Accurate Coding Impacts the Geometric Length of Stay for Malnourished Inpatients

CHANGES IN HEALTH CARE, such as rising costs and revised reimbursement practices like the hospital Value Based Purchasing program,[1] have resulted in a heightened focus on quality of care. Hospital performance, measured by patient outcomes such as hospital acquired conditions and readmission rates, has affected reimbursement rates since 2012 and is publicly reported.[1] Good patient outcomes also have the benefit of reducing a hospital's average length of stay (LOS), thus lowering the cost of care. The focus of this article is to review previous literature exploring the association between malnutrition and LOS and to demonstrate the importance of accurately coding for malnutrition to ensure expected LOS is determined accurately, using an example from a community hospital.

MEDICARE REIMBURSEMENT PROCESS

Medicare determines expected LOS and reimbursement rates for hospitals using the Inpatient Prospective Payment System,[1] and some commercial insurance companies follow their lead. This means that hospitals are usually not paid using a fee-for-service model where individual expenses, such as medications, procedures, laboratory measurements, or tests, are reimbursed. Rather, they are paid one lump sum for each patient's hospital stay based on the Centers for Medicare and Medicaid Services' (CMS) complex analysis of the average cost of care to treat patients with the same or similar principal and secondary diagnoses.

At discharge, based upon provider documentation in the electronic health record for that particular episode of care, the principal and all secondary diagnoses that impact the care required for each patient must be documented on the Medicare claim form using codes from the *International Classification of Disease, 10th edition, Clinical Modification* (ICD-10-CM).[1] Cases are then assigned to diagnosis-related groups (DRGs), the CMS classification system that groups similar diagnoses together (Figure 1). The DRG assignment is determined by the patient's principal diagnosis, up to 24 secondary diagnoses, and up to 25 procedures performed during the stay.

To further refine payment to better account for severity of illness and resource consumption for Medicare patients, CMS modified the DRG classifications by designing the Medicare Severity (MS)-DRG system. There are three levels of severity in this system based on secondary diagnoses and procedures, as documented using ICD-10-CM codes. A designation of Major Complications/Comorbidities (MCC) reflects the highest level of severity, with Complications/Comorbidities (CC) indicating the next level of severity. Secondary diagnoses that CMS has determined do not significantly affect severity of illness and resource use are classified as Non-CC. CMS has designated different malnutrition diagnoses as MCCs, CCs, or Non-CCs for use in the MS-DRG system.

Only one MS-DRG is assigned per discharge; because there are 754 different MS-DRGs available (for fiscal year 2018),[1] and because most patients have several secondary diagnoses and procedures, hospitals use coding software with algorithms to determine the proper MS-DRG assignment. Because this can be a complicated system to comprehend, Figure 2 uses a simplified example patient to demonstrate the steps necessary to determine the MS-DRG.

A weight is assigned to each MS-DRG that reflects the average cost to provide care for inpatients with that diagnosis, relative to the average cost to provide care for all Medicare patients; this is known as the relative weight (RW). Although also influenced by several other factors, multiplying the RW of the assigned MS-DRG by the hospital's base payment rate can provide an estimate of the Medicare payment the hospital will receive for that case.

CMS completes an annual analysis using billing and quality data submitted by hospitals to continually refine the MS-DRG system to ensure that each diagnosis group includes cases with clinically similar conditions that consume comparable amounts of resources.[1] They also assess secondary diagnoses and may reassign them to a different level of severity (MCC, CC, or Non-CC). In addition, CMS may reassign diagnoses and procedures to a different diagnostic category, create a new DRG, or modify the RW or expected LOS. Updated DRG tables must be obtained from the CMS website each federal fiscal year (October 1 through September 30 of the following year) to ensure that data analysis is accurate.[2]

LENGTH OF STAY

The MS-DRG RW table referenced in Figure 1 includes the expected LOS for each MS-DRG, differentiated as the arithmetic mean LOS and geometric mean LOS.[2] The arithmetic mean LOS does not account for outliers, such as patients who are in the hospital for a significantly longer or shorter time than expected for the assigned MS-DRG.[3] The geometric mean LOS does account for these stays, reducing the effect of these outliers on the expected LOS. The geometric mean LOS is one of the components that Medicare considers when determining the RW and

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https://doi.org/10.1016/j.jand.2017.10.023

