

Malnutrition in Hospitalized Adults: A Systematic Review

Evidence Summary



Main Points

- **Association Between Malnutrition and Clinical Outcomes**
 - Patients requiring intensive care unit (ICU) care and diagnosed with malnutrition (using Subjective Global Assessment [SGA]) may have higher hospital mortality compared to well-nourished patients requiring ICU care.
 - Patients requiring ICU care and diagnosed with malnutrition (using SGA) are likely to experience prolonged hospital length of stay compared to well-nourished patients requiring ICU care.
 - Patients requiring ICU care and diagnosed with malnutrition (using Mini Nutritional Assessment [MNA]) may experience more hospital acquired complications compared to well-nourished patients requiring ICU care.
 - Patients hospitalized due to traumatic injury and screened at risk of malnutrition (using Nutritional Risk Screening [NRS]-2002) may experience more hospital acquired conditions compared to well-nourished patients.
 - Patients hospitalized with heart failure and diagnosed with malnutrition (using several different measurement tools) may have higher mortality compared to well-nourished patients with heart failure.
 - Patients hospitalized with cancer and diagnosed with malnutrition (using SGA) may experience prolonged hospital length of stay compared to well-nourished patients.
 - Patients hospitalized with cirrhosis awaiting transplantation and diagnosed with malnutrition (using SGA) may have higher pre-transplant mortality compared to well-nourished patients.

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- **Effectiveness of Screening on Clinical Outcomes**
 - No studies met inclusion criteria to address effectiveness of screening or diagnostic assessment on clinical outcomes, primarily because studies lacked an appropriate control group.
 - This evidence gap underscores the need for future research that addresses the effectiveness of various measurement tools for malnutrition on clinical outcomes. Such research is vital to standardize malnutrition assessment and further understand its downstream implications on patient-relevant outcomes.
- **Effectiveness of Hospital-Initiated Interventions for Malnutrition**
 - Hospital-initiated malnutrition interventions (i.e., specialized nutrition care, protein/calorie supplementation) likely decrease mortality compared to usual care.
 - Hospital-initiated malnutrition interventions may improve quality of life compared to usual care.
 - No difference was observed between hospital-initiated malnutrition interventions and usual care for length of stay, readmission rates, and hospital acquired conditions compared to usual care.
 - Evidence was insufficient to address the effect of hospital-initiated malnutrition interventions on activities of daily living and discharge disposition compared to usual care.



Background and Purpose

In fiscal year 2020, Congress requested that the Agency for Healthcare Research and Quality (AHRQ) convene a panel of experts charged with developing quality measures for malnutrition-related hospital readmissions. At AHRQ's request, we conducted a systematic review to inform the potential development of these measures. Our Key Questions addressed the following: (1) reviewing the association between malnutrition and clinical outcomes, (2) evaluating the effectiveness of measurement tools of malnutrition on clinical outcomes, and (3) assessing the effectiveness of hospital-initiated interventions to treat patients diagnosed with malnutrition. Understanding downstream consequences of malnutrition screening is extremely important as US hospitals are mandated to provide nutrition screening for all hospitalized patients within 24 hours of admission.



Methods

Electronic databases (MEDLINE[®], Embase[®], and Cochrane Library) were searched from January 1, 2000, to June 3, 2021. We hand-searched the reference lists of relevant studies and searched for unpublished studies in ClinicalTrials.gov.

Using predefined criteria, we selected (1) existing systematic reviews (SRs) assessing the association between malnutrition and clinical outcomes, (2) randomized and non-randomized studies evaluating the effectiveness of screening or diagnostic assessment on clinical outcomes, and (3) randomized controlled trials (RCTs) assessing hospital-

initiated treatments for malnutrition. We only included studies of hospitalized patients aged 18 years or older.

Malnutrition was defined based on commonly available diagnostic assessment tools, such as SGA, or MNA. Interventions of interest included measurement tools and treatments initiated within the hospital and intended to impact nutritional status. Clinical outcomes of interest included mortality, length of stay, 30-day readmission, quality of life, functional status, activities of daily living, hospital acquired condition, wound healing, and discharge disposition.

Data syntheses were performed using methods consistent with those outlined in the AHRQ Methods Guide ([Methods Guide for Effectiveness and Comparative Effectiveness Reviews | Effective Health Care Program \[\(ahrq.gov\)\]](#)).



Results

A total of 17 studies (6 SRs and 11 RCTs) met eligibility criteria for inclusion. Existing SRs found that patients screened or diagnosed with malnutrition (using various measurement tools) may be at increased risk of hospital mortality compared to well-nourished patients (Strength of evidence [SOE]: Low). This association was observed among patients hospitalized for acute medical conditions, heart failure, and cirrhosis. Malnutrition (diagnosed using SGA) was also independently associated with prolonged hospital length of stay among patients hospitalized with acute medical conditions (SOE: Moderate) or cancer (SOE: Low). Finally, malnutrition (diagnosed using MNA or screened using NRS-2002) was found to be associated with increased hospital acquired conditions among patients hospitalized due to traumatic injury or acute medical conditions compared to well-nourished patients (SOE: Low).

