CBE ID

3188

Title

30-Day Unplanned Readmissions for Cancer Patients

Project

Cost and Efficiency

Endorsement Status

Endorsed with Conditions

E&M Committee Rationale/Justification

When the measure returns in 3 years for maintenance endorsement, the developer would have conducted an empirical exploration of the reasons for patients being readmitted, especially considering those unrelated to cancer, and the impact of those reasons on the measure's performance.

Is Under Review

No

Next Maintenance Cycle

Spring 2028

Previous Endorsement Cycle

Spring 2025

Initial Endorsement

Wed, 07/12/2017 - 08:34

Steward

Alliance of Dedicated Cancer Centers

1.0 New or Maintenance

Maintenance

1.1 Measure Structure

Single Measure

1.3 Electronic Clinical Quality Measure (eCQM)

No

1.6 Measure Description

30-Day Unplanned Readmissions for Cancer Patients measure is a cancer-specific measure. It

provides the rate at which adult cancer patients have an unplanned readmission within 30 days of discharge from an acute care hospital. The unplanned readmission is defined as a subsequent inpatient admission to a short-term acute care hospital, which occurs within 30 days of the discharge date of an eligible index admission and has an admission type of “emergency” or “urgent.”

1.7 Measure Type

Outcome

1.8 Level of Analysis

Facility

1.9 Care Setting

Hospital: Inpatient

1.10 Measure Rationale

Hospital readmission, for any reason, is disruptive to patients and caregivers, costly to the healthcare system, and puts patients at additional risk of hospital-acquired infections and complications. Readmissions are also a major source of patient and family stress and may contribute substantially to loss of functional ability, particularly in older patients.

Some readmissions are unavoidable and result from inevitable progression of disease or worsening of chronic conditions. However, readmissions may also result from poor quality of care or inadequate transitional care. Transitional care includes effective discharge planning, transfer of information at the time of discharge, patient assessment and education, and coordination of care and monitoring in the post-discharge period. Numerous studies have found an association between quality of inpatient or transitional care and early (typically 30-day) readmission rates for a wide range of conditions.[1-8]

Throughout medicine, randomized controlled trials have shown that improvement in the following areas can directly reduce readmission rates: quality of care during the initial admission; improvement in communication with patients, their caregivers and their clinicians; patient education; predischarge assessment; and coordination of care after discharge.[9-24] Despite these isolated successful interventions, the overall national readmission rate remains high, with a 30-day readmission following nearly one fifth of discharges. Furthermore, readmission rates vary widely across institutions.[25-27] Both the high baseline rate and the variability across institutions speak to the need for a quality measure to prompt more concerted and widespread action.

Existing studies in cancer have largely focused on post-operative readmissions, reporting readmission rates between 6.5% and 25%. For many cancer patients, readmission following

hospitalization may be preventable and should be addressed to lower costs and improve patient outcomes.[28-30] The Alliance of Dedicated Cancer Centers (ADCC) recognized the need for an oncology-specific unplanned readmission measure because this population was excluded from most existing measures, and because planned readmissions are often used in clinical pathways for cancer patients. In 2014, the ADCC proposed the 30-Day Unplanned Readmissions for Cancer Patients measure as an accountability measure for the PPS-Exempt Cancer Hospitals Quality Reporting Program (PCHQR). The measure was initially developed by the Comprehensive Cancer Centers for Quality Improvement (C4QI), a national group of academic medical centers that collaborate to measure and improve the quality of cancer care in their institutions. C4QI's members have utilized this claims-based, cancer-specific unplanned readmissions measure since 2012. It is designed to reflect the unique clinical aspects of oncology and to provide a comprehensive measurement of unplanned readmissions in cancer patients. It considers patients with an admission type of "emergency" or "urgent" within 30 days of an index admission as an unplanned readmission. It excludes readmissions for patients readmitted for chemotherapy or radiation therapy treatment or with disease progression. Using this measure, hospitals can better identify and address preventable readmissions for cancer patients.

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1.13 Data Dictionary

Attached

1.13a Attach Data Dictionary

3188_PCH_36_DataDict_PQMmaintenance_052025.xls

1.14 Numerator

This outcome measure demonstrates the rate at which adult cancer patients have unplanned readmissions within 30 days of discharge from an eligible index admission. The numerator includes all eligible unplanned readmissions to any short-term acute care hospital within 30 days of the discharge date from an index admission that is included in the measure denominator. Readmissions with an admission type (UB-04 Uniform Bill Locator 14) of “emergency = 1” or “urgent = 2” are considered unplanned readmissions within this measure. Readmissions for patients with progression of disease and for patients with planned admissions for treatment are excluded from the measure numerator.

1.14a Numerator Details

This outcome measure demonstrates the rate at which adult cancer patients have unplanned

readmissions within 30 days of discharge from an eligible index admission. The numerator includes all eligible unplanned readmissions to any acute care hospital within 30 days of the discharge date from an index admission that is included in the measure denominator.

