

Estimating the Budget Impact of Sugammadex vs Neostigmine Use in Surgeries With Neuromuscular Blockade in Brazil: An Institution-Level Analysis

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BACKGROUND

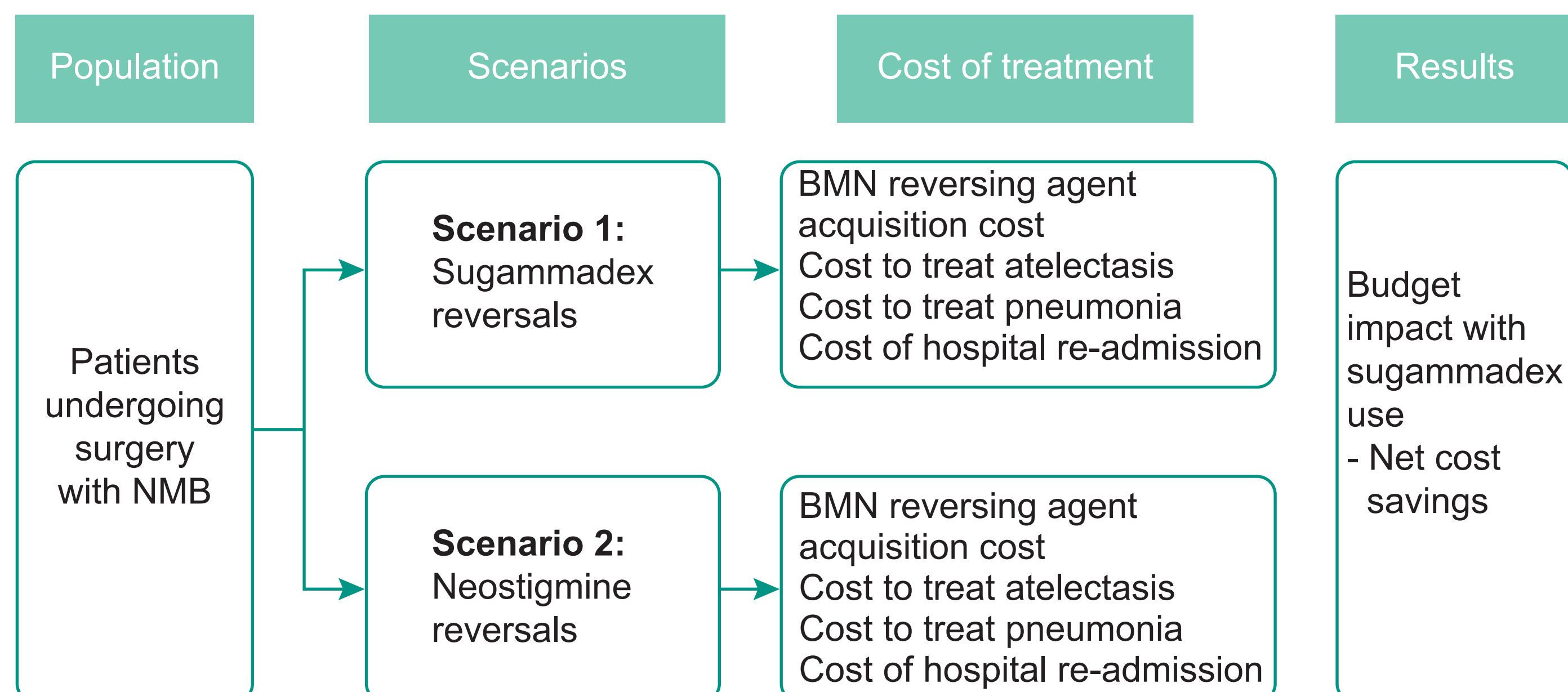
- Use of neuromuscular blocking agents (NMBA) during surgery facilitates tracheal intubation and improves surgical conditions by suppressing voluntary or reflex skeletal muscle movements^{1,2}
- Acetylcholinesterase inhibitors have traditionally been used for reversal of non-depolarizing neuromuscular blocking agents. However, these drugs have significant limitations³
- Residual neuromuscular blockade (NMB) occurs in up to 60% of patients at arrival in the post-anesthesia care unit (PACU) and is associated with an increased incidence of postoperative respiratory complications, such as hypoxemia, pneumonia, and atelectasis, and an increased length of stay in the PACU⁴
- Sugammadex can offer more complete and predictable recovery from rocuronium- and vecuronium-induced NMB.³ However, despite clinical benefits, cost pressures can often impact the choice of NMB reversal method

