

Systematic review and cost-effectiveness of treatment with abobotulinumtoxinA for post-stroke spasticity compared with physiotherapy alone

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Disclosures

Author	Disclosure
ME	Ipsen collaborator (consultancy fees)
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MF	Ipsen Employee at the time this research was conducted

All authors declare their contribution has not influenced the study results.



Advance of findings

The results show a high probability that aboBoNT-A (given together with physiotherapy) is a cost-effective treatment for post-stroke spasticity after stroke, even when evaluated in the most pessimistic (highest cost) scenario possible

Introduction

BACKGROUND

Stroke: among the 4 leading causes of mortality worldwide

(> 6 million deaths in 2017) (WHO, 2020).

Post-stroke spasticity (PSS): a highly prevalent disease among stroke patients (18% - 42%) (Zeng, 2021) known for its burden for the patient, affecting quality of life (QoL), causing pain and problems for self-care, mobility and performance of activities of the daily life.

- PSS treatments:
 - Physiotherapy
 - Antispastic oral agents
 - Surgical intervention
 - Botulinum Toxin (BoNT) injections + Physiotherapy

ST0

HOW ARE PROMs BEING MEASURED?

- Modified Ashworth Scale (measures muscle tone)
- Perceived function and pain Disability Assessment Scale (DAS)
- QoL measures
- SF-36, EQ-5D, Barthel Index



Diapositiva 4

ST0

Corrected spelling

Sarah THOMAS; 2023-05-10T16:02:27.495

Objective

To carry out a cost-effectiveness analysis of the treatment of spasticity after stroke, in adults, with aboBoNT-A (given together with physiotherapy), compared with the treatment of physiotherapy alone.



Methods

SYSTEMATIC LITERATURE REVIEW

PICO

- Articles that include information from people with a diagnosis of PSS treated with aboBoNT-A and/or physical therapy
- Articles that include information on costs and/or outcome measures for patients (efficacy, effectiveness...)

DATABASES CONSULTED

- Embase (with PubMed & Medline filter)
- Scopus
- Google Scholar (for gray literature and to capture relevant articles that were not captured by the search algorithm)

INCLUSION CRITERIA

Articles / documents are included that:

- Provide information on costs and/or effectiveness/efficacy of aboBoNT-A (plus physiotherapy) for the treatment of PSS
- Only studies with adult population
- Available in full text
- In English or Spanish
- Passed the Quality and bias assessment



Methods

SYSTEMATIC LITERATURE REVIEW

DATA EXTRACTION

- GENERAL INFORMATION
- OBJECTIVES
- DATA AND SOURCE
- DESIGN
- TREATMENT & CONTROL GROUP (FOR RCTS)
- POPULATION AND SAMPLING
- TREATMENT INFORMATION
- COSTS INFORMATION AND DESCRIPTION
- EFFECTIVENESS MEASURES
- SENSITIVITY ANALYSIS
- STATISTICAL METHODS
- RESULTS
- DISCUSSION
- CONCLUSIONS
- STRENGTHS AND LIMITATIONS

Aim: Obtaining relevant information to design the model

- Probability of survival
- Time horizon to consider
- Other relevant information of patients and the disease
- Costs per patient and as much disaggregated as possible
- QoL and clinical efficacy measures



Methods

COST-EFFECTIVENESS ANALYSIS

Treatment with aboBoNT-A & Physiotherapy vs. Physiotherapy alone

Compare two perspectives: direct costs vs. societal costs

- Three scenarios
 - Mean/Min/Max costs
- Sensitivity analysis:
 - Uncertainty analysis: Acceptability curves and uncertainty plot
 - Different discount rates (3% vs 5%) and time horizons (2, 5, 8 and 10 years)

