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Prevalence of use and characteristics of users of home-based medical care in Medicare Advantage

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Abstract

Background/Objectives: Home-based medical care (HBMC) is longitudinal medical care provided by physicians, advanced practice providers, and, often, inter-professional care teams to patients in their homes. Our objective is to determine the prevalence of HBMC among older adults (> 65) insured by a Medicare Advantage (MA) plan and compare characteristics of those who receive HBMC to those who do not.

Methods: Study used de-identified medical claims and enrollment records for MA beneficiaries during calendar years 2017 and 2018 linked with socioeconomic status data in the OptumLabs

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Bruce Leff and Christine Ritchie contributed equally to this work.

AUTHOR CONTRIBUTIONS

Concept and design: Bruce Leff, Christine Ritchie, and Stephan Dunning. *Acquisition of subjects and/or data:* Stephan Dunning. *Analysis and interpretation of data:* Bruce Leff, Christine Ritchie, Elizabeth Ciemins, and Stephan Dunning. *Preparation of manuscript:* Bruce Leff, Christine Ritchie, Elizabeth Ciemins, and Stephan Dunning.

An abstract and poster based on this work were presented at the Academy Health annual meeting 2021.

CONFLICT OF INTEREST

Dr. Leff serves as a clinical advisor to Medically Home, Dispatch Health, and the Chartis Group. He serves as a volunteer member of the Humana Multidisciplinary Advisory Board. In the early 2000s Dr. Leff developed Hospital at Home technical assistance tools that were licensed by Johns Hopkins to several entities and, as a result of these license agreements, both the University and its inventors received royalty income. Dr. Leff's arrangements and relationships have been reviewed and approved by the Johns Hopkins University in accordance with its conflicts of interest policy.

Data Warehouse. We defined a cohort of MA beneficiaries age ≥ 65 receiving HBMC for at least 2 months during 2017–2018, described the cohort using demographic, utilization, and comorbidity data and compared it to a 5% random sample of a population of MA beneficiaries age ≥ 65 not receiving HBMC (No HBMC).

Results: Overall, 1.45% of the study cohort age ≥ 65 received HBMC. Compared to No HBMC ($n = 132,147$), those receiving HBMC ($n = 38,800$) were more likely to be: older (46.6% vs. 11.9% age 85+); female (70.8% vs. 58.5%); Black (12.3% vs. 11.3%); urban (90.3% vs. 81.3%); experience hospitalization (38.0% vs. 13.3%), emergency department visit (58.3% vs. 26.9%), ambulance trip (44.1% vs. 9.6%), skilled nursing facility (37.6% vs. 6.4%), or hospice care admission (21.1% vs. 3.5%). They also were more likely to experience a wide range of chronic conditions including dementia (58.1% vs. 5.2%), morbidity burden (Charlson score 3.4 vs. 1.8), and serious illness (77.1% vs. 29.5%). All comparisons $p < 0.0001$.

Conclusions: MA beneficiaries who received HBMC are older, experience greater chronic and serious illness burden, and higher levels of facility-based care than those who did not receive HBMC. MA plans need strategies to identify patients that would benefit from HBMC and develop approaches to deliver such care to this impactful, often invisible population.

Keywords

home-based medical care; home-based primary care; managed care; Medicare Advantage

INTRODUCTION

Approximately 2 million older adults in the United States are homebound, defined as leaving home once a week or less in the previous month. Another 5.5 million are unable to leave home without difficulty or assistance. These persons have multiple chronic conditions, functional impairments, and, often, limited social capital¹; they have unmet care needs and high mortality.^{2,3} Because of difficulty leaving home, frail homebound older adults are commonly unable to access office-based primary care. In population-based studies, only 12% of completely homebound older adults are estimated to receive home-based medical care (HBMC) from a physician or advanced practice provider.¹

HBMC is longitudinal care provided by physicians, advanced practice providers, and, often, inter-professional care teams at home.⁴ This care addresses complex medical issues, as well as those related to functional status, cognitive and behavioral concerns, and social determinants of health. The benefit of HBMC has been studied extensively. Systematic reviews demonstrate reductions in hospital admissions, emergency department visits, hospital length of stay, and long-term care admissions.^{5,6}

