

# Hospital Nutrition Care Better Patient Clinical Outcomes and Reduces Costs: The Malnutrition Quality Improvement Initiative Story



Sharon M. McCauley, MS, MBA, RDN, LDN, FADA, FAND; Albert Barrocas, MD, FACS, FASPEN;  
Ainsley Malone, MS, RDN, LD, CNSC, FASPEN, FAND

**D**ISEASE-ASSOCIATED MALNUTRITION and malnutrition-associated diseases and conditions are common among hospitalized patients, yet all too often such malnutrition goes unrecognized and untreated. As a result, patient quality outcomes worsen, excess costs of care are incurred, and patients and their families are disappointed and alarmed by slow, stalled, or no recovery from illness or injury. Now more than ever is the time for key health care stakeholders—from providers to patients—to recognize and harness the potential of nutritional care to help prevent and treat malnutrition and to advance value-based medicine in the current health care reimbursement environment.

The numbers of acute care patients who are malnourished or at risk of malnutrition is particularly compelling. The estimated prevalence of malnutrition or its risk at the time of hospital admission ranges from 20% to 50% worldwide.<sup>1-4</sup> However, as few as 5% to 8% of patients in the United States received a documented or coded diagnosis of malnutrition during their hospital stay.<sup>5,6</sup> Such findings suggest that

malnutrition may be underdiagnosed or underdocumented and thus “under the radar” of care in US hospitals, and possibly overshadowed by a focus on acute conditions or high-tech diagnostic and treatment strategies. Lack of attention to nutrition care in different hospitals has many possible etiologies. They include limited nutrition education in medical schools, inadequate training of hospital providers on nutrition screening and assessment, confusion over best-practice processes for nutrition care, deficits in how malnutrition information is documented and tracked in hospital medical records, and lack of awareness when the patient is not eating adequately.<sup>7-10</sup>

The consequences of malnutrition in hospitalized patients are serious. Malnutrition increases risks for complications including impaired wound healing,<sup>11</sup> infections,<sup>12</sup> and pressure ulcers<sup>13</sup>; leads to longer hospital length of stay and hospital readmissions<sup>14</sup>; and is associated with increased risk of mortality.<sup>14,15</sup> Older adults are particularly vulnerable because of their higher likelihood of having multiple chronic conditions or diseases along with acute illness or need for surgery, impaired functional or cognitive status, or limited food access.<sup>16-20</sup> Notably, conditions such as gastrointestinal and other cancers,<sup>21-23</sup> chronic obstructive pulmonary disease,<sup>24</sup> and heart disease<sup>25</sup> may impair appetite and lower nutrient intake and increase metabolic needs due to inflammatory processes; the overall result of these factors is malnutrition.

Malnutrition also carries a high toll in terms of costs for hospital care. A 2018 analysis of US hospital discharges found that the average cost for all hospital stays (excluding neonatal and maternal) was \$12,900, and patients diagnosed with

malnutrition had costs averaging up to \$22,200.<sup>6</sup> Overall, it is estimated that the economic burden of the morbidity, mortality, and direct medical costs associated with disease-associated malnutrition totals \$157 billion in the United States, with \$51.3 billion attributed to those age 65 and older, who are the most at risk.<sup>26</sup>

Given the high prevalence, adverse clinical impacts, and excessive costs of malnutrition, hospitals, other health care facilities, payers, regulators, and legislators need better tools and measures to support systematic implementation of malnutrition care best practices.<sup>5</sup> Such tools and measures can help ensure appropriate and prompt identification and treatment for patients who are malnourished or at risk of malnutrition.

This special supplement issue of the *Journal of the Academy of Nutrition and Dietetics* discusses how prevention and treatment of malnutrition present outstanding opportunities to improve the overall quality of patient acute care, enhance quality clinical outcomes, and reduce costs.<sup>27,28</sup> To this end, the Academy of Nutrition and Dietetics, along with Avalere Health and other stakeholders, developed and implemented the Malnutrition Quality Improvement Initiative (MQii).<sup>29</sup> MQii is a dual-pronged approach to support quality improvement (QI) for malnutrition care based on: (1) a set of four malnutrition-focused electronic clinical quality measures and (2) a complementary MQii Toolkit that includes resources guiding implementation of QI activities (Figure).