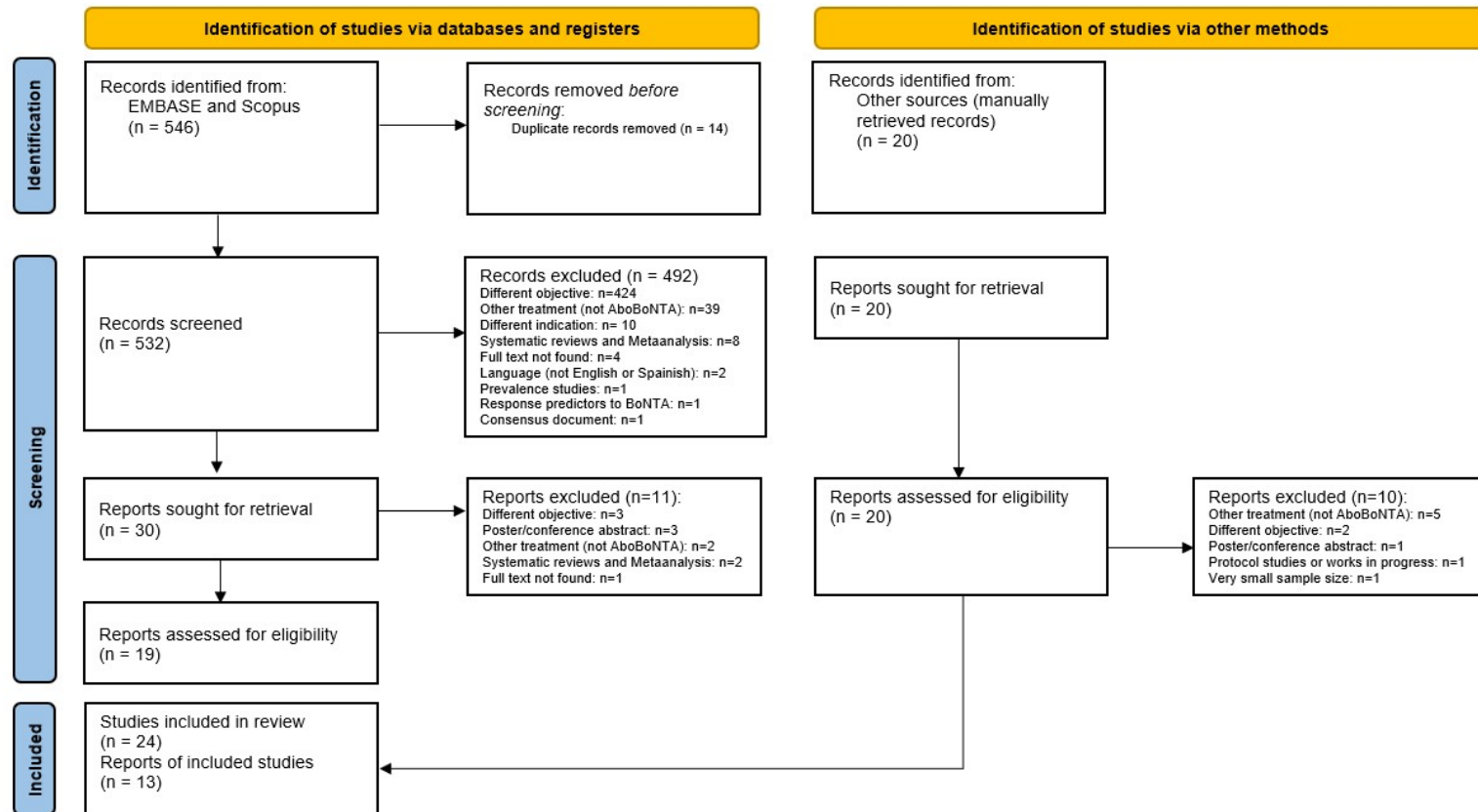
Model parameters

- N=1000 simulated patients
- $\text{Pr}(\text{aboBoNT-A}) = \text{Pr}(\text{physiotherapy}) = 0.5$
- $\text{Pr}(\text{survival at 1 year}) = 0.937$
- $\text{Pr}(\text{survival at 2 years}) = 0.957$
- Time horizon 10 years
- Normal distribution assumed for costs and effectiveness variables



Results

Figure 1.
PRISMA flow diagram



Notes: aboBoNT-A, abobotulinumtoxinA; BoNT-A, type A botulinum toxin; PRISMA, preferred reporting items for systematic reviews and meta-analysis.

