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A Quality Improvement Project for Malnutrition at a Large Urban Hospital

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A QUALITY IMPROVEMENT PROJECT FOR MALNUTRITION AT A LARGE URBAN

HOSPITAL

By

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Introduction

Malnutrition is a pressing public health concern around the globe that impacts individuals across all age groups and regions. In 2022, 390 million adults were underweight, and over 2 billion adults were overweight including 890 million obese individuals.[1] Malnutrition is a multi-factorial emergent phenomenon that includes developmental, economic, social, and medical concerns.[1] Krishnamoorthy et al. suggest that up to 54% of older adults are malnourished and elderly patients in hospitals or nursing homes have the highest incidence of malnutrition.[2] The World Health Organization (WHO) defines malnutrition as energy or nutrient deficiencies, imbalances or excesses.[1] There are 3 subgroups of malnutrition. Firstly, undernutrition includes wasting, stunting, underweight, and vitamin and mineral deficiencies.[1] The second subgroup is micronutrient-related deficiencies and the third subgroup is overweight, obesity, and diet-related noncommunicable diseases.[1] Malnutrition may often get underdiagnosed due to inconspicuous signs and symptoms.[3] If malnutrition is underdiagnosed or not treated, severe complications may occur such as an impaired immune system, increased risk of infection, delayed recovery from disease, and increased morbidity and mortality.[4]

Accurate screening and assessment for malnutrition are crucial so that appropriate treatment can be prescribed. Healthcare providers such as nurses can screen for malnutrition, and registered dietitians (RDs) can assess then provide nutrition prescriptions for care.[5] RDs play an important role in assessing and identifying patients with malnutrition. They are the professionals and the authority on the interdisciplinary team to assess a patient's nutrition status.[3] Depending on the policy of each healthcare facility, the RD may use different assessment tools to identify malnutrition. Additionally, RDs perform nutrition-focused physical examinations (NFPE) on patients during the nutrition care process to provide an accurate and appropriate nutrition diagnosis, intervention, monitoring, and evaluation.[3] RDs will also coordinate the nutrition plan of care and communicate it with physicians to improve overall patient care.[3] Patients who are malnourished will receive education, counseling and related services from their RD.[3] Currently, medical doctors are the only healthcare providers to diagnose malnutrition using ICD-10 codes, which are E40 – E46.

This capstone project is going to examine the differences and effectiveness among traditional malnutrition assessments and evaluate the implementation of a newly developed software to help address and provide nutrition insights into malnutrition in a hospital setting. As a part of a quality improvement project, this project will evaluate the perceptions of RDs and Dietetic Technicians (DTs) regarding the implementation of a new malnutrition documentation tool. In January of 2024, the Medical Nutrition Therapy Department at Grady Memorial Hospital integrated Junum®, a new malnutrition diagnostic tool, into the electronic medical record to improve the quality of patient care. Based on the survey results, this project aims to provide insights and recommendations for continuous quality improvement around malnutrition assessment and diagnosis.

Literature Review

There are several traditional screening and assessment tools for malnutrition. Nutrition screening tools are designed to identify risk factors of nutrition status.[6] They are supposed to be simple and

quick tools, that most people can fill out with their own answers.[6] Nutrition assessment tools were designed to help to diagnose of malnutrition.[6] Compared to screening tools, they have a more complex structure, which takes more time for healthcare professionals to complete.[6]

Traditional Malnutrition Screening/ Assessment Tools

Five methods are widely used in clinical settings to screen for malnutrition: Malnutrition Screening Tool (MST), Mini Nutrition Assessment Short-Form (MNA - SF), Short Nutritional Assessment Questionnaire (SNAQ), Malnutrition Universal Screening Tool (MUST) and Nutrition Risk Screening 2002 (NRS-2002).

Malnutrition Screening Tool (MST)

The MST is a simple and quick screening tool for identifying adult patients at risk for malnutrition. It consists of two questions: recent unintentional weight loss and reduced intake due to poor appetite.[7] Patients will receive a score for each parameter and the sum of all parameters will fall between zero to five.[7] A score of 2 or more indicates a risk of malnutrition.[7]

