Assessment of the Nutrition Care Process in US Hospitals Using a Web-Based Tool Demonstrates the Need for Quality Improvement in Malnutrition Diagnosis and Discharge Care

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Abstract

Background: Malnutrition in hospitalized patients is a pervasive problem in the United States. To our knowledge, although malnutrition has been acknowledged as a concern for >40 y, it has not yet been well addressed with a systematic, process improvement approach.

Objectives: We aimed to characterize the current nutrition care process in US hospitals to establish a baseline for improvements. We also aimed to demonstrate the application of a web-based quality improvement tool as a simple approach to address malnutrition in hospitalized patients.

Methods: We established a web-based tool to measure and assess nutrition care practices from hospital electronic medical records. Individual institutions self-selected to participate and were assigned a unique identifier to input data. Aggregated patient data from registered institutions were assessed. Data from all institutions were combined and are presented as the totals for each variable.

Results: Of 243 registered users, 97 provided data and 150 reports were included in the analysis, resulting in a total of 107,106 patients. Almost all patients (89.98%) were screened for malnutrition risk within 24 h of admission, and ~30% were at risk for malnutrition. Of those at risk, ~65% received a registered dietitian nutritionist consultation or an order for an oral nutrition supplement. The rate of malnutrition diagnosis for those at risk was ~14%, and <10% of patients received a recommendation or prescription for an oral nutrition supplement at discharge.

Conclusions: Malnutrition remains an issue for hospitalized patients, particularly the gap between those screened as at risk and those diagnosed with malnutrition. Moreover, discharge recommendations for patients who are screened as at risk for malnutrition are also lacking. These data demonstrate that a web-based quality improvement tool could be used to capture the nutrition care practice at an institution level to provide directed approaches for addressing hospital malnutrition and improving care of patients at risk for malnutrition. *Curr Dev Nutr* 2017;1:e001297.

Keywords: malnutrition, quality improvement, nutrition care process, hospitalized patients, nutrition screening

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Abbreviations used: EHR, electronic health record; QI, quality improvement; RDN, registered dietitian nutritionist.

Introduction

Malnutrition continues to be a serious problem across health care settings, particularly in hospitals. With prevalence rates between 20% and 50%, malnutrition remains a "skeleton in the hospital closet" (1–3). Malnutrition contributes to a myriad of negative consequences, including increased morbidity and mortality, length of stay, complications, and readmission rates and decreased patient quality of life (3–8). This results in a significant economic burden on the health care system. For example, Weiss et al. (9) showed that in 2013 hospital stays for patients with malnutrition accounted for $42 billion in health care costs, patients with malnutrition had a 1.5–5 times higher proportion of in-hospital deaths and 2 times longer hospital stays, and ~50–70% of patients did not have a routine hospital discharge. Studies have shown that providing nutrition care through early and appropriate nutrition screening,

assessment, and intervention can improve outcomes in hospitalized patients, particularly among high-risk patient populations such as older adults (10–13). A comprehensive malnutrition study published ~20 y ago by Brugler et al. (14) was one of the first noted studies in nutrition quality improvement (QI). Brugler et al. (14) found delays in identifying malnutrition and initiating a nutrition care plan for acutely ill patients; therefore, a nutrition screening pilot was implemented, resulting in more high-risk patients receiving nutrition care (26% compared with 37%) and the timeliness of intervention improved from 6.9 to 3.4 d.

Recent studies have shown that nutrition QI initiatives can provide benefits to not only patient care but also financial outcomes for the institution by including early nutrition care in the nursing workflow (10) and by using automation (11) and electronic health records (EHRs) (15) to make improvements in nutrition supplement ordering. Meehan et al. (10) employed an interdisciplinary QI team that developed a system utilizing nurses to screen patients' nutritional status on admission and to prescribe oral nutritional supplements for those at risk for malnutrition. Improvements were seen in patients with "nutrition-sensitive" (as defined by the authors) diagnoses regarding length of stay, probability of readmissions, and total hospital costs. A similar QI initiative from Sriram et al. (11) included a basic and enhanced QI protocol to improve delivery of nutrition care to hospitalized patients. This QI protocol significantly reduced the relative risk of readmission and length of stay, which were more marked with the enhanced protocol that included discharge and postdischarge nutrition care (11). Finally, Citty et al. (15) used a triangulated approach in their nutrition QI initiatives to evaluate both pre- and postprocess changes utilizing medical record reviews, patient interviews, and assessment of formula room logs. Their goal was to redesign the ordering, administration, and documentation of oral nutrition supplements, resulting in significantly more patients being offered an oral nutrition supplement and the correct type, amount, and frequency of nutritional products (15).

