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Home health care services to persons with dementia and language preference

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Abstract

Despite the rapid increase in the number of persons with dementia (PWD) receiving home health care (HHC), little is known of HHC services patterns to PWD of varied backgrounds, including language preference other than English. Analyzing data of 12,043 PWD from an urban home health agency, we found on average PWD received 2.48 skilled visits or 1.88-hour skilled care and 5.81 aide visits or 24.13-hour aide care weekly. Approximately 63% of the skilled visits were from nurses. More non-English preferred PWD received aide visits, compared to English preferred PWD (44% vs. 36%). The type and intensity of HHC services were associated with language preference; when stratified by insurance, non-English preference was still significantly associated with more HHC aide care. Our study indicated that HHC services (both type and amount) varied by language preference and insurance type as an indicator of access disparities was a significant contributor to the observed differences.

Keywords

Alzheimer’s disease; Dementia; Disparities; Home health care; Language Preference

Introduction

Dementia is a growing public health crisis that challenges the health care system in the United States (U.S.) and many other nations.[1,2] As the fastest growing sector within the U.S. health care system and a leading community-based care source for persons with dementia (PWD), home health care (HHC) is expected to play a pivotal role in providing high quality patient-centered care to PWD of all socio-demographic backgrounds, including those with a language preference other than English and/or limited English proficiency. Between 2013 and 2014, it is estimated that 31% of the 4.9 million Americans who received HHC had dementia.[3] Researchers and policymakers have called for transformation of HHC to meet

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the increasing care needs of a growing body of diverse patients.[4] Evidence documenting services delivery patterns in HHC for PWD, however, is scarce.

The number of PWD is rapidly increasing in the U.S., resulting in serious healthcare consequences. Dementia is a chronic progressive deterioration of cognition that impairs memory, executive function, mobility, communication/interpersonal interactions, and quality of life. It causes a high burden of morbidity and mortality.[5] In the U.S., approximately 5.7 million individuals live with dementia and one in ten older adults (age 65 or older) have dementia.[2] As the U.S. population ages, so will the number of those with dementia which is projected to triple by 2050.[6,7] Dementia also has a significant economic impact on the U.S. health care system. Health care expenditures for older adults with dementia is projected to be over $1 trillion by 2050, increasing from current $260 billion per year.[8]

National initiatives have been taken to address the challenges posed by dementia, including the U.S. National Alzheimer's Project Act in 2011 and the launch of a national plan to overcome dementia.[9] This national plan underscores the necessity and urgency of developing home health care and other non-hospital care for PWD. The plan also highlighted the existence of disparities in dementia care, and a lack of empirical evidence to drive future improvement. Whilst the evidence grows annually demonstrating racial/ethnic and gender disparities in health care services and outcomes,[10–12] there is a dearth of studies examining the influence of other socio-demographic factors, such as language preference, nativity, etc. on health disparities. In fact, language preference other than English is one of the social risk factors explicitly listed in the report of *Accounting for Social Risk Factors in Medicare Payment* by the National Academies of Sciences, Engineering, and Medicine.[13]

A language preference other than English may pose unique challenges for PWD and thus could influence HHC utilization. The language preference is further complicated in the U.S. in persons with limited English proficiency, defined as the inability to communicate safely and clearly in English.[14] Persons with limited English proficiency often report difficulty with accurate and safe communication with health care providers.[15] Empirical neuroscience evidence also suggests that cognitive changes, like those seen in persons with dementia may cause second language speakers to lose their ability to effectively communicate in that language.[16] Therefore, a language barrier superimposed on cognitive changes associated with dementia contributes to the complexity of health care utilization.

Approximately one in five Americans speak a language other than English at home according to the most recent U.S. census.[17] With a continued increase in the number of older adults in the U.S., including those with limited English proficiency or non-English language preferences, PWD who have a language barrier with providers will only increase in the future. This is also true in HHC, as many PWD patients and their families prefer to remain at home, coupled with ongoing policy shifts that incentivize utilization of HHC and other non-hospital care.[3,18,19] Hence, it is imperative to determine the impact of language preference of PWD on HHC utilization. Research to date, however, has been limited, and our study aimed to fill this gap in the science.

The purpose of this study was two-fold: 1) to examine the patterns of HHC service to PWD, and 2) to identify the extent to which HHC services varied by PWD's language preference when considering insurance and other patient characteristics. We hypothesized that non-English preferred patients used less HHC overall due to structural disparities in access to HHC. Structural disparities can include insurance type, geographic location, and several other sociodemographic variables.[20] Our goal was to provide empirical evidence to inform future optimization of HHC organization and delivery for PWD who have a language preference other than English, as well to contribute to future research.

Methods

Design and setting

This is a retrospective, observational study using five years (2010–2014) of HHC data from a large, urban, nonprofit, Medicare-certified home health agency in the northeast region of the U.S. This study was approved by the Institutional Review Board at the author's institution and the participating agency.

