Medtronic

EE764

Cost analysis of rechargeable vs. non-rechargeable devices for deep brain stimulation in parkinson's disease treatment in Spain.

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Objective

The extended battery life of rechargeable devices for deep brain stimulation (DBS) significantly reduces the need for internal pulse generator (IPG) replacements, potentially resulting in long-term savings[1].

We aimed to evaluate the economic impact of using rechargeable versus non-rechargeable devices in patients with Parkinson's Disease (PD) from a tertiary-hospital perspective over a 5-year time horizon.

Methods

- A cost analysis was developed to follow a hypothetical cohort of 35 patients, capturing the initial implant and subsequent IPG replacements over time.
- The unit cost for insertion and replacement procedures was sourced from Spanish data and expressed in €, 2024[2]. (Table 1)
- A scenario where 100% of patients use a non-rechargeable device was compared to a scenario where a rechargeable device is available and used by 25-100% of patients.
- For the rechargeable device, a 15-years longevity was assumed, while for the non-rechargeable device 4 years were considered.
- Long-term projections of the results were made by extending the time horizon up to 15 years, and a deterministic sensitivity analysis was performed to assess the robustness of the results.
- The model's inputs were endorsed by a clinical expert.

Results

- Introducing the rechargeable device could reduce up to 1 IPG replacement per patient over 5 years, leading to potential savings of € 12,651 per patient compared to a non-rechargeable device (€ 38,035 vs. € 50,686). (Figure 1)
- For the total patient cohort, the model suggested savings of € 110,694, € 221,388, € 332,082, and € 442,777 with 25%, 50%, 75% and 100% usage of the rechargeable device, respectively. (Figure 2)
- These savings offset the higher initial investment once the first replacement of the non-rechargeable system is avoided.
- Long-term projections showed increased savings as the time horizon extends. (Table 2)
- The results from the univariate sensitivity analysis are shown in Figure 3, and they confirm the robustness of the model.

Table 1: Unit costs and parameters considered in the analysis.

	Non-rechargeable device	Rechargeable device
Total implants	35	
Cost of the device (first implant)	€ 24,758	€ 33,110
Cost of the device (replacements)	€ 16,078	€ 24,430
Cost of the implant procedure[2]	€ 4,924	€ 4,924
Battery longevity	4 years	15 years

Figure 1: Estimated mean total costs per patient over 5 years.

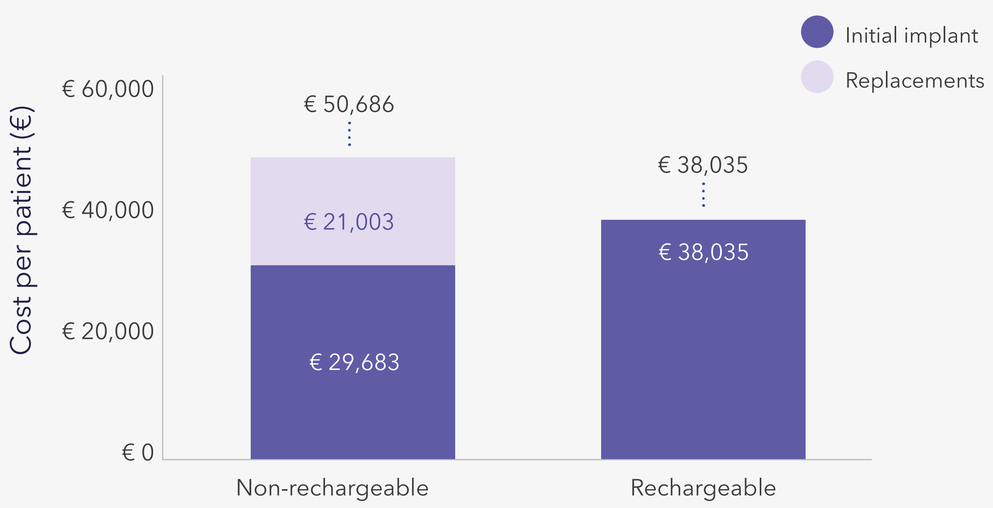

Figure 3: Tornado diagram of the univariate sensitivity analysis.

