Home Modifications for Rural Veterans With Disabilities

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Background: Appropriate home modifications (HMs) can make the home environment accessible and relatively safe by reducing the risk of falls. Of special concern are individuals living alone, living in rural communities, and/or living in substandard housing. The Home Improvements and Structural Alterations (HISA) is a Veterans Health Administration (VHA) benefit program providing HMs for veterans with disabilities.

Methods: The objective of this study was to detail the profile of rural veteran (RV) HISA users and report on national HISA utilization patterns. We compare use at US Department of Veterans Affairs (VA) medical centers of varying complexity levels, and in VA regions. An examination of the relationship between travel time/distance and HISA utilization is also provided. This retrospective database study uses GeoSpatial analyses and 3 VA sources: The National Prosthetics Patient Database, the VHA Medical Inpatient Dataset, and the VHA Outpatient Dataset.

Results: From 2015 through 2018, 10,810 RVs used HISA with a mean age of 70.9 years. A majority of participants were White (79.5%), married (74.3%), and male (96.5%) veterans. They traveled a mean of 79.8 miles for 94.5 minutes to reach a facility where they received a HISA prescription. Nearly 75% of HISA users were able to receive a HISA prescription from their nearest facility, while about one-quarter traveled to a facility farther away, of which 43% travelled between 100 and 200 miles to obtain the HISA benefit. The top categories of diagnoses were musculoskeletal (19.1%), neurologic (12.5%), and cardiovascular (5.4%). There were about 11,166 HM prescriptions afforded to rural HISA users during the period, including bathroom (82.4%), doorway (4.9%), and railing (3.6%) modifications.

Conclusions: This study documents the national demographics and clinical characteristics of rural HISA users, data that may be useful to policy makers, HM service providers and advocate as well as HISA administrators in predicting future use and users.

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The US Department of Veterans Affairs (VA) created the Home Improvements and Structural Alterations (HISA) program to help provide necessary home modifications (HMs) to veterans with disabilities (VWDs) that will facilitate the provision of medical services at home and improve home accessibility and functional independence. The Veterans Health Administration (VHA) has more than 9 million veteran enrollees; of those, 2.7 million are classified as rural or highly rural.[1] Rural veterans (RVs) possess higher rate of disability compared with that of urban veterans.[2-5] RVs have unequal access to screening of ambulatory care sensitive conditions (eg, hypertension, diabetes mellitus).[6] Furthermore, RVs are at risk of poor medical outcomes due to distance from health care facilities and specialist care, which can be a barrier to emergency care when issues arise. These barriers, among others, are associated with compromised health quality of life and health outcomes for RVs.[3,6] The HISA program may be key to decreasing falls and other serious mishaps in the home. Therefore, understanding use of the HISA program by RVs is important. However, to date

little information has been available regarding use of HISA benefits by RVs or characteristics of RVs who receive HISA benefits.

HISA Alterations Program

HISA was initially developed by VA to improve veterans' transition from acute medical care to home.[7,8] However, to obtain HISA grants currently, there is an average 3 to 6 months application process.[7] Through the HISA program, VWDs can be prescribed the following HMs, including (but not limited to): flooring replacement, permanent ramps, roll-in showers, installation of central air-conditioning systems, improved lighting, kitchen/bathroom modifications, and home inspections. The HMs prescribed depend on an assessment of medical need by health care providers (HCPs).[8]

As time passed and the veteran population aged, the program now primarily helps ensure the ability to enter into essential areas and safety in the home.[5] The amount of a HISA payment is based on whether a veteran's health condition is related to military service as defined by the VHA service connection medical evaluation process. Barriers to obtaining a HISA HM can include