Descriptions of the MQii and results of its successful implementation have begun to appear in publications.<sup>30-34</sup> This supplement builds on the body

**Keywords:** Malnutrition; Quality improvement; Electronic clinical quality measures; Electronic health records; Outcomes assessment

**Funding/Support:** Publication of this supplement was supported by Abbott. The Academy of Nutrition and Dietetics does not receive funding for the MQii. Avalere Health's work to support the MQii was funded by Abbott.

**Statement of Potential Conflict of Interest:** See page S14.

2212-2672/Copyright © 2019 by the Academy of Nutrition and Dietetics.  
<https://doi.org/10.1016/j.jand.2019.05.027>

The MQii Toolkit provides practical resources to enable hospitals to achieve optimal nutrition standards of care



Data reported from eCQMs will help hospitals demonstrate their success in meeting the standards of care

**Figure.** The Malnutrition Quality Improvement Initiative (MQii) dual-pronged approach to achieving standards of care for malnutrition. eCQM=electronic clinical quality measure.

of literature and provides the first comprehensive report to date. Included in the supplement are: an overview of how QI is integral to today's health care environment, a history of the MQii, a description of developing the evidence-based MQii Toolkit, and the process for validating a set of malnutrition electronic clinical quality measures. The supplement also profiles the unique results of MQii projects in two acute care institutions. The supplement further highlights leadership behaviors and innovations of clinical nutrition managers leading MQii programs and concludes with a series of abstracts that share real-world experiences and results of using MQii measures and tools.

During the malnutrition project's inception in 2013, it was realized quickly that the essential steps taken to develop the MQii conceptual framework required ongoing collaborative

visionary leadership among various partners and stakeholders. Using hospital nutrition care to improve patient clinical outcomes and reduce costs, the identified measured gaps in malnutrition care demonstrated the need for creative innovations, which translated into learning how to change indicators for malnutrition standards of care. Pivotal to this goal is the ability of interdisciplinary health teams to uptake, adopt, launch, and implement necessary quality-driven improvements through the MQii within their health care delivery system environment whether in the hospital acute care, a next point of care—post-acute care, a transition to community services, and primary care. The future of the MQii for 2020 and beyond will report research outcomes from hospitals participating in the MQii Learning Collaborative and will incorporate continuous QI and innovation

endeavors. It will also utilize data for integration into evidence-based practice to build a health learning system for malnutrition care.<sup>35-37</sup>

In summary, the supplement is designed to provide a guide or template for individuals and organizations interested in continually improving the nutrition care in their respective facility regardless of their particular situation and resources. The editors, authors, and other contributors encourage and welcome your feedback and suggestions.

**References**

1. Allard JP, Keller H, Jeejeebhoy KN, et al. Malnutrition at hospital admission—contributors and effect on length of stay: A prospective cohort study from the Canadian Malnutrition Task Force. *JPEN J Parenter Enteral Nutr.* 2016;40(4):487-497.
2. Barker LA, Gout BS, Crowe TC. Hospital malnutrition: prevalence, identification