Data sources

Two HHC datasets were used, including the Outcome and Assessment Information Set (OASIS) data and administrative data. OASIS is a data collection tool developed with the purpose of enabling a standardized, systematic and comprehensive assessment of HHC quality and patient outcomes. All Medicare-certified home health agencies serving Medicare and/or Medicaid beneficiaries are mandated to collect and submit OASIS data. Using OASIS, HHC patients are assessed multiple times through a HHC episode including at least the initial admission assessment and the assessment at discharge from HHC, transferring to inpatient facility or nursing home, or death. The OASIS data collected at admission assessment is the most comprehensive. It includes patient socio-demographics (e.g., race/ethnicity, gender, age, and insurance), primary diagnosis and comorbidities, functional status, and living arrangement. Patient information at admission to HHC was used in this study.

Administrative data was used for additional information about HHC patients and services delivered to each patient. Patient demographic data from this source included a patient's language preference for daily communication at home. For HHC services, it provided data on the number of visits during a stay, duration (hours) of each visit, and the provider of each visit (e.g., nurse, occupational therapist, physical therapist, HHC aides, etc.).

Sample

Our study included PWD admitted to HHC following hospital discharge for post-acute care. PWD were identified using ICD-9 codes of the primary and secondary diagnoses at admission to HHC for any episode during the study period (2010–2014). PWD were included if they reported a preferred language for communication as English, Chinese, Korean, Russian, or Spanish. These languages represented the largest language groups served by the participating home health agency and were consistent with linguistic demographics of the agency's large metropolitan service area. PWD were excluded if they had a HHC stay longer than 120 days as all the PWD in this study were referred from hospital for post-acute care. Approximately 93% of the PWD had a stay within 120 days. For those PWD with more than one HHC episode during the study period, we chose the most recent episode to avoid potential inter-personal correlation during statistical analysis. This method also maximized our ability to identify PWD as we used diagnoses from previous HHC admissions. This is because researchers have reported underrepresentation of PWD in OASIS data and PWD are often admitted to HHC for post-acute care for diagnoses other than dementia.[21] Our final sample included 12,043 PWD.

Variables

HHC services—

We used a set of measures to reflect HHC provided to PWD, including number of visits, duration of visits, proportion of nurse visits or duration, visit intensity, and visit duration intensity. Each measure was further categorized by HHC provider type, differentiating between HHC professionals (e.g., nurses, physical therapist, and occupational therapist) vs. HHC aides.

Number of visits.: During a HHC episode, a patient received skilled visits from HHC professionals that mostly common included nurses, and physical and occupational therapists. Many of the patients also received visits from HHC aides for personal care assistance, such like assistance in bathing, toileting, and dressing. We calculated the number of visits by HHC professionals (number of skilled visits) and HHC aides (number of aide visits) respectively for each patient.

Duration of visits (hours).: In addition to the number of visits, our data provided unique information of the duration (measured in hours) providers spent during each HHC visit. We calculated the duration of visits by summing the hours from all visits by HHC professionals and aides respectively during a HHC episode, including duration of skilled visits and duration of aide visits.

Proportion of nurse visits or visit duration.: Though it has been commonly acknowledged in the HHC community that the majority of the skilled visits are provided by nurses, empirical evidence of quantifying nurse visits is limited. We calculated two measures to reflect the contribution of nurses to HHC, including proportion of nurse visits and proportion of nurse visit duration (hours). The former measured the amount of visits paid by nurses among all skilled visits and the latter reflected the proportion of care hours provided by nurses among the total skilled care hours.

Visit intensity.: Given that PWD's length of a HHC episode might vary, we also used visit intensity to measure HHC to PWD. Visit intensity is a measure that considers both the number of visits and length of a HHC episode. Specifically, we calculated visit intensity by dividing the number of visits by the length of the HHC episode in days and multiplying by 7. In other words, this measure indicated the average number of visits per week to a patient. This is a method that has been used in previous research of HHC.[22] Visit intensity was calculated for skilled HHC visits (skilled visit intensity) and HHC aide visits (aide visit intensity) respectively. In addition, nurse visit intensity was calculated.

Duration intensity.: Similar to visit intensity, we calculated duration intensity by dividing the total care hours of skilled HHC visits or aide visits by the length of the HHC episode in days and multiplying by 7. Duration intensity reflected the average weekly care hours received by a HHC patient. We calculated three specific measures of duration intensity based upon the providers, skilled visit duration intensity, aide visit duration intensity, and nurse visit duration intensity.

Language preference

Based upon the preferred language for communication, patients were categorized into either the non-English group or the English group. The non-English group included patients who indicated a language preference other than English. A dummy variable was created to indicate the language preference in analyses (English vs. non-English).

Patient characteristics

A set of patient characteristics that might affect their use of HHC were included as covariates, including socio-demographics and clinical/medical conditions. More specifically, social-demographic data included age, gender, race/ethnicity, insurance, and living arrangement. Living arrangement was measured by a dummy variable indicating whether a patient lived alone or not. Clinical/medical conditions included functional status, overall health status, pain, pressure ulcer/injury, urinary incontinence, shortness of breath, cognitive status, anxiety, medication issues, risk factors for hospitalization, and number of comorbidities. Using the method by Scharpf and Madigan,[23] a composite score was calculated to reflect a patient’s overall functional status, based upon the scores of eight items on daily activities in living (ADLs). The variable of medication issues measured the presence of any medication problems, including drug reactions, duplicate therapy, dosage errors, etc. that were reported during drug regimen review by home health care providers.