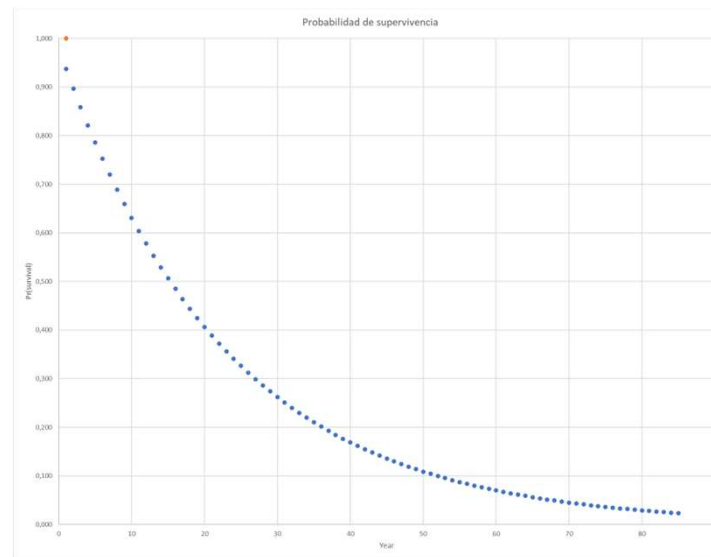


Results

COSTS AND EFFECTIVENESS

Costs*	Mean cost (SD)	Minimum Cost	Maximum Cost
Treatment with aboBoNT-A*			
Direct costs perspective	7982.56	594	28642.38
Societal costs perspective	9642.98	1251.56	28681.44
Physiotherapy			
Direct costs perspective	9748.76	408	34430.45
Societal costs perspective	11143.88	833.26	34470.96

Other parameters	AboBoNTA	Physiotherapy
Effectiveness		
QALYs	0.81 (0.081)	0.575 (0.07)
Efficacy		
MAS	4.12 (0.942)	4.59 (0.786)
Pr survival 1 year after the stroke	0.937	0.937
Discount rate	5%	5%



Cost estimates

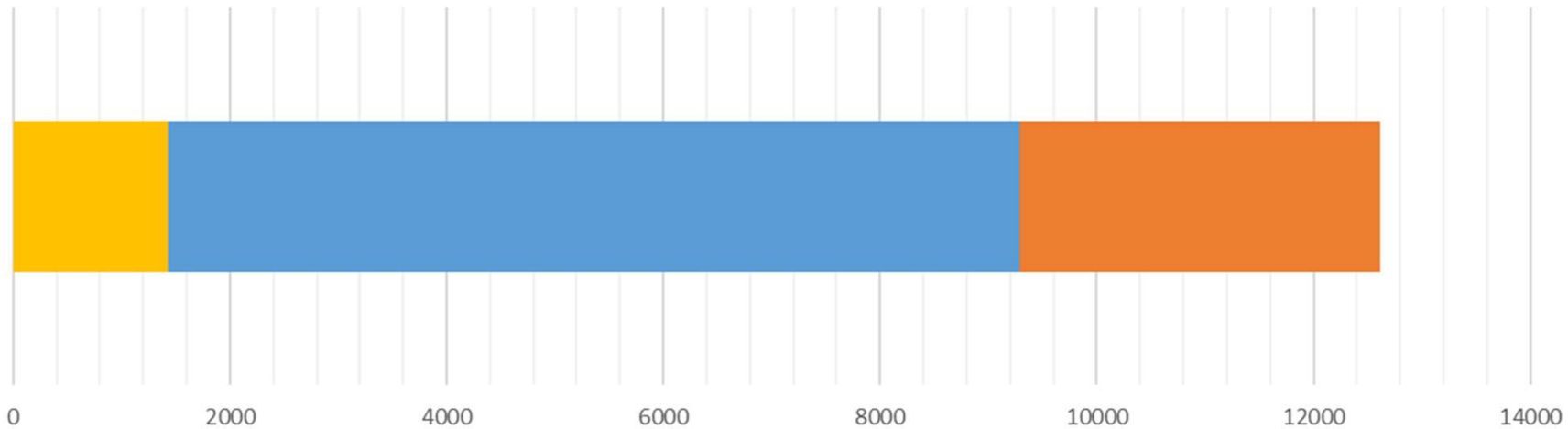
AboBoNT-A plus Physiotherapy is more expensive compared to Physiotherapy alone, but it also has shown to improve QoL of patients.

Results

Figure 2.

