

# Emergency Department Visits in Patients with Parkinson's Disease with Deep Brain Stimulation

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While the number of deep brain stimulation (DBS) procedures continues to rise,<sup>1,2</sup> there remains a scarcity of reports detailing the utilization pattern of emergency departments (ED) among patients who have undergone DBS. Therefore, we aimed to review the ED utilization of patients to provide insights for better management in the ED and post-operative care.

We retrospectively reviewed 71 Parkinson's disease (PD) patients who underwent DBS (PD-DBS) and visited ED between January 2017 and June 2023. Medical records of 35 PD patients without DBS (PD-nonDBS) who visited ED during the same period were also reviewed. All ED visits were categorized into five groups: neurological problems, DBS wound related, dermatologic, orthopedic, and medical. All statistical analysis were performed using SPSS 23.0 statistical software.

The mean age, gender, and Hoehn-Yahr scale did not differ between groups, while the PD-DBS group exhibited a longer disease duration. The PD-nonDBS group had a higher mean number of visits. Neurological problems constituted the highest proportion in both groups. There was no difference in the number of visits for PD related complications between two groups (Table 1).

Among PD related complications, 20 (16.0%) ED visits related to DBS parameter inspection or adjustment in PD-DBS groups. Among these, eight visits required hospitalization, with seven admissions related to DBS battery problems. In contrast, there were no admissions for PD-related complications in the PD-nonDBS group.

The number of visits for DBS wound complications were 22 (17.6%) by 12 patients, all of whom ultimately required

surgery. Among them, three had hypertension, one had diabetes, and another was taking anticoagulant for arrhythmia, which were all well controlled. Specifically, three required the removal of the DBS device due to scalp wound infections, including one case of meningitis. One patient developed a wound complication 14 years after surgery, emphasizing regular long-term wound inspection.

Our finding contrasted with a previous study where altered mental status was the primary reason for ED visit.<sup>3</sup> In our study, only eight visits required immediate hospitalization; some received outpatient level care. This is possibly because in Korea, even patients with milder symptoms can use ED easily at relatively low cost.<sup>4</sup>

This study has some limitations. We were unable to count ED visits at another hospital of our subjects; therefore, the visit number might be underestimated. In addition, differences in ED accessibility among different countries put some limits on the generalizability of our results. Finally, due to the lack or incompleteness of follow-up data, we could not evaluate the improvements after ED discharge.

In PD-DBS patients, a significant proportion of visits (42 visits, 33.6%) were due to DBS-related issues, which can be separated as previously suggested: surgery-related, hardware-related and stimulation-induced.<sup>3</sup> However, PD not-related and non-neurological problems are not uncommon. Therefore, it is crucial to provide education and special algorithms to neurologists and ED staffs about patients with DBS. It is equally imperative to underscore the importance of preemptive measures to avert the need for patients to seek ED care.

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**TABLE 1** Demographics and visit results in PD-DBS and PD-nonDBS patients presenting to the ED

Demographics and visit results	PD-DBS (71 patients)	PD (35 patients)
Age <sup>a</sup>	63.2 ± 9.8 years	66.3 ± 8.3 years
N of male (%)	36 (50.7%)	18 (54.3%)
Disease duration <sup>a</sup>	19.7 ± 5.5 years*	8.9 ± 5.5 years*
Time since DBS <sup>a</sup>	12.3 ± 3.9 years	-
Hypertension (%)	22 (31.0%)	10 (28.6%)
Diabetes (%)	8 (11.3%)	3 (8.6%)
H&Y scale <sup>a</sup>	30.0 ± 0.8	3.0 ± 1.0
Total N of ED visit	125 (57.1%)	94 (42.9%)
Mean N of ED visit per patients <sup>a</sup>	1.8 ± 1.2 times*	2.7 ± 2.1 times*
Neurological complications <sup>b</sup>	58 (46.4%, 40)	40 (42.6%, 23)
	PD related complications: 42 (33.6%, 33)	PD related complications: 25 (27.7%, 18)
DBS wound related problems <sup>b</sup>	22 (17.6%, 12)	-
Dermatologic problems <sup>b</sup>	4 (3.2%, 4)	3 (3.2%, 3)
Orthopedic problems <sup>b</sup>	25 (20.0%, 23)	15 (14.9%, 8)
Medical problems <sup>b,c</sup>	16 (12.8%, 10)	36 (39.4%, 15)
	Cardiologic 2, Pulmonary 3, Gastrointestinal 8, Genitourinary 2, Hemato-oncologic 0, Nephrologic 1, Endocrinologic 0	Cardiologic 7, Pulmonary 7, Gastrointestinal 7, Genitourinary 2, Hemato-oncologic 9, Nephrologic 3, Endocrinologic 1

Abbreviations: DBS, deep brain stimulation; ED, emergency department; H&Y, Hoehn and Yahr; N, number; PD, Parkinson's disease.

\* $P < 0.05$ , Mann-Whitney test.

<sup>a</sup>Presented as mean ± standard deviation.

<sup>b</sup>Presented as visit number (% of total visit, number of patients).

<sup>c</sup>Subclassified into 7 categories, presented with visit number.

## Author Roles

(1) Research Project: A. Conception, B. Organization, C. Execution; (2) Statistical Analysis: A. Design, B. Execution, C. Review and Critique; (3) Manuscript Preparation: A. Writing of the First Draft, B. Review and Critique.

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## Disclosures

**Ethical Compliance Statement:** This research was carried out in accordance with the principles outlined in the Declaration of Helsinki and was approved by the Institutional Review Board (IRB) of Seoul National University Hospital (IRB number: 2307-075-1448). Since this study was retrospective in nature, written consent from the patients was waived. We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this work is consistent with those guidelines.

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## Data Availability Statement

Data available from the corresponding author on reasonable request.

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