TABLE 5.—LIST OF MEDICARE SEVERITY DIAGNOSIS-RELATED GROUPS (MS-DRGS), RELATIVE WEIGHTING FACTORS, AND GEOMETRIC AND ARITHMETIC MEAN LENGTH OF STAY—FY 2017								
MS-DRG	FY 2017 FINAL Post-Acute DRG	FY 2017 FINAL Special Pay DRG	MDC	TYPE	MS-DRG Title	Weights	Geometric mean LOS	Arithmetic mean LOS
286	No	No	05	MED	CIRCULATORY DISORDERS EXCEPT AMI, W CARD CATH W MCC	2.2027	5.2	7.0
287	No	No	05	MED	CIRCULATORY DISORDERS EXCEPT AMI, W CARD CATH W/O MCC	1.1693	2.6	3.3
288	Yes	No	05	MED	ACUTE & SUBACUTE ENDOCARDITIS W MCC	2.7773	7.6	9.7
289	Yes	No	05	MED	ACUTE & SUBACUTE ENDOCARDITIS W CC	1.5523	5.2	6.4
290	Yes	No	05	MED	ACUTE & SUBACUTE ENDOCARDITIS W/O CC/MCC	1.2605	4.5	5.5
291	Yes	No	05	MED	HEART FAILURE & SHOCK W MCC	1.4796	4.6	5.8
292	Yes	No	05	MED	HEART FAILURE & SHOCK W CC	0.9574	3.5	4.3
293	Yes	No	05	MED	HEART FAILURE & SHOCK W/O CC/MCC	0.6618	2.6	3.0
294	No	No	05	MED	DEEP VEIN THROMBOPHLEBITIS W CC/MCC	1.1154	3.8	4.7
295	No	No	05	MED	DEEP VEIN THROMBOPHLEBITIS W/O CC/MCC	0.6746	3.3	3.7
296	No	No	05	MED	CARDIAC ARREST, UNEXPLAINED W MCC	1.3715	1.9	3.0
297	No	No	05	MED	CARDIAC ARREST, UNEXPLAINED W CC	0.5925	1.3	1.6
298	No	No	05	MED	CARDIAC ARREST, UNEXPLAINED W/O CC/MCC	0.4395	1.1	1.2
299	Yes	No	05	MED	PERIPHERAL VASCULAR DISORDERS W MCC	1.4161	4.1	5.4
300	Yes	No	05	MED	PERIPHERAL VASCULAR DISORDERS W CC	1.0077	3.5	4.3
301	Yes	No	05	MED	PERIPHERAL VASCULAR DISORDERS W/O CC/MCC	0.7237	2.6	3.1
302	No	No	05	MED	ATHEROSCLEROSIS W MCC	1.0408	2.8	3.8
303	No	No	05	MED	ATHEROSCLEROSIS W/O MCC	0.6428	1.9	2.4

Figure 1. Screen shot of a section of Medicare's Table 5 for Fiscal Year 2017—List of Medicare Severity Diagnosis-Related Groups, Relative Weighting Factors, and Geometric and Arithmetic Mean Length of Stay.[2]

therefore the reimbursement for each MS-DRG. Because hospitals do not receive extra reimbursement for additional hospital days (except for extreme outlier cases), the goal is often to discharge patients before they exceed the expected geometric mean LOS for the assigned MS-DRG. Likewise, it is important to ensure all secondary diagnoses are properly coded to maximize the assigned MS-DRG to increase the expected geometric mean LOS.

Hospitals can compare their actual average LOS to the expected geometric mean LOS for each MS-DRG to gauge their performance against the Medicare benchmark and identify possible patterns or performance improvement areas. For example, analysis of geometric mean LOS data may reveal that patients admitted late on a Thursday or Friday have a longer LOS than Medicare's expected geometric mean LOS.[3] This information can be used to develop a performance improvement project. Further review may suggest that the longer LOS is due to delays in completing diagnostic tests and procedures over the weekend. This insight can then be used to develop a plan of action to reduce the average LOS for that particular demographic.

Because CCs and MCCs influence LOS, an analysis of coding practices is also important when assessing a hospital's average LOS. For example, records of patients who underwent a specific surgical procedure, such as a colectomy, could be examined to determine if malnutrition was noted by the registered dietitian nutritionist (RDN). If the malnutrition is not coded as a CC or MCC (depending on severity level) and no other CCs or MCCs are identified, the stay may be assigned to an MS-DRG with a lower RW than it should be, missing the opportunity for a higher payment and longer expected geometric mean LOS against which to benchmark. Figure 3 provides instructions on how to calculate the difference in expected geometric mean LOS if the malnutrition diagnosis is coded properly.

