

Cost-Effectiveness of Coblation Intracapsular Tonsillectomy in the Management of Sleep-Disordered Breathing and Recurrent Tonsillitis: A Brazilian Perspective

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Background and aims

- Obstructive sleep-disordered breathing, including obstructive sleep apnea (OSA), is characterized by recurrent upper airway collapse during sleep, leading to hypoxia, hypercapnia, and sleep fragmentation^{1,2}.
- Multiple risk factors, such as obesity, endocrine disorders, cardiopulmonary disease, and neuromuscular conditions, increase airway collapsibility and contribute to disease burden^{2,3}.
- Management strategies range from non-surgical options, such as continuous positive airway pressure (CPAP), oral appliances, lifestyle modification, and oropharyngeal exercises, to surgical interventions^{2,4}.
- Tonsillectomy is particularly relevant in both pediatric OSA and recurrent tonsillitis, a common inflammatory condition often caused by viral or Group A Streptococcus infection⁵.
- Traditional total tonsillectomy is effective but associated with significant postoperative pain and bleeding risk^{6,7}.
- Newer techniques, such as Coblation intracapsular tonsillectomy, use radiofrequency energy to remove tonsillar tissue while preserving the capsule, thereby reducing pain, exposure of blood vessels and nerves, and postoperative hemorrhage⁷.
- Given its potential clinical and recovery benefits, evaluating the cost-effectiveness of Coblation intracapsular tonsillectomy in the management of sleep-disordered breathing and recurrent tonsillitis is crucial, particularly from a Brazilian healthcare perspective.

Methods and assumptions

- A de novo Excel-based cost-effectiveness model was developed to compare Coblation intracapsular tonsillectomy (CIT) with standard care (cold steel) in a hypothetical cohort of 1,000 pediatric patients (Figure 1).
- Clinical inputs were sourced from the meta-analysis by Sedgwick et al.⁸; in the absence of Brazil-specific event rates and relative risks, international data were assumed to be generalizable to the Brazilian population.
- Model outcomes included bleeding episodes avoided, quality-adjusted life years (QALYs) gained, and incremental cost-effectiveness ratios (ICERs).
- Resource utilization was stratified by bleeding severity: major bleeding required return to theatre, moderate bleeding resulted in an emergency department visit, and minor bleeding was managed via telephone consultation.
- Cost data were derived from the 2020 Classificação Brasileira Hierarquizada de Procedimentos Médicos (CBHPM).
- Subgroup focusing on adults and sensitivity analyses were performed (Figure 2 and Figure 3).

Discussion and conclusion

- CIT is estimated to be cost-effective in both pediatric and adult populations in Brazil, primarily due to its reduction in postoperative bleeding.
- The technology is supported by strong and reliable clinical evidence from both randomized and observational studies. The clinical data came from a recently published meta-analysis, while the costs were based on the local payor.
- A wide range of sensitivity analyses was performed to test key model assumptions, and the main results remain consistent.
- Both one-way and probabilistic sensitivity analysis (PSA) analyses support the conclusion that using CIT may be a cost-effective alternative to the standard care for managing sleep-disordered breathing and recurrent tonsillitis.
- However, additional data is needed, in particular, bleeding outcomes following tonsil regrowth and consideration of costs beyond those incurred by the healthcare system to fully understand the costs of interventions.