Readmissions with an admission type (UB-04 Uniform Bill Locator 14) of “emergency = 1” or “urgent = 2” are considered unplanned readmissions within this measure. Readmissions for patients with progression of disease (using a principal diagnosis of metastatic disease as a proxy) and for patients with planned admissions for treatment (defined as a principal diagnosis of chemotherapy or radiation therapy) are excluded from the measure numerator.

If a patient has more than one unplanned admission (for any reason) within 30 days after discharge from the index admission, only one is counted as a readmission for calculating the measure. The outcome is a dichotomous yes or no indicating if each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.

The numerator algorithm and associated code tables are attached (Data Dictionary).

1.15 Denominator

The denominator includes inpatient admissions for all adult Fee-for-Service Medicare beneficiaries where the patient is discharged from a short-term acute care hospital with a principal or secondary diagnosis (i.e., not admitting diagnosis) of malignant cancer within the defined measurement period.

1.15a Denominator Details

The denominator includes inpatient admissions for all adult Fee-for-Service Medicare beneficiaries where the patient is discharged from an acute care hospital with a

principal or secondary diagnosis of malignant cancer within the defined measurement period.

The denominator algorithm and associated code tables are attached (Data Dictionary). Briefly, admissions are included if all of the following criteria are met:

Enrolled in Medicare fee-for-service (FFS) for the 60 days prior to the date of admission and during the index admission.

- ***Rationale***: The 2-month prior enrollment criterion ensures that the comorbidity data used in risk adjustment can be captured from inpatient claims data in the 2 months prior to the index admission. Enrollment during the index admission is needed to qualify for the cohort and to ensure availability of data from the index admission for risk adjustment.

Aged 65 or over.

- ***Rationale:*** Medicare beneficiaries younger than 65 are not included in the measure because they are considered to be too clinically distinct from Medicare beneficiaries who are 65 or older.

Discharged alive from a non-federal short-term acute care hospital.

- ***Rationale***: It is only possible for patients to be readmitted if discharged alive.

Not transferred to another acute care facility.

- ***Rationale***: Hospitalizations that result in a transfer to another acute care facility are not included in the measure because the measure's focus is on admissions that result in discharge to a non-acute care setting (for example, to home or a skilled nursing facility).

1.15b Denominator Exclusions

The measure excludes index admissions for patients who meet any of the following criteria:

- Patients discharged against medical advice (AMA)
- Patients discharged with a planned readmission
- Patients having missing or incomplete data
- Patients not admitted to an inpatient bed
- Patients admitted for primary psychiatric diagnoses
- Patients admitted for rehabilitation

1.15c Denominator Exclusions Details

The following index admissions are excluded from the measure denominator:

- Patients discharged against medical advice (AMA), identified using the discharge disposition indicator in claims data. *Rationale:* Providers did not have the opportunity to deliver full care and prepare the patient for discharge.
- Patients discharged with a planned readmission. *Rationale*: Not an unplanned readmission.
- Patients having missing or incomplete data
- Patients not admitted to an inpatient bed
- Patients admitted for primary psychiatric diagnoses, identified by a principal diagnosis in one of the specific AHRQ CCS categories listed in the attached data dictionary. *Rationale:* Patients admitted for psychiatric treatment are typically cared for in separate psychiatric or rehabilitation centers which are not comparable to acute care hospitals.
- Patients admitted for rehabilitation, identified by the specific ICD-10 diagnosis codes included in CCS 254 (Rehabilitation care; fitting of prostheses; and adjustment of devices). *Rationale:* These admissions are not typically admitted to an acute care hospital and are not for acute care.

Associated code tables for denominator exclusions are in the attached Data Dictionary.

1.15d Age Group

Adults (18-64 years), Older Adults (65 years and older)

1.16 Type of Score

Rate/proportion

1.17 Measure Score Interpretation

Better performance = Lower score

1.18 Calculation of Measure Score

Below we provide the individual steps to calculate the measure score:

Define Cohort

Apply the inclusions/exclusions criteria to construct the measure cohort. See Tab 3: Denominator Calculation of the Data Dictionary; Tab 4: Denominator Codes; and Tab 5: Denominator Exclusion Codes of the Data Dictionary.

- Identify discharges meeting the inclusion criteria described in Tab 3 and Tab 4.
- Exclude admissions meeting any of the exclusion criteria described in Tab 3 and Tab 5.

Define outcome

Derive the measure outcome of 30-day readmission, by identifying a binary flag for an unplanned hospital visit within 30 days of index admission as described above.

Define risk variables

Use patients' historical and index admission claims data, as well as fields (Age, Sex) from the Master Beneficiary Summary File to create risk-adjustment variables.

