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Factors Predictive of Type of Powered Mobility Received by Veterans with Disability

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Background: The goal of this observational study was to determine factors predictive of the type of powered mobility prescribed to veterans with disability.





Material/Methods: A retrospective chart review was conducted for all veterans (n=170) who received powered mobility from a designated power mobility clinic. Logistic regression analysis was used to determine factors predictive of the type of powered mobility provided.

Results: Sixty-four (38%) veterans were provided powered wheelchairs and 106 (62%) were provided powered scooters. Of the variables examined, only primary medical conditions for referral and disability severity (as measured by the 2-minute timed walk test; 2-MWT) were predictive of the types of powered mobility prescribed. Veterans who were able to walk longer distances were more likely to be prescribed powered scooters. Age, gender, race, level of education, marital and employment status, number of chronic medical conditions, and upper and lower limb muscle strength were not significant predictors.

Conclusions: This study suggests that the primary medical conditions for referral and 2-MWT can assist clinicians in the determination of the type of powered mobility to prescribe to veterans with disability.

MeSH Keywords: **Decision Support Techniques • Mobility Limitation • United States Department of Veterans Affairs**

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Background

According to LaPlante et al. [1], an estimated 3.3 million community-dwelling Americans use wheelchairs, based on their analysis of 2005 data from the U.S. Census Bureau's Survey of Income and Program Participation. Their ambulation difficulty restricts them from being able to self-care, be involved in social and leisure activities, and be able to work, resulting in high levels of unemployment [1]. The proportion of the population using wheelchairs increases: a) with age, with the highest rates (5.2%) in those aged 65 years and older (1.8 million users); b) in adults with lower education level (people with high school education or less are 2.7 times more likely than adults with college degree); c) in the unemployed (73% vs. 24% for working adults); and d) in Hispanics and Asians [1]. However, none of these variables achieved significance when the level of difficulty in mobility was controlled.

Powered mobility provides disabled individuals with an energy-efficient mobility system [2] that increases the ability to work, self-care, and engage in leisure and social activities independently. However, the provision of mobility devices should be appropriate to needs since those individuals who receive inappropriate wheelchairs and accessories (e.g., seating devices) can experience adverse events such as low back pain and pressure sores, which can adversely affect physical functioning, safety and quality of life [3]. Injuries related to wheelchairs are common and can be serious. Kirby et al., in their analysis of the Food and Drug Administration database, found that the proportion of incidents related to the use of scooters and powered wheelchairs were 52.8%, and 24.6%, respectively [4]. Forward-direction tips and falls were most common in powered wheelchairs, and sideways tips and falls were most common in scooters [4]. The most common injuries sustained from such incidents were fractures (45.5%), followed by lacerations (22.3%) and contusions/abrasions (20.1%). Recently Nelson et al. in a study of 702 veterans with spinal cord injury residing in the community, found 31% had wheelchair-related falls of which 14% were serious [5].

Powered mobility devices can be either electric scooters or power wheelchairs. Scooters are motorized devices guided by a tiller with limited seat modification capabilities. Scooters are available in both full-size and portable models and most commonly consist of 3 or 4 wheels. These devices have a large turning radius and are best suited for outdoor use. The indications for the provision of a scooter include the following: 1) the user must meet the general indications for motorized mobility, 2) demonstrate ability to negotiate the home environment without powered mobility but needs powered mobility outside the home, 3) sufficient postural support from the device to assure the user's safety and comfort, 4) demonstrated ability to transfer safely to and from the scooter, and 5) intended

use environments that can accommodate the turning radius of the scooter [6]. Power wheelchairs are motorized devices driven by a joystick or an alternative input device with varied seat modification capabilities. They typically have four to six wheels and the reduced length of power wheelchairs and mid-wheel drive wheelchairs allow for a smaller turning radius, which makes them suitable for inside the home environment. The indications for a power wheelchair include the following: 1) the user must meet the general indications for motorized mobility, 2) demonstrated need for a powered device for functional mobility within the home or work environment, 3) postural support needs that cannot be met with a scooter or significant time to be spent in the power wheelchair, 4) requires power tilt and/or power recline mechanisms to promote skin integrity or to manage medical conditions (e.g., postural hypotension and pulmonary hygiene), 5) need for specialty controls to operate the power mobility device independently (e.g., sip and puff, chin control, and head array), and 6) diagnosis of a progressive disorder that will necessitate a power wheelchair within 1 year [6].