- and impact on patients and the health-care system. *Int J Environ Res Public Health*. 2011;8(2):514-527.
3. Norman K, Pichard C, Lochs H, Pirlich M. Prognostic impact of disease-related malnutrition. *Clin Nutr*. 2008;27(1):5-15.
  4. Ruiz AJ, Buitrago G, Rodriguez N, et al. Clinical and economic outcomes associated with malnutrition in hospitalized patients. *Clin Nutr*. 2019;38(3):1310-1316.
  5. Tobert CM, Mott SL, Nepple KG. Malnutrition diagnosis during adult inpatient hospitalizations: Analysis of a multi-institutional collaborative database of academic medical centers. *J Acad Nutr Diet*. 2018;118(1):125-131.
  6. Barrett ML, Bailey MK, Owens PL. Non-maternal and non-neonatal inpatient stays in the United States involving malnutrition, 2016. Healthcare Cost and Utilization Project. [https://www.hcup-us.ahrq.gov/reports/HcupMalnutritionHospReport\\_083018.pdf](https://www.hcup-us.ahrq.gov/reports/HcupMalnutritionHospReport_083018.pdf). Published August 30, 2018. Accessed May 17, 2019.
  7. Patel V, Romano M, Corkins MR, et al. Nutrition screening and assessment in hospitalized patients: A survey of current practice in the United States. *Nutr Clin Pract*. 2014;29(4):483-490.
  8. Tappenden KA, Quatrara B, Parkhurst ML, Malone AM, Fanjiang G, Ziegler TR. Critical role of nutrition in improving quality of care: An interdisciplinary call to action to address adult hospital malnutrition. *JPEN J Parenter Enteral Nutr*. 2013;37(4):482-497.
  9. Adams KM, Butsch WS, Kohlmeier M. The state of nutrition education in US medical schools. *J Biomed Educ*. 2015;ID357627:1-7. <http://dx.doi.org/10.1155/2015/357627>.
  10. Sauer AC, Goates S, Malone A, et al. Prevalence of malnutrition risk and the impact of nutrition risk on hospital outcomes: Results from nutritionDay in the US [published online January 22, 2019]. *JPEN J Parenter Enteral Nutr*. <https://doi.org/10.1002/jpen.1499>.
  11. Stechmiller JK. Understanding the role of nutrition and wound healing. *Nutr Clin Pract*. 2010;25(1):61-68.
  12. Thibault R, Makhlof AM, Kossovsky MP, et al. Healthcare-associated infections are associated with insufficient dietary intake: An observational cross-sectional study. *PLoS One*. 2015;10:e0123695. <https://doi.org/10.1371/journal.pone.0123695>.
  13. Jaul E, Barron J, Rosenzweig JP, Menczel J. An overview of co-morbidities and the development of pressure ulcers among older adults. *BMC Geriatr*. 2018;18:305.
  14. Lim SL, Ong KC, Chan YH, Loke WC, Ferguson M, Daniels L. Malnutrition and its impact on cost of hospitalization, length of stay, readmission and 3-year mortality. *Clin Nutr*. 2012;31(3):345-350.
  15. Correia MI, Waitzberg DL. The impact of malnutrition on morbidity, mortality, length of hospital stay and costs evaluated through a multivariate model analysis. *Clin Nutr*. 2003;22(3):235-239.
  16. Favaro-Moreira NC, Krausch-Hofmann S, Matthys C, et al. Risk factors for malnutrition in older adults: A systematic review of the literature based on longitudinal data. *Adv Nutr*. 2016;7(3):507-522.
  17. Porter Starr KN, McDonald SR, Bales CW. Nutritional vulnerability in older adults: A continuum of concerns. *Curr Nutr Rep*. 2015;4(2):176-184.
  18. Agarwal E, Ferguson M, Banks M, et al. Malnutrition and poor food intake are associated with prolonged hospital stay, frequent readmissions, and greater in-hospital mortality: Results from the Nutrition Care Day Survey 2010. *Clin Nutr*. 2013;32(5):737-745.
  19. Bardon LA, Streicher M, Corish CA, et al. Predictors of incident malnutrition in older Irish adults from The Irish Longitudinal Study on Ageing (TILDA) cohort—A MaNuEL study [published online ahead of print September 25, 2018]. *J Gerontol A Biol Sci Med Sci*. <https://doi.org/10.1093/gerona/gly225>.
  20. Corish CA, Bardon LA. Malnutrition in older adults: Screening and determinants [published online December 3, 2018]. *Proc Nutr Soc*. 2018:1-8. <https://doi.org/10.1017/S0029665118002628>.
  21. Choi WJ, Kim J. Nutritional care of gastric cancer patients with clinical outcomes and complications: A review. *Clin Nutr Res*. 2016;5(2):65-78.
  22. Mosquera C, Koutlas NJ, Edwards KC, et al. Impact of malnutrition on gastrointestinal surgical patients. *J Surg Res*. 2016;205(1):95-101.
  23. Alvaro Sanz E, Garrido Siles M, Rey Fernandez L, Villatoro Roldan R, Rueda Dominguez A, Abiles J. Nutritional risk and malnutrition rates at diagnosis of cancer in patients treated in outpatient settings: Early intervention protocol. *Nutrition*. 2019;57:148-153.
  24. Hoong JM, Ferguson M, Hukins C, Collins PF. Economic and operational burden associated with malnutrition in chronic obstructive pulmonary disease. *Clin Nutr*. 2017;36(4):1105-1109.
  25. Adejumo AC, Adejumo KL, Adegba OM, et al. Protein-energy malnutrition and outcomes of hospitalizations for heart failure in the USA. *Am J Cardiol*. 2019;123(6):929-935.
  26. Snider JT, Linthicum MT, Wu Y, et al. Economic burden of community-based disease-associated malnutrition in the United States. *JPEN J Parenter Enteral Nutr*. 2014;38(Suppl 2):77S-85S.
  27. Nepple KG, Tobert CM, Valladares AF, Mitchell K, Yadrick M. Enhancing identification and management of hospitalized patients who are malnourished: A pilot evaluation of electronic quality improvement measures. *J Acad Nutr Diet*. 2019;119(9 Suppl 2):S32-S39.
  28. Fitall E, Pratt KJ, McCauley SM, et al. Improving malnutrition in hospitalized older adults: The development, optimization, and use of a supportive toolkit. *J Acad Nutr Diet*. 2019;119(9 Suppl 2):S25-S31.
  29. Academy of Nutrition and Dietetics. Malnutrition Quality Improvement Initiative. Published 2016. <http://mqii.defeatmalnutrition.today>. Updated 2018. Accessed May 20, 2019.
  30. McCauley SM, Khan M. Elevating malnutrition care coordination for successful patient transitions. *J Acad Nutr Diet*. 2018;118(9):1761-1763.
  31. Doley J, Phillips W, Talaber J, Leger-LeBlanc G. Early implementation of malnutrition clinical quality metrics to identify institutional performance improvement needs. *J Acad Nutr Diet*. 2019;119(4):547-552.
  32. Silver HJ, Pratt KJ, Bruno M, Lynch J, Mitchell K, McCauley SM. Effectiveness of the Malnutrition Quality Improvement Initiative on practitioner malnutrition knowledge and screening, diagnosis and timeliness of malnutrition related care provided to older adults admitted to a tertiary care facility: A pilot study. *J Acad Nutr Diet*. 2018;118(1):101-109.
  33. Bopp S. Addressing malnutrition and improving performance: Stakeholders develop a malnutrition toolkit. Hospitalist. <https://www.the-hospitalist.org/hospitalist/article/168672/gastroenterology/addressing-malnutrition-and-improving-performance>. Published June 22, 2018. Accessed May 20, 2019.
  34. McCauley SM. Malnutrition care: Preparing for the next level of quality. *J Acad Nutr Diet*. 2016;116(5):852-855.
  35. US Department of Health & Humans Services. Agency for Healthcare Research and Quality. Learning Health Systems. <https://www.ahrq.gov/professionals/systems/learning-health-systems/index.html>. Accessed May 20, 2019.
  36. National Academy of Medicine. The Learning Health Systems Series. <https://nam.edu/programs/value-science-driven-health-care/learning-health-system-series/>. Accessed May 20, 2019.
  37. National Academy of Medicine. Leadership Consortium for a Value & Science-Driven Health System. <https://nam.edu/programs/value-science-driven-health-care/>. Accessed May 20, 2019.

