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Persistence of High-Need Status Over Time Among Fee-for-Service Medicare Beneficiaries

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Abstract

Although administrative claims data can be used to identify high-need (HN) Medicare beneficiaries, persistence in HN status among beneficiaries and subsequent variation in outcomes are unknown. We use national-level claims data to classify Fee-for-Service (FFS) Medicare beneficiaries as HN annually among beneficiaries continuously enrolled between 2013 and 2015. To examine persistence of HN status over time, we categorize longitudinal patterns in HN status into being never, newly, transiently, and persistently HN and examine differences in patients' demographic characteristics and outcomes. Among survivors, 23% of beneficiaries were HN at any time—4% persistently HN, 13% transiently HN, and 6% newly HN. While beneficiaries who were persistently HN had higher mortality, utilization, and expenditures, classification as HN at any time was associated with poor outcomes. These findings demonstrate longitudinal variability of HN status among FFS beneficiaries and reveal the pervasiveness of poor outcomes associated with even transitory HN status over time.

Keywords

Medicare; high-need; health care utilization; mortality

Introduction

Approximately 5% to 10% of Americans are responsible for 50% to 75% of health care spending. To better understand the small proportion of Americans who consume a vast amount of health care services at the highest cost, a variety of work has been conducted to identify high-need, high-cost (HNHC) individuals (Belanger et al., 2019; Figueroa et al., 2017; Hayes et al., 2016; Joynt et al., 2017). Significant emphasis has been placed on identification of clinical subgroups within samples of high-cost patient populations (Clough

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Declaration of Conflicting Interests

The authors declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Vincent Mor is the chair of the Scientific Advisory Board and consultant at NaviHealth, Inc. as well as former director of PointRight, Inc., where he holds less than 1% equity. All other authors have no conflicts to disclose.

Supplemental Material

Supplemental material for this article is available online.

et al., 2016; Figueroa et al., 2017; Figueroa et al., 2019; Joynt et al., 2017). While HN individuals are typically considered to be the most costly to the health care system, not all high-cost individuals can be easily classified as HN (Long et al., 2017). Moreover, persistence of high-cost status over time is variable as many Medicare beneficiaries in high-cost samples transition out of being high-cost over time. In fact, only 28% beneficiaries classified as high-cost in 2012 in one study remained so over 2 years of follow-up and accounted for only 20% of overall spending during the 3-year study period (Figueroa et al., 2019). These findings raise concerns about the usefulness of targeting enrollees on the basis of cost alone.

Additionally, many health systems have designed and implemented programs to improve care delivery to decrease costs among HNHC individuals, but programs have had inconsistent results, have lacked sustainability, and have not been broadly implemented (Anderson et al., 2015; Blumenthal et al., 2016). Lack of consensus about how to best identify individuals who are HNHC has delayed sustainable implementation and generalizability of these interventions, as programs typically focus on individuals with a particular diagnosis or utilization pattern. The health care needs of this population are complex, difficult to meet, and are not necessarily related to a single diagnosis (Anderson et al., 2015; Blumenthal et al., 2016). As a first step toward optimizing care delivery for this population, we need to develop definitions of HN status that health systems can leverage to identify patients as HN over time.

Our team recently used administrative claims data to identify HN beneficiaries at risk of hospitalization and mortality among the entire Medicare population, rather than in a high-cost sample of beneficiaries (Belanger et al., 2019). Using national data, beneficiaries were classified as HN based on the presence of complex conditions or multimorbidity, acute or postacute health care utilization, frailty, and dependency in mobility or activities of daily living (ADL). This definition used a larger variety of data sources (inpatient claims as well as postacute care assessments) to classify HN beneficiaries and was found to have comparable specificity and improved sensitivity for prediction of mortality and hospitalization in the next year than previous definitions, such as having three or more hierarchical condition categories (HCCs). Overall, 11.8% of Medicare beneficiaries in 2014 ($n = 6,465,948$) were classified as HN using our definition. Moreover, beneficiaries who were classified as HN in 2014 were seven times more likely to die and three times more likely to be hospitalized in 2015 when compared with non-HN beneficiaries. Although this definition can identify beneficiaries at risk of poor outcomes in the next year, it has not yet been used to examine transitions in HN status over time and how this may affect health outcomes. Variation in outcomes as a function of persistence or fluctuation in HN status among beneficiaries provides valuable insight into the relationship between transitions in HN status, mortality, hospitalization, and being high-cost over time. Beneficiaries whose HN status varies over time may be misclassified and closer examination of such transient HN status and utilization could further improve our conceptualization of the HN population.

