Original Investigation

Association Between Self-reported Health-Related Social Needs and Acute Care Utilization Among Older Adults Enrolled in Medicare Advantage

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Abstract

IMPORTANCE There is increased focus on identifying and addressing health-related social needs (HRSNs). Understanding how different HRSNs relate to different health outcomes can inform targeted, evidence-based policies, investments, and innovations to address HRSNs.

OBJECTIVE To examine the association between self-reported HRSNs and acute care utilization among older adults enrolled in Medicare Advantage.

DESIGN, SETTING, AND PARTICIPANTS This cross-sectional study used data from a large, national survey of Medicare Advantage beneficiaries to identify the presence of HRSNs. Survey data were linked to medical claims, and regression models were used to estimate the association between HRSNs and rates of acute care utilization from January 1, 2019, through December 31, 2019.

EXPOSURES Self-reported HRSNs, including food insecurity, financial strain, loneliness, unreliable transportation, utility insecurity, housing insecurity, and poor housing quality.

MAIN OUTCOMES AND MEASURES All-cause hospital stays (inpatient admissions and observation stays), avoidable hospital stays, all-cause emergency department (ED) visits, avoidable ED visits, and 30-day readmissions.

RESULTS Among a final study population of 56 155 Medicare Advantage beneficiaries (mean [SD] age, 74.0 [5.8] years; 32 779 [58.4%] women; 44 278 [78.8%] White; and 7634 [13.6%] dual eligible for Medicaid), 27 676 (49.3%) reported 1 or more HRSNs. Health-related social needs were associated with statistically significantly higher rates of all utilization measures, with the largest association observed for avoidable hospital stays (incident rate ratio for any HRSN, 1.53; 95% CI, 1.35-1.74; P < .001). Compared with beneficiaries without HRSNs, beneficiaries with an HRSN had a 53.3% higher rate of avoidable hospitalization (incident rate ratio, 1.53; 95% CI, 1.35-1.74; P < .001). Financial strain and unreliable transportation were each independently associated with increased rates of hospital stays (marginal effects of 26.5 [95% CI, 14.2-38.9] and 51.2 [95% CI, 30.7-71.8] hospital stays per 1000 beneficiaries, respectively). All HRSNs, except for utility insecurity, were independently associated with increased rates of ED visits. Unreliable transportation had the largest association with increased hospital stays and ED visits, with marginal effects of 51.2 (95% CI, 30.7-71.8) and 95.5 (95% CI, 65.3-125.8) ED visits per 1000 beneficiaries, respectively. Only unreliable transportation and financial strain were associated with increased rates of 30-day readmissions, with marginal effects of 3.3% (95% CI, 2.0%-4.0%) and 0.4% (95% CI, 0.2%-0.6%), respectively.

CONCLUSIONS AND RELEVANCE In this cross-sectional study of older adults enrolled in Medicare Advantage, self-reported HRSNs were common and associated with statistically significantly increased rates of acute care utilization, with variation in which HRSNs were associated with different

(continued)

Key Points

Question To what extent are self-reported health-related social needs (HRSNs) associated with acute care utilization among older adults enrolled in Medicare Advantage, and are there specific HRSNs that seem to matter more?

Findings In this cross-sectional study of 56 155 older adults enrolled in Medicare Advantage, HRSNs were associated with statistically significantly higher rates of acute care utilization, with the largest association observed for avoidable hospital stays (53.3% increase). Unreliable transportation had the largest association with hospital stays and emergency department visits (marginal effects of 51.2 and 95.5 events per 1000 beneficiaries, respectively).

Meaning Among older adults enrolled in Medicare Advantage, self-reported HRSNs are associated with increased rates of acute care utilization.

➕ **Supplemental content**

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Abstract (continued)

utilization measures. These findings provide evidence of the unique association between certain HRSNs and different types of acute care utilization, which could help refine the development and targeting of efforts to address HRSNs.