Analysis

Standard descriptive analysis was conducted to summarize the characteristics of our study sample and the distribution of HHC services. Comparisons of HHC services between patient groups based upon the types of HHC services they received (i.e., receiving skilled visits only vs. receiving both skilled and aide visits) and their language preference were conducted using one-way and two-way analysis of covariance. Multivariate linear regression models were employed to examine the association between HHC services and patient language preference with and without stratification by insurance type. All models were adjusted for patient characteristics. Due to the high correlation between visit intensity and visit duration intensity, we used duration intensity in the multivariate regression analyses.

Results

Table 1 presents the characteristics of PWD at admission to HHC, overall and by language preference. On average, patients were 82 years old (SD=11) with a mean HHC stay of 36 days (SD=22). Patients had a mean score of 4.04 (SD=2.16) out of 8.00 on their functional status. About one third were White (37%) or Hispanic (33%) and one fourth were Black (26%). Approximately two thirds were female (66%) and the majority were insured by Medicare (70%). The majority of patients had temporary or ongoing high health risk(s) (86%), urinary incontinence (68%), at least one identified risk factor for hospital readmission (92%), and two or more comorbidities (77%). Medication issues were found in 41% of the patients. One in three (34%) lived alone.

Approximately one-third (35%) of the patients had a language preference other than English. When comparing patient characteristics by their language preference, significant differences between the two groups were observed in many variables (Table 1), though the differences in absolute values of some variables were small (e.g., age, length of stay for home health care). For example, compared to English patients, more non-English patients had dual eligibility (23% vs. 7%, $p < 0.001$) or medication issues (45% vs. 39%, $p < 0.001$).

The distribution of HHC services, overall and by services type, are summarized in Table 2. Most of the PWD (61%) received skilled visits by HHC professionals only. The remaining PWD (39%) received visits by HHC aides as well. On average, patients received 12 skilled home care visits (SD=11) totaling 9 h (SD=7) of care. After adjustment for the length of a HHC episode (days), the average skilled visit intensity was 2.48 (SD=1.27) visits per week and skilled visit duration intensity was 1.88 (SD=1.05) hours per week. Nursing care was the major contributor to skilled HHC as 63% of the skilled care visits or 66% of the skilled care hours were from nurses. Among PWD who also received HHC aide visits, on average, they received 35 visits (SD=37) or 147 h (SD=197) of care from HHC aides during a HHC episode; and the aide visit intensity and aide visit duration intensity were 5.81 (SD = 4.62) visits per week and 24.13 (SD = 26.58) hours per week respectively.

We further differentiated HHC services by PWD’s language preference (Table 3). Overall, 44% of the non-English PWD vs. 36% of the English PWD received both skilled and aide visit ($p < 0.001$). For those PWD received both care from HHC professionals and aides, non-English patients received much more HHC aide visits and hours as well as higher intensity of visits and hours. Notably, non-English patients received fewer skilled visits and shorter skilled visit duration (hours), compared to English patients. Similarly, non-English patients had lower skilled visit intensity and skilled visit duration intensity than that of English patients. Non-English patients received higher proportion of nursing care, compared to English patients, regardless whether they received care from HHC aides or not.

Estimates of the association between HHC services (i.e., visit duration intensity), language preference, and other patient characteristics are presented in Table 4. A language preference other than English was significantly associated with lower skilled visit duration intensity (β, 0.11; 95% CI, [0.22, 0.01]) and higher aide visit duration intensity (β, 7.57; 95% CI, [5.03, 10.12]). No association was observed between nurse visit duration intensity and non-English preference. Insurance type was significantly associated with HHC services use and PWD with Medicare had higher skilled visit intensity and lower aide visit intensity, compared to PWD with other insurance.

When stratified by insurance type (Table 5), most of the significant associations between HHC services and language preference disappeared. The one exception was the association with HHC aide visit duration intensity among Medicare patients. Specifically, Medicare patients who preferred another language besides English had higher HHC aide visit duration intensity, compared to Medicare patients that preferred English (β, 9.36; 95% CI, [6.28, 12.43]).

Discussion

This is one of the very first studies that has empirically explored HHC services for PWD who had a language preference other than English, and compared it to that of English PWD. Our findings showed that HHC to PWD varied by language preference, and the observed variations were further linked to patient socio-demographics such as insurance type.

While our results indicated a slightly yet significantly lower number of skilled care hours per week (i.e., skilled visit duration intensity) in non-English preferred PWD, no significant relationship was observed between nurse visit duration intensity and language preference of PWD. This finding suggests that the observed differences in skilled HHC services intensity were likely due to less skilled HHC services from occupational, speech, or physical therapists and medical social services in non-English preferred PWD. Other researchers have reported less utilization of physical therapy among racial/ethnic minorities who were more likely to have a language preference other than English or limited English proficiency.[24,25] It is possible that non-English speaking PWD might have received fewer referrals to other skilled HHC services that may benefit them or are contributable to other clinical comorbidities or cultural preferences. Since referrals for additional HHC services need to come from physicians based on the HHC nurses' recommendation, a care coordination gap may be present and merits further exploration to understand the source of this disparity. Examining patterns of unconscious bias in HHC referrals for additional skilled services is also warranted.

