Effects of Gender on Inpatient Rehabilitation Outcomes in the Elderly With Incomplete Paraplegia From Nontraumatic Spinal Cord Injury

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Received March 8, 2010; accepted May 12, 2010

Abstract

Objective: To examine gender differences in rehabilitation outcomes for patients with nontraumatic spinal cord injury.

Research Design: Secondary analysis was conducted on Medicare beneficiary data from 65 to 74 year olds with incomplete paraplegia discharged from inpatient rehabilitation facilities in 2002 through 2005.

Main Outcome Measures: Length of stay, Functional Independence Measure instrument motor item and subscale scores on discharge, and discharge destination.

Results: Among patients with degenerative spinal disease, men had significantly longer rehabilitation stays than women ($P < 0.001$). Men with degenerative spinal disease had significantly lower discharge Functional Independence Measure scores than women, indicating more dependence in self-care ($P < 0.001$) and mobility ($P < 0.001$). Among patients with degenerative spinal disease, men were less likely to walk (odds ratio = 0.58; 95% CI = 0.38–0.87) and less likely to be independent with bladder management (odds ratio = 0.44; 95% CI = 0.31–0.62). Among patients with vascular ischemia, men were more independent (B = 2.59; 99% CI = 0.42–4.76) in mobility than women. There were no gender differences in the malignant spinal tumors group. There were no gender differences in being discharged to a community-based residence.

Conclusions: Gender distributions varied by etiology. Gender differences were found in demographics, length of stay, and functional outcomes but not discharge destination. Men were more dependent than women at discharge in the etiology group with the least overall disability (degenerative spinal disease) and more independent in mobility than women at discharge in the etiology group with the most overall disability (vascular ischemia).

J Spinal Cord Med. October 2010;33(4):379–386

Key Words: Elderly; Gender; Outcomes, paraplegia; Spinal cord injuries, nontraumatic; Rehabilitation, physical; Disability; Myelopathy; Degenerative spinal disease, spinal tumor or vascular ischemia

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No author received any financial benefits. No medical devices were used in this study. Supported in part by grant #2543 from the PVA Research Foundation, Washington, DC (Kay, principal investigator) and grant H133N060014 for The Midwest Regional Spinal Cord Injury Model Care System, Washington, DC (Chen, principal investigator).

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INTRODUCTION

Studies have found no significant relationship between gender and Frankel grades (1), Functional Independence Measure (FIM) instrument subscale scores (2), and functional outcomes (3) in patients with nontraumatic spinal cord injury (NT-SCI) at discharge from initial rehabilitation. However, these studies combined patients with various etiologies and did not control for differences in injury level or completeness. Sipski et al (4) controlled for injury level and completeness when comparing men and women with traumatic spinal cord injury (T-SCI) and found that men tended to have more functional recovery at discharge from rehabilitation than women. However,

the mean $\pm$ SD age of Sipski's patients was only 31.8 $\pm$ 15.0 years, much younger than the mean age typical in NT-SCI.

Understanding gender differences is especially important in older (≥ 65 years) adults because this age group is often not included in research on gender differences (5). Community-living women older than 65 years have been reported to have more disability (5,6) than men, so women might enter rehabilitation more dependent than men. Further, only 57% of 65- to 74-year-old women are married vs 78% of men (7), so more women lack a spouse to provide assistance at home. Studying gender differences in older adults with NT-SCI is important because adults older than 65 years are projected to make up 20% of the US population by 2030 (8), NT-SCI tends to affect older adults, and more women than men have NT-SCI (2,9–11).

The aim of this study was to investigate the effects of gender on rehabilitation outcomes during the initial rehabilitation stay of adults aged 65 to 74 years with incomplete paraplegia from NT-SCI. Studies of patients with NT-SCI found that incomplete (9,12–14) paraplegic (9,13–15) lesions are the most common. We hypothesized that (a) the length of stay (LOS) in initial inpatient rehabilitation does not differ by gender, (b) men are more independent than women in functional outcomes at discharge, and (c) men are more likely than women to be discharged to a community residence (vs nursing home).