Cost by type of resources, for treatment with aboBoNT-A plus physiotherapy

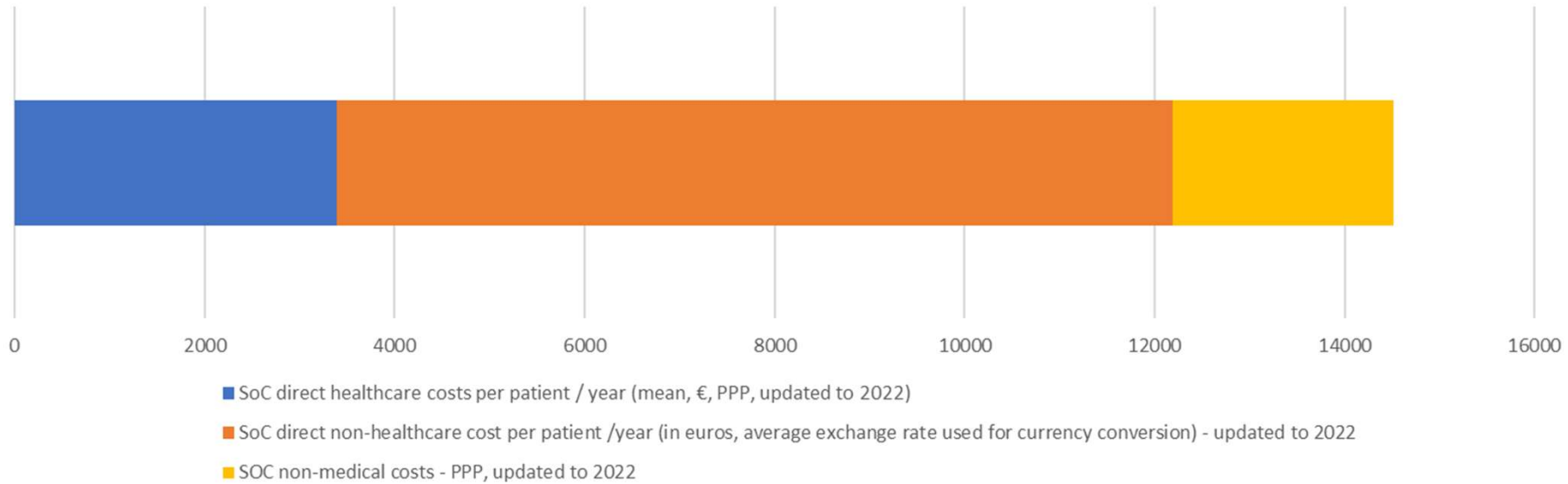
- Mean BoNTA cost per patient /year (in euros, average exchange rate used for currency conversion) - updated to 2022
- Other medical cost (mean, €, average exchange rate used for currency conversion) - updated to 2022
- Other non-medical costs (mean, €) - PPP, updated to 2022



Results

Figure 3.

Cost by type of resources, for treatment with Physiotherapy alone



Results

TABLE 1. COSTS-EFFECTIVENESS RESULTS.

Mean ICERs show treatment with aboBoNT-A plus physiotherapy would be cost-effective in all the 3 scenarios. Even dominant in the worst possible scenario of maximum costs.

Scenario	Direct costs	Societal costs	QALYs	MAS ^b
Mean Costs				
AboBoNT-A + PT	10254.61	11025.88	0.733	4.120
Physiotherapy alone	13530.80	13606.88	0.523	4.593
<i>ICER (direct costs perspective)</i>			-15600.904	6926.40
<i>ICER (societal costs perspective)</i>			-12290.428	5456.64
Minimum Costs				
AboBoNT-A + PT	526.53	1111.74	0.735	4.120
Physiotherapy alone	363.56	740.60	0.523	4.593
<i>ICER (direct costs perspective)</i>			768.73	-344.54
<i>ICER (societal costs perspective)</i>			1750.66	78.65
Maximum Costs				
AboBoNT-A + PT	25346.17	25428.6	0.736	4.12
Physiotherapy alone	30624.88	30644.38	0.526	4.59
<i>ICER (direct costs perspective)</i>			-25256.98	11160.06
<i>ICER (societal costs perspective)</i>			-24867.79	11027.02