- Revenue Center Codes – ICU admission

- Diagnostic Related Group (DRG) codes – Surgical admission

- ICD-10 CM codes – BMT, Solid tumor, metastatic, comorbidities (following algorithm to calculate Elixhauser comorbidity index, including comorbidity specific application of POA indicator; with cancer related condition groups replaced with specific cancer specific risk indicators)

- Claim inpatient admission type code – Admission via ER

- Previous Inpatient claims within 60 days – Prior admissions

- Age variable recoded into dichotomous indicators based on 5 year increments (65-69, 70-74, 75-79, 80-85, 85+)

Measure score calculation

Estimate a mixed effects hierarchical logistic regression model (mHLM) to produce a standardized

risk ratio (SRR), calculated as the ratio of the number of “predicted” readmissions to the number of “expected” readmissions at a given hospital. The mHLM is adjusted for age groups, gender, comorbidities, length of stay, prior admissions, solid tumor vs hematologic disease, metastatic cancer, surgery admission, ICU admission, bone marrow transplant, and a hospital-specific effect. Details about the risk-adjustment methodology are in section 5.4.5.

1.19 Measure Stratification Details

CMS initiated stratified reporting by dual eligibility status for PCHQR in 2024 (please see 2024 CMS Disparities Methods FAQs (07/19/24), at https://qualitynet.cms.gov/pch/measures/readmissions/resources). Associated codes are in the attached Data Dictionary.

We compared the difference in observed readmission rates between dual eligible and non-dual eligible patients for hospitals. See Supplemental Table 1.19.

1.20 Types of Data Sources

Claims Data

1.21a Data Collection Tool URL(s)

http://example.com

1.25 Data Source Details

Medicare Limited Dat Set (LDS) Standard Analytic Files (SAF), 2020-2022

Master Beneficiary Summary File

Fee-For-Service Inpatient (IP) Claim File

Inpatient Revenue Center File

1.26 Minimum Sample Size

Based on the signal to noise reliability values calculated for 5.4.2, we determined a minimum case count of 50 index admissions per year helped stabilize the reliability values above .7.

2.1 Attach Logic Model

3188 Logic Model Attachment.docx

2.2 Evidence of Measure Importance

Cancer is the second leading cause of death in the United States, with 2,041,910 new cancer cases and 618,120 cancer deaths projected to occur in the United States in 2025.[1] It is now the leading cause of death among adults aged 40 to 79 years as well and in 21 states.[2] Cancer disproportionately affects older Americans, with 86% of all cancers diagnosed in people 50 years of age and older.[1] The overall cost of cancer treatment in the US was $183 billion in 2015, and conservative projections indicate that these costs will increase 34% to $246 billion by 2030.[3] Given the current and projected increases in cancer prevalence and costs of care, it is essential that healthcare providers look for opportunities to lower the costs of cancer care.

Reducing readmissions after hospital discharge has been proposed as an effective means of lowering healthcare costs and improving the outcomes of care. Unnecessary hospital readmissions negatively impact cancer patients by compromising their quality of life, by placing them at risk for health-acquired infections, and by increasing the costs of their care. Furthermore, unplanned readmissions during treatment can delay treatment completion and, potentially, worsen patient prognosis.

Preventing these readmissions improves the quality of care for cancer patients. Numerous studies have examined all-cause readmissions and readmissions for specific conditions, and randomized controlled trials demonstrate reduced readmission rates through the following: improvement of quality of care during the initial admission improvement in communication with patients, their caregivers, and their clinicians; patient education; pre-discharge assessment; and coordination of care after discharge. Evidence that hospitals have been able to reduce readmission rates through these quality-of-care initiatives illustrates the degree to which hospital practices can affect readmission rates. Successful randomized trials have reduced 30-day readmission rates by 20-40%.[4-16] Hospital processes that reflect the quality of inpatient and outpatient care such as discharge planning, medication reconciliation, and coordination of outpatient care have also been shown to reduce readmission rates.[17]

A 2017 systematic review by Bell et al identified comorbidities, gender, older age, more advanced cancer (identified by stage, tumor size, and/or lymph node involvement), low socioeconomic status, unmarried status, race, dual eligible insurance status, and residence in low population areas, rural areas, or the Midwest or South as associated with higher readmission rates. They also found that surgical factors, such as postoperative complications and operative methods, were associated with higher readmission rates, as were longer and shorter index hospital stays and high and low hospital volume. Other characteristics of the index hospitalization associated with higher rates included having a medical (versus surgical) discharging physician, greater travel distance, discharge to a place other than home, and emergent admission.[18] Existing studies in cancer have largely focused on post-operative readmissions, reporting readmission rates between 6.5% and 25%. Brown et al. (2014) concluded that 33% of readmissions within seven days of the

index hospitalization were for issues deemed potentially preventable by the authors, including nausea, vomiting, dehydration, and postoperative pain, with improved discharge follow-up, care coordination, and palliative care.[19] Johnson et al. (2019) Found premature discharges and inadequate outpatient follow-up to be common contributors to avoidable readmissions. Ensuring timely follow-up appointments and comprehensive discharge planning can mitigate this risk.[20]