Introduction

There is growing recognition of the consequences that upstream social factors have on downstream health outcomes.[1] Within the Medicare program—where health-related social needs (HRSNs) such as food insecurity, financial strain, and unreliable transportation are estimated to affect roughly half of beneficiaries—policy makers, payers, and delivery organizations are increasingly investing in efforts to identify and address HRSNs.[2-5] In 2016, the Centers for Medicare & Medicaid Services (CMS) launched the Accountable Health Communities (AHC) program to incentivize organizations to identify Medicare beneficiaries with unmet HRSNs and connect them to community resources.[6,7] Outside of the AHC program, many delivery organizations participating in Medicare's value-based payment models, such as accountable care organizations (ACOs), have been seeking to address HRSNs with the goal of improving health outcomes and reducing costs for their attributed populations.[8,9] Within the Medicare Advantage program, plans may use new regulatory flexibility to directly address beneficiaries' unmet HRSNs through supplemental benefits, and CMS may soon measure their ability to collect self-reported HRSN data.[10,11]

As more attention, investment, and innovation are directed toward addressing HRSNs, it is important that efforts are focused on the right priorities. Although prior research has linked specific HRSNs to specific health outcomes, the comparative and independent relationship between different, and often co-occurring, HRSNs on health outcomes among older adults is limited.[12-16] A better understanding of how different HRSNs affect various outcomes can help support policy makers, payers, and delivery organizations in developing targeted, evidence-based, and financially sustainable programs to identify and address HRSNs.

Using data from a large national survey linked to medical claims, we sought to answer 3 questions. First, to what extent are the presence and burden of self-reported HRSNs associated with acute care utilization among older adults enrolled in Medicare Advantage? Second, does the association between HRSNs and acute care utilization differ for events that are potentially avoidable? Finally, are there specific self-reported HRSNs that are independently associated with acute care utilization?

Methods

Setting and Participants

This study population was drawn from a national sample of Medicare Advantage beneficiaries who responded to a survey of HRSNs conducted from October 16, 2019, through February 29, 2020. Additional detail on the survey has been previously published[2] and is available in the eMethods in the Supplement. The survey was adapted from the CMS AHC HRSN Screening Tool[6,7] and administered to 431 215 noninstitutionalized Medicare Advantage beneficiaries enrolled in plans offered by Humana Inc. We limited the sample to beneficiaries who completed the full survey, were not contractually excluded from research, and were continuously enrolled from January 1, 2019, to December 31, 2019. Because our focus was on older adults, we excluded beneficiaries who were younger than 65 years.

This study was reviewed by the Humana Healthcare Research Human Subject Protection Office and deemed exempt from approval because it used all publicly available, deidentified data. We

followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines for cross-sectional studies.

Measures

Health-Related Social Needs

The survey assessed the presence of 7 HRSNs: (1) food insecurity, (2) financial strain, (3) loneliness, (4) unreliable transportation, (5) utility insecurity, (6) housing insecurity, and (7) poor housing quality. Survey responses were used to construct binary indicators for the presence of each of the 7 HRSNs, the presence of any HRSN, and a count of all reported HRSNs (see the eMethods in the Supplement for additional detail).

Participant Characteristics

For each beneficiary, we extracted age, sex, race and ethnicity, Medicare-Medicaid dual eligibility status, and Social Security disability status from enrollment files. Race and ethnicity were assessed according to the CMS beneficiary race and ethnicity codes and categorized as Black, White, other (including Asian, Hispanic, North American Native, and other race or ethnicity), and unknown owing to inaccuracies in classification for non-White and non-Black beneficiaries. Demographic characteristics were assessed as of December 31, 2019. Using the primary address during the survey period, we classified beneficiary residence according to US Census geographic region, zip code level population density, and Dartmouth Atlas of Health Care hospital referral region (HRR). We calculated the Elixhauser Comorbidity Index[17-19] score for each participant using claims from January 1, 2019, through December 31, 2019.

Utilization

Utilization measures included inpatient admissions, observation stays, emergency department (ED) visits, and all-cause 30-day inpatient readmissions. We classified inpatient hospitalizations and observations stays together as hospital stays. All utilization measures were assessed using medical claims from January 1, 2019, through December 31, 2019.

We segmented hospital stays and ED visits into all-cause and potentially avoidable (hereafter referred to as avoidable) events under the hypothesis that HRSNs may have a disproportionate influence on avoidable utilization. Avoidable hospital stays were defined using the Agency for Healthcare Research and Quality Prevention Quality Indicators definition.[20] Avoidable ED visits were defined using the New York University ED visit algorithm[21-23] (see the eMethods in the Supplement for additional detail).