The U.S. National Veterans Health Administration policy on wheelchairs stipulates that veterans with disability should have access to wheelchairs appropriate for their needs if their mobility limitation cannot be sufficiently and safely resolved by the use of an appropriately fitted cane or a walker. The mobility limitations significantly impair their ability to participate in mobility-related activities of daily living such as toileting, feeding, dressing, grooming, and bathing. The policy states that prescription of a powered wheelchair is contingent upon the mental and physical capabilities of the individual to safely operate the device without causing harm to self or others [7].

Hubbard et al. [8] examined the regional prescription patterns of wheeled mobility devices and the disparities that exist between geographical locations. They reported that of all wheelchairs provided to veterans, 71% to 86% were manual, 5% to 11% were electric wheelchairs, and 5% to 20% were scooters. The provision of powered mobility across the region (Veterans Integrated Service Networks) varied considerably and could not be explained by age, diagnosis, or level of disability, thus indicating a need for evidence-based guidelines that can bridge this regional divide.

Given that the provision of powered mobility across the Veterans Integrated Service Networks varies considerably, this study sought to identify factors predictive of the type of powered mobility received by veterans with disability who were referred to our powered mobility clinic. This information could help guide clinicians make decisions about powered mobility devices based on their individual patient needs.

Material and Methods

Participants

All veterans (n=196) who had presented to the power mobility clinic over a 12-month period (1/1/2009 to 12/31/2009) at the Oklahoma City VA Medical Center (VAMC), based on the clinic's electronic list, were retrospectively accessed. Local Institutional Review Board approval of the study was obtained. The inclusion criteria were: veterans who presented to the power mobility clinic (n=196) and who received power mobility (n=170). The study had no exclusion criteria. Data collected via electronic chart review included age, gender, ethnicity, level of education, marital and employment status, smoking habit, number of chronic medical conditions (including hypertension, diabetes mellitus, hyperlipidemia, coronary artery and peripheral arterial diseases, congestive heart failure, chronic obstructive airway disease, osteo and rheumatoid arthritis, depression, gastro-esophageal reflux, and the primary medical conditions for which the veteran was referred to the powered mobility clinic. Data collected also included cognitive state-based on Mini-Mental State Examination (MMSE), upper and lower limb muscle strength, results of the 2-minute walk test (2-MWT), and the type of powered mobility provided on completion of the clinical and safety evaluation during their clinic visit. All of these variables were collected by the neurologist in the power mobility clinic during the veteran's initial face-to-face evaluation. A number of these variables were collected to best define the referred veteran population and determine if they influenced the type of power mobility prescribed.

The Oklahoma City VAMC established a powered mobility clinic in 2005. Individuals are referred to the power mobility clinic by their primary care physician when they report being limited in their ability to ambulate and being dependent on their care-givers. The clinic has a multidisciplinary team approach and consists of a physician, occupational therapist, and wheelchair technician from the prosthetics department. The clinician is a board-certified neurologist with sub-specialty certification in neuro-rehabilitation. The occupational therapist is a certified Assistive Technology Professional. Although the clinician makes recommendations on the provision of the type of mobility device, these recommendations are occasionally modified based on input from the therapist and the patient. The initial clinical evaluation documents the following: a) primary medical diagnosis for referral to the clinic; b) current living condition, including the type of accommodation, the level of supervision, and ability to ambulate indoors and outdoors; and c) medical assessment for 1) cognition based on the MMSE [9], 2) visual acuity based on the Snellen chart, 3) muscle strength in the upper and lower limbs measured by Medical Research Council (MRC) grading with 0=no movement and 5=normal movement [10], 4) ability to sit and stand with the level of assistance with 1=total assistance to 6= modified independence and 7=normal [11], and

