

# Academy for Quality and Safety Improvement (AQSI) project to improve diagnosis and documentation of malnutrition in a community hospital

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## ABSTRACT

**Background** Malnutrition is a significant public health problem that affects many patients in inpatient settings. Timely identification and addressing malnutrition in an inpatient setting presents an opportunity to improve patient care and reduce costs. There is a clear link between malnutrition, increased length of hospital stay, higher risk of readmissions and infections, skin breakdown, and higher hospital costs due to complications.

**Methods** We conducted a quality improvement project to increase the number of times patients were accurately diagnosed and successfully coded as malnourished. We used the Define, Measure, Analyse, Intervene, Control (DMAIC) process to complete this project. Data were collected for nearly a year using the Epic Report Tool developed explicitly for the project. Initial data showed that our hospital performed at 20% of patients diagnosed as malnourished, while the industry standard was 33%. A multidisciplinary team of physicians, nurses and dietitians identified critical areas of improvement, including incomplete nutritional assessments by nurses, delayed evaluations by dietitians and lack of documentation by physicians. We addressed these issues by partnering with nurse managers to provide education and individual accountability for missed screenings, expanding dietitian workflows to include an in-person assessment within 24 hours of consultation, and updating physician note templates to include smart phrases that automatically inserted nutritional evaluations from registered dietitians into notes. We also worked with hospital executives and administration to increase buy-in from participating care team members.

**Results** Our interventions resulted in 100% of malnutrition screening tool being completed, 33% of patients being screened at risk of malnutrition, 98% of nutrition assessments being done within 24 hours of patient admission and 100% of providers documenting malnutrition findings.

**Conclusions** Our study found an immediate and significant increase in the number of times malnutrition was diagnosed and ultimately coded during billing with our interventions. This highlights the importance of timely identification and addressing malnutrition in an inpatient setting to improve patient care and reduce costs. The DMAIC process and multidisciplinary team approach proved to be effective in identifying and addressing the barriers to malnutrition diagnosis in our hospital setting.

## WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Malnutrition's impact on patient outcomes and healthcare costs is well documented. Malnutrition in inpatient settings leads to prolonged hospital stays, higher readmission risks, infections, skin issues and increased costs. The deficiency in accurate malnutrition diagnosis and coding affects patient care and resource utilisation, highlighting the need for improved identification and intervention.

## WHAT THIS STUDY ADDS

⇒ This study introduces a successful quality improvement initiative that heightened the precision of malnutrition diagnosis and coding within inpatient contexts. Employing the Define, Measure, Analyse, Intervene, Control (DMAIC) approach and interdisciplinary collaboration, the project effectively addressed prevalent challenges such as incomplete nutritional assessments, delayed evaluations and documentation gaps. Consequently, the interventions resulted in full completion of malnutrition screening tools, improved assessment timeliness and comprehensive documentation, substantially fortifying the hospital's malnutrition management capabilities.

## HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ By showcasing the efficacy of a multidisciplinary approach and the DMAIC process, this study offers a replicable framework for hospitals to enhance malnutrition diagnosis practices. The tangible enhancements observed in screening, assessment and documentation underscore the potential for improved patient outcomes and cost reduction through timely malnutrition management. These findings may inspire similar quality enhancement endeavours in healthcare institutions and potentially influence policy considerations related to malnutrition identification and management in inpatient settings.

## INTRODUCTION

According to the American Society of Parenteral and Enteral Nutrition (ASPEN), malnutrition is defined as the presence of two or

more of the following characteristics: insufficient energy intake, weight loss, loss of muscle mass, loss of subcutaneous fat, localised or generalised fluid accumulation, or decreased functional status.<sup>1</sup>

A study conducted by the NutriDay survey in 2007–2008 revealed that routine malnutrition screening on hospital admission existed in only 53% of hospitals, with this practice being more prevalent in the UK (93%) compared with other regions (less than 33%). The study also found that 27% of patients were at risk of malnutrition and energy goals were not met in 43% of the population. This highlights the need for improved malnutrition screening and assessment in hospitals.