Statistical Analysis

We compared demographic and clinical characteristics between beneficiaries who reported any HRSN and those who reported no HRSNs using standardized mean differences, of which those greater than 0.25 were considered meaningful.[24] We then calculated unadjusted rates of avoidable and all-cause hospital stays and ED visits, as well as 30-day readmissions, and compared these rates using t tests.

To estimate the association between HRSNs and all-cause hospital stays, avoidable hospital stays, all-cause ED visits, and avoidable ED visits, we constructed a series of negative binomial regression models that adjusted for age, sex, race and ethnicity, disability status, dual eligibility, and Elixhauser Comorbidity Index score, with HRR fixed effects. First, we estimated the association between the presence of any HRSN and acute care utilization. For each measure, we calculated the incidence rate ratio (IRR) associated with the presence of any HRSN (compared with no HRSNs), which allowed us to compare the magnitude of associations across utilization measures. Second, we estimated the association between cumulative HRSN burden and utilization. For this analysis, HRSN burden was capped at 5 to simplify the number of comparisons, to balance group size at the upper end of HRSN burden, and with the assumption that incremental needs would be less meaningful at high levels of HRSN burden. To enable comparison across groups, we calculated the IRR for different

levels of HRSN burden (ie, 1, 2, 3, 4, or ≥5 HRSNs) on utilization measures, all compared with no HRSNs. Finally, we estimated the association between individual HRSNs and utilization. To account for the co-occurrence of multiple HRSNs, the main analysis included indicators for each of the 7 HRSNs in the regression model. Prior to including all HRSNs in the regression model, we checked for correlation between individual HRSNs. We also performed a series of regressions where each of the 7 HRSNs were modeled separately, still adjusting for the patient-level characteristics noted above. To aid interpretability, we calculated and report the marginal effect of HRSNs on utilization rates per 1000 beneficiaries. To estimate the association between HRSNs and 30-day readmissions, we performed a similar series of regressions but used logistic regression models.

Analyses were performed using SAS Enterprise Guide, version 8.3 (SAS Institute), from March 2021 to February 2022. All hypothesis tests were 2-sided, with *P* < .05 indicating significance.

Results

Study Population and Baseline Characteristics

There were 105 901 respondents and 325 575 nonrespondents to the HRSN survey (response rate of 24.5%). Among the respondents, 79 848 (75.4%) completed the full survey. Demographic and clinical characteristics were similar across survey respondents and nonrespondents and, among respondents, across survey completers and noncompleters (eTable 1 in the Supplement). After exclusions, the final study population included 56 155 beneficiaries (see eFigure in the Supplement for a depiction of participant flow through the study). Among the final study population, the mean (SD) age was 74.0 (5.8) years, 32 779 (58.4%) were women, 44 278 (78.8%) were White, 9651 (17.2%) were disabled, and 7634 (13.6%) were dually eligible for Medicare and Medicaid.

Among the final study population, 27 676 (49.3%) beneficiaries reported at least 1 HRSN. The most commonly reported HRSNs were financial strain, food insecurity, and poor housing quality. **Table 1**[24] compares demographic and clinical characteristics between beneficiaries reporting any HRSN and those reporting no HRSNs. Beneficiaries with HRSNs were more likely to be Black, dual eligible, and disabled, and had a higher burden of comorbidities. Although beneficiaries with HRSNs were more likely to be dual eligible and disabled, the majority of beneficiaries with HRSNs were neither dual eligible nor disabled. Beneficiaries with and without HRSNs were similar with respect to age, sex, and the region and population density of their residence. Financial strain and food insecurity were moderately correlated (ϕ = 0.50), with all other HRSN combinations weakly correlated (ϕ = 0.07-0.27) (eTable 2 in the Supplement).

HRSN Burden and Acute Care Utilization

Figure 1[20-22] presents unadjusted rates of hospital stays and ED visits for beneficiaries with and without HRSNs. Beneficiaries with HRSNs vs those without had statistically significantly higher rates of all-cause hospital stays (299.7 vs 188.0 per 1000 beneficiaries; *P* < .001), avoidable hospital stays (47.7 vs 19.1; *P* < .001), all-cause ED visits (483.4 vs 290.1; *P* < .001), and avoidable ED visits (197.5 vs 107.1; *P* < .001).