## **AUTHOR INFORMATION**

S. M. McCauley is senior director, Quality Management, Academy of Nutrition and Dietetics, Chicago, IL. A. Barrocas is owner, ALMA, LLC, Atlanta, GA. A. Malone is a nutrition support dietitian, Mt Carmel Grove City Hospital, Columbus, OH, and the American Society for Parenteral and Enteral Nutrition.

Address correspondence to: Sharon M. McCauley, MS, MBA, RDN, LDN, FADA, FAND, Academy of Nutrition and Dietetics, 120 S Riverside Plaza, Suite 2190, Chicago, IL 60606. E-mail: [smccauley@eatright.org](mailto:smccauley@eatright.org)

## **STATEMENT OF POTENTIAL CONFLICT OF INTEREST**

The Malnutrition Quality Improvement Initiative (MQii) is a project of the Academy of Nutrition and Dietetics, Avalere Health, and other stakeholders who participated in and provided guidance and expertise in this collaborative partnership. S. McCauley is an employee of the Academy of Nutrition and Dietetics. A. Barrocas is self-employed, owner of ALMA, LLC. A. Malone is an employee of Mt Carmel Grove City Hospital and the American Society for Parenteral and Enteral Nutrition.

## **FUNDING/SUPPORT**

Publication of this supplement was supported by Abbott. The Academy of Nutrition and Dietetics does not receive funding for the MQii. Avalere Health's work to support the MQii was funded by Abbott.

## **ACKNOWLEDGEMENTS**

We thank Mujahed Khan MBA, RDN, LDN, for his critical review of the manuscript and the medical writers from C. Hofmann & Associates (Western Springs, IL) for editorial assistance with this manuscript.

## **AUTHOR CONTRIBUTIONS**

S. M. McCauley led the development of the manuscript with insight from A. Barrocas and A. Malone. All authors reviewed and commented on subsequent drafts of the manuscript.