# IMRT Appraisal

Economic Model of Side Effects

Evidence Review Group
June 11, 2007

# ICER Appraisal Process: Economic Review

- Key economic questions from scoping committee
- Identify existing economic model
- Contract with developers of existing model or create model to run scenarios that reflect key questions
- Technical review of model: Model Review Group
- Presentation of results to Evidence Review Group
- Final Report

# IMRT

- Key Questions from Scoping Committee: reduced side effects
- No existing model that specifically modeled individual side effects
- Commissioned development of simple economic model focusing on side effects
- Technical review
- Evidence review group – clinical and economic evidence
- Recommendations

# Overview of Presentation

- Model structure and key assumptions
- Data inputs
  - Transition probabilities
  - Costs
  - Quality adjustments
- Results
- Summary of feedback from Model Review Group

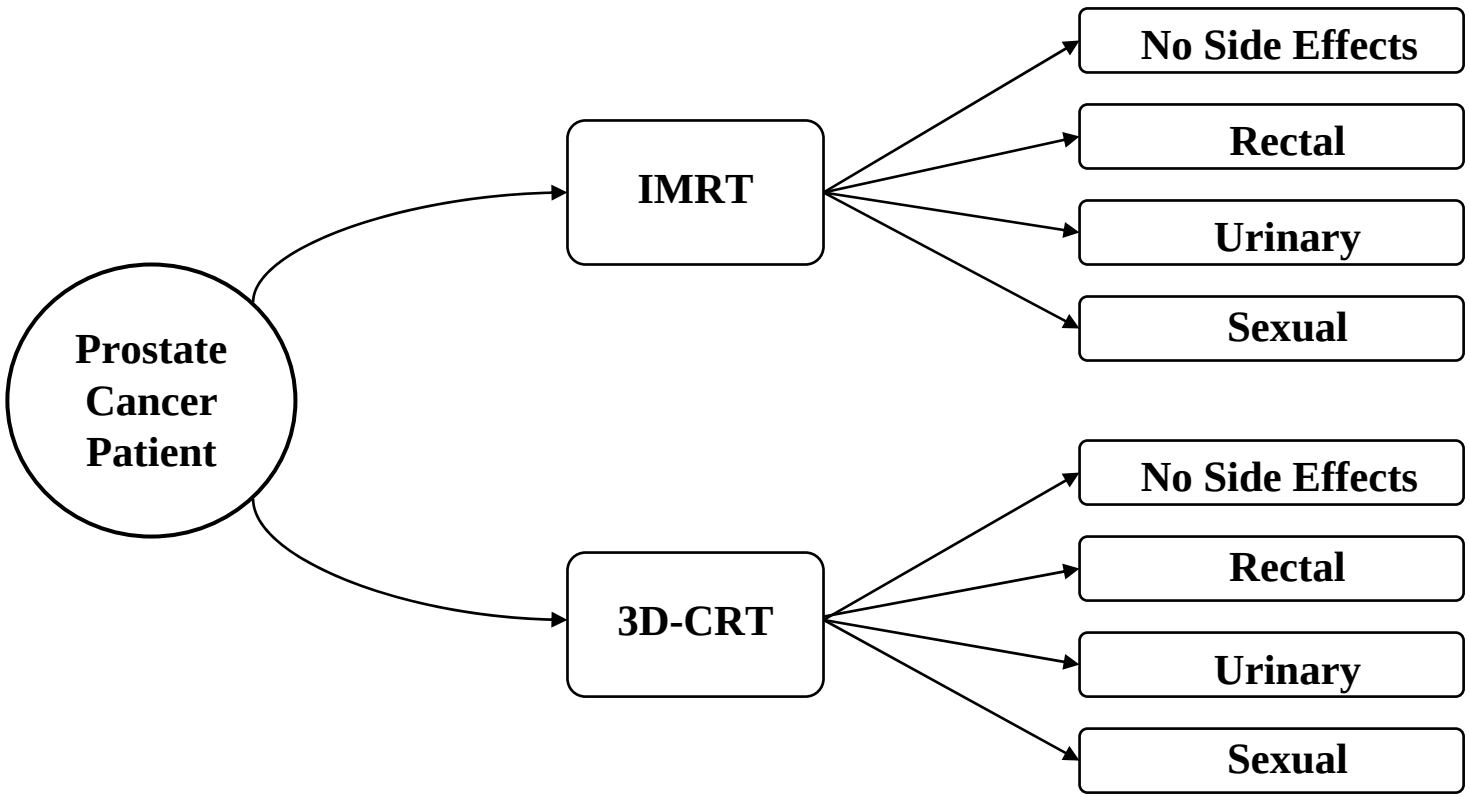
# IMRT Economic Model: Key Assumptions (i)

