EE252: Cost-Effectiveness of Genetic Testing for Optimizing Warfarin Therapy in Mechanical Heart Valve Patients: Insights From Qatar

Dina Abushanab[1], Shaban Mohammed[1], Rania Abdellatif[2], Touqa Hazzem[3], Tamer Abdelghafour[3], Sameh Aboulnagah[3], Samy Hanoura[3], Yasser Shouman[3], Moza Al Hail[1], Wadha Al-Muftah[2], Said I. Ismail[2], Amr Omar[3], Daoud Al-Badriyeh[4]

[1]Pharmacy Department, Hamad Medical Corporation; [2]Qatar Foundation; [3]Department of Cardiothoracic Surgery, Hamad Medical corporation; [4]College of Pharmacy, Qatar University, Doha, Qatar.

1 Background

- Patients with mechanical heart valve replacement (MHVR) require lifelong antithrombotic therapy, primarily with vitamin K antagonists like warfarin
- Variants in the CYP2C9 and VKORC1 genes play a significant role in influencing warfarin metabolism and sensitivity, leading to dosing disparities among patients
- The FDA now endorses genetic testing to individualize warfarin dosing, supported by guidelines from the Clinical Pharmacogenetics Implementation Consortium
- In Qatar, there is a lack of local data on the economic consequences of genotype screening (PGx) in patients with MHVR

2 Objective

- To analyze the cost-effectiveness of PGx testing for warfarin dosing compared to the standard of care (SoC) in patients with MHVR
  - ➢ Perspective: Public Healthcare System (Heart Hospital, Hamad Medical Corporation), Qatar

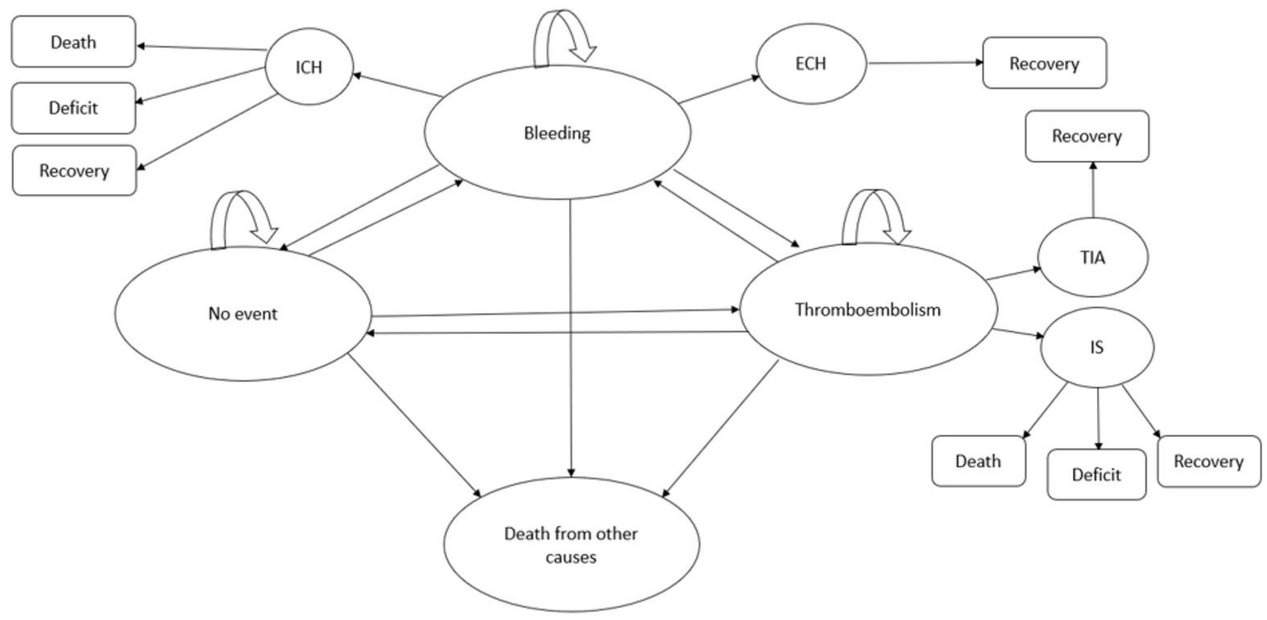
3 Methods

Design
- Decision-analytic Markov model of 1-week Markovian cycles over a lifetime horizon
  - Evidence-based literature & publicly available Qatari data