Although the research is limited, these data demonstrate the beneficial outcomes that can be seen from nutrition QI initiatives. However, to our knowledge, there has not yet been a wide-scale assessment of US hospital practices as it relates to the nutrition care process outside of the 2012–2013 survey data from Patel et al. (16). This report used survey data collected from multidisciplinary health care professionals on current nutrition care practices in US hospitals. They demonstrated there was good compliance with accreditation standards (at the time) in completing a nutrition screen within 24 h of admission. However, challenges still existed in the use of validated screening tools, mechanisms for malnutrition coding, and education for health care professionals around nutrition screening and assessment (16). US hospitals are now utilizing EHRs more broadly, providing a systematic approach for the collection of nutrition data for QI initiatives. Our study adds much needed US-based data on nutrition care processes, including screening, intervention, malnutrition diagnosis, and discharge care for hospitalized patients to ultimately identify areas of improvement for hospital processes and patient outcomes. The objective of this study was to assess nutrition care in US hospitals to determine what gaps may still exist while demonstrating the functionality of a web-based process to collect such data.

Methods

A web-based tool was developed in 2015 to measure and assess nutrition care practices in US-based hospitals. The tool was designed to collect aggregate process data and no patient-level data were recorded in the system; therefore, institutional review board approval was not required for this study. This study included data that met the following inclusion criteria: patients were ≥18 y of age and admitted to the hospital, access to EHRs was available, and EHR data were available on day 1 of admission. The web-based tool was available to >1500 US hospitals; 200 were targeted to be included in the program and 243 hospitals registered to participate. Therefore, the data collected are considered to be a convenience sample. In a nonprobability sample such as this, the tendency toward self-selection is high, which introduces bias and violates the independence assumption of random sampling. For these reasons, the data presented in this article are aggregated to a single measure per variable with descriptive analysis of the cohort data.

Registration was available to any US hospital that had nutrition care incorporated into its EHRs, and each hospital site was provided a unique registration code for the web-based system. After registration, aggregated hospital-level data were abstracted from the EHRs and entered into the web-based tool (**Table 1**). Hospital sites were instructed to gather EHR data for each timeframe (monthly or quarterly) that they chose to report data and to include the number of patients who *1*) were admitted during this time frame, *2*) received a nutrition screening within 24 h of admission or upon initial nurse screening, *3*) were identified as not "at risk" for malnutrition per the screening tool, *4*) were identified as "at risk" for malnutrition per the screening tool, *5*) received an order for an oral nutrition supplement, *6*) received a registered dietitian nutritionist (RDN) consultation, *7*) were diagnosed with malnutrition (as determined by each facility), *8*) had a recommendation for an oral nutrition supplement in their discharge instructions, or *9*) received a prescription of an oral nutrition supplement upon discharge.

TABLE 1 Hospital-level data variables[1]

Hospital-level variable
Hospital type (academic, community, government)
Presence of a formal nutrition screening, intervention, and discharge protocol
Nutrition screening tool currently being used (MST, MNA, NRS-2002, MUST, facility specific, other)
Data collection on the entire hospital or a particular floor or unit. If particular floor or unit, specify that floor or unit
Data collection on the entire patient population or a particular subpopulation. If particular subpopulation, specify that subpopulation

[1] MNA, Mini Nutritional Assessment; MST, Malnutrition Screening Tool; MUST, Malnutrition Universal Screening Tool; NRS-2002, Nutrition Risk Screening 2002.

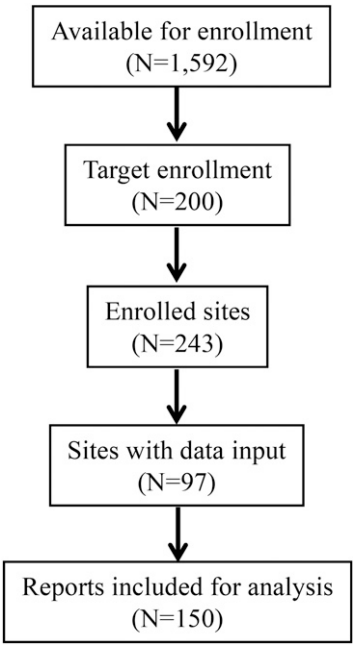

FIGURE 1 Program adoption. Of the 97 sites including data, 14 provided >1 unique report, resulting in 150 total unique reports for data analysis.

