

BUDGET IMPACT ANALYSIS OF PATIENT BLOOD MANAGEMENT IMPLEMENTATION FROM HEALTH INSURANCE PAYER AND HOSPITAL PERSPECTIVES IN FRANCE



INTRODUCTION

Patient Blood Management (PBM) is a patient-focused, evidence-based and systematic approach designed to optimize patients' outcomes in an effort to improve quality of care in the perioperative setting. PBM is based on three pillars: optimizing the patients' red blood cell (RBC) mass, minimizing blood loss and optimizing physiologic tolerance of anemia. One of the main objectives of PBM is to mitigate the potential negative outcomes of anemia pre-and postoperatively. We built a budget impact model (BIM) of a PBM program in France, defined in this study by the pre-operative management of iron deficiency-anemia with ferric carboxymaltose (FCM).

METHODS

This BIM compared two scenarios: "current clinical practice" (i.e. without a PBM program) and "national PBM implementation" in orthopedic surgery from two different perspectives, hospital and French national health insurance. The time horizon of this BIM was one year.

The model was based on an analysis of the French national hospital database for 2016 (Programme de Médicalisation des Systèmes d'Information - PMSI) which provides estimates of the eligible population, the average length of stay, the average number of RBC units transfused, and the cost of hospitalization. These data were supplemented by a systematic literature review and validated by an expert consensus.

The literature data also allowed to determine a coefficient of variation in order to simulate input data after the PBM implementation. In this context, the proportion of patients treated pre-operatively with IV iron, Erythropoiesis Stimulating Agent (ESA) and RBC transfusion, with the corresponding doses, was tested. A variation of the average length of stay was also considered (Kotzé & al. 2012)¹.

Hospitalization costs were estimated from both perspectives.

The cost of ESA was estimated according to the French national database². The dose of ESA (based on SmPC) corresponds to 600 IU/kg administered in 4 injections before a major orthopedic surgery.

The current cost of one RBC unit is available in the Journal Officiel de la République Française (n°0162 12th July 2017).

The administration cost for IV iron was estimated from the Diagnosis Related Group (DRG) 28Z17Z. FCM cost was only accounted for the hospital perspective.

The French biological nomenclature states the cost of an iron deficiency blood test. This cost was applied for 100% of patients in the PBM group.

The data regarding the proportion of patients transfused, the proportion of patients treated with ESA and the proportion of patients treated preoperatively with FCM came from the publication by Rineau & al. (2016)³.

RESULTS

More than 385,000 patients could benefit from the implementation of a PBM program in orthopedic surgery over one year (170,000 in public hospital and 215,000 in private hospital respectively).

From a public hospital perspective, the total cost impact of PBM implementation is estimated to be -€201.7M (Figure 1), which corresponds to a cost saving per patient of €1,173.2. From a private hospital perspective, the total cost impact of PBM implementation is estimated to be -€191.9M with a cost saving of €891.3 per patient.

From a Health Insurance perspective, the total cost impact of PBM implementation is estimated to be -€138.4M in a public setting (Figure 1) and -€60.3M in a private setting. The cost impact is estimated to be -€804.9 per patient and -€279.8 per patient for public and private hospitals respectively.

A PBM implementation decreases in-hospital stay costs by 16.7% in both perspectives. A reduction of 76.9% was also observed in both transfusion rate and number of units transfused, which represents from a hospital perspective a saving of €3.5M for public hospitals and €4.2M for private hospitals.

The deterministic sensitivity analysis (DSA) (Figure 4) indicates the variation compared to the base value. The label indicates the value for a variation of +/- 20%. In a public hospital setting, the tornado graph shows that hospital length of stay is the parameter that impacts the most the result. Indeed, for a reduction of 20% of the average length of stay (5.51 days instead of 6.88 days) post PBM implementation, the total cost savings are €421.5M.

