



Potentially Preventable Hospitalizations Among Medicare Home Health Patients

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Purpose

- In 2005, 28% of all Medicare home health (HH) episodes ended in hospitalization
 - Rate has changed little since CMS began tracking this quality measure in 2002
 - CMS official hospitalization rates are based on home health agency reporting using OASIS data
- Some hospitalizations may be appropriate and not all are avoidable, given many HH patients' trajectory of illness
 - CMS will soon begin a “pay for performance” demonstration to test whether the hospitalization rate (along with other outcomes of care) can be influenced by financial incentives
 - CMS is also conducting research to explore a modified hospitalization measure for use in a pay for performance program
- This study applies the adult Prevention Quality Indicators (PQIs) to explore potentially preventable HH hospitalizations

Prevention Quality Indicators (PQIs)

- PQIs are a set of measures used to identify “ambulatory care sensitive conditions” or ACSCs
- ACSCs are conditions for which good outpatient care can potentially prevent the need for hospitalization or for which early intervention can prevent complications or more severe disease
- Such PQI hospitalizations may be avoided if clinicians effectively diagnose, treat and educate patients, and if patients actively participate in their care
- Additional ACSCs in the literature are important in HH (e.g., cellulitis and gastroenteritis)

Prevention Quality Indicators 1-3, 5,7

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| <p>Diabetes Short-term Complications Admission Rate (PQI 1)</p> | <p>All non-maternal/non-neonatal discharges of age 18 years and older with ICD-9-CM principal diagnosis codes for diabetes short-term complications (ketoacidosis, hyperosmolarity, coma).</p> | <p>Exclude cases: transferring from another institution (SID ASOURCE=2) MDC 14 (pregnancy, childbirth, and puerperium) MDC 15 (newborn and other neonates).</p> |
| <p>Perforated Appendix Admission Rate (PQI 2)</p> | <p>Discharges with ICD-9-CM diagnosis code for perforation or abscess of appendix in any field among cases meeting the inclusion criteria for the denominator (population at risk).</p> | <p>Exclude cases: transferring from another institution (SID ASOURCE=2) MDC 14 (pregnancy, childbirth, and puerperium) MDC 15 (newborn and other neonates)</p> |
| <p>Diabetes Long-term Complications Admission Rate (PQI 3)</p> | <p>Discharges age 18 years and older with ICD-9-CM principal diagnosis codes for long-term complications of diabetes (renal, eye, neurological, circulatory, or complications not otherwise specified).</p> | <p>Exclude cases: transferring from another institution (SID ASOURCE=2) MDC 14 (pregnancy, childbirth, and puerperium) MDC 15 (newborn and other neonates)</p> |
| <p>Chronic Obstructive Pulmonary Disease Admission Rate (PQI 5)</p> | <p>All non-maternal discharges of age 18 years and older with ICD-9-CM principal diagnosis codes for COPD.</p> | <p>Exclude cases: transferring from another institution (SID ASOURCE=2) MDC 14 (pregnancy, childbirth, and puerperium) MDC 15 (newborn and other neonates)</p> |
| <p>Hypertension Admission Rate (PQI 7)</p> | <p>All non-maternal discharges of age 18 years and older with ICD-9-CM principal diagnosis codes for hypertension.</p> | <p>Exclude cases: transferring from another institution (SID ASOURCE=2) MDC 14 (pregnancy, childbirth, and puerperium) MDC 15 (newborn and other neonates) with cardiac procedure codes in any field</p> |