TABLE 1 Sociodemographic and Clinical Characteristics of Rural HISA Users

Characteristics	Overall (N = 10,810)	Class 1 (n = 7931)	Class 2 (n = 2879)	P value[a]
Age group, No. (%)				
< 45 y	284 (2.6)	260 (3.3)	24 (0.8)	< .001
45-64 y	2004 (18.5)	1591 (20.1)	413 (14.3)	
65-69 y	2743 (25.4)	2331 (29.4)	412 (14.3)	
70-74 y	2189 (20.2)	1757 (22.2)	432 (15.0)	
75-79 y	1119 (10.4)	714 (9.0)	405 (14.1)	
≥ 80 y	2471 (22.9)	1278 (16.1)	1193 (41.4)	
Age, mean [median] (SD), y	70.9 [70] (11.6)	69.1 [69] (11.3)	75.7 [77] (10.9)	< .001
Gender, No. (%)				
Male	10,428 (96.5)	7651 (96.5)	2777 (96.5)	.98
Female	382 (3.5)	280 (3.5)	102 (3.5)	
Race, No. (%)				
Black	1146 (10.6)	923 (11.6)	223 (7.8)	< .001
White	8596 (79.5)	6247 (78.8)	2349 (81.6)	
Others	221 (2.0)	173 (2.2)	48 (1.7)	
Unknown	847 (7.8)	588 (7.4)	259 (9.0)	
Marital status, No. (%)				
Married	8033 (74.3)	6074 (76.6)	1959 (68.0)	< .001
Unmarried	2714 (25.1)	1808 (22.8)	906 (31.5)	
Unknown	63 (0.6)	49 (0.6)	14 (0.5)	
Disability conditions, No. (%)				
Musculoskeletal	2061 (19.1)	1643 (20.7)	418 (14.5)	< .001
Pulmonary	348 (3.2)	229 (2.9)	119 (4.1)	
Neurologic	1353 (12.5)	988 (12.5)	365 (12.7)	
Endocrine	325 (3.0)	249 (3.1)	76 (2.6)	
Cardiovascular	588 (5.4)	397 (5.0)	191 (6.6)	
Vision impairment	123 (1.1)	80 (1.0%)	43 (1.5%)	
Hearing impaired	8 (0.1)	7 (0.1)	1 (0.0)	
Other	2174 (20.1)	1478 (18.6)	696 (24.2)	
Hospital stay, No. (%)				
No	6831 (63.2)	4987 (62.9)	1844 (64.1)	.27
Yes	3979 (36.8)	2944 (37.1)	1035 (35.9)	
Stay, mean [median] (SD), d				
Average per patient	7.5 [4.3] (17.6)	7.2 [4] (18.7)	8.2 [4.5](14.1),	.15
Total per patient	21.9 [10] (45.2)	22.1 [10] (49.2)	21.1 [10] (31.3),	.51

Abbreviations: ANOVA, analysis of variance; HISA, Home Improvements and Structural Alterations.
[a]P value was calculated with χ² test for dichotomous and categorical variables, and 1-way ANOVA for continuous variables.
[b]Top diagnoses included other malaise and fatigue, unspecified, and abnormalities of gait and mobility.

difficulty in navigating the evaluation process and difficulty in finding a qualified contractor or builder to do the HM.[7]

This article aims to: (1) Detail the sociodemographic and clinical characteristics of rural HISA users (RHUs); (2) report on HISA usage patterns in number, types, and cost of HMs; (3) compare use amid the diverse VA medical centers (VAMCs) and related complexity levels and Veterans Integrated Service Networks (VISNs); and (4) examine the relationship between travel time/distance and HISA utilization. The long-term goal is to provide accurate information to researchers, HM administrators, health care providers and policy makers on HISA program utilization by rural VWDs, which may help improve its use and bring awareness of its users. This study was approved by the affiliate University of Florida Institutional Review Board and VA research and development committee at the North Florida/South Georgia Veterans Health System.

METHODS

Data were obtained from 3 VA sources: the National Prosthetics Patient Database

TABLE 2 Home Modification Type by Facility Complexity Level

| Home Modifications | Overall, No. (%) (N = 10,810) | Complexity Levels, No. (%) | | | | | P value[a] |
		High 1a (n = 3574)	High 1b (n = 888)	High 1c (n = 3186)	Medium 2 (n = 1540)	Low 3 (n = 1622)	
Bathroom	8904 (82.4)	2968 (33.3)	658 (7.4)	2609 (29.3)	1338 (15.0)	1331 (14.9)	< .001
Doorway	530 (4.9)	190 (35.8)	45 (8.5)	137 (25.8)	66 (12.5)	92 (17.4)	.13
Railing	384 (3.6)	126 (32.8)	32 (8.3)	106 (27.6)	45 (11.7)	75 (19.5)	.10
Walkway	130 (1.2)	41 (31.5)	11 (8.5)	33 (25.4)	20 (15.4)	25 (19.2)	.64
Ramp	257 (2.4)	63 (24.5)	21 (8.2)	128 (49.8)	17 (6.6)	28 (10.9)	< .001
Electrical	128 (1.2)	30 (23.4)	2 (1.6)	78 (60.9)	10 (7.8)	8 (6.3)	<.001
Kitchen	34 (0.3)	9 (26.5)	4 (11.8)	8 (23.5)	7 (20.6)	6 (17.6)	.56
Air conditioning	35 (0.3)	9 (25.7)	6 (17.1)	10 (28.6)	6 (17.1)	4 (11.4)	.36
Fees	15 (0.1)	2 (13.3)	1 (6.7)	2 (13.3)	3 (20.0)	7 (46.7)	.02
Driveway	76 (0.7)	23 (30.3)	7 (9.2)	23 (30.3)	8 (10.5)	15 (19.7)	.70
Plumbing	14 (0.1)	3 (21.4)	2 (14.3)	5 (35.7)	2 (14.3)	2 (14.3)	.74
Others	659 (6.1)	255 (38.7)	146 (22.2)	145 (22.0)	46 (7.0)	67 (10.2)	< .001

[a]P value was calculated using χ^2 test and Fisher exact test.