In an Australian study that recruited 408 acute hospital patients between 19-94 years, 5.9% of the patients were misclassified as being malnourished using the MST.[7] Only 1.2% of them were misclassified as being well nourished. The study reported that the sensitivity and specificity were 93% although the ideal sensitivity and specificity are 100%.[7] The study found the differences in the mean values of parameters between individuals who were or were not at risk of malnutrition were significant.[7] Patients with malnutrition also had a significantly longer length of stay than those without malnutrition.[7] The MST is recommended, with a high reliability of 93-97% based on the study.[7] Another study conducted in Vietnam used the MST to examine the prevalence of malnutrition in outpatients with a mean age of 67.7 diagnosed with COPD.[8] The results showed that 20.7% of the patients were at risk of malnutrition with 38% sensitivity and 94% specificity.[8] The study also reported that MST does not indicate fat-free mass depletion, which reduced its sensitivity.[8] In a third study, a group of 51 patients who underwent chemotherapy for over 18 years were screened for the risk of malnutrition using MST.[9] From the results, 32% of patients were malnourished or at risk of malnutrition with 26% true positives and 68% true negatives.[9] No false negatives were classified using MST. The study suggested that MST has 100% sensitivity and 92% specificity with a positive predictive value of 0.8 and a negative predictive value of 1.0.[9] Moreover, the MST was graded as a good/ strong screening tool by the Academy of Nutrition and Dietetics (Academy), with a moderate degree of validity, agreement and reliability in diagnosing malnutrition.[10]

Mini Nutrition Assessment Short-Form (MNA-SF)

The MNA-SF is a simplified version of the Mini Nutrition Assessment (MNA), a screening tool that identifies malnutrition risk in patients over age 65 when they visit healthcare facilities.[11] The MNA-SF consists of six criteria: changes in appetite in the past 3 months, weight loss in the last 3 months, mobility, psychological stress, acute disease in the last 3 months, neuropsychological problems, and body mass index (BMI).[11] Each answer is assigned a score based on the severity. Patients are considered at risk of malnutrition if the sum of all answers is less than 11.[11]

Rubenstein et al. study recruited 881 individuals with an average age of 76.4 years residing in Spain and New Mexico to evaluate MNA-SF's consistency, reliability, completeness, and ease of administration.[12] The study reported that 18.8% and 18.5% of elderly patients in hospital settings and residential care respectively, were reported as being at risk of malnutrition.[12] Moreover, the sensitivity of MNA-SF was 97.9%, diagnostic accuracy for predicting undernutrition was 98.7% and specificity was 100%.[12] Another study by Calvo et al. utilized the MNA-SF to examine the prevalence of malnutrition among 160 patients with a mean age of 79.4 years who were admitted in the internal medicine department.[13] Twenty-two percent of the patients were diagnosed with malnutrition and their nutritional status was positively associated with the location of residence,[13] meaning that malnutrition among hospitalized patients was significantly more than those in nursing homes.[13] The study reported that MNA-SF has a 95% sensitivity, 64% specificity, 80% positive predictive value and 20% negative predictive value for determining the risk of malnutrition.[13] Santin et al. examined the nutrition status of 137 patients who were on hemodialysis and over the age of 60 using MNA-SF and other screening tools.[14] The results showed MNA-SF scored 74% of the patients as well-nourished and 26% of them as 'protein-energy wasting,' which was the least likely to test positive among all the screening tools.[14] The MNA-SF had the lowest score of inter-rater agreement (kappa=6%) and specificity (6%) but a 6% of negative predictive value.[14] Finally, the MNA-SF was rated as a fair screening tool for malnutrition by the Academy with a moderate degree of validity and inter-rater reliability but a low degree of agreement.[10]

Short Nutritional Assessment Questionnaire (SNAQ)

The SNAQ was designed to screen for the risk of malnutrition in hospitalized patients, covering only the 3 most highly predictive questions.[15] It includes unintentional weight loss in the last 3 and 6 months, decreased appetite over the last month, and use of supplemental drinks or tube feeding. Each answer carries a different score. Patients who receive a score of 2 or more are considered as moderately malnourished and those who receive a score of 4 or more indicate severe malnutrition.[15]

A study in the Netherlands aimed to observe the prevalence of malnutrition in patients in rehabilitation centers using the SNAQ and other methods.[16] Twenty-eight percent of patients were diagnosed with severe malnutrition and 10% of the patients had moderate malnutrition.[16] The study suggested SNAQ had 96% sensitivity, 77% specificity, 62% positive predictive value and 90% negative predictive value.[16] Another study by Young et al. reported on using the SNAQ to screen for malnutrition in 134 medical patients over age 65, and then comparing the results to the MNA and Subjective Global Assessment (SGA).[17] The SNAQ was reported to have 62.2% sensitivity, 100% specificity with a positive predictive value, and 55.8% negative predictive value when compared to MNA.[17] Overall, the SNAQ had 79% sensitivity, 90.3% specificity, 87.5% positive predictive value, and 83.3% negative predictive value when compared to SGA.[17] Another nutrition screening study was conducted among cardiopulmonary bypass patients using SNAQ and other screening tools.[18] The study found that 16.7% of 894 patients were diagnosed with moderate-to-severe malnutrition using SNAQ, compared to 6.4% when using the NRS-2002.[18] The results of the SNAQ are positively associated with adverse reactions such as postoperative complications, acute heart failure, and prolonged hospitalization.[18] The sensitivity and specificity of SNAQ were 21.2% and 86.6% respectively.[18] Moreover, the SNAQ was

graded as a fair screening tool for malnutrition by the Academy with a moderate degree of validity and inter-rater reliability but no agreement was reported.[10]