To date, however, data on HBMC utilization among older adults has been mostly among Medicare fee-for-service (FFS) beneficiaries. There is a dearth of data on older adults who are beneficiaries of Medicare Advantage (MA) plans (Medicare Part C) beneficiaries. MA currently insures 48%⁷ of Medicare beneficiaries and is projected to increase to 69% by 2030.^{8,9} Given this projected growth of MA¹⁰ and the growing interest of commercial payors in home-based care,¹¹ it is important for MA plans to understand HBMC use

patterns and the characteristics of MA patients receiving such care in order for them to develop strategies and tactics to provide high-value care to these complex patients. It is also important for the Center for Medicare and Medicaid Services to be made aware of potential disparities, or lack thereof, in access to services between FFS and MA beneficiaries.

This study aimed to leverage a large de-identified claims database of MA beneficiaries, linked with socioeconomic status information from the OptumLabs® Data Warehouse to: (1) determine the prevalence of receipt of HBMC among MA beneficiaries age 65, and; (2) compare characteristics of beneficiaries age 65 who receive HBMC to those who do not.

MATERIALS AND METHODS

Study design

This study was conducted using the OptumLabs Data Warehouse (OLDW).¹² The OLDW includes de-identified claims data for more than 200 million privately insured and MA enrollees in a large, private, US health plan from 1993 to the present and represents a diverse population in terms of age and US geographic region. MA plans provides comprehensive insurance coverage for physician, hospital, and prescription drug services, including Part D coverage for MA enrollees. The distributions of age, sex, and race or ethnicity in the databases are similar to the US commercial and MA Populations.¹³

We defined a cohort age 65 receiving HBMC, described the cohort using demographic, coverage, utilization, and comorbidity data, and compared it to a 5% random sample age 65 of MA plan beneficiaries who did not receive HBMC (No HBMC).

Demographic characteristics included: age in years, sex, race/ethnicity, education level, income, insurance type, rural/urban. The OLDW includes socioeconomic information on race/ethnicity, education level, and household income, for approximately 73% of enrollees. This information was derived from a nationally recognized supplier of consumer marketing data and is a compilation of public data and derived predictive data including 5-digit zip code. Although the imputation methods used by this supplier are proprietary, imputation methods for race/ethnicity have been shown in previous studies to have moderate sensitivity (48%), excellent specificity (97%), and moderate positive predictive value (71%) for the purpose of identifying race.¹⁴

Medical comorbidity data included: serious illness status per Kelley et al.,¹⁵ Charlson comorbidity score per Quan et al. (range 0–24),¹⁶ and presence of major medical comorbidities common among older adults including cardiopulmonary disease, dementia, depression, and endocrine disorders. Claims-based utilization data included: outpatient visits, hospitalizations, emergency department visits, skilled nursing facility admissions, hospice use, and ambulance trips. Podiatry visits were excluded. Specialties of attributed HBMC clinicians included family practice, internal medicine, advanced practice providers, and other specialties.

HBMC study cohort

The HBMC cohort included all those: (1) age 65 or older, non-missing age and sex; enrolled in a MA plan with: continuous enrollment for calendar years 2017 and 2018; (2) medical coverage, with or without pharmacy coverage; and (3) two or more months during calendar years 2017 and 2018 with qualifying HBMC encounter in the home. CPT codes for qualifying HBMC encounters provided by physicians, nurse practitioners, or physician assistants were home care encounters (99,341 through 99,345, 99,347 through 99,350) and domiciliary encounters (99,324 through 99,328, 99,334 through 99,337). Subjects were excluded upon disenrollment or death during 2017 or 2018.

Analysis

Means, SDs, and prevalence are used to describe the population characteristics.

Comparisons between the general population and HBMC population are accomplished with chi-square for categorical variables and *t*-tests for continuous variables.