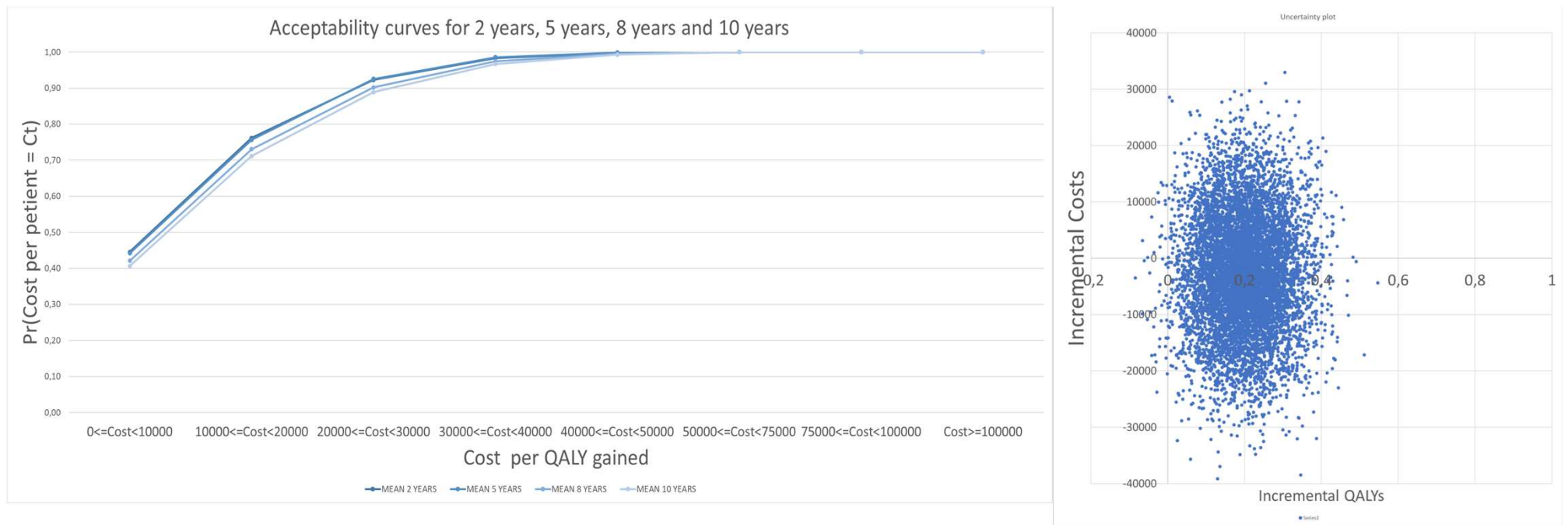


Results: Uncertainty Analysis

Figure 4.

Acceptability curves and incremental costs compared to incremental effectiveness plot.

Mean cost scenario. Direct costs method.

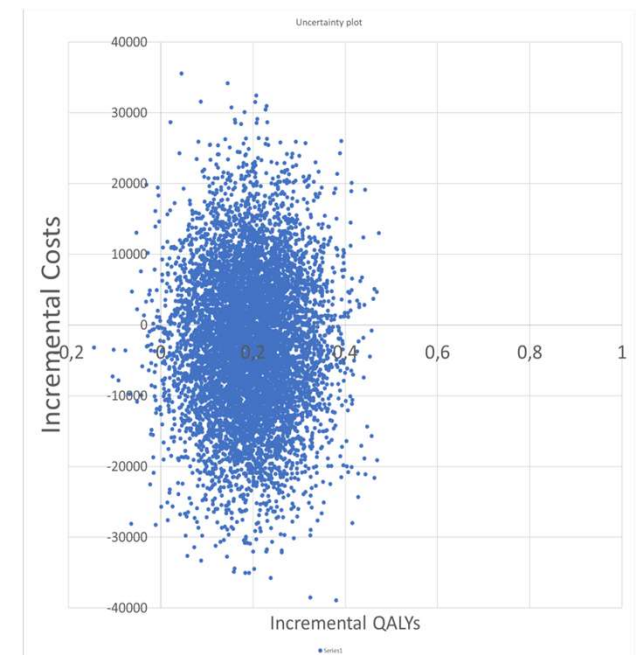
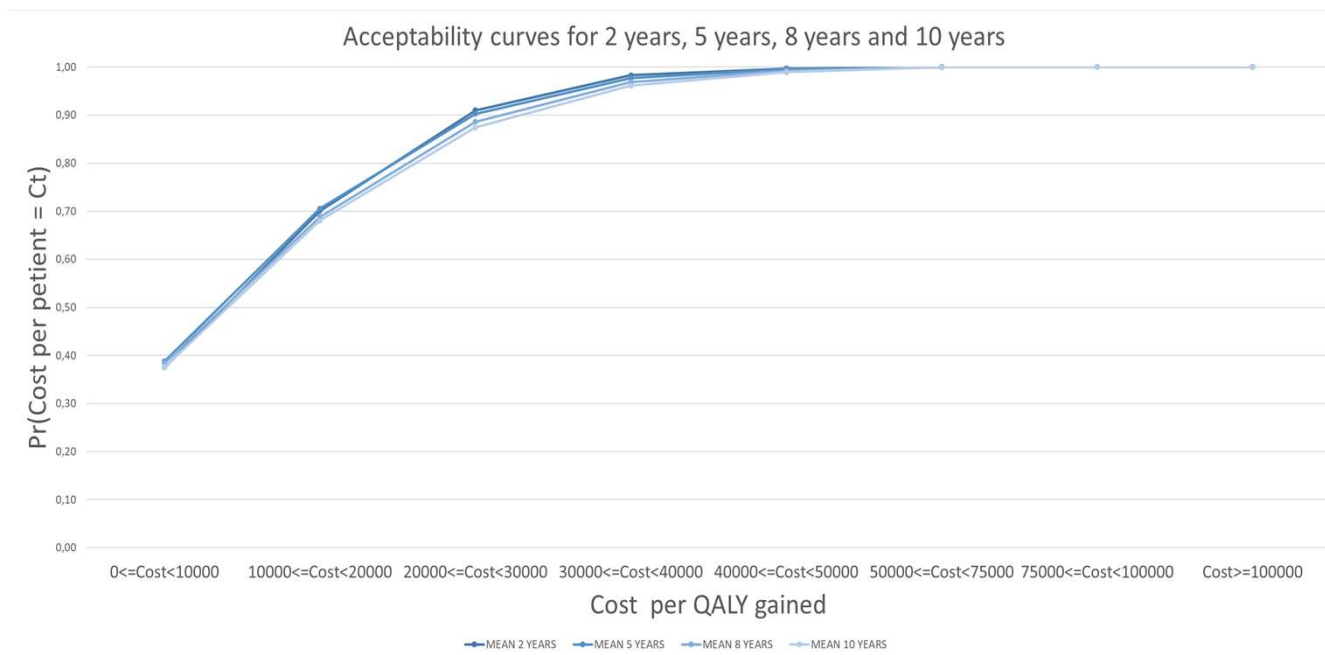