All-cause and disease-specific unplanned readmissions rates have been adopted by the Centers for Medicare & Medicaid Services (CMS) as key indicators of inpatient quality care. Additionally, Medicare began reducing payments to hospitals with excess readmissions in October 2012, as mandated in the Patient Protection and Affordable Care Act of 2010. However, cancer has lagged behind these conditions in the development of validated readmission rates. In 2012, the Comprehensive Cancer Center Consortium for Quality Improvement, or C4QI (a group of academic medical centers that collaborate to measure and improve the quality of cancer in their centers), began development of a cancer-specific unplanned readmissions measure: *30-Day Unplanned Readmissions for Cancer Patients*. The ADCC identified this ongoing work as a potential accountability measure for the PCHQR. Both groups recognize the importance of measuring unplanned readmissions as an indicator of the quality of hospital-based oncology care and have designed the *30-Day Unplanned Readmissions for Cancer Patients* measure accordingly.[5,6] This measure is intended to reflect the unique clinical aspects of oncology patients and to yield readmission rates that more accurately reflect the quality of cancer care delivery, when compared with broader readmissions measures.

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2.4 Performance Gap

Data source: Inpatient claims via the Medicare Limited Dat Set (LDS) Standard Analytic Files (SAF), 2020-2022

Unadjusted performance scores by decile for CY 2022 are provided in Table 1. 2021 performance scores and adjusted scores for 2021 and 2022 are attached in the 2.4.a attachment.

Table 1. Performance Scores by Decile

Performance Gap, 30-Day Unplanned Readmissions for Cancer Patients Measure

	Overall	Minimum	Decile_1	Decile_2	Decile_3	Decile_4	Decile_5	Decile_6	Decile_7	Decile_8	Decile_9	Decile_10	Maximum
Mean Performance Score	15.2%	0%	0%	0.6%	9.0%	12.8%	14.8%	16.4%	17.7%	19.4%	22.3%	39.4%	39.4%
N of Entities	4333		434	434	434	433	433	433	433	433	433	433	
N of Persons / Encounters / Episodes	646,500		2,137	3,760	21,792	65,953	95,032	137,322	140,636	108,031	63,132	8,705	

2.4a Attach Performance Gap Results

3188 2.4a Performance Gap Results Attachment.docx

2.6 Meaningfulness to Target Population

Hospital readmission, for any reason, is disruptive to patients and caregivers, costly to the healthcare system and policy holders, and puts patients at additional risk of hospital-acquired infections and complications. During development of the 30-Day Unplanned Readmissions for Cancer Patients measure, developers engaged five patient/caregiver advisory representatives, who provided feedback during conceptualization and development. All five agreed that the measure is meaningful and provides information valuable in making care decisions.

Moreover, a study conducted at the Hospital of the University of Pennsylvania and Penn Presbyterian Medical Center surveyed 197 oncology patients who were readmitted within 30 days of discharge to identify patient-perceived factors contributing to readmission. The most commonly reported challenges included difficulty with activities of daily living, feeling unprepared for discharge, and difficulty adhering to medications. The study highlights the importance of understanding patient perspectives to improve transition-of-care processes and reduce unplanned readmissions.[1]

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3.1 Contributions Towards Closing Care Gaps

See supplemental Table 5.1.4 and section 5.1.4. This analysis revealed higher unplanned 30-day readmission rates for cancer patients who were all other races compared to white patients (16.45% for White patients; 19.17% for Black patients; 18.31% for Asian patients; 16.60% for Hispanic patients; 18.23% for Native American patients; and 18.55% for other races). Patients who were dual eligible during the measurement period had a higher readmission rate (19.01%) compared to those who were never dual eligible (16.43%).

The literature regarding association between social risk factors and cancer-specific readmissions suggests that low income, older age, unmarried status, and language barriers are social risk factors associated with readmissions.[1-4] A 2017 recent systematic review by Bell et al identified comorbidities, gender, older age, low socioeconomic status, unmarried status, race, dual eligible insurance status, and residence in low population areas, rural areas, or the Midwest or South as associated with higher readmission rates.[5]

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4.1a Data Structure and Availability

This claims-based measure analyzes data generated or collected by and used by healthcare personnel during the provision of care, coded by someone other than person obtaining original information (e.g., DRG, ICD-10 codes on claims).

An analysis of missing data in defining the denominator found 0% missing data elements in a population of more than 1.5 million patients.

4.1b Implementation Costs and Burden

Medicare claims data are used for this measure. Claims-based measures are feasible to implement comprehensively and efficiently for large populations of patients.

Data for claims-based measures are readily available, making the measure feasible to implement and report.

4.1c Confidentiality

Medicare claims data are used for this measure. Access to Medicare claims files are limited and controlled.

4.3 Feasibility Informed Final Measure

Medicare claims data are used for this measure. Claims-based measures are feasible to implement comprehensively and efficiently for large populations of patients.

