What Internists Should Know about Malnutrition in Hospitalized Patients

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Abstract
There is a high prevalence of malnutrition amongst hospitalized patients in Canada which is associated with poor outcomes including increased length of stay, readmission rates and mortality. Despite its ubiquity, malnutrition is often underdiagnosed and undertreated which is of concern because intervention has been shown to improve many of these outcomes, including mortality. In Canada, an interdisciplinary group called the Canadian Malnutrition Task Force has developed a framework for the screening of, diagnosis and treatment of malnutrition which has been successfully implemented at multiple sites across the country. Despite advancements in the field, many clinicians report feeling unknowledgeable about nutrition management as there is minimal training provided in most medical school and residency curriculums. This is a short review article highlighting the essentials of what we believe internists should know about malnutrition in hospitalized patients.

Keywords: internists, malnutrition, poor outcomes, length of stay

Résumé
Parmi les patients hospitalisés au Canada, on constate une forte prévalence de malnutrition qui est associée à de mauvais résultats, notamment une augmentation de la durée d’hospitalisation, du taux de réhospitalisation et de la mortalité. Malgré son omniprésence, la malnutrition est souvent sous-diagnostiquée et partiellement traitée, ce qui est préoccupant, car il a été démontré qu’une intervention pouvait améliorer bon nombre de ces résultats, y compris la mortalité. Au Canada, un groupe interdisciplinaire appelé le Groupe de travail canadien sur la malnutrition a élaboré un cadre pour le dépistage, le diagnostic et le traitement de la malnutrition qui a été mis en œuvre avec succès à plusieurs endroits un peu partout au pays. Malgré les progrès réalisés dans ce domaine, beaucoup de cliniciens estiment manquer de connaissances sur la gestion de la nutrition, car la plupart des curriculums des écoles de médecine et des programmes de résidence ne prévoient qu’une formation minimale dans ce domaine. Ce court article de synthèse met en lumière l’essentiel de ce que nous pensons que les internistes devraient savoir à propos de la malnutrition chez les patients hospitalisés.

Keywords: internists, malnutrition, poor outcomes, length of stay
Malnutrition is a Broad Condition with Multiple Definitions that Can Be Diagnosed With the Subjective Global Assessment

The World Health Organization defines malnutrition as, “deficiencies, excesses or imbalances in a person’s intake of energy and/or nutrients.” This definition covers undernutrition to micronutrient abnormalities, obesity, sarcopenia, and frailty. For patients admitted to hospital, malnutrition in the form of undernutrition arising from decreased oral intake, malabsorption, or increased energy requirements is often the most clinically relevant form. Malnutrition in hospitals can show an impaired ability to fight infection, lead to poor wound healing, third-spacing of fluid, and loss of lean muscle mass, leading to sarcopenia and reduced mobility. Clinicians to recognize that malnutrition is not synonymous with being underweight as this may represent a late finding, with many malnourished patients having normal or even elevated body mass index (BMI).

Multiple diagnostic criteria for malnutrition exist with limited global consensus. An interdisciplinary group in Canada known as the Canadian Malnutrition Task Force (CMTF) has been formed to advance nutritional care and reduce malnutrition in Canadian patients through active research, education, and collaboration. The CMTF has published a variety of literature in the past 10 years on the scope of malnutrition in Canadian hospitals, identifying gaps in nutrition care, and implementing changes. For practical clinical application, the CMTF recommends diagnosing malnutrition with a bedside nutrition assessment tool, subjective global assessment (SGA), that can be performed by any trained provider (including physicians) with a registered dietitian (RD). The SGA is a comprehensive assessment and scoring system that includes details of the patient’s nutritional intake, weight, symptoms, functional capacity, and physical examination (Figure 1).