Malnutrition Universal Screening Tool (MUST)

The MUST is a five-step screening tool to identify adults who are malnourished, at risk of malnutrition, and includes undernutrition and obesity.[19] This tool is recommended for use in the community setting.[19] Three components are assessed on the MUST: BMI, severity of unintentional weight loss, and acute disease effect on nutritional intake.[19] To obtain the risk of malnutrition, the scores of each parameter are added together; a score of 1 indicates a medium risk of malnutrition, while a score of 2 or greater indicates a high risk of malnutrition.[19] Depending on the severity of malnutrition, guidelines on developing a care plan are provided.

The MUST was used to determine the prevalence of malnutrition among a group of 127 older adults living in a long-term care facility.[20] The study found that 21.3% of them were at risk of malnutrition with 68.8% sensitivity and 96.7% specificity.[20] The study recommended MUST has a fair agreement between viewers with a kappa of 0.320.[20] Another study by Neelemaat et al. recruited a group of 275 adult inpatients to determine their prevalence of malnutrition, finding that 12% of them were at moderate risk and 32% of them were at severe risk.[21] The researchers suggested that the MUST has a lower sensitivity (67%) when determining characteristics of older patients (age ≥60) who are at moderate and severe risk, compared to all patients of all ages.[21] Apart from sensitivity, specificity (82%), positive predictive value (56%), and negative predictive value (87%) were similar to those of patients of all age.[21] Another assessment of malnutrition used MUST to screen for the prevalence of malnutrition among 85 medical and surgical inpatients with a mean age of 78.[22] The study reported 19-60% of inpatients were diagnosed with malnutrition and MUST had an excellent agreement with SGA.[22] However, no specificity, sensitivity, positive and negative predictive values were reported in the study.[22] The MUST was graded as a fair screening tool for malnutrition by the Academy with a high degree of validity, moderate degree of agreement and inter-rater reliability.[10]

Nutrition Risk Screening 2002 (NRS-2002)

The NRS-2002 is designed to screen hospitalized patients for risk of malnutrition.[23] It consists of 2 main sections. The initial section assesses BMI, weight loss within the last 3 months, reduced dietary intake in the last week, and severity of acute disease.[23] If a positive response is present in the initial section, the second part of NRS-2002 will be performed to determine the severity of malnutrition. The level of impaired nutritional status and severity of the disease is assessed in the second part. One score will be given to each qualified parameter. Moreover, if the patient is over 70 years, one point will be added to the final score. The patient with greater than 3 points is at risk nutritionally and a care plan should be initiated.[23]

Mourão et al. conducted a study to examine the prevalence of malnutrition among 100 hospitalized patients in the nephrology unit with an average age of 55 ± 18.9 years, finding that 41% of the patients were diagnosed with malnutrition.[24] Additionally, the NRS-2002 showed a positive association between the risk of malnutrition and the duration of hospitalization.[24] The study reported that the NRS-2002 had 96% sensitivity, 30% specificity and agreement with

kappa=0.29.[24] Karateke et al found that when a group of 588 general surgery patients were screened for malnutrition by NRS-2002, 22.5% were at risk of malnutrition.[25] The study reported that NRS-2002's sensitivity and specificity were 53.3% and 96.6% respectively.[25] The NRS-2002 showed a significant correlation between its score and lengths of stay, postoperative complications, body weight and BMI.[25] Kyle et al. recruited 995 patients at hospital admission to screen for nutritional status and determine an association with length of stay.[26] The study found that 19% and 9% of the patients were at moderate and severe risk of malnutrition respectively.[26] The study reported that NRS-2002 had 62% sensitivity and 93% specificity.[26] It had a higher positive (85%) and negative (79%) predictive values than those of the MUST.[26] The association between the score of NRS-2002 and the length of stay was significant (OR 2.9, CI 1.7-4.9).[26] The NRS-2002 was graded as a fair screening tool for malnutrition by the Academy with a moderate degree of validity and agreement but no inter-rater reliability was reported.[10]

Academy/American Society for Parenteral and Enteral Nutrition (ASPEN) criteria for assessing malnutrition