(NPPD), the VHA Medical Inpatient Dataset, and the VHA Outpatient Dataset.[7] The NPPD is a national administrative database that contains information on prosthetic-associated products ordered by HCPs for patients, such as portable ramps, handrails, home oxygen equipment, and orthotic and prosthetic apparatus. Data obtained from the NPPD included cost of HMs, clinical characteristics, VISN, and VAMC. VA facilities are categorized into complexity levels 1a, 1b, 1c, 2, and 3. Complexity level 1a to 1c VAMCs address medical cases that entail "heightening involvedness," meaning a larger number of patients presented with medical concerns needing medical specialists. Complexity levels 2 and 3 have fewer resources, lower patient numbers, and less medically complex patients. Finally, the VHA Medical Inpatient and Outpatient Datasets administrated by VA Informatics and Computing Infrastructure, consist of in-depth health services national data on inpatient and outpatient encounters and procedures.

The study cohort was divided into those with service-connected conditions (Class 1) or those with conditions not related to military service (Class 2). If veterans were identified in both classes, they were assigned to Class 1.

The cost variable is determined by using the veterans' classification. Class 1 veterans receive a lifetime limit of $6800, and Class 2 veterans receive a lifetime limit of $2000. A Class 2 veteran with ≥ 50% disability rating is eligible for a HISA lifetime limit of $6800. Whenever a value exceeds allowed limit of $6800 or $2000, due to data entry error or other reasons, the study team reassigned the cost value to the maximum allowed value.

Travel distance and time were derived by loading patient zip codes and HISA facility locations into the geographical information system program and using the nearest facility and find-route tools. These tools used a road network that simulates real-world driving conditions to calculate distance.

Study Variables

VWDs of any age, gender, and race/ethnicity who qualified for HISA and received HMs from fiscal year (FY) 2015 through FY 2018 were identified (N = 30,823). Most VWDs were nonrural subjects (n = 19,970), and 43 had no Federal Information Processing

TABLE 3 Top Prescribing Facilities for HISA Use

VAMCs[a]	Rank	Total Rural HISA Users, No.	Class 1, No. (%)[b]	Class 2, No. (%)[b]	Complexity Level[c]	VISN, No.
Gainesville, FL	1	494	351 (71.1)	143 (28.9)	1a	8
Durham, NC	2	355	297 (83.7)	58 (16.3)	1a	6
Huntington, WV	3	349	258 (73.9)	91 (26.1)	1c	5
Cleveland, OH	4	317	191 (60.3)	126 (39.7)	1a	10
Asheville, NC	5	273	197 (72.2)	76 (27.8)	1c	6
Marion, IL	6	266	196 (73.7)	70 (26.3)	2	15
San Antonio, TX	7	260	228 (87.7)	32 (12.3)	1a	17
Birmingham, AL	8	234	172 (73.5)	62 (26.5)	1a	7
Augusta, ME	9	214	155 (72.4)	59 (27.6)	1c	1
Richmond, VA	10	208	168 (80.8)	40 (19.2)	1a	6
Salisbury, NC	11	205	166 (81.0)	39 (19.0)	1c	6
Clarksburg, WV	12	196	167 (85.2)	29 (14.8)	1c	5
Dallas, TX	13	177	120 (67.8)	57 (32.2)	1a	17
Dublin, GA	14	168	146 (86.9)	22 (13.1)	2	7
Saginaw, MI	15	162	119 (73.5)	43 (26.5)	3	10
Des Moines, IA	16	157	61 (38.9)	96 (61.1)	1c	23
Fayetteville, NC	16	157	133 (84.7)	24 (15.3)	1c	6
Beckley, WV	18	150	131 (87.3)	19 (12.7)	2	5
Omaha, NE	19	147	110 (74.8)	37 (25.2)	1b	23
Columbia, SC	20	136	105 (77.2)	31 (22.8)	1c	7

Abbreviations: HISA, Home Improvements and Structural Alterations; VA, Veterans Affairs medical centers; VISN, Veterans Integrated Service Networks.
[a]VAMCs were identified from the prescribing station where the HISA users obtained the home modification. Prescribing stations are connected to a parent (administrative) station.
[b]Class 1 veterans have service-connected disability with a lifetime maximum of $6800 for home modifications; Class 2 veterans have a nonservice-connected disability and may receive a lower lifetime maximum.
[c]US Department of Veterans Affairs complexity levels: High: 1a, 1b, 1c; medium: 2; low: 3.

