

Budget impact of the VELYS™ robotic-assisted solution compared to manual procedure in patients undergoing primary total knee arthroplasty in Italy

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Introduction

- Primary Total Knee Arthroplasty (TKA) is one of the most common orthopaedic procedures worldwide¹, with over 108,000 procedures performed in Italy in 2023.²
- Despite TKA being so common, up to 22.2% of patients indicate that they are not satisfied with their TKA one-year post-operatively.³
- Robotic TKA (rTKA) can improve implant alignment and positioning compared to manual TKA^{4,5} as well as some studies have found that rTKA may reduce patient pain in the early post-operative period compared to manual TKA (mTKA)^{#,6}.
- VELYS™ Robotic-Assisted Solution (VRAS) is designed to help support precision and accuracy without the need for pre-operative imaging^{#,7-10} and facilitates a patient specific alignment, which may improve patient reported outcome measures^{#,11-14}.
- However, studies investigating the economic impact of VRAS remain limited in European countries due to its novelty.

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Objective

The objective of this study was to assess the budget impact of VRAS compared to manual TKA (mTKA) in patients undergoing primary TKA from both the hospital and the payer perspective in Italy.

Methods

- We developed a **budget impact model** inclusive of all relevant potential primary TKA resources to estimate costs of primary TKA over **7 years**, corresponding to the robot lifespan.
- Two payer perspectives in **Italy** were used in this analysis: **Hospital perspective and Payer perspective**.
- The model assumed **250 patients/year** (1,750 patients, total) undergoing primary TKA for end-stage knee osteoarthritis.
- Clinical inputs, cost and resource use** were collected from literature, public databases and expert opinion (Table 1).

Table 1. Clinical inputs and resource use and cost inputs

	Scenario without VRAS	Scenario with VRAS
Surgery costs[#]		
Overall cost (€/patient)	964	1,835
Hospital resource use^{\$}		
Length of stay (days) ¹⁵	4.80	3.41* (Reduced by 29% ¹⁶)
Cost per length of stay (€/day) ¹⁷	674	
Trays sterilized [†]	8	3
Sterilization cost (€/tray) ¹⁸	143	
Post-Hospital resource use[‡]		
Annual revision risk ¹⁹	0.68%	0.48%* (Reduced by 30% ²⁰)
Revision cost** (€) ²¹	11,152	
3-month knee-related revisit rate ²²	4.81%	2.65%
Knee-related revisit cost** (€) ²³	17.9	
3-month knee-related readmission rate ²²	1.46%	0.69%
Knee-related readmission cost** (€) ²¹	7,315	
Physiotherapy visits after primary TKA ²⁴	11	6
Physiotherapy cost** (€/visit) ²³	17.9	

