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CLINICAL RESEARCH

## Is transcatheter aortic valve replacement a profitable procedure in a high-volume French hospital?

*Le TAVI est-il une procédure rentable dans un centre hospitalier français à haut volume ?*

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### KEYWORDS

Transcatheter aortic valve replacement;  
Health economics;  
Cost benefit;  
Bioprosthesis

### Summary

**Background.** — Transcatheter aortic valve replacement (TAVR) has revolutionized the prognosis of inoperable patients with severe aortic valve stenosis. Yet, the implantation of expensive prostheses in patients with comorbidities may be questionable in an era when healthcare costs are becoming a major concern.

**Aim.** — The objective of this study was to assess whether the TAVR procedure is profitable in a high-volume French hospital.

**Methods.** — Consecutive patients eligible for transfemoral TAVR using the SAPIEN bioprostheses (Edwards Lifesciences, Irvine, CA, USA) were included retrospectively in this single-centre study between September 2014 and December 2015. Three medicoeconomic severity-level subgroups were considered. The primary clinical endpoint was the difference between hospital costs and revenues, calculated for each patient. Secondary composite endpoints included major adverse events within 30 days and breakdown of costs.

**Abbreviations:** GHM, Groupe Homogène des Malades (diagnosis-related group); ICU, intensive care unit; TAVR, transcatheter aortic valve replacement.

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**Results.** – Overall, 189 patients were included in the analysis. Three patients died (two from non-cardiac causes) within 30 days of the procedure. The mean hospital cost was €27,530 ± 3814 per patient, and the mean hospital income was €30,313 ± 2681 per patient ( $P < 0.001$ ), resulting in a significant profit of €2783 ± 1743 per patient. The total estimated profit was €525,000 for the whole study period. The largest benefits were observed for patients assigned to the lowest severity level. The price of the bioprosthesis represented 71% of the total costs.

**Conclusions.** – The TAVR procedure performed in carefully selected patients was profitable for the academic centre, regardless of the level of severity assigned to the patients.

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## MOTS CLÉS

Remplacement  
valvulaire aortique  
percutané ;  
Analyse  
médico-économique ;  
Rentabilité ;  
Bioprothèses

## Résumé

**Contexte.** – Le remplacement valvulaire aortique percutané (TAVR) a révolutionné le pronostic des patients non opérables présentant une sténose aortique sévère. Le coût des prothèses implantées chez des patients comorbides pourrait être discutable à l'époque où les enjeux médico-économiques constituent une problématique majeure.

**Objectif.** – L'objectif de cette étude était de déterminer la rentabilité du TAVR dans un hôpital français à grand volume d'activité.

**Méthodes.** – Tous les patients consécutifs éligibles au TAVR transfémoral avec une bioprothèse SAPIEN (SAPIEN-XT ou SAPIEN 3 ; Edwards Lifesciences, Irvine, CA, États-Unis) entre septembre 2014 et décembre 2015 étaient inclus rétrospectivement dans cette étude monocentrique. Trois sous-groupes étaient constitués, selon le niveau de sévérité médico-économique. Le critère de jugement principal était la différence entre les coûts et les remboursements pour chaque séjour de patient. Les critères secondaires étudiaient les événements indésirables graves à 30 jours et la répartition des coûts.

**Résultats.** – Cent quatre vingt-neuf patients étaient inclus dans l'analyse. Au trentième jour, 3 patients étaient décédés (2 de causes non cardiaques). Le coût moyen s'élevait à €27 530 ± 3814 pour un remboursement à €30 313 ± 2681 par patient ( $p < 0,001$ ). Le critère de jugement principal démontrait un bénéfice significatif de €2783 ± 1743 par patient pour un bénéfice total de €525 000 sur la période évaluée. Les patients présentant le plus faible niveau de sévérité généraient les bénéfices les plus importants. Le prix de la bioprothèse représentait 71 % du coût total.

**Conclusions.** – Le TAVR transfémoral chez des patients sélectionnés est rentable pour le centre implanteur, indépendamment du niveau de sévérité du patient.

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## Background

In less than 15 years, transcatheter aortic valve replacement (TAVR) has revolutionized the prognosis of patients who present with severe aortic valve stenosis and cannot undergo conventional surgery. A clear benefit has been demonstrated for TAVR versus medical treatment in randomized studies [1], and non-inferiority has been confirmed versus conventional surgery in high-risk patients [2]. Current guidelines [3,4] support its use in severe symptomatic patients who are considered unsuitable for surgery, and recent studies are widening its use to patients with high-to-intermediate risk [5]. As a result, hospitals have to face a major increase in the number of TAVR procedures. In our centre, the implantation of percutaneous aortic bioprostheses almost equalled the implantation of conventional surgical bioprostheses in 2016, leading to unexpected costs and hospitalizations

attributable to the treatment of patients previously denied invasive strategies.

TAVR prostheses are very expensive, and their implantation in elderly patients with comorbidities may be questionable in an era when healthcare costs are becoming a major concern. Cost-revenue analyses are rarely performed, although it can be anticipated that robust economic data analyses will be increasingly needed to inform future guidelines.

In France, the price of a surgical aortic valve is included in the surgical act reimbursement, whereas a percutaneous aortic bioprosthesis incurs an additional charge. In this context, the appreciation of profit in percutaneous bioprosthesis implantation is challenging, and we considered that there was a need for a strategic evaluation in our institution. Therefore, the objective of this study was to perform a cost-revenue analysis for the TAVR procedure

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