Data for claims-based measures are readily available, making the measure feasible to implement and report. Our testing work proved that it is feasible to calculate the measure, as specified.

4.4 Proprietary Information

Not a proprietary measure and no proprietary components

5.1.1 Data Used for Testing

Medicare Limited Dat Set (LDS) 100% Standard Analytic Files (SAF), Q4 2020, CY 2021, CY 2022

Master Beneficiary Summary File

Fee-For-Service Inpatient (IP) Claim File

Inpatient Revenue Center File

5.1.1a Dates of Testing Data

Field not required for Spring 2025.

5.1.2 Differences in Data

We tested minimum case counts of 5 to 50 in increments of 5, and opted for a minimum case count of 50 annual index admissions for reliability. We then also maintained that threshold for validity testing and the finalized hierarchical logistic regression mixed model covariates.

5.1.3 Characteristics of Measured Entities

4,462 hospitals were included in this analysis, including the 11 PPS exempt cancer hospitals. There were 1,356,010 admissions, with a mean of 304 admissions per hospital (standard deviation= 603). See Supplemental Table 5.1.3 in Section 7.1.

5.1.4 Characteristics of Units of the Eligible Population

Supplemental Table 5.1.4 in Section 7.1 provides characteristics of the patients with the 1,356,010 eligible hospital admissions included in the maintenance analysis. Briefly, there were 227,439 30-day unplanned readmissions. Readmission rates were slightly higher for men compared with women (17.24% vs 16.23%, respectively). Readmission rates were higher for all other races compared to white patients (16.45% for White patients; 19.17% for Black patients; 18.31% for Asian patients; 16.60% for Hispanic patients; 18.23% for Native American patients; and 18.55% for other races). Readmission rates were highest for the 75-79 age group (17.45%). Patients who were dual eligible during the measurement period had a higher readmission rate (19.01%) compared to those who were never dual eligible (16.43%).

5.2.1 Level(s) of Reliability Testing Conducted

Accountable entity level (i.e., measure score) (e.g., signal-to-noise analysis)

5.2.2 Method(s) of Reliability Testing

To calculate accountable entity level reliability of the risk standardized readmission rate, we applied signal to noise analysis, taking the variance of the hospital random effect intercepts, estimated via the hierarchical logistic regression, as the ‘signal’ value (hospital to hospital variance) and each hospital’s estimated measurement error variance as ‘noise’ (hospital-specific error). Thus, each hospital’s signal to noise reliability for the risk adjusted outcome is calculated as signal/(signal+noise).

5.2.3 Reliability Testing Results

After limiting the dataset to hospitals with 50 or more index admissions in a calendar year, reliability estimates for are .7 or greater. Mean reliability for the hospital cohort meeting that

threshold is 0.938 and 0.935 in 2021 and 2022 respectively.

5.2.3a Attach Additional Reliability Testing Results

3188 5.2.3a Reliability Testing Results Attachment.docx

5.2.4 Interpretation of Reliability Results

Testing done via the test-retest method for the original measure submission found that hospitals with a minimum annual case count of 50 admissions produced consistent and stable results while maintaining as many hospitals as possible for the measure calculations. We opted to reevaluate this cutoff point, applying annual minimum index admissions thresholds from 5 to 50 in increments of 5 to the cohort of index admissions, refitting the hierarchical logistic random intercepts model to that dataset, then calculating signal to noise reliability based on the estimated variance of the hospital random intercepts fit to that cohort (signal) and each hospital's estimated measurement error variance (noise).

Our findings corroborated the previous findings, suggesting that an annual minimum of 50 index admissions produced reliability estimates above .7 for all hospitals included in the dataset while minimizing the removal of hospitals from reporting.

Table 2. Accountable Entity Level Reliability Testing Results by Denominator, Target Population Size

Accountable Entity-Level Reliability Testing Results

	Overall	Minimum	Decile_1	Decile_2	Decile_3	Decile_4	Decile_5	Decile_6	Decile_7	Decile_8	Decile_9	Decile_10	Maximum
Reliability	0.935	0.772	0.849	0.880	0.908	0.924	0.938	0.952	0.962	0.972	0.980	0.989	0.989
Mean Performance Score	17.3%		17.3%	17.3%	17.3%	17.3%	17.3%	17.4%	17.4%	17.3%	17.3%	17.5%	
N of Entities	2,008		201	201	201	201	201	201	201	201	200	200	
N of Persons / Encounters / Episodes	614,217	50	11,669	15,793	20,830	25,978	33,124	43,242	55,925	75,046	106,083	226,581	

5.3.1 Level(s) of Validity Testing Conducted

Accountable entity level (i.e., measure score) (e.g., criterion validity)

5.3.2 Type of Accountable Entity Level Validity Testing Conducted

Empirical validity testing at the accountable entity-level (e.g., criterion validity, construct validity, known groups analysis)

5.3.3 Method(s) of Validity Testing

Initial empirical validity testing compared the 30-Day Unplanned Readmissions for Cancer Patients measure with CMS' Hospital-Wide All-Cause Readmission (HWR) measure. At that time, the TEP selected the HWR measure given gaps in cancer-specific process or outcome measures suitable for this purpose. While the two measures have different target populations, they both utilize Medicare claims administrative claims data and assess unplanned readmissions within

thirty days of hospital discharge. Additionally, the 30-Day Unplanned Readmissions for Cancer Patients measure was modeled after the HWR measure where possible.

