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Receipt of Home-Based Medical Care Among Older Fee-for-Service Medicare Beneficiaries

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Abstract

Millions of older Americans are homebound and may benefit from home-based medical care (HBMC). We characterized receipt of HBMC among community-dwelling, fee-for-service Medicare beneficiaries ages 65 surveyed in the National Health and Aging Trends Study between 2011 and 2017. Five percent of those surveyed received any HBMC between 2011 and 2017 (mean follow-up of 3.4 years/ individual) and 75% of HBMC recipients were homebound. Only 11% of the total homebound population (approximately 4.4 million fee-for-service Medicare beneficiaries in 2017) received any HBMC between 2011 and 2017. Receipt of HBMC was more common among the homebound living in metropolitan areas and assisted living facilities, suggesting that geographic factors create operational efficiencies for HBMC practices that may improve their financial sustainability within the fee-for-service reimbursement setting. The significant unmet needs of this high-need, high-cost population and the known health and costs benefits of HBMC should spur stakeholders to expand the availability of HBMC.

INTRODUCTION

There are an estimated 2 million older adults in the United States who never or rarely leave the home, with an additional 5.3 million older adults who leave home only with assistance or with significant difficulty.¹ Together, these individuals are considered homebound by the Medicare definition.² The homebound population is understudied and often is “invisible” to health care delivery systems, payers, and quality-reporting programs.³ As the population of older adults grows and the shift from institution-based to community-based long-term care continues, the number of homebound individuals will also grow.^{1,4}

Being homebound has tremendous clinical implications. Compared to their non-homebound counterparts, the homebound use more medications,⁵ experience higher symptom burden,⁶ have more functional impairment,^{1,7} and are hospitalized more frequently.^{1,7} The homebound have higher mortality rates,⁸ with 2-year mortality rates as high as 40% among those who report rarely or never leaving home.⁹ The homebound report difficulty accessing routine medical care¹ and an inability to engage in valued activities,¹⁰ which may contribute to these poor outcomes.

Home-based medical care (HBMC) provides longitudinal, interdisciplinary care in the home and includes both home-based primary care and other longitudinal medical services in the home, (e.g., palliative care). In contrast to home health services (e.g., short-term skilled nursing care, physical therapy, home health aide services), HBMC provides ongoing medical care to treat patient’s acute and chronic health conditions in the home. While recipients of HBMC are not necessarily homebound, many HBMC programs and providers target this vulnerable population.

There are few randomized controlled trials of HBMC,¹¹ but in primarily observational studies, home-based primary care (the predominant model of HBMC) has been shown to be associated with reduced hospitalizations and emergency room visits in the setting of high patient and caregiver satisfaction as compared to traditional office-based care.^{12,13} In addition, lower costs among those receiving home-based primary care have been reported both within Department of Veterans Affairs and non-Veterans Affairs practices.^{12,14,15} The strongest evidence of cost savings among Medicare-beneficiaries receiving HBMC comes from the the Center for Medicare and Medicaid Innovation’s (CMMI’s) Independence At Home demonstration project, a shared savings program where 14 practices throughout the country provided home-based primary care services to high-risk, chronically ill patients. In its first two years, Independence at Home saved an average of \$2,700 per beneficiary per year over expected patient costs and projections suggest that expansion of home-based primary care to the 2.4 million IAH-qualified beneficiaries would result in 10-year system-wide savings between \$2.6 billion to \$27.8 billion.¹⁶

Despite this evidence, HBMC is not widely disseminated and the number of those receiving Medicare-funded HBMC nationally is unknown. Our prior work demonstrated that only 12% of the 2.1 million individuals living in the community who rarely or never leave the home report receiving any medical care at home.¹ Only about 11,000 clinicians made 1.7 million HBMC visits in 2013, compared to 77,000 providers who made 7 million nursing

homes visits to 1.5 million nursing home residents in the same year.¹⁷ While enrollees of individual home-based primary care programs have been described, data on the characteristics (including homebound status) of the older Medicare population who actually receive HBMC services are limited.

This study uses data from a nationally representative study linked with Medicare claims to evaluate receipt of HBMC among a population of older adults with defined homebound status and to determine patient sociodemographic, geographic, and clinical characteristics associated with receipt of HBMC.