The differences in HHC aide visits by language preference is the most striking findings in this study. Our finding is consistent with previous research reporting that Americans who preferred a language other than English and those with limited English proficiency utilized significantly less health care compared to peer English-speaking Americans.[26] While evidence remains limited to explain our observed difference, we have several speculations. One possible explanation is the shortage of bilingual or multi-lingual HHC professionals who could speak the same language as the PWD and/or their family members for effective communication and patient assessment. Meanwhile, literature on HHC aides suggested the majority of HHC aides were able to speak the same language when assisting HHC patients,[27] thus potentially explaining the disparities in HHC utilization. While not a legal practice, it is not hard to imagine skilled HHC professionals who do not speak the patient's language timing their visits with a language concordant home health aide to facilitate communication. Increasing the number of professionals with language skills that match local care therefore is needed.[28]

Another notable yet not surprising finding is that the insurance type is a significant contributor to the observed differences in HHC services between PWD groups of different language preferences. Our finding added to the evidence pool of the influence of insurance on health services delivery and outcomes.[29] The study supports the classification of insurance status as a social risk factor and future research should examine the effects of insurance type and coverage on HHC outcomes in PWD, especially since the insurance market is going to have a wider range of plans available to consumers in the future.

Our study also implies that differences may exist in the preference for types of HHC by PWD and their families. Retaining a first language preference can be an indicator of a person adhering to traditional cultural values and norms in daily life. It is reported that caregivers of minorities are less likely than White caregivers to utilize formal care services.[30] Minority caregivers often provide more care and assistance than their peer Whites.[31] For example, in the Asian cultures, caregiving is not just a “right and correct” thing to do but also an expected part of life.[32] Aspects of these findings would benefit from further exploration through qualitative methods.

With our findings come several limitations. First, in the OASIS data, for each HHC admission, up to five diagnoses (i.e., ICD-9) are recorded. We used all available diagnoses from any HHC admission between 2010 and 2014; however, it is possible that our study sample under-represented PWD in the HHC settings. It should also be noted that our sample were PWD admitted to HHC for post-acute care and the vast majority of them were admitted for diagnoses other than dementia. Patient data sources from other health care sectors that have more diagnostic information should be considered for identifying PWD. Second, we only used data from one home health agency and should be cautious when generalizing our findings to other agencies. Third, we were not able to include measures of the involvement of family caregivers and their interactions with formal HHC, which may influence the delivery and use of HHC to PWD. Future studies should use multi-site or national HHC data to examine HHC service utilization and disparities among PWD and/or other patients as well as considering factors related to informal caregiving, neighborhood environment, and home health agency factors.

Conclusion

The findings of this study underscore the importance of considering language preference and insurance type as social risk factors in HHC services delivery and outcomes among PWD. Future studies about PWD in HHC that use established data sources like national OASIS data and administrative data will help the HHC industry to understand the optimal organization of HHC services that can keep PWD safely in their homes for as long as possible and reduce institutionalization.

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References

1. WHO. Dementia: a public health priority. https://www.who.int/mental_health/neurology/dementia/en/. Published 2018. Accessed 14 March 2019.
2. Alzheimer’s Association. 2018 Alzheimer’s disease facts and figures. Alzheimer’s Dement. 2018;14(3):367–429.