Results: Uncertainty Analysis

Figure 5.

Acceptability curves and incremental costs compared to incremental effectiveness plot.

Mean cost scenario. Societal costs method.

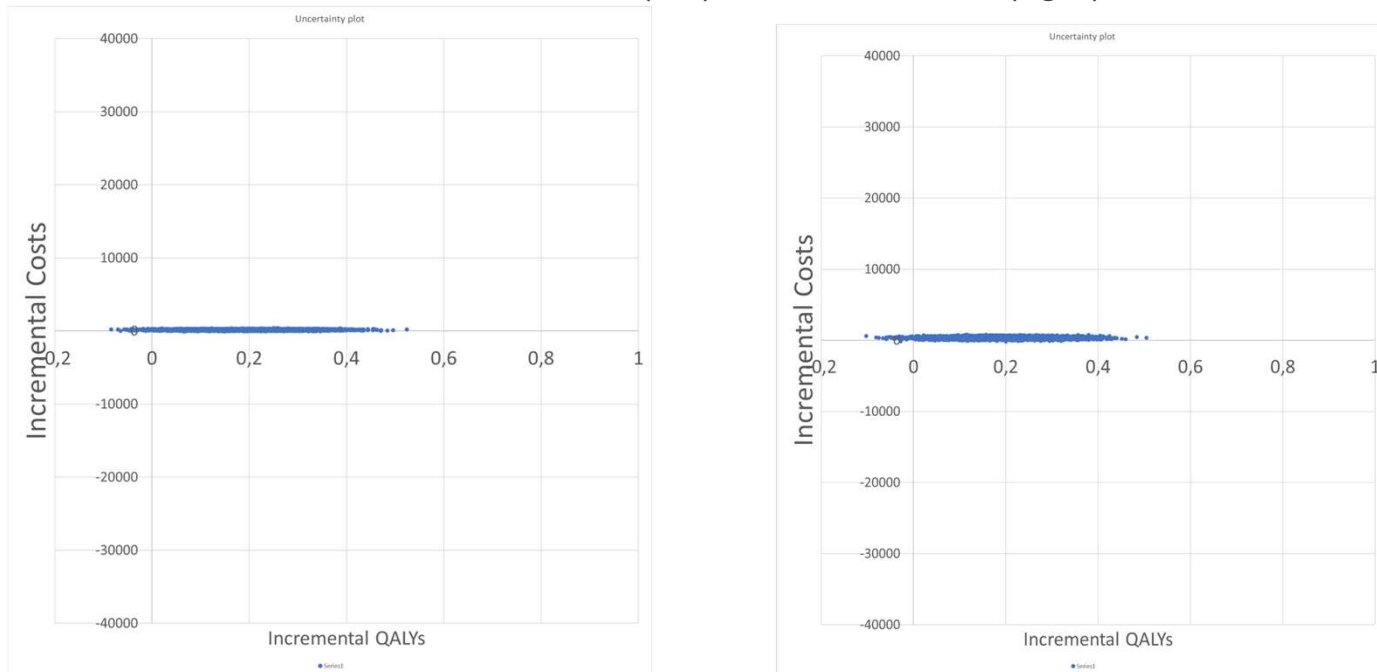


Results: Uncertainty Analysis

Figure 6.