RESULTS

Figure 1 is a flow diagram of the study cohorts. Overall, 1.45% of the population received HBMC. Table 1 depicts sociodemographic characteristics of the HBMC cohort ($n = 38,800$) compared to the 5% sample of the general population ($n = 131,147$). Compared to No HBMC, those receiving HBMC were more likely to be: older (46.6% vs. 11.9% age 85+, $p < 0.0001$); female (70.8% vs. 58.5%, $p < 0.0001$); black (12.3% vs. 11.3%, $p = 0.021$); low income (55.0% vs. 52.0%, $p < 0.0001$), and live in urban areas (90.3% vs. 81.3%, $p < 0.0001$). Family medicine physicians provided HBMC to 37.6% of the HBMC cohort with a mean (SD) of 4.0 (6.7) visits, internal medicine physicians to 34.6% with mean (SD) of 3.8 (6.7 visits), and other specialties 28.0% with a mean of 2.8 (4.9) visits.

Table 2 depicts medical comorbidity characteristics of the HBMC cohort compared to the No HBMC sample. Compared to the No HBMC sample, those receiving HBMC were more likely to be classified as seriously ill (77.1% vs. 29.5%) and had higher levels of comorbidity burden as measured by mean (SD) Charlson score 3.4 (SD 2.5) vs. 1.8 (SD 2.1). In terms of specific medical conditions, those receiving HBMC were more likely to have a full range of medical conditions. Differences in prevalence ranged from a greater than 10-fold difference in dementia (58.1% vs. 5.2%) to a 1.2-fold difference in hyperlipidemia (57.1% vs. 47.1%). Cardiovascular diseases, pulmonary disease, and endocrine conditions were also more prevalent in HBMC recipients. All comparisons $p < 0.0001$.

Figure 2 depicts health service utilization of the HBMC and the No HBMC groups. The HBMC cohort experienced higher rates of all types of health service utilization: hospitalization (38.0% vs. 13.3%), emergency department visit (58.3% vs. 26.9%), skilled nursing facility admission (37.6% vs. 6.4%), hospice care admission (21.1% vs. 3.5%), and ambulance trip (44.1% vs. 9.6%). All comparisons $p < 0.0001$.

DISCUSSION

To our knowledge, this is the first study to examine the use of HBMC in a large national MA-insured older adult sample and found that 1.45% of patients used HBMC. We found that HBMC recipients were older, had lower income levels and were more likely to reside in urban areas than those who did not receive such services. In addition, HBMC recipients were multimorbid with substantially higher prevalence of many chronic conditions and had higher rates of health service utilization compared to those who did not receive HBMC. These data are important as MA is projected to reach 69% of the Medicare population by 2030.⁹

One previous study of use of HBMC in MA and commercially-insured older adults demonstrated higher use of HBMC than the current study (2.43% vs. 1.45%). This may be due to the markedly lower proportion of the sample in the previous study being enrolled in MA plans (46% vs. 100% in the current study).¹⁷ All other previous studies on receipt of HBMC care among older adults have focused on general population studies or on Medicare FFS beneficiaries. A national population-based study examined receipt of HBMC care among older FFS Medicare Beneficiaries and found that between 2011 and 2017, 5% of those surveyed used HBMC services and that 75% of HBMC recipients were homebound.⁴ As in our study, HBMC recipients were more likely to be older, live in urban areas, have dementia, and have high rates of health service utilization. It is worth noting the exceptionally high proportion of persons receiving HBMC with a diagnosis of dementia (58.1%). Other studies have shown similar findings^{1,18} and highlight the need for dementia-informed care and effective dementia care delivery models to be integrated into HBMC.¹⁹

Using the OLDW data, we found the prevalence of HBMC use among mostly MA insured persons to be lower than in population studies of the Medicare FFS population. We consider several potential explanations for this difference. First, there may be a mismatch between MA plan service areas and the availability of HBMC practices in those areas to provide HBMC services. Second, in market areas where MA plans and HBMC practices co-exist, there may be an insufficient patient density for a particular MA plans to contract for services with an HBMC practice. Third, while HBMC is gaining recognition as a means to provide value-based care, such appreciation is not yet widespread.²⁰ Finally, in MA plans, receipt of HBMC may not be consistently captured as completely as in Medicare FFS claims.

