-busting (e.g., overly restrictive diets, misconceptions about specific foods), and long-term health promotion.
- Audit, quality improvement, and clinical research, including collection of standardised data on nutritional status, interventions, and outcomes; benchmarking across centres; and participation in multicentre studies[12][14][25].

7. Research and implementation agenda

To move from conceptual proposals and expert consensus to robust, evidence-based practice that can be implemented equitably across diverse settings, several avenues of research and implementation science are urgently needed.

- Standardisation and validation of assessment tools and thresholds: Multicentre observational studies and consensus processes are needed to compare different anthropometric and functional measures (e.g., BMI-for-age z-score, weight-for-height z-score, MUAC, body composition indices from BIA or DEXA) and to validate pragmatic, paediatric oncology-specific cut-offs for identifying nutritional risk and for initiating ONS, EN, or PN. Such efforts would reduce current heterogeneity, improve comparability of data across studies and centres, and facilitate benchmarking and quality improvement[4][5][9][13][14][15][25].

- Development and testing of tumour- and phase-specific care modules: The ALL and HSCT modules outlined in this review, as well as analogous modules for other tumour types and high-risk scenarios (e.g., CNS tumours with dysphagia, neuroblastoma with high metabolic demand, relapsed/refractory disease with intensive salvage regimens), could serve as templates for structured protocol development in collaboration with international and national paediatric oncology groups (e.g., SIOP networks, Children's Oncology Group, national societies). These modules should be piloted in prospective cohort studies with predefined clinical and patient-reported outcomes (e.g., weight trajectory, intake adequacy, treatment tolerance, quality of life, family satisfaction) and, where feasible, tested in pragmatic randomised trials comparing structured, protocol-driven nutritional care with usual care[1][12][13][24].
- Evaluation of multidisciplinary models and professional roles: Comparative studies—using observational designs, natural experiments, or cluster-randomised trials—of centres with and without dedicated, multidisciplinary paediatric oncology nutrition teams (including various compositions and role distributions) could assess differences in process indicators (screening coverage, time from diagnosis to first assessment, time to initiation of interventions) and in clinical and patient-centred outcomes (growth trajectories, treatment toxicity, infections and other complications, unplanned hospitalisations, quality of life, family burden). [1][2][14][25].
- Economic analyses and cost-effectiveness studies: In adult oncology, medical nutrition support has been associated with reduced complications, shorter hospital stays, and lower overall healthcare costs in some settings, but robust economic data specific to paediatric oncology are scarce. Cost-effectiveness and budget-impact studies of personnel, specialised formulas and supplements (ONS, EN, PN), equipment (feeding pumps, body composition devices), and education programmes—compared with usual care, are needed to inform

policy decisions, resource allocation, and advocacy for sustainable funding, particularly in resource-constrained settings[15][18][25][27].

- Global equity, adaptability, and implementation science: Building on the work of IIPAN, SIOP PODC, and other initiatives focused on LMICs, future research and implementation efforts must ensure that frameworks, algorithms, and professional role definitions are adaptable to diverse resource settings, with explicit attention to feasibility, cultural appropriateness, and sustainability. Implementation science approaches—including barrier and facilitator analyses, co-design with local stakeholders, iterative pilot-test-refine cycles, and use of implementation frameworks such as Reach, Effectiveness, Adoption, Implementation, Maintenance (RE-AIM) or Consolidated Framework for Implementation Research (CFIR)—will be critical to translating evidence and consensus into routine practice in real-world settings with variable infrastructure, workforce, and cultural contexts[14][18][24][25][27].

8. Limitations of this review

This review has several important limitations. First, it is narrative and non-systematic, and it relied on iterative database and website searches as well as expert knowledge, so some relevant regional or national documents may not have been identified or fully represented. Second, no formal risk-of-bias or methodological quality appraisal was conducted, and the strength of individual documents was not graded using a standardised instrument. Third, the phase-based framework and tumour-specific examples presented here are conceptual and have not been prospectively validated; they should therefore be regarded as hypotheses to be explored and tested, not as ready-to-use clinical pathways. Finally, the relevance of specific professional roles within multidisciplinary teams, including additional nutrition science professionals, is likely to vary between health systems, and the models discussed in this review may not be directly transferable to all contexts.