System data. The final study cohort consisted of 10,810 HISA recipients. The NPPD, inpatient and outpatient data were merged by scrambled social security numbers to retrieve the following data: age, gender, race, ethnicity, marital status, Class (1 or 2), mean and total number of inpatient days, and type of HMs prescribed.

We also recorded rurality using the VA Rural-Urban Commuting Areas (RUCA) system, but we combined the rural and highly rural designation.[1] Census tracts with a RUCA score of 10.0 are deemed highly rural, the remainder are considered rural except those with a RUCA score of 1.0 or 1.1. Travel time and distance from a veteran's home to the VA facility that provided the HISA prescription were determined from zip codes. The current study focuses on VAMCs prescribing stations (affiliated sites of administrative parent medical facilities) where the HISA users obtained the HM, not the parent station (administrative parent medical facilities).
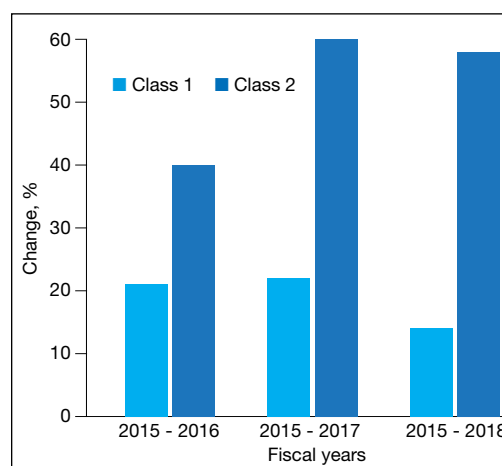
FIGURE 1 HISA Program Rural Users
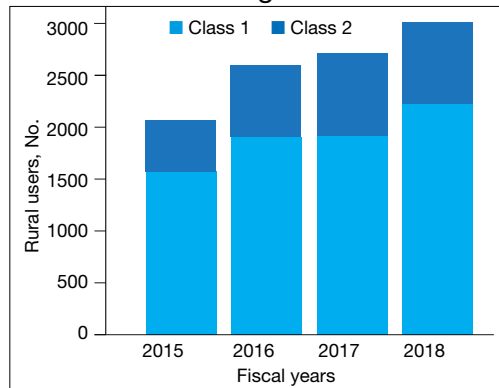
Abbreviation: HISA, Home Improvements and Structural Alterations.

FIGURE 2 HISA Program Change in Use Relative to Previous Fiscal Year
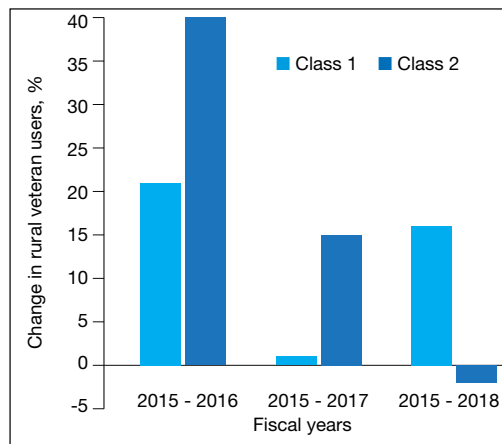
Abbreviation: HISA, Home Improvements and Structural Alterations.

FIGURE 3 Cumulative Change in HISA Use Relative to Fiscal Year 2015

Abbreviation: HISA, Home Improvements and Structural Alterations.

HISA Utilization

To characterize HISA utilization geographically and over time, the number of users were mapped by county. Areas where users were increasing (hot spots) or decreasing (cold spots) also were mapped. The maps were created using Environmental Systems Research Institute ArcGIS Pro 2.2.1 software. We chose to use natural breaks (Jenks) data classification method in a choropleth to symbolize the change over time map. We then used the Getis Ord GI* optimized hot spot analysis tool in the Arc-GIS Pro spatial statistics tool set to generate the hot/cold spot maps. This tool identifies clusters of high values (hot spots) and low values (cold spots) creating a new output layer, RHUs by county, with a Z score, P value, and CI for each county. The Gi Bin field classifies statistically significant hot and cold spots. Counties sorted into the ± 3 category (bin) have a clustering characteristic (eg, with neighboring counties) that is statistically significant with a 99% CI; the ± 2 bin indicates a 95% CI for those county clustering sorted therein; ± 1 reflects a 90% CI; and 0 bin contains county features that have no statistical significant clustering with neighboring counties.

Data Analysis

Data were cleaned and analyzed using SAS 9.4 and R 3.5.3. Descriptive statistics are provided for sociodemographic characteristics, clinical characteristics, and class. ANOVA and t tests were used to compare continuous variables between groups, while χ^2 and Fisher exact tests were used for dichotomous and categorical outcome variables. The threshold for statistical significance for these tests was set at $\alpha = .001$.

