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Clinical and Economic Model of Treatment Strategies Atrial Fibrillation: Overview & Key Assumptions

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Overview

- Review of clinical and economic model
  - Objectives & strategies
  - Model approach and structure
  - Patients
  - Model data
  - Analytic approach
- Key Assumptions in model
- Questions for ERG
- Other issues

Objective

- To estimate the clinical effectiveness, costs, and cost-effectiveness of cardiovascular management strategies and stroke prevention strategies for adult patients with non-valvular atrial fibrillation

Cardiac Management Strategies

- Rate control
- Rhythm control, amiodarone
- Rhythm control, dronedarone
- Primary LA catheter ablation
- Rhythm control -> LA catheter ablation
- Rhythm control -> mini-Maze

Stroke Prevention Strategies

- Warfarin
- Aspirin
- Dabigatran
- WATCHMAN® procedure

Model Approach

Approach, 1

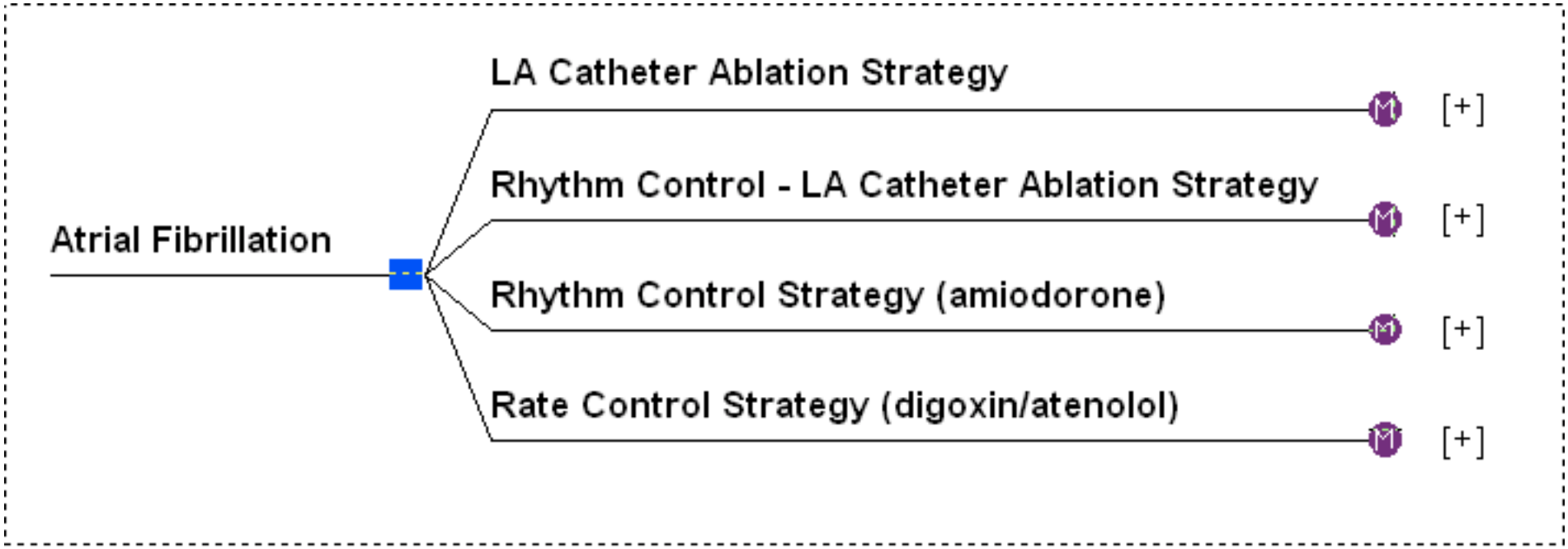
- Decision Analysis model
  - Each alternative strategy is represented graphically in a decision tree
- Markov Models
  - Each management strategy has cardiovascular management component and a stroke prevention component
  - Each management strategy is represented as discrete clinical states, and patients transition between the clinical states over time

Approach, 2

- Perspective
  - Health care system payers perspective with Medicare costs
- 3 Month Markov stage or cycle
  - Lifetime horizon from onset of symptomatic AF
- Discount future costs and QALYs to estimate net present value
  - Discount rate 3% (range 0 to 5%)

Model Structure

Atrial Fibrillation Decision Tree



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Rate Control Strategy
Clinical States

- Well, AF
- Well, NSR
- Disability from drugs
- Stroke, mild disability
- Stroke, moderate/severe disability
- ICH, mild disability
- ICH, moderate/severe disability
- Dead, AF
- Dead, Other causes