3. CDC. FastStats - Home Health Care. CDC/National Center for Health Statistics. https://www.cdc.gov/nchs/fastats/home-health-care.htm. Accessed 14 February 2019.
4. National Research Council. The Future of Home Health Care: Workshop Summary. Washington, DC: The National Academies Press; 2018. Accessed 25 May.
5. NIA. What Is Dementia? https://www.nia.nih.gov/health/what-dementia. Accessed 1 March 2019.
6. HHS. A Profile of Older Americans: 2014 administration on aging administration for community living. U.S. Partment of Health and Human Services. https://acl.gov/sites/default/files/Aging/andDisability/in/America/2014-Profile.pdf. Accessed 19 February 2019.
7. Hebert LE, Weuve J, Scherr PA, Evans DA. Alzheimer disease in the united states (2010–2050) estimated using the 2010 census. Neurology. 2013;80(19):1778–1783. 10.1212/WNL.0b013e31828726f5. [PubMed: 23390181]
8. WHO. World Alzheimer Report 2016 j Alzheimer's Disease International. https://www.alz.co.uk/research/world-report-2016. Accessed 25 December 2018.
9. HHS. National Plan to Address Alzheimer's Disease: 2017 Update. https://aspe.hhs.gov/system/files/pdf/257526/NatlPlan2017.pdf. Accessed 26 November 2018.
10. Katz SJ, Kabeto M, Langa KM. Gender disparities in the receipt of home care for elderly people with disability in the united states. JAMA. 2000;284(23):3022. 10.1001/jama.284.23.3022. [PubMed: 11122589]
11. Cameron KA, Song J, Manheim LM, Dunlop DD. Gender disparities in health and healthcare use among older adults. J Women's Heal. 2010;19(9):1643–1650.
12. Chase J-AD, Huang L, Russell D, et al. Racial/ethnic disparities in disability outcomes among post-acute home care patients. J Aging Health 2017:1–21. doi:10.1177/0898264317717851.
13. Kwan LY, Stratton K, Steinwachs DM. Accounting For Social Risk Factors in Medicare Payment. Washington, D.C.: National Academies Press; 2017. 10.17226/23635.
14. HHS. Limited English proficiency (LEP). https://www.hhs.gov/civil-rights/for-individuals/special-topics/limited-english-proficiency/index.html. Accessed 19 August 2019.
15. Ali PA, Watson R. Language barriers and their impact on provision of care to patients with limited English proficiency: nurses' perspectives. J Clin Nurs. 2018;27 (5–6):e1152–e1160. 10.1111/jocn.14204. [PubMed: 29193568]
16. Antoniou M, Gunasekera GM, Wong PCM. Foreign language training as cognitive therapy for age-related cognitive decline: a hypothesis for future research. Neurosci Biobehav Rev. 2013;37(10):2689–2698. 10.1016/J.NEUBIOREV.2013.09.004. [PubMed: 24051310]
17. Bureau UC. Detailed languages spoken at home and ability to speak english. https://www.census.gov/data/tables/2013/demo/2009-2013-lang-tables.html. Accessed 11 December 2018.
18. Weber SR, Pirraglia PA, Kunik ME. Use of services by community-dwelling patients with dementia: a systematic review. Am J Alzheimer's Dis Other Dementiasr. 2011;26(3):195–204. 10.1177/1533317510392564.
19. CMS. Home health care services http://www.medpac.gov/docs/default-source/reports/mar17_medpac_ch9.pdf?sfvrsn=0. Accessed 2 December 2018.
20. Perez-Stable EJ, Collins FS. Science visioning in minority health and health disparities. Am J Public Health. 2019;109(S1):S5. 10.2105/AJPH.2019.304962. [PubMed: 30699033]
21. Murtaugh C, Peng T, Totten A, Costello B, Moore S, Aykan H. Complexity in geriatric home healthcare. J Healthc Qual. 2009;31(2):34–43. 10.1111/j.1945-1474.2009.00017.x.
22. O'Connor M, Bowles K, Feldman PH, et al. Frontloading and intensity of skilled home health visits: a state of the science. Home Health Care Serv Q. 2014;33 (3):159–175. [PubMed: 24924484]
23. Scharpf TP, Madigan EA. Functional status outcome measures in home health care patients with heart failure. Home Health Care Serv Q. 2010;29(4):155–170. 10.1080/01621424.2010.534044. [PubMed: 21153996]
24. Chen J, Rizzo JA, Parasuraman S, Gunnarsson C. Racial disparities in receiving total hip/knee replacement surgery: the effect of hospital admission sources. J Health Care Poor Underserved. 2013;24(1):135–151. 10.1353/hpu.2013.0026. [PubMed: 23377724]

25. Iversen MD, Schwartz TA, von Heideken J, et al. Sociodemographic and clinical correlates of physical therapy utilization in adults with symptomatic knee osteoarthritis. Phys Ther. 2018;98(8):670–678. 10.1093/ptj/pzy052. [PubMed: 29718472]
26. Li J, Maxwell AE, Glenn BA, et al. Healthcare access and utilization among Korean Americans: the mediating role of English use and proficiency. Int J Soc Sci Res. 2016;4(1):83. 10.5296/ijssr.v4i1.8678. [PubMed: 29057278]
27. Bureau Health Workfoce. Health workforce projections : nursing assistants and home health aides. https://bhw.hrsa.gov/national-center-health-workforce-analysis. Published 2016. Accessed 19 April 2019.
28. Squires A, Peng TR, Barrón-Vaya Y, Feldman P. An exploratory analysis of patient-provider language-concordant home health care visit patterns. Home Health Care Manag Pract. 2017;29(3):161–167. 10.1177/1084822317696706. [PubMed: 34257503]
29. Han X, Call KT, Pintor JK, Alarcon-Espinoza G, Simon AB. Reports of insurance-based discrimination in health care and its association with access to care. Am J Public Health. 2015;105(Suppl 3):S517–S525. 10.2105/AJPH.2015.302668. [PubMed: 25905821]
30. Napoles AM, Chadiha L, Eversley R, Moreno-John G. Reviews: developing culturally sensitive dementia caregiver interventions: are we there yet. Am J Alzheimer's Dis Other Dementiasr. 2010;25(5):389–406. 10.1177/1533317510370957.
31. Park L, Jacobs E. Cultural determinants of health and healthy aging for older adults with limited-English proficiency. Innov Aging. 2018;2(suppl_1):195. 10.1093/geroni/igy023.717.
32. Pharr JR, Dodge Francis C, Terry C, Clark MC. Culture, caregiving, and health: exploring the influence of culture on family caregiver experiences. ISRN Public Health. 2014;2014:1–8. 10.1155/2014/689826.

Table 1

Characteristics of home care patients with dementia.