Due to the variations and inadequacy of the current screening and assessment tools for malnutrition, in 2012 the Academy and ASPEN set out to standardize the parameters for diagnosing malnutrition. A minimum of 2 out of the 6 characteristics is required for diagnoses of either non-severe or severe malnutrition in the context of either acute illness, chronic illness, or social/behavioral circumstances: insufficient energy intake, weight loss, loss of muscle mass, loss of subcutaneous fat, localized or generalized fluid accumulation that may sometimes mask weight loss, or diminished functional status as measured by handgrip strength.[27] According to these guidelines, adults are considered at risk of malnutrition if they experience any symptoms such as involuntary weight loss of 10% or more of the usual body weight within 6 months or involuntary weight loss of 5% or more of the usual body weight within 1 month, involuntary weight loss or gain of 10 pounds within 6 months, chronic disease, increased metabolic requirements, altered diets or diet schedules, inadequate nutrition intake including refusing food or nutrition products for more than 7 days.[27]

White et al. suggested that some patients may have met one of the characteristics used in the diagnosis of malnutrition, but it does not necessarily indicate an accurate diagnosis.[27] For instance, some elderly patients maintain their body weight and are used to consuming 'less than recommended calories' but they weigh lower than the healthy weight.[27] Their nutrition diagnoses and corresponding medical nutrition therapy may be different than those who are critically ill. Although elderly patients, especially may already be malnourished or are at high risk of developing malnutrition before admission, it is challenging for clinicians to determine their characteristics for diagnosis of malnutrition in the early stage of hospitalization.[27]

With different levels and categories of malnutrition, diagnoses and treatments can be prescribed more accurately. Patients with malnutrition are categorized into three different etiology-related nutrition diagnoses. The first is acute disease or injury-related malnutrition, which is characterized by acute and severe inflammation.[28] The second diagnosis is chronic disease-related malnutrition, which may be characterized by chronic mild-to-moderate inflammation.[28] The third diagnosis is social or environmental (starvation-related) malnutrition, which is chronic starvation without any inflammatory activity.[28] It is important for clinicians to determine the

level of inflammatory activity of the patients since the acuity of the condition or related complications can shift their nutrition status and needs significantly.[29] Inflammatory activity may limit the effectiveness of nutrition intervention and increase one's risk of developing malnutrition.[30] Other factors, including the ability to eat, feeding regimen, unintended body weight change and any interruptions of nutrition therapy, should be carefully monitored if elderly patients are critically ill.[27]

The Academy and ASPEN suggest clinicians should review the patient's chief complaints and past medical history to evaluate the risk of malnutrition and inflammatory activity.[31] Also, they should look for any signs and symptoms of malnutrition such as fluid loss, muscle or fat loss and specific nutrient deficiencies.[27] Clinicians should also examine signs of inflammation such as fever.[32] Laboratory markers such as serum albumin or prealbumin should be cautiously interpreted when used as indicators of malnutrition as they are affected by inflammation.[27] Moreover, anthropometric parameters such as unintentional weight loss would be a validated indicator of malnutrition.[27] If patients or their caregivers can provide an accurate food/ nutrient intake, such as 24-hour diet recall or observed intake/ estimated post-meal plate waste, the information would provide evidence of adequate intake.[33] These parameters should be discussed when initiating diagnoses, implementing and monitoring treatment and performing evaluation.[27]

Assessing Malnutrition in the Hospital Using Technology

Two technology platforms have been designed and implemented in hospital settings to help clinicians screen for characteristics and diagnose malnutrition: Junum® and Nutrition Dashboard.

Junum®

Junum® is a software that uses MalnutritionCDS™ to assist clinicians in hospitals in screening for malnutrition to address any underdiagnoses.[34] It aims to optimize patient care and potentially increase revenue by critically assessing for malnutrition based on information input by the nutrition professional. Junum® aims to streamline the process and aid in diagnosing malnutrition using the six Academy/ ASPEN criteria.[34] RDs can document any clinical characteristics of malnutrition, including weight loss, intake, fat, and muscle loss on an avatar.[34] The information will flow into the electronic medical record, to provide the physicians with the tools and information to diagnose malnutrition and make further medical decisions.[34]

Nutrition Dashboard

Nutrition Dashboard is a software platform that examines the risk and categories of malnutrition by patients' food provision and dietary intake.[35] A study by Fisher et al. compared the ability of the Nutrition Dashboard to determine the risk of malnutrition with the MST.[35] The results showed that the inter-rater reliability of estimated dietary intake between dietitians reported a good agreement (kappa=0.69).[35] Also, patients who were scored as the highest risk of malnutrition in the Nutrition Dashboard were 1.93 times more likely to be screened positive for malnutrition by MST, compared to those who had a lower score in the Nutrition Dashboard.[35]