RESULTS

There were 10,810 RHUs from FY 2015 through FY 2018 and HISA utilization increased each year (Figure 1). Although some years may show usage decreases relative to previous fiscal years, the cumulative trends showed an increase relative to FY 2015 for both Classes of RVs (Figure 2). There was a 45.4% increase from FY 2015 to FY 2018 with a mean 13.6% yearly increase. Class 1 increased 21.0% and Class 2 increased 39.5% from FY 2015 to FY 2016 (Figure 3).

Most RHUs were male, White, and married. Class 1 and Class 2 RHUs differed significantly by age, race, marital status, and disability conditions: Class 1 RHUs were aged 6.6 years younger with a mean age of 69.1 years compared with 75.7 years for Class 2 users. For Class 1 RHUs, a plurality (29.4%) were aged 65 to 69 years; while a plurality (41.4%) of Class 2 users were aged ≥ 80 years. Musculoskeletal was the most common identified type of condition for all RHUs (Table 1).

To better understand HISA utilization patterns and net RHUs per county, we used a map to detail RHUs by county and change over time (Figure 4). Additionally, we compared US counties by RHUs from FY 2015 to FY 2018 and determined how clusters of high numbers of RHUs (hot spots) and low numbers of RHUs (cold spots) shifted over this period (Figure 5). While HISA utilization grew over the study period, the net count of RHUs per county varied by 9 to 20 persons/county. The population of RHUs increased over time in the Southwest, Southeast, and over much of the East/Northeast, while in the Central and Midwest regions, number of RHUs seems to decrease in population and/or use of the system. The cold spots in the Midwest and South Central US seem to increase with a significant relationship to neighboring counties having a low number of RHUs.

There were 11,166 HM prescribed to RHUs (Table 2). Bathroom HMs also were the dominant HM type for all facilities regardless of complexity levels (Table 3). The San Antonio, Texas, VAMC demonstrated the highest Class 1 vs Class 2 difference in HISA use (Class 1: 87.7% and Class 2: 12.3%). Except for the Des Moines VAMC, all other VAMCs showed HISA use > 60% by Class 1.

Cost Data

Air-conditioning installation ($5007) was the costliest HM overall (Table 4), closely followed by bathroom ($4978) and kitchen modifications ($4305). Bathroom renovations were the costliest HM type for both Class 1 and Class 2, closely followed by electrical repair and air-conditioning installation for Class 1 and driveway reconstruction and wooden ramp construction for Class 2.

The mean award received for HM was $4687 (Table 5). While the number of RHUs

FIGURE 4 Rural HISA Users by County Change From Fiscal Year 2015 to 2018[a]
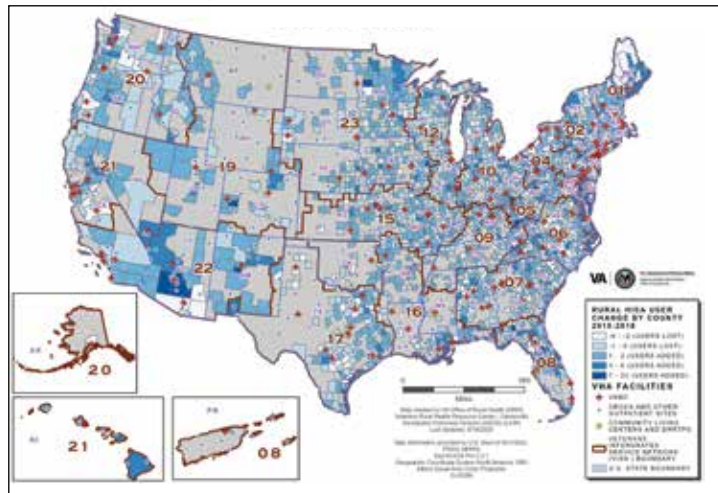
Abbreviation: HISA, Home Improvements and Structural Alterations.
[a]The symbology of a choropleth was used for visualization over the study period. The gray space in the increase/decrease map indicates nulls/missing data where no data on users in these counties were available at the time of analysis. Of 3227 counties, 1554 counties had no data or data were missing. From fiscal year 2015-2018, of 3227 counties, 509 counties had a net decrease in rural or highly rural HISA users; 246 counties had no change, and 918 counties had a net positive increase.