	Overall (*N* = 12,043) Mean [SD]	**English (*N* = 7887) Mean [SD]**	**Non-English (*N* = 4156) Mean [SD]**
Age[*]	82.40 [10.73]	82.57 [10.73]	82.07 [10.11]
HHC LOS[*]	36.32 [22.19]	36.03 [22.13]	36.86 [22.29]
Functional status[*,†]	4.04 [2.16]	4.01 [2.17]	4.10 [2.14]
	N [%]	N [%]	N [%]
Male[***]	4116 [34.18]	2822 [35.78]	1294 [31.14]
Race[***]			
White	4421 [36.71]	4063 [51.52]	358 [8.61]
Black	3112 [25.84]	3053 [38.71]	59 [1.42]
Hispanic	3964 [32.92]	494 [6.26]	3470 [83.49]
Other	546 [4.53]	277 [3.51]	269 [6.47]
Insurance[***]			
Medicare	8405 [69.79]	6034 [76.56]	2371 [57.09]
Medicaid	664 [5.51]	288 [3.65]	376 [9.05]
Dual	1547 [12.85]	580 [7.36]	967 [23.28]
Other	1418 [11.78]	979 [12.42]	439 [10.57]
Overall health status[**]			
Stable with no high health risk(s)	1559 [12.95]	1058 [13.41]	501 [12.05]
Temporarily facing high health risk(s)	7706 [63.99]	4952 [62.79]	2754 [66.27]
Fragile with ongoing high risk(s) or serious progressive conditions	2649 [22.00]	1792 [22.72]	857 [20.62]
Unknown/unclear	129 [1.07]	85 [1.08]	44 [1.06]
Pain			
No pain	5615 [46.72]	3713 [47.18]	1902 [45.85]
Pain but no interference with activity	1258 [10.47]	829 [10.53]	429 [10.34]
< daily	1769 [14.72]	1152 [14.64]	617 [14.87]
Daily or all of the time	3376 [28.09]	2176 [27.65]	1200 [28.93]
Presence of PU[***]	1155 [9.59]	830 [10.52]	325 [7.82]

	Overall (N = 12,043) Mean [SD]	**English (N = 7887) Mean [SD]**	**Non-English (N = 4156) Mean [SD]**
Presence of urinary incontinence	8200 [68.21]	5384 [68.38]	2816 [67.89]
Short of breath[**]			
No short of breath	7215 [60.01]	4782 [60.73]	2433 [58.65]
Walking >20 feet	2525 [21.00]	1600 [20.32]	925 [22.30]
With moderate exertion	1657 [13.78]	1108 [14.07]	549 [13.24]
With minimal exertion or with agitation or at rest	625 [5.20]	384 [4.88]	241 [5.81]
Cognition[***]			
Alert/oriented	2100 [17.47]	1456 [18.50]	644 [15.52]
Requires prompting under stressful or unfamiliar conditions	4219 [35.09]	2785 [35.38]	1434 [34.55]
Requires assistance and direction	3448 [28.68]	2222 [28.23]	1226 [29.54]
Requires considerable assistance in routine situations or totally dependent	2255 [18.76]	1409 [17.90]	846 [20.39]
Anxiety[**]			
None of the time	7629 [65.33]	4952 [64.61]	2677 [66.71]
less often than daily	2177 [18.64]	1428 [18.63]	749 [18.66]
Daily but not constantly	1659 [14.21]	1149 [14.99]	510 [12.71]
All the time	213 [1.82]	136 [1.77]	77 [1.92]
Presence of medication issues[***]	4865 [40.94]	3025 [38.86]	1840 [44.91]
N of risk factors for hospitalization			
No risk factor	1015 [8.43]	669 [8.48]	346 [8.33]
1 or 2 risk factors	7098 [58.94]	4602 [58.35]	2496 [60.06]
>=3 risk factors	3930 [32.63]	2616 [33.17]	1314 [31.62]
N of comorbidities[***]			
No comorbidity	591 [4.91]	453 [5.74]	138 [3.32]
1 comorbidity	2159 [17.93]	1542 [19.55]	617 [14.85]
2 comorbidities	3389 [28.14]	2335 [29.61]	1054 [25.36]
>=3 comorbidities	5904 [49.02]	3557 [45.10]	2347 [56.47]
Live alone[*]	4109 [34.12]	2749 [34.85]	1360 [32.72]

[*] $p < 0.5$.

[**] $p < 0.001$.

[***] $p > 0.001$.

[†] Possible score range of functional status, 0–8.

Table 2

Home health care (HHC) services to patients with dementia.

	Overall		Receiving both skilled and aide visits		Receiving skilled visits Only	
	Mean [SD]	IQR	Mean [SD]	IQR	Mean [SD]	IQR
Number of skilled visits **	12.49 [10.52]	[5.00–17.00]	14.69 [10.85]	[7.00–19.00]	11.10 [10.07]	[4.00–15.00]
Number of aide visits **	13.74 [29.02]	[0.00–13.00]	35.44 [37.45]	[8.00–52.00]	–	–
Proportion of Nurse visits **	0.63 [0.28]	[0.40–1.00]	0.60 [0.26]	[0.39–0.83]	0.65 [0.30]	[0.40–1.00]
Duration of skilled visits (hours) **	8.89 [7.14]	[4.08–11.55]	10.54 [7.66]	[5.50–13.38]	7.85 [6.58]	[3.43–10.27]
Duration of aide visits (hours) †	57 [142.12]	[0.00–37.75]	147 [197.14]	[24–199.5]	–	–
Proportion of nurse visit duration **	0.66 [0.27]	[0.45–1.00]	0.64 [0.25]	[0.44–0.84]	0.68 [0.27]	[0.45–1.00]
Skilled visit intensity **	2.48 [1.27]	[1.56–3.18]	2.54 [1.26]	[1.63–3.23]	2.44 [1.28]	[1.53–3.15]
Aide visit intensity †	2.25 [4.04]	[0.00–2.63]	5.81 [4.62]	[1.97–10.00]	–	–
Nurse visit intensity *	1.44 [0.97]	[0.82–1.75]	1.41 [0.88]	[0.86–1.69]	1.45 [1.02]	[0.81–1.75]
Skilled visit duration intensity	1.88 [1.05]	[1.18–2.33]	1.90 [0.99]	[1.21–2.36]	1.87 [1.09]	[1.17–2.33]
Aide visit duration intensity †	9.36 [20.3]	[0.00–7.52]	24.13 [26.58]	[5.41–39.03]	–	–
Nurse visit duration intensity **	1.21 [0.95]	[0.66–1.41]	1.15 [0.82]	[0.67–1.36]	1.25 [1.03]	[0.64–1.45]

