



Specialised Nutrition in Cancer Care: Expanding the Role of Pharmacists in Improving Patient Outcomes

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ABSTRACT

Cancer-associated malnutrition is a prevalent and clinically significant condition affecting a large proportion of patients undergoing oncological treatment. It contributes to decreased tolerance to chemotherapy and radiotherapy, increased risk of complications, prolonged hospitalisation, impaired functional status, and reduced survival. Early nutritional screening, timely initiation of specialised nutritional therapy, and continuous monitoring are essential elements of comprehensive cancer care. Pharmacists, as highly accessible healthcare professionals with expertise in pharmacotherapy, patient counselling, and medication management, are uniquely positioned to play an expanded role in nutritional care for oncology patients. Their involvement includes nutritional risk identification, optimisation of oral nutritional supplements (ONS), prevention of medication–nutrition interactions, patient education, and participation in multidisciplinary care teams. This review discusses the epidemiology and pathophysiology of cancer-related malnutrition, the clinical importance of specialised nutritional interventions, and the emerging contributions of pharmacists in improving patient outcomes. Strengthening pharmacist participation in oncology nutrition services can enhance treatment effectiveness, improve quality of life, and support patient-centred healthcare delivery.

Keywords: Oncology nutrition, malnutrition, oral nutritional supplements, oncology pharmacy, pharmaceutical care, cancer cachexia

INTRODUCTION

Cancer remains one of the leading causes of morbidity and mortality worldwide¹, posing substantial clinical, economic, and social challenges. Advances in diagnostic methods and therapeutic strategies have improved survival rates for many cancers; however, treatment-related complications continue to affect patient outcomes significantly. Among these complications, malnutrition is one of the most common yet frequently under-recognised problems in oncology practice. Studies indicate that approximately 30–50% of patients with cancer experience some degree of malnutrition during their illness, with higher prevalence observed in gastrointestinal, pancreatic, lung, and head-and-neck cancers^{2, 3}.

Cancer-related malnutrition arises from a complex interplay of metabolic, inflammatory, and behavioural factors³. Tumour-induced metabolic alterations, systemic inflammation, treatment-related adverse effects such as nausea, vomiting, mucositis, and anorexia, as well as psychological factors, contribute to reduced nutrient intake and increased energy expenditure⁴. If not addressed promptly, malnutrition can progress to cancer cachexia, a multifactorial syndrome characterised by progressive weight loss, muscle wasting, fatigue, and reduced physical performance^{3, 4}. Cachexia is associated with decreased tolerance to chemotherapy, increased postoperative complications, impaired immune response, and higher mortality rates^{3, 12, 13}.

Despite the strong evidence linking nutritional status to clinical outcomes, nutritional care remains inadequately integrated into routine oncology practice in many healthcare systems^{2, 3}. Screening is often delayed or omitted, and nutritional interventions may be initiated only after significant weight loss has occurred. Improving early identification and management of malnutrition requires a coordinated multidisciplinary approach involving oncologists, dietitians, nurses, and pharmacists. Pharmacists are increasingly recognised as valuable contributors to nutritional care because of their accessibility, medication expertise, and frequent patient contact across healthcare settings⁵.

This article provides a comprehensive review of the importance of specialised nutrition in cancer care and examines the evolving role of pharmacists in supporting nutritional therapy to improve treatment outcomes and patient quality of life^{7, 8, 9}.



Epidemiology and Clinical Impact of Cancer-Related Malnutrition

Malnutrition in cancer patients is a widespread problem affecting clinical outcomes across all stages of disease². Prevalence varies depending on tumour type, disease stage, and treatment modality, but reports consistently indicate high rates among hospitalised oncology patients³. Patients with pancreatic, gastric, oesophageal, and lung cancers exhibit particularly high risk due to tumour location, metabolic disturbances, and treatment-related complications^{2, 3}.

The consequences of malnutrition extend beyond weight loss. Malnourished cancer patients experience reduced tolerance to chemotherapy and radiotherapy, increased treatment interruptions and dose reductions, higher rates of infections and postoperative complications, delayed wound healing, prolonged hospital stays, reduced physical functioning and quality of life, and increased mortality risk^{2, 4}. Evidence suggests that nutritional status at the time of cancer diagnosis is an independent predictor of survival³. Even modest weight loss during treatment is associated with poorer clinical outcomes².