Prevention Quality Indicators 8, 10-12

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|---|--|--|
| <p>Congestive Heart Failure Admission Rate (PQI 8)</p> | <p>All non-maternal/non-neonatal discharges of age 18 years and older with ICD-9-CM principal diagnosis codes for CHF.</p> | <p>Exclude cases: transferring from another institution (SID ASOURCE=2) MDC 14 (pregnancy, childbirth, and puerperium) MDC 15 (newborn and other neonates) with cardiac procedure codes in any field</p> |
| <p>Dehydration Admission Rate (PQI 10)</p> | <p>All non-maternal discharges of age 18 years and older with ICD-9-CM principal diagnosis code for hypovolemia (276.5).</p> | <p>Exclude cases: transferring from another institution (SID ASOURCE=2) MDC 14 (pregnancy, childbirth, and puerperium) MDC 15 (newborn and other neonates)</p> |
| <p>Bacterial Pneumonia Admission Rate (PQI 11)</p> | <p>All non-maternal discharges of age 18 years and older with ICD-9-CM principal diagnosis code for bacterial pneumonia.</p> | <p>Exclude cases: transferring from another institution (SID ASOURCE=2) MDC 14 (pregnancy, childbirth, and puerperium) MDC 15 (newborn and other neonates) with diagnosis code for sickle cell anemia or HB-S disease</p> |
| <p>Urinary Tract Infection Admission Rate (PQI 12)</p> | <p>All non-maternal discharges of age 18 years and older with ICD-9-CM principal diagnosis code for urinary tract infection.</p> | <p>Exclude cases: transferring from another institution (SID ASOURCE=2) MDC 14 (pregnancy, childbirth, and puerperium) MDC 15 (newborn and other neonates) with diagnosis code of kidney/urinary tract disorder with diagnosis code of immunocompromised state with immunocompromised state procedure code</p> |

Prevention Quality Indicators 13-16

| | | |
|---|--|---|
| <p>Angina without Procedure Admission Rate (PQI 13)</p> | <p>All non-maternal discharges of age 18 years and older with ICD-9-CM principal diagnosis codes for angina.</p> | <p>Exclude cases: transferring from another institution (SID ASOURCE=2) MDC 14 (pregnancy, childbirth, and puerperium) MDC 15 (newborn and other neonates) with a code for cardiac procedure in any field</p> |
| <p>Uncontrolled Diabetes Admission Rate (PQI 14)</p> | <p>All non-maternal discharges of age 18 years and older with ICD-9-CM principal diagnosis codes for uncontrolled diabetes, without mention of a short-term or long-term complication.</p> | <p>Exclude cases: transferring from another institution (SID ASOURCE=2) MDC 14 (pregnancy, childbirth, and puerperium) MDC 15 (newborn and other neonates)</p> |
| <p>Adult Asthma Admission Rate (PQI 15)</p> | <p>All non-maternal discharges of age 18 years and older with ICD-9-CM principal diagnosis codes for asthma.</p> | <p>Exclude cases: transferring from another institution (SID ASOURCE=2) MDC 14 (pregnancy, childbirth, and puerperium) MDC 15 (newborn and other neonates) with any diagnosis code of cystic fibrosis and anomalies of respiratory system</p> |
| <p>Rate of Lower-extremity Amputation among Patients with Diabetes (PQI 16)</p> | <p>All non-maternal discharges of age 18 years and older with ICD-9-CM procedure codes for lower-extremity amputation in any field and diagnosis code for diabetes in any field.</p> | <p>Exclude cases: transferring from another institution (SID ASOURCE=2) MDC 14 (pregnancy, childbirth, and puerperium) MDC 15 (newborn and other neonates) with trauma diagnosis code in any field</p> |

Medicare's Home Health Benefit

■ Eligibility

- 1) Beneficiary must be under the care of a physician
- 2) Must need at least one of following (a) intermittent skilled nursing care, or (b) physical therapy or speech-language therapy or continue to need occupational therapy
- 3) The home health agency must be certified
- 4) Patient must be homebound, or normally unable to leave home unassisted

NOTE: prior hospital stay is not required, although more than 2/3 have prior hospital stay

■ Services covered by Medicare

- 1) Skilled nursing on part time or intermittent basis
- 2) Home health aide services on a part time or intermittent basis
- 3) Physical therapy, speech language therapy and occupational therapy for as long as doctor orders it
- 4) Other services and certain supplies

Medicare Home Health Utilization

Medicare Home Health Benefit , CY 2005 (estimated from 10% sample)

Persons served: 3,001,220

Average visits per person served: 31.79

Total program payments \$12.8 billion

Payments per persons served: \$4,276

Average number of 60-day claims: 1.74

Proportion of users with one 60-day claim: 65.45%

Data and Methods

- 10% sample of Medicare HH paid claims in 2003 and 2005
- HH claims merged with Medicare Part A claims data to identify the first acute care hospitalization within 30 days from HH episode start
- Unit of analysis is the HH episode
 - HH episode is defined as a sequence of HH claims spaced no more than 60 days apart
 - A few patients have more than one HH episode in a year
- Merged hospital stay claims provided information about admission date, primary and secondary diagnoses, and procedures, which was used to classify the stay as PQI-related or not
- Medicare enrollment data routinely added to claims provided information about patient characteristics
- Medicare provider of service data added to the analytic file provided information about HH agency characteristics