METHODS

Patient Criteria

After approval from the institutional review board at Northwestern University, patients were identified from the Medicare fee-for-service (FFS) data files from 2002 through 2005. Patient inclusion criteria were (a) discharged from an inpatient rehabilitation facility in the United States in 2002 through 2005; (b) 65 to 74 years of age at admission to inpatient rehabilitation; (c) diagnosis of incomplete paraplegia (including cauda equina and conus); and (d) etiologic diagnosis of myelopathy due to degenerative spinal disease (DSD), malignant spinal tumor, or vascular ischemia. Patients were excluded if they (a) lived in a nursing home prior to the acute care stay, (b) had a comorbid diagnosis of stroke, (c) were admitted for a stay that was not an initial rehabilitation stay, (d) stayed less than 5 days in rehabilitation, or (e) did not complete their rehabilitation stay. We limited our study to 65 to 74 year olds because individuals older than 74 years were expected to have a higher incidence of morbidity and functional dependence before NT-SCI.

Patients were excluded if they were admitted to acute care (prior to rehabilitation) from an institution with nursing care or with a stroke, a common cause of motor problems in this age group, as both could affect

functional status. We excluded the records of patients with incomplete rehabilitation stays due to discharge against medical advice, dying during rehabilitation, a stay of <5 days, or transfer to an acute care hospital or another rehabilitation hospital so our results represent outcomes for a completed inpatient rehabilitation stay.

Variable Definitions

The records of patients with incomplete paraplegia due to NT-SCI were selected based on the admission impairment group code (4.111) reported in the Inpatient Rehabilitation Facility–Patient Assessment Instrument (IRF-PAI) data. On the IRF-PAI, paraplegia includes all noncervical lesions. Some records were coded with nonspecific codes of “paraplegia unspecified” or “other nontraumatic spinal cord dysfunction” and were not included. The IRF-PAI does not define incomplete so some people might have considered motor function rather than ASIA grades when determining the impairment code. After identifying patients with incomplete paraplegia, we used the International Classification of Diseases, 9th revision, Clinical Modification (ICD-9-CM) codes to assign patients to an etiologic group. Patients with spinal stenosis (16), spondylosis (17–19), and/or intervertebral disk disorders (20) were combined into a single etiology group (21), DSD. Spinal stenosis, spondylosis, and intervertebral disk disorders produce myelopathies, such as incomplete paraplegia, via spinal cord compression and ischemia. Due to their shared pathophysiology (18,19) it is not unusual for patients to have more than one of these DSD pathologies. Because anatomic and symptom severity are not correlated (16), it is difficult to determine the cause of a myelopathy when multiple pathologies are present. Further, we suspected some coding errors among these etiologic diagnoses because the physicians and coders would have had varying familiarity with this population. Malignant spinal tumors included primary and metastatic neoplasms of the spinal cord, spinal meninges, or spine. Residence was defined as a community-based setting with a private living space. Nursing home was defined as a subacute or chronic institutional living setting with nursing care.

Procedures

The data records of patients that met our inclusion criteria were selected from 3 Medicare databases that were linked based on scrambled patient identifiers, facility identification numbers, admission dates, discharge dates, and demographic data. The 3 Medicare databases were (a) the Medicare Provider Analysis and Review (MedPAR) file for the rehabilitation stay, (b) the MedPAR file for the acute care stay immediately prior to the rehabilitation stay, and (c) the IRF-PAI file for the rehabilitation stay. The MedPAR data files are the billing records and include admission date, age at admission,

gender, race/ethnicity, medical diagnoses, and LOS. IRF-PAI data files are clinical assessment records and include marital status, payment source, primary impairment, diagnosis including etiology, comorbid conditions, pre-hospital living setting, admission and discharge FIM instrument item scores, and discharge destination. Admission and discharge FIM data were collected at the rehabilitation hospitals/units during the first and last 3 days, respectively, of the rehabilitation stay. Definitions for IRF-PAI variables are from their training manuals (22,23).

Each FIM item had a score of 1 meaning total assistance, 2 for maximal assistance (patient performs 25%–49% of effort), 3 for moderate assistance (patient performs 50%–74%), 4 for minimal assistance (patient performs $\geq 75\%$ of effort), 5 for supervision or setup, 6 for modified independence, or 7 for complete independence. The eating, grooming, dressing upper body, dressing lower body, bathing, and toileting item scores were combined to create the self-care subscore with a possible range of 6 to 42. The bed/wheelchair, toilet, and tub/shower transfers; locomotion; and stairs item scores were combined to create mobility subscores with a possible range of 5 to 35.