FIGURE 1: Cost impact of a PBM program implementation (public hospital)

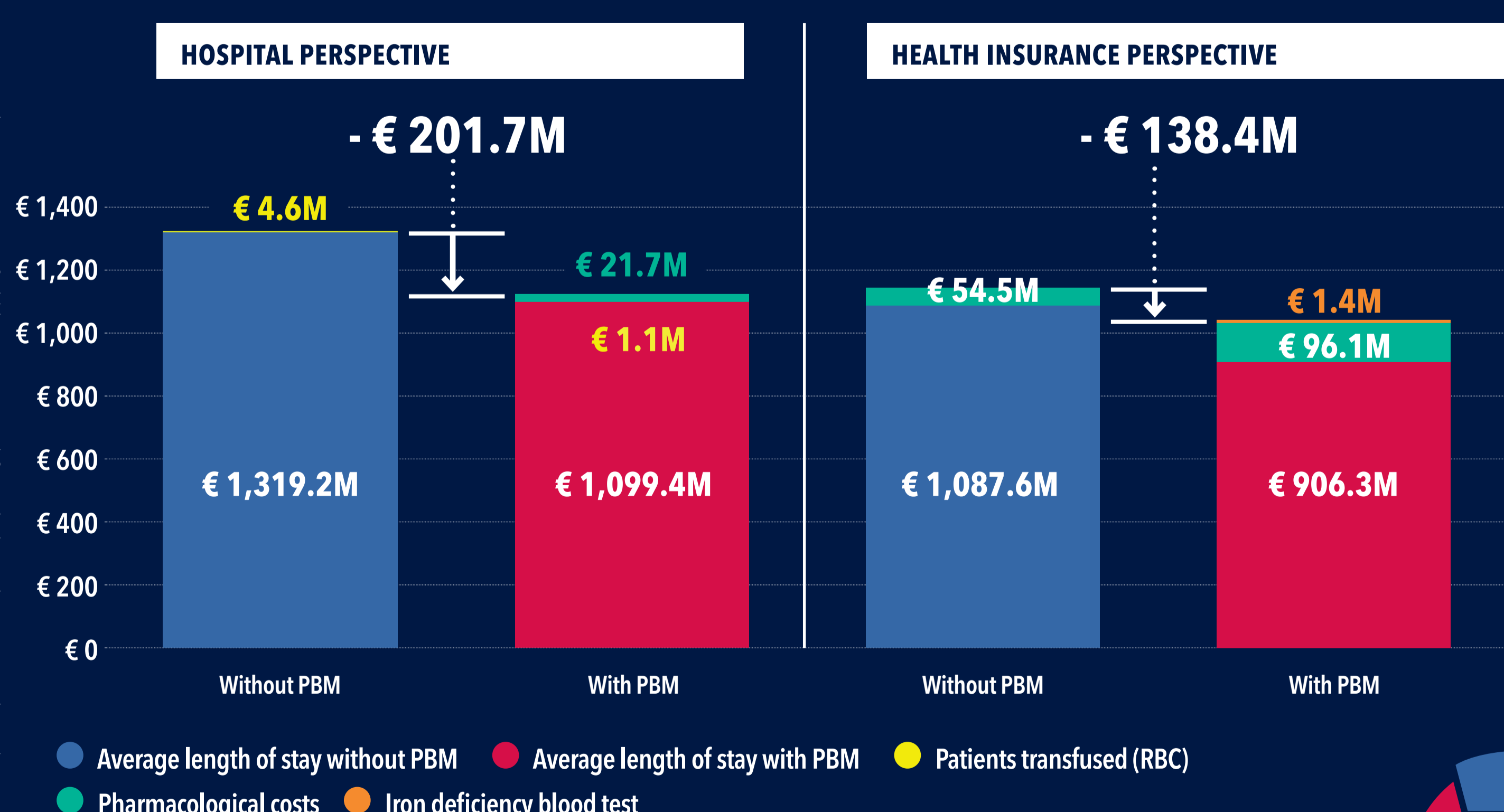


FIGURE 2: Cost impact of PBM per patient (public hospital)