TABLE 2: Top Primary Diagnostic Codes for Hospitalizations within 30 Days of Start of Medicare Home Health, 2003 and 2005

| Rank | ICD 9 CM Code and Name | 2003 | 2005 | | |
|------|------------------------------------|---------|------|--------------------------------|---------|
| | | Percent | Rank | ICD Code | Percent |
| 1 | *Heart Failure | 8.83 | 1 | *Heart Failure | 8.31 |
| 2 | *Pneumonia, organism NOS | 4.65 | 2 | *Pneumonia, organism NOS | 4.42 |
| 3 | *Fluid/Electrolyte Dis | 4.42 | 3 | *Fluid/Electrolyte Dis | 3.86 |
| 4 | Cardiac Dysrhythmias | 2.92 | 4 | Septicemia | 3.17 |
| 5 | Other Surgical Complications | 2.8 | 5 | Other Surgical Complications | 2.9 |
| 6 | Replace & Graft Complications | 2.77 | 6 | Cardiac Dysrhythmias | 2.83 |
| 7 | *Chronic Bronchitis | 2.69 | 7 | Replace & Graft Complications | 5.46 |
| 8 | *Other Urinary Tract Disorders | 2.48 | 8 | *Other Urinary Tract Disorders | 2.66 |
| 9 | *Diabetes mellitus | 2.42 | 9 | *Chronic Bronchitis | 2.53 |
| 10 | General Symptoms | 2.36 | 10 | Acute Renal Failure | 2.45 |
| 11 | Septicemia | 2.19 | 11 | General Symptoms | 2.24 |
| 12 | Acute Myocardial Infarction | 1.88 | 12 | *Diabetes mellitus | 2.14 |
| | | 40.67 | | | 42.97 |
| | *PQI-related codes | | | | |

Results: Top Causes of 30-day Hospitalization Rates

- 16% of HH episodes result in hospitalization within the first 30 days following start of HH care
- 12 major ICD9 diagnosis code categories (using principal diagnosis) account for at least 40% of these stays
 - Leading cause of these hospitalizations (8-9%): congestive heart failure (8%-9%)
 - Remaining 11 code categories each account for between 2% and 5% of stays
- Of the top 12 principal diagnoses for these hospitalizations, 6 are potentially preventable, using proxies for PQI categories (Table 2):
 - Congestive heart failure (8-9%)
 - Pneumonia (4-5%)
 - Fluid/electrolyte disorder (4%)
 - Chronic bronchitis (2-3%)
 - Urinary tract infection (2-3%)
 - Diabetes (2-3%)
- 2003 and 2005 results indicate consistency in potential prevention targets

Results: Top Causes of 30-day Hospitalization Rates

- High ranking for patient safety indicators/medical errors
 - Surgical complications principal diagnosis rate, approx. 3%
 - Replace and graft complications diagnosis rate, approx. 5%
- Acute renal failure appears on the top-12 list in 2005, replacing AMI (moved to 16th place in 2005)
- Other ACSCs are important causes of stays within 20 days of admission to home health (data not shown)
 - Cellulitis (2%)
 - Gastroenteritis (2%)

Results: PQI Stays

- Almost 30% of all hospitalizations within 30 days of start of care are PQI related (Table 3)
- Leading PQI-related stays, 2005:
 - Congestive heart failure (10%)
 - Bacterial pneumonia (5%)
 - Dehydration (3%)
 - COPD (3%)
 - UTI (3%)
 - Diabetes (2%)
- Additional ACSCs (e.g., cellulitis) account for an additional 4% of hospitalizations (data not shown)

Table 3: Prevention Quality Indicators (PQIs) Hospitalizations within 30 days of start of Medicare home health, 2003 and 2005

