Specifications for Home Health Claims-Based Utilization Measures

1.1 Overview of Measures

	Emergency Department Use without Hospitalization	Acute Care Hospitalization
Measure Description	Percentage of home health stays in which patients used the emergency department but were not admitted to the hospital during the 60 days following the start of the home health stay.	Percentage of home health stays in which patients were admitted to an acute care hospital during the 60 days following the start of the home health stay.
Numerator	Number of home health stays for patients who have a Medicare claim for outpatient emergency department use and no claims for acute care hospitalization in the 60 days following the start of the home health stay.	Number of home health stays for patients who have a Medicare claim for an admission to an acute care hospital in the 60 days following the start of the home health stay.
Numerator Details	The 60 day time window is calculated by adding 60 days to the "from" date in the first home health claim in the series of home health claims that comprise the home health stay. If the patient has any Medicare outpatient claims with any ER revenue center codes (0450-0459, 0981) during the 60 day window AND if the patient has no Medicare inpatient claims for admission to an acute care hospital (identified by the CMS Certification Number on the IP claim ending in 0001-0879, 0800-0899, or 1300-1399) during the 60 day window, then the stay is included in the measure numerator.	The 60 day time window is calculated by adding 60 days to the "from" date in the first home health claim in the series of home health claims that comprise the home health stay. If the patient has at least one Medicare IP claim from short term or critical access hospitals (identified by the CMS Certification Number ending in 0001-0879, 0800-0899, or 1300-1399) during the 60 day window, then the stay is included in the measure numerator.
Numerator Exclusions	None.	Planned hospitalizations are excluded from the numerator.
Denominator	Number of home health stays that begin during the 12-month observation period. A home health stay is a sequence of home health payment episodes separated from other home health payment episodes by at least 60 days.	Number of home health stays that begin during the 12-month observation period. A home health stay is a sequence of home health payment episodes separated from other home health payment episodes by at least 60 days.

	Emergency Department Use without Hospitalization	Acute Care Hospitalization
Denominator Details	See below for details about home health stay construction.	See below for details about home health stay construction.
Denominator Exclusions	1) Home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 60 days following the start of the home health stay or until death. 2) Home health stays that begin with a Low Utilization Payment Adjustment (LUPA) claim. 3) Home health stays in which the patient receives service from multiple agencies during the first 60 days. 4) Home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 6 months prior to the home health stay.	1) Home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 60 days following the start of the home health stay or until death. 2) Home health stays that begin with a Low Utilization Payment Adjustment (LUPA) claim. 3) Home health stays in which the patient receives service from multiple agencies during the first 60 days. 4) Home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 6 months prior to the home health stay.

1.2 Construction of Home Health Stays

A home health stay is a sequence of home health payment episodes separated from other home health payment episodes by at least 60 days. Each home health payment episode is associated with a Medicare home health (HH) claim, so home health stays are constructed from claims data using the following procedure.

1. First, retrieve HH claims with a "from" date (FROM_DT) during the 12-month observation period or the 120 days prior to the beginning of the observation period and sequence these claims by "from" date for each beneficiary.
2. Second, drop claims with the same "from" date and "through" date (THROUGH_DT) and claims listing no visits and no payment. Additionally, if multiple claims have the same "from" date, keep only the claim with the most recent process date.
3. Third, set Stay_Start_Date(1) equal to the "from" date on the beneficiary's first claim. Step through the claims sequentially to determine which claims begin new home health stays. If the claim "from" date is more than 60 days after the "through" date on the previous claim, then the claim begins a new stay. If the claim "from" date is within 60 days of the "through" date on the previous claim, then the claim continues the stay associated with the previous claim.
4. Fourth, for each stay, set Stay_Start_Date(n) equal to the "from" date of the first claim in the sequence of claims defining that stay. Set Stay_End_Date(n) equal to the "through"

date on the last claim in that stay. Confirm that Stay_Start_Date(n+1) – Stay_End_Date(n) > 60 days for all adjacent stays.