The hypothesized relationship was that better performance (i.e., lower hospital-level rates) on the HWR measure should be associated with better performance (i.e., lower hospital-level rates) on the 30-Day Unplanned Readmissions for Cancer Patients measure. Moderate positive correlation was expected, given that the measures assess similar healthcare practices related to patient care, but mutually exclusive patient populations.

For this maintenance analysis, we tested the same hypothesis, with moderate positive correlation expected.

5.3.4 Validity Testing Results

Using the results of 30-Day Unplanned Readmissions for Cancer Patients for CY 2022 compared with the HWR values published for the period Q3 2022 – Q2 2023, 1,995 hospitals had data for both measures. We found an overall correlation of .402 (95% CI: .365, .439) ($p<0.001$).

5.3.5 Interpretation of Validity Results

As expected, we found a statistically significant, moderate, positive correlation (0.402) between the 30-Day Unplanned Readmissions for Cancer Patients measure and the HWR measure.

5.4.1 Methods Used to Address Risk Factors

Statistical case-mix adjustment model, Stratification by risk factor category

5.4.2 Conceptual Model Rationale

During the initial measure development, we identified potential risk factors for the 30-Day Unplanned Readmissions for Cancer Patients measure using the following methods:

- Review of the literature; and,
- Convening a multidisciplinary workgroup of:
- Physician subject-matter experts from cancer hospitals to identify patient-level risk adjustors that are clinically-relevant for unplanned readmissions in patients with cancer;
- Data analysts with experience in complex analyses of hospital data, quality measurement, and quality improvement, with a specific focus on cancer conditions;
- Experienced coders to advise on the selection and completeness of code lists for the measure; and,
- Analytics experts with experience in statistical testing methods and in creating predictive models for unplanned readmissions.

In total, 25 patient-level variables were evaluated for potential inclusion in the risk adjustment model. The list of potential risk adjustors was then compared to the data elements available in administrative claims data. Since this measure is to be implemented using claims data only, 7 clinical and SDS variables (Supplemental Table 5.4.2, Group A in Section 7.1) that are not well-defined in claims data were not included in this model. Additionally, 2 variables (Supplemental Table 5.4.2, Group B in Section 7.1) were unavailable in our measure testing dataset. The list of potential risk adjustors was then refined to include only variables *not* in the control of the hospital, as the goal of this model is to adjust for patient-specific factors only. This eliminated 1 variable (Supplemental Table 5.4.2, Group C). Finally, 1 SDS variable ("Race") was removed (Supplemental Table 5.4.2 in Section 7.1, Group D). Joynt et al. found that racial disparities in readmissions were related to patient race *and* the site of care, suggesting an opportunity to reduce disparities in care;[2] thus, we removed the variable to ensure that the risk adjustment model would not mask disparities in care. This process yielded 14 risk factors (Supplemental Table 5.4.2, Group E in Section 7.1) to be evaluated for fit in the risk adjustment model. Throughout this process, all potential risk factors were determined by careful review with workgroup members. They reflect clinically-relevant decisions and alignment with coding practices and analytical standards to ensure accurate assessments of patient-level risk factors present at the index admission and outside the control of the hospital.

The complete list of potential risk factors identified through the workgroup's review, with the workgroup's assessment, is in attached Supplemental Table 5.4.2 in Section 7.1.

For measure maintenance, we re-evaluated clinical and social risk factors. First, we re-reviewed published literature. The literature regarding association between social risk factors and cancer-specific readmissions is mostly limited to readmissions following surgical procedures and results are varied; however, studies suggest that low income, older age, unmarried status, and language barriers are social risk factors associated with readmissions.[1-4] A 2017 recent systematic review by Bell et al identified comorbidities, gender, older age, more advanced cancer (identified by stage, tumor size, and/or lymph node involvement), low socioeconomic status, unmarried status, race, dual eligible insurance status, and residence in low population areas, rural areas, or the Midwest or South as associated with higher readmission rates. They also found that surgical factors, such as postoperative complications and operative methods, were associated with higher readmission rates, as were longer and shorter index hospital stays and high and low hospital volume. Other characteristics of the index hospitalization associated with higher rates included having a medical (versus surgical) discharging physician, greater travel distance, discharge to a place other than home, and emergent admission.[5]