Notes: SD, standard deviation; IQR, interquartile range.

* $p < 0.01$.

** $p < 0.001$.

† analysis of variance not applicable.

Table 3

Home care services by services type and patient language preference.

	Receiving both skilled and aide visits (*n* = 4607)				**Receiving skilled visits only (*n* = 7373)**			
	English (*n* = 2857)		**English (*n* = 1813)**		**English (*n* = 5030)**		**Non-English (*n* = 2343)**	
	Mean (SD)	**IQR**	**Mean (SD)**	**IQR**	**Mean (SD)**	**IQR**	**Mean (SD)**	**IQR**
Number of skilled visits	15.47 (11.18)	8.00–20.00	13.47 (10.17)	6.00–18.00	11.51 (10.70)	4.00–15.00	10.21 (8.49)	4.00–14.00
Number of aide visits	28.70 (34.25)	7.00–36.00	46.04 (39.76)	14.00–69.00	–	–	–	–
Proportion of Nurse visits	0.57 (0.26)	0.36–0.75	0.66 (0.26)	0.44–1.00	0.63 (0.30)	0.38–1.00	0.69 (0.29)	0.44–1.00
Duration of skilled visits (hours)	11.00 (7.93)	5.82–13.97	9.81 (7.15)	4.92–12.52	8.07 (6.97)	3.45–10.53	7.38 (5.63)	3.43–9.77
Duration of aide visits (hours)	117.10 (190.12)	18.00–129.25	194.12 (198.84)	44.00–287.75	–	–	–	–
Proportion of nurse visit duration	0.60 (0.24)	0.41–0.77	0.69 (0.24)	0.50–1.00	0.66 (0.28)	0.43–1.00	0.72 (0.26)	0.51–1.00
Skilled visit intensity	2.67 (1.29)	1.75–3.38	2.34 (1.18)	1.49–3.00	2.51 (1.31)	1.57–3.25	2.29 (1.19)	1.40–2.92
Aide visit intensity	4.64 (4.22)	1.62–6.63	7.66 (4.62)	3.02–12.38	–	–	–	–
Nurse visit intensity	1.40 (0.89)	0.84–1.68	1.42 (0.85)	0.89–1.70	1.46 (1.05)	0.78–1.79	1.45 (0.95)	0.84–1.75
Skilled visit duration intensity	1.97 (1.00)	1.29–2.44	1.79 (0.96)	1.13–2.25	1.91 (1.10)	1.18–2.36	1.80 (1.06)	1.11–2.21
Aide visit duration intensity	18.75 (25.21)	4.34–21.82	32.6 (26.49)	9.38–48.39	–	–	–	–
Nurse visit duration intensity	1.13 (0.82)	0.66–1.33	1.19 (0.82)	0.70–1.40	1.24 (1.04)	0.63–1.44	1.27 (1.01)	0.68–1.47

Notes: SD, standard deviation; IQR, interquartile range.

Table 4

Associations between home health care (HHC) services, langauge preference and patient characteristics.

