Bridging the gap: why cost-effectiveness analysis of congenital heart interventions are critical for patient-centered, value-based care

Poster Code: **EE77**

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Background

- Congenital heart disease (CHD) affects 1-2% of live births globally and remains a lifelong condition for many survivors. Despite rapid advances in treatment, economic evaluations of CHD interventions remain scarce.
- Most common lesion types are: Atrial Septal Defect (ASD) and Ventricular Septal Defect (VSD) are the most common CHD lesions, where repair can either be surgical or via transcatheter interventions.
- Exploring cost-effectiveness is essential for equitable and person-centered resource allocation, and is underused in CHD care.

Purpose

This project aimed to:

- Demonstrate how structured cost-effectiveness can guide value-based CHD care, and highlight issues of equity
- Assess and compare the cost-effectiveness of two commonly used interventions to repair ASD and VSD
- Highlight gaps in available effectiveness data and their implications for future CHD research and policy

Method

- **Design**: Two independent decision-analytic cost-effectiveness models developed for ASD and VSD
- **Data source**: Systematic literature reviews and meta-analyses (2000–2024) using PubMed, Scopus, and CINAHL, following PRISMA guidelines.
- **Perspective:** Healthcare payer; costs standardized to 2025 International Dollars (INT$).
- **Effectiveness metrics:**
  - **ASD model**: QALY gain
  - **VSD model:** Probability of avoiding complications (proxy effectiveness).
- Both models were subjected to deterministic sensitivity analyses

Results

- Most existing data lack standardized effectiveness measures, such as quality-adjusted life years (QALYs)
- Most studies conducted in China

ASD:

- Effectiveness measure: QALY gain = 0.107
- High variability in costs (Figure 1)
- ICER: 12,400 INT$ per QALY gained (below the 50,000 INT$ threshold).
- **Sensitivity and subgroup analyses:** Robust; transcatheter closure remains cost-effective across all scenarios. However, more cost-effective in children

Results (cont'd)

VSD

- Effectiveness: 97.44% vs 94.97% complications avoided
- Effectiveness proxied as QALY data unavailable
- Meta-analysis trends: Transcatheter closure had shorter operation times, ICU stays, and hospital stays (Figure 2) in all included studies.