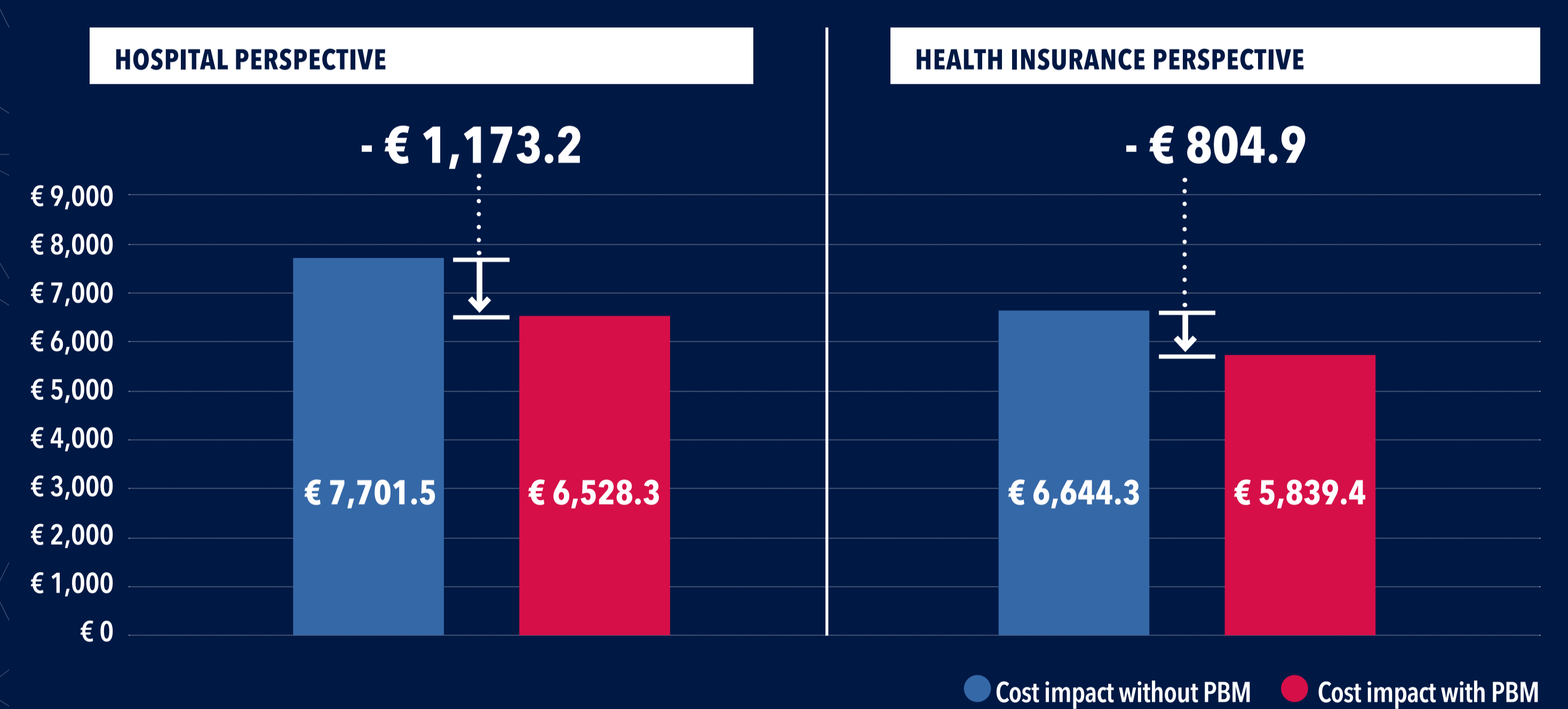


FIGURE 3: Impact of PBM on RBC units and length of stay