5) 2-MWT [12]. Individuals were denied powered mobility on the basis of their evaluation by the physician if they were cognitively impaired with an MMSE score of 15 or less or had visual acuity of 20/200 or worse in both eyes (legally blind). Cases were judged on an individual basis for individuals with an MMSE score between 16 and 21 and visual acuity of 20/100 in both eyes. Those individuals who failed the powered mobility evaluation would receive instead a customized manual wheelchair, provided they had a care-giver who could push them around or a rollator if they were able to safely operate it and it met their needs. Following the approval of powered mobility, all individuals were trained in the use of the prescribed powered mobility and completed an in-house driving test. The driving test requires successful completion of a zig-zag course of 6 cones spaced 5 feet apart longitudinally and 2 feet horizontally to ensure safe maneuverability and coordination [13]. Individuals were also required to demonstrate the ability to drive through hospital doorways, corridors, elevators, and cafeteria where they are made to collect food items and pull up to a table.

Measures

The primary predictive variable was the 2-MWT. The 2-MWT measures endurance by assessing walking distance during a 2-minute period while moving at a comfortable speed using any ambulation aids (e.g., cane, walkers, and rollators) used in everyday life. Rest periods are allowed during the evaluation. The test was adapted from the American Thoracic Society's 6-MWT protocol [14]. The 2-MWT is a valid, reliable, and sensitive measure that is easy to administer [15], is time-efficient, and minimizes the effect of fatigue [12]. Its main limitations are that quality of movement, balance, use of assistive devices, and amount of physical assistance required is not assessed [16].

Conceptually, 2-MWT performance is associated with everyday tasks that require brief, but intense bouts of ambulation (e.g., stair climbing or crossing the street). The distance covered on the walk test reflects the physical capacity of the individual to perform routine tasks [17] and represents a measure of both aerobic and anaerobic aspects of walking performance. Additionally, gait velocities have been shown to be a reliable and responsive measure of disability level [18,19], and are strongly associated with community ambulation [20].

The distance covered (in feet) was measured using the Trumeter Mini-Measure Distance-Measuring Wheel, a device that accurately measures up to 10 000 feet. Veterans were classified according to the ambulation distance and need for assistance: a) *non-ambulator* (0 to 15 feet), b) *limited house-hold ambulator* (16 to 59 feet with assistance), c) *unlimited household ambulator* (60 to 150 feet without assistance), and d) *community ambulator* (≥ 151 feet) [21]. A healthy elderly individual can usually walk at speeds of 260 feet/min [22].

Table 1. Study Sample divided based on the 2-minute timed walk test [Mean ±SD; n (%)].