FIM function modifiers for walking and sphincter control (bladder accidents, assistance with bladder, bowel accidents, and assistance with bowel) were dichotomized. Bowel and bladder assistance were classified as needed a helper (FIM scores 1–5) or independent (scores 6–7), bowel and bladder frequency of accidents were classified as incontinent/accidents (FIM scores 1–5) or continent/no accidents (FIM scores of 6–7), and the locomotion modifier was classified as does not walk (FIM scores 1–3) or walks (FIM score 4–7). Walking was defined as requires no more than minimal assistance (FIM score ≥ 4) because more improvement is expected after discharge (24) so this degree of mobility has ramifications for equipment selection and home modifications.

Outcome Measures

The outcome measures were mean rehabilitation LOS, mean discharge FIM self-care and mobility subscores, percent independent at discharge in walking (FIM function modifier ≥ 4) and bowel and bladder management (FIM function modifier scores 6–7), bowel and bladder continence (FIM function modifier scores 6–7), and percent discharged to a residence (vs nursing home).

Data Analysis

Descriptive statistics were used to characterize patients by gender and etiology. Differences in rehabilitation outcomes have been found among etiologies in these patients (25) so we compared men and women by etiologic diagnosis. Means $\pm$ SDs were calculated for continuous variables. Percentages were obtained for categorical variables.

The association between gender and FIM instrument discharge self-care and mobility subscores was examined using multiple linear regression models to adjust for age and admission FIM scores. We examined the association between gender and the percent continent/no accidents (FIM ≥ 6) in bowel and bladder and independence with bowel and bladder and (FIM ≥ 4) walking, using logistic regression models to adjust for age and the admission FIM item score for the same item modifier. We examined the relationship between gender and discharge destination using logistic regression models to adjust for age, marital status, Medicaid status, and the discharge FIM motor score (13 items). Eleven patient records did not report marital status; we substituted a status based on the data reported for the item “living with.” If the patient lived alone, we inserted the patient’s status as “not married” and if the patient lived with family, we inserted the patient’s status as “married.” Data were analyzed using SPSS 17 (SPSS Inc, Chicago, IL) with alpha set at 0.01.

RESULTS

Among the 2,216 patients who met our inclusion criteria, 571 (25.8%) were excluded because they (a) lived in a nursing home ($n = 28$), (b) were not an initial rehabilitation patient ($n = 150$), (c) had an inpatient rehabilitation LOS < 5 days ($n = 186$), (d) had a comorbid diagnosis of stroke ($n = 26$), or (e) did not complete the inpatient rehabilitation stay ($n = 313$). Of the excluded patients, 132 were excluded for more than 1 reason.

Patient Demographics

The final sample had 1,645 patients including 706 men and 939 women. A total of 1,203 patients had incomplete paraplegia from DSD, 295 from malignant spinal tumors (primary or metastatic), and 147 from vascular ischemia (Table 1). The gender distributions varied among etiology groups. Patients with a DSD were more likely to be women and patients with a malignant tumor were more likely to be men. Demographic characteristics for men and women varied by etiology. We have included the demographic characteristics of our target population, 65- to 74-year-old Medicare FFS beneficiaries, in Table 1 for comparison.

Rehabilitation Length of Stay

The mean $\pm$ SD LOS in rehabilitation ranged from 14.4 ± 8.7 days for men and 12.7 ± 7.0 days for women with DSD to 26.9 ± 14.3 days for men and 25.8 ± 12.3 days for women with vascular ischemia (Table 1). The only etiologic group with a significant gender difference in rehabilitation LOS was the DSD group, in which men had significantly longer ($P < 0.001$) stays than women.

Table 1. Demographic and Inpatient Rehabilitation Stay Information by Etiology and Gender in Elderly Patients With Incomplete Paraplegia and Demographic Characteristics of Population