Pathophysiology of Cancer Cachexia and Nutritional Decline

Cancer cachexia is a complex and multifactorial metabolic syndrome characterized by an ongoing loss of skeletal muscle mass, with or without concomitant loss of adipose tissue, that cannot be completely reversed by conventional nutritional support^{3, 4, 12}. It is frequently observed in advanced malignancies and is strongly associated with diminished functional status, reduced tolerance to anticancer therapies, impaired quality of life, and increased mortality^{2, 4}.

The underlying pathophysiology is driven by a sustained negative protein and energy balance resulting from tumour–host interactions and chronic systemic inflammation³. Pro-inflammatory cytokines activate intracellular signalling pathways, including the ubiquitin–proteasome system and the JAK/STAT pathway, which enhance skeletal muscle proteolysis while simultaneously suppressing muscle protein synthesis^{3, 4}. Alterations in lipid metabolism, insulin resistance, enhanced gluconeogenesis, and tumour-associated metabolic demands further exacerbate energy inefficiency and hypermetabolism³.

Unlike simple starvation, cancer cachexia involves persistent inflammatory activation and metabolic dysregulation that limit the effectiveness of nutritional supplementation alone^{3, 4}.

Importance of Specialised Nutritional Therapy

Specialised nutritional therapy refers to targeted nutritional interventions designed to meet the increased metabolic demands of cancer patients³. These interventions include oral nutritional supplements (ONS), enteral nutrition, and parenteral nutrition depending on the patient's clinical condition and gastrointestinal function³.

ONS are frequently used as first-line nutritional support because they are convenient, cost-effective, and non-invasive. High-protein, energy-dense formulations help maintain body weight, preserve lean muscle mass, and improve treatment tolerance⁶. Studies have demonstrated that early initiation of ONS in at-risk patients reduces complication rates, shortens hospital stays, and improves quality of life⁶.

When oral intake is insufficient or impossible, enteral nutrition provides an effective alternative and maintains gastrointestinal integrity³. Parenteral nutrition is reserved for patients with non-functional gastrointestinal tracts or severe malabsorption^{3, 4}.

Expanding Role of Pharmacists in Oncology Nutrition Care

Pharmacists play a critical yet often underutilized role in the nutritional care of patients with cancer⁵. Their expertise in pharmacotherapy, frequent patient contact, and active participation in multidisciplinary healthcare teams position them uniquely to contribute to comprehensive nutritional management^{7, 9}.

Pharmacists can conduct preliminary nutritional screening using validated assessment tools and identify patients at risk of malnutrition, facilitating timely referral to dietitians⁵. Early risk identification supports prompt initiation of individualized nutrition care plans, helping prevent weight loss, muscle wasting, and treatment interruptions.

In optimizing nutritional supplement therapy, pharmacists can recommend appropriate oral nutritional supplements (ONS) based on patients' caloric and protein needs, comorbidities, organ function, and ongoing anticancer regimens⁶. They also play a vital role in preventing medication–nutrition interactions by identifying potential drug–nutrient incompatibilities and advising on appropriate timing of medications and supplements to ensure maximal therapeutic efficacy.



Furthermore, pharmacists provide patient counseling to improve adherence, manage gastrointestinal adverse effects such as nausea, mucositis, or diarrhoea, and encourage adequate intake during therapy⁵. Through participation in multidisciplinary rounds, pharmacists can monitor weight trends, biochemical parameters, supplement tolerance, and medication adjustments, thereby supporting safe, effective, and patient-centred nutritional care throughout the cancer treatment continuum.

Multidisciplinary Collaboration in Oncology Nutrition

Effective management of cancer-associated malnutrition requires coordinated multidisciplinary collaboration^{2, 3}. Integration of structured nutritional care pathways into routine oncology practice enhances treatment tolerance, minimizes therapy-related complications, and improves overall quality of life^{3, 4}. Early nutritional screening at diagnosis, followed by individualized nutrition care plans, is essential to prevent weight loss, muscle wasting, and cancer cachexia^{12,13}. Continuous monitoring during chemotherapy, radiotherapy, or immunotherapy allows timely adjustments to dietary and pharmacological interventions. Collaboration among oncologists, dietitians, pharmacists, and nursing professionals ensures comprehensive assessment, management of drug–nutrient interactions, and patient education, ultimately supporting better clinical outcomes and improved survivorship^{11,12,14}.