	Full sample N=170	Non-ambulator N=35	Limited household ambulators N=22	Unlimited household ambulator N=59	Community ambulator N=54	p-value
Patient characteristics						
Age (years)	69.4±10.7	66.9±10.4	67.7±11.6	71.5±10.5	69.3±10.6	.19
Gender; Male: Female	163: 7 (96: 4)	33: 2 (94: 6)	22: 0 (100: 0)	56: 3 (95: 5)	52: 2 (96: 4)	.82
Ethnicity						
White	149 (88)	27 (77)	19 (86)	53 (90)	50 (93)	.26
Black	16 (9)	5 (14)	2 (9)	6 (10)	3 (6)	
Hispanic	0	0	0	0	0	
Native American	4 (2)	2 (6)	1 (5)	0	1 (2)	
Asian	1 (1)	1 (3)	0	0	0	
Education						
Less than High School	36 (21)	10 (29)	2 (9)	9 (16)	15 (28)	.04
High School	62 (36)	9 (26)	6 (27)	26 (44)	21 (39)	
College	47 (28)	14 (40)	11 (50)	13 (22)	9 (17)	
Graduate School	15 (9)	1 (3)	1 (5)	9 (15)	4 (7)	
Unknown	10 (6)	1 (3)	2 (9)	2 (3)	5 (9)	
Marital status						
Married	98 (58)	17 (49)	10 (45)	36 (61)	35 (65)	.11
Divorced	36 (21)	11 (31)	7 (32)	9 (15)	9 (17)	
Single	7 (4)	4 (11)	1 (5)	1 (2)	1 (2)	
Widow	29 (17)	3 (9)	4 (18)	13 (22)	9 (17)	
Employment						
Employed	3 (2)	1 (3)	0	0	2 (4)	.25
Unemployed	9 (5)	4 (11)	2 (9)	1 (2)	2 (4)	
Disabled	67 (39)	17 (49)	9 (41)	21 (36)	20 (37)	
Retired	91 (54)	13 (37)	11 (50)	37 (63)	30 (56)	
Smoker	56 (33)	14 (40)	10 (45)	16 (27)	16 (30)	
Number of chronic medical conditions						
1–3	40 (24)	7 (20)	7 (32)	13 (22)	13 (24)	.03
4–6	108 (64)	17 (49)	13 (59)	41 (69)	37 (69)	
7–11	22 (13)	11 (31)	2 (9)	5 (8)	4 (7)	

Secondary predictors included age, gender, ethnicity, level of education, marital and employment status, number of chronic medical conditions, and primary medical diagnosis for referral.

Statistical analysis

Data were analyzed using SAS (SAS System for Windows, ver. 9.2, SAS Institute Inc., Cary, NC). Statistical significance was set at $p \leq 0.05$ for all analyses. Descriptive statistics for the study sample were calculated as mean and standard deviation [SD] for

continuous variables and proportions for categorical variables (Table 1). Demographic comparisons were made using general linear models or chi-square tests as appropriate. Tukey's HSD post hoc tests were conducted following significant results for continuous variables. Spearman's correlation coefficient was computed to describe the relationship between age and 2-MWT. Univariate analyses with type of powered mobility (powered mobility/wheelchair) were conducted to select variables for inclusion in a logistic regression model. Variables considered for inclusion were gender (male/female), race (white/other), employment

Table 1 continued. Study Sample divided based on the 2-minute timed walk test [Mean ±SD; n (%)].

	Full sample N=170		Non-ambulator N=35		Limited household ambulators N=22		Unlimited household ambulator N=59		Community ambulator N=54		p-value
Diagnosis for powered mobility											
Pulmonary:	50 (29.4)										
Chronic obstructive pulmonary disease	48	(28)	3	(9)	3	(14)	20	(34)	22	(41)	
Idiopathic pulmonary fibrosis	2	(1.2)	0		0		1	(2)	1	(2)	
Musculoskeletal disorder:	40 (23.5)										
Amputation	22	(13)	17	(49)	2	(9)	1	(2)	2	(2)	
Arthritis (disabling)	18	(11)	2	(6)	4	(18)	8	(14)	4	(7)	
Neurological disorder:	31 (18.2)										
Spinal cord injury/disease	5/9	(8)	5/1	(14/3)	0		0/8	(0/14)	0		
Motor neuron disease	2	(1)	0		0		0		2	(4)	
Muscle dystrophy	1	(1)	0		0		0		1	(2)	
Parkinson's Disease	8	(5)	0		2	(9)	3	(5)	3	(6)	
Stroke	6	(4)	2	(6)	2	(9)	1	(2)	1	(2)	
Cardiac:	21 (12.3)										
Congestive Heart Failure	11	(6)	0		3	(14)	6	(10)	2	(4)	
Coronary Artery Disease	4	(2)	0		1	(5)	2	(3)	1	(2)	
Peripheral arterial disease	6	(4)	1	(3)	1	(5)	1	(2)	3	(6)	
Others:	28 (16)										
Type of Power Mobility:	64	(38)	30	(86)	15	(68)	11	(19)	8	(15)	
Powered wheel-chair Scooter	106	(62)	5	(14)	7	(32)	48	(81)	46	(85)	<.0001
Upper limb muscle strength	4.8±0.7		4.7±0.7		4.7±0.6		4.8±0.8		4.8±0.5		.64
Lower limb muscle strength	4.2±1.4		2.4±2.2		4.3±0.8		4.5±0.6		4.8±0.5		<.0001
MMSE	25.5±4.1		24.3±5.3		25.6±3.9		25.7±4.3		26.0±3.0		.27
2-Minute timed walk test	109.4±88.2		1.7±3.6		36.4±12.1		103.6±26.5		215.2±51.2		<.0001