Research has also shown a link between malnutrition, increased length of hospital stay (LOS), higher risk of readmissions and infections, and higher hospital costs due to complications. Malnutrition is also associated with decreased immune response and a higher risk of nosocomial infections. It is, therefore, crucial to diagnose and treat malnourished patients to reduce complication rates, readmissions, hospital costs and morbidity.<sup>1–5</sup>

Our hospital identified a need for improvement in malnutrition diagnosis, as the national average of hospitalised patients diagnosed with malnutrition is 33%, while our hospital was at 20%. A team of four residents, two registered dietitians and one registered nurse (RN) came together to use the Define, Measure, Analyse, Intervene, Control (DMAIC) model to identify the barriers to diagnosing malnutrition in an inpatient setting, and to find opportunities for improvement in the daily hospital workflow.

## OBJECTIVES

The primary objective of this study was to identify and assess the severity of malnutrition early during inpatient admission in a community hospital and identify barriers for low numbers of malnutrition diagnoses from admission through the discharge process.

## METHODS

We used the DMAIC process to complete this project. Data were collected for nearly a year from September 2020 to July 2021 using the Epic Report Tool developed explicitly for the project. Our outcome and process metrics were as follows:

### Outcome metrics

Percentage of malnutrition identified by registered dietitians (RDs) of total discharges, percentage of malnutrition diagnosis documented by providers.

### Process metrics

Percentage of nutrition screening completed of the total discharged patients, percentage of patients screened at risk of malnutrition, percentage of nutrition assessment done in <24 hours of patient admission.

| McHenry Hospital |   |
|------------------|---|
| 21               | <b>McHenry Hospital</b>                                     |
| 22               | Inpatient Admissions  |
| 23               | Screening - Nursing   |
| 24               | RN : % : Malnutrition Risk Identified                       |
| 25               | Assessment - Dietitian                                      |
| 26               | RD : MST RD Assessment <24 from inpatient admission         |
| 27               | RD : MST RD Assessment <48 hours from inpatient admission   |
| 28               | RD : Malnutrition Identified per RD Assessment <sup>4</sup> |
| 29               | RD : % Malnutrition Identified of Total Admissions          |
| 30               | Collaboration between RD and Provider                       |
| 31               | % of RD Identified Malnutrition Documented by Provider      |
| 32               | % of Provider Documented Malnutrition that RD Consulted     |
| 33               | Documentation in Medical Record - Provider                  |
| 34               | Total Malnutrition Coded                                    |
| 35               | % Coded of All Admitted Patients                            |
| 36               | Quality   |
| 37               | Average LOS : All Malnutrition Coded                        |
| 38               | Average Readmission Rate : All Malnutrition Coded           |
| 39               | Finance   |
| 40               | Malnutrition was only MCC/CC that increased DRG Payment     |
| 41               | Amount DRG Expected Payment Increased by                    |

(RN: registered nurse, RD: registered dietitian, MST.: malnutrition screening tool, LOS: length of stay, MCC/CC: major complication or comorbidity/complication or comorbidity, DRG:

**Figure 1** EPIC EMR Report Tool Parameters

The new Report Tool in EPIC consisted of the following metrics (figure 1).

We had the following results by using the updated Report Tool (figure 2).

Through our analysis, we identified several key findings:

1. The completion rate of the malnutrition screening tool (MST) by RNs was 22.7%, which was lower than the industry standard of 33%.
2. The percentage of patients diagnosed with malnutrition and coded as such on discharge was 10.2%, which was also lower than the industry standard of 33%.
3. The average LOS for patients diagnosed with malnutrition was 7.7 days, which was longer than the industry average of 5.3 days.