OBJECTIVES

- This study aimed to evaluate the budget impact of sugammadex for routine NMB reversal from the perspective of a Brazilian private healthcare setting

METHODS

- A decision analytical model was adapted to estimate the budget impact associated with the introduction of sugammadex
- The model considered reversal agent costs and costs and event counts of atelectasis, pneumonia, and re-admissions due to infections
- A hypothetical cohort of 1,000 moderate NMB procedures was considered, and 2 scenarios were compared (sugammadex only and neostigmine only)
- Analyses were performed for 1) patients with an average weight of 70 kg and 2) patients undergoing bariatric surgery, with an average weight of 120 kg



- Comparative data on the risks of these clinical events were obtained from international studies

Event	Neostigmine	Sugammadex
Risks of postoperative atelectasis ⁵	7.3%	1.1%
Risks of postoperative hospital re-admission ⁶	13.5%	7.3%
Risks of postoperative pneumonia ^{5,6,7}	4.0%	1.9%

- The dosage considered was 2 mg/kg for sugammadex and 0.05 mg/kg for neostigmine, with a maximum of 3.5 mg plus 1 mg atropine
- Drug costs were available in Brasíndice⁸ (May 2019, factory price with 18% ICMS^a), and costs of managing clinical outcomes were based on a micro-costing study (R\$686 for atelectasis, R\$14,416 for re-admission, and R\$4,729 for pneumonia with postoperative events)

^aImposto de Circulação de Mercadorias e Serviços, tax levied at a state level

Drug	Dose/kg	mg/ Surgery	Vials/ Surgery	Cost/Vial ⁷	Cost per Surgery
Sugammadex 70 kg	2 mg	140	1	R\$336.91	R\$336.91
Sugammadex 120 kg	2 mg	240	2	R\$336.91	R\$673.81
Neostigmine	0.05 mg	3.5	7	R\$0.90	R\$6.27
Atropine	1 mg fixed	1	2	R\$0.70	R\$1.40

