

University of Groningen

## Patient Referral for Device-Aided Therapies in Parkinson's Disease is Suboptimal

Moes, Harmen R.; ten Kate, Jolien M.; Buskens, Erik; van Laar, Teus

*Published in:*  
 Movement Disorders Clinical Practice

*DOI:*  
[10.1002/mdc3.13913](https://doi.org/10.1002/mdc3.13913)

**IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.**

*Document Version*  
 Publisher's PDF, also known as Version of record

*Publication date:*  
 2023

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

Moes, H. R., ten Kate, J. M., Buskens, E., & van Laar, T. (2023). Patient Referral for Device-Aided Therapies in Parkinson's Disease is Suboptimal: A Dutch Survey. *Movement Disorders Clinical Practice*, 10(12), 1821-1823. <https://doi.org/10.1002/mdc3.13913>

**Copyright**

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

**Take-down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

*Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.*

# Patient Referral for Device-Aided Therapies in Parkinson's Disease is Suboptimal; A Dutch Survey

Harmen R. Moes, MD,<sup>1,\*</sup> Jolien M. ten Kate, MSc,<sup>1</sup> Erik Buskens, MD PhD,<sup>2</sup> and Teus van Laar, MD PhD<sup>1</sup>

Patients with Parkinson's disease (PD) suffering from response fluctuations and/or troublesome dyskinesias insufficiently responding to optimized oral/transdermal therapy may benefit from device-aided therapy (DAT).<sup>1</sup> The term DAT refers to deep brain stimulation (DBS), subcutaneous infusion of apomorphine and continuous infusion of levodopa/carbidopa intestinal gel with or without entacapone.<sup>2</sup>

However, timely referral for DAT remains challenging. Not all eligible patients are referred to a specialized center in time, while others may be referred too early, both attributable to a lack of clear and objective referral criteria.<sup>3</sup> The knowledge and attitudes of referring neurologists may be part of this issue.<sup>4</sup> Identification of relevant factors is necessary to effectively address the clinical need identified.

In 2017–2018, we conducted a survey among general neurologists from 13 non-university hospitals in the northern part of the Netherlands to investigate their knowledge of DAT. Questions and agree/disagree statements on various aspects of DAT in PD were part of the anonymous paper-based questionnaire. We compared the agree/disagree statements between neurologists who had experience with DAT and those who had no experience. The main findings are discussed below, while the Appendix S1 provides a more detailed description of the methods and results.

In total, 36 questionnaires were returned (response rate 59%; Fig. A1). Respondents had worked as neurologists for a mean of 12.5 years. Neurologists with DAT experience cared for a larger population of PD patients than neurologists without DAT experience (median: 100 vs. 30 PD patients per neurologist).

Less than half of respondents (44%) considered the eligibility criteria for DAT to be clear (Table 1). A similar minority of respondents (47%) felt they had sufficient expertise to determine whether a patient would be eligible for *any* DAT. Experienced

neurologists were more likely than neurologists without DAT experience to report having the necessary expertise to assess eligibility for DAT (81 vs. 18%,  $P < 0.001$ ). The three clinical symptoms that respondents considered most important in assessing DAT eligibility were response fluctuations (78%), cognitive impairment (53%), and treatment-resistant tremor (50%).

The results of this survey confirm that management of patients with advanced PD is perceived as difficult, especially by general neurologists who lack professional experience with DAT.<sup>4</sup> Moreover, respondents ranked two factors particularly relevant to DBS (treatment-resistant tremor and cognitive impairment) in the top three most important selection criteria for *any* DAT. This may have a negative impact on referrals for DATs in general, as the exclusion criteria for pump therapies are less stringent than for DBS.<sup>3</sup>

Our study revealed a lack of competence among general neurologists in identifying PD patients possibly eligible for DAT. This knowledge gap partly explains the suboptimal referral practices, with evidence of both under- and over-referral (Table A4). Under-referral implies a missed opportunity to improve motor symptoms and quality of life in appropriate patients,<sup>1,3</sup> whereas over-referral may lead to false patient expectations and potentially overburden the referral network. Implementation of a user-friendly and validated screening tool is key to achieving timely referral for DAT without over-referral.<sup>5</sup>

## 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.

<sup>1</sup>Department of Neurology, University Medical Center Groningen, University of Groningen, Groningen, the Netherlands; <sup>2</sup>Department of Epidemiology, University Medical Center Groningen, University of Groningen, Groningen, the Netherlands

\*Correspondence to: Dr. Harmen R. Moes, Department of Neurology, University Medical Center Groningen, University of Groningen, Groningen, the Netherlands; E-mail: [h.r.moes@umcg.nl](mailto:h.r.moes@umcg.nl)

**Keywords:** Parkinson's disease, device-aided therapies, referral, survey, screening tool, eligibility.

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial](https://creativecommons.org/licenses/by-nc/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

Received 28 November 2022; revised 23 August 2023; accepted 13 October 2023.

