

# Factors Related to Postoperative Complications Following Internal Pulse Generator Surgery: Evidence from the National Surgical Quality Improvement Program (NSQIP)

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## Introduction

-Deep brain stimulation (DBS) is increasingly being used as an effective treatment for a variety of neurological disorders

-Complications and/or malfunction of internal pulse generators (IPGs) for DBS are estimated to occur in 12.9% of patients (1)

-Little is known about the risk of surgical procedures for implantation, revision, replacement, and removal of IPGs

-Therefore, our objective was to investigate the prevalence of and risk factors for postoperative complications following IPG-related procedures within the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP)

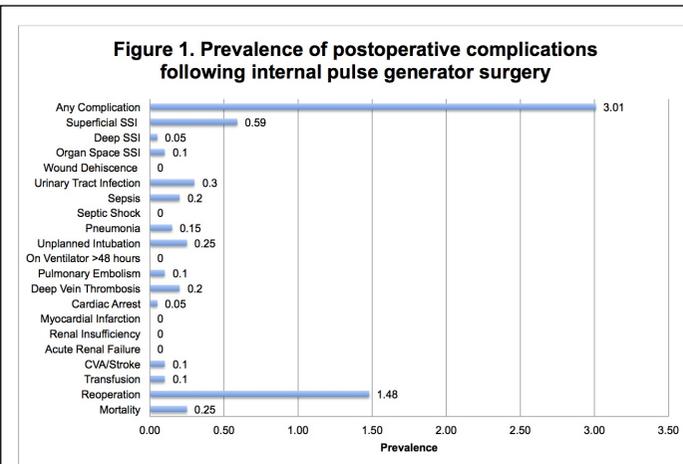
## Methods

-Patients undergoing surgery performed by neurosurgeons for implantation, revision, replacement, or removal of cranial IPGs (CPT codes: 61885, 61886, 61888) were extracted from the 2005-2015 ACS-NSQIP

-Cases with concurrent DBS electrode implantation were excluded

-The prevalence of postoperative complications was determined

-Multivariable logistic regression was used to identify demographic, comorbid, and perioperative characteristics associated with at least one 30-day complication



**Table 2. Multivariable model for any complication**

Variable	OR	95% CI	P-value
<b>Age</b>			
<45	1.00	Reference	
45 to <55	0.35	0.09-1.32	0.12
55 to <65	0.93	0.40-2.15	0.86
≥ 65	1.34	0.63-2.85	0.45
Female Sex	0.69	0.39-1.23	0.21
<b>Race</b>			
White	1.00	Reference	
Other	1.34	0.63-2.82	0.45
<b>Body Mass Index</b>			
Normal-Underweight	1.00	Reference	
Overweight	0.75	0.38-1.51	0.42
Obese	1.42	0.75-2.69	0.29
Tobacco Use	2.54	1.22-5.31	0.013
Diabetes	0.97	0.41-2.27	0.94
Dyspnea	0.54	0.12-2.36	0.41
Dependent Functional Status	1.28	0.60-2.72	0.53
COPD	1.45	0.41-5.17	0.56
Hypertension	0.90	0.49-1.65	0.74
Wound Classification II-IV	3.53	1.40-8.93	0.008
<b>ASA Classification</b>			
I-II	1.00	Reference	
III-V	1.40	0.77-2.57	0.27
Duration of Surgery (hrs)	1.28	1.08-1.52	0.004
AUC		0.7025	

## Results

-A total of 2,025 cases of IPG-related surgery were identified

-Of these, there were 61 (3.01%) cases with at least one complication and 5 (0.25%) cases with mortality

-The most common complications were:

- Reoperation (1.48%)
- Superficial surgical site infection (0.59%)

-In multivariable logistic regression models, tobacco use (OR: 2.54; 95% CI: 1.22-5.31; p=0.013), wound class II-IV (OR: 3.53; 95% CI: 1.40-8.93; p=0.008), and duration of surgery in hours (OR: 1.28; 95% CI: 1.08-1.52; p=0.004) were associated with significantly higher odds of at least one complication

## Conclusions

-Postoperative complications following implantation, revision, replacement, and/or removal of IPGs are relatively rare (3.01%)

-Tobacco use, contaminated wound classification, and longer duration of surgery were risk factors for any complication

-These estimates and risk factors should be considered in the long-term management of patients with DBS for neurological disorders

## References

(1) K. E. Lyons, S. B. Wilkinson, J. Overman, and R. Pahwa, "Surgical and hardware complications of subthalamic stimulation: a series of 160 procedures," *Neurology*, vol. 63, no. 4, pp. 612-616, 2004