Characteristics	Degenerative Spinal Disorder ^a		Malignant ^b Spinal Tumor		Vascular Ischemia		2005 Medicare Beneficiaries: Age 65 to 74 y	
	n = 439	n = 764	n = 183	n = 112	n = 84	n = 63	n = 8,295,237	n = 9,712,138
Gender	Men	Women	Men	Women	Men	Women	Men	Women
Subjects (%)	36.5	63.5	62.0	38.0	57.1	42.9	46.1	53.9
Age, mean $\pm$ SD (y)	70.2 $\pm$ 2.8	70.2 $\pm$ 2.8	69.4 $\pm$ 2.8	68.9 $\pm$ 2.4	69.5 $\pm$ 2.6	70.1 $\pm$ 3.0	65–74	65–74
Married (%)	74.5	47.3	72.1	58.9	83.3	49.2	NA	NA
Medicaid (%)	8.2	10.9	5.5	8.9	7.1	11.1	NA	NA
Race/ethnicity (%)								
White	82.9	85.1	77.0	75.0	90.5	85.7	84.7	84.8
Black	12.5	11.6	18.0	18.8	3.6	12.7	9.4	9.8
Other or unknown	4.6	3.3	5.0	6.2	5.9	1.6	5.9	5.4
Acute care LOS, mean $\pm$ SD (d) ^c	7.6 $\pm$ 7.7	6.2 $\pm$ 5.3	9.8 $\pm$ 7.4	10.3 $\pm$ 5.4	12.4 $\pm$ 8.6	13.5 $\pm$ 13.4	NA	NA
Rehabilitation LOS, mean $\pm$ SD (d)	14.4 $\pm$ 8.7 ^d	12.7 $\pm$ 7.0 ^d	17.5 $\pm$ 8.7	18.3 $\pm$ 7.8	26.9 $\pm$ 14.3	25.8 $\pm$ 12.3	NA	NA

LOS, length of stay; NA, not available.

^a Degenerative spinal disorder group includes spinal stenosis, intervertebral disk disorders, and spondylosis.

^b Includes primary and metastatic neoplasms of spinal cord, meninges, and spine.

^c For acute care LOS, the number of records available was degenerative spinal disorder = 405 men and 723 women; malignant tumor = 176 men and 106 women; vascular ischemia = 68 men and 60 women.

^d Men and women different at $P \leq 0.01$.

Functional Outcomes

Among the patients with a DSD, the unadjusted data showed that men were more dependent (ie, lower FIM subscores) in self-care and mobility than women at the time of discharge. However, in the vascular ischemia group, unadjusted data showed that men achieved higher mobility subscores by discharge than women. When data were adjusted for age and admission functional status, these differences remained. Men in the DSD group had lower mean self-care ($B = -0.86$; $P = 0.002$) and mobility ($B = -1.03$; $P < 0.001$) discharge FIM subscores (more dependence) than women (Table 2). Men with vascular ischemia had a higher mean ($B = 2.59$; $P = 0.002$; see Table 2) mobility subscore (more independence) than women after adjusting for age and the admission FIM mobility subscore.

Unadjusted data showed that a significantly smaller percent of men than women with DSD ($P < 0.001$) walked (FIM score ≥ 4) at discharge. After adjusting for age and the admission FIM locomotion modifier score, a significant gender difference remained (odds ratio [OR] = 0.58; 99% CI = 0.38–0.87). There were no gender differences in walking at discharge in the malignant tumor or vascular ischemia groups (Table 3).

As shown in Table 3, unadjusted data revealed that only the DSD group had a significant ($P < 0.001$) gender

difference in the percent of patients independent in bladder management. Even after adjusting for age and the admission FIM modifier, men with DSD were less likely to be independent (OR = 0.44; 99% CI = 0.31–0.62) than women at discharge. There were no significant gender differences in the percent continent/no accidents of bladder at discharge.

Men with DSD were less likely to be independent ($P < 0.001$) than women in bowel management at discharge (unadjusted data). However, after adjusting for age and the admission FIM modifier score, no gender difference remained in bowel management (Table 3). A significantly smaller percent ($P = 0.002$) of men than women in the DSD group were continent/no accidents of bowel at discharge (unadjusted data). However, after adjusting for age and the admission FIM modifier score for bowel assistance, no gender difference remained in the DSD group (OR = 0.67; 99% CI = 0.38–1.19).

Discharge Destination

The percent of patients discharged to a community-based residence did not differ by gender (Table 4). After we adjusted for age, marital status, Medicare status, and the discharge FIM motor score, we did not find any statistically significant ($P < 0.01$) gender differences in the percents discharged to a community residence.