FIGURE 5 Rural HISA Users Hot and Cold Spots
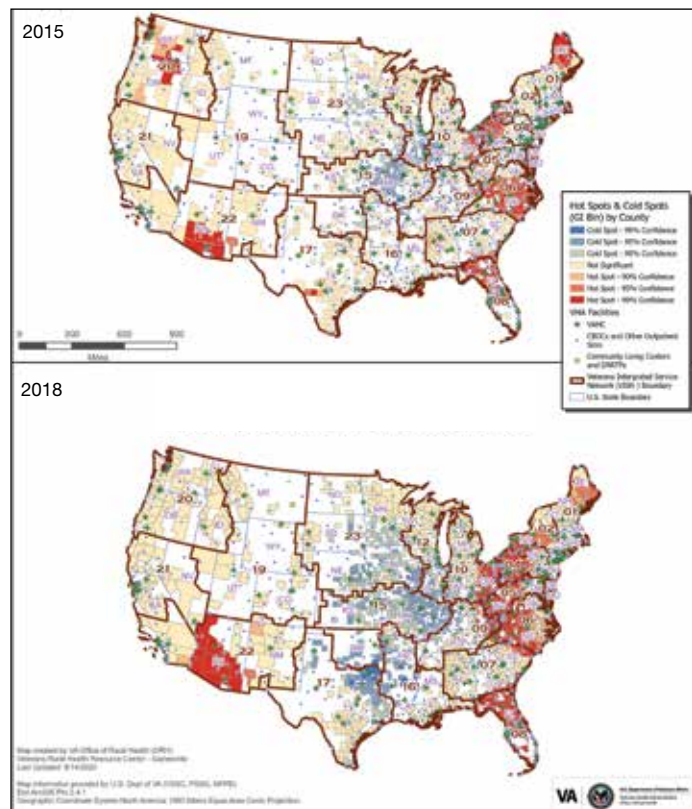
Abbreviation: HISA, Home Improvements and Structural Alterations.

TABLE 4 Costliest Home Modification by Class From Fiscal Years 2015-2018

Modification Types	Overall Cost, Mean (SD), $	Class 1 Cost, Mean (SD), $[a]	Class 2 Cost, Mean (SD), $[a]
Bathroom (n = 8904)	4978 (2222)	6760 (5887)	2139 (1226)
Doorway (n = 530)	3277 (2214)	4292 (2259)	1755 (863)
Railing (n = 384)	1715 (1669)	2165 (2087)	1190 (674)
Ramps (n = 257)	3816 (2277)	4470 (2257)	1946 (860)
Cement (n = 48)	3915 (2666)	4117 (2646)	1220 (1039)
Wood (n = 209)	3796 (2194)	4569 (2136)	1982 (844)
Walkway (n = 130)	3663 (2123)	4680 (1988)	1926 (822)
Electrical (n = 128)	5602 (2186)	6143 (1686)	1529 (691)
Driveway (n = 76)	4018 (2232)	4721 (2091)	2052 (1216)
Air conditioning (n = 35)	5007 (1971)	5674 (1407)	1783 (531)
Kitchen (n = 34)	4305 (2761)	5066 (2637)	1589 (750)
Fees (n = 15)	1434 (1872)	1746 (2265)	873 (718)
Plumbing (n = 14)	4071 (2268)	5663 (1669)	1948 (85)
Others (n = 659)	3983 (2371)	4941 (2151)	1839 (1095)

[a]Class 1 veterans have service-connected disability with a lifetime maximum of $6800 for home modifications; Class 2 veterans have a nonservice-connected disability and may receive a lower lifetime maximum.

increased from FY 2015 to FY 2016, the average cost decreased, both overall ($280) and for Class 1 ($195) and Class 2 ($153). Except for a small decline in the number of Class 2 HISA recipients from FY 2017 to FY 2018, overall, the number of RHUs continuously grew from FY 2015 to FY 2018: 977 for the overall cohort, 678 for Class 1 and 299 for Class 2. Despite the obvious gain in the number of RHUs, the average costs did not notably change over time. VISN 21 had the highest mean cost, followed by VISNs 17, 6, 22, and 20.

Travel
Travel time and distance to the HISA prescribing facility differed significantly between Class 1 and Class 2 HISA users. RHUs had to travel about 95 minutes from their place of residence to access the HISA benefits program. There were no statistically significant differences between Class 1 and 2 users with respect to travel time and distance traveled (Table 6).

The majority of Class 1 and Class 2 veterans accessed the HISA from their nearest facility. However, nearly one-quarter of both Class 1 and 2 RHUs (24% each) did not. Among the 2598 who accessed the nonnearest facility, 97 (3.7%) accessed a facility that is ≤ 40 miles. Many (44%) users traveled 40 to 100 miles, and another 43.2% traveled 100 to 200 miles from their residence to access a HM prescription. Some 2598 users (1.1%) traveled > 500 miles to access a facility.

DISCUSSION
Although utilization of the HISA program has steadily increased, overall participation by subpopulations such as RHUs can still be improved significantly. Veterans aged ≤ 46 years who have a disability that is common to those receiving HISA benefits have low HISA utilization. Similarly, veterans with sensory disabilities also have low use. These subpopulations are among those in great need of attention and services.

