

Nutrition Interventions Deliver Value in Healthcare: Real-World Evidence

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Abstract: Value is a key guiding principle in healthcare, yet value is defined in varying ways by different stakeholders. In this paper, we review evidence of the health and financial tolls of malnutrition or poor nutrition, report positive results from recent nutrition-focused quality improvement programs in hospitals, and discuss clinical and policy implications of realizing best-practice nutrition care. Hospitalized patients with malnutrition diagnoses have up to two-fold greater hospital costs for care compared to inpatient stays for adequately nourished patients. By contrast, implementation of nutrition care programs for hospitalized adults (nutrition status screening, assessment and diagnosis of malnutrition, oral nutritional supplements provided when indicated) is associated with substantial per-patient, per-episode healthcare savings approaching \$4,000. Improved nutrition care has also been associated with fewer complications and faster recovery (shortened lengths of stay, lower readmission rates). Nutrition care thus delivers value, which is evidenced by better patient outcomes at cost savings to healthcare systems.

Keywords: nutrition, value, healthcare, real-world evidence, quality improvement programs

What is the “Value” of Therapeutic Nutrition in Healthcare?

Value is a central aim for healthcare, yet value is defined in varying and sometimes conflicting terms by different stakeholders—providers, payers, and patients.¹ In terms of health economics, value is determined by outcomes relative to costs (Figure 1).² The numerator of the value equation is outcome, while the denominator is cost. Depending on the stakeholder’s viewpoint, high value may be seen as reduced patient morbidity and mortality, cost containment, or profitability. Some aspects of value are important to patients and providers alike, eg, outcomes such as survival, fast recovery, few or no complications during hospitalization, and quality of life, as well as experience or satisfaction. To hospitals and healthcare systems, measurable outcomes that contribute to value include reduced length of stay (LOS) and lower readmission rates. Cost-effective treatments represent value to payers. Levels of patient-perceived satisfaction with care are being increasingly monitored as measures of healthcare quality, thus representing values shared by both patients and provider systems.³ Like healthcare processes in general, nutrition care in hospitals and other healthcare settings is beneficial when it improves outcomes. The value of nutrition care is demonstrated when improved health outcomes for hospitalized patients are achieved at reasonable incremental costs for nutrition care and with reduced overall costs of care. Health economic studies support the concept that nutrition care can improve patient outcomes

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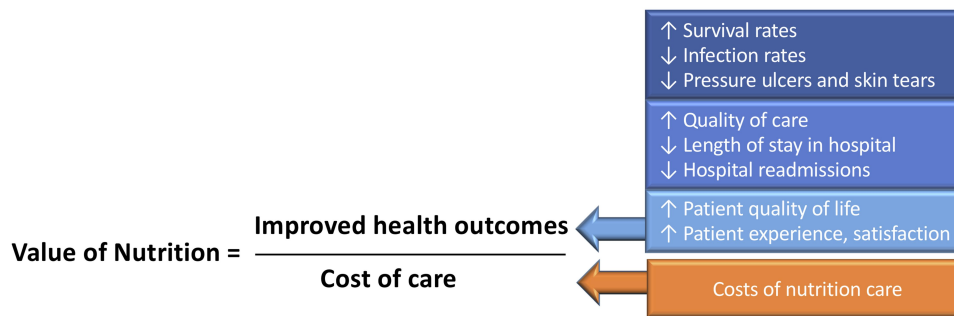


Figure 1 For a hospitalized patient with malnutrition or its risk, the value of nutrition care is determined by improved health outcomes relative to cost of care.

while reducing costs. Several years ago, a pivotal and large-scale data analysis by Philipson et al first raised awareness that therapeutic nutrition care during hospitalization—use of oral nutritional supplements (ONS) for inpatients identified as being at risk for malnutrition—could significantly improve health outcomes and lower costs of care.^{4,5} Specifically, ONS use was associated with a 2-day reduction in LOS in hospital and with cost savings for inpatient care estimated at over \$4,700 per patient.⁵ Based on this analysis and other work, healthcare decision-makers worldwide have likewise begun to realize that therapeutic nutrition plays important and cost-saving roles in overall care, ie, the value of nutrition care.^{6–10}

To highlight value in nutrition care, this paper will review evidence of the health and financial tolls of disease-associated malnutrition in hospitals, report real-world results from nutrition-focused quality improvement programs (QIPs) in hospitals, and discuss clinical and policy implications of value in nutrition care for hospitalized patients with disease-associated malnutrition.