METHODS

Data Sources

Data are from seven rounds of the National Health and Aging Trends Study (NHATS), a longitudinal, annual, population-based survey of late-life disability trends and trajectories. NHATS conducts two-hour, in-person interviews (via proxy as necessary) to collect detailed self-reports of physical function, activities of daily life, chronic health conditions, and economic status as well as to conduct physical and cognitive tests. In 2011 NHATS conducted surveys with a random sample of Medicare beneficiaries ages 65 and older living in the contiguous U.S. from the Medicare enrollment file in 2010. Participants were then interviewed annually. The sample was replenished in 2015. In order to ensure all respondents had complete Medicare claims available for analysis, we included only those NHATS participants with 6+ consecutive months of fee-for-service claims data prior to their most recent NHATS interview (n=7,552). We then linked NHATS with Medicare claims for all data years 2011–2017.

Measures

Our primary outcome was receipt of HBMC as determined via Medicare claims. Because a single home visit may occur in the absence of longitudinal HBMC (e.g., a post-hospitalization transitional care visit, one-time home assessment visit), we defined receipt of HBMC as receipt of at least 2 home visits within the 180 days surrounding the completed NHATS interview (90 days before and 90 days after). For those who died or were placed in a nursing home within 90 days following their interview, we defined receipt of HBMC as 1 home visit within this period. We used Healthcare Common Procedure Coding System codes to identify medical visits to private residences (99341–99345, 99347–99350) and assisted living facilities (99324–99328, 99334–99337).

We describe the characteristics (including homebound status) of those who received HBMC at the most recent interview where they received HBMC. Based on previous work,¹ homebound status was determined using the NHATS mobility questionnaire. We considered individuals to be homebound if they reported that they never or rarely (once a week or less) left the home in the past month, never left the home by themselves, or left home but needed help and/or had difficulty). Demographic, clinical, and functional measures were assessed by NHATS via in-person interviews of respondents and/or their proxy in addition to in-person

home-based assessments of functional and cognitive status. Probable dementia was determined based on self or proxy reports of diagnosis and/or cognitive testing.¹⁸

Analysis

We examined receipt of HBMC in each of the 7 study years in order to determine the overall receipt of HBMC in the full sample and among the homebound. We used NHATS survey weights to create annual population estimates of HBMC use per year with 95% confidence intervals. We used regression models to explore differences in HBMC use across individual calendar years and to determine whether there was a linear trend in HBMC use over the study period. Next, we compared characteristics of individuals by use of HBMC and homebound status using t-tests and chi-square analyses. Finally, we created a multivariable logistic regression model to assess factors independently associated with receipt of HBMC among the homebound adjusting for calendar year fixed effects.

The Johns Hopkins University Institutional Review Board approved the NHATS protocol, and all NHATS participants provided informed consent prior to their NHATS interview.

Limitations:

This study had several potential limitations. Homebound status and other variables were determined annually via survey and do not reflect possible fluctuations in these characteristics over time (e.g. someone may temporarily report being homebound with difficulty getting around at home following an acute illness). In addition, claims data were available only for fee-for-service Medicare beneficiaries. While our results do not include HBMC that occurs under Medicare Advantage, a 2019 analysis of HBMC in the Medicare Advantage population found similar HBMC utilization estimates.¹⁹

RESULTS

We identified 7,552 community-dwelling, fee-for-service Medicare beneficiaries from 2011–2017. Nearly 5 percent received HBMC at any point during follow-up (mean follow-up time per individual 3.4 years) and the average number of HBMC visits per calendar year for those who received them was 7.74 (Exhibit 1). Of those receiving HBMC, 75% were homebound, and among the homebound 11.26% received HBMC. Less than 2% of the non-homebound sample received HBMC at any point during follow-up (Exhibit 1).

The percent of community-dwelling, fee-for-service Medicare beneficiaries receiving HBMC in any given year between 2011–2017 ranged from 2.04% (estimated 505,000 individuals) in 2015 to 2.76% (estimated 639,000 individuals) in 2016 (Exhibit 2). Among the homebound, a larger proportion used HBMC annually (Exhibit 2). No significant linear trends in use of HBMC over time were noted for either the full population of community-dwelling, fee-for-service Medicare beneficiaries or the homebound subgroup (data not shown). Relative to 2016, the highest-percentage year for receipt of HBMC, we find significantly lower use in 2015 among all fee-for-service Medicare beneficiaries and in 2013, 2015, and 2017 among the homebound subgroup (See Appendix Exhibit 1 for analysis of HBMC times trends from 2011–2017).²⁰

Exhibit 3 depicts the characteristics of community-dwelling fee-for-service Medicare beneficiaries in our sample by homebound status and receipt of HBMC. Among the homebound, those who received HBMC were more likely to live in a metropolitan or live in an assisted living facility as compared to those who did not receive HBMC. They were also more likely to have dementia, have been hospitalized in previous 12 months, die within 12 months, and receive Medicare home health (Exhibit 3).