Malnutrition is Highly Prevalent Amongst Patients Hospitalized in Canada but Frequently Under-recognized

The CMTF has demonstrated that 45% of nonpalliative patients admitted to Canadian hospitals were malnourished,

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**Figure 1.** Subjective global assessment components. Dietary intake is assessed based on the adequate or inadequate eating and the input within the last 2 weeks. Weight is calculated based on changes within the past 6 months and the past 2 weeks. Symptoms that affect oral intake (anorexia, nausea, vomiting, dysphagia, diarrhea, and dyspepsia); functional capacity, particularly, regarding mobility; and metabolic requirements, are assessed. Finally, a physical examination assesses the patient’s subcutaneous fat, muscles, and the presence of fluid retention.
with 11.4% classified as severely malnourished based on the SGA.\textsuperscript{2} The risk factors for malnutrition include older age, chronic disease, polypharmacy, depression, living alone, and relying on others for grocery shopping, all of which are common amongst the internal medicine patient population.\textsuperscript{3,4,9} Malnutrition in adults often falls into one of the following broad categories: (i) starvation-related, (ii) chronic disease-related, and (iii) acute disease-related.\textsuperscript{10} Predominant malnutrition seen in general medical patients is the result of chronic disease. However, when these patients develop acute illness and are hospitalized, they often have poor appetites, and all three categories are potentially at play.\textsuperscript{9,10} The association between malnutrition and chronic disease is pivotal in an aging Canadian population, given a recent Canadian study reported an 11% increase in chronic disease over the last 10 years.\textsuperscript{11}

Malnutrition is often under-recognized by clinicians, with a multicenter study of six million patients highlighting that only 5% of patients were diagnosed with malnutrition in academic centers.\textsuperscript{12} The reasons for underrecognition is multifactorial. Malnutrition can be subtle, and clinicians often focus on managing acute and competing for complex medical issues. Additionally, inadequate nutrition training throughout medical school and medical residency leave many practicing physicians feeling unconfident in diagnosing, treating, and consulting an RD for malnutrition.\textsuperscript{13,14}

In a prospective cohort study of 1015 patients admitted to Canadian hospitals, 35% had a low food intake, defined as less than 50% intake of a given meal, and malnourished patients were more likely to have less food intake (45%) than their well-nourished counterparts.\textsuperscript{2} Furthermore, cross-sectional studies have also demonstrated that the nutritional status of patients deteriorates during hospital admission with a significant decrease in the validated physical examination markers of nutritional status including mid-upper arm circumference and fat-free mass in addition to a reduction in serum albumin at the time of discharge compared with hospital admission.\textsuperscript{14} This is likely caused by a variety of reasons in these patients including increased energy requirements because of acute illness, anorexia, prolonged or unnecessary dietary restrictions such as “nil per os” (NPO) or clear fluids, not being provided with food when a meal was missed, needing assistance with sitting up, opening packages, hospital routines interfering with mealtimes, and a lack of usual food and supports.\textsuperscript{15,16} Many of these barriers to nutrition improvement are modifiable and preventable if clinicians concentrate on eradicating these barriers through regular check-ins.

### Malnutrition Leads to Poor Patient Outcomes and Increased Healthcare Costs

Malnutrition in hospitalized patients is associated with increased 30-day mortality, prolonged stay, and higher readmission rates after discharge.\textsuperscript{17–19} In a prospective cohort study of 3186 patients, malnourished patients experienced nearly a five-fold increase in 30-day mortality compared with well-nourished control participants.\textsuperscript{15} In another prospective cohort study of 818 patients, Lim et al.\textsuperscript{18} demonstrated that malnourished compared with well-nourished nutrition status was associated with significantly increased 1 year (34% vs. 4.1%), 2 years (42.6% vs. 6.7%), and 3 years (48.5% vs. 9.9%) mortality. Canadian data suggests that when compared with well-nourished control participants, malnourished patients remain admitted to hospitals on an average of 3 days longer, increased per hospitalization costs between 31% and 38% more per hospitalization, and higher readmission within 30 days after discharge, culminating in up to $2.1 billion (CAD) per year of extra hospital costs.\textsuperscript{19} Poor nutrition also contributes to posthospital syndrome (a transient period of vulnerability after discharge with higher morbidity and increased risk for readmission).\textsuperscript{20} Additionally, most hospitalized patients experience decreased mobility and can accelerate the development of sarcopenia when combined with malnutrition.\textsuperscript{21–23}