In adjusted analyses, the presence of any HRSN was statistically significantly associated with increased rates of all utilization measures (**Figure 2**[20-22]). The magnitude of the association varied by measure, with the largest association observed for avoidable hospital stays. Compared with beneficiaries without any HRSN, beneficiaries with HRSNs had 53.3% higher rates of avoidable hospitalizations (IRR, 1.53; 95% CI, 1.35-1.74; *P* < .001) and 32.0% higher rates of avoidable ED visits (IRR, 1.32; 95% CI, 1.25-1.39; *P* < .001). The association between the presence of any HRSN and increased rates of all-cause ED visits (IRR, 1.25; 95% CI, 1.20-1.30; *P* < .001) was larger than that for all-cause hospital stays (IRR, 1.11; 95% CI, 1.06-1.15; *P* < .001).

Also shown in Figure 2 are the associations between different levels of HRSN burden and acute care utilization. A dose-response trend was observed for all measures, with increasing HRSN burden associated with higher rates of utilization, though the differences observed at higher levels of HRSN

burden (eg, 2 HRSNs compared with 3, 4, or ≥5 HRSNs) were not statistically significant. The association between increasing HRSN burden and increased rates of utilization was largest for avoidable hospital stays.

Compared with beneficiaries without any HRSNs, beneficiaries with HRSNs had statistically significantly higher rates of 30-day readmissions (9.5% vs 19.2% per 1000 beneficiaries; $P < .001$). When adjusted for beneficiary characteristics, the association between the presence of any HRSN and odds of 30-day readmission was not statistically significant. Full regression results are provided in eTable 3 in the Supplement.

Table 1. Baseline Characteristics of the Study Population

| Characteristic | No. (%) | | | |
	Overall	Any HRSN	No HRSN	SMD[a]
Total No.	56 155	27 676	28 479	NA
Age, mean (SD), y	73.99 (5.84)	73.57 (5.87)	74.40 (5.78)	.14
Sex				
Female	32 779 (58.4)	17 142 (61.9)	15 637 (54.9)	.14
Male	23 376 (41.6)	10 534 (38.1)	12 842 (45.1)	.14
Race and ethnicity[b]				
Black	9135 (16.3)	5995 (21.7)	3140 (11.0)	.29
White	44 278 (78.8)	20 230 (73.1)	24 048 (84.4)	.28
Other	1996 (3.6)	1145 (4.1)	851 (3.0)	.06
Unknown	746 (1.3)	306 (1.1)	440 (1.5)	.04
Geographic region				
Northeast	1703 (3.0)	902 (3.3)	801 (2.8)	.03
Midwest	12 915 (23.0)	5918 (21.4)	6997 (24.6)	.08
South	33 866 (60.3)	17 283 (62.4)	16 583 (58.2)	.09
West	7671 (13.7)	3573 (12.9)	4098 (14.4)	.04
Population density				
Urban	34 919 (62.2)	17 025 (61.5)	17 894 (62.8)	.03
Suburban	13 980 (24.9)	6865 (24.8)	7115 (25.0)	.004
Rural	6050 (10.8)	3228 (11.7)	2822 (9.9)	.06
Unknown	1206 (2.1)	558 (2.0)	648 (2.3)	.02
Dual Medicare and Medicaid eligible	7634 (13.6)	5830 (21.1)	1804 (6.3)	.44
Social Security disability eligible	9651 (17.2)	6691 (24.2)	2960 (10.4)	.37
Elixhauser Comorbidity Index score, mean (SD)	2.94 (2.62)	3.36 (2.78)	2.53 (2.38)	.32
HRSN burden				
0	NA	NA	28 479 (100.0)	NA
1	NA	13 553 (49.0)	NA	NA
2	NA	7240 (26.2)	NA	NA
3	NA	3948 (14.3)	NA	NA
4	NA	1838 (6.6)	NA	NA
≥5	NA	1097 (4.0)	NA	NA
Individual HRSNs				
Financial strain	NA	18 544 (67.0)	NA	NA
Food insecurity	NA	10 134 (36.6)	NA	NA
Poor housing quality	NA	9765 (35.3)	NA	NA
Utility insecurity	NA	5007 (18.1)	NA	NA
Unreliable transportation	NA	3729 (13.5)	NA	NA
Housing insecurity	NA	3134 (11.3)	NA	NA
Loneliness	NA	2785 (10.1)	NA	NA

Abbreviations: HRSN, health-related social need; NA, not applicable; SMD, standardized mean difference.