Definitions

As background for our discussion, definitions of terms relevant to malnutrition and its care are provided (Box 1).

The Cost Burden of Malnutrition

Disease-associated malnutrition is common and costly in healthcare settings. Financial costs of disease-associated malnutrition in the USA have been estimated as more than \$147 billion per year,^{13,14} with \$15.5 billion attributed to direct therapeutic costs.¹⁵ US inpatients who also had a diagnosis of malnutrition had up to two-fold higher hospital costs compared to those for adequately nourished inpatients.¹⁶ Similarly, the Canadian

Malnutrition Task Force reported that 40% of patients were malnourished at hospital admission, and they cost between \$1,500 and \$2,000 more per hospital stay than an adequately nourished patient.¹⁷ As such, the excess cost of malnutrition to Canadian hospitals was estimated at about \$2 billion per year.¹⁷

Cost Savings Attributed to Therapeutic Nutrition Support

The results of a wide range of studies (n=34) showed that the use of therapeutic nutrition—ONS, enteral nutrition (EN), and parenteral nutrition (PN)—plays an important role in the quality of care and in overall outcomes of care.⁶ While nutrition care for patients with disease-associated malnutrition includes nutrition services/consultation, as well as food fortification, ONS,

Box 1 Malnutrition Care Definitions

Malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients.¹¹ Malnutrition thus includes three categories: 1) undernutrition, 2) micronutrient-related malnutrition, and 3) overweight or obesity.

Medical nutrition therapy (MNT) is defined as an evidence-based application of nutrition care processes in clinical settings with focus on disease management.¹² As such, MNT involves individualized nutrition interventions supported by: nutritional assessment, diagnosis, individualized nutrition interventions, and follow-up monitoring of affected individuals.

Individualized nutrition intervention (INI) is used to meet the needs of a patient who is malnourished or at risk of malnutrition. Such interventions range from food fortification to oral nutritional supplements (ONS, standard or condition-specific formulas) to standard or tailored formulations for enteral tube feeding or parenteral feeding. For patients who can tolerate oral nutrition, ONS are used most frequently, both during and after hospitalization. Use of enteral or parenteral nutrition (EN, PN) is sometimes necessary but relatively uncommon in general medical/surgical units; EN or PN is more often used for patients in intensive care units.

and EN or PN, most health economic studies to date have evaluated ONS value, as ONS beverages are often selected by nutrition professionals for individualized nutrition support. Numerous studies have compared ONS with routine care (no use of ONS) for hospitalized patients with malnutrition. In a comprehensive review of nutrition care in hospitalized patients, use of ONS led to median cost savings of 12.2% when quantitative data were available.⁸ Savings were associated with fewer complications and shortened LOS in hospital.⁸ Similarly, older people discharged from US hospitals

experienced more quality-adjusted life years when they were given ONS; costs were well within standards of a cost-effective treatment.¹⁸ These studies examined the effects of different ONS products on patients with a wide variety of diseases and conditions, underscoring the importance of medical nutrition therapy (MNT) advised by a nutrition professional. Notably, it has been estimated that every dollar spent for MNT provided under the care of a nutrition professional can yield five to 99 times that amount in savings on subsequent medical care.¹⁹