New Contributions

Although it is possible to classify HN status among Medicare beneficiaries using national-level administrative claims and assessment data, transitions in HN status over time have yet to be explored. Moreover, little is known about variation in expenditures and outcomes associated with longitudinal transitions in HN status. Given low persistence of high-cost status over time among Medicare beneficiaries (Figueroa et al., 2019), it is probable that significant variation also exists in persistence of HN status over time, which may reflect fluctuations in medical need and associated expenditures. The population of high utilizers of health care is incredibly complex and heterogeneous—some individuals are HN based on an acute and high-cost event while others are HN as a result of complexity or type of chronic conditions, presence of frailty, and/or functional limitations (Long et al., 2017). Therefore, some individuals may remain persistently HN for years while others transition in and out of HN status, die, or recover and these fluctuations in HN status over time may be associated with variation in outcomes. In this investigation, we aim to (a) describe the patterns of persistence in HN status among Medicare beneficiaries over a 3-year period using a national-level claims-based definition and (b) examine the characteristics and outcomes of Medicare beneficiaries as a function of persistence of HN status over time.

Method

Data Sources and Study Population

To identify HN FFS beneficiaries, we used the Medicare Master Beneficiary Summary file (MBSF), MedPAR hospitalization file, Cost & Use file, Chronic Conditions Warehouse (CCW), and postacute care assessments (Minimum Data Set [MDS]), Inpatient Rehabilitation Facility Patient Assessment Instrument (IRF-PAI), and Home Health Outcome and Assessment Information Sets [OASIS]). The MBSF was used to identify demographic characteristics, and the MedPAR and Cost & Use files were used to identify diagnoses indicative of frailty, acute stays, postacute stays, and expenditures. The CCW was used to identify the presence of 26 chronic conditions, which were then used to identify multimorbidity (six or more conditions) and medical complexity (two or more complex chronic conditions). We used postacute care assessments to identify functional limitations. A complete listing of variables used in our HN definition by data source is provided in the Supplemental Table S1 (available online).

Measures

High-Need Beneficiaries.—Fee-for-Service beneficiaries were classified as HN using a hierarchical administrative claims-based definition. For detailed information on the identification of the HN population, see Belanger et al. (2019). Briefly, first, we identified beneficiaries who were flagged as having multimorbidity or being medically complex and who received acute or postacute care services in that year. In addition, any beneficiaries flagged as being frail or having functional limitations were considered HN if not already captured with multimorbidity and utilization. Functional limitations were defined as dependency in one or more mobility or ADL items in their last postacute care assessment for the target year.

Outcomes

We examined the following outcomes in 2016 as a function of persistence of HN status between 2013 and 2015: mortality, hospitalization, and being in the highest 10% of expenditures. Hospitalization was characterized as one or more acute care stays in 2015 based on the MedPAR file. We quantified total expenditures per day alive using total Medicare costs from the Cost & Use file. We then identified beneficiaries who had expenditures in the top 10% of the overall FFS Medicare population.

Analysis

To classify persistence of HN status over time and compare outcomes, we constructed an analytic cohort of FFS Medicare beneficiaries using 100% enrollment files from 2013 to 2015. In our previous work, we found that approximately 16% of beneficiaries classified as HN in a given year died the following year. Although independently informative, high mortality among HN beneficiaries inhibits clear delineation of transitions in HN status over time. Because the goal of this investigation is to identify transitions in HN status over time, we replicated the methods used by previous researchers (Figueroa et al., 2019) and included beneficiaries in the cohort only if they were enrolled continuously and survived through the end of 2015. We excluded beneficiaries who had MA enrollment in any month during the study period.