5. Finally, drop stays that begin before the 12-month observation window.

Note that examining claims from the 120 days before the beginning of the 12-month observation period is necessary to ensure that stays beginning during the observation period are in fact separated from previous home health claims by at least 60 days.

1.3 Exclusions from the Measure Denominators

Four types of home health stays are excluded from the measure denominator:

1. Home health stays for patients who are not continuously enrolled in fee-for-service Medicare during the measure numerator window (60 days following the start of the home health stay) or until death.
    - Both enrollment status and beneficiary death date are identified using the Medicare Enrollment Database (EDB).
2. Home health stays that begin with a Low Utilization Payment Adjustment (LUPA) claim.
    - Exclude the stay if LUPAIND = L for the first claim in the home health stay.
3. Home health stays in which the patient receives service from multiple agencies during the first 60 days.
    - Define Initial_Provider = PROVIDER on the first claim in the home health stay.
    - If Intial_Provider does not equal PROVIDER for a subsequent claim in the home health stay AND if the "from" date of the subsequent claim is within 60 days of Stay_Start_Date, then exclude the stay.
4. Home health stays for patients who are not continuously enrolled in fee-for-service Medicare for the 6 months prior to the start of the home health stay.
    - Enrollment status is identified using the Medicare Enrollment Database (EDB).

In the first case, we lack full information about the patient's utilization of health care services and cannot determine if care was sought in an emergency department during the numerator window. In the next two cases, it is unclear that the initial home health agency had an opportunity to impact the patient's health outcomes. In the final case, the stay is excluded because we lack information about the patient's health status prior to the beginning of home health that is needed for risk adjustment.

1.4 Exclusions from the Measure Numerators

No home health stays are excluded from the Emergency Department Use without Hospitalization or the Acute Care Hospitalization measure numerators.

Inpatient claims for planned hospitalizations are excluded from the Acute Care Hospitalization measure numerator. Planned hospitalizations are defined using the same criteria as the Hospital-Wide All-Cause Unplanned Readmission Measure. Specifically, admissions are categorized as "planned" based on AHRQ Procedure and Condition CCS as well as other sets of ICD-9-CM procedure codes. These admissions are excluded unless they have a discharge condition category considered "acute or complication of care," which is defined using AHRQ Condition CCS. The definitions of AHRQ CCS can be found here: http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp

The AHRQ CCS that define planned hospitalizations are found below and are AHRQ Procedure CCS unless otherwise noted.

AHRQ CCS	Description
45	PTCA
Condition CCS 254	Rehabilitation
84	Cholecystectomy and common duct exploration
157	Amputation of lower extremity
44	CABG
78	Colorectal resection
51	Endarterectomy; vessel of head and neck
113	Transurethral resection of prostate
99	Other OR Gastrointestinal therapeutic procedures
48	Insertion; revision; replacement; removal of cardiac pacemaker or cardioverter/defibrillator
Condition CCS 45	Maintenance chemotherapy
211	Therapeutic radiology for cancer treatment
3	Laminectomy; excision intervertebral disc
43	Heart valve procedures
152	Arthroplasty knee
158	Spinal fusion
55	Peripheral vascular bypass
52	Aortic resection; replacement or anastomosis
36	Lobectomy or pneumonectomy
153	Hip replacement; total and partial
60	Embolectomy and endarterectomy of lower limbs
85	Inguinal and femoral hernia repair
104	Nephrectomy; partial or complete
1	Incision and excision of CNS

AHRQ CCS	Description
124	Hysterectomy; abdominal and vaginal
167	Mastectomy
10	Thyroidectomy; partial or complete
114	Open prostatectomy
74	Gastrectomy; partial and total
119	Oophorectomy; unilateral and bilateral
154	Arthroplasty other than hip or knee
ICD-9 codes 30.5, 31.74, 34.6	Radial laryngectomy, revision of tracheostomy, scarification of pleura
166	Lumpectomy; quadrantectomy of breast
64	Bone marrow transplant
105	Kidney transplant
176	Other organ transplantation
ICD-9 codes 94.26, 94.27	Electroshock therapy

Discharge AHRQ Condition CCS considered "acute or complication of care" are listed below.