References

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Acknowledgments

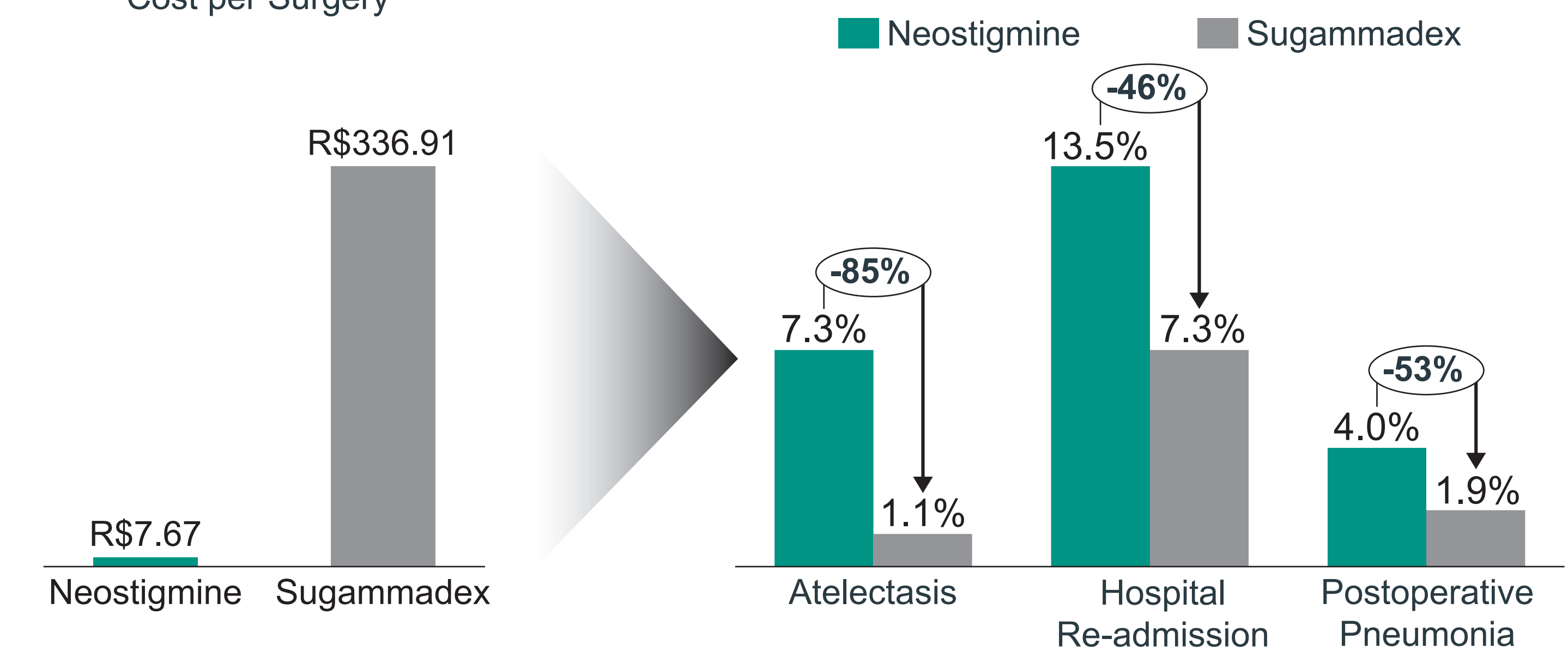
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RESULTS

- Based on the model assumptions and the hypothetical cohort of 1000 moderate NMB procedures: There were 247 total events in the neostigmine group, being 73 atelectasis, 135 re-admissions and 40 pneumonia, compared to 104 total events in the sugammadex group, being 11 atelectasis, 73 re-admissions and 19 pneumonia
- Total postoperative events costs were R\$2,182,789 vs R\$1,150,617 in the neostigmine and sugammadex groups, respectively
- There was a reduction of 144 events and R\$1,032,172 when comparing both arms of the analysis
- Including the drug acquisition costs, the potential total savings were R\$702,934 in the population with an average weight of 70 kg
- Considering only patients undergoing bariatric surgeries, the potential total savings were R\$366,029

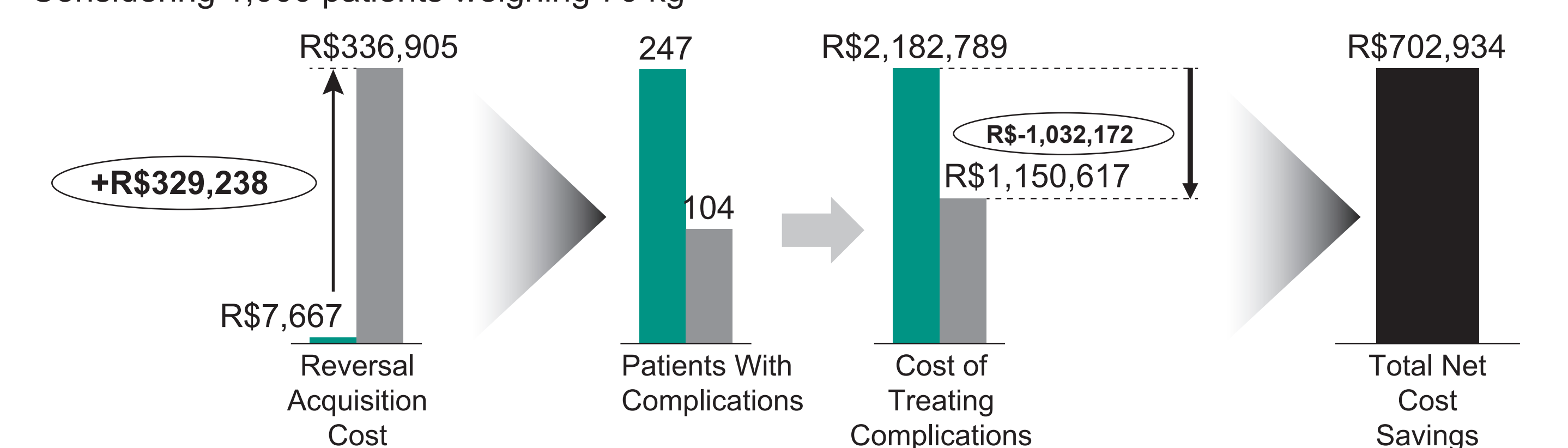
Event	Neostigmine	Sugammadex	Events Eliminated
Atelectasis	73	11	62
Hospital re-admission	135	73	62
Pneumonia	40	19	21

