ECONOMIC EVALUATION OF CEREBRAL OXIMETRY MONITORING IN CAROTID ENDARTERECTOMY : THE EMOCAR RANDOMIZED CONTROLLED TRIAL (MAY 2011 - APRIL 2016)

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Background

The risk of cerebrovascular incidents is one of the principal complications of the carotid endarterectomy (CE). One of the major challenges is to be able to detect them as soon as possible to avoid complications.

- The standard technique is constant monitoring of clinical parameters throughout the intervention.
- Cerebral Oximetry is a medical device for non-invasive and continuous neurological monitoring of cerebral blood oxygen saturation. The monitoring by cerebral oximetry supposes to reduce the suffering of the brain and thus reduce the number of complications.

Aims

The main purpose of this study was to assess the cost-effectiveness of the cerebral oximetry monitoring compared to the usual monitoring during CE.

Methods

EMOCAR Study design :

- prospective, multicenter, controlled, randomized, double-blind; including 904 patients; followed between May 2011 and April 2016;
- adults ≥ 18 years old with an indication of carotid endarterectomy;
- 4-months follow-up with 5 visits (D+0, D+30, D+60, D+90, D+120).

Costs:

- outpatients and caregivers' resource utilization collected with 5 Wilmer questionnaires (D+0, D+30, D+60, D+90, D+120);
- hospital expenses estimated through a retrospective HRG survey.

Quality of life:

- patients' quality of life was assessed with EQ-5D and SF-36 questionnaires only during D+0, D+30, and D+120 visits;
- QALY's calculated using French tariffs;
- mapping technique used between SF-36 and EQ-5D.

Analysis sets:

- 686 patients included in Economic FAS : 346 and 340 in the control and experimental groups respectively;
- multiple imputation applied to handle missing values;
- community perspective performed.

A new criteria : break-event points of the mean NMB of the two strategies

Results

- The costs of health care and QALYs are € 10,452 and 0.301 for the control group and € 10,345 and 0.288 for the experimental group respectively. There is no significant difference between the costs and the QALYs of two strategies.
- Under the € 8,676 WTP threshold, the experimental strategy has a higher NMB than the control strategy. The experimental strategy is preferred to the control strategy. After the € 8,676 WTP threshold, the control strategy is preferred to the experimental strategy (Table 1).
- The break-even point represents the WTP from which the strategy becomes profitable, i.e. the strategy contributes to improving the overall health of patients regardless the resources used.
- The break-even point for the control group is € 34,774, i.e. the NMB becomes positive. Below € 31,431 there is no uncertainty, the NMB of the control group is always negative. Beyond € 38,220, no uncertainty, the NMB of the control group is positive (Figure 1(a)).
- The break-even point for the experimental group is € 35,890, i.e. the NMB becomes positive. Below € 32,786, no uncertainty, the NMB of the experimental group is always negative. Beyond € 39,155, no uncertainty, the NMB of the experimental group is always positive (Figure 1(b)).

Table 1 : Net Monetary Benefit and Differential Net Monetary Benefit

Results	Experimental Group	Control Group	Incremental NMB
Total costs (€)	€ 10 345	€ 10 452	-€ 107
QALY	0,288	0,301	-0,012
λ Willingness to pay (WTP) (€)	**NMB Experimental Group (€)**	**NMB Control Group (€)**	**INMB (€)**
0	-10 345	-10 452	107
4000	-9 192	-9 250	58
8 676	-7 845	-7 845	**0**
10 000	-7 463	-7 447	-16
20 000	-4 580	-4 441	-140
34 774	-322	**0**	-322
35 890	**0**	336	-336
50 000	4 067	4 577	-510
80 000	12 715	13 594	-880
100 000	18 480	19 606	-1 126

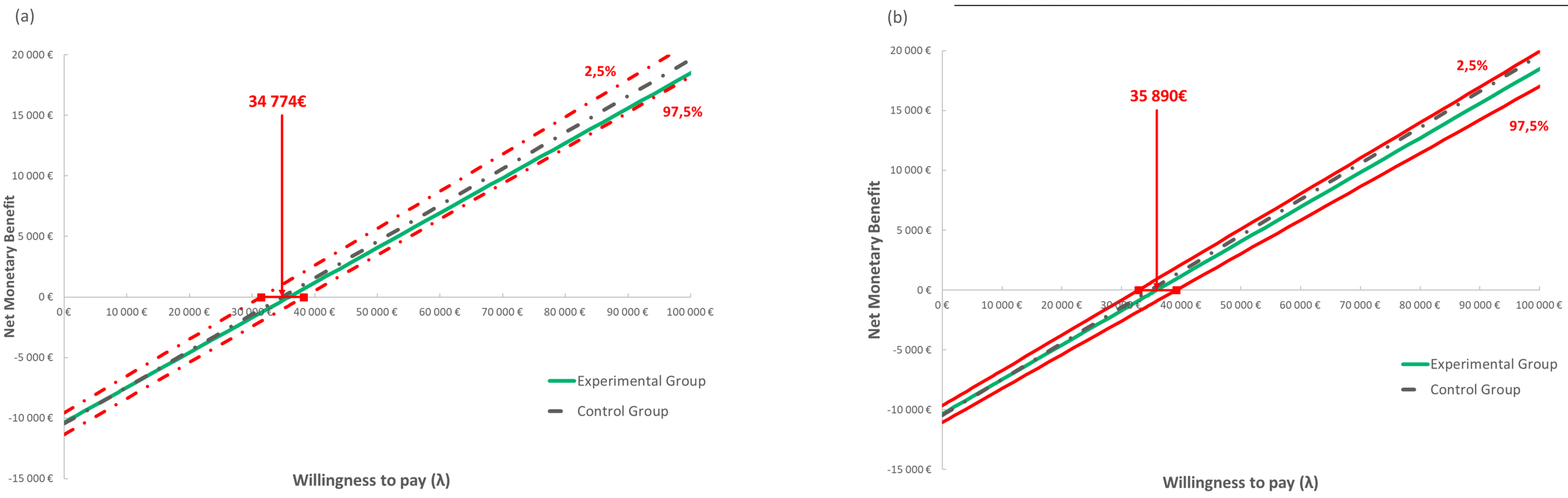

Figure 1 : A new threshold : The Net Monetary Benefit break-event point (a) Control Group and (b) Experimental Group

Conclusion

A strategy with a higher NMB is not necessarily profitable: it minimizes the losses while remaining deficit. The break-even point is reached faster for the control group than for the experimental group. From this point, a therapeutic strategy creates more value than it destroys.

Optimized anesthetic monitoring is the first-line therapeutic option. After taking into account the uncertainty associated with the net socio-economic benefits of two options, the use of cerebral oximetry equipment is not economically recommended in this indication.

References

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