To categorize persistence of HN status over time within our survival cohort, we identified each beneficiary's annual HN status between 2013 and 2015. We first calculated the number of beneficiaries in each HN status (non-HN vs. HN) in 2013 and then identified HN status for beneficiaries in both groups in each subsequent year (2014 and 2015). We named transitions in HN status based on final HN status in 2015, accounting for patterns of HN persistence observed during the study period. Beneficiaries were classified as persistently HN (HN throughout the study period), transiently HN (HN for 1 or 2 years), newly HN (became HN in 2015), and never HN.

After identifying groups by HN persistence, we examined their characteristics and outcomes. We compared their demographic characteristics as well as the persistence of different components of the HN definition over time (overall medical complexity, specific complex chronic conditions, multi-morbidity, acute and postacute utilization, and functional limitations). We calculated the percentage of beneficiaries in each group who died, were hospitalized, or were in the top 10% of all FFS Medicare expenditures in 2016. We fit a logistic regression model to estimate the odds of experiencing each outcome across all groups by HN persistence, adjusted for age, sex, race/ethnicity, and dual eligibility. Data files were prepared using SAS version 9 and analyses were conducted using Stata version 15. Access to the data was obtained through data use agreement RSCH-2017-51007. This study received approval from the Brown University Institutional Review Board.

Results

Persistence of HN Status in 2013-2015

There were 55,328,562 Medicare beneficiaries in 2013. We excluded those who were MA at any point during 2013-2016 ($n = 20,947,991$) and individuals who were HN or non-HN but did not survive through 2015 ($n = 4,429,967$). Our final analytic cohort comprised 29,839,380 FFS Medicare beneficiaries. Persistence of HN status varied over the 3-year study period (Figure 1). Overall, 77.0% of beneficiaries were never HN, 6.0% were newly HN in 2015, 12.8% were transiently HN, and 4.0% were persistently HN. Among the non-HN beneficiaries in 2013 ($n = 26,746,169$), 7.2% became HN in 2014 and 6.8% became HN in 2015. A second group of non-HN beneficiaries were transiently HN over time (7.2%), characterized by transitions in and out of HN status in 2014 and 2015. Approximately 86.0% of the non-HN cohort remained non-HN in 2014 and 2015 and were classified as never HN.

In comparison, among beneficiaries identified as HN in 2013 ($n = 3,093,211$), 38.8% were persistently HN, and 61.2% were transiently HN by 2015. Among the beneficiaries who were HN in 2013, 46.9% transitioned out of HN status and 53.1% remained HN in 2014. Of the 46.9% beneficiaries who were no longer HN in 2014, 28.8% were reclassified as HN in 2015. Finally, 14.4% of the beneficiaries who were HN in 2013 remained HN in 2014 but were no longer HN in 2015.

Persistence of HN Status Over Time and Beneficiary Characteristics

Beneficiary demographic characteristics varied by persistence of HN status (Table 1). The never HN cohort was younger and had the smallest proportion of dually eligible beneficiaries (14.4%), while the persistently HN cohort had the highest proportion of individuals aged 85 years and older (35.0%), females (64.9%), Black race/ethnicity (14.3%), and dual-eligible beneficiaries (53.3%). Variation in prevalence of HN characteristics in each year of data was also noted based on persistence of HN status (see Supplemental Table S2, available online). By definition, beneficiaries who were categorized as persistently HN had consistently high rates of medical complexity, multimorbidity, and health care utilization. Rates of functional limitation among persistently HN beneficiaries grew steadily over time—20.0% of persistently HN beneficiaries had functional dependency in ADLs in 2013, which then increased to 50.2% in 2014 and 54.0% in 2015. Conversely, rates of functional limitations fluctuated between 9.9% and 15.2% among transiently HN beneficiaries while rates of functional limitation increased from 0% to 26.6% in 2015 among newly HN beneficiaries.