AHRQ CCS	Description
237	Complications of device; implant or graft
106	Cardiac dysrhythmias
Condition CCS 207, 225, 226, 227, 229, 230, 231, 232	Fracture
100	Acute myocardial infarction
238	Complications of surgical procedures or medical care
108	Congestive heart failure; nonhypertensive
2	Septicemia (except in labor)
146	Diverticulosis and diverticulitis
105	Conduction disorders
109	Acute cerebrovascular disease
145	Intestinal obstruction without hernia
233	Intracranial injury
116	Aortic and peripheral arterial embolism or thrombosis
122	Pneumonia (except that caused by TB or sexually transmitted disease)
131	Respiratory failure; insufficiency; arrest (adult)
157	Acute and unspecified renal failure
201	Infective arthritis and osteomyelitis (except that caused by TB or sexually transmitted disease)
153	Gastrointestinal hemorrhage
130	Pleurisy; pneumothorax; pulmonary collapse
97	Peri-; endo-; and myocarditis; cardiomyopathy
127	Chronic obstructive pulmonary disease and bronchiectasis

AHRQ CCS	Description
55	Fluid and electrolyte disorders
159	Urinary tract infection
245	Syncope
139	Gastroduodenal ulcer (except hemorrhage)
160	Calculus of urinary tract
112	Transient cerebral ischemia

1.5 Risk Model and Risk Factors

The risk model is a multinomial logit with outcomes of "no acute event," "emergency department use without hospitalization," and "acute care hospitalization."

The five risk factors include:

1. Prior Care Setting

The main categories are community (i.e., no prior care setting), outpatient emergency room, inpatient-acute (IP-acute), inpatient rehabilitation facility (IRF), psychiatric facility, long-term care facility (LTC), and skilled nursing facility (SNF). The hierarchy of setting is SNF, most recent inpatient stay, and outpatient ER. The IP-acute category is segregated using the five cohorts from the Hospital-Wide All-Cause Unplanned Readmission Measure (HWR). The five cohorts are:

1. Surgery/Gynecology: admissions likely cared for by surgical or gynecological teams;
2. Cardiorespiratory: admissions for cardiorespiratory conditions with very high readmission rates, such as pneumonia, chronic obstructive pulmonary disease, and heart failure;
3. Cardiovascular: admissions for cardiovascular conditions, such as acute myocardial infarctions;
4. Neurology: admissions for neurological conditions, such as stroke; and
5. Medicine: admissions for all other non-surgical patients.

These cohorts were designed to account for differences in readmission risk for surgical and non-surgical patients.

Finally, the IP-acute categories and the SNF category were further refined by length of stay. The categories of stay length are the 25th, 50th, and 75th percentile of prior care IP and SNF stay lengths from Medicare claims data. Each of the five IP-acute categories is separated into

stays of length 0 to 3 days, 4 to 8 days, and 9 or more days, while the SNF categories are split into stays of length 0 to 13, 14 to 41, and 42 and more days. A patient cared for in both a skilled nursing facility and an inpatient hospital during the 30 days prior to starting home health care is included in the skilled nursing categories and not the inpatient categories. The length of stay is determined from the last inpatient or skilled nursing stay prior to beginning home health care.

2. Age and Sex Interactions

Age is subdivided into 12 bins for each sex: aged 0-34, 35-44, 45-54, five-year age bins from 55 to 95, and a 95 and older category. Using a categorical age variable allows the model to account for the differing effects of age and sex. Age is determined based on the patient's age at Stay_Start_Date.

3. CMS Hierarchical Condition Categories (HCCs)

HCCs were developed for the risk adjustment model used in determining capitation payments to Medicare Advantage plans and are calculated using Part A and B Medicare claims. While the CMS-HHC model uses a full year of claims data to calculate HCCs, these measures use only 6 months of data to limit the number of home health stays excluded due to missing HCC data. All 2008 HCCs and CCs that are not hierarchically ranked that were statistically significant predictors of ACH and ED use are included in the model.