Acceptability curves and incremental costs compared to incremental effectiveness plot.

Minimum cost scenario. Direct costs (left) vs. Societal cost (right).

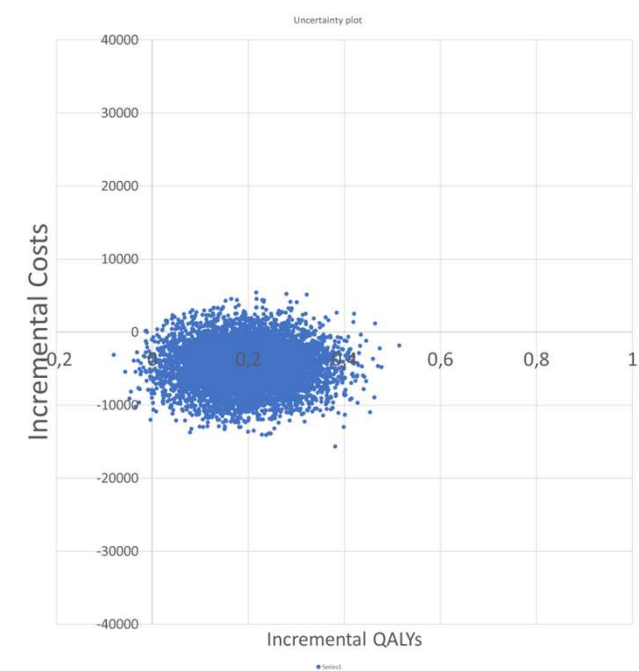
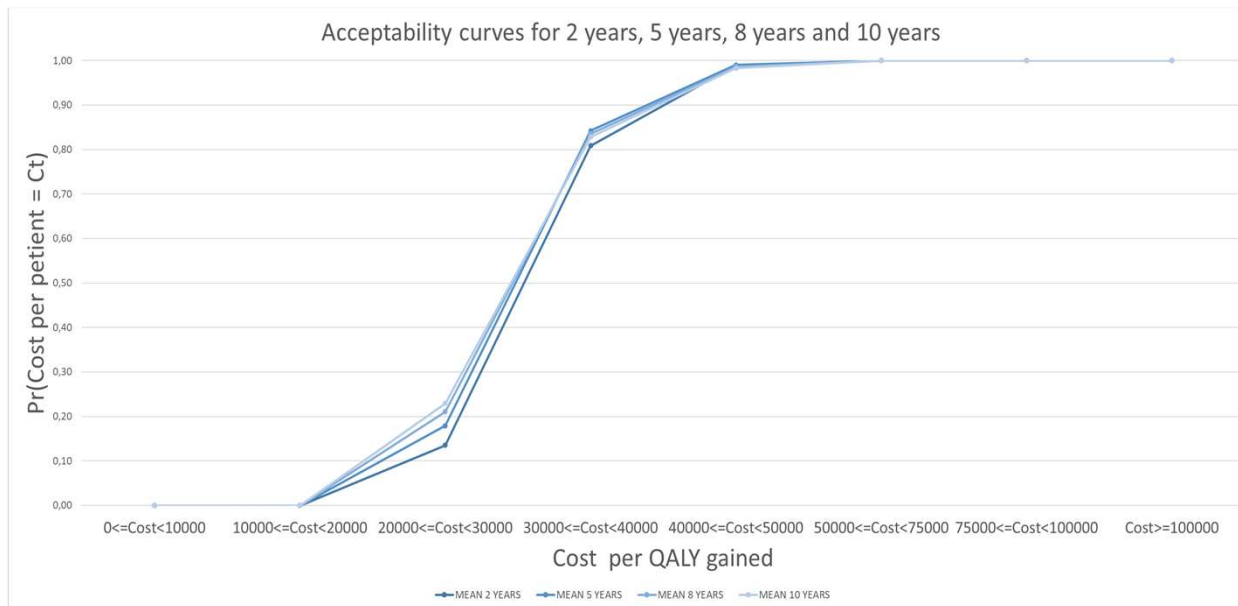


Results: Uncertainty Analysis

Figure 7.

Acceptability curves and incremental costs compared to incremental effectiveness plot.