Attitudes and Perceptions of RDs Using New Tools for Malnutrition Documentation

RDs are the nutritional professionals who have the expertise to assess and identify patients who are at risk for malnutrition or who are malnourished. Their attitudes and perceptions of utilizing new tools may affect the accuracy of patient care. Incorrect diagnosis may result in increased medical costs and financial burdens. The U.S. Department of Health and Human Services Office of Inspector General (HHS/OIG) reported incorrect severe malnutrition code assignment to inpatient hospital claims resulting in $1 billion in Medicare overbilling.[36] Diagnosis codes E41 (Nutritional marasmus) and E43 (unspecified severe protein-calorie malnutrition) are the two types of severe malnutrition that can lead to major complications and comorbidity.[36] The report showed hospitals had used severe malnutrition diagnosis codes when patients only had other levels of malnutrition and even no malnutrition.[36] Therefore, documentation is the main way to prove diagnosis codes are medically necessary and used accurately. In the hospital, physicians have to state the etiologies and factors that contribute to the patient's level of malnutrition.[36] Some of this additional required documentation comes from the clinical screening tools, nutrition assessment by RDs, and plan of care.[36]

Lack of knowledge and training in malnutrition assessment among healthcare providers may contribute to incorrect diagnosis and billing codes. A European study recruited a group of 369 RDs from Belgium, the Netherlands, Norway, and Sweden to complete a survey assessing their knowledge of clinical signs of malnutrition, starvation, cachexia, and sarcopenia according to ESPEN guidelines.[37] Around 10% of the RDs' performance was rated as unsatisfactory regarding the correct use of terminology and knowledge and only 31% of the RDs could correctly identify all clinical conditions.[37] They explained that they did not usually use 'starvation,' 'cachexia' and 'sarcopenia' in their daily clinical work.[37] The results of this study demonstrated the insufficient training and knowledge of malnutrition and its diagnosis requirements. Inaccurate and inappropriate nutrition treatment plans may affect the process of care and medical costs.

Besides enriching the basic knowledge from malnutrition diagnosis among RDs, adaptability and perception to new assessment tools and clinical routines are also key to optimal patient care. A study interviewed 33 clinical RDs about their perceptions of Subjective Global Assessment (SGA) before and after regular practice.[38] They reported they were not confident about SGA when it was first introduced.[38] To successfully integrate SGA into their clinical routine, RDs suggested some approaches such as hands-on training and buddy systems to support the use of SGA.[38] After a year of adaption, RDs reported SGA improved overall efficiency in the delivery of nutrition care.[38] They also mentioned practice, continuous training and peer support could enhance the comfort level with completing the physical assessment and interpreting the findings.[38] By practicing SGA, they understood the reason for SGA, which was motivational and led them to success in improving efficiency in malnutrition diganosis.[38]

Quality Improvement for Inpatient Malnutrition Care

Multiple validated screening and assessment tools for malnutrition have been created to provide references and documentation for RDs and other healthcare providers to optimize patient care. However, there are different factors such as readiness of healthcare providers, sufficient

education/training, or a support system that all contribute to the health outcome. Therefore, it is important to assess the quality of patient care to ensure consistency and compliance with recommended clinical guidelines.

The Centers for Medicare and Medicaid Services (CMS)

The CMS is a federal organization, which provides healthcare coverage to American citizens through Medicare, Medicaid, and other healthcare plans.[39] The CMS aims to improve quality, equity, and outcomes of care in the current healthcare system by developing and provisioning quality measures in different medical settings.[39] Ongoing evaluation of patient care can encourage quality improvement and help patients to evaluate their service.[39] Hospital Inpatient Quality Reporting (IQR) was one of the financial incentive programs to encourage participation in quality data reports annually.[39] IQR is beneficial to both public health and hospital operations, which fosters a win-win situation.