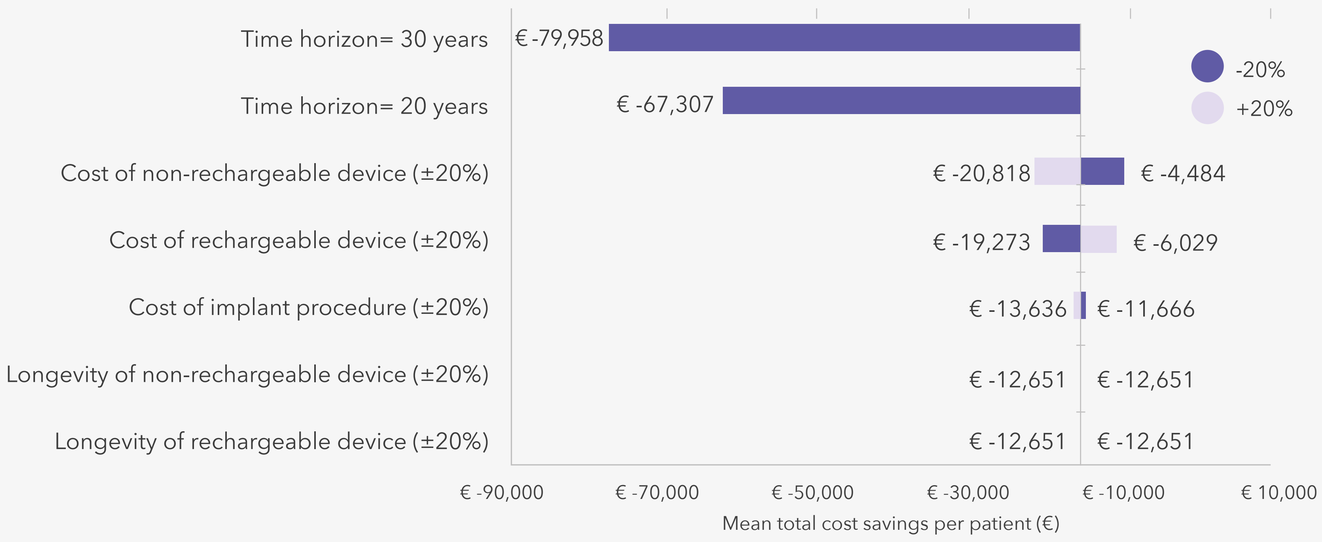

Figure 2: Total costs considering the entire patient cohort and varying percentages of rechargeable device usage over 5 years.

