Single-staged sacral neuromodulation: A cost analysis based on actual patient outcomes

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Objective: Sacral neuromodulation is traditionally performed in two stages. Studies have projected that single-staged sacral neuromodulation is cost effective if the conversion rate is \geq 61.3%. We present the first case series of single-stage sacral neuromodulation reported in the literature. The objective of our study was to evaluate the outcomes and analyze the cost from our institutional experience with single-staged sacral neuromodulation.

Methods: 15 consecutive single-staged sacral neuromodulation procedures were performed at a selfinsured integrated healthcare institution. Cost data were determined using 2019 Medicare reimbursement rates from Current Procedural Terminology codes 64581, 64585, 64590, and 64595. Median operative times were derived from actual institutional data.

Results: 15 patients underwent single-stage sacral neuromodulation implantation. Their median follow up was 14.6 mos (IQR 6.9-22.5 mos). A total of 14/15 (93.3%) patients had success, defined as \geq 50% improvement from their baseline. Total reimbursement for the 15 patients undergoing single-stage implantation was \$329,430. If these patients had undergone traditional 2 stage implantation with equivalent outcomes, the overall reimbursement was determined to be \$414,796. Single-stage sacral neuromodulation implantation afforded a calculated total cost savings of \$85,366 (p<0.01). Moreover, a projected 233 minutes in operative room time was saved by undergoing single-stage sacral neuromodulation (p<0.01).

Conclusions: This study demonstrates the potential healthcare savings from a single-stage sacral neuromodulation procedure. Moreover, single-stage sacral neuromodulation may have other added benefits such as reduction in infection rates, patient satisfaction, and other indirect cost savings, such as time off from work.

	Lead implant Stage 1	IPG implant Stage 2	2-stage implant (Stage 1+2)	Single- stage implant	Lead explant	Lead + Generator explant
CPT code:						
64581 Implant neuroelectrodes	\$6,913		\$6,913	х		
64585 Remove neuroelectrodes					\$3,300	\$1650
64590 Implant neurostimulator		\$21,629	\$21,629	\$21,629		
64595 Remove neurostimulator						\$3,300
Total	\$6,913	\$21,629	\$28,542	\$21,629	\$3,300	\$4,995

Table 1: Medicare 2019 allowable reimbursement for single institution's SNM surgery.

	Lead Implant Stage 1	IPG Implant Stage 2	2 Stage Implant (Total)	Single- Stage Implant	Lead explant	Lead + Generator Explant
2019 Medicare Reimbursement	\$6,913	\$21,629	\$28,542	\$21,629	\$3,300	\$4,995
Device costs						
Lead	\$3,350		\$3,350	\$3,350		
Introducer sheath	\$280		\$280	\$280		
Test cable	\$520		\$520	\$520		
IPG		\$11,010	\$11,010	\$11,010		
Patient programmer		\$1,843	\$1,843	\$1,843		
OR costs						
Median time, minutes	48	27	75	59.5	24	32
Cost	\$1,735	\$976	\$2,711	\$2,150	\$867	\$1,156

Table 2: Net savings to our institution by performing single-stage SNM when compared to 2-stage SNM. Medicare 2019 allowable reimbursement adjusted for device and OR costs. Device costs based on Medtronic© 2019 billing rates. OR times include interval between timeout and end of surgery derived from institutional data. Estimated OR cost of \$36.14 per minute based on statewide averages for ambulatory surgeries in fiscal year 2014.



Figure 1: Analysis of cost scenarios for single- versus 2-stage SNM procedures based on 2019 Medicare reimbursement rates to institution. Overall cost for single-stage SNM is \$329,430, while 2-stage SNM is \$414,796 (p<0.01).