9. Conclusions

Nutritional care has evolved from a relatively neglected aspect of paediatric oncology to a recognised component of comprehensive supportive care, yet implementation remains uneven and often reactive across both high-income and limited-resource settings. Existing international standards, consensus statements and national guidelines provide an important foundation, but they leave considerable room for greater harmonisation of assessment tools, clearer thresholds for intervention, and more detailed, tumour- and phase-specific pathways [10][11][12][13][14][15][18][21][25].

The conceptual framework outlined in this review, organised around diagnosis and early intensive therapy, ongoing treatment, haematopoietic stem cell transplantation and survivorship, offers one way of structuring current knowledge and identifying priority areas for protocol development. It should not be interpreted as a

formal guideline, but as a starting point for multicentre observational studies, implementation research and pragmatic trials. In parallel, further work is needed to clarify how multidisciplinary teams, with context-appropriate combinations of medical, dietetic, nursing, psychosocial and nutrition science expertise, can best support the consistent, equitable delivery of nutritional care for children and adolescents with cancer [1][12][14][18][24][25][33].

Abbreviations

- ACS – American Cancer Society
- AICR – American Institute for Cancer Research
- AIEOP – Italian Association of Paediatric Haematology and Oncology
- ALL – Acute lymphoblastic leukaemia
- ASPEN – American Society for Parenteral and Enteral Nutrition
- BIA – Bioelectrical impedance analysis
- BMI – Body mass index
- CFIR – Consolidated Framework for Implementation Research
- CNS – Central nervous system
- DEXA – Dual-energy X-ray absorptiometry
- EN – Enteral nutrition
- ESPGHAN – European Society for Paediatric Gastroenterology, Hepatology and Nutrition
- ESPEN – European Society for Clinical Nutrition and Metabolism
- GI – Gastrointestinal
- GVHD – Graft-versus-host disease
- HIC – High-income country
- HSCT – Haematopoietic stem cell transplantation
- IAPEN – Indian Association for Parenteral and Enteral Nutrition (India context)
- IIPAN – International Initiative for Paediatrics and Nutrition
- KPI – Key performance indicator
- LMIC – Low- and middle-income country
- MUAC – Mid-upper arm circumference
- ONS – Oral nutritional supplements
- PAHO – Pan American Health Organization
- PICU – Paediatric intensive care unit
- PN – Parenteral nutrition

- RCT – Randomised controlled trial
- RE-AIM – Reach, Effectiveness, Adoption, Implementation, Maintenance
- SCCM – Society of Critical Care Medicine
- SIOP – International Society of Paediatric Oncology
- SIOP Europe – European branch of SIOP
- SIOP PODC – SIOP Paediatric Oncology in Developing Countries
- WHO – World Health Organization

Statements and Declarations

Funding

No funding was received for this work.

Potential Competing Interests

The author declares that she has no competing interests.

Ethics

Not applicable. This narrative review does not report on or involve the use of any animal or human data or tissue.

Data Availability

Data sharing is not applicable to this article as no datasets were generated or analysed during the current study.

Authors' Contributions

NA: conceptualisation, literature search, synthesis, writing, and final approval of the manuscript.