[a] SMDs greater than 0.25 were considered to be meaningful.[24]

[b] Race and ethnicity were assessed according to the Centers for Medicare & Medicaid Services beneficiary race and ethnicity codes, which reflect data reported to the Social Security Administration. The Other category includes Asian, Hispanic, North American Native, and other races or ethnicities.

Individual HRSNs and Acute Care Utilization

The associations between individual HRSNs and hospital stays and ED visits are summarized in **Table 2**.[20-22] Financial strain and unreliable transportation were each associated with increased rates of all-cause and avoidable hospital stays. Among all-cause hospital stays, unreliable transportation had the largest association, with a marginal effect of 51.2 (95% CI, 30.7-71.8) hospital stays per 1000 beneficiaries. Among avoidable hospital stays, financial strain had the largest association, with a marginal effect of 14.7 (95% CI, 9.4-20.0) avoidable hospital stays per 1000 beneficiaries. All HRSNs except for utility insecurity were associated with statistically significantly increased rates of all-cause ED visits. Similar to hospital stays, unreliable transportation had the largest association for all-cause ED visits, with a marginal effect of 95.5 (95% CI, 65.3-125.8) ED visits per 1000 beneficiaries. Unlike hospital stays, loneliness had a large and statistically significant association with all-cause ED visits (marginal effect of 80.6 [95% CI, 46.9-114.3] ED visits per 1000 beneficiaries). The patterns of associations between individual HRSNs and avoidable ED visits were similar to all-cause ED visits, with the exception of housing insecurity, which was not associated with increased rates of avoidable ED visits. In analyses that modeled each individual HRSN separately, housing insecurity and food insecurity were also associated with all-cause and avoidable hospital stays, and all HRSNs were associated with all-cause and avoidable ED visits (eTable 4 in the Supplement). Only unreliable transportation and financial strain were statistically significantly associated with 30-day readmission rates, with marginal effects of 3.3% (95% CI, 2.0%-4.0%) and 0.4% (95% CI, 0.2%-0.6%), respectively.

Discussion

In this study of older adults enrolled in Medicare Advantage, we found that self-reported HRSNs were common and associated with statistically significantly increased rates of acute care utilization. As policy makers, payers, and delivery organizations increase investments to identify and address HRSNs, several of the present findings have important implications.

First, we found that HRSNs were widespread, with roughly half of Medicare Advantage beneficiaries reporting at least 1 HRSN. Although HRSNs were more common among dual-eligible and disabled beneficiaries, the majority of Medicare Advantage beneficiaries with HRSNs were neither dual eligible nor disabled. These findings support efforts by CMS, Medicare Advantage plans, and care delivery organizations to achieve population-level screening for HRSNs among all older adults and to underscore the need to address HRSNs in the broader Medicare program, not just among specific groups of high-need patients.[11,25,26] Notwithstanding the need for broadly focused efforts,

Figure 1. Unadjusted Rates of Acute Care Utilization by Presence of Health-Related Social Needs (HRSNs)
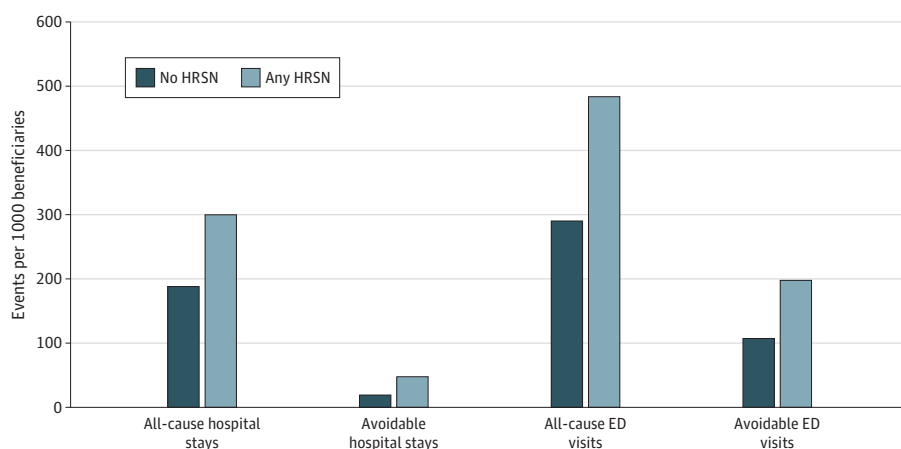
Hospital stays are an aggregate of inpatient admissions and observation stays. Avoidable hospital stays were defined using the Agency for Healthcare Research and Quality Prevention Quality Indicators definition.[20] Avoidable emergency department (ED) visits were defined using the New York University ED visit algorithm and subsequent algorithm patch.[21,22] All differences between beneficiaries with and without HRSNs across the 4 categories were statistically significant, with *P* values <.001.