* Calculated on basis of reported reduction rate

**Based on official reimbursement DRG tariff

†Expert opinion

‡Hospital perspective only

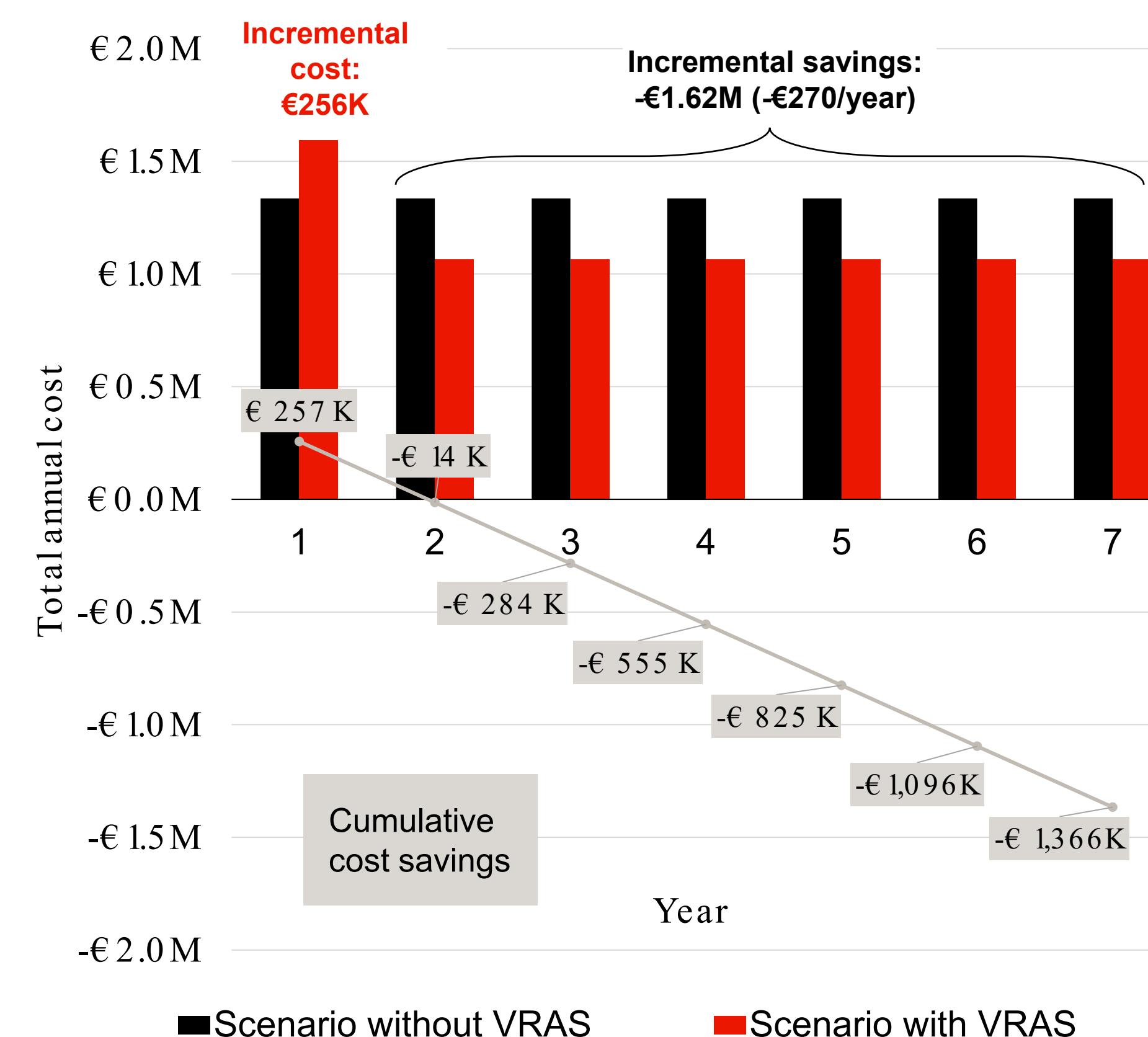
†Payer perspective only

Results

Hospital perspective

- From the hospital perspective, the adoption of VRAS had a cumulative **savings of -€1,366,238 by year 7** (Fig. 1), for mean savings of -€781/patient over the time horizon.
- After a first-year incremental cost of €256,537 following the adoption of VRAS, an annual total savings of -€270,463 are seen from Year 2 onwards (Fig. 1).
- In the scenario with VRAS, the break-even point was less than **2 years** (Fig. 1).