Persistence of HN Status Over Time and Beneficiary Outcomes

We found large variation in 2016 outcomes as a function of persistence of HN status between 2013 and 2015 (Table 2). Rates of mortality, hospitalizations, and being in the top 10% of Medicare expenditures were higher for any transition pattern when compared with never HN and increased incrementally for transiently, newly, and persistently HN beneficiaries. Although rates of adverse outcomes were higher for beneficiaries with any transition in HN status compared with beneficiaries who were never HN, beneficiaries who were persistently HN throughout the study period fared the worst, as they had the

highest rates of mortality (22.9%), hospitalization (47.8%), and the highest proportion of beneficiaries with expenditures in the top 10% of the sample (39.4%). In both unadjusted and adjusted regression models, beneficiaries who were classified as HN at any time had higher likelihood of poor outcomes than those who were never HN during the study period (Table 3). Transiently and newly HN beneficiaries had similar adjusted odds mortality (4.1 and 5.0, respectively), hospitalization (3.5 and 3.7), and being in the top decile of expenditures in 2016 (5.1 and 5.8) when compared with never-HN beneficiaries. However, persistently HN beneficiaries had markedly higher odds of mortality (9.4), hospitalization (5.9), and being in the top decile of expenditures (11.7) when compared with individuals who were never HN.

Discussion

The results from this investigation reveal previously unexplored patterns in the persistence of HN status among FFS Medicare beneficiaries during 3 years of follow-up. Although a large proportion of beneficiaries were never HN (77.0%), over the course of 3 years 6.0% were newly HN, 12.8% were transiently HN, and 4.0% were persistently HN. We found that classification as HN at any time was associated with markedly increased risk of mortality, hospitalization, and high health care expenditures.

Regardless of persistence of HN status, beneficiaries classified as HN at any time had markedly higher odds of mortality in 2016 when compared with beneficiaries who were never HN. Beneficiaries who were persistently HN over the 3-year period were 9.4 times more likely to die in 2016 than those never HN, and this is even ignoring all the beneficiaries who were considered HN by the end of 2013 but were excluded from analyses due to death in the 2-year interval (representing 30.2% of beneficiaries identified as HN by the end of 2013 [$n = 1,337,582$]). This large increase in mortality risk seen among persistently HN beneficiaries reflects the physiological vulnerability of this population. Persistently HN beneficiaries may have slowly evolving advanced illness and could benefit from concurrent palliative care interventions and discussion about goals of care to improve end-of-life care outcomes (Long et al., 2017). Therefore, variation in outcomes, especially mortality, based on persistence of HN status over time may be useful for identifying specific groups within the HN population that would benefit from targeted interventions, such as palliative care or hospice services to reduce overutilization of health care resources.

As expected by design of our HN definition, substantial variation in components of HN definition (multimorbidity, complexity, utilization, and functional limitation) drive persistence of HN status over time. Beneficiaries who were persistently HN had consistently high rates of multi-morbidity, medical complexity, acute and postacute utilization, and functional limitation, when compared with transiently HN beneficiaries. These findings are consistent with previous work examining variation in utilization and cost trends among high-cost and high utilizer populations (Figueroa et al., 2018; Figueroa et al., 2019; Horn et al., 2017; Johnson et al., 2015). In high-cost cohorts, expenditures typically spike around an episode of care, and remain high for only 10% to 28% of patients while dropping precipitously for the remainder of the population (Figueroa et al., 2019; Horn et al., 2017). Similar trends in acute care utilization are noted among patient populations identified as

“super-utilizers” (Johnson et al., 2015). Our results mirror these trends as utilization and subsequent cost fluctuate markedly based on longitudinal HN status, yet we find that a larger proportion of beneficiaries remain persistently HN over time when compared with beneficiaries identified as high-cost. Additionally, a higher proportion of persistently HN beneficiaries remain in the top 10% of expenditures over time when compared with high-cost beneficiaries (39% vs. 28%, respectively). This may be due to our inclusion of functional limitations, which have been excluded from previous definitions. Functional limitations are prevalent among older adults following hospitalizations (Krumholz, 2013) and have been found to persist at discharge from postacute care (Middleton et al., 2018). Recovery from high-cost or HN status following an intensive health care episode may occur more often in beneficiaries who survive such an episode with few or no functional limitations.