the disproportionate burden of HRSNs among specific racial and socioeconomic subgroups of Medicare Advantage beneficiaries necessitates some focused initiatives to improve health equity.

Second, we found a statistically significant association between the presence of HRSNs and increased rates of acute care utilization, even after adjusting for clinical and demographic characteristics, including dual eligibility for Medicare and Medicaid. The independent association between HRSNs and acute care utilization supports a continued focus on HRSNs as a contributory driver of poor outcomes and avoidable health care utilization, and motivates experimentation with social risk adjustment for payment and quality measurement.[11,27,28] It also raises the possibility that addressing HRSNs may lead to reductions in downstream utilization, possibly creating a sustainable

Figure 2. Association Between Health-Related Social Need (HRSN) Burden and Rates of Hospital Stays or Emergency Department (ED) Visits

A | HRSN burden and rates of hospital stays

No. of HRSNs	Incidence rate ratio (95% CI)
≥5 HRSNs	
Avoidable hospital stays	2.12 (1.58-2.82)
All-cause hospital stays	1.31 (1.17-1.47)
4 HRSNs	
Avoidable hospital stays	1.82 (1.41-2.35)
All-cause hospital stays	1.22 (1.11-1.35)
3 HRSNs	
Avoidable hospital stays	1.57 (1.29-1.92)
All-cause hospital stays	1.18 (1.10-1.27)
2 HRSNs	
Avoidable hospital stays	1.68 (1.42-1.98)
All-cause hospital stays	1.18 (1.11-1.25)
1 HRSN	
Avoidable hospital stays	1.35 (1.17-1.57)
All-cause hospital stays	1.02 (0.97-1.08)
Any HRSN	
Avoidable hospital stays	1.53 (1.35-1.74)
All-cause hospital stays	1.11 (1.06-1.15)

Incidence rate ratio (95% CI)
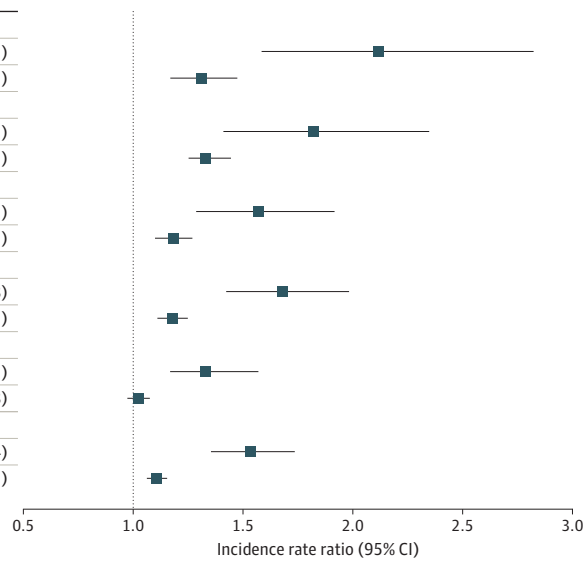
B | HRSN burden and rates of ED visits

No. of HRSNs	Incidence rate ratio (95% CI)
≥5 HRSNs	
Avoidable ED visits	1.78 (1.53-2.06)
All-cause ED visits	1.79 (1.61-1.99)
4 HRSNs	
Avoidable ED visits	1.65 (1.46-1.87)
All-cause ED visits	1.56 (1.42-1.70)
3 HRSNs	
Avoidable ED visits	1.49 (1.36-1.63)
All-cause ED visits	1.39 (1.30-1.49)
2 HRSNs	
Avoidable ED visits	1.38 (1.28-1.49)
All-cause ED visits	1.28 (1.21-1.35)
1 HRSN	
Avoidable ED visits	1.17 (1.10-1.25)
All-cause ED visits	1.13 (1.08-1.18)
Any HRSN	
Avoidable ED visits	1.31 (1.25-1.39)
All-cause ED visits	1.25 (1.20-1.30)