Global Malnutrition Composite Score (GMCS)

The Global Malnutrition Composite Score (GMCS) is the first nutrition-focused electronic clinical quality measure (eCQM) designed to evaluate the quality of inpatient malnutrition care.[40] The purpose is to standardize malnutrition care provided in the hospital through performance measurement.[40] The GMCS includes four key components: nutrition screening, nutrition assessment, malnutrition diagnosis, and nutrition care plans.[40] Each component is intended to ensure that hospitals are identifying and treating malnutrition. GMCS also encourages hospitals to use standardized malnutrition terminology.[40] Hospitals are GMCS-scored based on documentation.[40] A score of 0 is given if the component is not documented, and a score of 1 is given if the component is documented.[40] The total malnutrition components score is the sum of the four individual component scores.[40] The overall GMCS score is calculated by dividing the total malnutrition components score by the total number of eligible occurrences and then multiplying by 100 to get a percentage.[40] This percentage score reflects the facility's performance in malnutrition care.[40] Facilities then aggregate individual encounter scores to determine the facility-level performance for a specific measurement period.[40]

Facilities that achieve high scores on the GMCS are likely to see improved patient outcomes related to malnutrition care.[40] The GMCS's structured framework, supported by clinical evidence, provides a means to improve the consistency and quality of malnutrition care across healthcare facilities. In 2023, GMCS was included in the CMS IQR Program in the Inpatient Prospective Payment System Final Rule to emphasize the importance of nutrition in health outcomes and quality of inpatient care.[41] 2024 is the first year that hospitals can submit GMCS data to CMS. Junum® is a way for hospitals to report their compliance to CMS by organizing the malnutrition data from diagnosis, and documentation to a reportable form.

Junum® in the workflow at Grady Memorial Hospital

Background of Grady Memorial Hospital

Grady Memorial Hospital opened in 1892, and is currently a nationally verified Level 1 trauma center in Georgia.[42] It provides medical care to the underserved residents of Fulton and DeKalb counties, along with residents of metro Atlanta and Georgia.[42] According to the Fast Fact 2023: Key Performance Indicators, 55% of patients were Fulton residents and 30% of the patients were DeKalb residents.[43] There were over 680,000 patient visits and 953 total licensed beds in 2023 with 8146 total staff including physicians and nurses.[43] There are currently 18 inpatient RDs and 5 DTs in the Medical Nutrition Department. Grady also participates in the GMCS to ensure their data compliance with CMS for their patients and the hospital. According to The Joint Commission, MST is the most recommended by CMS for GMCS.[44] In July of 2023, MST became the new malnutrition screening tool at Grady.

Junum® Quality Improvement Survey

Junum® went live at Grady Memorial Hospital in January 2024. Before the implementation, all RDs and DTs were given an introduction and education on Junum®. They were required to enter nutrition assessment information such as NFPE findings, weight loss history, and energy intake into the Junum® flowsheet in EPIC. All nutrition practitioners may use the suggested malnutrition diagnosis of 'does not meet criteria,' 'moderate malnutrition,' or 'severe malnutrition.' They can adjust the suggested malnutrition diagnosis based on their clinical judgment.

To assess the effectiveness of Junum® and perceptions among nutrition practitioners at Grady Memorial Hospital, an anonymous online survey was given to all RDs and DTs from June 6th to 26th, 2024. (See Appendix A for Survey). A total of 14 true responses were received, of which 9 were RDs and 5 were DTs.

Survey Results

The participants were asked to rank the importance of why Junum® has been implemented based on 'decrease time for diagnosing malnutrition,' 'improve the accuracy of diagnosing malnutrition,' 'increase physician billing,' 'improve documentation for CMS guidelines,' 'participate in the Global Malnutrition Composite Score for Grady to CMS,' and 'improve health equity.' The result showed that 'improve the accuracy of diagnosis' was ranked as the most important reason by most participants (n= 6, 43%), followed by 'increase physician billing' (n=5, 36%). On the other hand, the majority of the participants ranked 'decreased time for diagnosing malnutrition' as the least important reason for Junum®, indicating perhaps they felt it takes longer to use the tool than previously. Although the result reflects that the nutrition practitioners have different interpretations of Junum® implementation, their perceptions align with some of the goals of Junum® such as improving the accuracy of diagnosis and increasing physician billing. The developers aim to assist clinicians in addressing any underdiagnosis of malnutrition, which will then drive revenue through malnutrition billing. (See Table 1)

Table 1: Reasons to use Junum®

Reasons to use Junum®	Ranked as 'most important' (%)
Improve the accuracy of diagnosing malnutrition	43%
Increase physician billing	35%
Improve health equity	21%
Participate in the Global Malnutrition Composite Score (GMCS) for Grady to CMS	7%
Improve documentation for CMS guidelines	7%
Decrease time for diagnosing malnutrition	0%

Participants responded to 6 statements regarding the use of Junum® with Likert scale of 'strongly disagree,' 'disagree,' 'neutral,' 'agree' and 'strongly agree.' The first statement asked if the participants thought that documentation in Junum® was more time-consuming than previously. Six participants (46%) agreed or strongly agreed that Junum® documentation is more time-consuming, with 4 (31%) feeling neutral. This aligns with the overall perception that the primary purpose of Junum® was not to decrease the time necessary to diagnose malnutrition.