A panel of experts - including physician subject-matter experts from cancer hospitals, quality measurement experts, and analytic experts – re-reviewed the original variables, updated literature, and discussed potential changes. Generally, the original clinical and SES variables and methods were supported for maintenance. Age and gender were maintained as risk factors for our maintenance modeling. Race remained excluded from modeling, as described above. Also, for this

maintenance analysis, we removed the dual eligibility variable from the risk model, as CMS initiated stratified reporting by dual eligibility status for PCHQR in 2024 (please see 2024 CMS Disparities Methods FAQs (07/19/24), at https://qualitynet.cms.gov/pch/measures/readmissions/resources). Finally, we removed the 'Discharge to' variables (Discharged to Home; Discharged to Hospice) based on expert feedback that these are substantively within the control of the hospital. The expert panel reviewed the updated statistical results produced for maintenance, as described in 5.4.4.

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5. Bell JF, Whitney RL, Reed SC, et al. Systematic Review of Hospital Readmissions Among Patients With Cancer in the United States. *Oncol Nurs Forum*. 2017;44(2):176-191. doi:10.1011/17.ONF.176-191

5.4.2a Attach Conceptual Model

3188 5.4.2a Conceptual Model Attachment.pdf

5.4.3 Variable Distribution Across Measured Entities

Variables tested for risk/case-mix adjustment included:

- Age
- Sex
- Admitted via Emergency Department
- Comorbidities
- Length of stay greater than 3 days
- Metastatic disease

- Admissions in the prior 60 days
- Intensive care unit (ICU) stay
- Solid tumor vs hematologic cancer diagnosis

Descriptive statistics are in Table 5.4.3 in the attachment.

Surgical admissions and One or more comorbidities were excluded from the model fitting process due to high tetrachoric correlation. Dual eligibility was not included in the risk adjustment model but is considered for risk stratification.

5.4.4 Risk/Case-Mix Adjustment Modeling and/or Stratification Results

Statistical results are in Table 5.4.4 in the attachment.

Testing variables for Tetrachoric correlation, we removed:

- 1 or More Comorbidities (.98 with 2 or More Comorbidities)

- Surgical Admission (-.62 with Admission via ER)

After reviewing the fitted hospital-level random intercepts hierarchical logistic regression model with our TEP, we opted to maintain all other covariates.

5.4.4a Attach Risk/Case-mix Adjustment Modeling and/or Stratification Specifications

3188 5.4.4a Risk:Case-mix Adjustment Modeling Specifications Attachment .pdf

5.4.5 Calibration and Discrimination

The Hosmer-Lemeshow Goodness-of-Fit test statistic (G = 10) is a Chi-square with 8 degrees of freedom: 470.59 ($p < 0.0001$). While this is a significant result indicating potential issues of fit with the model, the H-L test can be overpowered for large datasets ($n > 25{,}000$), potentially magnifying relatively small differences between observed and predicted rates.

The c-statistic gives a measure of how well the model discriminates between patients with or without an unplanned readmission compared. Our c-statistic was 0.601 (95% CI: 0.5993-0.6018). The decile plot attached in 5.4.5a shows relatively close predicted and observed rates within each risk decile.

5.4.5a Attach Calibration and Discrimination Testing Results

3188 5.4.5a Calibration and Discrimination Testing Results Attachment .docx

5.4.6 Interpretation of Risk/Case-mix Factor Findings

Our c-statistic of 0.601 (95% CI: 0.5993-0.6018) suggests that there are risk covariates not captured in our model that could be useful in understanding the rates of unplanned readmissions for cancer patients; however, additional variables identified by experts are not available in claims (see 5.4.2). The decile plot attached in 5.4.5a shows relatively close predicted and observed rates within each risk decile, with the largest magnitude difference in the lowest risk decile, observed: 8.1%, predicted: 9.5%, a difference of 1.4%. The magnitude of the remaining differences are 0.7% or lower. The spread between the lowest risk decile (observed: 8.1%, predicted: 9.5%) and the highest risk decile (observed: 25.4%, predicted: 26.0%) suggests the model may be adequate in controlling for differences in patient-level risk factors.

5.4.7 Final Approach to Address Risk Factors

Statistical risk adjustment model with risk factors, Stratification by risk factor category

6.1.1 Current Status

In use

6.1.3 Current Use(s)

Public Reporting, Quality Improvement (Internal to the specific organization)

6.1.3 Program Details

Name of the program and sponsor
PPS-Exempt Cancer Hospital Quality Reporting (PCHQR) Program, Centers for Medicare and Medicaid Services (CMS)
URL of the program
https://www.cms.gov/medicare/quality/initiatives/hospital-quality-initiative/pp...
Purpose of the program
Medicare Quality Reporting Program
Geographic area and percentage of accountable entities and patients included
Eleven hospitals across the nation that are granted as PPS-Exempt Cancer Hospitals. In the 7/1/2022 - 6/30/2023 PCHQR reporting period, there were a total of 20,371 cases in the 11 hospitals for this measure.
Applicable level of analysis and care setting

Hospital inpatient reporting program

6.2.1 Actions of Measured Entities to Improve Performance

The outcome of unplanned hospital visits following discharge from an inpatient admission is a widely accepted measure of care quality. The 30-Day Unplanned Readmissions for Cancer Patients measure provides the opportunity to improve the quality of care for patients with cancer and to lower rates of adverse events that result in unplanned readmission after an inpatient stay.