Incidence rate ratio (95% CI)
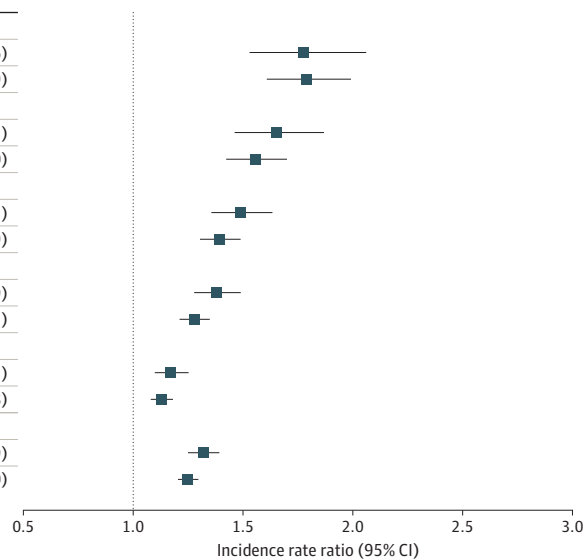
Incident rate ratios are calculated from negative binomial regression models estimating the association between HRSNs and utilization measures. Models adjust for age, sex, race and ethnicity, disability status, dual eligibility status, and Elixhauser Comorbidity Index score, with hospital referral region fixed effects. For all incident rate ratios, the reference population is beneficiaries with no HRSNs. Hospital stays were an aggregate of inpatient admissions and observation stays. Avoidable hospital stays were defined using the Agency for Healthcare Research and Quality Prevention Quality Indicators definition.[20] Avoidable ED visits were defined using the New York University ED visit algorithm and subsequent algorithm patch.[21,22]

financing model for investments by payers and risk-bearing delivery organizations to address HRSNs.[29] Of course, the present findings represent associations between HRSNs and utilization and do not provide causal evidence that addressing HRSNs will reduce utilization. But this notion is supported by evidence that interventions targeting HRSNs can improve health outcomes and produce health care savings by reducing ED visits and hospitalizations.[30]

That we observed a statistically significant association between HRSNs and acute care utilization among older adults enrolled in Medicare Advantage is especially salient in light of recent efforts by Congress and CMS to give Medicare Advantage plans increased flexibility to directly address HRSNs through supplemental benefits.[10] The uptake of these benefits has grown in recent years,[31,32] and the present findings should support continued efforts by Medicare Advantage plans to design, offer, and evaluate the effect of supplemental benefits aimed at addressing HRSNs.

Third, we found that the magnitude of the association between HRSNs and utilization was largest for avoidable hospital stays. This finding has multiple possible interpretations, including that HRSNs may contribute to worse control of chronic conditions (eg, diabetes), resulting in preventable decompensations or otherwise treatable complications. It may also reflect findings from prior studies indicating that many patients with HRSNs also experience poor access to primary and preventive care.[12-15,33] A better understanding of the mechanisms by which HRSNs mediate poor outcomes could help with the development and targeting of efforts to reduce avoidable hospitalizations.

Finally, there was considerable heterogeneity in the association between individual HRSNs and different measures of acute care utilization. Financial strain and unreliable transportation were each independently associated with increased rates of hospital stays. In contrast, almost all HRSNs studied were independently associated with increased ED use. Only financial strain and unreliable transportation were associated with increased odds of 30-day readmissions. Interestingly, some HRSNs that have been the subject of considerable interest and investment, such as food and housing insecurity,[34,35] were not uniformly associated with increases in acute care utilization.

This complexity and heterogeneity will require payers and delivery organizations to make strategic and nuanced decisions about which HRSNs to screen for and address when attempting to improve health outcomes. For a program or initiative aimed at reducing readmissions, it may be appropriate to focus disproportionately on transportation and financial strain. Whereas efforts to address recurrent ED utilization may need to tackle a more expansive set of HRSNs. The consistent