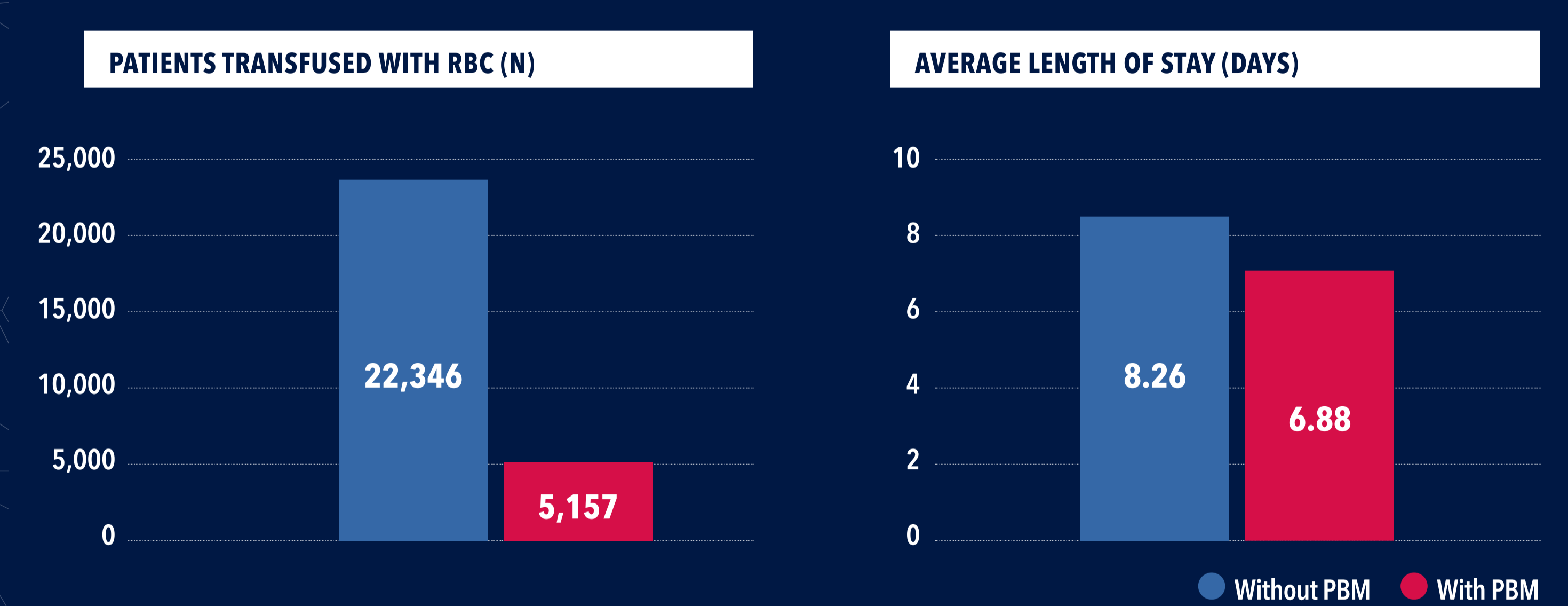
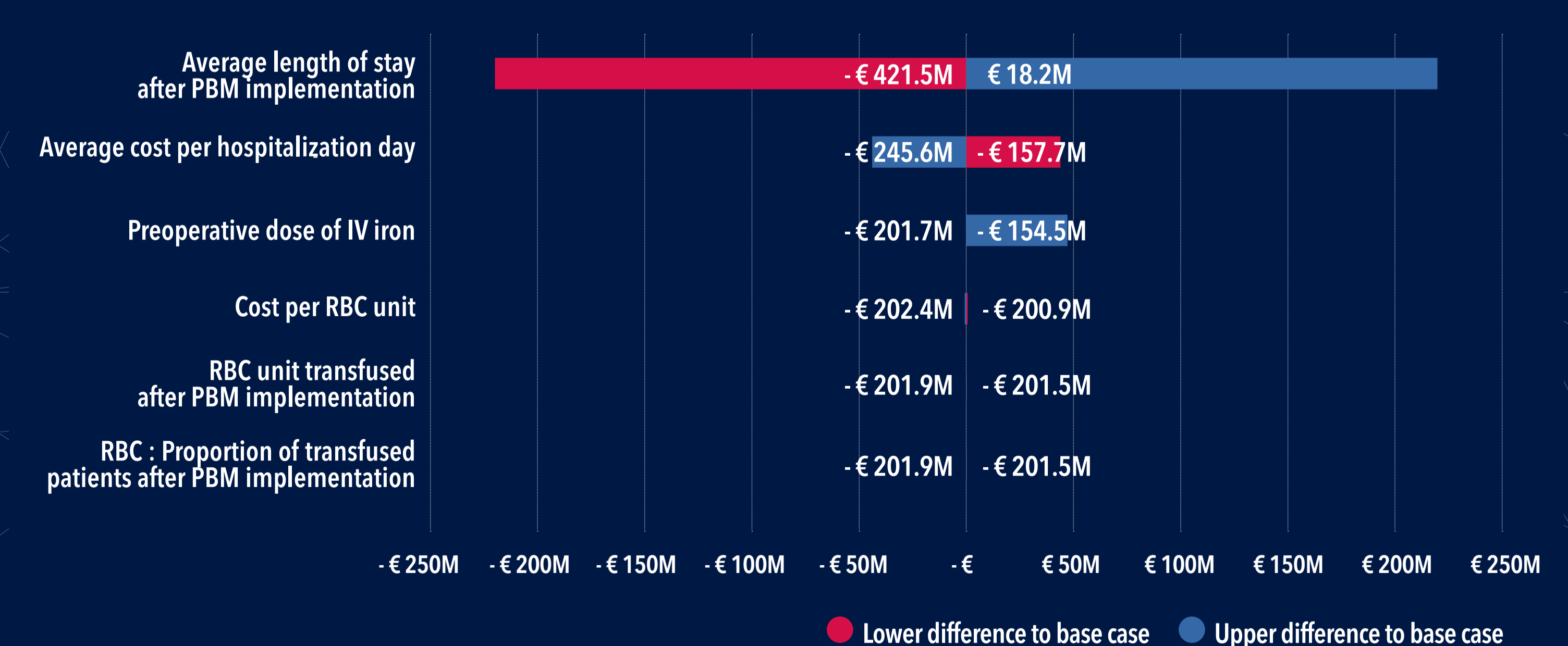