### Screening for Malnutrition Should Occur in All Patients Admitted to Hospital

Because the presentation of malnutrition can be subtle, nutrition screening is essential to identify patients requiring further nutrition assessment and to determine appropriate nutrition interventions. Screening at the institutional level is the preferred approach, and implementation has been shown to increase the diagnosis and improve treatment for malnutrition through the “More-2-Eat” study, which focused on implementing nutrition screening protocols in multiple Canadian hospitals.\textsuperscript{19} To increase diagnosis and treatment of malnutrition in patients admitted to hospital, an algorithm known as the “Integrated Nutrition Pathway for Acute Care(INPAC),” has been developed in Canada, which begins with nutrition screening.\textsuperscript{24}

Nutrition screening is designed to be easy, quick to employ, and can be performed by any individual. Multiple screening tools have been validated in different settings (inpatient, outpatient, elderly, etc.). But the CMTF suggests screening all patients admitted to the hospital for
malnutrition within 24 hours of admission using the simple Canadian Nutrition Screening Tool (CNST). The CNST is a short and easy to use tool that has been employed in Canadian hospitals and consists of only two questions:

i. Has the patient lost weight in the past 6 months without trying?
ii. Has the patient been eating less than usual for more than a week?

If the patient answers “yes” to both of these questions, they screen positive and are deemed “at-risk” for malnutrition and should have a nutrition assessment performed by an RD within 24-hours as per INPAC. Nutrition assessment such as the SGA establishes the diagnosis of malnutrition and stratifies the severity into well-nourished (SGA-A), mild/moderately malnourished (SGA-B), or severely malnourished (SGA-C). RD consultation can also help determine the patient’s estimated nutritional requirements to finalize the nutrition prescription. An adapted flowchart for clinicians based on the INPAC is shown in Figure 2.

Many hospitals in Canada may not yet have adopted protocols for universal nutrition screening for admitted patients. The scale and practicality of screening every admitted patient cannot be completed by physicians alone, highlighting the essential multidisciplinary collaboration required.

**Figure 2.** Flowchart demonstrating a nutrition pathway after a patient is admitted to hospital. Adapted from the CMTF’s Integrated Nutrition Pathway for Acute Care. CNST, Canadian Nutrition Screening Tool; SGA, subjective global assessment.
with nursing and allied health to screen for malnutrition. At an institutional level, malnutrition screening implementation through hospital administration support is essential to implement change. The CMTF has created a comprehensive INPAC toolkit which is available free of cost online (http://m2e.nutritioncareincanada.ca/), which provides resources and tools to implement or improve nutrition care practices in the hospital.

**Nutritional Intervention Should Occur in Patients Diagnosed with Malnutrition**

A large meta-analysis recently demonstrated that malnourished medical inpatients treated with nutritional intervention in the form of dietary advice, food fortification, oral nutrition supplements (ONS), or enteral nutrition (EN), experienced lower rates of all-cause mortality (230/2759 [8.3%] vs. 307/2787 [11.0%]; odds ratio [OR], 0.73; 95% confidence interval [CI], 0.56–0.97) as well as a reduction in nonelective hospital readmissions (280/1903 [14.7%] vs. 339/1880 [18.0%]; risk ratio [RR], 0.76; 95% CI, 0.60–0.96).25

When managing a patient with malnutrition, the first step should be to limit restricted diets/NPO orders whenever possible and optimize their oral intake, including the use of ONS and/or other nutrient-dense foods targeting ≥75% of their estimated nutritional requirements.26 In patients who cannot meet their nutritional requirements orally, EN or parenteral nutrition (PN) is administered for nutritional requirement fulfillment. Generally, EN is preferred to PN for its lower infection risks, ease of administration because of avoidance of intravenous access, lower metabolic and central venous catheter risks, maintenance of intestinal integrity, and cost-effectiveness.26,27 PN is suggested in cases where EN is not feasible or insufficient to meet the total nutrient requirements in some cases of mechanical bowel obstruction, bowel perforations, fistula healing, the need to restrict oral/enteral intakes for prolonged periods and impaired absorption or loss of nutrients such as in short bowel syndrome.28