In fact, rates of functional limitations also drove a lot of the classification in HN status—functional dependency increased among newly HN beneficiaries and remained consistently high among persistently HN beneficiaries. Persistently HN beneficiaries also had consistently high rates of postacute care utilization in addition to functional dependency. Given that functional limitations are a primary characteristic used to define the HNHC population (Blumenthal et al., 2016; Hayes et al., 2016), it is important to better understand the relationship between postacute care utilization and functional recovery in this population. Continued functional dependency among medically complex, persistently HN beneficiaries despite postacute care utilization for rehabilitation purposes may potentially identify individuals who will remain high utilizers of health care services. This population may benefit from targeted goals of care discussions with health care providers to identify realistic potential for recovery and future care needs in an effort to deter unnecessary utilization and excessive expenditures. Further work is needed to elucidate the relationship between postacute care utilization, persistence of HN status, and health care expenditures for older adults who are medically complex and functionally dependent.

As a first step toward identifying beneficiaries at risk of sustained high health care utilization in the HNHC population, health systems need to leverage electronic health data to more accurately identify individuals who may be classified as HN (Niles et al., 2019). Empirically based definitions of HN can be implemented at the health system level to flag individuals as potentially HN. Health systems could then follow individuals flagged as HN longitudinally in order to identify those who remain persistently HN. Identification of persistently HN individuals within health systems could then allow providers and health services researchers to more granularly identify characteristics that may be amenable to interventions and better target intervention strategies to improve outcomes for this vulnerable population.

This study has a few limitations. Components of the HN definition were derived from administrative claims data, which is primarily used for billing of medical services. Measures of medical complexity and multimorbidity rely on chronic condition codes, which are based on diagnosis codes from provider encounters. Therefore, some of the shifts observed in medical complexity and multimorbidity may be due to decreased health care utilization, which would result in decreased coding and billing for conditions and lead to variation in classification of comorbidities (Lochner et al., 2013). Given that measures of utilization

are based on billing, we are unable to identify wasteful or excessive utilization. Therefore, some individuals may be misattributed as HN in our sample, and we are unable to identify individuals who may be HN, but do not have health care encounter data in administrative claims. Additionally, beneficiaries lack a common starting point for classification of HN status, as we classified HN status in 2013-2015, but did not identify HN status prior to 2012 among Medicare enrollees who certainly had significant utilization before then. Last, due to high annual mortality rates among HN beneficiaries (Belanger et al., 2019), decedents were excluded from classification and outcome analyses, which means that the results apply to a group of survivors with high utilization and need, but exclude a large portion of end-of-life care utilization each year.

Overall, we described important transitions in HN status over a 3-year period, as a portion of beneficiaries remain persistently HN, while others are transient HN, or become newly HN during follow-up. Mortality, hospitalizations, and health care expenditures vary based on persistence of HN status but are highest among persistently HN beneficiaries. Health systems could use empirically tested definitions of HN as a first step to improving the identification of actionable cohorts of HN individuals whose outcomes vary significantly over time. Once identified, health systems could target intervention programs to improve health and decrease costs for the HN populations they serve.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

