A SYSTEMATIC REVIEW AND STATISTICAL ANALYSIS OF FACTORS INFLUENCING THE COST-EFFECTIVENESS OF TRANSCATHETER AORTIC VALVE IMPLANTATION FOR SYMPTOMATIC SEVERE AORTIC STENOSIS

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Introduction

Transcatheter aortic valve implantation (TAVI) is a disruptive technology recommended for patients with symptomatic severe aortic stenosis (sSAS) [1]. Despite being available for over 15 years in Europe [2], with an extensive volume of clinical and economic evaluations across all surgical risk groups [3-4], there is little evidence on the key drivers of TAVI's cost-effectiveness. This study sought to identify these factors and quantify their role.

Methods

- A systematic literature search was conducted to identify published economic evaluations of TAVI, supplemented by health technology assessment reports (Figure 1). This was followed by a statistical analysis using eight identified factors from the search results that could potentially influence estimates of cost-effectiveness.
- The factors were grouped into procedural variables (features of how TAVI is performed) and methodological variables (the modelling methods chosen by the authors of the studies retrieved from the literature search). The impact of these variables were investigated on a primary outcome and two secondary outcomes.
- The primary outcome was the likelihood of TAVI being cost-effective. Penalised logistic regression (PLR) [5] was used to estimate the relative importance of these variables as part of a multivariate analysis.
- Secondary outcomes of TAVI being dominant, and the incremental health benefits of TAVI were also explored using narrative synthesis and linear regression, respectively.

Results

- 42 studies (65 unique analyses) (Figure 1) were identified through the systematic literature search.
- TAVI was found to be cost-effective in 74% and dominant in 20% of analyses.
- All the evaluations of SAPIEN-3 found TAVI to be cost-effective (Figure 3a).
- The most important factor driving the cost-effectiveness of TAVI was device type, followed by risk group (Figure 2).
- Compared to the inoperable population, the low surgical risk population has an increased probability of TAVI being cost-effective, whilst intermediate and high surgical risk populations have a lower probability (Figure 2, Figure 3a).
- Access route was found to not be important in the multivariate analysis, possibly due to strong correlations between access route and both risk group and device type.
- There was heterogeneity in the approach taken to economic modelling, along with correlations between the variables. These may also influence estimates of cost-effectiveness.
- Studies that found TAVI to be dominant always compared it to surgery and usually considered SAPIEN 3.
- In multivariate analyses, the largest health benefits were observed for the high/inoperable risk population, use of the SAPIEN 3 device, and increased use of transfemoral access route.

Discussion

- TAVI is typically a cost-effective treatment option.
- There were often strong correlations between the modelling methods employed, but no clear picture about how these influenced estimates of cost-effectiveness.
- There are important differences by device generation, risk group and access route; these must be considered when assessing health economic evidence for TAVI.
- Treating all TAVI procedures as similar risks underestimating the benefit of this procedure in certain settings.

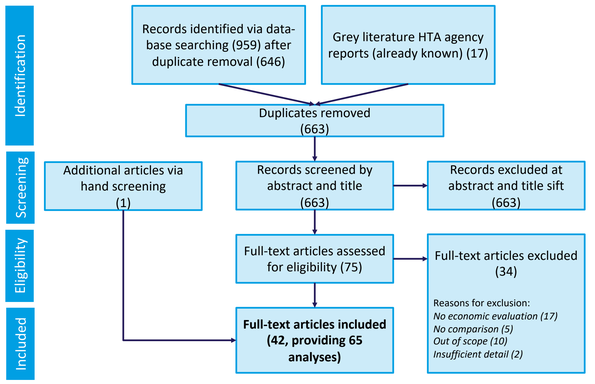
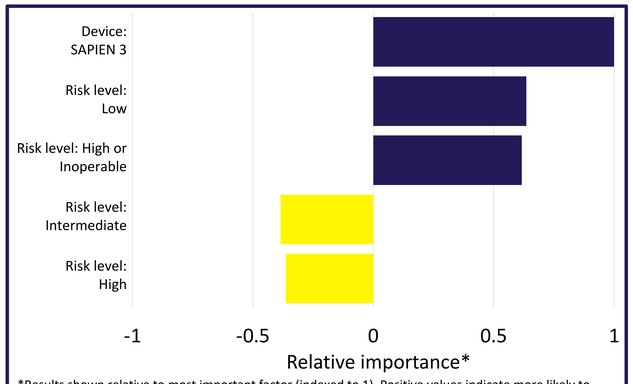
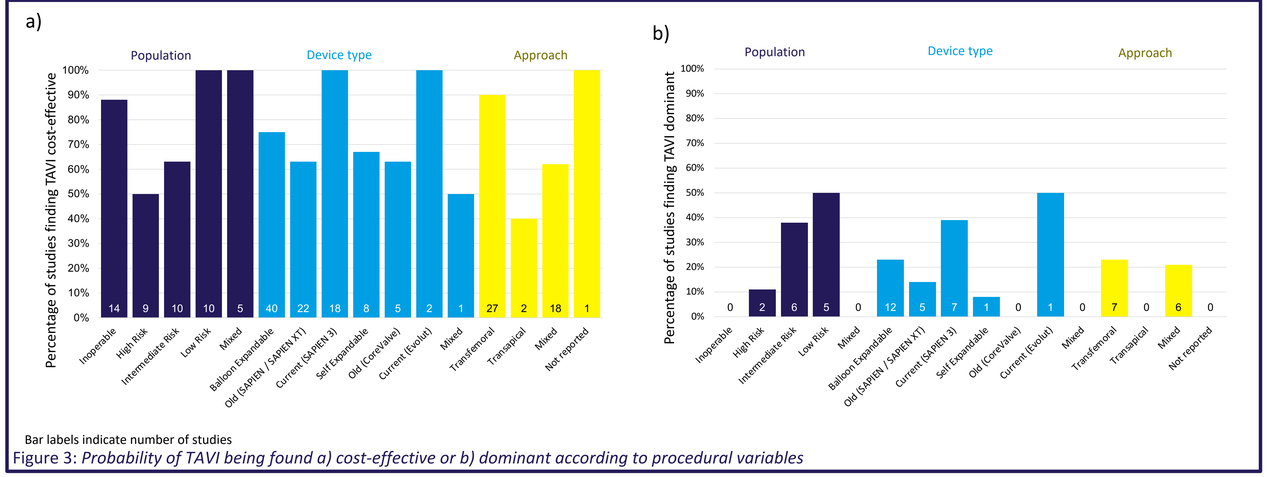


Figure 1: *PRISMA flow chart*



*Results shown relative to most important factor (indexed to 1). Positive values indicate more likely to be cost effective, negative values less likely.

Figure 2: *Results of PLR*



Bar labels indicate number of studies

Figure 3: *Probability of TAVI being found a) cost-effective or b) dominant according to procedural variables*

References

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[2] doi:10.1161/01.CIR.0000047200.36165.B8
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