MMSE – Mini-Mental State Examination; * Chi-square test performed on the main diagnosis category (i.e., Cardiac, Pulmonary, etc.) and not on specific diagnoses.

status (retired and employed/disabled and unemployed), marital status (currently married/not married), education (high school or less/more than high school), diagnostic medical referral groups (cardiac and pulmonary/all others), 2MWT, age, upper- and lower-limb muscle strength, and number of chronic medical conditions. Any variable with *p*-value <0.25 was included in a multi-variable logistic model predicting the likelihood that a veteran received a scooter versus powered wheelchair.

Results

Of the 170 veterans who received powered mobility during the study period, the majority of the sample were non-Hispanic

white (88%) males (96%) with a mean age of 69.4 (SD=10.7) (Table 1). Fifty-six percent of the sample had high school education or less and the majority described their employment status as either retired (54%) or disabled (39%). The primary medical conditions for which the powered mobility was prescribed were: pulmonary (28%) such as chronic obstructive pulmonary disease (COPD); musculoskeletal disorders (24%) such as amputation and disabling arthritis (not surgically remediable); neurological disorders (19%) such as strokes, spinal cord injuries and Parkinson's disease; and cardiac (12%). The mean (±SD) MMSE score was 25.5±4.1, the mean upper and lower extremity muscle strength was 4.8±0.7 and 4.2±1.4, and the average distance travelled in the 2-MWT was 109±88 feet. Powered wheelchairs were provided to 38% of veterans

Table 2. Univariate analysis of covariates.

Covariates	χ^2	p^*
Categorical		
Gender	0.08	.99
Race	0.05	.06
Education	1.45	.04
Marital status	2.46	.12
Employment	7.13	.008
Primary medical diagnosis for referral	16.69	<.0001
Upper limb muscle strength	1.18	.28
Lower limb muscle strength	16.41	<.0001
Continuous		
Age (yrs)	3.44	.06
2-minute timed walk test (ft)	34.41	<.0001
Number of chronic medical conditions	1.06	.30

* p -values for categorical variables from Chi-Square or Fisher's exact tests; p -values for continuous variables from Wald Chi-Square. Chronic medical conditions included were hypertension, diabetes mellitus, hyperlipidaemia, coronary artery and peripheral arterial diseases, stroke, congestive heart failure, chronic obstructive airway disease, depression, gastroesophageal reflux, and arthritis (osteoarthritis, rheumatoid).

and powered scooters to the remaining 62%. Twenty-six of the 196 veterans did not receive power mobility due primarily to cognitive or visual impairments.

When the sample was divided based on the ambulation distance on the 2-MWT, there were 35 non-ambulators, 22 limited household ambulators, 59 unlimited household ambulators, and 54 community ambulators. Subject characteristics were comparable across the 4 groups except for education ($p=0.04$); there were more who achieved up to high school diploma in the unlimited household and community ambulation groups (59% and 67%, respectively), while there were more college-educated veterans in the non-ambulator and limited household groups (40% and 50%, respectively). The number of chronic medical conditions differed between the ambulation groups [$F(3, 166)=3.77, p=0.012$] with limited and unlimited household (68% and 77%) and community ambulators (76%) having fewer chronic medical conditions compared to non-ambulators (80%) ($p=0.014$ and $p=0.002$). Important differences were also seen with respect to the primary medical conditions for which the veterans were referred to the clinic, with pulmonary causes (88% of the COPD cases) primarily occurring in the unlimited household and community ambulators,

while musculoskeletal (77% of amputations) and neurological disorders were the primary cause in the non-ambulators or limited household groups ($p=0.0001$). The lower-limb muscle strength of the non-ambulators differs from the 3 other groups (all $p<0.0001$). The 2-MWT ambulation distances were statistically different for the 4 groups ($p=0.0001$). Power wheelchairs were provided to 86% of non-ambulators and 68% of limited household ambulators, while 81% of unlimited household and 85% of community ambulators were provided with scooters ($p=0.0001$).