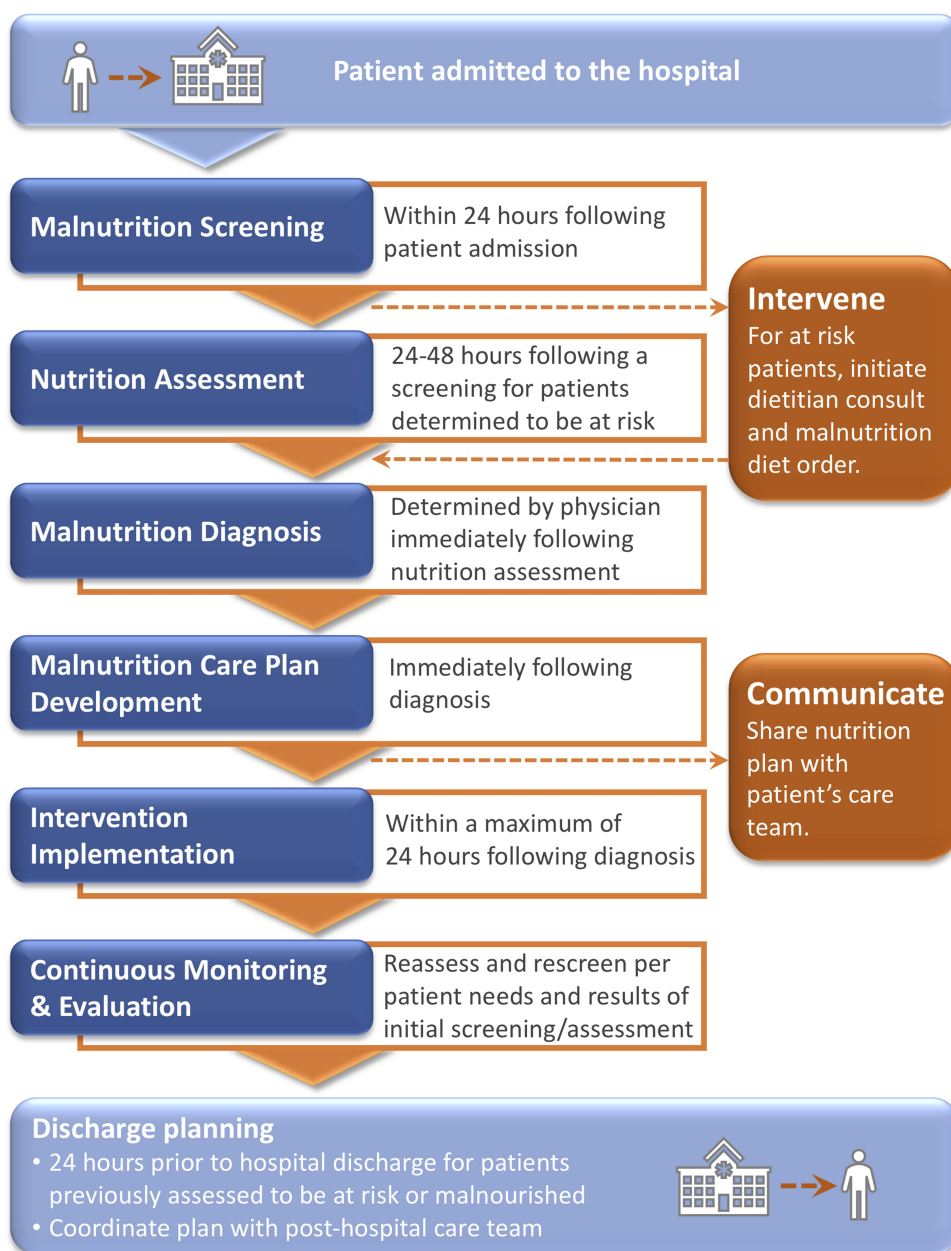


Figure 2 Medical nutrition support for patients who are hospitalized.

Best-Practice Medical Nutrition Support Across the Continuum of Care

According to nutrition experts in the USA and Canada, optimal and patient-focused nutrition care is guided by key actions: screening patients for malnutrition risk; diagnosing those who are malnourished; implementing individualized nutrition interventions promptly and continuing to monitor for status changes; communicating nutrition plans with members of the patient's care team; and developing a post-discharge nutrition and education plan for the patient (Figure 2).^{20–22} The patient's full hospital care team includes physicians, nurses and nursing assistants, dietitians and dietetic technicians, and pharmacists and pharmacy technicians. Registered Dietitian Nutritionists are recognized for the key roles they play in ensuring best-practice nutrition care during hospitalization, and they are recognized to add “value” by helping prevent hospitalizations and excess healthcare costs for people with chronic diseases.^{23–25} It has also been noted that nurses are ideally positioned to play critical roles in nutrition-related care since they are involved in the initial screening and they regularly observe and monitor the patients during hospitalization.²⁶ Post-discharge nutrition education may need to target the patient, his or her family members, and other caregivers, depending on each individual's situation.