Published online 11 November 2023 in Wiley Online Library ([wileyonlinelibrary.com](https://www.wileyonlinelibrary.com)). DOI: 10.1002/mdc3.13913

**TABLE 1** Summary of survey results, including respondent demographics, agreement with statements about device-assisted therapies (DATs), and characteristics considered relevant for assessing DAT-eligibility

Survey item	All (N = 36) <sup>a</sup>	Missing	Experience with DAT <sup>b</sup>		P-value <sup>c</sup>
			DAT = 0 (N = 19)	DAT ≥1 (N = 16)	
Gender (male)	20 (56%)	0	7 (37%)	12 (75%)	
Work experience as a neurologist (years)	12.5 (7.0–23.5)	0	10.0 (1.5–18.0)	18.5 (28.8)	
PD population in own practice					
Number of PD patients	50 (20–106)	2	30 (13–55)	100 (39–200)	
Number of PD patients treated with DAT	0 (0–5)	1	0 (0–0)	6 (2–18)	
Agreement with statement about DAT <sup>d</sup>					
1. The selection criteria for DAT are clear.	16 (44%)	2	6 (35%)	10 (63%)	0.17
2. I have sufficient expertise to ascertain whether a patient is eligible for DAT.	17 (47%)	2	3 (18%)	13 (81%)	<0.001
3. I feel competent being the treating neurologist of a PD patient who is treated with DAT.	9 (25%)	0	1 (5%)	7 (44%)	0.01
Clinical characteristics relevant to assess DAT-eligibility <sup>e</sup>					
• Response fluctuations	28 (78%)	0			
• Cognitive impairment	19 (53%)	0			
• Treatment-resistant tremor	18 (50%)	0			
• Quality of life	14 (39%)	0			
• Dyskinesia	12 (33%)	0			
• Drug intakes per day	10 (28%)	0			
• Age	4 (11%)	0			
• Impulse control disorder	1 (3%)	0			
• Disease duration	1 (3%)	0			
• Having a partner	0 (0%)	0			

Note: Variables are expressed as number (percentage) or median (IQR).

Abbreviations: DAT, device-aided therapy; PD, Parkinson's disease.

<sup>a</sup>N = 36 if no missing values. All percentages are calculated with N = 36 in the denominator.

<sup>b</sup>N = 35 due to one missing value.

<sup>c</sup>P-values for comparisons between neurologists without experience with DAT (DAT = 0) and neurologists with experience treating at least one patient with DAT (DAT ≥1) based on two-sided Fisher's exact test.

<sup>d</sup>For brevity, this table only includes the statement discussed in the text. See Appendix S2 for the complete tables.

<sup>e</sup>Respondents were allowed to choose three characteristics that they consider most important in assessing eligibility for DAT. Characteristics are here ordered by frequency (high-low), whereas on the questionnaire they were ordered alphabetically.

H.R.M.: 1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B

J.M.t.K.: 1B, 1C, 2B, 3B

E.B.: 1A, 2C, 3C

T.v.L.: 1A, 1B, 2C, 3C

the Dutch Parkinson Patient's Association for their feedback on an earlier version of this manuscript.

## Disclosures

**Ethical Compliance Statement:** Medical Ethical Committee of the University Medical Center Groningen waived the need for ethical approval of the study protocol. Informed patient consent was not necessary for this work. 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.

## Acknowledgments

The authors thank all neurologists who completed the survey. In addition, we thank neurologists who suggested relevant research topics when this project was still in a start-up phase. Moreover, the authors thanks Wim Simons and Martin van Schijndel from

**Funding Sources and Conflicts of Interest:** Harmen R. Moes received funding from the Dutch Parkinson Patient's Association to conduct this study (Parkinson Vereniging; grant number 2017-R04). The authors declare that there are no conflicts of interest relevant to this work.

**Financial Disclosures for the Previous 12 Months:**

Teus van Laar reports having received consulting fees from AbbVie, Britannia Pharm., Eurocept, and Clexio, and research grants from the Michael J. Fox Foundation, the Dutch Brain Foundation, and the University Medical Center Groningen; all unrelated to this work. Other authors declare that there are no additional disclosures to report. ■

## References

1. Deuschl G, Antonini A, Costa J, et al. European academy of neurology/Movement Disorder Society-European section guideline on the treatment of Parkinson's disease: I. *Invasive Therapies Mov Disord* 2022; 37(7):1360–1374.
2. Fabbri M, Barbosa R, Rascol O. Off-time treatment options for Parkinson's disease. *Neurol Ther* 2023;12:391–424. <https://doi.org/10.1007/s40120-022-00435-8>.
3. Odin P, Ray Chaudhuri K, Slevin JT, et al. Collective physician perspectives on non-oral medication approaches for the management of clinically relevant unresolved issues in Parkinson's disease: consensus from an international survey and discussion program. *Parkinsonism Relat Disord* 2015; 21(10):1133–1144.
4. Cabrera LY, Young Han C, Ostendorf T, Jimenez-Shahed J, Sarva H. Neurologists' attitudes toward use and timing of deep brain stimulation. *Neurol Clin Pract* 2021;11(6):506–516.
5. Moes HR, Henriksen T, Slawek J, Phokaewvarangkul O, Buskens E, van Laar T. Tools and criteria to select patients with advanced Parkinson's disease for device-aided therapies: a narrative review. *J Neural Transm* 2023; 2023:0123456789. <https://doi.org/10.1007/s00702-023-02656-z>.

## Supporting Information

Supporting information may be found in the online version of this article.

**Appendix S1.** Description of methods and results.

**Appendix S2.** English translation of the questionnaire used in this study (originally in Dutch).