Reversal Acquisition Cost Cost per Surgery^a

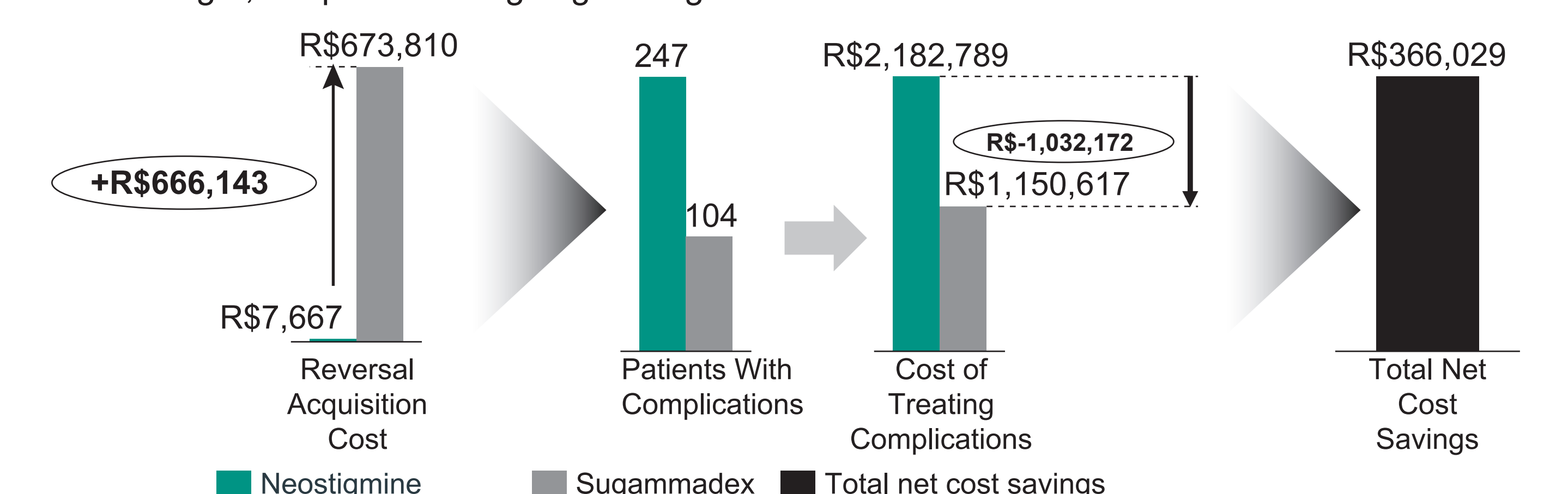


^aConsidering a 70 kg patient

Considering 1,000 patients weighing 70 kg



Considering 1,000 patients weighing 120 kg



LIMITATIONS

The major limitations of this study include:

- Treatment of postoperative events is based on guidelines. Clinical practice may vary between institutions and physicians
- Medication costs were extracted from official publicly available sources. Negotiation and discounts are not considered
- The model considers that all patients undergo moderate NMB

CONCLUSIONS

- The use of sugammadex for routine moderate NMB reversal reduces the risk of residual NMB and its sequelae and results in overall net cost savings, with average patient savings of R\$366 to R\$703, from the private healthcare setting perspective