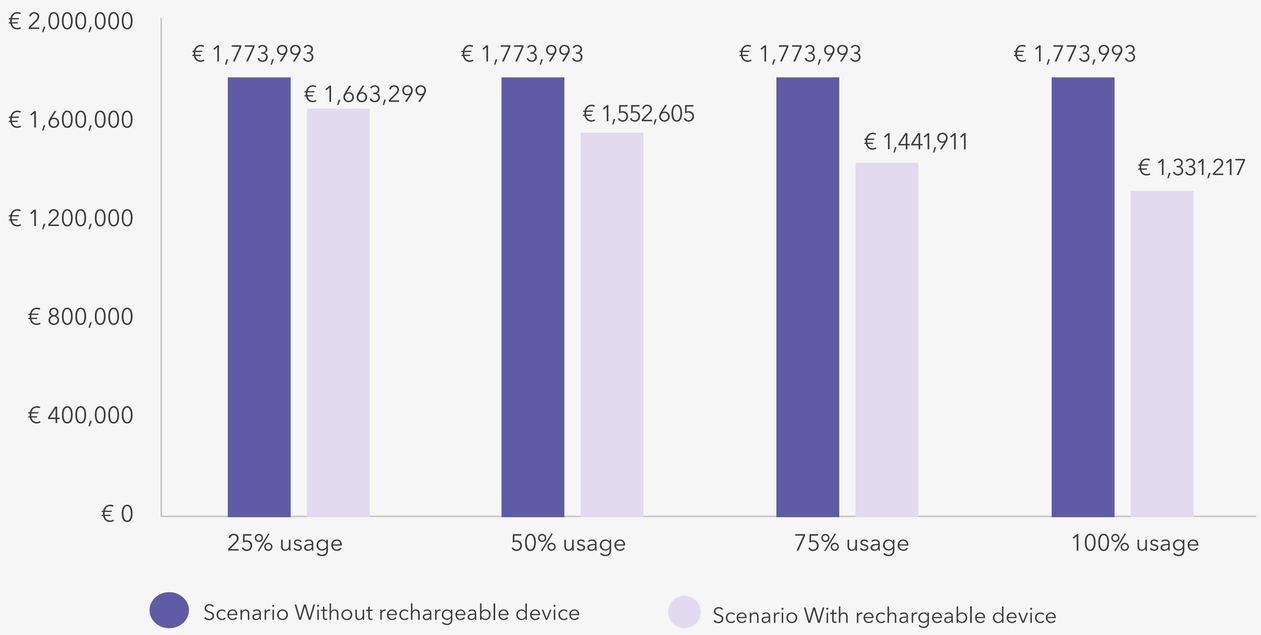

Table 2: Budget impact analysis of the introduction of rechargeable device considering the total patient cohort and long-term projections.

25% usage of the rechargeable device	Year 1	Year 5	Year 10	Year 15
Scenario WITHOUT rechargeable device	€ 1,038,897	€ 1,773,993	€ 2,509,090	€ 3,244,186
Scenario WITH rechargeable device	€ 1,111,977	€ 1,663,299	€ 2,214,621	€ 3,022,798
Savings/Cost Increase	**€ 73,080**	**€ -110,694**	**€ -294,468**	**€ -221,338**
50% usage of the rechargeable device	Year 1	Year 5	Year 10	Year 15
Scenario WITHOUT rechargeable device	€ 1,038,897	€ 1,773,993	€ 2,509,090	€3,244,186
Scenario WITH rechargeable device	€ 1,185,057	€ 1,552,605	€ 1,920,153	€ 2,801,410
Savings/Cost Increase	**€ 146,160**	**€ -221,388**	**€ -588,937**	**€ -442,777**
75% usage of the rechargeable device	Year 1	Year 5	Year 10	Year 15
Scenario WITHOUT rechargeable device	€ 1,038,897	€ 1,773,993	€ 2,509,090	€ 3,244,186
Scenario WITH rechargeable device	€ 1,258,137	€ 1,441,911	€ 1,625,685	€ 2,580,021
Savings/Cost Increase	**€ 219,240**	**€ -332,082**	**€ -883,405**	**€ -664,165**
100% usage of the rechargeable device	Year 1	Year 5	Year 10	Year 15
Scenario WITHOUT rechargeable device	€ 1,038,897	€ 1,773,993	€ 2,509,090	€ 3,244,186
Scenario WITH rechargeable device	€ 1,331,217	€ 1,331,217	€ 1,331,217	€ 2,358,633
Savings/Cost Increase	**€ 292,320**	**€ -442,777**	**€ -1,177,873**	**€ -885,553**

Conclusion

From a Spanish hospital perspective, using DBS rechargeable devices for eligible PD patients could significantly reduce long-term treatment costs, while improving hospital efficiency.

References

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2. Oblikue Consulting. Base de datos de costes sanitarios eSalud [Internet]. Barcelona: Oblikue Consulting; 2015. Available at: http://www.oblikue.com/bddcostes/ (accessed June 2024)

ISPOR Europe 2024 17th-20th November, Barcelona, Spain