This study focused on those who received HBMC services. We were unable to identify persons who need HBMC but are not receiving it. The data from this study could inform the development of strategies to identify such patients using claims data in predictive models. The lack of a standard scalable method to identify such patients is a barrier to optimizing value-based care at a population level. Several strategies have been used. In the Independence at Home demonstration, which tested HBMC in the context of a shared-savings payment model, patients were identified using Medicare claims for the presence of multiple chronic conditions, utilization of facility-based care, and functional impairments.²¹ Systematic data collection of homebound status of patients through self-report or data obtained during in-home annual wellness visits could be another approach. Identifying older adults who would benefit from HBMC using claims-based algorithms may also be

possible.^{22,23,24} In addition, EMR or health care claims can be used to identify factors associated with likelihood of needing HBMC such as dementia status, frailty, serious mental illness, high cost, or use of skilled home health care. However, the sensitivity and specificity of such factors in identifying those who need HBMC remains uncertain. Although self-reported homebound status may be the strongest indicator that HBMC may be needed, such data are not easy for health systems and payors to obtain. In addition to lacking sensitivity and specificity, substantial time lags from health care claims reduce their value in helping to identify those in need of HBMC. In a population with a 20% annual mortality, such time lags to identify a population may end up offering too little too late. Developing scalable approaches to identify those who could benefit from HBMC and are not receiving it in real time could be a major boon to value-based care delivery.

This study is increasingly relevant as there is growing interest in home-based care, in general, and in HBMC, in particular, among MA plans and especially among so-called “payviders,” organizations that are combined payer and health care provider entities. Volpp et al. argue that an idealized care model of the future would be based in the home and facilitated by appropriate payment that would support customization of care and meet patients where they are. They note the challenges in prospectively determining the population appropriate for home care.¹¹ In addition, the study contributes to a relatively small but growing literature on use and value of home-based care, in general,²⁵ and in MA, specifically. Overall, such studies of home-based care in MA demonstrate lower rates of skilled home health care and post-acute facility-based care with similar or better outcomes.^{26,27,28,29}

This study has several strengths. The focus on use of HBMC in an understudied MA population is unique and important to understand as MA penetration in Medicare increases. In addition, the sample size was large and leverages a dataset that is similar to the US MA population, enhancing its generalizability. There are also several limitations. The analysis relied on claims data that are limited in their ability to fully capture an individual's health history. Claims data are generated and collected for payment purposes, not research, and are subject to coding errors and clinicians vary in their intensity of their coding practices. Imputation methods for socioeconomic status variables have limitations, as well.³⁰ There were no data in the OLDW on functional status, a major factor associated with receipt of HBMC. The analysis was limited to a 2-year observation period and because of high mortality among homebound patients,^{2,3} patients who received HBMC during the study period who died were not captured in the analysis. Thus, we may have underestimated the prevalence of HBMC use in the population.

Among older adult MA beneficiaries, those who received HBMC compared to the general population age 65 were older, experienced greater chronic and serious illness burden, and higher levels of facility-based health service utilization. People receiving HBMC represent a high-need population that have high levels of health service utilization. Health plans, health systems, and clinicians need to recognize the existence of this impactful, often invisible population, and develop and target appropriate value-based health and social service interventions.

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This study was funded by a grant from the AARP. SD was an employee of OptumLabs. SD and EC performed all analyses using the OptumLabs Data Warehouse data.

SPONSOR'S ROLE

The funder had no role in the design, methods, subject recruitment, data collections, analysis, and preparation of paper.

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Key points

- 1.45% of a large representative Medicare Advantage (MA) insured older adult cohort used home-based medical care (HBMC)—a substantially lower rate of use than among fee-for-service Medicare beneficiaries

Why does this paper matter?

MA beneficiaries who received HBMC are older, experience greater chronic and serious illness burden, and higher levels of facility-based care than those who did not receive HBMC. MA plans need strategies to identify and provide HBMC to those who need it and optimize provision of HBMC to maximize opportunities under value-based care.