In a multivariable analysis, receipt of HBMC among the homebound was most strongly associated with living in an assisted living (OR 6.09) and living in a metropolitan area (OR 6.15). HBMC use continued to be associated with greater age, impairment in 2+ ADLS, dementia, receipt of Medicare home health, and region of residence (See Appendix Exhibit 2 for results of a multivariable logistic regression model predicting receipt of HBMC among the homebound).²¹

The non-homebound who received HBMC had more chronic conditions, more functional impairment, and higher health care utilization as compared to the non-homebound who did not receive HBMC. Similar to the homebound population, they were more likely to live in an assisted living facility than those who did not receive HBMC. Importantly, the non-homebound population who received HBMC were more socially disadvantaged as compared to those who did not: they were less likely to be White Non-Hispanic, married, and have at least a high school education, and were more likely to have Medicaid and be in the lowest income quartile (Exhibit 3).

DISCUSSION:

Our study is the first to use data from a national sample of Medicare beneficiaries to link use of HBMC as determined by claims data with individual homebound status. Less than five percent of Medicare beneficiaries in our sample received HBMC at any point between 2011 and 2017 and only 11.26% of those who were homebound received HBMC. While the homebound who received HBMC were older, sicker, and more functionally impaired than the homebound who did not receive HBMC, those who did not receive HBMC were still a highly vulnerable group: approximately one third were hospitalized in the previous year and nearly as many died in the 12 months following their interview.

These findings suggest that the pool of individuals who may benefit from HBMC greatly exceeds the number who receive it. While data suggest that the homebound with multiple chronic conditions and functional limitations benefit from HBMC, information about optimal rates of utilization of HBMC are lacking. It is apparent that the current system of community-based primary care does not adequately meet the needs of medically and socially complex homebound individuals: for example, in a post-hoc analysis among the homebound community-dwelling Medicare beneficiaries in our study who did not receive HBMC, we found that a significant portion (over 20%) had zero primary care provider visits in any ambulatory, non-hospital setting (i.e., claims submitted for non-hospital provider services by internal medicine physicians, family medicine physicians, or nurse practitioners)²² in the 180 days surrounding their interview (90 days before and 90 days after). Given the importance of coordinated primary care for high-cost, high needs patients

such as the homebound, HBMC is a promising model whose expansion can help meet the needs of this vulnerable population.

In addition to finding underutilization of HBMC among the homebound, our evaluation of non-homebound individuals who are receiving HBMC suggests that HBMC may provide important care for non-homebound individuals. Twenty five percent of HBMC recipients in our study were non-homebound and these individuals were more clinically complex and functionally impaired as compared to the non-homebound who did not receive HBMC. Importantly, they also had lower income, higher use of Medicaid, less education, and were more likely to be non-white. This suggests that HBMC may be an important care delivery approach to address social determinants of health in patients with complex care needs. This may in part reflect the ability of interdisciplinary HBMC teams to meet not only the medical needs but also the complex social needs of vulnerable individuals in the community.^{23–25} Further evaluation of outcomes associated with receipt of HBMC over time relative to both trajectories of homebound status and other social determinants of health is needed.

An important driver of the underutilization of HBMC is the challenge of creating a financially sustainable model of HBMC within a fee-for-service model where reimbursement for care of patients with complex chronic illness and functional impairments is limited. Our finding of higher rates of HBMC among those living in assisted living and in metropolitan areas likely reflects the fact that favorable geographic factors create operational efficiencies and opportunities to improve the financial sustainability of HBMC practices. This is consistent with literature reporting a dearth of HBMC practices in rural areas.^{17,26} While cost savings generated by HBMC can contribute rather substantially to shared savings for Accountable Care Organizations in the current fee-for-service Medicare system,^{27,28} our finding of no sustained growth in the proportion of Medicare-beneficiaries receiving HBMC between 2011–2017 suggests that to date these shared savings opportunities have not resulted in significant growth of HBMC.

Given the financial challenges of supporting a HBMC practice within a Medicare fee-for-service payment structure, a growing number of HBMC practices are seeking out value-based contracts to support the care they provide.²⁹ Such contracts provide HBMC practices with additional per-patient revenue beyond the visit-based Medicare payment in order to manage high-need, high-cost patients. This additional financial support may offset existing, unbillable costs incurred by HBMC practices (e.g., travel) and support for non-medical HBMC team members (e.g. social workers). Additionally, value-based contracts may improve the ability of the HBMC to address important social determinants of health,²³ e.g., home modifications and repair to improve safety and function for the homebound.³⁰

An important barrier to HBMC participation in value-based care has been the lack of quality metrics that are appropriate to the home setting or the needs of homebound older adults.³ Quality metrics relevant to HBMC are necessary to ensure HBMC can participate in the growing number of value-based reimbursement options within both Medicare Advantage and traditional Medicare. A CMS Qualified Clinical Data Registry for HBMC has been implemented so that HBMC providers can access performance payments under the Merit

Incentive Payment System (MIPS) program.³¹ However, additional work is required to ensure that the value HBMC provides is appropriately measured.