Hospital sites also had the option to provide data on the number of 30-d readmissions, the number of patients with a documented fall, or the number of patients who developed a stage III or IV pressure ulcer during the timeframe; these optional data are not reported in this article.

Data were downloaded from the web-based tool in October 2015, March 2016, and July 2016. The data were electronically screened for exact duplicates. The remaining data were checked against the hospital site registration list to ensure that all data to be analyzed were from registered hospital users and not test users. Next, the data were reviewed independently by the authors (ACS, CLS, and KET) for spurious, pseudo, or mock data. Any data for which the authors did not reach independent consensus were reviewed and discussed in order to achieve group consensus. The data were then reviewed to determine that each entry was unique according to 8 characteristics of the data entries (registration code, hospital name, hospital type, whether a screening tool was used, which tool was used, whether it was the entire hospital or floor, which floor, and whether it was the population and which subpopulation). Data for each variable were combined across all reports and results are presented as totals for each variable. No measure of variability was obtained, owing to the type of sampling scheme used.

Results

Over ~14 mo (May 2015 to July 2016), 243 sites registered for the QI program; 97 unique sites input data, which provided 150 reports that are included in the analysis (14 sites included >1 unique report) (**Figure 1**), contributing data from 107,106 patients. The majority of the data are from community (58.8%) and teaching (38.1%) hospitals, with <5% from government (1.0%) and other (2.1%) institutions. The majority of these hospitals were located in the Northeast (37.6%) and South (33.1%).

Of those admitted during this data collection period, ~90% of patients received a nutrition screening within 24 h of admission. Of the patients that were screened, ~30% were at risk for malnutrition. Approximately two-thirds of at-risk patients received a nutrition intervention in the form of a consultation with a RDN or an order for an oral nutritional supplement. The rate of malnutrition diagnosis for patients who were screened as at risk was 14%, which is >4 times less than the nutrition intervention rate of ~65%. Upon discharge, <10% of patients who were screened as at risk for malnutrition received a recommendation or prescription for an oral nutrition supplement (**Table 2**).

Over half of the hospitals were using a facility-specific nutrition screening tool. All facility-specific or other tools that were self-reported were considered to be nonvalidated. The remaining hospital sites reported using a validated screening tool, including the Mini Nutritional Assessment, the Malnutrition Screening Tool, the Malnutrition Universal Screening Tool, and the Nutrition Risk Screening 2002 test; no sites reported using the Nutrition Risk Screening 2002 test (**Figure 2**). There were a similar number of patients screened within 24 h between those using a validated tool (91.83%) compared with a nonvalidated tool (88.73%), and those using a validated tool had slightly more patients screened as at risk (31.10%) compared with those using a nonvalidated tool (27.07%) (**Figure 3**A). Those using a nonvalidated tool had more consultations for RDNs (67.85% compared with 56.37%) and more orders for oral nutrition supplements (73.34% compared with 58.75%) (Figure 3B). The rate of malnutrition diagnosis of patients screened as at risk with a validated tool was 3 times higher than for those screened with a nonvalidated tool (23.16% compared with 7.28%) (Figure 3B).

Discussion

QI is not new to health care but, to our knowledge, it is not widely used in the nutrition. From the nutrition QI studies (10, 11, 14, 15, 17) conducted to date, it is clear that these types of initiatives improve

TABLE 2 Nutrition care process[1]

Nutrition care process step	*n* (%)
Patients admitted	107,106 (100)
Patients screened	96,377 (89.98)
Patients identified as at risk for malnutrition	27,691 (28.73)
Received oral nutrition supplement order	18,507 (66.83)
Received an RDN[1] consultation	17,370 (62.73)
Received a malnutrition diagnosis	3977 (14.36)
Received discharge recommendation or prescription for oral nutrition supplement	2467 (8.91)

[1] RDN, registered dietitian nutritionist.