Clinicians should work with RDs and nursing to monitor the effects of nutrition support therapies through regular food intake monitoring, weekly measurements of weight, muscle/fat wasting, and fluid status. Malnourished patients should be monitored closely for refeeding syndrome with at least daily monitoring of electrolytes and extended electrolytes and with replacement as needed until nutrition support is at goal and electrolytes are stable.26 Parenteral nutrition requires more complex monitoring that is beyond the scope of this article. In addition to nutritional intervention in malnourished patients, clinicians should follow nutrition best practices for all patients. This includes monitoring food intake, reducing interruptions at mealtimes whenever possible, prompt recognition and daily reassessment of unnecessary diet order restrictions such as NPO or clear fluids, addressing barriers to intake such as pain, nausea, constipation, dysphagia, chewing difficulties, or physical limitations, and accommodating food preferences or allowing the family to bring preferred foods from home, whenever possible. Clinicians need to be aware of malnutrition as a modifiable risk factor in patient outcomes and involve dietitians early for nutrition plan codevelopment. Clinicians often have a “housekeeping” list of essential things to monitor for patients, such as deep vein thrombosis prophylaxis, intravenous fluids, medication stop dates, etc. Daily housekeeping should also include diet orders and reassessments of barriers to optimal nutrition.

**Continued Use of Nutritional Intervention After Discharge May Improve Outcomes**

Many patients leave the hospital more malnourished than at admission and at risk for posthospital syndrome, which increases vulnerability to readmission and higher morbidity.20,26 Developing a discharge plan that prioritizes adequate nutritional intake is essential for a successful discharge and may improve clinical outcomes. A randomized controlled trial of 652 medical inpatients demonstrated that those who received a high-protein oral nutritional supplement for 3 months after discharge experienced significantly lower 90-day mortality (4.8% vs. 9.7%; relative risk, 0.49; 95% CI, 0.27–0.90; P = 0.018) and improved 90-day odds of improvement in SGA nutritional status assessment (SGA class: OR, 2.04; 95% CI, 1.28–3.25; P = 0.009).29 Additionally, another retrospective cohort study of 807 patients at discharge demonstrated that those who received ready-to-consume meal deliveries at home under the supervision of an RD experienced significantly fewer admissions to a hospital (incidence rate ratio, 0.51; 95% CI, 0.22–0.80; risk difference, −519; 95% CI, −360 to −678 per 1000 person-years) and was cost-effective.30 Although these studies appear promising to improve postdischarge adverse events, more research is needed before recommending it for all patients upon discharge. Clinicians should be aware of continued management of malnutrition after discharge as a potentially modifiable risk factor, prioritize malnutrition as an active medical issue, and work with the multidisciplinary team to refer the patient to appropriate resources in the community as required.
Take Home Points

Internists should be able to:

- Recognize the high prevalence and implications of malnutrition in hospitalized patients.
- Recommend effective malnutrition screening practices for all hospitalized medical patients using the CNST and consult an RD within 24 hours to perform a nutrition assessment if patients screen positive.
- Be aware of nutrition best practices for hospitalized patients and continually reassess the need for restrictive diet orders such as NPO or clear fluids, which can negatively contribute to malnutrition.
- Address barriers to food intake such as pain, nausea, dysphagia, chewing difficulties, constipation, and accommodate food preferences whenever possible.
- Have a basic understanding of nutritional interventions and their indications.
- Work collaboratively with Allied Health to address malnutrition as a medical issue and as part of discharge planning.

Disclosure Statement

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Author’s Contributions

CO, EC, and HP prepared the manuscript. MR reviewed the manuscript. All authors have read and approved the final version of the manuscript.

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