Quality Improvement Programs Translate Nutrition Care Value to Practice

We believe that the evidence clearly supports the value of optimal nutrition in healthcare settings, especially on admission to hospital. Specifically, disease-associated malnutrition predisposes patients and care systems to adverse clinical outcomes and excess costs, while early nutritional intervention can help achieve better outcomes and cut costs.

To put such actions into practice, QIPs have been applied. The quality improvement (QI) process is intended to combine the efforts of multiple stakeholders—healthcare professionals, planners and educators, and patients and their families—to implement changes that can lead to better patient outcomes (health and satisfaction with care), better system performance (care), and better professional development.²⁷ QIPs have been increasingly used for improving nutrition care processes, especially for increasing the effective use of ONS to treat malnutrition and those at

risk. Such studies have been led by nurses, dietitians, and other nutrition-focused healthcare professionals in large healthcare systems. The QI process generally involves iterative cycles of process change with outcome measurements before and after changes are implemented (Figure 3). An ever-growing number of QIPs have been implemented to help achieve best-practice nutrition care in hospital settings. Taken together, the findings of such studies provide compelling data showing that nutrition-focused QIPs can improve the identification of hospitalized patients with malnutrition or its risk, enhance nutrition practice and care (including use of ONS), and lower costs, mainly by reducing hospital LOS and readmission rates. Here, we summarize five recent studies that evaluated “value” in the use of ONS for care of patients with disease-associated malnutrition in US hospital settings (Table 1). Nutrition-focused QIP efforts have recently been extended to programs for home health care as well.²⁸

Quality Nutrition Care in Action: From Policy to Practice

Improved quality of care begins with effective policies—in both governmental and specific healthcare settings. In the US, The Joint Commission (TJC) is an independent organization that accredits, certifies, and provides disease

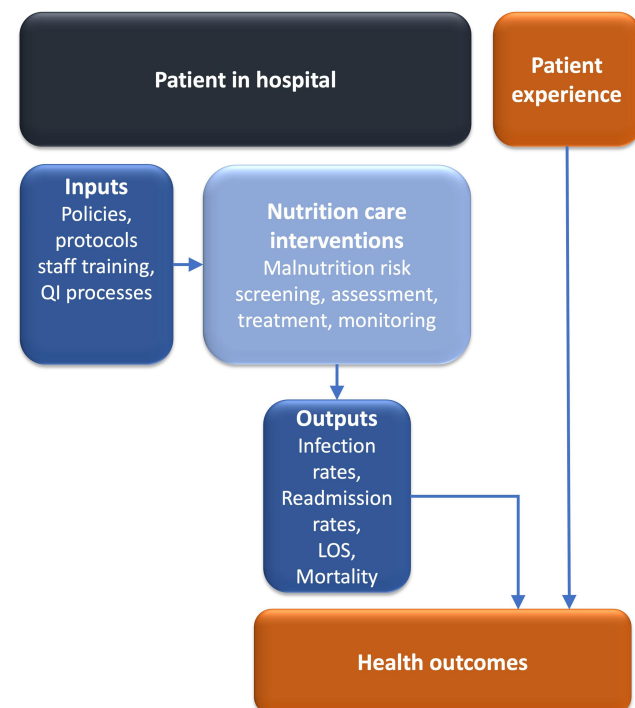


Figure 3 Policies and processes for improving the quality of nutrition care for hospitalized patients with malnutrition or its risk. A patient's experience is a key component of the health outcome.