References

1. a, b, c, d, e, f, g, h, i, j, k, l, m, n *Muratore E, Leardini D, Baccelli F, Fabozzi F (2024). "Editorial: Nutritional Support in Pediatric Cancer: Novel Insights and Future Perspectives." Front Nutr. **11**. doi:10.3389/fnut.2024.1397439.*
2. a, b, c, d, e, f, g, h, i *Pedretti L, Massa S, Leardini D, Muratore E, Rahman S, Pession A, Esposito S, Masetti R (2023). "Role of Nutrition in Pediatric Patients with Cancer." Nutrients. **15**. doi:10.3390/nu15030710.*
3. a, b, c, d, e, f *Franke J, Bishop C, Runco DV (2022). "Malnutrition Screening and Treatment in Pediatric Oncology: A Scoping Review." BMC Nutr. **8**:150. doi:10.1186/s40795-022-00643-3.*

4. a, b, c, d, e, f, g *Diakatou V, Vassilakou T (2020). "Nutritional Status of Pediatric Cancer Patients at Diagnosis and Correlations with Treatment, Clinical Outcome and the Long-Term Growth and Health of Survivors." Children (Basel). **7**. doi:10.3390/children7110218.*
5. a, b, c, d, e *Singh A, Mandal P, Bagai P, Fatima N, Sharma K, Gupta H, Sharma P, Singh P, Keshari A (2025). "Malnutrition Among Pediatric Cancer Patients: A Study of Government Hospitals in Delhi." Indian J Med Paediatr Oncol. **47**. doi:10.1055/s-0045-1810620.*
6. a, b, c, d *Makamo N, Schoon S, Ozuah N, Kaspers G, Ladas EJ, Huibers M (2025). "Prevalence of Undernutrition in Children with Cancer in Low-Income and Middle-Income Countries: A Systematic Review." BMJ Glob Health. **10**. doi:10.1136/bmjgh-2025-019345.*
7. a, b, c *Alshammary FMA, Alshammri ER, Alharbi AT, Alshammari WM, Alanaze MG, Alshammari AMA, Alenezi AA, Alrsheedi SS (2024). "Nutrition Status and Pediatrics with Cancers: An Updated Review." Rev Contemp Philos. **23**.*
8. a, b, c *Ferrettia RDL, EMMC (2023). "Malnutrition in Children and Adolescents with Cancer and the Challenge for Health Professionals: A Narrative Review." Int J Innov Sci Res Technol. **8**.*
9. a, b, c, d, e, f, g, h *Viani K TA, Manzoli B, Schoeman J (2020). "Assessment of Nutritional Status in Children with Cancer: A Narrative Review." Pediatr Blood Cancer. **67**. https://doi.org/10.1002/pbc.28211.*
10. a, b, c, d, e, f, g *Muscaritoli M, Arends J, Bachmann P, Baracos V, Barthelemy N, Bertz H, Bozzetti F, Hütterer E, Isenring E, Kaasa S, Krznaric Z, Laird B, Larsson M, Laviano A, Mühlebach S, Oldervoll L, Ravasco P, Solheim TS, Strasser F, de van der Schueren M, Preiser JC, Bischoff SC (2021). "ESPEN Practical Guideline: Clinical Nutrition in Cancer." Clin Nutr. **40**:2898–2913. doi:10.1016/j.clnu.2021.02.005.*
11. a, b, c, d, e, f *Arends J, Bachmann P, Baracos V, Barthelemy N, Bertz H, Bozzetti F, Fearon K, Hütterer E, Isenring E, Kaasa S, Krznaric Z, Laird B, Larsson M, Laviano A, Mühlebach S, Muscaritoli M, Oldervoll L, Ravasco P, Solheim T, Strasser F, de van der Schueren M, Preiser JC (2017). "ESPEN Guidelines on Nutrition in Cancer Patients." Clin Nutr. **36**:11–48. doi:10.1016/j.clnu.2016.07.015.*
12. a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z *Fabozzi F, Trovato CM, Diamanti A, Mastronuzzi A, Zecca M, Tripodi SI, Masetti R, Leardini D, Muratore E, Barat V, Lezo A, De Lorenzo F, Caccialanza R, Pedrazzoli P (2022). "Management of Nutritional Needs in Pediatric Oncology: A Consensus Statement." Cancers (Basel). **14**. doi:10.3390/cancers14143378.*
13. a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w *Budka-Chrzęszczyk A, Szlagatys-Sidorkiewicz A, Bień E, Irga-Jaworska N, Borkowska A, Krawczyk MA, Popińska K, Romanowska H, Toporowska-Kowalska E, Świder M, Styczyński J, Szczepański T, Książyk J (2024). "Managing Undernutrition in Pediatric Oncology: A Consensus Statement Developed Using the Delphi Method by the Polish Society for Clinical Nutrition of Children and the Polish Society of Pediatric Oncology and Hematology." Nutrients. **16**. doi:10.3390/nu16091327.*