A study by Lucas and Zelaya, using the 2016 National Health Interview Survey data with an aim to measure degree of vision problems, dual sensory impairment, and hearing trouble in male veterans aged ≥ 18 years, found that veterans were more likely to report dual sensory impairment and balance difficulties when compared with nonveterans.[9] The number of female veterans is growing but had very low representation in this study.[10] This emerging VHA population requires information and education on their HM benefits.

Home Modifications
The most common HM prescribed for RHUs was for the bathroom. Further investigation is warranted as to why, given the diversity of HM types that the grant covers, low prescription rates exist across most of the HM types. There may be a lack of knowledge by providers and VWD as to the range of HMs that can be awarded under the grant. It is important that HCPs and veterans receive education on HISA HM options.

Semeah and colleagues pointed out the need for an assessment of the HISA HM ordering system to ensure that multiple HMs items (eg, kitchen, air conditioning, fees, driveway, and plumbing) are listed among

TABLE 5 Cost Data for Home Improvements and Structural Alterations Use

Times Periods	No.	Total Mean (SD), $	No.	Class 1 Mean (SD), $[a]	No.	Class 2 Mean (SD), $[a]
Overall cost	10,810	4687 (2335)	7931	5639 (1859)	2879	2021 (1180)
Fiscal year 2015	2153	4983 (2280)	1637	5888 (1690)	516	2096 (1311)
Fiscal year 2016	2704	4703 (2319)	1983	5693 (1804)	721	1943 (971)
Fiscal year 2017	2823	4614 (2335)	1996	5650 (1837)	827	2043 (1164)
Fiscal year 2018	3130	4607 (2338)	2315	5407 (206)	815	2020 (1272)
Veterans Integrated Service Networks[b]						
1	369	4143 (2327)	268	5031 (2013)	101	1791 (1188)
2	426	4285 (2391)	314	5196 (2132)	112	1790 (654)
4	529	4058 (2360)	383	4922 (2224)	146	1803 (397)
5	812	5071 (2259)	635	5920 (1714)	177	2073 (1101)
6	1364	5301 (2142)	1094	6169 (1373)	270	1854 (653)
7	817	4984 (2253)	651	5781 (1738)	166	1880 (985)
8	768	3939 (2331)	484	4986 (2127)	284	1836 (794)
9	413	4882 (2268)	334	5582 (1886)	79	1957 (1087)
10	1106	4216 (2384)	701	5426 (1933)	405	2107 (1442)
12	397	4161 (2357)	267	5340 (1950)	130	1756 (704)
15	714	4805 (2289)	545	5732 (1785)	169	1819 (398)
16	448	4876 (2293)	347	5535 (1978)	101	2635 (1829)
17	584	5302 (2130)	469	6144 (1412)	115	1921 (674)
19	185	4330 (2460)	127	5388 (2084)	58	2011 (1402)
20	535	5238 (2147)	436	6002 (1540)	99	1862 (710)
21	245	5354 (2124)	206	5874 (1767)	39	2637 (1742)
22	317	5244 (2207)	249	5703 (1930)	68	1846 (470)
23	781	3996 (2372)	421	5292 (2023)	360	2493 (1790)

[a]Class 1 veterans have service-connected disability with a lifetime maximum of $6800 for home modifications; Class 2 veterans have a nonservice-connected disability and may receive a lower lifetime maximum.
[b]The Veterans Integrated Service Network was determined by the patient's location rather than the prescribing facility's location.

the forced choices shown to clinicians to select from.[7] Poor housing in rural America is widespread: 63% of rural dwellings need renovations and/or repairs to be accessible to individuals with disabilities, with > 6.7 million rural homes having no or faulty plumbing or kitchens; yet in this study, prescriptions for these HMs accounted for < 1%.[11,12]

VISN 6 had the most HISA awards with 1364, while VISN 21 had the fewest (245). Across all VISNs, Class 1 RHUs received more prescriptions than did Class 2 RHUs. Future research may seek to examine whether prescribers are fully aware of the eligibility of HM prescription to Class 2 veterans. VISN 21 ($5354); VISN 17 ($5302);

TABLE 6 Travel Patterns of Home Improvements and Structural Alterations Home Modification Users