Rhythm Control Strategy Clinical States

- Initial rhythm control treatment
- Well, NSR
- Well, AF
- Disability from drugs
- Stroke, mild disability
- Stroke, moderate/severe disability
- ICH, mild disability
- ICH, moderate/severe disability
- Dead, AF
- Dead, Other causes

LA Catheter Strategy Clinical States

- Initial LA catheter ablation, PVI
- Well, NSR after LA Catheter ablation, PVI
- AF -> LA catheter ablation, other lines
- Well, NSR
- Well, AF
- Disability, LA catheter ablation
- Disability from drugs
- Stroke, mild disability
- Stroke, moderate/severe disability
- ICH, mild disability
- ICH, moderate/severe disability
- Dead, AF
- Dead, Other causes

Rhythm Control-> LA Catheter Ablation Clinical States

- Initial rhythm control treatment
- NSR after initial rhythm control
- AF after initial rhythm control
- LA catheter ablation, PVI
- Well, NSR after LA Catheter ablation, PVI
- AF-> LA catheter ablation, other lines
- Disability, LA catheter ablation
- Disability from drugs
- Stroke, mild disability
- Stroke, moderate/severe disability
- ICH, mild disability
- ICH, moderate/severe disability
- Dead, AF
- Dead, Other causes

Patients

Patient Characteristics

- Initial age
- Sex
- Comorbidity ($CHADS_2$)
  - CHF
  - Hypertension
  - Advanced age
  - DM
  - Prior stroke or TIA
- AF (paroxysmal, or chronic persistent)

Model Data

Model Data

- Probabilities
  - Published data & vital statistics
  - ICER systematic review
- Costs
  - Medicare fee schedule
- Utilities - Quality of Life (QoL)
  - Published CEAs - AF patients
  - US non-institutionalized population (MEPS)
    - EuroQol (EQ-5D), US norms

Clinical Outcomes

- Clinical events
  - AF episodes, time intervals with AF
  - Stroke and disability from stroke
  - Intracranial hemorrhage (ICH) and disability from ICH
  - Procedure & complications
  - Drug toxicity
  - Life-years (LY)
  - Quality-adjusted life-years (QALYs)

Model Analysis

Model Analysis

- Clinical outcomes
- Cost-Effectiveness Analysis (CEA)
- (Deterministic) Sensitivity Analyses
  - Multiple 1-way, selected 2-way, 3-way sensitivity analyses
- Probabilistic Sensitivity Analysis (Monte Carlo)
  - Uncertainty in model parameters
  - Confidence intervals for CEA
  - Acceptability curves for each strategy

Atrial Fibrillation
Key Assumptions

Review of Model Assumptions

- Atrial Fibrillation disease course
- AF and stroke
- AF and stroke prevention
- Stroke prevention after LA catheter ablation
- Stroke prevention and hemorrhage
- AF and death

Review of Strategy Assumptions

- LA catheter ablation
- Rhythm control
- Rhythm control-> LA catheter ablation
- Rate control

Key Issues for ERG Input, 1

- What is the risk of stroke for AF patients after LA catheter ablation?
- What is stroke risk for AF patients in *NSR* after LA catheter ablation?
  - Proposed approach - CHADS2 (Gage, JAMA, 2001)
  - Alternate approach (Chan, 2006)
    - Framingham Heart Study (Wolf, Stroke, 1991)
      - Age, sex, SBP, HTN Rx, cigarette smoking, AF, LVH
    - Framingham Heart Study - risk score (Wang, JAMA, 2003)
      - Age, sex, SBP, DM, Prior stroke/TIA

Key Issues for ERG Input, 2

- Stroke prevention for patients in NSR after catheter ablation
  - Proposed approach
    - ACC/AHA/ESC guideline, 2006
  - Alternate approach
    - Evaluate strategies with discontinuation of warfarin and switch to ASA
      - Sensitivity analysis to duration of warfarin
      - Sensitivity analysis to stroke risk

Key Issues for ERG Input, 3

- LA catheter ablation is modeled as initial LA catheter ablation with PVI
- Patients may have a repeat LA catheter ablation with other ablation lines or targets for ablation
  - Proposed approach - 1 repeat LA catheter procedure
  - Alternative approaches - model additional repeats?

Key Issues for ERG Input, 4

- Rhythm control with LA catheter ablation for failure to control rhythm
- What is indication for LA catheter ablation?
  - Proposed approach in AF model: 6-month trial of AADs
  - Alternate approaches?

Other Issues?

Thank you!

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