# Cost-Effectiveness of Mechanical Thrombectomy for Acute Ischemic Stroke: Colombian Health System Perspective

EE107

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## Introduction

Mechanical thrombectomy plus intravenous thrombolysis is the treatment of choice for patients with ischemic stroke due in large vessels of the anterior circulation. The number of patients with mechanical thrombectomy has increased. Our objective was to establish if it is cost-effective for the Colombian Health System.

## Materials and methods

We conducted a systematic review of the literature with meta-analysis, limited to randomized controlled trials comparing the efficacy and safety of second-generation mechanical thrombectomy devices for the treatment of patients with ischemic stroke of the large vessels of the anterior circulation. Only direct medical costs were estimated, utilities were derived from the literature. Annual discount rate was 5%. With clinical data extracted from the meta-analysis, we developed a decision tree and a Markov model, with a time horizon of 5 years and the perspective of the Colombian healthcare system, calculated incremental cost-utility ratios, and performed deterministic and probabilistic sensitivity analysis.

## Results

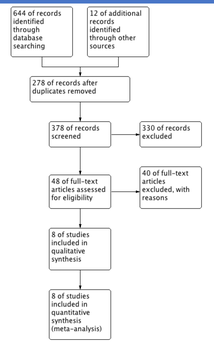


**Figure 1: PRISMA flowchart of literature review.**

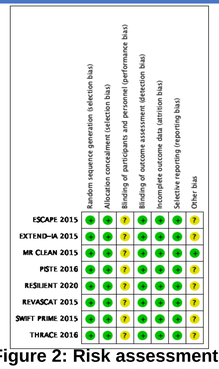


**Figure 2: Risk assessment by of bias for included studies.**

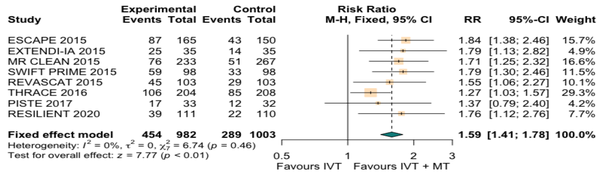


**Figure 3: MT plus IVT versus IVT on the proportion of functionally independent patients at 90-day follow-up**

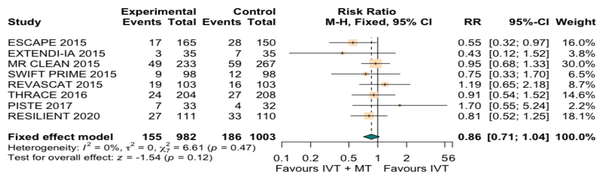


**Figure 4: MT plus IVT versus IVT on mortality at 90-day follow-up**

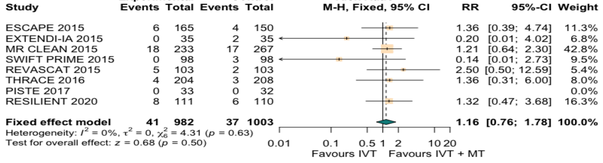


**Figure 5: MT plus IVT versus IVT on symptomatic intracerebral hemorrhage**

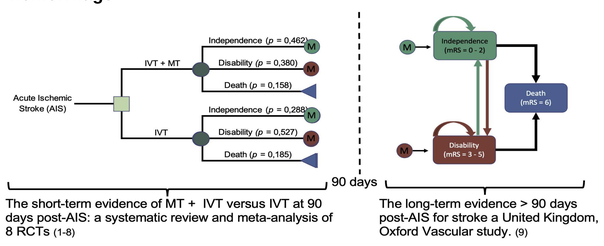


**Figure 6: Decision analytic model of mechanical thrombectomy plus intravenous thrombolysis versus intravenous thrombolysis alone for acute ischemic stroke. IVT = intravenous thrombolysis, MT = mechanical thrombectomy, M = Markov model, mRS = modified Rankin Scale, RCT = randomized controlled trial.**