| PQI Number | ICD 9 CM Code and Name | 2003* | | 2005* | |
|----------------|---|--------|---------|--------|---------|
| | | Number | Percent | Number | Percent |
| 1 and 3 and 14 | Diabetes Short-term & Long Term Complications/Uncontrolled Diabetes | 995 | 2.42 | 1011 | 2.14 |
| 2 | Perforated Appendix | 10 | 0.02 | 12 | 0.03 |
| 5 | Chronic Obstructive Pulmonary Disease | 1243 | 3.02 | 1267 | 0.1 |
| 7 | Hypertension | 511 | 1.24 | 156 | 1.39 |
| 8 | Congestive HEART FAILURE* | 3767 | 9.16 | 4500 | 8.66 |
| 10 | Dehydration | 1816 | 4.42 | 1275 | 3.86 |
| 11 | Bacterial pneumonia | 2247 | 5.46 | 2249 | 5.15 |
| 12 | Urinary Tract Infection | 1157 | 2.81 | 1204 | 2.98 |
| 13 | angina | 97 | 0.24 | 80 | 0.19 |
| 15 | Adult asthma | 200 | 0.49 | 254 | 0.53 |
| 16 | Lower-extremity amputation among Diabetic Patients | 0 | 0 | 0 | 0 |
| | TOTAL PQI RELATED HOSPITALIZATIONS | 12043 | 29.28 | 12008 | 25.03 |
| | Total hospitalizations w/i 30 days of HH start | 41131 | | 43895 | |
| | Percent PQI-related hospitalizations of total hospitalizations | 0.29 | | 0.27 | |

* Preliminary estimates based on 10% file

Results: Variations in PQI Rates

- We estimated odds ratios from simple logistic regression predicting at least one PQI stay within 30 days of start of care

- Patient characteristics odds ratios
 - Male: 1.23 (p<.0001)
 - Rural residence: 1.19 (p<.0001)
 - African-American: 1.54 (p<.0001, reference group=Asian)
 - Hispanic: 1.61 (p<.0001, reference group=Asian)
 - White: 1.48 (p<.0001, reference group=Asian)
 - End-stage renal beneficiaries: ≥ 2.00 (p<.0001, reference group=disability beneficiaries)

- Agency characteristics odds ratios (reference group=proprietary agencies)
 - Nonprofit: 1.12-1.16 (p<.0002)
 - Governmental, state and local: 1.17-1.24 (p<.03)

Discussion

- Preliminary estimates suggest PQI related hospitalizations constitute a sizeable proportion, up to 30%, of all hospitalizations, among Medicare home health patients within 30 days
- Congestive heart failure alone consistently accounts for 8% to 9% of stays within the first 30 days, and some industry efforts underway recognize that patients with this condition are an important focus for quality improvement
- Additional ACSCs (e.g., cellulitis) appear to be prominent reasons for stays among HH populations, and may serve to supplement the results of the PQI algorithm
- In 2005, as many as 9% of home health admissions experienced a subsequent stay within 30 days that potentially related to patient safety issues (surgical or graft complications)
- Characteristics associated with reduced access to care (race/ethnicity, rural residence) are associated with higher preliminary PQI rates
- Agency “demographic” differences in PQI rates may exist

Implications for Quality in HH

- Implications for home health providers:
 - HH agencies may use this information about potentially preventable stays to target patients with conditions where hospitalization risk is high and may be influenced by HH care plans
 - About 30% of home health admissions present with a surgical wound of some kind. The high proportion of subsequent stays potentially due to patient safety issues highlight that this population is at risk for patient safety problems and might be targeted for special approaches in HH treatment plans
- Implications for Medicare quality programs:
 - In developing P4P programs, CMS may find it beneficial to focus on subsets of stays (e.g., more preventable ones) when linking prevention to rewards
 - Use of hospital-determined reasons for the stay (as in this study) will likely improve the statistical reliability of hospitalization outcome measures in the quality program

Limitations

- Applicability of preventable hospitalization algorithms to Medicare home health populations may be limited in certain cases, as significant portions of the population can be terminal (annual death rate among home health users exceeds general Medicare beneficiary annual death rate). Further development of the algorithm for this application needs study.
- Risk adjustment, not part of this study, may be appropriate for the home health population when applying PQIs.
- A 10% sample, consisting of 285,000 HH admissions, was not large enough to capture any amputations (PQI #16), and resulted in very low numbers for perforated appendix. A larger sample is desirable, especially when estimating PQI rates for some subgroups.
- Inclusion of end-stage-renal beneficiaries (3% of the sample) increased the observed rates.
- Changes in hospital diagnosis coding practices are possible over time (e.g., due to occasional payment system modifications), which could affect comparisons of outcomes through time unless accounted for.

Next Steps

- Investigate possible role of hospitalization prior to start of HH episode in influencing rates and timing of PQI-related stays
- Examine sensitivity of PQIs to inclusion/exclusions of certain days post-admission (i.e., some time periods may be more reflective of agency care quality than others)
- Develop and test risk adjustment methods