- Anderson GF, Ballreich J, Bleich S, Boyd C, DuGoff E, Leff B, Salsburg C, & Wolff J (2015). Attributes common to programs that successfully treat high-need, high-cost individuals. *American Journal of Managed Care*, 21(11), e597–e600. <https://www.ajmc.com/journals/issue/2015/2015-vol21-n11/attributes-common-to-programs-that-successfully-treat-highneed-high-cost-individuals>
- Belanger E, Silver B, Meyers DJ, Rahman M, Kumar A, Kosar C, & Mor V (2019). A retrospective study of administrative data to identify high-need Medicare beneficiaries at risk of dying and being hospitalized. *Journal of General Internal Medicine*, 34(3), 405–411. 10.1007/s11606-018-4781-3 [PubMed: 30604120]
- Blumenthal DM, Anderson G, Burke SP, Fulmer T, Jha AK, & Long P (2016). Tailoring complex-care management, coordination, and integration for high-need, high-cost patients [Discussion Paper]. Vital Directions for Health and Health Care Series. <https://nam.edu/wp-content/uploads/2016/09/tailoring-complex-care-management-coordination-and-integration-for-high-need-high-cost-patients.pdf>
- Clough JD, Riley GF, Cohen M, Hanley SM, Sanghavi D, DeWalt DA, Rajkumar R, & Conway PH (2016). Patterns of care for clinically distinct segments of high cost Medicare beneficiaries. *Healthcare (Amsterdam)*, 4(3), 160–165. 10.1016/j.hjdsi.2015.09.005

- Figueroa JF, Joynt Maddox KE, Beaulieu N, Wild RC, & Jha AK (2017). Concentration of potentially preventable spending among high-cost Medicare subpopulations: An observational study. *Annals of Internal Medicine*, 167(10), 706–713. 10.7326/M17-0767 [PubMed: 29049488]
- Figueroa JF, Lyon Z, Zhou X, Grabowski DC, & Jha AK (2018). Persistence and drivers of high-cost status among dual-eligible Medicare and Medicaid beneficiaries: An observational study. *Annals of Internal Medicine*, 169(8), 528–534. 10.7326/M18-0085 [PubMed: 30285049]
- Figueroa JF, Zhou X, & Jha AK (2019). Characteristics and spending patterns of persistently high-cost Medicare patients. *HealthAffairs (Millwood)*, 38(1), 107–114. 10.1377/hlthaff.2018.05160
- Hayes SL, Salzberg CA, McCarthy D, Radley DC, Abrams MK, Shah T, & Anderson GF (2016). High-need, high-cost patients: Who are they and how do they use health care? <https://www.commonwealthfund.org/publications/issue-briefs/2016/aug/high-need-high-cost-patients-who-are-they-and-how-do-they-use>
- Horn BP, Crandall CS, Binder DS, & Sklar DP (2017). What happens to high-cost patients? An analysis of the trajectories of billed charges over time. *Population Health Management*, 20(5), 362–367. 10.1089/pop.2016.0149 [PubMed: 28574810]
- Johnson TL, Rinehart DJ, Durfee J, Brewer D, Batal H, Blum J, Oronce C, Melinkovich P, & Gabow P (2015). For many patients who use large amounts of health care services, the need is intense yet temporary. *HealthAffairs (Millwood)*, 34(8), 1312–1319. 10.1377/hlthaff.2014.1186
- Joynt KE, Figueroa JF, Beaulieu N, Wild RC, Orav EJ, & Jha AK (2017). Segmenting high-cost Medicare patients into potentially actionable cohorts. *Healthcare (Amsterdam)*, 5(1-2), 62–67. 10.1016/j.hjdsi.2016.11.002
- Krumholz HM (2013). Post-hospital syndrome: An acquired, transient condition of generalized risk. *New England Journal of Medicine*, 368(2), 100–102. <https://www.nejm.org/doi/full/10.1056/NEJMp1212324>
- Lochner KA, Goodman RA, Posner S, & Parekh A (2013). Multiple chronic conditions among Medicare beneficiaries: State-level variations in prevalence, utilization, and cost, 2011. *Medicare & Medicaid Research Review*, 3(3). 10.5600/mmrr.003.03.b02
- Long P, Abrams M, Milstein A, Anderson G, Lewis Apton K, Lund Dahlberg M, & Whicher D (Eds.). (2017). Effective care for high-need patients: Opportunities for improving outcomes, value, and health. <https://nam.edu/wp-content/uploads/2017/06/Effective-Care-for-High-Need-Patients.pdf>
- Middleton A, Downer B, Haas A, Lin YL, Graham JE, & Ottenbacher KJ (2018). Functional status is associated with 30-day potentially preventable readmissions following skilled nursing facility discharge among Medicare beneficiaries. *Journal of the American Medical Directors Association*, 19(4), 348–354.e4. 10.1016/j.jamda.2017.12.003 [PubMed: 29371127]
- Niles J, Litton T, & Mechanic R (2019, 4 11). An initial assessment of initiatives to improve care for high-need, high-cost individuals in accountable care organizations. *Health Affairs Blog*. <https://www.healthaffairs.org/doi/10.1377/hblog20190411.143015/full/>

Figure 1.