To assess clinical utility of measurement tools we sought to identify prospectively controlled studies in which some patients were screened or assessed for malnutrition while other patients were either (1) not screened or assessed or (2) assessed with a reference standard (i.e., imaging or SGA). However, we identified no studies meeting these criteria.

We identified 11 RCTs indicating that some interventions improve clinical outcomes among malnourished patients (screened at risk or diagnosed with malnutrition using commonly available measurement tools). Specifically, we found that hospital-initiated malnutrition interventions (i.e., specialized nutrition care and increased protein/calorie provision) likely reduce mortality compared to usual care (SOE: moderate); these interventions may also improve quality of life (SOE: Low). However, evidence was insufficient or showed no difference for other outcomes (length of stay, activities of daily living, discharge disposition, hospital acquired conditions, or adverse events).



Limitations and Suggestions for Future Research

No studies met criteria to address clinical effectiveness of measurement tools. Eleven RCTs assessed hospital-initiated malnutrition interventions. Furthermore, although SRs assessing the association between malnutrition and clinical outcomes included a combined 80 studies, only 43 used a known tool to measure malnutrition and could be included for this review.

This evidence base reveals several shortcomings of the published literature on malnutrition in hospitalized patients. First, only a relatively small number of studies used commonly available measurement tools to identify malnutrition. Instead, many studies identified malnutrition using only biometric measures, such as serum albumin levels, body mass index, and weight.^{1,2} Future studies assessing the impact of malnutrition on outcomes or evaluating malnutrition interventions should use known tools to establish malnutrition status.

The absence of studies addressing the clinical utility (effectiveness) of measurement tools for nutrition screening and diagnostic assessment (Key Question 2) does not necessarily imply that these tools are ineffective. Instead, it highlights two important knowledge gaps in current literature. First, is the need for controlled studies assessing their effectiveness in hospitalized adults. Understanding downstream consequences of malnutrition screening, including subsequent diagnostic assessment, management, and clinical outcomes is extremely important as US hospitals are mandated to provide nutrition screening for all hospitalized patients within 24 hours of admission. Further research could also support alignment of screening efforts with similar tools across different institutions.

Second, is the need to establish an accepted reference gold standard for diagnosing malnutrition in hospitalized patients. Through discussions with our Technical Expert Panel (TEP), we recognized that there currently is no universally agreed upon gold standard for malnutrition assessment and measurement. For the purposes of this report, we selected, with input from our TEP and subject matter experts, imaging modalities to quantify and evaluate body composition (i.e., muscle and adipose tissues) as the gold standard and SGA as a semi-gold standard for classifying malnutrition. However, use of imaging specifically to assess malnutrition is infrequent and has important limitations, including cost, radiation exposure, and need for serial studies. Consensus regarding objective measures to define a gold standard for diagnosing malnutrition are critical to advance clinical care and research.

Finally, studies addressing efficacy of malnutrition-focused interventions only addressed specialized nutrition care (consultation with a dietitian to set goals for protein and calorie intake) or increased protein/calorie provision. These studies had several shortcomings, including high risk of bias and poor reporting of adverse events. These limitations, along with inconsistencies in the findings for some outcomes and lack of precision for others, downgraded the overall strength of the evidence to low or insufficient for most outcomes. Future studies need to clearly indicate any harms associated with treatment.



References

1. Bharadwaj S, Ginoya S, Tandon P, et al. Malnutrition: laboratory markers vs nutritional assessment. *Gastroenterol Rep (Oxf)*. 2016 Nov;4(4):272-80. Epub 2016 May 11.
<http://dx.doi.org/10.1093/gastro/gow013>. PMID: 27174435.
2. Barone M. Is the use of the BMI alone sufficient to diagnose malnutrition in both male and female adults? *Clin Nutr*. 2018 Oct;37(5):1771.
<http://dx.doi.org/10.1016/j.clnu.2018.07.003>. PMID: 30055866.

Full Report

Uhl S, Siddique SM, McKeever L, Bloschichak A, D'Anci K, Leas B, Mull NK, Tsou AY. Malnutrition in Hospitalized Adults: A Systematic Review. Comparative Effectiveness Review No. 249. (Prepared by the ECRI–Penn Medicine Evidence-based Practice Center under Contract No. 75Q80120D00002.) AHRQ Publication No. 21(22)-EHC035. Rockville, MD: Agency for Healthcare Research and Quality; October 2021. DOI: <https://doi.org/10.23970/AHRQEPCCER249>. Posted final reports are located on the Effective Health Care Program [search page](#).