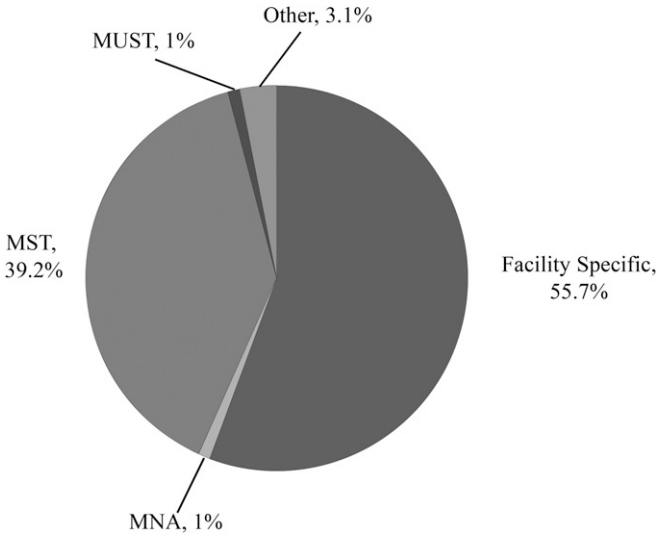

FIGURE 2 Site distribution by malnutrition screening tool reported to be used. MNA, Mini Nutritional Assessment; MST, Malnutrition Screening Tool; MUST, Malnutrition Universal Screening Tool.

patient care, reduce length of stay and hospital costs (11), and require an interdisciplinary approach and strong infrastructures (10, 11). This report focuses on gathering baseline data related to the current state of the nutrition care process in US hospitals to help identify gaps in care and address areas of focus for nutrition QI initiatives. The strength of these data is in the number of patients (>100,000 that contributed to the findings) and the national scope of the information. The primary limitations of this study were the restriction to discrete variables from the EHRs and data collection from institutions who self-selected to contribute data. The latter may reflect the most optimal scenario, because it can be hypothesized that these institutions are already "malnutrition aware" and working toward addressing malnutrition in their institutions.

Our study demonstrates consistency with other studies (16), indicating that the prevalence of malnutrition risk is ~30%. Interestingly, data from Patel et al. (16) and those reported here mirror each other in regard to nutrition screening rates in <24 h (87.5% and 89.9%, respectively) and the use of a validated nutrition screening tool (38.5% and 41.2%, respectively). The low adoption of a validated nutrition screening tool is surprising considering evidence from Skipper et al. (18) that supports the use of validated tools and the wide availability of simple and easy-to-use validated tools. However, these data are similar to those examined by Eglseer et al. (19) in Austrian hospitals; in 53 hospitals with 5255 patients, only 21.2% (n = 839) were assessed with a validated screening tool such as the Mini Nutritional Assessment or the Malnutrition Universal Screening Tool. Furthermore, patients in departments using a validated screening tool received more interventions, including dietitian referrals, provision of energy-rich snacks between meals, and monitoring of nutritional intake (19). The data presented here highlight an area in the nutrition care process that can be explored further. The use of a validated screening tool was associated with a higher percentage of patients who were screened as at risk and diagnosed with malnutrition, but had a lower rate of interventions as shown by reduced recommendations for RDN consultations and orders for oral nutrition supplements. One could hypothesize that use of a validated screening tool more accurately identifies patients and provides interdisciplinary consensus (i.e., diagnosis of malnutrition) to stimulate appropriate action to improve outcomes through the duration of the hospital stay and through discharge planning. Although nutrition screening within 24 h of admission is no longer a requirement by the Joint Commission on Accreditation of Healthcare Organizations, it remains the best method for early identification and appropriate intervention. Two recently published QI studies emphasized the importance of a validated nutrition screen related to adherence to meal intake (20) and better nutritional care and lower prevalence of malnutrition (19). Nutrition screening, assessment, and intervention during a patient's stay and planning for the patient's nutrition care after discharge are important components of the nutrition care process.

