

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

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Jean-Baptiste Trouiller<sup>1</sup>, Gonzalo Hormías-Martín<sup>2</sup>, Natalia Robledinos-Antón<sup>2</sup>, Vito Paragò<sup>3</sup>

<sup>1</sup>Johnson & Johnson Medical, Paris, France  
<sup>2</sup>Johnson & Johnson S.A., Madrid, Spain  
<sup>3</sup>Johnson & Johnson Medical S.p.A., Pratica di Mare, Italy

Introduction

- Primary Total Knee Arthroplasty (TKA) is one of the most common orthopaedic procedures worldwide<sup>1</sup>, with over 67,000 procedures performed in Spain in 2023.<sup>2</sup>
- Despite TKA being so common, up to 22.2% of patients indicate that they are not satisfied with their TKA one-year post-operatively.<sup>3</sup>
- Robotic TKA (rTKA) can improve implant alignment and positioning compared to manual TKA<sup>4,5</sup> as well as some studies have found that rTKA may reduce patient pain in the early post-operative period compared to manual TKA (mTKA)<sup>#</sup>.<sup>6</sup>
- VELYS™ Robotic-Assisted Solution (VRAS) is designed to help support precision and accuracy without the need for pre-operative imaging<sup>#</sup> <sup>7-10</sup> and facilitates a patient specific alignment, which may improve patient reported outcome measures<sup>#</sup>.<sup>11-14</sup>
- 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 global payer perspective in Spain.

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 **Spain** were used in this analysis: **Hospital perspective and Global 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