Table I Examples of US Hospital Quality Improvement Programs That Used ONS to Treat Malnutrition or Its Risk, Improve Health Outcomes, and Lower Costs of Care

First Author, Year, Citation	Patients	Model Design	Healthcare Setting	Results
Meehan, 2016 ⁴⁰	Adult patients (≥ 18 years) at risk or malnourished	Nurse-led QIP that included malnutrition risk screening at admission, prompt initiation of ONS for at-risk patients, and continued nutrition support	Magnet hospital (Ohio)	<ul style="list-style-type: none"> Enhanced compliance with timely nutrition screening and with prescription/delivery of ONS QIP halved the incidence of hospital-acquired pressure ulcers, reduced hospital costs by an average of \$591 per nutrition-sensitive patient, and reduced rates of 30-day hospital readmissions by 17% in nutrition-sensitive patients
Sriram, 2017 ⁴¹	Adult patients (≥ 18 years) at risk or malnourished with any diagnosis	Nutrition-focused QIP with use of electronic medical record-cued nutrition screening, early provision of ONS when needed, patient/caregiver nutrition education, and sustained nutrition support	Hospitals in a large US healthcare system (Illinois)	<ul style="list-style-type: none"> QIP significantly reduced absolute rates of readmission rates within 30 days of discharge by about 4%, ie, >20% relative reduction compared to various pre-QIP control cohorts Nearly 2-day reduction in LOS post-QIP, or about 25% RRR compared to different pre-QIP control cohorts
Sulo, 2017 ¹³	Adult patients (≥ 18 years) at risk or malnourished with any diagnosis	QIP as above; retrospective cost analyses	Hospitals in large US healthcare system (Illinois)	<ul style="list-style-type: none"> The avoided hospital readmissions and reduced LOS for the patients in the QIP led to per-treated patient savings of \$3858 when compared to a control cohort
Sriram, 2018 ⁴²	Adult patients (≥ 18 years) at risk or malnourished with medical and surgical diagnosis	Post-hoc analysis of previously published data; nutrition-focused QIP with historical controls	Hospitals in large US healthcare system (Illinois)	<ul style="list-style-type: none"> RRR for readmissions was found in all patients, but RRR was higher among surgical patients than medical patients (46.9% vs 20.6). Average LOS decreased for both groups (29.0% and 29.6%) Underscores the importance of nutrition care for surgery patients
Siegel, 2019 ⁴³	Adult patients (≥ 18 years) at risk for malnutrition	Nutrition-focused QIP based on screening for nutritional risk on patient admission, and prompt initiation of ONS for at-risk patients	Hospitals in a large healthcare system (Kentucky)	<ul style="list-style-type: none"> QIP reduced time from admission to start of ONS treatment by 20 hours for patients at nutrition risk (compared to pre-QIP) LOS reduced more for ONS users than non-users

Abbreviations: ONS, oral nutritional supplements; QIP, quality improvement program; RRR, relative risk reduction; LOS, length of stay.

management standards for healthcare organizations. TJC promotes effective and continuous improvements of quality and safety within healthcare. TJC's standards state that nutritional and functional screenings are performed when warranted by the patient's needs or condition. Each

healthcare organization is expected to define in writing the criteria that identify when screenings and more in-depth assessments are needed. When applicable for the patient's condition, nutrition screenings must be completed within 24 hours of inpatient admission.²⁹

To support nutrition care processes, the Academy of Nutrition and Dietetics, along with Avalere Health and other stakeholders recently developed a practical program to guide nutrition screening, assessment of nutrition status for malnutrition diagnoses, prompt initiation of treatment when needed, and ongoing monitoring of care—the Malnutrition Quality Improvement Initiative (MQii).^{22,30–38} MQii offers tips for electronic Clinical Quality Measures (eCQMs) to be added to electronic health records, and it contains a toolkit to initiate such a program for nutrition-focused QI. Recent studies have shown that MQii can improve nutrition awareness and care in hospitals with remarkable cost-saving results.^{30–38}

Take-Home Messages on the Value of Nutrition

Cost containment is important to healthcare providers, but cost cutting without regard for overall value—health and quality outcomes included—is perilous.³⁹ To bring the value of nutrition to healthcare, policies and practices supporting nutrition care during hospitalization and in post-discharge settings are essential. In this article, we have provided considerable evidence on the “value of nutrition” based on data from clinical studies and from real-world programs evaluating hospitalized patients who are malnourished or at risk for malnutrition.

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All authors made a significant contribution to the work reported, took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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