FIGURE 4: Deterministic sensitivity analysis - Public hospital perspective



CONCLUSION

The implementation of a national PBM program in France would represent an improvement in patients' outcomes and a high added value for the public health system resulting from reductions in transfusion rates and hospital lengths of stay. In orthopedic surgery, cost saving is estimated to be €1,173 per patient from a public hospital perspective. PBM, as a holistic approach, should become the standard of care in the pre-operative setting to improve patients' outcomes and quality of care as well as lowering costs.

Abbreviations

BIM: Budget Impact Model ; DRG: Diagnosis Related Group ; DSA: Deterministic Sensitivity Analysis ; ENCC: Echelle Nationale de Coûts à méthodologie Commune ; ESA: Erythropoiesis Stimulating Agent ; INSEE: Institut National de la Statistique et des Etudes Economiques ; IU: International Unit ; IV: IntraVenous ; JORE: Journal Officiel de la République Française ; PBM: Patient Blood Management ; PMSI: Programme de Médicalisation des Systèmes d'Information ; RBC: Red Blood Cells ; SmPC: summary of product characteristics

¹ Kotzé A, Carter LA, and Scally AJ. Effect of a patient blood management programme on preoperative anaemia, transfusion rate, and outcome after primary hip or knee arthroplasty: a quality improvement cycle. *British Journal of Anaesthesia* 108 (6): 943-52 (2012)
² <http://base-donnees-publique.medicaments.gouv.fr/>
³ Rineau E, Chaudet A, Chassier C, Bizot P and Lasocki S. Implementing a blood management protocol during the entire perioperative period allows a reduction in transfusion rate in major orthopedic surgery: a before-after study. *TRANSFUSION* Volume 56, March 2016.