To further understand the reasons for these discrepancies in performance, we conducted a brainstorming session and surveyed our three main stakeholders: physicians, RDs and RNs. These stakeholders were asked to identify possible causes of the inability to reach industry standards regarding malnutrition outcomes and how they affect patient care. The findings were as follow:

1. Electronic medical record (EMR): The EMR system used in the hospital did not have a built-in mechanism for reminding physicians and nurses to complete the MST at the time of admission. Additionally, there was no navigation guide for nurses to complete the MST for patients with altered mental status.

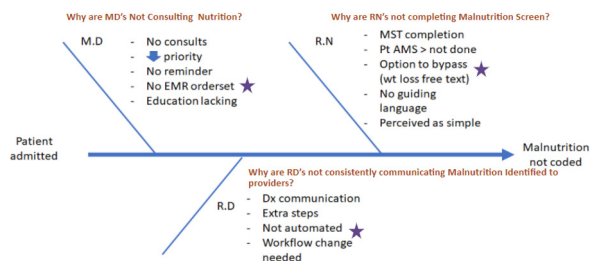
| McHenry Hospital  | Benchmark | 2020 Average / Month | Sep-20       | Oct-20       | Nov-20       | Dec-20       |
|---|-----------|----------------------|--------------|--------------|--------------|--------------|
| Inpatient Discharges (>17 years old)                              |           | 719                  | 676          | 642          | 686          | 682          |
| <b>Screening - Registered Nurse</b>                               |           |                      |              |              |              |              |
| RN Malnutrition Screen Completed : Actual Number                  |           |                      | 542          | 569          | 433          | 172          |
| RN Malnutrition Risk Identified of MST Completed : Actual Number  |           |                      | 143          | 118          | 122          | 34           |
| RN : % : Malnutrition Risk Identified of MST Completed            | 33%       | 0                    | 26.4%        | 20.7%        | 28.2%        | 19.8%        |
| RN: % Malnutrition Risk Identified of Total Discharges            | 33%       |                      | 21.2%        | 18.4%        | 17.8%        | 5.0%         |
| RN : MST Completed of Total Discharges                            |           |                      | 80.2%        | 88.6%        | 63.1%        | 25.2%        |
| <b>Screen Assessment - Dietitian</b>                              |           |                      |              |              |              |              |
| RD : MST to RD Assessment <24 hours : Actual Number               |           |                      | 78           | 83           | 56           | 19           |
| RD : MST to RD Assessment <24 hours : %                           | 100       | n/a                  | 54.5%        | 70.3%        | 45.9%        | 55.9%        |
| <b>Dietitian : Malnutrition Identification</b>                    |           |                      |              |              |              |              |
| RD : Malnutrition Identified per RD Assessment <sup>4</sup>       |           | 42                   | 57           | 52           | 42           | 42           |
| RD: % Malnutrition Identified of Total Discharges                 |           | 5.8%                 | 8.4%         | 8.1%         | 6.1%         | 6.2%         |
| RD: Missed MST RD Assessment prior to discharge: Actual Number    |           |                      | 18           | 3            | 14           | 1            |
| <b>RD Identified Malnutrition and Collaboration with Provider</b> |           |                      |              |              |              |              |
| RD Identified Malnutrition: Actual Number                         |           |                      | 57           | 52           | 42           | 42           |
| MD Documented of Malnutrition Identified : Actual Number          |           |                      | 48           | 50           | 36           | 37           |
| % of RD Identified Malnutrition Documented by Provider            | 100%      | 86%                  | 84.2%        | 96.2%        | 85.7%        | 88.1%        |
| <b>Malnutrition Documentation in Medical Record - Provider</b>    |           |                      |              |              |              |              |
| Total Malnutrition Coded  |           | 62                   | 68           | 68           | 53           | 65           |
| % Coded of All Discharged Patients                                | 33%       | 9%                   | 10.1%        | 10.6%        | 7.7%         | 9.5%         |
| RD Consulted on Patients Coded : Actual Number                    |           |                      | 52           | 62           | 53           | 55           |
| % of Provider Documented Malnutrition that RD Consulted           | 100%      | 84%                  | 76.5%        | 91.2%        | 100.0%       | 84.6%        |
| <b>Quality</b>  |           |                      |              |              |              |              |
| Average LOS : All Malnutrition Coded                              | 5.3       | 7                    | 6.1          | 6.6          | 6.2          | 11.0         |
| 30 day Readmission : Actual                                       |           |                      |              |              |              |              |
| % Readmission Rate : All Malnutrition Coded                       | 15.60%    | 18%                  | 7.4%         | 25.0%        | 20.8%        | 16.9%        |
| <b>Finance</b>  |           |                      |              |              |              |              |
| Malnutrition was only MCC/CC that increased DRG Payment           |           | 13                   | 16           | 18           | 11           | 13           |
| % Malnutrition on MCC/CC that increased DRG Payment               |           |                      | 23.5%        | 26.5%        | 20.8%        | 20.0%        |
| Amount DRG Expected Payment Increased by                          |           | \$ 56,250.00         | \$ 72,000.00 | \$ 81,000.00 | \$ 49,500.00 | \$ 58,500.00 |