Results of univariate analyses in relation to type of powered mobility are presented in Table 2. Neither gender ($p=0.99$), upper-limb motor strength ($p=0.28$), nor number of chronic medical conditions ($p=0.30$) met the a priori criterion ($p<0.25$) for inclusion in the multivariable model. All other variables, including age ($p=0.06$), race ($p=0.06$), employment status ($p=0.008$), marital status ($p=0.12$), level of education ($p=0.04$), primary medical condition for referral ($p<0.0001$), lower-limb muscle strength ($p<0.0001$), and 2-MWT ($p<0.0001$), met the inclusion criterion and were entered simultaneously into a multivariable logistic regression model.

Table 3 presents the results of the logistic regression analysis, including partial logistic regression coefficients (β), standard errors of the partial slope coefficients (SE), Wald test, significance level, and exponential slope coefficient (odds ratio). Results of the logistic regression model suggest that the log odds of a veteran receiving a scooter (versus power wheelchair) was not related to age ($p=0.89$), race ($p=0.87$), employment status ($p=0.21$), marital status ($p=0.74$), lower-limb muscle strength ($p=0.68$), or education ($p=0.64$) (Table 3). Of the variables examined, only the distance travelled in the 2-MWT ($p<0.0001$) and primary medical condition for referral ($p=0.03$) were predictive of the type of powered mobility the veteran would receive. For every extra foot increase in walking distance, the odds of receiving a scooter increased by 1.4%. Additionally, the odds of a subject with cardiac and pulmonary diagnoses receiving a scooter were 2.57 times greater than for all other diagnoses (musculoskeletal, neurologic, and other). No correlation was found between age and 2-MWT values ($r_s=.11, p=0.17$).

Discussion

Although provision of wheelchairs usually takes into consideration factors unique to the individual, this is the first study to suggest that among veterans who are not cognitively or visually impaired, the primary medical condition for referral and the 2-MWT ambulation distance are factors predictive of the type of powered mobility prescribed. This finding is relevant because the demographic characteristics of our veterans who received powered mobility (power wheelchairs and scooter)

Table 3. Summary of logistic regression results.

Predictor	β	SE β	Wald χ^2	df	p	Odds ratio (95% CI)
Constant	-0.65	1.74	0.14	1	0.71	NA
Walking distance (ft)	0.01	0.003	21.71	1	<.0001	1.014 (1.008–1.021)
Age (yrs)	-0.004	0.02	0.02	1	0.89	0.996 (0.949–1.046)
Race (minority/white)	-0.05	0.30	0.03	1	0.87	0.905 (0.275–2.977)
Employment status (disabled, unemployed/retired, employed)	-0.34	0.27	1.57	1	0.21	0.508 (0.176–1.464)
Marital status (not married/ married)	-0.07	0.20	0.11	1	0.74	0.874 (0.401–1.906)
Primary medical diagnosis for referral (cardiac-pulmonary/all other)	0.47	0.22	4.78	1	0.03	2.571 (1.103–5.993)
Education (HS or less/more than HS)	0.10	0.21	0.22	1	0.64	1.210 (0.540–2.713)
Muscle strength Lower limb (3 or less/4 or more)	0.12	0.30	0.17	1	0.68	1.274 (0.400–4.060)
Test			χ^2	df	p	
Overall model evaluation						
Likelihood Ratio test			61.55	8	<.0001	
Score test			52.46	8	<.0001	
Wald test			39.41	8	<.0001	
Goodness-of-fit test						
Hosmer & Lemeshow			14.26	8	0.08	