Across medicine, there are evidence-based interventions that can reduce readmission rates. These interventions often address inadequate transitions of care, including patient education at

discharge and coordination of outpatient care. For example, a 2021 systematic review that analyzed 60 trials, including 19 randomized controlled trials, concluded, in agreement with prior systematic reviews, that interventions that focus on communication at discharge were statistically significantly associated with lower rates of hospital readmissions (Becker et al., 2021). Within the 19 trials,10 focused on medication counselling, and six focused on patient education about their condition: the other three focused on other specific communication strategies. A 2022 systematic review found that post-discharge care including home care, telephone, and/or clinic visits resulted in lower rates of readmission compared with “usual care” for cardiac patients (Chauhan & McAlister, 2022). A systematic review published in 2023 pooled the results from 73 different studies to compare transitional care interventions with different levels of complexity and their impact on improving outcomes and found that low- and medium-complexity interventions were the most effective at reducing 30-day readmissions (Tyler et al., 2023). Study authors found that compared with usual care, readmission rates were reduced by 18 percent to 55 percent for these types of interventions. Complexity was categorized by the number of components of the intervention, and the number of stages of the hospitalization that the intervention was implemented. Finally, CMS has published a guide for hospitals, aimed at leadership, staff, and clinicians, which outlines effective strategies for reducing readmissions and reducing disparities. Strategies covered in the guide include: ensuring that patients understand discharge instructions and have appropriate follow-up visits, improving accessibility (transportation) for post-discharge care, ensuring patients have a primary care provider, starting post-discharge visit planning early in the discharge process, ensuring transfer of information to the post-discharge provider, and strategies to address language barriers and low health literacy (CMS Office of Minority Health, 2024).

For cancer patients specifically, Brown et al. (2014) concluded that 33% of readmissions within seven days of the index hospitalization were for issues deemed potentially preventable by the authors, including nausea, vomiting, dehydration, and postoperative pain, with improved discharge follow-up, care coordination, and palliative care. Johnson et al. (2019) Found premature discharges and inadequate outpatient follow-up to be common contributors to avoidable readmissions. Ensuring timely follow-up appointments and comprehensive discharge planning can mitigate this risk.

References

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6.2.2 Feedback on Measure Performance

The ADCC's Quality Workgroup provides ongoing review and discussion regarding reporting of the 30-Day Unplanned Readmissions for Cancer Patients in the PCHQR program. Members of ADCC's Quality Workgroup and Physician Advisory Group served as the TEP for maintenance of this measure. Further, discussions with CMS staff and analytic vendor for this measure in PCHQR informed the maintenance efforts.

CMS receives feedback on all its measures through the publicly available Q&A tool on Quality Net. As the measure steward, the ADCC has not received any substantive feedback on this measure as implemented in the PCHQR program.

6.2.3 Consideration of Measure Feedback

Modifications made based on feedback from the groups described above are noted throughout this submission. Briefly, these include:

- updating the Data Dictionary to reflect coding changes
- modifications to the cohort / denominator analysis, to exclude patients admitted with a psychiatric primary diagnosis and exclude patients admitted for rehabilitation (based on TEP guidance and to be consistent with other hospital readmission measures)
- modifications to risk adjustment variables. QWG members proposed and the TEP ultimately rejected a suggestion to add a variable for DNR status present on admission. TEP members supported removing the 'discharge to' variables based on feedback that this variable is within the control of the measured entity. TEP members supported removing dual eligibility from the risk adjustment model after understanding CMS' reporting of the measure with stratification based on dual eligibility status.

6.2.4 Progress on Improvement

This measure has been publicly reported in the PCHQR program in 2023 and 2024. For results published in 2023 (reflecting a measurement window of 10/1/21-9/30/22), the national rate was

20.8; 1 of 11 hospitals were better than the national rate, 1/11 were worse than the national rate, and 9/11 were no different from the national rate. For results published in 2024 (reflecting a measurement window of 10/1/22-9/30/23), the national rate was 20.2; 1 of 11 hospitals were better than the national rate, 10/11 were no different than the national rate. With only 2 years of publicly reported data it is difficult to make conclusions about progress on improvement; however, national rates and individual performance slightly improved from 2023 to 2024.

6.2.5 Unexpected Findings

There were no unintended impacts during implementation of this measure on patients or in care delivered by hospitals.

7.1 Supplemental Attachment

3188 Supplemental Tables .docx

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The measure developer is different from the measure steward

Yes

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