**Figure 2** EPIC EMR Report. LOS, length of stay; MCC/CC, major complication or comorbidity/complication or comorbidity; MST, malnutrition screening tool; RD, registered dietitian; RN, registered nurse.

- Admission order set: The admission order set did not include a reminder for physicians to consult with dietitians for malnutrition assessment.
- Patient factors: Patients with altered mental status, cachexia related to malignancy and other medical conditions may have been less likely to be assessed for malnutrition due to the focus on their primary condition.

- Communication: A lack of communication and collaboration between physicians, nurses and dietitians led to fewer consultations and assessments for malnutrition.
- Prioritisation: Physicians, nurses and dietitians were not giving malnutrition assessment a high priority in their daily work, resulting in fewer screenings and interventions.
- Resources: The hospital may not have enough resources, such as dietitians, to meet the needs of all patients in need of malnutrition assessment.

We summarised all above-mentioned possible causes through the fishbone diagram (figure 3).



**Figure 3** Fishbone diagram of deficiency findings. MST, malnutrition screening tool; RD, registered dietitian; RN, registered nurse.

## Interventions

Our goal was to create an appropriate, efficient and sustainable workflow to obtain the desired results and provide strong evidence for the generalisability of our interventions. Our intervention course consisted of three main factors: education, improvement and accountability.



Standard Workflow to complete malnutrition screen:

Process:

1. Both Malnutrition Screen questions highlighted need to be answered.
2. When a score is 2 or greater an automatic risk trigger is sent to the dietitians.
3. RD's will put an automatic intervention in as soon as risk is received and a comprehensive assessment will be completed within 24 hours.

**Figure 4** Malnutrition Screening Tool Flowsheet in EPIC EMR. RD, registered dietitian.

Education is a significant component of any quality improvement index. All the involved stakeholders must be aware of the required intervention. Our project focused mainly on nursing and supporting staff education. Some parts of the nutrition status assessment are performed by RNs, such as MST on admission. At the same time, nursing supporting staff mainly noticed the percentage of meal tray consumption. Physicians were also educated about the importance of malnutrition identification and documentation. This intervention included morning nursing rounds, flyers at nursing stations and physician lounges.

Improvement in the existing workflow was the significant next step. We strategised to make the workflow more efficient and sustainable. The existing nursing nutrition flowsheet on the EMR to document MST did not permit RNs to submit nutrition assessments if a patient was unstable or has altered mental status. Our team worked with Health System Clinical Collaboratives (HSCC) to improve the MST flowsheet in the EMR (figure 4). HSCC consists of 27 multidisciplinary clinical and 14 business workgroups that work together on building consensus and recommending essential changes to Northwestern Medicine care processes and electronic health record system to support the Patients First mission. This step helped us reach our goal documenting 100% MST by RNs. We worked with HSCC to automatically send inbox messages of the RDs findings of nutritional status to physicians. We involved hospital executives in adding malnutrition smart phrases in providers' note templates. Our teams also talked with residency programme leadership to update residents' templates.