14. a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q*Venturelli F, Leardini D, Baccelli F, Gottardi F, Barat V, Vendemini F, Folsi VM, Meazza C, Marinoni M, Bernardo ME, Tumino M, Brugiolo A, Pizzato C, Battisti L, Bertolini P, Pancaldi A, Rinieri S, Pericoli R, Coccia P, Onofrillo D, Fabozzi F, Bianchi S, Rizzo D, Daniele RM, Stellato P, Prete A, Masetti R, Muratore E (2024). "Current Practices for Nutritional Evaluation and Care During the Treatment of Pediatric Oncology Patients: A Survey Among AIEOP Centers." Eur J Pediatr. **183**:1137–1144. doi:10.1007/s00431-023-05368-4.*

15. a, b, c, d, e, f, g, h, i, j*Mastrangelo S, Rizzo D, Attinà G, Ruggiero A (2024). "Nutritional Challenges in Paediatric Oncology: Screening and Managing Malnutrition and Sarcopenia." Biomed Pharmacol J. **17**. doi:10.13005/bpj/3017.*

16. ^*Abbasi N (Year Missing). "Oncology Nutrition Guidelines: From Clinician Limitations to Biologist-Nutritionist–Led Patient Implementation Tools." Qeios. doi:10.32388/98TRZY.*

17. a, b*Ladas EJ, Sacks N, Meacham L, Henry D, Enriquez L, Lowry G, Hawkes R, Dadd G, Rogers P (2005). "A Multidisciplinary Review of Nutrition Considerations in the Pediatric Oncology Population: A Perspective From Children's Oncology Group." Nutr Clin Pract. **20**:377–93. doi:10.1177/0115426505020004377.*

18. a, b, c, d, e, f, g, h, i, j, k, l, m*Viani K, Alves J, Damasco-Avila E, Murra MS, Schoeman J, Walters M, Ladas EJ (2025). "Consensus Recommendations for the Nutritional Management of Children with Cancer in Limited Resource Settings: A Report From the International Initiative for Pediatrics and Nutrition." Front Nutr. **12**:1605632. doi:10.3389/fnut.2025.1605632.*

19. a, b, c*Sreedharan L VS, Prasad M, Anand KC, Bhat KV, Dhanaki N, Arolkar P, Gala RM, Raj R, Nandhini S, Kore R, Barman M, Surendran AS, Mehta V, Gaonkar N, Aleem R, Narang K, Vijayashree N, Srinivasan N, Brundavani V, Ananthasubramanian D, John KA, Reena C, Daptardar A, Ramaswamy KN, Kumar V, Timmanpyati S (2024). "IAPEN India: Consensus Guidance and Recommendation on Nutritional Management of Paediatric Cancer Patients." J Nutr Res. **12**:15–31. https://doi.org/10.55289/jnutres/v12i1_23.31.*

20. a, b, c*Organization PAH (2023). "Nutritional Care Guide for Pediatric Cancer." Pan American Health Organization-PAHO. doi:10.37774/9789275126196.*

21. a, b, c, d, e, f, g*Foundation SE-JKs (2009). "European Standards of Care for Children with Cancer." Foundation SE-JKs.*

22. ^*Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, Shamseer L, Tetzlaff JM, Akl EA, Brennan SE, Chou R, Glanville J, Grimshaw JM, Hróbjartsson A, Lalu MM, Li T, Loder EW, Mayo-Wilson E, McDonald S, McGuinness LA, Stewart LA, Thomas J, Tricco AC, Welch VA, Whiting P, Moher D (2021). "The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews." BMJ. **372**:n71. doi:10.1136/bmj.n71.*