Details of the CMS-HCC model and the code lists for defining the HCCs can be found here: https://www.cms.gov/MedicareAdvtgSpecRateStats/06_Risk_adjustment.asp

A description of the development of the CMS-HCC model can be found here: https://www.cms.gov/HealthCareFinancingReview/Downloads/04Summerpg119.pdf

4. ESRD and Disability Status

Original End Stage Renal Disease (ESRD) and current ESRD status are included as risk factors. Interactions between original disabled status and sex are also included. Medicare beneficiaries with ESRD or disabled status represent a fundamentally different health profile.

5. Interaction Terms

All interaction terms included in the 2008 and 2012 HCC risk adjustment models that were statistically significant predictors of ED use and ACH were included. Interaction terms account for the additional effect two risk factors may have when present simultaneously, which may be more or less than the additive effect of each factor separately.

1.6 Algorithm for Calculating Measures

1. Construct home health stays from HH claims.

2. Identify numerator window (60 days following Stay_Start_Date) for each stay and exclude stays for patients who are not continuously enrolled in fee-for-service Medicare during the numerator window or until patient death.
3. Exclude stays that begin with a LUPA or that involve a provider change during the numerator window.
4. Link stays to enrollment data by beneficiary.
5. Exclude stays for patients who are not continuously enrolled in fee-for-service Medicare during the 6 months prior to Stay_Start_Date.
6. Calculate demographic risk factors for each stay (age, sex, etc.) using enrollment data.
7. Link to Part A and Part B claims for 6 months prior to Stay_Start_Date for each beneficiary.
8. Calculate prior care setting indicators, HCCs, and HCC interactions.
9. Link to Inpatient (IP) claims from Short Stay and Critical Access hospitals for numerator window (60 days following Stay_Start_Date).
10. Link to Outpatient claims with revenue center codes indicating emergency department use for the numerator window (60 days following Stay_Start_Date).
11. Calculate measure flags for each stay:
    a. Set Hospital Admission indicator (Hosp_Admit = 1) if any IP claims are linked to the stay in step 9.
    b. Set Outpatient ED Use indicator (OP_ED = 1) if any outpatient claims are linked to the stay in step 10.
    c. Set ED Use without Hospitalization indicator (ED_noHosp = 1) if OP_ED =1 and NOT Hosp_Admit = 1.
12. Using coefficients from the multinomial logit risk model and risk factors calculated in steps 6 and 8, calculate the predicted probability of being included in each measure numerator, for each stay (Pred_Hosp and Pred_ED_noHosp). Additionally calculate the average of Pred_Hosp and Pred_ED_noHosp across all stays that are included in the measure denominator (not excluded in steps 3 or 5) and call these values National_pred_Hosp and National_pred_ED_noHosp.
13. Calculate observed and risk-adjusted rates for each measure at each home health agency (Initial_Provider):
    a. Observed Rates:

i. Calculate the observed rate of acute care hospitalization as the fraction all (non-excluded) HH stays with that agency as Initial_Provider that are also included in the measure numerator (Hosp_Admit = 1). Call the value Agency_obs_Hosp.

ii. Calculate the observed rate of emergency department use without hospitalization as the fraction all (non-excluded) HH stays with that agency as Initial_Provider that are also included in the measure numerator (ED_noHosp = 1). Call the value Agency_obs_ED.

b. Predicted Rates:

i. Calculate the agency predicted rate of acute care hospitalization by taking the average of Pred_ Hosp across all (non-excluded) stays with that agency as Initial_Provider. Call this value Agency_pred_Hosp.

ii. Calculate the agency predicted rate of emergency department use without hospitalization by taking the average of Pred_ED_noHosp across all (non-excluded) stays with that agency as Initial_Provider. Call this value Agency_pred_ED.

c. Risk-Adjusted Rates:

i. Agency_riskadj_Hosp = National_pred_Hosp + (Agency_obs_Hosp – Agency_pred_Hosp)

ii. Agency_riskadj_ED = National_pred_ED + (Agency_obs_ED – Agency_pred_ED)