Table 2. Gender Difference in Discharge Self-Care and Mobility Skills by Etiology

FIM Subscore	Etiology	Unadjusted Data			Adjusted Data ^a : Effect of Male Gender	
		Men	Women	P Value	B (99% CI) ^b	P Value
Self-care	Degenerative spinal disorders ^c	31.8 ± 6.6 (6–42)	33.3 ± 5.2 (9–42)	< 0.001	−0.86 (−1.58 to −0.13)	0.002
	Malignant tumors	29.3 ± 6.7 (6–42)	28.6 ± 7.2 (11–41)	0.402	0.41 (−1.43 to 2.25)	0.563
	Vascular ischemia	30.0 ± 6.6 (16–42)	28.4 ± 6.6 (16–41)	0.142	1.38 (−0.87 to 3.64)	0.112
Mobility	Degenerative spinal disorders ^c	21.5 ± 5.8 (5–34)	23.0 ± 5.5 (5–35)	< 0.001	−1.03 (−1.74 to −0.31)	< 0.001
	Malignant tumors	18.0 ± 6.0 (5–32)	16.3 ± 7.2 (5–30)	0.031	0.86 (−0.82 to 2.55)	0.185
	Vascular ischemia	18.3 ± 6.1 (5–30)	15.6 ± 6.4 (5–30)	0.009	2.59 (0.42 to 4.76)	0.002

Unadjusted data given as mean ± SD (range); adjusted data given as linear regression coefficient (B) (standard error [SE]). FIM, Functional Independence Measure.

^a Linear regression models adjusted for covariates: age and admission FIM self-care or mobility subscore.

^b Confidence interval that includes 0 is not significant.

^c Degenerative spinal disorders group includes patients with incomplete paraplegia due to spinal stenosis, intervertebral disk disorders, and/or spondylosis.

DISCUSSION

We found gender differences in demographics, LOS, and functional outcomes but not discharge destination among 65 to 74 year olds with incomplete paraplegia due to NT-SCI for our 3 etiology groups. We used patient records from a national database, FFS Medicare, but patients with nonspecific codes of “paraplegia unspecified” or “other nontraumatic spinal cord dysfunction” were excluded from our analyses. In 2005 there were 1,231 inpatient rehabilitation facilities (IRF) in the United

States, so the 463 rehabilitation hospitals and units that submitted our 1,645 patients’ records (mean ± SD of 3.55 ± 4.40 patients per IRF; range = 1–41) represented 37.6% of the IRFs nationwide.

Patient Demographics

Men comprised 46.1% of the 65- to 74-year-old Medicare enrollee population in 2005, so the male distributions of 36.5% in the DSD group and 62.0% in malignant spinal tumor group appear to be different

Table 3. Gender Differences in Walking and Bladder and Bowel Management at Discharge by Etiology

FIM Item	Etiology	Unadjusted Data			Adjusted Data: Effect of Male Gender	
		Men	Women	P Value	OR ^a	99% CI ^b
Percent who walk (FIM score ≥4)	Degenerative spine disorders	71.8	82.1	< 0.001	0.58	0.38–0.87
	Malignant tumors	39.3	39.3	0.992	0.91	0.43–1.92
	Vascular ischemia	29.8	22.2	0.306	1.47	0.48–4.52
Percent independent with bladder mgmt (FIM 6–7)	Degenerative spine disorders	47.6	67.9	< 0.001	0.44	0.31–0.62
	Malignant tumors	26.2	34.8	0.116	0.68	0.39–1.42
	Vascular ischemia	28.6	17.5	0.118	1.77	0.58–5.32
Percent bladder continent/no accidents (FIM 6–7)	Degenerative spine disorders	87.2	89.4	0.258	0.88	0.52–1.49
	Malignant tumors	85.2	80.4	0.274	1.58	0.66–3.76
	Vascular ischemia	84.5	81.0	0.568	1.09	0.33–3.57
Percent independent bowel mgmt (FIM 6–7)	Degenerative spine disorders	67.7	76.6	0.001	0.73	0.50–1.07
	Malignant tumors	43.2	40.2	0.614	1.15	0.57–2.30
	Vascular ischemia	35.7	23.8	0.121	1.76	0.59–5.26
Percent bowel continent/no accidents (FIM 6–7)	Degenerative spine disorders	87.9	93.1	0.002	0.67	0.38–1.19
	Malignant tumors	73.8	73.2	0.916	1.13	0.52–2.47
	Vascular ischemia	61.9	61.9	1.00	0.76	0.26–2.25

FIM, Functional Independence Measure; mgmt, management; and OR, odds ratio.