Economic and Healthcare System Implications

Cancer-related malnutrition significantly increases healthcare expenditure due to prolonged hospitalisation, greater incidence of treatment-related complications, and frequent readmissions^{2, 3}. Malnourished patients often show reduced tolerance to chemotherapy and radiotherapy, delayed wound healing, impaired immunity, and longer recovery periods, all contributing to higher clinical and financial burden. Early nutritional screening and timely intervention can substantially reduce complication rates and shorten hospital stays^{3, 6}. Structured nutritional care pathways improve treatment response, enhance functional status, and lower overall resource utilization. Therefore, proactive nutrition management represents a cost-effective strategy that improves patient outcomes while reducing long-term healthcare costs.

Barriers to Implementation of Pharmacist-Led Nutritional Services

Barriers to the implementation of pharmacist-led nutritional services in oncology and other clinical settings are multifactorial and span structural, professional, educational, and policy domains. One of the primary challenges is the limited recognition of pharmacists' clinical role in nutrition care beyond medication management. In many healthcare systems, pharmacists are traditionally viewed as dispensers rather than integral members of the multidisciplinary nutrition support team, which may restrict their involvement in nutritional assessment, counseling, and monitoring⁵. This role ambiguity can hinder interprofessional collaboration and reduce opportunities for pharmacist-led interventions.

Workforce constraints and time limitations further impede service expansion. High patient loads, administrative responsibilities, and dispensing demands often leave insufficient time for pharmacists to conduct comprehensive nutritional assessments or provide individualized counseling¹⁵. Additionally, lack of specialized training in clinical nutrition, particularly in oncology nutrition and cachexia management, may reduce confidence and competency among pharmacists, highlighting the need for targeted continuing professional development programs¹³.

Financial and policy-related barriers also play a significant role. In many regions, reimbursement models do not adequately compensate pharmacist-led nutritional consultations, limiting institutional incentives to establish such services. Absence of standardized protocols, documentation frameworks, and clear scope-of-practice guidelines may further complicate implementation. Limited integration of pharmacists into electronic health records and care coordination systems can restrict effective communication within multidisciplinary teams.

Infrastructure challenges, especially in resource-constrained settings, include inadequate access to nutritional screening tools, body composition assessment technologies, and specialized nutritional products.

Addressing these barriers requires systemic changes, including policy reforms that support reimbursement, integration of nutrition competencies into pharmacy curricula, development of standardized practice guidelines, and strengthening interprofessional collaboration within oncology care pathways. Overcoming these challenges would enable pharmacists to contribute more effectively to nutritional optimization, symptom management, and overall improvement in patient outcomes^{9,10}.

Future Directions

Future directions in cancer nutrition focus on personalized and evidence-based interventions integrated into routine oncology care⁵. Guidance from the World Health Organization and the American Society of Clinical Oncology emphasizes early nutritional



screening and management of cancer cachexia. Advances in nutrigenomics and digital health may enable tailored dietary strategies and remote monitoring. Pharmacists will play a vital role in identifying nutritional risks, managing drug–nutrient interactions, and counseling on supplements¹⁵. Through interdisciplinary collaboration, pharmacists can enhance treatment tolerance, adherence, and quality of life, strengthening comprehensive, patient-centred cancer care.

Conclusion

Malnutrition remains a major yet preventable contributor to poor outcomes among cancer patients^{2, 3}. Early nutritional screening, timely initiation of specialised nutritional therapy, and ongoing monitoring are essential components of comprehensive oncology care^{3, 4}. Pharmacists are well positioned to support nutritional interventions across healthcare settings⁵. Strengthening pharmacist participation in oncology nutrition care pathways can improve treatment tolerance, enhance quality of life, reduce healthcare costs, and ultimately improve patient outcomes.

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