MALNUTRITION AND LENGTH OF STAY

Many research studies reporting the effect of malnutrition on LOS have been published. However, the methodologies used are highly variable, thus making the results difficult to compare and quantify. One complicating factor is that

MS-DRG[a] Assignment Process	Example Patient
	Principal diagnosis (reason admitted to the hospital): Perforation of esophagus (ICD-10-CM[d] code K22.3)
Step 1. Assign 1 of 25 MDC[b] based on **principal** diagnosis *causing that hospitalization*	Step 1. Assigned to MDC 06: Diseases and Disorders of the Digestive System.
Step 2. Assign DRG[c] within that MDC based on the **principal** diagnosis	Step 2. Assigned to DRG, *Major Esophageal Disorder* based on **principal** diagnosis.
Step 3. Assign severity level within that DRG based on **secondary** diagnoses impacting the hospitalization and procedures furnished during the stay	Step 3. Identified **secondary** diagnosis: MCC[e] Severe protein-calorie malnutrition (ICD-10-CM code E43)
	Final: Assigned to MS-DRG 368, *Major Esophageal Disorder with MCC* based on **principal** and **secondary** diagnoses.

[a]MS-DRG=Medicare Severity Diagnosis-Related Group.

[b]MDC=major diagnostic categories.

[c]DRG=diagnosis-related group.

[d]ICD-10-CM=*International Classification of Disease, 10th edition, Clinical Modification*.

[e]MCC=Major Complications/Comorbidities.

Figure 2. Steps to determine Medicare Severity Diagnosis-Related Group assigned to the patient's hospital stay.

many studies examined only very specific groups of patients (ie, cerebrovascular accident[4]; elective surgery[5]; elective ear, nose, and throat surgery[6]; appendectomy within 24 hours of admission[7]; or intensive care unit patients≥65 years of age[8]). Other key differences specifically related to the malnutrition diagnosis were also noted.

Many researchers described their subjects as malnourished; however, the only methods used to determine nutrition status were nutrition screening tools such as the Malnutrition Screening Tool (MST) or Nutrition Risk Screening-2002 (NRS-2002).[4-6,9-12] These tools are intended to identify malnutrition *risk*, not actually diagnose malnutrition. Some studies did diagnose malnutrition using assessment methods such as the Subjective Global Assessment; however, the nutrition assessment was not completed by an RDN (or the assessor was not reported).[7,13,14] Lastly, none of the identified studies used the Academy of Nutrition and Dietetics (Academy) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.) proposed malnutrition definitions published in 2012.[4-27]

To our knowledge, this is the first study examining the effect of malnutrition coding on expected geometric mean LOS in which the Academy and A.S.P.E.N. malnutrition criteria for adult patients[28] were used by RDNs to diagnose malnutrition. Furthermore, all patients admitted to the hospital, not just specific patient populations, were screened and referred to the RDN for a full nutrition assessment if they were positively identified as at nutrition risk.

MALNUTRITION AND LENGTH OF STAY IN A COMMUNITY HOSPITAL

In a community hospital with an average census of 185 and average LOS of 4.5 days, patients are screened by the nurse for nutritional risk within 24 hours of admission, the results of which are documented in the electronic health record. An RDN consult is generated automatically if the patient triggers positively as at nutrition risk, and the RDN assesses the patient within 24 to 48 hours. The RDNs use criteria suggested by the Academy and A.S.P.E.N.[28] to diagnose malnutrition and record malnourished inpatients' names and account numbers (inpatients under observation status are excluded). Reports on all malnourished patients are generated monthly by the hospital's financial analysts and include the admission and discharge dates, assigned MS-DRG, and CCs or MCCs and their associated ICD-10-CM codes.

Between March 2015 and June 2017, the RDNs identified 1,817 malnourished adult patients. Of these, 1,171 (64.4%) were not coded for malnutrition. Of the patients not coded for malnutrition, the assigned MS-DRGs, including secondary diagnoses coded as CCs and MCCs, were assessed to see if a malnutrition code would have made an impact on the MS-DRG and, therefore, the RW and expected geometric mean LOS. If the RDN diagnosed severe malnutrition, this was correlated with severe protein calorie malnutrition (E43), an MCC; similarly, an RDN diagnosis of nonsevere malnutrition correlated with either moderate protein-calorie malnutrition (E44.0), mild protein-calorie malnutrition (E44.1), or unspecified protein-calorie malnutrition (E46), all CCs.

If the patient was diagnosed with malnutrition but not coded as such, the expected geometric mean LOS would not have increased appropriately due to the missing MCC or CC.

