EE436. ESTIMATING THE POTENTIAL ECONOMIC IMPACT OF TISSUE VS. MECHANICAL SURGICAL REPLACEMENT VALVES IN MAINLAND CHINA FROM A SOCIETAL PERSPECTIVE

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Objective

The objective was to estimate the potential societal economic impact of treating Heart Value Disease (HVD) patients with a surgical tissue valve replacement vs. a mechanical valve in Mainland China.

Methods

- **Type of Economic Evaluation:** societal benefit-cost evaluation based on a patient-level decision-analytic model **(Figure 1)**
- **Intervention:** surgical Aortic Valve Replacement (SAVR) with tissue vs. mechanical valves.
- **Patient:** eight distinct HVD candidate subgroups based on: (a) years of age—40-49 vs. 50-59; (b) location—urban vs. rural; and (c) occupation—primary/secondary (manual labors) vs. tertiary (office workers).
- **Clinical inputs:** relative risk of tissue vs. mech valves based on internal healthcare insurance claims analysis, quality of life data from published literature. All inputs were validated by clinical experts **(Table 1)**
- **Economic inputs**: labor wages derived from China statistics yearbook, medical resource use and costs from published literature and post-SAVR labor force participation (LFP) based on expert opinions **(Table 2-4)**
- **Model outcomes:** direct costs (SAVR, clinical events, anticoagulation monitoring (ACM)), indirect costs (productivity loss due to ACM), the value of quality-of-life gains, and economic gains from post-SAVR LFP

Table 1. Clinical Inputs

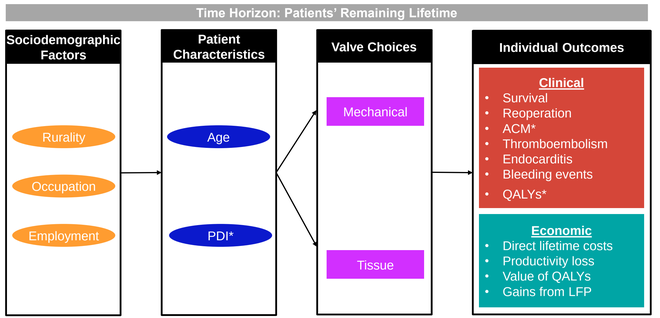
Parameters	Value
Relative Risk of Tissue vs. Mech Valves[1]	
Mortality	1.0
Reoperation	1.1
Thromboembolism	0.8
Bleeding	0.6
Endocarditis	1.6
Quality of Life (EQ-5D)[2-4]	
Pre-SAVR	0.75
Post-SAVR (tissue valve)	0.88
Post-SAVR (mech valve)	0.80

Table 2. Labor Economic Inputs[5]

Parameters	Value
Urban Workers	
Primary & secondary	$9,315
Tertiary	$11,303
Rural Workers	
Primary & secondary	$3,528
Tertiary	$4,281

*All costs were converted and inflated to 2021 USD [12,13]

Figure 1. Model Structure



PDI = personal disposable income; ACM= anticoagulation monitoring; QALYs = quality-adjusted life years

Table 3. Clinical Event Costs and Health Resource Use

Parameters	Value
Clinical Event Cost	
SAVR Cost	$21,924[6]
Tissue Valve Cost	$6,112[1]
Mechanical Valve Cost	$1,750[1]
Thromboembolism	$5,235[7]
Endocarditis	Assume SAVR Cost
Bleeding	$4,313[8]
Warfarin	$0.02[9]
ACM (visit) (rural)	$120[10]
ACM (visit) (urban)	$9[10]
Frequency of ACM per Month[10]	
<1 month after SAVR	4
1-3 months after SAVR	2
3 months after SAVR	1
Time spent on ACM (hrs.)[10]	
Urban residents	16
Rural residents	55

*All costs were converted and inflated to 2021 USD[12,13]

Table 4. Post-SAVR Change in LFP[11]

Parameters	Value
Tissue Valve Patients	
40-49 yrs.	
Primary & secondary	40%
Tertiary	25%
50-59 yrs.	
Primary & secondary	35%
Tertiary	20%
Mech Valve Patients	
40-49 yrs.	
Primary & secondary	10%
Tertiary	10%
50-59 yrs.	
Primary & secondary	5%
Tertiary	5%

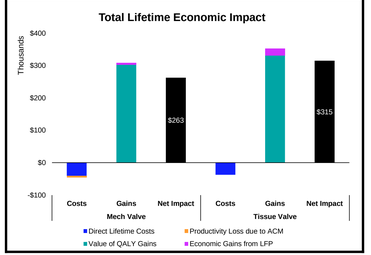
Results

- The total lifetime economic gain was $315,215 and $262,622 for tissue and mech patients, respectively. The net economic gain was USD52,593 (representing 20.0% more than for mechanical valve patients) despite the tissue value alone costing more than mechanical valve—USD 6,112 vs. USD 1,750 **(Table 5 & Figure 2)**.
- Societal cost-offsets were generated by avoiding costs and productivity losses associated with ACM, greater quality-of-life improvements and post-SAVR employment gains achievable with tissue valves.

Table 5. Total Lifetime Economic Impact

	Mech	Tissue
Direct Lifetime Costs	$40,816	$37,327
Productivity Loss due to ACM	$4,683	$0
Value of QALY Gains	$302,448	$331,026
Economic Gains from LFP	$5,674	$21,516
Total Impact (Gains – Costs)	$262,622	$315,215
Difference (in dollars)	$52,593	
Difference (in %)	20%	

Figure 2. Total Lifetime Economic Impact



Conclusion

An individual-level economic model projected that HVD patients undergoing SAVR with tissue valves would generate greater lifetime societal economic gain —by $52,593 or 20% more, on average— than with mechanical valves.

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