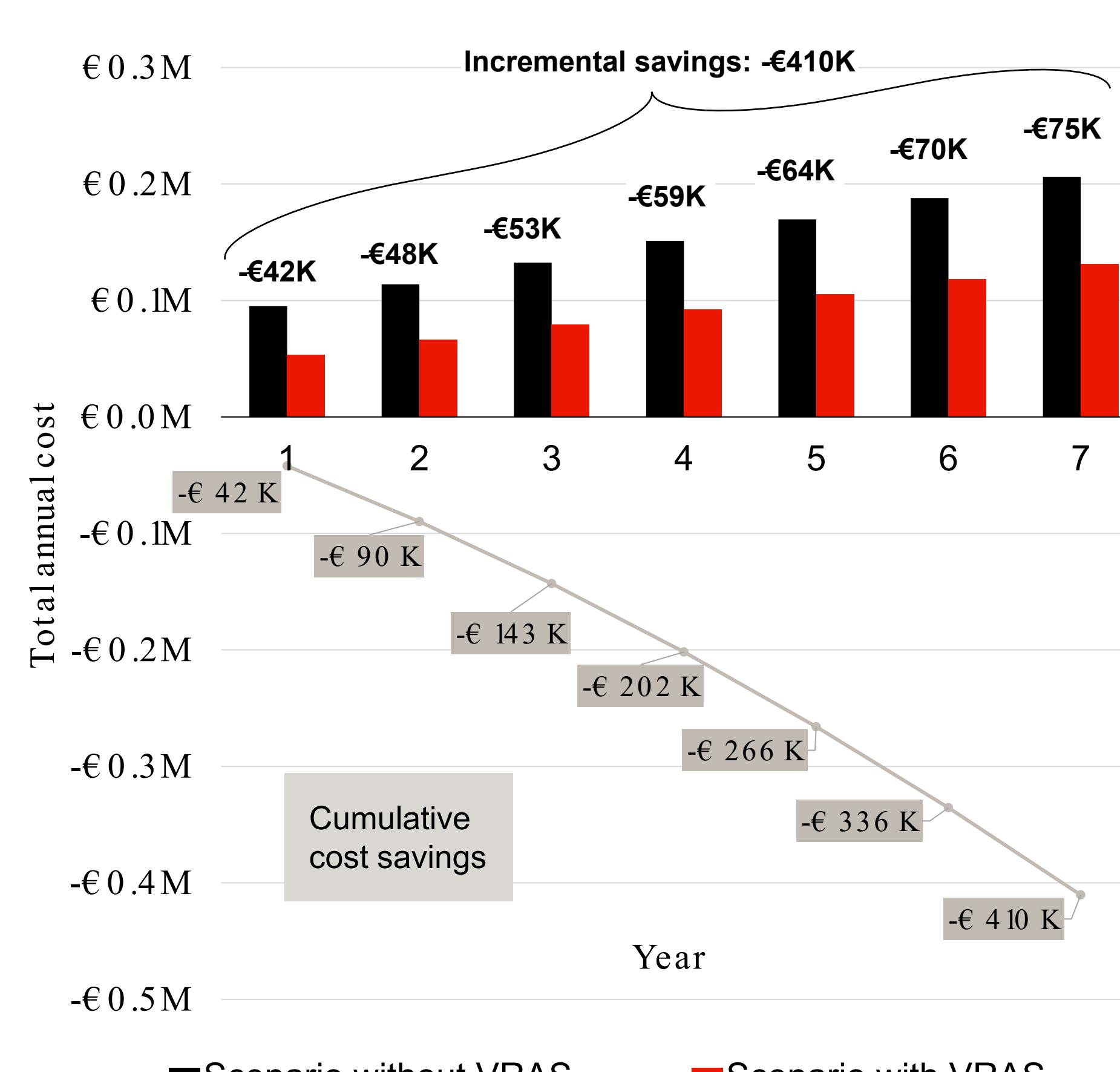
Figure 1. Cumulative and annual budget impact - Hospital perspective



Payer perspective

- From the payer perspective, the adoption of VRAS had a cumulative **cost savings of -€410,402** (Fig. 2) and a mean savings of -€235/patient over the time horizon.
- The annual cost savings increased in magnitude from -€42,086 in Year 1 to -€74,851 in Year 7 (Fig. 2).