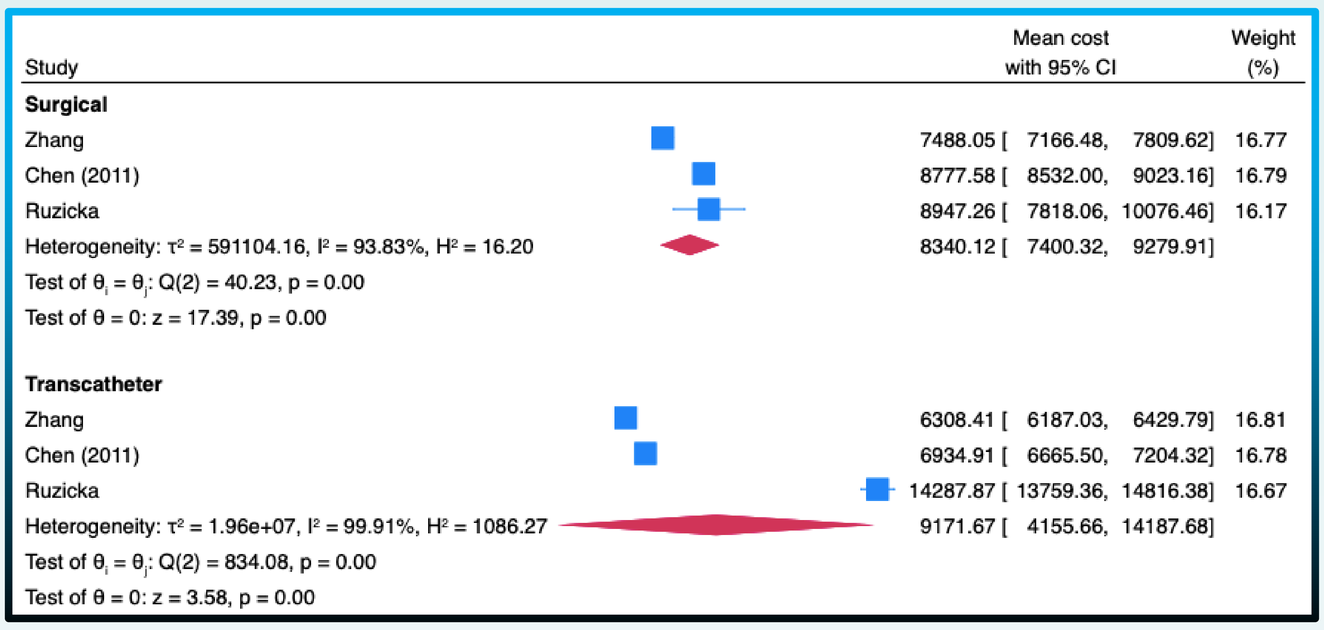

Figure 1: Forest plot of total charges for adult patients for ASD closure

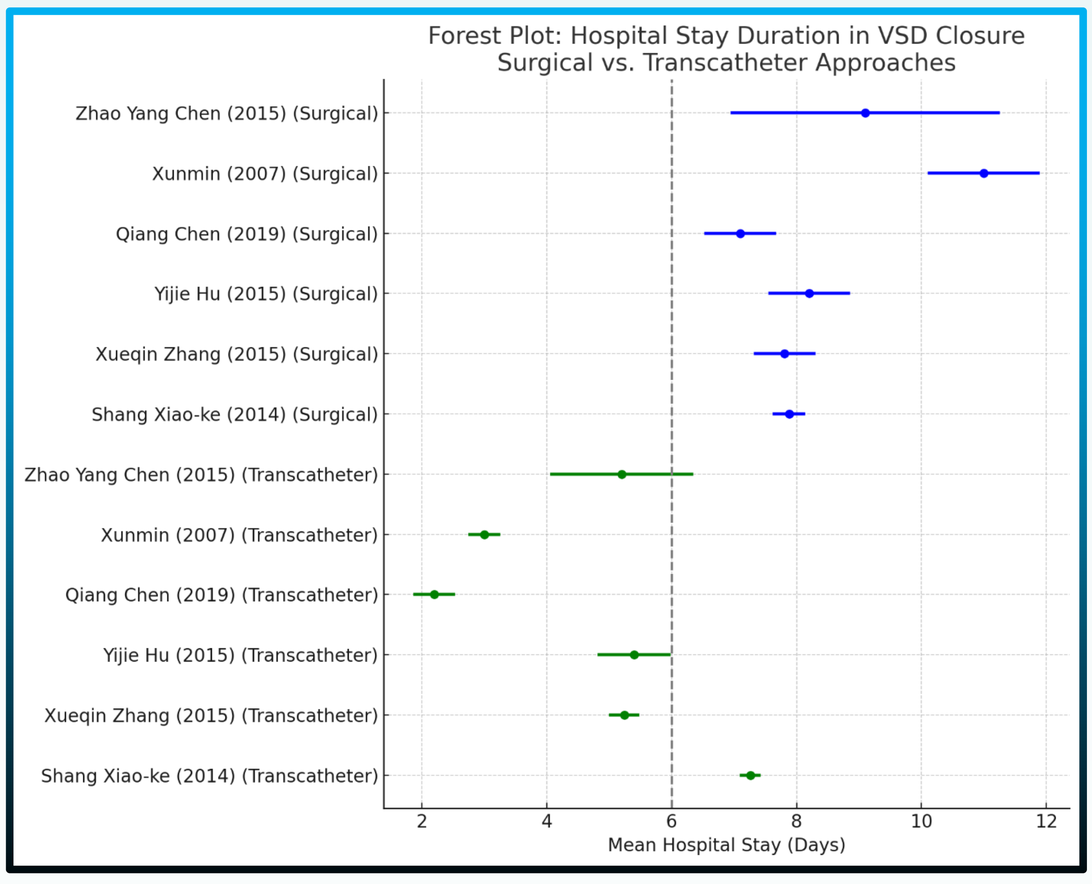

Figure 2: Forest plot of mean hospital length of stay (days) for VSD closure

Conclusion

- Transcatheter repair cost-effective for both ASD and VSD
- However, analysis revealed key system-level challenges:

1) Lack of standardized utility-based outcomes
2) Heavy reliance on non-European cost data
3) Absence of societal and long-term cost components

Take home message

Lack of standardized effectiveness data hinders patient-centered, value-based healthcare planning

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