Payment reforms are necessary to make HBMC more broadly sustainable, but such reforms must recognize that most HBMC practices are small and require costly mobile interdisciplinary care teams. For example, Medicare’s High Needs Direct Contracting option in CMMI’s Direct Contracting program is intended to target practices like HBMC by providing per-member-per-month payments above and beyond fee-for-service reimbursement for those with high needs,³² yet the minimum size limits of the program (750 high-need patients by year 3) would preclude adoption by most HBMC practices. A more promising approach would be to treat HBMC patients and providers as distinct practices caring for high risk patients within CMMI’s Primary Care First program,³³ which provides performance-based payments meant to strengthen primary care with higher payments for the care of those with serious illnesses. While most HBMC providers currently combine office and home-based care within their practices and therefore would not qualify for these higher payments,³⁴ if HBMC practices were embedded in a Primary Care First payment structure this could incentivize providers and systems to utilize HBMC as a financially sustainable model to care for high risk patients.³⁵

Conclusion

HBMC is currently serving both clinically and socially complex homebound and non-homebound individuals, but the pool of individuals who may benefit from HBMC is much greater than those who receive it. Policies that support the expansion through quality metric development and payment reform will help ensure that vulnerable individuals can benefit from this high-value, patient-centered model of care.

App1

APPENDIX EXHIBIT 1:

Analysis of home-based medical care (HBMC)^a time trends 2011–2017 among total fee-for-service Medicare population and homebound^b only

Year	Total population (mean % change ^c in proportion using HBMC)	Homebound population (mean % change ^c in proportion using HBMC)
2011	-0.00	-0.02
2012	-0.00	-0.02
2013	-0.01	-0.03 *
2014	-0.00	-0.01
2015	-0.01 **	-0.03 *
2017	-0.00	-0.03 *

SOURCE: Authors’ analysis of the data from participants in the 2011–2017 waves of the National Health and Aging Trends Study (NHATS) with 6+ consecutive months of fee-for-service Medicare claims prior to their most recent NHATS interview.

NOTES:

^aReceipt of HBMC was defined as at least 2 home visits within 90 days before or after the NHATS interview date.

^b Homebound was defined as those never or rarely (once a week or less) leaving the home in the past month, leaving the home but never by self, or leaving the home needing help and/or having difficulty.

^c Analyses conducted with 2016 (the year with the highest rates of HBMC use, see Exhibit 1) as referent.

**
p<0.01,

*
p<0.05

APPENDIX EXHIBIT 2:

Multivariable logistic regression model^a predicting receipt of home-based medical care (HBMC)^b among the homebound^c

	Odds Ratio	P-value	95% CI
Age	1.02	0.07	1.00–1.04
Female	1.11	0.55	0.80–1.53
Married	0.94	0.77	0.64–1.39
Lives Alone	1.05	0.80	0.71–1.56
Assisted Living	6.09	<0.01	4.14–8.97
Impairment in 2+ activities of daily living	1.60	<0.01	1.15–2.23
Dementia	1.81	<0.01	1.31–2.48
Hospitalization in 12 months before interview	1.11	0.49	0.82–1.50
Received Medicare home health in 180 days surrounding interview	2.78	<0.01	2.05–3.76
Lives in metropolitan area	6.15	<0.01	3.52–10.75
Region (as compared to Northeast)			
Midwest	1.43	0.09	0.94–2.17
South	0.61	0.01	0.41–0.90
West	0.57	0.02	0.35–0.93

SOURCE: Authors' analysis of the data from participants in the 2011–2017 waves of the National Health and Aging Trends Study (NHATS) with 6+ consecutive months of fee-for-service Medicare claims prior to their most recent NHATS interview.

NOTES:

^a Model adjusted for calendar year.

^b Receipt of HBMC was defined as at least 2 home visits within 90 days before or after the NHATS interview date.

^c Homebound was defined as those never or rarely (once a week or less) leaving the home in the past month, leaving the home but never by self, or leaving the home needing help and/or having difficulty.