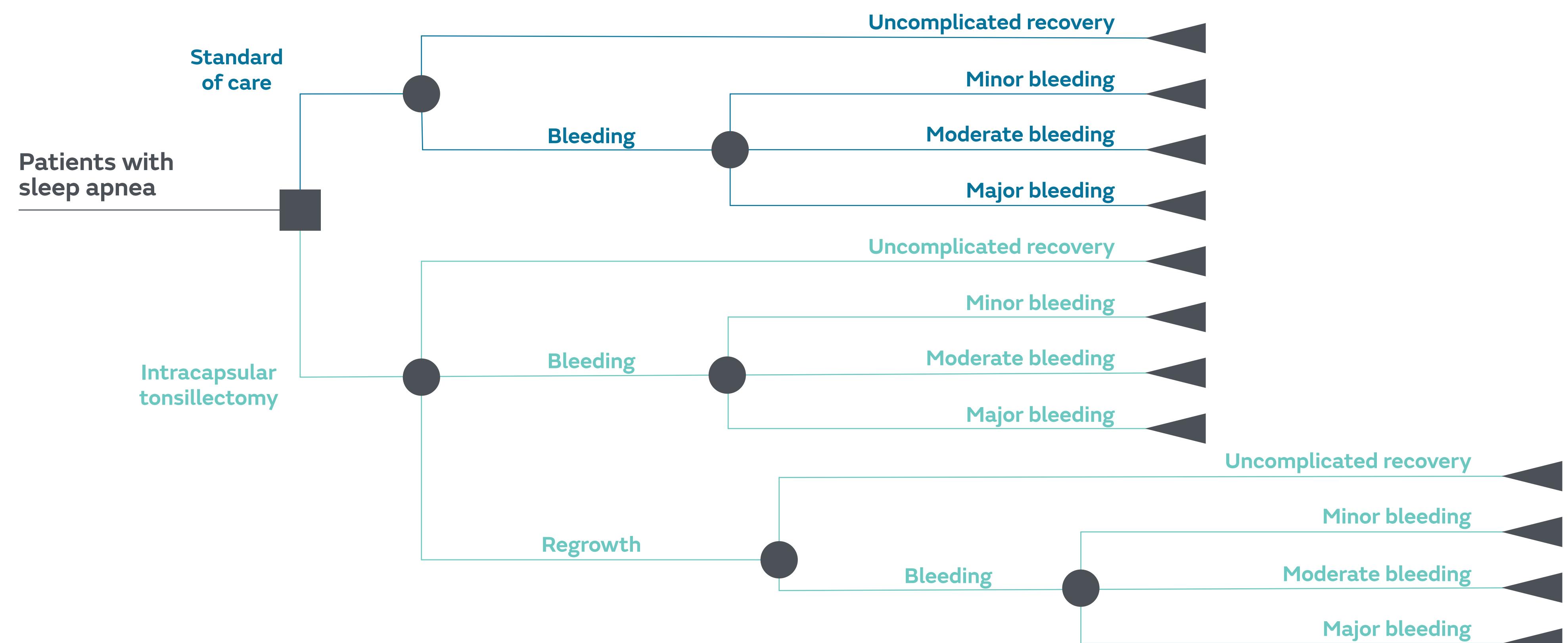
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An economic analysis showed that COBLATION[◊] intracapsular tonsillectomy is cost-effective from the Brazilian payer's perspective for both pediatric and adult patients, compared with standard care (total tonsillectomy using cold steel), for the treatment of sleep-disordered breathing, including snoring, obstructive sleep apnea, and chronic or recurrent tonsillitis. The results remained consistent in sensitivity analyses, supporting COBLATION technology as a strong alternative to standard care in this patient population.

Figure 1. Model structure

A one-year time horizon was selected because most key outcomes, such as bleeding, occur within 30 days of the procedure, while this period also allows capture of potential tonsil regrowth specific to the CIT intervention.



Base case results: per 1000 patients

- The ICERs were R\$9,498 per bleeding episode avoided and R\$35,253 per QALY for the pediatric population, which is deemed cost-effective since the calculated ICERs are less than R\$40K/QALY (Table 1).

- Subgroup analysis in adults showed slightly higher ICERs (R\$10,609/bleeding episode and R\$39,377/QALY), driven primarily by differences in resource use, and again is cost-effective (Table 2).