To our knowledge, this is the first report to "track" the process for patients after screening to determine what nutrition care may

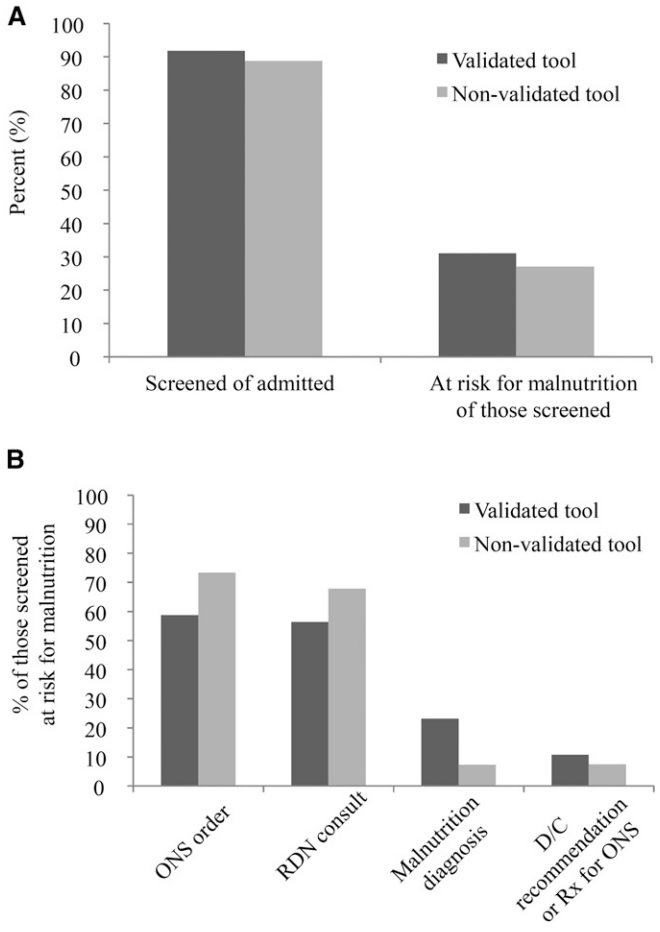

FIGURE 3 Cohort data (A) and subsequent nutrition care of those screened as at risk for malnutrition (B) by nutrition screening tool used. D/C, discharge; ONS, oral nutrition supplement; RDN, registered dietitian nutritionist; Rx, prescription.

have been provided and to understand discharge plans. Given the ongoing adoption of EHRs and integration of nutrition assessment and care plans into these EHRs at the time of the tool development, data were limited to the collection of discreet variables and did not allow for collection of free-text data. Therefore, RDN consultations, nutrition supplement orders, and recommendations and prescriptions served as a proxy for nutrition assessment and discharge plans, which is a limitation of this study. In addition, many institutions are not integrated with outpatient records, making it very difficult to follow patients after discharge. Nonetheless, the data presented here demonstrate a need for improved nutrition interventions and discharge planning for those patients who are screened as at risk for malnutrition. Measurement and documentation of nutrition screening, assessment, care, and discharge plans are important priorities of a nutrition QI initiative and these align with the Malnutrition Quality Improvement Initiative, a project from a coalition of 60 organizations and stakeholders, including the Academy of Nutrition and Dietetics, working to defeat malnutrition among seniors (21).

Since 2010, there has been a slow increase in the rate of malnutrition diagnosis. Previous research from the 2010 Healthcare Costs and Utilization Project data indicated a very low percentage (3.2%) of patients in the hospital with a diagnosis of malnutrition at discharge (22). More recent data report that ~5–7% of hospitals stays involved a malnutrition diagnosis (2, 9), and data in our study also demonstrate a higher rate of malnutrition diagnosis. This could indicate increasing adoption of coding for malnutrition since 2010; however, there still seems to be a significant gap between diagnosis of malnutrition and providers utilizing this information for patient care, suggesting that there is still room for improvement despite these small increases. Another recent survey reflects that 79% of RDNs report diagnosing malnutrition; however, providers omit the malnutrition diagnosis (45%), utilize an incorrect diagnosis (38%), or disagree with the RDN diagnosis (35%) (23), thereby creating a gap in what the trained nutrition professional assesses compared with the final coded diagnosis. In addition, the higher rate of malnutrition diagnosis in our study could also be attributed to oversampling of "malnutrition-aware" institutions who self-selected to opt in to the program and provide data compared with a survey of US discharge records via the Healthcare Costs and Utilization Project data.

The data reported here highlight the greatest areas of QI need within the nutrition care process, which include the use of a validated tool, increased emphasis on malnutrition diagnosis, and discharge planning. These findings are a call to action for all in patient care, from nurses and dietitians to administrators and coders, to include nutrition in their QI initiatives to evaluate their own baseline process and determine where practices are working and where improvements can be made.

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