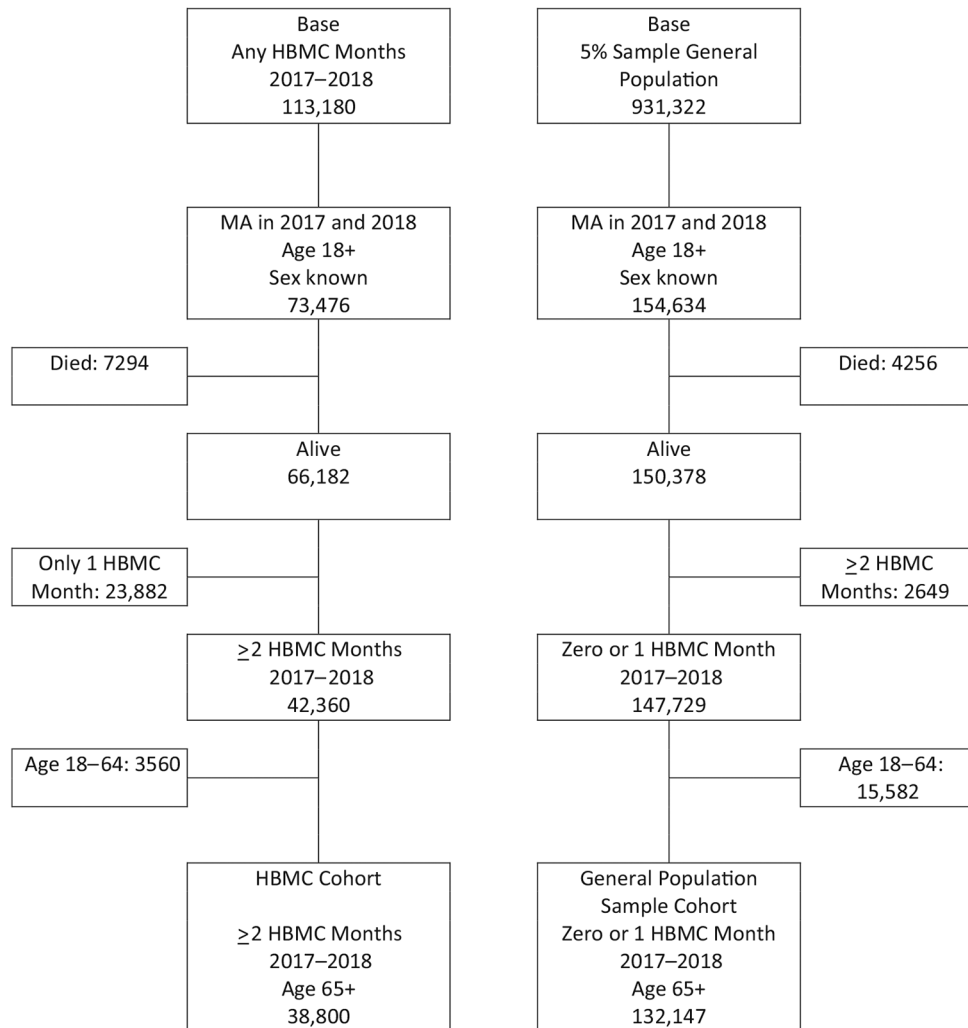


FIGURE 1. Flow diagram of the study cohorts. HBMC, home-based medical care; MA, Medicare Advantage

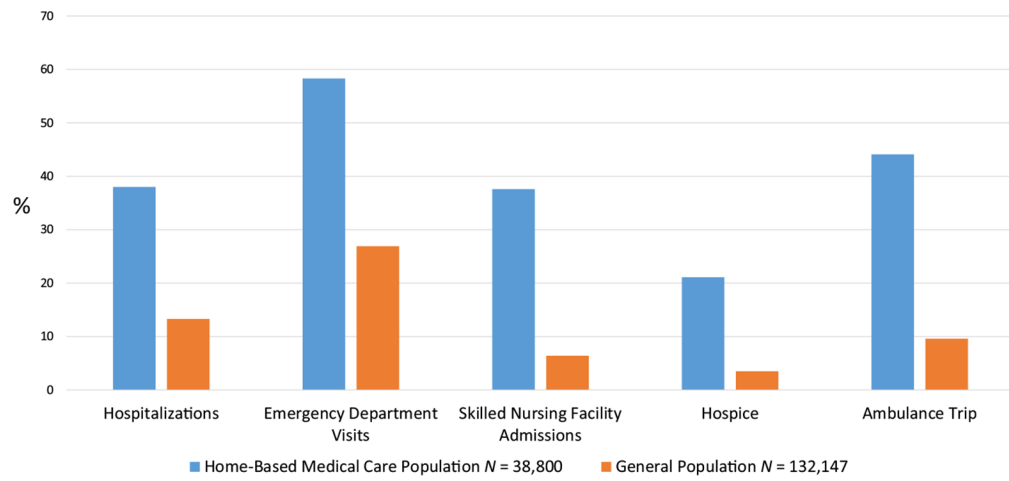


FIGURE 2. Health service utilization of the study cohorts. All comparisons, $p < 0.0001$