Groups
- (i) interventional CYP2C19 and VKORC1 genetic testing and (ii) the current Qatari SoC

Outcomes
- Incremental cost-effectiveness ratio (ICER)
  - Cost / year of life saved
  - Cost / quality-adjusted life year (QALY) gained

Decision analytic Markov model



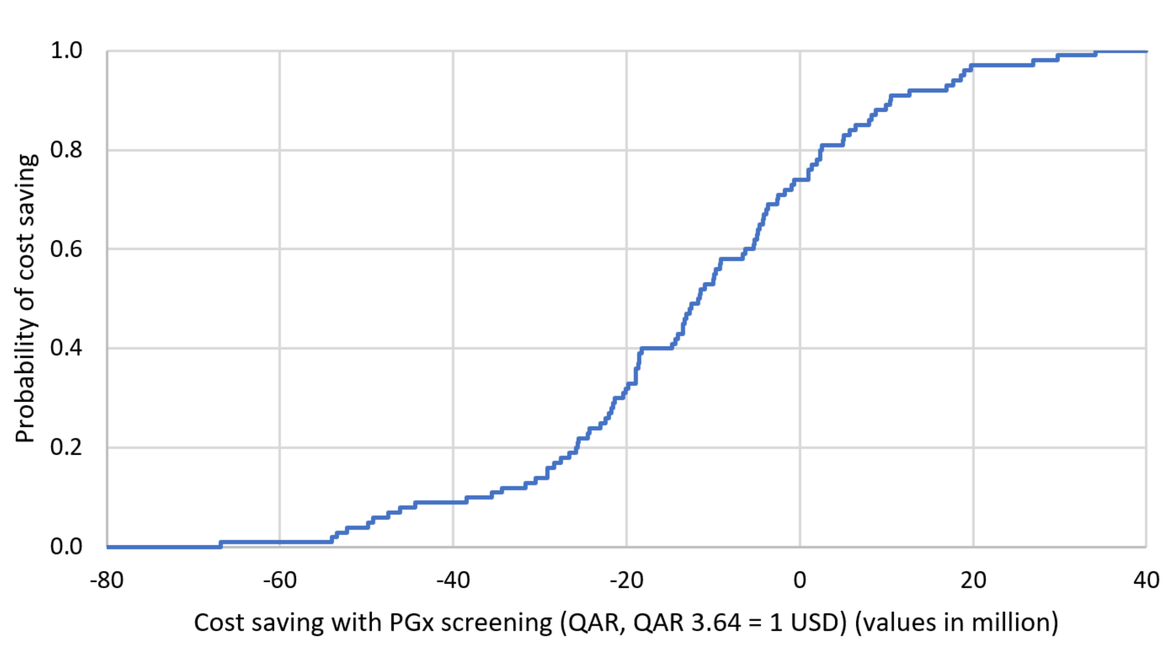
ICH: intracranial hemorrhage, ECH: extracranial hemorrhage, TIA: transient ischemic attack, IS: ischemic stroke

4 Results & conclusions

In 1,000 Qatari MHVR patients: Relative to SoC, the PGx-guided approach was associated with:

- **QALY & life years:**
  - ➢ A gain of 1,681 QALYs (1.68 QALYs per person)
  - ➢ An increase of 1,009 life years saved (1.01 life years per person)
- **Overall cost:**
  - ➢ Cost saving of QAR 9,538,262 (QAR 21,521,081 vs. QAR 31,059,343)

Sensitivity analysis confirmed robustness of results, with 92% probability of the PGx-guided approach being cost savings to cost effective



Conclusion:

- PGx-guided warfarin dosing is both cost-saving and more effective for patients with MHVR in Qatar compared to SoC, aligning with precision medicine goals and can guide personalized treatment strategies

مؤسسة قطر
Qatar Foundation

مؤسسة حمد الطبية
Hamad Medical Corporation
HEALTH • EDUCATION • RESEARCH صحة • تعليم • بحوث

جامعة قطر
QATAR UNIVERSITY
كلية الصيدلة
COLLEGE OF PHARMACY
HEALTH SECTOR القطاع الصحي