Table 1: Pediatric patients (<18 years)

Intervention	Total cost	Bleeding avoided	QALYs	Difference in costs	Difference in complications	Difference in QALYs	Cost per complication avoided	Cost per QALY
Total tonsillectomy (SC)	R\$ 2,243,868	934.11	933.35					
Intracapsular tonsillectomy (CIT)	R\$ 2,594,785	971.06	943.31	R\$ 350,918	36.9465	9.9543	R\$ 9,498	R\$ 35,253

Table 2: Sub-group Analysis: Older patients

Intervention	Total cost	Bleeding avoided	QALYs	Difference in costs	Difference in complications	Difference in QALYs	Cost per complication avoided	Cost per QALY
Total tonsillectomy (SC)	R\$ 2,184	0.93	0.93					
Intracapsular tonsillectomy (CIT)	R\$ 2,576	0.97	0.94	R\$ 392	0.0369	0.0100	R\$ 10,609	R\$ 39,377

Figure 2. One-way sensitivity analysis (OWSA); tornado plot

Figure 2 varies each parameter individually to show the impact on cost-effectiveness. The results remained cost-effective even when the baseline assumption changed, suggesting that the model results are not due to chance.

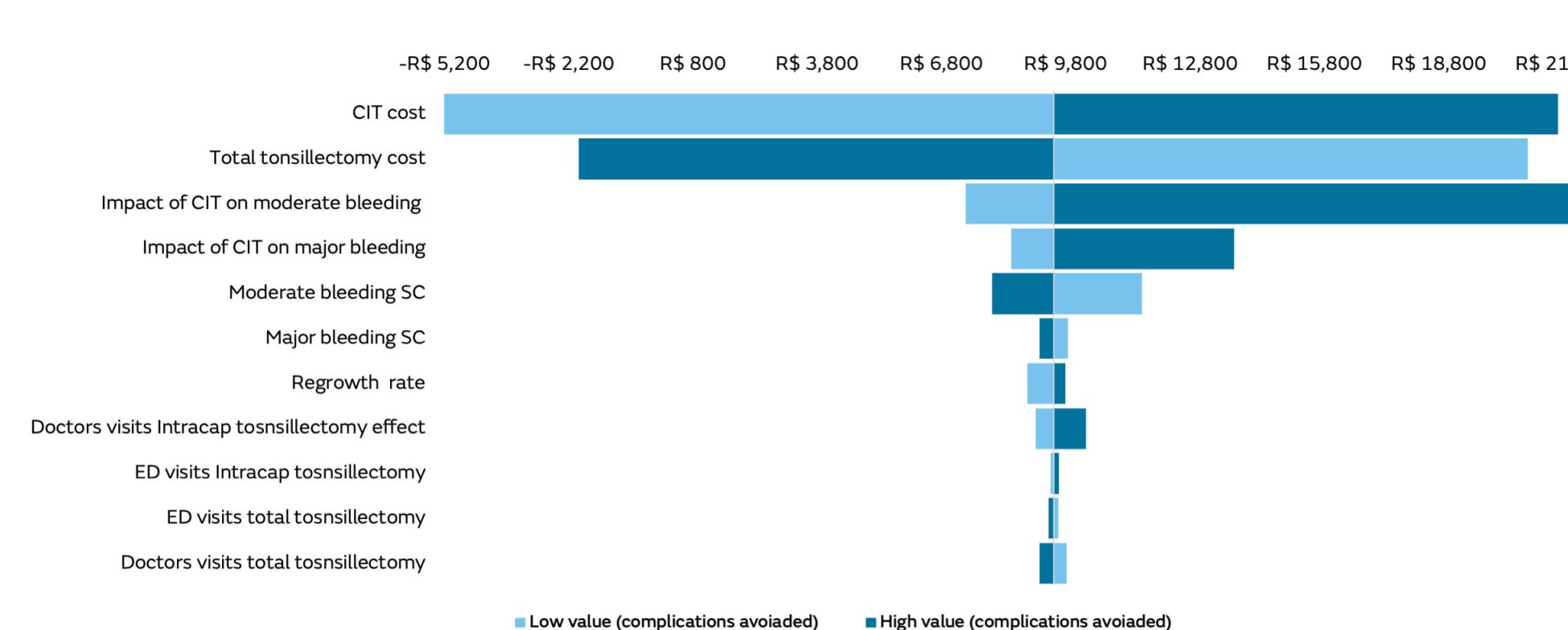


Figure 3. Cost-effectiveness acceptability curve

There is a 95% probability that CIT is cost-effective at a willingness-to-pay threshold of R\$40,000. This corroborates the results of OWSA