	Skilled HHC visit duration intensity (β [95% CI])	HHC aide visit duration intensity (β [95% CI])	Nurse visit duration intensity (β [95% CI])
Non-English	−0.11* [−0.22, −0.01]	7.57*** [5.03, 10.12]	0.05 [−0.04, 0.13]
Age	0 [0, 0]	0.20*** [0.12, 0.27]	0 [0, 0]
Male	0.07* [0.01, 0.13]	−5.43*** [−6.87, −3.99]	0.01 [−0.04, 0.06]
Race (While as baseline)			
Black	−0.31*** [−0.38, −0.23]	4.08*** [2.27, 5.88]	−0.07* [−0.13, −0.01]
Hispanic	−0.20*** [−0.32, −0.09]	4.37** [1.67, 7.08]	−0.04 [−0.13, 0.05]
Other	−0.27*** [−0.41, −0.13]	7.54*** [4.12, 10.95]	−0.08 [−0.19, 0.04]
Insurance (Medicare as baseline)			
Medicaid	−0.24*** [−0.37, −0.12]	5.03** [1.97, 8.09]	0 [−0.10, 0.10]
Dual	−0.09* [−0.17, −0.01]	15.44*** [13.54, 17.35]	0.06* [0, 0.13]
Private/Other	0.01 [−0.08, 0.10]	3.18** [0.97, 5.40]	0.08* [0.01, 0.15]
Overall health status (Baseline: Stable with no high health risk(s))			
Temporarily facing high health risk(s)	0.09 [0, 0.18]	−1.00 [−3.19, 1.18]	0.08* [0.01, 0.15]
Fragile with ongoing high risk(s) or serious progressive conditions	0.18** [0.08, 0.29]	−0.70 [−3.24, 1.83]	0.18*** [0.10, 0.26]
Unknown/unclear	0.34* [0.02, 0.65]	0.60 [−7.11, 8.31]	0.19 [−0.07, 0.44]
Functional status	0.05*** [0.03, 0.07]	3.37*** [2.93, 3.82]	0.04*** [0.03, 0.06]
Pain (baseline: no pain)			
Pain but no interference with activity	0.09 [0, 0.19]	−0.13 [−2.46, 2.20]	0.00 [−0.06, 0.10]
< daily	−0.02 [−0.10, 0.07]	−0.39 [−2.42, 1.64]	−0.06 [−0.12, 0.01]
Daily or all of the time	0.13*** [0.07, 0.20]	−1.64* [−3.27, −0.02]	0.02 [−0.03, 0.07]
Presence of PU	0.41*** [0.31, 0.51]	−1.56 [−4.06, 0.94]	0.56*** [0.48, 0.65]
Presence of Urinary incontinence	0.01 [−0.05, 0.08]	2.96** [1.29, 4.62]	−0.02 [−0.08, 0.03]
Short of breath (baseline: no short of breath)			
Walking >20 feet	0.05 [−0.02, 0.11]	0.09 [−1.61, 1.79]	0.04 [−0.01, 0.10]

	Skilled HHC visit duration intensity (β [95% CI])	HHC aide visit duration intensity (β [95% CI])	Nurse visit duration intensity (β [95% CI])
With moderate exertion	0.04 [−0.04, 0.12]	−0.65 [−2.67, 1.36]	0.03 [−0.03, 0.10]
With minimal exertion or with agitation or at rest	0.11 [−0.01, 0.23]	−1.19 [−4.19, 1.81]	0.11* [0.01, 0.21]
Cognition			
Requires prompting under stressful or unfamiliar conditions	0.07 [−0.01, 0.15]	1.15 [−0.83, 3.13]	0.01 [−0.05, 0.08]
Requires assistance and direction	0 [−0.09, 0.09]	0.63 [−1.53, 2.79]	−0.02 [−0.10, 0.05]
Requires considerable assistance in routine situations or totally dependent	0.03 [−0.08, 0.14]	4.77** [2.07, 7.48]	0.12* [0.03, 0.21]
Anxiety (baseline: none of the time)			
less often than daily	−0.04 [−0.11, 0.03]	−1.08 [−2.84, 0.69]	−0.02 [−0.08, 0.04]
Daily but not constantly	−0.06 [−0.14, 0.02]	−0.93 [−2.90, 1.04]	−0.01 [−0.08, 0.05]
All the time	0.10 [−0.11, 0.31]	1.54 [−3.50, 6.58]	0.05 [−0.12, 0.22]
Presence of medication issues	0.05 [−0.01, 0.11]	−0.19 [−1.56, 1.18]	0.04 [−0.01, 0.08]
N of risk factors for hospitalization			
1 or 2 risk factors	0.05 [−0.07, 0.16]	−0.16 [−2.87, 2.56]	0.04 [−0.05, 0.13]
>=3 risk factors	0.11 [0, 0.23]	−1.00 [−3.87, 1.88]	0.03 [−0.07, 0.12]
N of comorbidities			
1 comorbidity	−0.04 [−0.19, 0.11]	1.44 [−2.19, 5.06]	0.01 [−0.11, 0.13]
2 comorbidities	0 [−0.14, 0.14]	3.45 [−0.04, 6.94]	0.02 [−0.10, 0.13]
>=3 comorbidities	−0.03 [−0.17, 0.11]	7.51*** [4.09, 10.92]	0.07 [−0.05, 0.18]
Live alone	0.06 [0, 0.12]	5.00*** [3.54, 6.46]	0.08** [0.03, 0.12]

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table 5

Association between home health care (HHC) services and langauge preference by insurance type.

Insurance type		Skilled HHC visit duration intensity(β [95% CI])	HHC AIDE visit duration intensity (β [95% CI])	Nurse visit duration intensity(β [95% CI])
Medicare (n = 3139)	English	–	–	–
	Non-English	−0.12 [−0.25, 0.01]	9.36*** [6.28, 12.43]	0.06 [−0.05, 0.16]
Medicaid (n = 260)	English	–	–	–
	Non-English	−0.01 [−0.46, 0.48]	−2.79 [−12.52, 6.94]	0.17 [−0.20, 0.56]
Dual eligibility (n = 781)	English	–	–	–
	Non-English	−0.01 [−0.26, 0.24]	−0.29 [−6.36, 5.78]	0.06 [−0.16, 0.27]
Private/Other (n = 490)	English	–	–	–
	Non-English	0.01 [−0.34, 0.36]	9.04 [−0.24, 18.33]	0.04 [−0.25, 0.33]

Each model were adjusted for patient characteristics.

[***] $p < 0.001$.