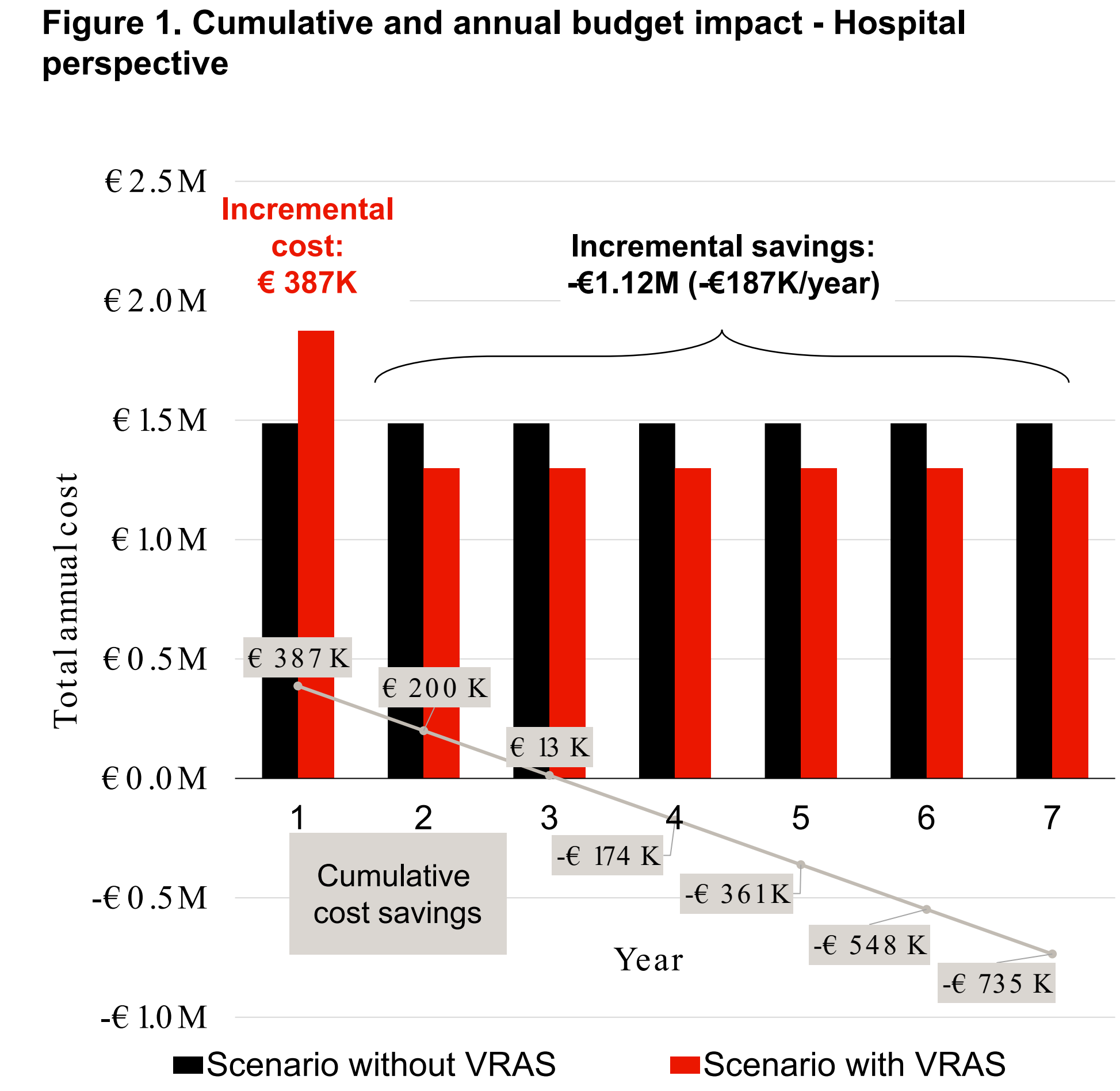
|  | Scenario without VRAS | Scenario with VRAS                        |
|--|-----------------------|---|
| Surgery costs  |                       |   |
| Overall cost (€/patient)                             | 1,168                 | 2,335                                     |
| Hospital resource use                                |                       |   |
| Length of stay (days) <sup>2</sup>                   | 3.57                  | 2.53*<br>(Reduced by 29% <sup>16</sup> )  |
| Cost per length of stay (€/day) <sup>16</sup>        |                       | 1,170                                     |
| Trays sterilized†                                    | 8                     | 3   |
| Sterilization cost (€/tray) <sup>17</sup>            |                       | 75  |
| Post-Hospital resource use‡                          |                       |   |
| Annual revision risk <sup>18</sup>                   | 0.68%                 | 0.48%*<br>(Reduced by 30% <sup>20</sup> ) |
| Revision cost (€) <sup>16</sup>                      |                       | 22,891                                    |
| 3-month knee-related revisit rate <sup>20</sup>      | 4.81%                 | 2.65%                                     |
| Knee-related revisit cost (€) <sup>16</sup>          |                       | 98  |
| 3-month knee-related readmission rate <sup>20</sup>  | 1.46%                 | 0.69%                                     |
| Knee-related readmission cost (€) <sup>16</sup>      |                       | 4,726.80                                  |
| Physiotherapy visits after primary TKA <sup>21</sup> | 11                    | 6   |
| Physiotherapy cost (€/visit) <sup>16</sup>           |                       | 37  |

\* Calculated on basis of reported reduction rate  
† Expert opinion  
‡ Global payer perspective only