Travel Characteristics	Overall (N = 10,810)	Class 1a (n = 7931)	Class 2 (n = 2879)[a]	P value[b]
Time, mean [median] (SD), min	94.5 [77.5] (98.1)	95.2 [77.9] (101.0)	92.4 [75.7] (88.5)	.18
Distance, mean [median] (SD), mi	79.8 [65] (92.4)	80.2 [65.6] (93.9)	78.5 [62.7] (88.3)	.39
Is prescribing facility the nearest facility? No. (%)				.78
Yes	8073 (74.7)	5920 (74.6)	2153 (74.8)	
No	2598 (24.0)	1898 (23.9)	700 (24.3)	
Unknown	139 (1.29)	113 (1.42)	26 (0.9)	
Nonnearest prescribing facility distance, No. (%)				.51
< 40 mi	97 (3.7)	64 (3.4)	33 (4.7)	
40-100 mi	1142 (44.0)	835 (44.0)	307 (43.9)	
101-200 mi	1122 (43.2)	827 (43.6)	295 (42.1)	
201-300 mi	175 (6.7)	129 (6.8)	46 (6.6)	
301-400 mi	29 (1.1)	20 (1.1)	9 (1.3)	
401-500 mi	4 (0.2)	4 (0.2)	0 (0.0)	
> 500 mi	29 (1.1)	19 (1.0)	10 (1.4)	

[a]Class 1 veterans have service-connected disability with a lifetime maximum of $6800 for home modifications; Class 2 veterans have a nonservice-connected disability and may receive a lower lifetime maximum.
[b]Calculated using χ^2 test for dichotomous and categorical variables, and 1-way analysis of variance for continuous variables.

and VISN 6 ($5301) had the highest mean HM expenditures. The national mean cost for HISA HMs were $4978 for bathrooms and $4305 for kitchens; for non-HISA HMs in FY 2017, the mean costs were $6362 and $12,255, respectively. A noteworthy concern is whether the maximum grant limit awards are sufficient to perform more expensive and complex HMs, such as the kitchen or major bathroom alternations.[13]

Facilities categorized as 1a, 1b, or 1c provided prescription to more than 70.7% of all RHUs. Embedded in the infrastructures of these higher complexity level facilities are substantial research and education opportunities for staff and patients and a diversity of medical specialties. Attention must be provided to less resourced facilities located in rural areas or serving many RVs that may not have the infrastructure to monitor the HISA process or make it available to VWDs. Furthermore, the top prescribing VAMCs were almost all high-complexity facilities, and all served > 100 unique RHUs. Further research may be warranted to be better understand the variation in HM prescriptions at VAMCs.

North Florida/Sough Georgia was the highest-prescribing VAMC with 39% more HM prescriptions than the second highest prescribing facility (Durham, NC). Unfortunately, the data presented here cannot establish causality for the large variance difference between the top facilities, and the skewed distribution of total RHUs across VAMCs.

Travel-Related Variables
HISA beneficiaries face significant travel-related challenges. Just 3.6% of RHUs could access a facility within 40 miles of their home and 43.2% traveled 100 to 200 miles from their home to access a HM prescription. Further exploration is warranted to understand how travel patterns impact access to or the uptake of HISA.

RVs already have problems with accessing care because of long travel time.[14,15] The choice or necessity to travel to a farther facility for HISA prescription is problematic for RVs, especially when transportation is often reported in the literature as a barrier to resources for people living in rural communities.[15-17] When patients have travel barriers, they wait longer to obtain medical services and often wait for their conditions to worsen before seeking services.[15,18] Once HM is completed, telerehabilitation is an effective delivery method used for delivering health care services to people in remote places.[18,19] Considering that HISA use has the potential to improve quality of life, afford comfort, facilitate the accomplishment of activities of daily living

for RVs, it is important that future studies examine how existing telehealth technologies can be used to improve HISA access.

Future Directions

County-level analyses is warranted in future studies exploring potential variables associated with HISA use; for example, county-level rates of primary care physicians and other HCPs. Future research should explore how long distance travel impacts the HISA application process and HM implementation. Further research also should focus on the HISA application structure and process to identify causes of delays. The HISA application process takes a mean 6 months to complete, yet the duration of hospital stays is 1 to 3 weeks, thus it is impossible to connect HISA to hospital discharge, which was the original intent of the program. Future research can examine how telehealth services can expedite HISA obtainment and coordination of the application process. Future research also may study the possible causes of the wide variations in HM prescriptions per facility. It is also important that educational programs provide information on the array of HM items that veterans can obtain.

CONCLUSIONS

In our previous study of the HISA cohort (2011-2017), we documented that an increase in utilization of the HISA program was warranted based on the low national budgetary appropriation and identification of significant low participation by vulnerable subpopulations, including veterans residing in rural areas or having returned from recent conflicts.[7] The present study documents national utilization patterns, demographic profiles, and clinical characteristics of RHUs from FY 2015 through FY 2018, data that may be useful to policy makers and HISA administrators in predicting future use and users. It is important to note that the data and information presented in this article identify trends. The work in no way establishes a gold standard or any targeted goal of utilization. Future research could focus on conceptualizing or theorizing what steps are necessary to set such a gold standard of utilization rate and steps toward achievement.

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