^a Odds ratio from logistic regression models adjusting for age and admission FIM item score.

^b Confidence intervals that include 1.00 are not significant.

Table 4. Gender Differences in Percent of Patients Discharged to a Community Residence by Etiology

Etiology	Percent of Patients Discharged to the Community: Unadjusted Data			Adjusted Data: Effect of Male Gender	
	Men	Women	P Value	OR ^a	99% CI ^b
Degenerative spinal disorders	90.4	90.7	0.875	1.00	0.50–1.99
Malignant tumor	82.5	75.0	0.120	0.98	0.39–2.45
Vascular ischemia	76.2	66.7	0.203	0.73	0.22–2.49

OR, odds ratio.

^a Odds of being discharged to a residence (home, board and care, or assisted living center) using logistic regression adjusting for age, marital status, Medicaid status, and discharge Functional Independence Measure motor score.

^b Confidence intervals that include 1.00 are not statistically significant.

from the FFS Medicare population. The gender distribution of our 1,645 patients treated in an IRF was consistent with previous reports that more women than men have NT-SCI (2,9–11), but we found that more 65- to 74-year-old men, than women, had incomplete paraplegia due to malignant spinal tumors. It has been reported that there is no relationship between gender and etiology (2), but our finding that 62% of patients in the malignant spinal tumor group were men was similar to a report that 65% of 319 patients with malignant cord compression were men (26).

Length of Stay

It has been reported that gender does not affect LOS (1,2,10,27); however, we found that men in the DSD group had significantly longer ($P < 0.001$) stays in rehabilitation than the women. Further, men with DSD stayed in acute care longer than women. Despite their longer rehabilitation stays, men with DSD were significantly more dependent than women in functional skills at discharge. We analyzed gender differences in the admission FIM self-care and mobility subscores and found that men in the DSD group came to rehabilitation with significantly more disability; a factor that probably explains their longer stays in rehabilitation.

Functional Outcomes

Among patients with DSD, the groups with the least overall disability, men were more dependent at discharge than women in self-care and mobility. We have already noted that men with DSD were admitted with more disability and had longer rehabilitation stays than women; perhaps because men wait longer to seek medical care for the gradual changes typical of DSD. In contrast, men with vascular ischemia, the group with the most overall disabilities, were more independent in mobility than women. Only 29.8% of the men and 22.2% of the women with vascular ischemia walked at discharge, so most of the vascular ischemia patients would have been wheelchair users and relied on upper extremity strength for mobility (eg, transfers); a physical demand that favors men. Sipski et al (4) found that

women with incomplete (ASIA impairment scale grades C and D) T-SCI were more independent in FIM self-care items and men tended to be more independent in tub/shower transfers, a mobility skill that requires strength.

We defined walking as a FIM score ≥ 4 and categorized walking and bowel and bladder items, but the biggest difference between our study and previous gender studies is our use of a more homogeneous group of patients, 65 to 74 year olds with incomplete paraplegia, analyzed by etiology. Shorter rehabilitation stays combined with the high cost of durable medical equipment (eg, wheelchairs) and home renovation to improve accessibility after discharge make it important to predict walking, even short distances, with minimal assistance because further gains after discharge are anticipated. Therefore, we used walking with no more than minimal assistance (FIM score ≥ 4) at discharge from inpatient rehabilitation to define walking. Bowel and bladder items were classified as continent/no accidents (FIM ≥ 6) or incontinent/accidents (FIM ≤ 5) and needs assistance from another person (FIM ≤ 5) or not (FIM ≥ 6). Bowel and bladder issues have been associated with discharge destination (2,14), so categorizing function in a way that reflects the burden of care seems reasonable for discharge planning and outcome comparisons.

It has been reported that gender is not associated with walking (>10 m indoors aided or unaided) at discharge for a person with a NT-SCI (2). We did not find gender differences in walking in the malignant spinal tumor and vascular ischemia groups, but we found that a significantly larger percentage of women (82.1%) than men (71.8%) with DSD walked at discharge. Our larger, stratified sample could explain our different findings regarding walking.