Of the 1,171 malnourished patients that were not coded for malnutrition, 475 (40.6%) would have benefitted from proper coding to change the MS-DRG and increase the RW and expected geometric mean LOS. The actual average LOS for this group was 5.3 days, and the Medicare expected geometric mean LOS based on the assigned MS-DRGs was 3.5 days (see the Table).[2] If the malnutrition had been coded appropriately, the *potential* expected geometric mean LOS

Step 1. Visit www.cms.gov and access the Acute Inpatient IPPS[a] page for the current fiscal year. Download Table 5, "List of MS-DRGs,[b] Relative Weighting Factors, and Geometric and Arithmetic Mean Length of Stay."[2]	
Steps Required for Each Patient	**Completed Example Using 2017 Data**
Step 2. Using data provided by the hospital, identify the actual assigned MS-DRG for each malnourished patient.	MS-DRG 293 Heart Failure & Shock without CC[e]/MCC[f]
Step 3. Using Medicare's Table 5 from step 1, determine the expected gmLOS[c] for that MS-DRG.	MS-DRG 293 Heart Failure & Shock without CC/MCC • gmLOS: 2.6 days
Step 4. Using Table 5, determine what the MS-DRG *would have been* if the malnutrition diagnosis had been included.	Same patient as in step 2, but coded with severe protein-calorie malnutrition, which is an MCC. • *New* MS-DRG 291 Heart Failure & Shock with MCC
Step 5. Using Table 5, determine what the expected gmLOS is for the new MS-DRG from step 4.	Same patient as in step 2, but coded with severe protein-calorie malnutrition, which is an MCC. • *New* MS-DRG 291 Heart Failure & Shock with MCC • *New* gmLOS: 4.6 days
Step 6. Determine the missed opportunity for expected LOS.[d]	Subtract actual gmLOS (step 3) from *new* gmLOS (step 5) (if malnutrition had been coded)=missed opportunity. • 4.6 days−2.6 days=2 days
In this example, the patient would have been expected to stay for 2 days longer based on the increased nursing care and other resources required to treat the secondary diagnosis (severe protein-calorie malnutrition) in addition to the principal diagnosis (heart failure and shock). Because the patient likely would stay extra days due to an increased severity of illness, the hospital needs the increased reimbursement that would also accompany the higher MS-DRG.	
[a]IPPS=Inpatient Prospective Payment System. [b]MS-DRG=Medicare Severity diagnosis-related group. [c]gmLOS=geometric mean length of stay. [d]LOS=length of stay. [e]CC=Complications/Comorbidities. [f]MCC=Major Complications/Comorbidities.	

Figure 3. Steps to determine the missed opportunity for maximizing the expected geometric mean length of stay for a patient case.

would have been 5.2 days. This correlates closely with the *actual* average LOS of 5.3 days. Comparison of the actual expected geometric mean LOS (3.5 days) and the potential expected geometric mean LOS (5.2 days) showed a difference of 1.7 days.

These data have several implications. Consistent with previous reports,[29-31] malnourished patients are not being properly coded for malnutrition, which negatively affects MS-DRG assignment and therefore reimbursement and comparison benchmarks such as expected geometric mean LOS. Required care for the malnourished patient in this hospital, at least in terms of LOS, is consistent with the expected norms, as the potential expected geometric mean LOS was essentially the same as the actual average LOS.

The hospital's actual average LOS for malnourished patients is 5.3 days, which is longer than the expected geometric mean LOS of 3.5 days based on the MS-DRGs assigned at discharge, indicating that there is an opportunity to improve the claims submitted to CMS to better reflect the acuity level of patients served and amount of care provided. Accurately identifying and coding for malnutrition is one way to improve this process to ensure the proper MS-DRG is assigned to the patient case upon discharge.

Table. Comparison of actual LOS[a] to expected gmLOS[b] in malnourished patients that were not coded for malnutrition (n=475)

Actual average LOS	Actual expected gmLOS	Potential expected gmLOS if malnutrition had been coded	Difference between actual and potential gmLOS ("Missed Opportunity")
5.3 days	3.5 days	5.2 days	1.7 days

[a]LOS=length of stay.
[b]gmLOS=geometric mean length of stay.

CONCLUSION

Accurate coding for malnutrition can impact the assigned MS-DRG, appropriately bringing greater reimbursement for the hospital stay and

establishing appropriate comparison benchmarks such as expected geometric mean LOS. Accurate coding will also inform CMS's ongoing efforts to refine the MS-DRG system. Consistent use of standardized criteria, such as that published by the Academy and A.S.P.E.N., to determine the presence of severe and nonsevere malnutrition aids ongoing efforts to predict financial costs and outcomes associated with the prevention and treatment of malnutrition. Future research should concentrate on efforts to determine which interventions, provided by which health care providers at which point in the care continuum, are the most effective in preventing or treating malnutrition.

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STATEMENT OF POTENTIAL CONFLICT OF INTEREST

No potential conflict of interest was reported by the authors.

FUNDING/SUPPORT

There was no funding support for this article.

ACKNOWLEDGEMENTS

Author Contributions: J. Doley collected data, reviewed literature regarding length of stay and malnutrition, and authored the first draft of the Malnutrition and Length of Stay sections; W. Phillips authored first draft of the other sections; J. Doley and W. Phillips reviewed and revised subsequent drafts.