Persistence of high-need status by 2015 ($N = 29,839,380$).

Note. Red = persistently HN; yellow = transiently HN; Orange = newly HN in 2015; Green = never HN.

Table 1.
Sociodemographic Characteristics by Persistence of HN Status Between 2013 and 2015 (%; $N = 29,839,380$).

	Never HN ($n = 23,001,200$)	Transiently HN ($n = 3,820,138$)	Newly HN in 2015 ($n = 1,818,809$)	Persistently HN ($n = 1,199,233$)
Age (years)				
65	16.8	14.3	12.9	15.6
65-74	47.9	28.2	30.2	20.3
75-84	25.8	33.0	33.1	29.1
85	9.5	24.6	23.8	35.0
Sex				
Men	47.5	43.0	44.9	35.1
Women	52.5	57.0	55.1	64.9
Race/ethnicity				
White	83.1	85.2	86.0	79.8
Black	8.9	9.4	8.7	14.3
Hispanic	2.1	1.8	1.5	2.8
Asian	2.1	1.4	1.4	1.3
Native American	0.6	0.6	0.6	0.7
Other	2.0	1.1	1.2	0.9
Dual eligibility in 2015	14.4	23.6	21.0	53.3

Note. Enrollees who are transiently high-need (HN) transitioned between HN and non-HN status multiple times during the course of the study. Persistently HN enrollees were classified as HN in each year from 2013 to 2015.

Table 2.

Percentage of Beneficiaries Deceased, Hospitalized, or High Cost in 2016 by Persistence of HN Status in 2013-2015 ($N = 29,839,380$).

Outcomes in 2016	Never HN ($n = 23,001,200$)	Transiently HN ($n = 3,820,138$)	Newly HN in 2015 ($n = 1,818,809$)	Persistently HN ($n = 1,199,233$)
Mortality	2.0	10.1	11.9	22.9
Hospitalization in MedPAR	11.4	33.7	34.7	47.8
Top 10% Medicare expenditures	4.2	19.7	21.6	39.4

Note. Enrollees who are transiently high-need (HN) transitioned between HN and non-HN status multiple times during the course of the study. Persistently HN enrollees were classified as HN in each year from 2013 to 2015. Mortality was assessed using the Master beneficiary summary file. Medicare expenditures were assessed using the Cost & Use file. Hospitalizations were identified using MedPAR in 2016.

Table 3.

Odds Ratios of Mortality, Hospitalization, and High Cost in 2016 by Persistence of HN Status in 2013-2015 ($N = 29,839,380$).

	Mortality		Hospitalization		High cost	
	Unadjusted	Adjusted ^a	Unadjusted	Adjusted ^a	Unadjusted	Adjusted ^a
Persistence of HN status						
Never HN	(Ref)	(Ref)	(Ref)	(Ref)	(Ref)	(Ref)
Transiently HN	5.5	4.1	3.9	3.5	5.7	5.1
Newly HN in 2015	6.6	5.0	4.1	3.7	6.4	5.8
Persistently HN	14.7	9.4	7.1	5.9	15.0	11.7

Note. Enrollees who are transiently high-need (HN) transitioned between HN and non-HN status multiple times during the course of the study. Persistently HN enrollees were classified as HN in each year from 2013 to 2015. Mortality was assessed using the Master beneficiary summary file. Medicare expenditures were assessed using the Cost & Use file. Hospitalizations were identified using MedPAR in 2016.

^a Adjusted for age, sex, race/ethnicity, and dual eligibility; All confidence intervals are within one decimal point.