23. a, b, c*Anonymous (2025). "American Cancer Society Guideline for Diet and Physical Activity for Cancer Prevention." American Cancer Society-ASCO. https://www.cancer.org/cancer/risk-prevention/diet-physical-activity/acs-guidelines-nutrition-physical-activity-cancer-prevention.html.*

24. a, b, c, d, e, f, g*Viani K, Alves J, Damasco-Avila E, Murra MS, Schoeman J, Walters M, Ladas EJ (2025). "Correction: Consensus Recommendations for the Nutritional Management of Children with Cancer in Limited Resource Settings: A Re*

port From the International Initiative for Pediatrics and Nutrition." Front Nutr. ***12****:1675916. doi:10.3389/fnut.2025.1675916.*

25. a, b, c, d, e, f, g, h, i, j, k, l, m, n*Damasco-Avila E, Sagastizado SZ, Carrillo M, Blanco J, Fu L, Espinoza D, Ladas EJ (2023). "Improving the Quality of the Delivery of Nutritional Care Among Children Undergoing Treatment for Cancer in a Low- and Middle-Income Country." JCO Glob Oncol. doi:10.1200/GO.23.00074.*
26. ^*Kowalczyk JR, Samardakiewicz M, Fitzgerald E, Essiaf S, Ladenstein R, Vassal G, Kienesberger A, Pritchard-Jones K (2014). "Towards Reducing Inequalities: European Standards of Care for Children with Cancer." Eur J Cancer.* ***50****:481–5. doi:10.1016/j.ejca.2013.11.004.*
27. a, b, c, d, e, f*Ladas EJ, Arora B, Howard SC, Rogers PC, Mosby TT, Barr RD (2016). "A Framework for Adapted Nutritional Therapy for Children With Cancer in Low- and Middle-Income Countries: A Report From the SIOP PODC Nutrition Working Group." Pediatr Blood Cancer.* ***63****:1339–48. doi:10.1002/pbc.26016.*
28. a, b, c*Podpeskar A, Crazzolara R, Kropshofer G, Hetzer B, Rabensteiner E, Meister B, Obexer P, Salvador C (2023). "Recommendations for Nutritional Supplementation in Pediatric Oncology: A Compilation of the Facts." Nutrients.* ***15****. doi:10.3390/nu15143239.*
29. ^*Nutrition A-ASfPaE (2025). "ASPEN/SCCM Pediatric Critical Care Nutrition Guideline: Protocol." ASPEN/SCCM. https://nutritioncare.org/wp-content/uploads/2025/01/Pediatric-Critical-Care-Protocol-Revised-Finalized-Protocol-Post-Review.pdf.*
30. ^*Lopez-Delgado JCP, Stoppe JJ, McClave C, Stephen A (2024). "Considerations for Medical Nutrition Therapy Management of the Critically Ill Patient with Hematological Malignancies: A Narrative Review." NCP Nutr Clin Pract (ASPEN).* ***39****:800–814. https://doi.org/10.1002/ncp.11152.*
31. ^*SHAH UA (2025). "Building and Sharing Dietary Evidence in Cancer Care." The ASCO Post.*
32. a, b*Cantrell MA, Ruble K (2011). "Multidisciplinary Care in Pediatric Oncology." J Multidiscip Healthc.* ***4****:171–81. doi:10.2147/jmdh.S7108.*
33. ^*Anonymous (2024). "Linee Guida Per La Professione Di Biologo In Ambito Nutrizionale." Federazione Nazionale degli Ordini dei Biologi-FNOB. https://www.fnob.it/wp-content/uploads/2025/01/Linee-guida_Biologo-in-ambito-nutrizionale.pdf.*

Declarations

Funding: No specific funding was received for this work.

Potential competing interests: No potential competing interests to declare.