Decision Modeling

Summary of issues in:

Debate About Modeling

• Data on efficacy vs. effectiveness and efficiency to inform clinical and economic policy decisions?
• Bias induced in models based on who pays?
• Can models meet the quality of evidence standards of replicability, verification, falsification, uncertainty in effects?

Bad Science in Models

• Combined data from critically different populations
• Extrapolating trends beyond the data limits
• “Black box” structures that makes invalid assumptions
• Misleading sensitivity analysis
• Incomplete reporting

Bad Information from Trials

• Comparator choice
• Protocol effects and costs
• Biased environment and “super” patients
• Short-term outcomes
• Limited measures
• Issues of poor design and power
• Publication bias
Roles of Modeling

- Apply findings to other populations with different risk or prognosis
- Apply findings to other settings
- Extend impacts in time
- Display multiple outcomes together
- Construct “synthetic” trials with different comparators

When to Model?

- When no trial data are available
- Before taking an intervention to trial
- During phase III
- During phase IV
- For debate on local guideline development
- When political pressure mounts
- To learn and to teach

Assessing Uncertainty

- Sensitivity analysis on effect and primary control variables
- Monte Carlo simulation if distributions known
- Boot strapping
- Other simulations

Quality Assurance

- Face validity
- Predictive validity, internal and external
- Reporting accuracy and transparency
- Programming accuracy (mirror results)
- Triangulation of results from competing models
- Use of second set of data sources
- Breaking the model
Conclusions

- Modeling is a method for translating evidence into practice
- Modeling is common
- Models may be high or low quality, same as clinical trials
- Models are dense integrators of evidence
- Modelers learn as much from the process as from the results
- Models are here to stay