The majority of participants (n=10, 77%) either agreed or strongly agreed with the statement 'using Junum® has been helpful to better understand how to document muscle and fat loss.' It shows that Junum® has been an effective application for understanding how to document malnutrition criteria.

Additionally, 7 participants (54%) either agreed or strongly agreed with the statement 'Junum® seems to "over" diagnose malnutrition, so I still need to use my critical thinking skills to decide if the patient is "moderately" or "severely" malnourished.' On the other hand, 77% (n=10) of the participants disagreed and strongly disagreed with the statement 'Junum® seems to "under" diagnose malnutrition, so I still need to use my critical thinking skills to decide if the patient is "moderately" or "severely" malnourished.' The results demonstrated participants perceive that Junum® is more likely to overdiagnosis malnutrition than underdiagnosis; clinical judgment is essential to correct the suggested malnutrition diagnosis.

On the other hand, participants were most evenly distributed regarding the statement 'Junum® adds excess information to the chart that is not necessary.' Thirty-one percent (n=4) of the participants disagreed and strongly disagreed with the statement, 38% (n=5) were neutral and 31% (n=4) agreed or strongly agreed with the statement. It is interesting to see how nutrition practitioners have different opinions regarding the additional information. The different perceptions might depend on one's experience and clinical practice.

Moreover, 85% (n=11) of the participants agreed or strongly agreed that 'Junum® is a tool that I believe will increase overall malnutrition diagnoses by physicians.' None of the participants either disagreed or strongly disagreed with the statement. The participants think Junum® can help diagnose malnutrition, which synchronizes the responses to the previous statements and aligns with the goals of implementing this diagnostic tool. (See Table 2)

Table 2. Perception to Statements about Using Junum®

Statements	Responses	N (n=13)	Percentage (%)
Documentation in Junum® is more time-consuming than how it was done previously in the flowsheets.	Strongly Disagree	1	8%
	Disagree	2	15%
	Neutral	4	31%
	Agree	5	38%
	Strongly Agree	1	8%
Using Junum® has been helpful to understand how to document muscle and fat loss.	Strongly Disagree	2	15%
	Disagree	0	0%
	Neutral	1	8%
	Agree	5	38%
	Strongly Agree	5	38%
Junum® seems to 'over' diagnose malnutrition, so I still need to use my critical thinking skills to decide if the patient is 'moderately' or 'severely' malnourished.	Strongly Disagree	2	15%
	Disagree	1	8%
	Neutral	3	23%
	Agree	4	31%
	Strongly Agree	3	23%
Junum® seems to 'under' diagnose malnutrition, so I still need to use my critical thinking skills to decide if the patient is 'moderately' or 'severely' malnourished.	Strongly Disagree	4	31%
	Disagree	6	46%
	Neutral	3	23%
	Agree	0	0%
	Strongly Agree	0	0%
Junum® adds excess information to the chart that is not necessary.	Strongly Disagree	3	23%
	Disagree	1	8%
	Neutral	5	38%
	Agree	2	15%
	Strongly Agree	2	15%
Junum® is a tool that I believe will increase overall malnutrition diagnose by physicians.	Strongly Disagree	0	0%
	Disagree	0	0%
	Neutral	2	15%
	Agree	7	54%
	Strongly Agree	4	31%

At the end of the survey, participants were asked to comment on the statements they marked as 'strongly agree' or 'strongly disagree.' Participants felt that the avatar was helpful, which saves time and diagnoses malnutrition based on the guidelines:

> *"Having an avatar to click on with descriptions of what to look for helps recall what was seen on NFPE."*

> *"I think Junum saves time overall! I think it diagnoses people based on guidelines."*

> *"I do not find Junum underdiagnosing in any situation I've come across."*

Some participants felt that Junum® has been 'over' diagnosing their patients regardless of their findings.

> *"Junum would often automatically mark a patient as malnourished although they do not meet the correct criteria, so the information has to be reviewed"*

> *"I do think it could over-diagnose. But because of my inputs on the avatar, I felt I could not justify giving them no diagnosis."*

However, other participants felt that Junum® was less useful, time-consuming, and monotonous, especially for an experienced clinician:

> *"As a basic competency RDs should know how to do an NFPE and dx malnutrition. Junum® is time consuming and often misdiagnosis malnutrition in my opinion to where I have to change several of the auto populations. It is monotonous. I do think that with the new BPA MDs are more forced to add the diagnosis to their notes, so that might be helpful for actual reimbursement, but I doubt that all of the diagnosis are appropriate if the RDs aren't carefully checking the autopopulations."*

> *"Clinical judgement are more valuable and Junum does not take into account the context of malnutrition, but rather leads/suggests a context based on timeframes selected for energy intake/weight loss, etc."*

> *"I think Junum could be useful as a learning tool, but an experienced/competent clinician should have the skillset to diagnose and document properly without an anatomical human diagram."*

Interestingly, one participant felt that it was more important for other healthcare providers to understand how nutrition professionals document malnutrition.