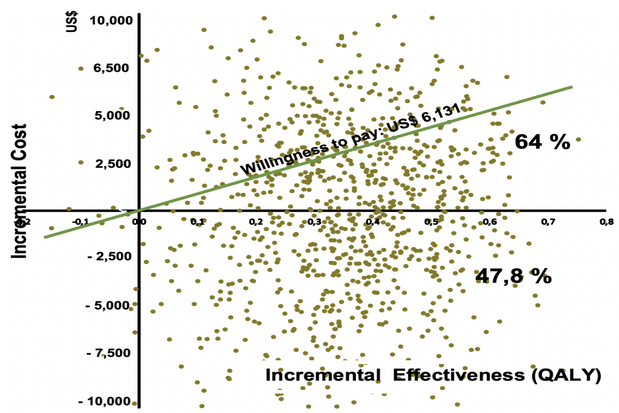


**Figura 7. Cost-effectiveness plane. QALY: quality-adjusted life year**

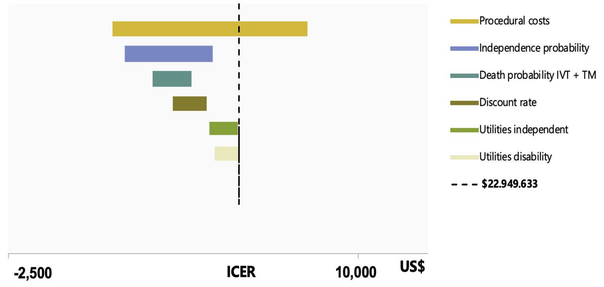


**Figure 8. Deterministic sensitivity análisis. ICER = cost-effectiveness ratio**

Mechanical thrombectomy plus intravenous thrombolysis is more effective than intravenous thrombolysis alone for functional independence, RR 1.59, (95% CI: 1.41-1.78). No difference in mortality RR 0.86 (95% CI: 0.71-1.04) or symptomatic intracranial hemorrhage RR 1.16 (95% CI: 0.76-1.78).

In the base case, mechanical thrombectomy plus intravenous thrombolysis has an incremental cost of COP $9,697,228 (USD $2,591) and an incremental utility of 0.453 QALYs. Incremental cost-utility ratio of COP $21,406,684 (USD $5,718).

The probabilistic sensitivity analysis, 64% of the simulations are below the willingness to pay threshold of COP $22,949,633 (USD $6,131).

## Conclusion

Mechanical thrombectomy plus intravenous thrombolysis provides more functional independence, but no difference in symptomatic intracranial hemorrhage or mortality, and is a cost-effective alternative compared to intravenous thrombolysis alone, for the treatment of anterior circulation large vessel ischemic stroke in the Colombian context.

## References

1. Berkhemer OA, Fransen PS, Beumer D, van den Berg LA, Lingsma HF, Yoo AJ, et al. A randomized trial of intraarterial treatment for acute ischemic stroke. N Engl J Med. 2015;372(1):11-20.
2. Goyal M, Demchuk AM, Menon BK, Eesa M, Rempel JL, Thornton J, et al. Randomized assessment of rapid endovascular treatment of ischemic stroke. N Engl J Med. 2015;372(11):1019
3. Campbell BC, Mitchell PJ, Kleinig TJ, Dewey HM, Churilov L, Yassi N, et al. Endovascular therapy for ischemic stroke with perfusion-imaging selection. N Engl J Med. 2015;372(11):1009-18.
4. Jovin TG, Chamorro A, Cobo E, de Miquel MA, Molina CA, Rovira A, et al. Thrombectomy within 8 hours after symptom onset in ischemic stroke. N Engl J Med. 2015;372(24):2296-306.
5. Saver JL, Goyal M, Bonafe A, Diener HC, Levy EI, Pereira VM, et al. Stent-retriever thrombectomy after intravenous t-PA vs. t-PA alone in stroke. N Engl J Med. 2015;372(24):2285-95.
6. Bracard S, Ducrocq X, Mas JL, Soudant M, Oppenheim C, Moulin T, et al. Mechanical thrombectomy after intravenous alteplase versus alteplase alone after stroke (THRACE): a randomised controlled trial. Lancet Neurol. 2016;15(11):1138-47.
7. Muir KW, Ford GA, Messow CM, Ford I, Murray A, Clifton A, et al. Endovascular therapy for acute ischaemic stroke: the Pragmatic Ischaemic Stroke Thrombectomy Evaluation (PISTE) randomised, controlled trial. J Neurol Neurosurg Psychiatry. 2017;88(1):38-44.
8. Martins SO, Mont'Alverne F, Rebello LC, Abud DG, Silva GS, Lima FO, et al. Thrombectomy for stroke in the public health care system of Brazil. N Engl J Med. 2020;382(24):2316-26.
9. Luengo-Fernandez R, Paul NL, Gray AM, Pendlebury ST, Bull LM, Welch SJ, et al. Population-based study of disability and institutionalization after transient ischemic attack and stroke: 10-year results of the Oxford Vascular Study. Stroke. 2013;44(10):2854-61.

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