Results

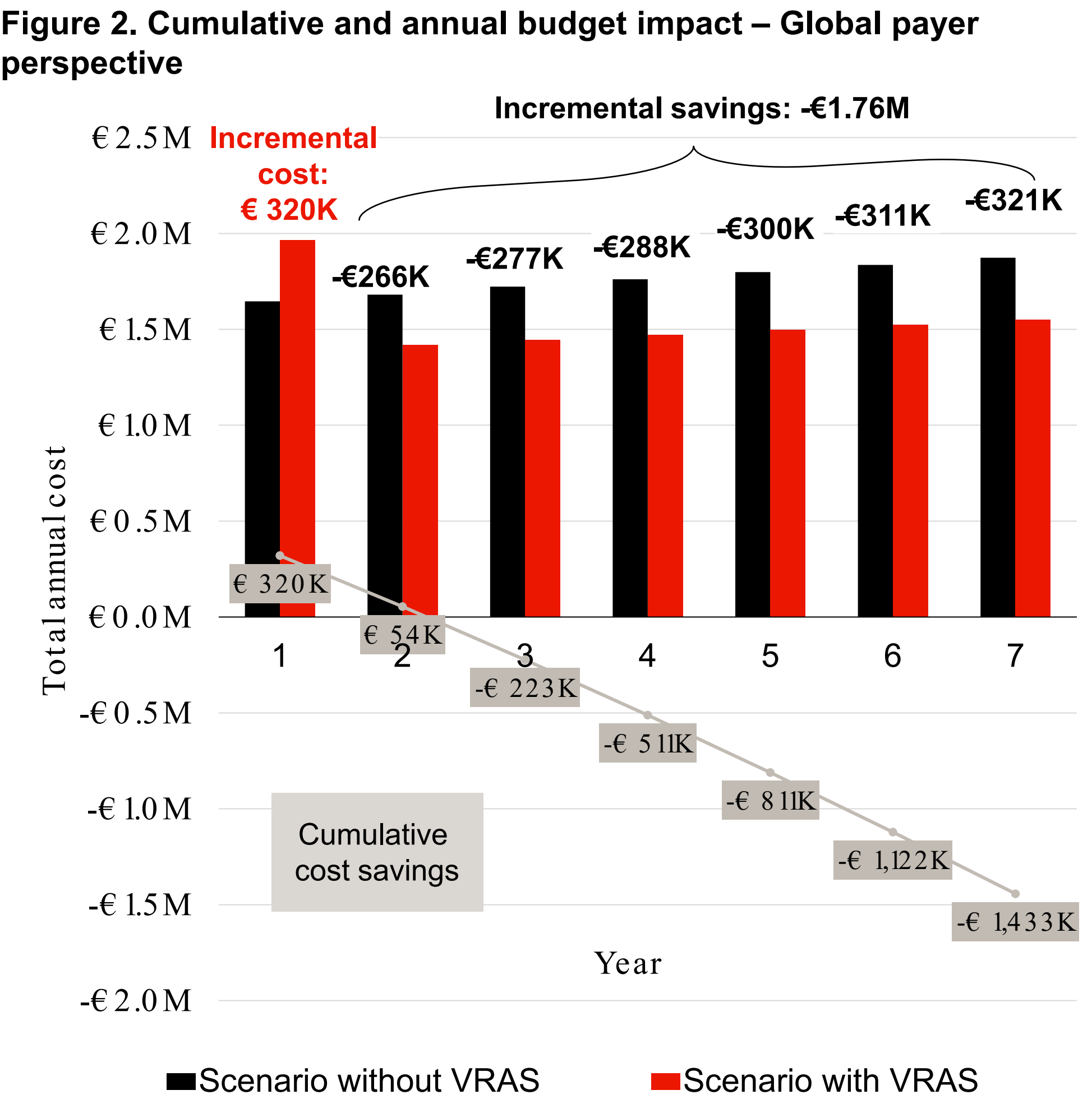
Hospital perspective

- From the hospital perspective, the adoption of VRAS had a cumulative **savings of -€735,308 by year 7** (Fig. 1), for mean savings of -€420/patient over the time horizon.
- After a first-year incremental cost of €386,956 following the introduction of VRAS, annual total savings of -€187,044 are seen from Year 2 onwards (Fig. 1).
- In the scenario with VRAS, the break-even point was **3.1 years** (Fig. 1).



Global payer perspective

- From the global payer perspective, the adoption of VRAS had cumulative **cost savings of -€1,442,949** (Fig. 2), and mean savings of -€825/patient over the time horizon.
- After a first-year incremental cost of €319,820 following the introduction of VRAS, annual cost savings increased in magnitude from -€265,720 in Year 2 to -€321,434 in Year 7 (Fig. 2).
- In the scenario with VRAS, the break-even point was **2.2 years** (Fig. 2).