Maximum cost scenario. Direct costs method.

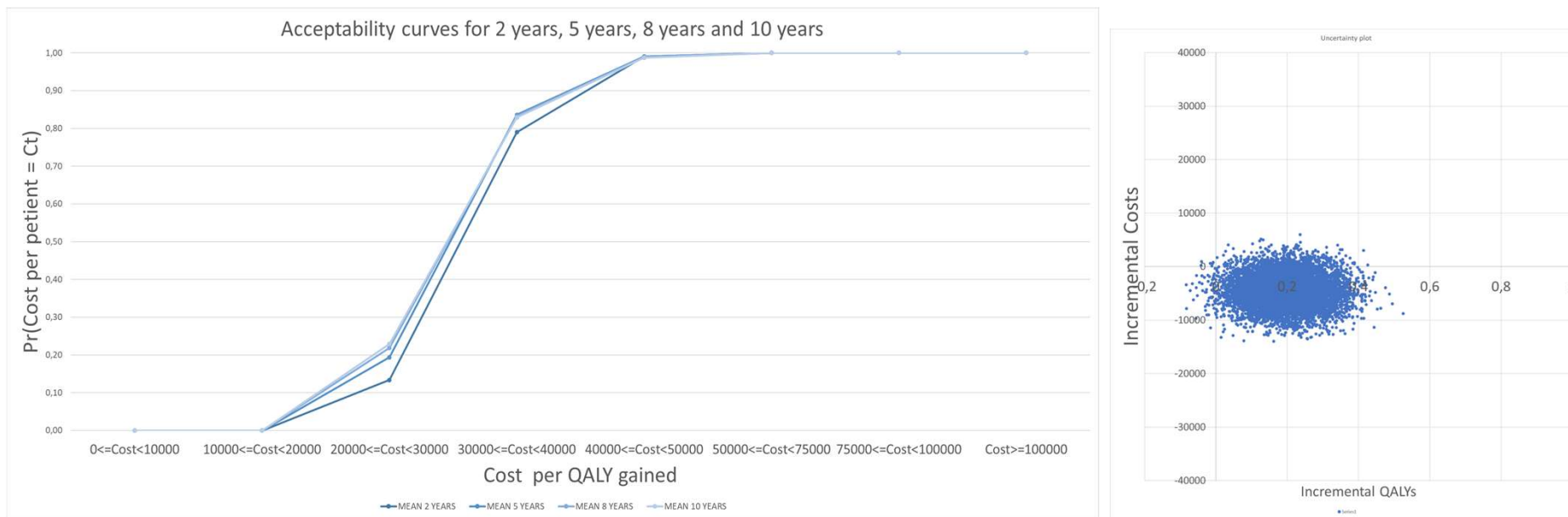


Results: Uncertainty Analysis

Figure 8.

Acceptability curves and incremental costs compared to incremental effectiveness plot.

Maximum cost scenario. Societal costs method.



Conclusions

A high probability of aboBoNT-A being cost-effective

- The analysis showed that aboBoNT-A treatment, provided with physiotherapy, was highly cost-effective. In the scenario in which the mean costs were considered, the incremental cost-effectiveness ratio (ICER) was within the acceptable threshold.
 - This was especially relevant when a societal perspective was assumed because the ICER was negative, indicating dominance of aboBoNT-A plus physiotherapy with respect to the SoC treatment (physiotherapy alone).
 - When a direct cost perspective was assumed, the mean ICER was below €30,000, suggesting it could be a cost-effective option.
 - When the lowest cost scenario was assumed, the ICER was small (below €2,000 per QALY gained), independent of the perspective of either being direct or societal costs.
 - When the highest costs were selected in the model, the ICER direct cost was approximately –€25,000 per QALY gained.

Limitations

Our study has limitations

- The analysis was based on a simulation exercise.
- Only one study provided information of good quality regarding QoL of patients treated with aboBoNT-A plus physiotherapy and therefore more studies would be needed to confirm the QoL used stands on average for the population of patients treated with it.
- Heterogeneity is high for costs' estimates, methods and type of costs considered.



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AUTHOR CONTRIBUTIONS

- All authors have substantially contributed to this work either through the conception and design of the work, or through the collection, analysis, and interpretation of the data.
- MF was responsible for the conception of the work. ME, JdLI, and RN are responsible of the design of the analysis, choice of methods, analysis and interpretation of the data.
- All the authors have contributed to the article writing, reviewed and approved the final version for publication.

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Thank You!

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