> *"I strongly disagree that Junum is a tool that is not necessary in the field of nutrition. Junum help other providers understand the documentation of malnutrition and how nutrition is important for the overall health field."*

One person also would like a better flow for energy and protein needs into their chart documentation and using a recommended body weight since it would be consistent with current Grady standards, rather than the ideal body weight calculated by Junum®.

> *"Junum does not flow the EEN and EPN that we enter into the RD assessment. it also uses IBW and usually we are calculating RBW. it would be helpful if RBW was an option based off BMI 24.9."*

Although years in practice were not queried in this survey, some of the discrepancies in the responses may be that some participants have more experience and overall training in diagnosing malnutrition.

Future Directions for Junum® at Grady Memorial Hospital

Junum® has become a required part of the workflow at Grady. Based on our survey, some participants believe that Junum® cannot be relied on completely for malnutrition documentation because overdiagnosis of malnutrition is a concern if clinical judgment is not also used. Additionally, nutrition practitioners need to consider the context of malnutrition and entire picture of the patient based on their overall assessment. In other words, though the tool may be helpful, clinicians need to think critically since the nutrition plan of care is individualized.

As this was a quality improvement project, the department should have continuous education on malnutrition and using critical thinking skills to accurately diagnose malnutrition. Internal education sessions can include practicing NFPE, updated ASPEN guidelines on malnutrition, and continuous Junum® training. There should be an emphasize the importance of critical thinking skills in clinical settings to avoid misdiagnosing malnutrition and overbilling. Using Junum® to diagnose malnutrition help the nutrition team to provide appropriate nutrition plans of care so that complications and comorbidities can be mitigated. As a result, health equity can be improved. Furthermore, future data may indicate increased billing for malnutrition, that may increase revenue. Grady will have more resources for patient care and community services.

Conclusion

Malnutrition remains a critical condition with multi-faceted factors and its complexities require collaborative efforts from the interdisciplinary medical team to mitigate the severe complications. Although there is no international consensus on the best assessment tools, ASPEN guidelines serve as the standardized guidance for malnutrition diagnosis in the United States. We also understand that perceptions of nutrition practitioners toward different assessment tools may affect clinical outcomes significantly. Therefore, healthcare facilities need to provide sufficient training on innovative applications and tools. Continuous education must also be provided to ensure the accuracy and compliance of the diagnosis. Blindly relying on the suggested diagnosis from the innovative application should not be promoted, clinical judgment and critical thinking are always the best tools of clinicians.

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Appendix A

Junum® Quality Assessment

As a part of Master's project at GSU, this survey is part of a quality improvement initiative for documenting malnutrition. Your responses are completely anonymous, so please answer honestly and thoughtfully. Additionally, your responses are combined with those of many others and summarized in a report to further protect your anonymity. The information will solely be used for quality improvement projects.

Q1

Junum® is a tool to help document malnutrition in EPIC. Please rank on a scale of 1-6, where 1 is "most important" and 6 is "least important" WHY you believe Junum® has been implemented.

( ) Decrease time for diagnosing malnutrition
( ) Improve the accuracy of diagnosing malnutrition
( ) Increase physician billing
( ) Improve documentation for CMS guidelines
( ) Participate in the Global Malnutrition Composite Score (GMCS) for Grady to CMS
( ) Improve health equity

Q2

Please respond to the following statements using the scale below.

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Disagree
Documentation in Junum® is more time-consuming than how it was done previously in the flowsheets.					
Using Junum® has been helpful to understand how to document muscle and fat loss.					
Junum® seems to 'over' diagnose malnutrition, so I still need to use my critical thinking skills to decide if the patient is 'moderately' or 'severely' malnourished.					
Junum® seems to 'under' diagnose malnutrition, so I still need to use my critical thinking skills to decide if the patient is 'moderately' or 'severely' malnourished.					
Junum® adds excess information to the chart that is not necessary.					
Junum® is a tool that I believe will increase overall malnutrition diagnose by physicians.					

Q3

Please comment on any of the above statements that you marked as 'strongly agree' and/or 'strongly disagree.'

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Q4

I am a:

( ) RD
( ) Diet Tech

Q5

Any additional comments about the implementation of Junum®.

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Thank you for your time spent taking this survey.
Your response has been recorded.