Disparities in the Use of Sacral Neuromodulation among Medicare Beneficiaries

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Purpose: Sacral neuromodulation with the InterStim® has been done to treat urinary and bowel control. There are limited data in the literature on use trends of sacral neuromodulation. We explored disparities in use among Medicare beneficiaries.

Materials and Methods: We queried a 5% national random sample of Medicare claims for 2001, 2004, 2007 and 2010. All patients with an ICD-9 diagnosis code representing a potential urological indication for sacral neuromodulation were included. Patients who underwent device implantation were identified using CPT-4 codes. Statistical analysis was done with the chi-square and Fisher tests, and multivariate logistic regression using software.

Results: A total of 2,322,060 patients were identified with a diagnosis that could potentially be treated with sacral neuromodulation. During the 10-year study period the percent of these patients who ultimately underwent implantation increased from 0.03% to 0.91% ($p < 0.0001$) for a total of 13,360 (0.58%). On logistic regression analysis women (OR 3.85, $p < 0.0001$) and patients younger than 65 years (OR 1.00 vs 0.29 to 0.39, $p < 0.0001$) were more likely to be treated. Minority patients (OR 0.38, $p < 0.0001$) and those living in the western United States (OR 0.52, $p < 0.0001$) were less likely to receive treatment.

Conclusions: Sacral neuromodulation use significantly increased among Medicare beneficiaries in a 10-year period. Patients were more likely to be treated with sacral neuromodulation if they were female, white, younger (younger than 65 years) and living outside the western United States.

Key Words: urinary bladder, electric stimulation, Medicare, lower urinary tract symptoms, fecal incontinence

Abbreviations and Acronyms

OAB = overactive bladder

SNM = sacral neuromodulation

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Sacral neuromodulation with the InterStim has been used to treat lower urinary tract symptoms refractory to conventional therapy.[1,2] Since its approval by the FDA (Food and Drug Administration) in 1997, uptake and use of SNM have been growing.[3] SNM improves symptoms in patients with OAB symptoms with or without urinary incontinence.[4–7] Although it is controversial, the role of SNM in patients with neurogenic bladder was also investigated and success rates were similar to those

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in patients with nonneurogenic OAB.[8,9] Indications for SNM were recently extended beyond urinary symptoms to include treatment of fecal incontinence.[10] Studies showed that up to 90% of these patients may experience 50% or greater symptom improvement.[11,12]

Although indications for SNM have grown, there is still significant variability in use according to a standardized treatment algorithm for urinary or bowel dysfunction. There are limited data in the literature on SNM use trends that explore precisely who is treated with SNM.[3] Because some reports suggest inequality when examining those who would benefit from SNM, we explored disparities in SNM use among Medicare beneficiaries.

MATERIALS AND METHODS

After obtaining institutional review board approval we acquired Medicare claims data from 2001, 2004, 2007 and 2010 from CMMS (Centers for Medicare and Medicaid Services). PUFs (Public Use Files) include multiple data sets of physician and hospital outpatient medical claims from a 5% national random sample of beneficiaries. Patients with a urological diagnosis amenable to SNM were identified based on ICD-9 (supplementary Appendix, http://jurology.com/). Diagnosis categories included neurogenic bladder, interstitial cystitis, urinary retention, wet OAB (urgency with incontinence), dry OAB (frequency, urgency or nocturia without incontinence) and fecal incontinence. Because urinary retention diagnoses could not be further stratified into obstructive vs nonobstructive categories, they were excluded from further analysis. Patients who underwent SNM implantation, specifically percutaneous stage I or II implantation, were identified based on CPT-4 codes. If an identified patient underwent multiple procedures, for example stage I plus stage II implantation, that patient was only counted once in the data set.

All beneficiaries were tracked longitudinally using an encrypted beneficiary identification number across multiple data sets. National estimates of service use were obtained by multiplying counts by a constant weight of 20.[13] Patients were categorized by age, gender, ethnicity, comorbidities and geographic location. Physician information was also captured, including the volume of SNM implantations performed.

Statistical tests included the chi-square and Fisher tests as well as multivariate logistic regression analysis. Statistical analysis was done with SAS®, versions 9.3 and 20.

RESULTS

A total of 2,322,060 patients were identified with a urological diagnosis that could potentially be treated with SNM (table 1). The most common relevant diagnoses were dry OAB in 1,744,940 patients (75.1%) and wet OAB in 272,980 (11.8%) A total of 13,360 eligible patients (0.58%) underwent SNM treatment. During a 10-year period the percent of patients who underwent SNM increased from 0.03% to 0.91% ($p < 0.001$, table 2). Of the total cohort 6,640 patients (0.3%) were treated with percutaneous implantation while 6,640 (0.3%) underwent a stage I procedure and 10,560 (0.5%) underwent a stage II procedure. When stratifying by provider, a subset of high volume providers who performed SNM could not be identified. In this data set most providers performed fewer than 0.1% of the total number of SNM procedures and the highest volume for a given provider was 0.3%.

During the 10-year study period SNM use differed significantly by demographic group. Specifically SNM was performed more often in women (0.8% vs 0.2% of patients, $p < 0.0001$, supplementary table, http://jurology.com/). SNM also tended to be performed more frequently in white patients (0.6% vs 0.3%, $p < 0.0001$). SNM was done in similar proportions when a reduction in use was noted (0.3%, $p < 0.0001$), except in patients older than 84 years. SNM was performed most often in the South (1%, $p < 0.0001$).

Logistic regression analysis was performed to evaluate the influence of demographic factors and time on the likelihood of SNM implantation. Women were more likely to undergo SNM than men (OR 3.85, $p < 0.0001$, table 3). Minority patients were less likely to undergo treatment than white patients (OR 0.38, $p < 0.0001$). Patients younger than 65 years were more likely to be treated than older age groups (OR 0.29–0.39, $p < 0.0001$). Patients in the West were less likely to undergo SNM than those in other parts of the United States (OR 0.52,

Table 1. *Patients diagnosed with potential indications for SNM from 2001 to 2010*

	No. 2001 (%)	No. 2004 (%)	No. 2007 (%)	No. 2010 (%)	Total No.
Neurogenic bladder	38,060 (9.7)	40,260 (7.1)	41,380 (6.5)	49,820 (6.9)	169,520
Interstitial cystitis	7,440 (1.9)	9,600 (1.7)	10,940 (1.7)	12,520 (1.7)	40,500
OAB:					
Wet	51,080 (13.0)	60,040 (10.6)	71,740 (11.3)	90,120 (12.4)	272,980
Dry	278,780 (71.1)	434,740 (76.5)	489,100 (76.7)	542,320 (74.9)	1,744,940
Fecal incontinence	16,700 (4.3)	23,700 (4.2)	24,440 (3.8)	29,280 (4.0)	94,120
Totals	392,060	568,340	637,600	724,060	2,322,060