- Cost-effectiveness analysis of IMRT compared with 3D-CRT
- Treatment dose of 75 to 81 Gy for both therapies
- Limited to incidence of treatment-related adverse effects (long-term survival does not differ between treatments)

# IMRT Economic Model: Key Assumptions (ii)

- Target population: 69 year old men with clinically localized prostate cancer and low/intermediate recurrence risk
- Payer perspective
  - Did not consider opportunity cost of time, etc.
- Time horizon – lifetime

# IMRT Economic Model*




*Model also allows for the occurrence of multiple side effects in a single patient

# IMRT Economic Model: Data inputs

- Data from primary and secondary sources
  - Probabilities:  Literature review, expert opinion
  - Utilities: Primary data
  - Costs: Literature review, cost interviews
- Direct medical costs of treating toxicities include costs of:
  - physician visits
  - diagnostic tests
  - procedures
  - prescription medications

# Model Inputs: Probabilities

| | IMRT | 3D-CRT | Time to onset (mo) | Time to resolution (mo) |
|---|---|---|---|---|
| Rectal | 0.04[1] | 0.14[2] | 12[3] | 12[3] |
| Urinary | 0.15[1] | 0.15[2,4] | 12[3] | 12[3] |
| Sexual | 0.50[4] | 0.50[4] | 12[3] | Lifetime |

[1]Zelefsky 2002 (772 patients)
[2]Zelefsky 2001 (810 patients)
[3]Zelefsky 1999 (743 patients)
[4]Clininician-expert guidance secondary to limited data

# Clinical Vignette for Patients with GI Toxicity*

- Treatment with 6 month course of anti-inflammatory enemas
- Effective in controlling bleeding in 70% of patients
- Remainder undergo an average of three sigmoidoscopy procedures with ablation, followed by an additional 6 month course of enemas

*Source: clinician interviews and literature review

# Model Inputs: Costs and Quality of Life

| | Cost per case | Utility weight[2,3] (0 to 1 scale) |
|---|---|---|
| IMRT | $42,450[1] | - |
| 3D-CRT | $10,900[1] | - |
| Rectal | $2,346 | 0.612 |
| Urinary | $954 | 0.685 |
| Sexual | $2,113 | 0.729 |

[1]Konski 2006, CPT codes

[2]Personal communication with Dr. Basu, Univ. of Chicago (207 patients, time trade-off method)

[3]Used to estimate quality-adjusted life-years (QALYs)

# Results (i)

- Base case
  - Cost per case averted =

# Results (i)

- Base case
  - Cost per case averted = $313,000

# Results (i)

- Base case
  - Cost per case averted = $313,000
  - Incremental C/E Ratio =

# Results (i)

- Base case
  - Cost per case averted = $313,000
  - Incremental C/E Ratio = $706,000/QALY

# Results (i)

- Base case
  - Cost per case averted = $313,000
  - Incremental C/E Ratio = $706,000/QALY

- Sensitivity analysis
  - C/E Ratio = $150K/QALY → IMRT cost =

# Results (i)

- Base case
  - Cost per case averted = $313,000
  - Incremental C/E Ratio = $706,000/QALY

- Sensitivity analysis
  - C/E Ratio = $150K/QALY → IMRT cost = $19,100

# Results (i)

- Base case
  - Cost per case averted = $313,000
  - Incremental C/E Ratio = $706,000/QALY

- Sensitivity analysis
  - C/E Ratio = $150K/QALY → IMRT cost = $19,100
  - C/E Ratio = $100K/QALY → IMRT cost =

# Results (i)

- Base case
  - Cost per case averted = $313,000
  - Incremental C/E Ratio = $706,000/QALY

- Sensitivity analysis
  - C/E Ratio = $150K/QALY → IMRT cost = $19,100
  - C/E Ratio = $100K/QALY → IMRT cost = $16,900

# Results (ii)

| Risk of Rectal Toxicity (IMRT) | Risk of Rectal Toxicity (3D-CRT) | Cost-effectiveness |
|---|---|---|
| 7% | 25% | $400,000/QALY |
| 14% | 50% | $198,000/QALY |
| 21% | 75% | $130,000/QALY |