Figure 2. Cumulative and annual budget impact – Payer perspective



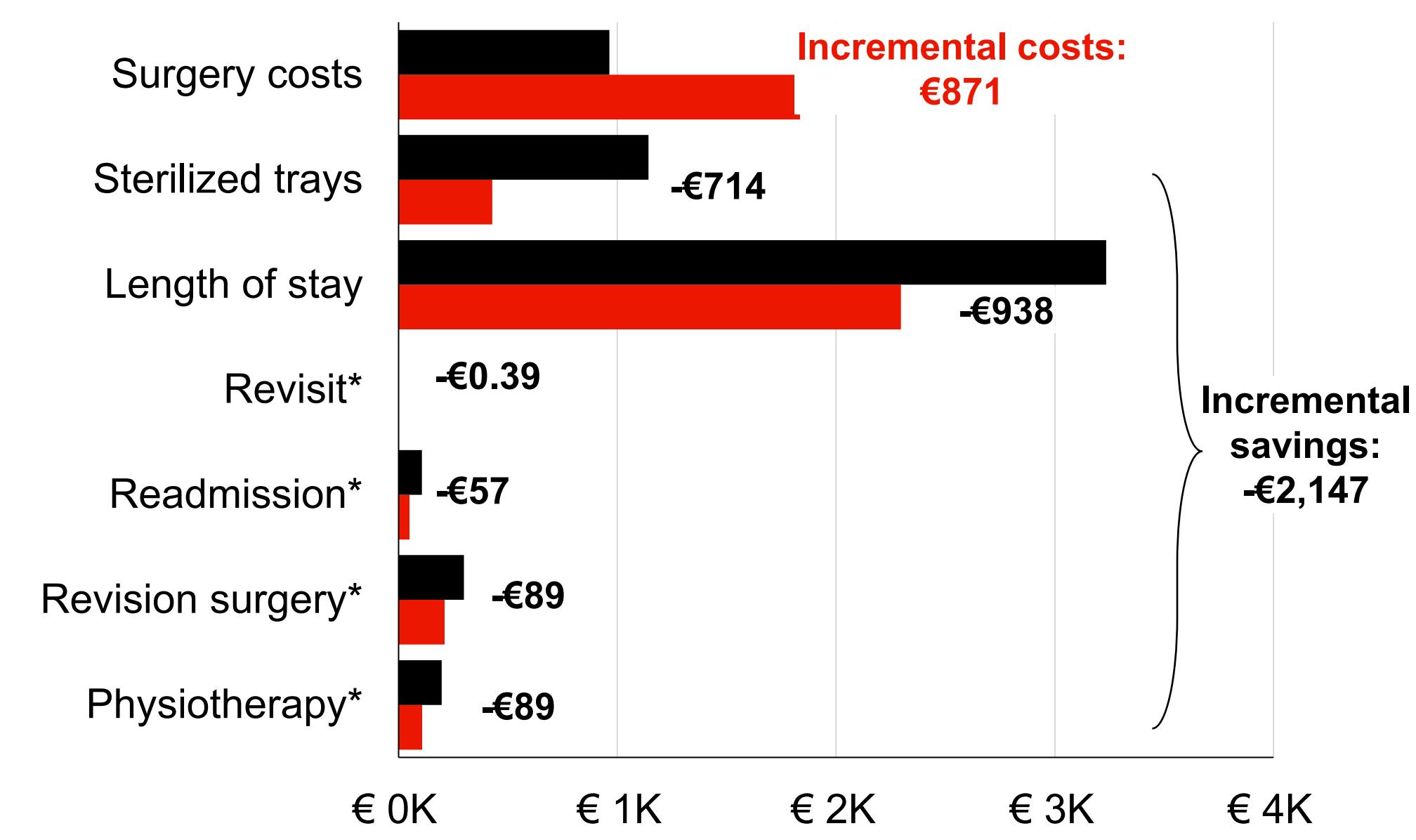
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Cost breakdown

- In the scenario with VRAS, there were higher surgery costs (including direct VRAS expenses, disposable and operating theatre) over the 7-year time horizon (€871/patient) (Fig. 3).
- Lower costs were observed for all other categories, with a major **reduction in hospitalization costs of -€938/patient**, translating to **-€1.64M for all patients** (Fig. 3).

Figure 3. Costs breakdown for each patient over 7 years



*Payer perspective only

Resource use breakdown

Cost savings over the 7-year time horizon in the scenario with VRAS derive from considerable reductions in

- surgical trays
- healthcare interactions (revisions, revisits, readmissions, and physiotherapy sessions)
- duration of hospital stays (Table 2).

Table 2. Resource use savings in the scenario with VRAS

Resource	Scenario with VRAS
Number of bed days saved	2,436
Number of trays saved	8,750
Number of physiotherapy sessions avoided*	8,663
Number of revisits avoided*	38
Number of readmissions avoided*	14
Number of revisions avoided*	14

*Payer perspective only

Conclusion

Over a 7-year time horizon, VRAS rTKA was found to reduce overall costs and resource use compared to mTKA under both hospital and payer perspectives in Italy. The largest cost-saver was the reduction in hospitalization costs.

Acknowledgements

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