Sociodemographic characteristics of the home-based medical care cohort and the general population sample ages 65 and over

TABLE 1

	Home-based medical care population 65, N = 38,800	General population (5% sample) 65, N = 132,147	p-Value
Age, mean (SD)	80.9 (6.2)	74.6 (6.3)	<0.0001
Age groups, N (%)			
5–74	7265 (18.7%)	72,766 (55.1%)	<0.0001
75–84	13,471 (34.7%)	43,649 (33.0%)	
85+	18,064 (46.6%)	15,732 (11.9%)	
Sex, female, N (%)	27,475 (70.8%)	77,269 (58.5%)	<0.0001
Race/ethnicity, N (%)			
Asian	567 (1.5%)	3429 (2.6%)	<0.0001
Black	4782 (12.3%)	14,909 (11.3%)	
Hispanic	2454 (6.3%)	10,316 (7.8%)	
White	25,004 (64.8%)	87,037 (65.9%)	
Other/unknown	5993 (15.4%)	16,456 (12.5%)	
Education, N (%)			
<12th grade	108 (0.3%)	418 (0.3%)	<0.0001
HS diploma	36,561 (94.2%)	125,664 (95.1%)	
Unknown	2131 (5.4%)	6065 (4.6%)	
Household income, N (%)			
<\$75,000 median HH income	21,332 (55.0%)	68,733 (52.0%)	<0.0001
>\$75,000 median HH income	8384 (21.6%)	46,325 (35.1%)	
Unknown	9084 (23.4%)	17,089 (12.9%)	
Rural/urban (RUCA), N (%)			
Urban (50,000 pop.)	35,028 (90.3%)	107,463 (81.3%)	<0.0001
10,000–49,999 population	2201 (5.7%)	12,916 (9.4%)	
<10,000 population	1513 (3.9%)	11,640 (8.4%)	
Unknown	58 (0.1%)	129 (0.1%)	

Abbreviations: HH, household; HS, high school; RUCA, rural-urban commuting area.

Medical comorbidity profile of the home-based medical care cohort and the general population sample ages 65 and over

TABLE 2

	Home-based medical care population 65, N = 38,800	General population (5% sample) 65, N = 132,147	p-Value
Seriously ill, N(%)	29,931 (77.1%)	39,023 (29.5%)	<0.0001
Charlson Comorbidity Score ^a , mean (SD)	3.4 (2.5)	1.8 (2.1)	<0.0001
Alzheimer's disease and other dementias	22,548 (58.1%)	6824 (5.2%)	<0.0001
Depression	15,652 (40.3%)	15,811 (12.0%)	<0.0001
Ischemic heart disease	14,859 (38.3%)	27,350 (20.7%)	<0.0001
Heart failure	12,229 (31.5%)	11,094 (8.4%)	<0.0001
Hypertension	32,572 (83.9%)	79,021 (59.8%)	<0.0001
Stroke	5315 (13.7%)	3944 (3.0%)	<0.0001
Atrial fibrillation	9607 (24.8%)	12,442 (9.4%)	<0.0001
Hyperlipidemia	22,140 (57.1%)	62,297 (47.1%)	<0.0001
Chronic obstructive pulmonary disease	10,103 (26.0%)	12,851 (9.7%)	<0.0001
Diabetes	13,513 (34.8%)	33,690 (25.5%)	<0.0001
Acquired hypothyroidism	12,023 (30.9%)	23,891 (18.1%)	<0.0001
Chronic kidney disease	17,265 (44.5%)	23,360 (17.7%)	<0.0001
Anemia	17,126 (44.1%)	19,386 (14.7%)	<0.0001
Osteoarthritis	17,317 (44.6%)	26,497 (20.1%)	<0.0001

^aRange 0–24.