Table 2. Association Between Individual Health-Related Social Needs (HRSNs) and Rates of Hospital Stays and Emergency Department (ED) Visits

| | Marginal effect of HRSN on rates of utilization per 1000 beneficiaries (95% CI)[a] | | | |
| | Hospital stays | | ED visits | |
HRSN	All cause[b]	Avoidable[c]	All cause	Avoidable[d]
Food insecurity	11.9 (−2.9 to 26.7)	2.0 (−4.1 to 8.2)	50.9 (29.6 to 72.2)[e]	20.8 (9.0 to 32.6)[e]
Financial strain	26.5 (14.2 to 38.9)[e]	14.7 (9.4 to 20.4)[e]	37.6 (20.5 to 54.8)[e]	18.6 (8.9 to 28.3)[e]
Loneliness	7.1 (−13.7 to 27.9)	1.8 (−6.9 to 10.5)	80.6 (46.9 to 114.3)[e]	44.4 (25.1 to 63.8)[e]
Unreliable transportation	51.2 (30.7 to 71.8)[e]	10.9 (2.2 to 19.5)[e]	95.5 (65.3 to 125.8)[e]	26.8 (10.9 to 42.6)[e]
Utility insecurity	−6.5 (−23.0 to 10.0)	−0.4 (−7.4 to 6.7)	11.6 (−12.1 to 35.3)	6.0 (−7.3 to 19.3)
Housing insecurity	17.2 (−4.2 to 38.7)	3.8 (−5.3 to 12.9)	44.6 (13.7 to 75.6)[e]	7.1 (−9.3 to 23.6)
Poor housing quality	−7.3 (−20.2 to 5.7)	1.6 (−4.2 to 7.3)	20.4 (1.8 to 39.1)[e]	17.2 (6.5 to 27.8)[e]

[a] Calculated from negative binomial regression models estimating the association between individual HRSNs and utilization measures. Models adjust for age, sex, race and ethnicity, disability status, dual eligibility status, Elixhauser Comorbidity Index score, and all other individual HRSNs, with hospital referral region fixed effects. The reference group for all marginal effects is beneficiaries not reporting that specific HRSN.

[b] Hospital stays are an aggregate of inpatient admissions and observation stays.

[c] Avoidable hospital stays were defined using the Agency for Healthcare Research and Quality Prevention Quality Indicators definition.[20]

[d] Avoidable ED visits were defined using the New York University ED visit algorithm and subsequent algorithm patch.[21,22]

[e] Statistical significance at the P < .05 level.

association between unreliable transportation and acute care utilization motivates specific attention to this HRSN, which has already been a focus of supplemental benefit offerings by MA plans[31,32] and innovations within delivery organizations.[36]

Limitations

This study has several limitations. First, owing to the observational design, we were unable to directly assess the causal relationship between HRSNs and acute care utilization, and there is likely to be some bidirectional causality in that disease progression and acute care utilization could lead to an increased burden of HRSNs, just as HRSNs could lead to disease progression and acute care utilization. Second, we did not explore interaction effects between different HRSNs or between HRSNs and demographic characteristics. Third, the study population was restricted to older adults and reflects that of a single, albeit large and national, Medicare Advantage plan. As a result, the findings may not generalize to other Medicare populations. Fourth, we captured self-reported HRSNs at a single point in time and examined utilization in a period that largely preceded the survey; HRSNs can change over time, and their pattern of association with utilization may differ when considered prospectively. Fifth, the measurement of HRSNs was subject to survey nonresponse bias. Although we found no evidence of this on observable characteristics, we could not assess for nonresponse by the presence of HRSNs, so the results could undercount the true extent of HRSNs in the study population. Finally, the ascertainment of HRNSs was limited to those included in the survey which, while adapted from a widely used instrument, may assess HRSNs in a different manner or cover different HRSNs than other instruments.

Conclusions

In this cross-sectional study of older adults enrolled in Medicare Advantage plans offered by a large national insurer, self-reported HRSNs were common and associated with statistically significantly increased rates of acute care utilization, with variation in which HRSNs were associated with different types of utilization. These findings provide evidence of the unique association between certain HRSNs and acute care utilization, which could help refine the development and targeting of efforts to address these needs among older adults.

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SUPPLEMENT.
eMethods. Supplemental Methods
eTable 1. Comparison of Survey Respondents and Non-Respondents, and Survey Completers and Non-Completers
eTable 2. Correlation between Individual Health-Related Social Needs
eFigure. Participant Flow Through the Study
eTable 3. Complete Regression Results
eTable 4. Association between Individual Health-Related Social Needs and Rates of Hospital Stays and ED Visits, with Each HRSN Modeled Independently