Accountability was ensured through our new EDW Report Tool. As a result, we could pinpoint the outliers at every step. For example, nursing leadership made sure to hold non-compliant RNs accountable. Similarly, outliers in physicians were conveyed to physician leadership.

## RESULTS

The results of a 6-month analysis of data collected using the EDW Report Tool were analysed. A total of 100% of MST were completed among discharged patients, with 33% of those patients being identified as at risk of malnutrition. Malnutrition was identified by RD in 98% of cases within 24 hours of patient admission. All malnutrition findings were documented by providers.

The average LoS in the hospital for patients with malnutrition was 4.6 days and the average 30-day readmission rate for malnourished patients was 16% (in comparison to hospital benchmark of average LoS of 5.3 days and average readmission of 15.60% of patients).

## DISCUSSION

In this study, we aimed to address the issue of malnutrition among hospitalised patients to improve the quality of patient care and optimise clinical outcomes. Malnutrition, as defined by the ASPEN, is characterised by insufficient energy intake, weight loss, loss of muscle mass, loss of subcutaneous fat, localised or generalised fluid accumulation, or decreased functional status. Left unrecognised and untreated, malnutrition can lead to increased LOS, higher risk of readmissions and infections.<sup>12</sup>

To address this issue, we conducted a quality improvement project using the DMAIC model at Northwestern Medicine Hospital in McHenry Illinois (a community hospital) under the supervision of the Academy for Quality and Safety Improvement (AQSI) at Northwestern Medicine Feinberg School of Medicine. A multidisciplinary team of physicians, nurses and dieticians was formed to identify and address roadblocks in the identification, documentation and treatment of malnutrition.

One problem identified was a lack of proper nurse assessment and documentation of malnutrition. To address this, we educated nurses on the importance of documenting if they were unable to assess a patient's physical condition and ensured that a dietician consult

was triggered within 24 hours of identifying a patient as malnourished. Another problem identified was the lack of proper documentation by physicians, which we addressed by creating templates in the EMR and placing informational flyers in various hospital locations.

As a result of these interventions, we observed a significant increase in the identification, documentation and coding of malnutrition in 6 months. We also ensured that discharge planning for malnourished patients included diet instructions and education for both patients and their families, as well as informing primary care physicians of the patient's malnutrition status. This project was limited to identifying and coding malnutrition, however, further studies could explore interventions for addressing and treating malnutrition.

### Limitations and lessons learnt

The project focused on enhancing malnutrition identification and documentation within a community hospital through a structured approach. However, its single-centre scope, short-term analysis, potential sampling bias, lack of a control group and resource constraints limit the generalisability of findings. Moreover, patient-centred outcomes and the sustainability of improvements were not fully addressed. While successful within its context, the project's applicability to diverse healthcare settings and the broader impact of interventions should be interpreted cautiously.

### CONCLUSION

In conclusion, the AQSI project to improve diagnosis and documentation of malnutrition in a community hospital was successful in achieving its intended goals. The implementation of a standardised MST and education on proper documentation led to an increase in the identification and documentation of malnutrition in patients. This resulted in improved care for these patients and better communication between healthcare providers. Additionally, the project helped to improve the hospital's compliance with regulatory requirements related to malnutrition documentation. The success of this project highlights the importance of addressing malnutrition in hospital settings and the benefits of using standardised tools and education to improve the identification and documentation of this condition.

Furthermore, the results of this project have demonstrated the potential for other hospitals and healthcare organisations to improve the identification and

documentation of malnutrition. This can be achieved through the implementation of a standardised MST, education on proper documentation, and active engagement of all members of the healthcare team. By prioritising the identification and documentation of malnutrition, healthcare providers can improve the care and outcomes for patients with malnutrition. This case study underscores the significance of recognising and addressing malnutrition, promoting standardised tools, education and collaboration for meaningful quality improvements in healthcare practices.

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**Patient consent for publication** Not applicable.

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**Data availability statement** The authors declare that data supporting the findings of this study are available within the article.

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