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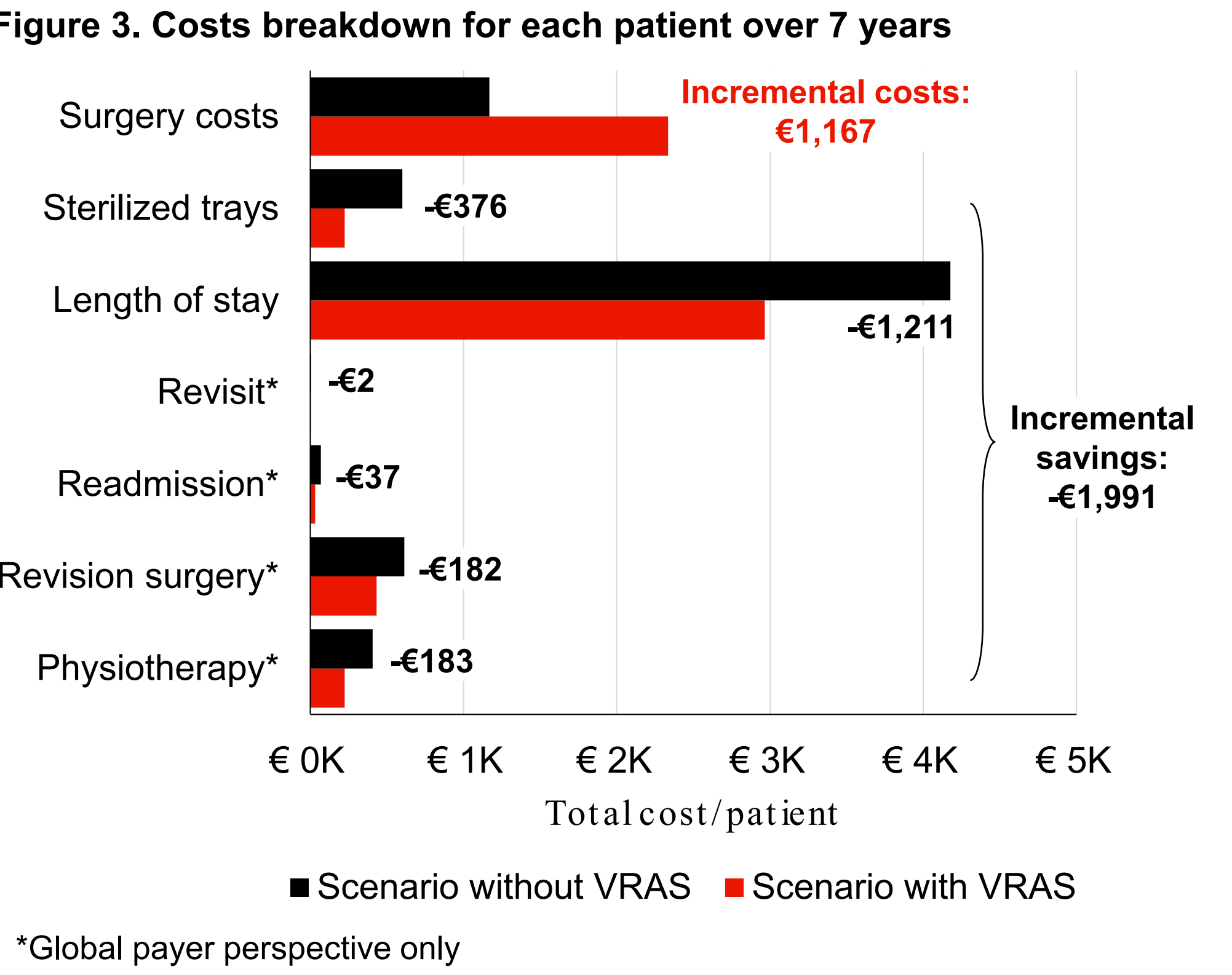
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Cost breakdown

- In the scenario with VRAS, there were higher surgery costs (including direct VRAS expenses, disposable, operating theatre) over the 7-year time horizon (€1,167/patient) (Fig. 3).
- Lower costs were observed for all other categories, with a major **reduction in hospitalization costs of -€1,211/patient**, translating to **-€2.12M for all patients** (Fig. 3).



\*Global 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                  | 1,812              |
| 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                 |

\*Global 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 global payer perspectives in Spain. The largest cost-saver was the reduction in hospitalization costs.

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