Our finding that gender was not related to bladder continence/no accidents is consistent with a study of adults with NT-SCI (2). However, we were surprised that a significantly ($P < 0.001$) smaller percentage of men (47.6%) than women (67.9%) with DSD were independent in bladder management at discharge. This contrasts with a previous report that “efficient bladder management” is correlated with being a man (OR = 6.25; 95%

CI = 2.9–12.5) in NT-SCI (28). Our finding was also unexpected because self-catheterization or the use of a urinal to achieve an FIM score of 6 is easier for men than women due to male anatomy. So although men with DSD were more dependent in walking, than women, the options for bladder management and our patients' unaffected upper extremities made us anticipate that men would be more independent in bladder management than women. One potential scoring issue could have been that men would have only scored a 5 on the FIM in bladder management if they did not empty their own urinal, a common occurrence when patients are busy with therapy or urinary output is being monitored as part of a bladder program. A score of 5 would have resulted in them being grouped with others receiving assistance (FIM 1–5).

Our finding of no gender differences in bowel continence was consistent with a report that fecal incontinence does not differ by gender (2). Although the other study was smaller ($n = 59$), had younger patients, combined etiologies of NT-SCI, and included patients with complete and injuries and tetraplegia, we both found that gender does not affect bowel continence.

We did not find a gender difference in the need for assistance with bowel management, which is consistent with a report that there was no gender difference in the “autonomy of bowel management” (29). However, it is not clear if Scivoletto et al (29) were referring to assistance, continence, or both.

Discharge Destination

Our finding that gender was not significantly related to discharge destination contrasts with the report by New and Epi (2) that being female significantly influenced being discharged to a nursing home and the finding by Shackelford et al (30) that women with T-SCI were more likely to have a paid attendant as caregiver while men were more likely to have a spouse (or parent) assist. Our unadjusted data (Table 4) revealed that larger percents of women with incomplete paraplegia due to malignant spinal tumors and vascular ischemia were discharged to a nursing home, but the gender differences were not statistically significant. No gender differences were found when we adjusted the data for age, marital status, Medicaid status, and the discharge FIM motor score. Although marital status was an important factor associated with discharge to a residence, removal of marital status from our logistic regression models for discharge location did not significantly affect the association between gender and discharge destination. Several factors may explain our different findings from New and Epi (2), including their sample that included younger patients with tetraplegic and complete lesions as well as different medical payment systems and discharge destination options.

Study Hypotheses

Contrary to our first hypothesis, men in one etiologic group, DSD, had a significantly longer rehabilitation LOS than women. This difference was probably related to men having lower mean admission FIM scores. Contrary to our second hypothesis, men with DSD were more dependent than women at discharge. However, men had higher mobility subscores (more independence) than women in the etiologic group (vascular ischemia) with the most disability. Our third hypothesis was supported; gender did not affect discharge destination.

Strengths and Limitations

Our study has several strengths. First, we minimized data errors by linking and cross-checking the data from 3 data files. Second, data from Medicare reflects the diversity of race (plus ethnicity) and care provided nationally in the United States. Third, limiting the subjects' age (65–74 years) and impairments (incomplete paraplegia) allowed a more focused study of older adults with NT-SCI than has previously been reported. Finally, we had a large enough sample to investigate gender differences by etiology.

This study had several limitations. We used existing administrative data, so we were limited to available data. For example Medicare data classify injury level as paraplegia or tetraplegia and injury completeness as complete or incomplete so analysis by neurologic level or ASIA impairment scale grade was not possible. However, there is no documentation that men and women in the same etiologic group would have different injury level distributions. As previously noted, imprecise impairment data (eg, paraplegia unspecified) were reported in some cases, so we were not able to identify all patients with incomplete paraplegia due to a nontraumatic lesion. Lastly, we did not adjust our data for time since onset, although it has been reported to affect outcomes (31,32). The onset date recorded on the IRF-PAI varied by etiologic diagnosis, as the instructions are to report the date of an initial diagnosis or an exacerbation of symptoms. Further, it could have meant time for neurologic recovery (postsurgical) or disease progression (eg, malignant tumors).

Administrative data are increasingly used to examine factors associated with patient outcomes. The inclusion of diagnosis-specific severity measures, such as injury level and ASIA grade for patients with a spinal cord injury, in these clinical administrative datasets would enhance this research through better case-mix adjustment.

CONCLUSIONS

The study demonstrated gender differences in demographics, LOS, and functional outcomes but not discharge destination among 65 to 74 year olds with incomplete paraplegia due to NT-SCI.

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