Nagelkerke R^2 (max-rescaled R^2)=0.41. Underline indicates reference group for qualitative predictors. β – regression coefficient; SE β – standard error of the regression coefficient; Wald χ^2 – Wald chi-square test statistic; df – degrees of freedom; p – significance level; CI – confidence interval.

and the diagnosis for which it was prescribed were no different from previously reported studies [8,23]. In this study more scooters (62%) were issued than power wheelchairs (38%). Those who were prescribed scooters had a lower level of education (high school or less), had fewer chronic medical conditions, and were able to walk longer distances. LaPlante et al. [1] also found wheelchair users had a lower level of education (high school or less). Power wheelchairs were mainly issued to non-ambulators and those veterans with limited household ambulation, who had a higher level of education (college degree), with multiple complex medical conditions, and were unable to ambulate or who walked short distances. Among veterans who were non-ambulators and had limited household ambulation, the main diagnoses for referral were musculoskeletal and neurological disorders, while in unlimited household and community ambulators it was pulmonary and cardiac disorders. Findings of this study were similar to those of Hubbard et al. [23], who also found scooters were provided to veterans with COPD and heart failure, while powered wheelchairs were prescribed to veterans with neurological disorders such

as amyotrophic lateral sclerosis, multiple sclerosis, tetraplegics, and those with leg amputation or arthritis. The types of power wheelchairs provided by the VAMC in this study fell within the Medicare-defined powered wheelchairs groups 1 (power-operated vehicles or scooter) to 4 (powered wheelchairs with special seating systems and/or controls) [24].

Logistic regression analysis showed that primary medical condition for referral and 2-MWT ambulation distance were significant predictors of the type of powered mobility prescribed. Those walking longer distances were more likely to be prescribed a scooter, which enabled them to access their communities independently [25], while those who were non-ambulatory or walking shorter distances were prescribed powered wheelchairs. Factors such as age, gender, race, marital and employment state, level of education, and number of chronic medical conditions were unrelated to the type of powered mobility prescribed.

This study improves upon previous mobility studies as it was not based on administrative data, which are mainly used to

run a health care system, with inherent weakness such as the clinical insight based on diagnosis codes, which may lack completeness and have questionable accuracy, and lack meaningfulness because the data may be several years old and out of date, and may not provide information such as their ability to ambulate, participation needs, and functional level [8,23,26–28]. In this retrospective study, the patient list was furnished by the power mobility clinic itself and was not derived from the ICD codes. Further, this study quantified the level of mobility limitations by 2MWT, which has not been done previously, and the available documentation captured the veterans' level of disability and personal needs. Despite these strengths, the present results should be interpreted in light of a number of limitations. First, this study is limited to the veteran population, which is predominantly a modest sample of white men (only 7 women were included) from a single center who have easy access to quality care. As such, it is difficult to generalize these results to the general population. Second, this study may be perceived as having selection bias because some of the veterans who would have qualified for a powered mobility device instead received a manual wheelchair, primarily due to cognitive and visual impairment. Safety should be paramount when prescribing a powered mobility device, not only

to prevent property damage, but also prevent personal and participant injury [29–31]. Third, there was no in-house evaluation, as it provides a better assessment of the appropriateness of the device prescribed. Finally, the VA-based powered mobility clinics have a standardized approach with clear-cut guidelines, which may differ from a non-VA based mobility clinic.

Conclusions

The results of this study suggest that the primary medical condition for referral and the 2-MWT are important predictive factors that can help clinicians in their decision-making to determine the type of powered mobility devices and taking into consideration each individual's unique characteristics. Factors such as age, gender, race, level of education, marital and employment state, and number of chronic medical conditions were not significant predictors of the type of powered mobility prescribed. Future studies should examine whether this prescription of provision of powered mobility is successful in individuals for other outcome factors such as quality of life. Additional research to further evaluate the long-term outcomes of the devices prescribed is being considered.

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