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EXHIBIT 1:

Receipt of home-based medical care (HBMC)^a among older fee-for-service Medicare beneficiaries by homebound status 2011–2017

	N	Received HBMC, %	Mean (SD) # of HBMC visits in calendar year (among those receiving HBMC)
All respondents	7,552	4.97	7.74 (6.3)
Homebound	2,486	11.26	7.64 (5.71)
Never or rarely (once a week or less)leaves home	842	17.34	8.47 (6.64)
Leaves home but never by self	511	14.09	6.32 (3.96)
Leaves home but needs help/ has difficulty	1,133	5.47	7.24 (4.73)
Not homebound	5,066	1.88	7.22 (5.69)

SOURCE: Authors' analysis of the data from participants in the 2011–2017 waves of the National Health and Aging Trends Study (NHATS) with 6+ consecutive months of fee-for-service Medicare claims prior to their most recent NHATS interview.

NOTES:

^aReceipt of HBMC was defined as at least 2 home visits within 90 days before or after the NHATS interview date.

EXHIBIT 2:

Weighted estimate of annual home-based medical care (HBMC)^a use among fee-for-service Medicare beneficiaries by calendar year

Year	Total population			Homebound ^b population		
	Weighted percent	Population estimate in 1,000s	95% CI	Weighted percent	Population estimates in 1,000s	95% CI
2011	2.29	547	386–709	7.61	386	275–497
2012	2.41	527	387–669	8.12	366	257–475
2013	2.21	443	309–579	7.06	289	197–381
2014	2.64	478	345–611	9.15	355	248–463
2015	2.04	505	396–614	7.12	337	252–423
2016	2.76	639	454–823	10.59	515	346–683
2017	2.56	546	405–688	7.37	327	224–431

SOURCE: Authors' analysis of the data from participants in the 2011–2017 waves of the National Health and Aging Trends Study (NHATS) with 6+ consecutive months of fee-for-service Medicare claims prior to their most recent NHATS interview.

NOTES:

^aReceipt of HBMC was defined as at least 2 home visits within 90 days before or after the NHATS interview date.

^bHomebound was defined as those never or rarely (once a week or less) leaving the home in the past month, leaving the home but never by self, or leaving the home needing help and/or having difficulty.

EXHIBIT 3:

Characteristics of community-dwelling fee-for-service Medicare beneficiaries by homebound status and receipt of home-based medical care (HBMC)^a

	Homebound ^b		Not Homebound	
	HBMC	No HBMC	HBMC	No HBMC
Demographics				
N	280	2,206	95	4,971
Age (years)	87.28 ***	83.40	84.74 ***	77.95
Female (%)	71.07	67.50	61.05	52.58
White Non-Hispanic (%)	63.57	65.10	61.05 ***	73.53
Married (%)	22.58 ***	31.73	28.42 ***	51.42
At least high school education (%)	71.22	65.28	66.32 ***	81.76
Medicaid (%)	28.35	28.41	33.33 ***	11.32
Income in lowest quartile (%)	39.64	41.70	47.37 ***	20.46
Geography and Living Arrangement				
Lives in metropolitan area (%)	94.29 ***	76.43	NR ^{C***}	77.89
Region of residence	***		**	
Northeast (%)	21.43	16.32	20.00	15.29
Midwest (%)	28.57	21.71	33.6	23.56
South (%)	35.36	44.83	NR ^C	43.21
West (%)	14.64	17.14	NR ^C	17.94
Lives alone (%)	54.29 ***	35.13	61.05 ***	33.41
Assisted Living (%)	46.79 ***	11.11	47.37 ***	4.53
Functional and Clinical Characteristics				
Impairment in 2+ activities of daily living(%)	69.64 ***	45.83	17.89 ***	2.35
Difficulty moving around inside (%)	72.14 ***	60.02	12.63	7.38
2+ chronic conditions (%)	95.00	93.20	86.32 **	74.93
Dementia (%)	64.52 ***	38.88	30.85 ***	8.01
Died within 12 months of interview (%)	40.00 ***	31.14	14.74	9.01
Hospitalization in 12 months before interview (%)	51.07 ***	37.44	36.84 ***	14.46
Received Medicare home health in 180 days surrounding interview (%)	51.79 **	26.16	49.47 **	5.29

SOURCE: Authors' analysis of the data from participants in the 2011–2017 waves of the National Health and Aging Trends Study (NHATS) with 6+ consecutive months of fee-for-service Medicare claims prior to their most recent NHATS interview.

NOTES:

^aReceipt of HBMC was defined as at least 2 home visits within 90 days before or after the NHATS interview date.

^bHomebound was defined as those never or rarely (once a week or less) leaving the home in the past month, leaving the home but never by self, or leaving the home needing help and/or having difficulty.

^c“NR” indicated results not reportable due to cell size restrictions.

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p<0.05,

p<0.01

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