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**Economic Model of Treatment Strategies  
for Low-Risk Prostate Cancer: Overview  
& Key Assumptions**

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# Model Overview

- Objective: To perform cost-effectiveness analysis of
    - Radical prostatectomy
    - Active surveillance
    - Radiation therapy
- for treatment of clinically localized, low-risk prostate cancer

# Model Overview

- Cost-Effectiveness Analysis
  - Incremental cost-effectiveness ratios generated
    - Costs in 2008 U.S. dollars
    - Effectiveness in quality-adjusted life-years (QALYs)
- Primary Outcomes
  - Quality adjusted life expectancy
  - Cost-effectiveness (\$/QALY)

# Model Overview

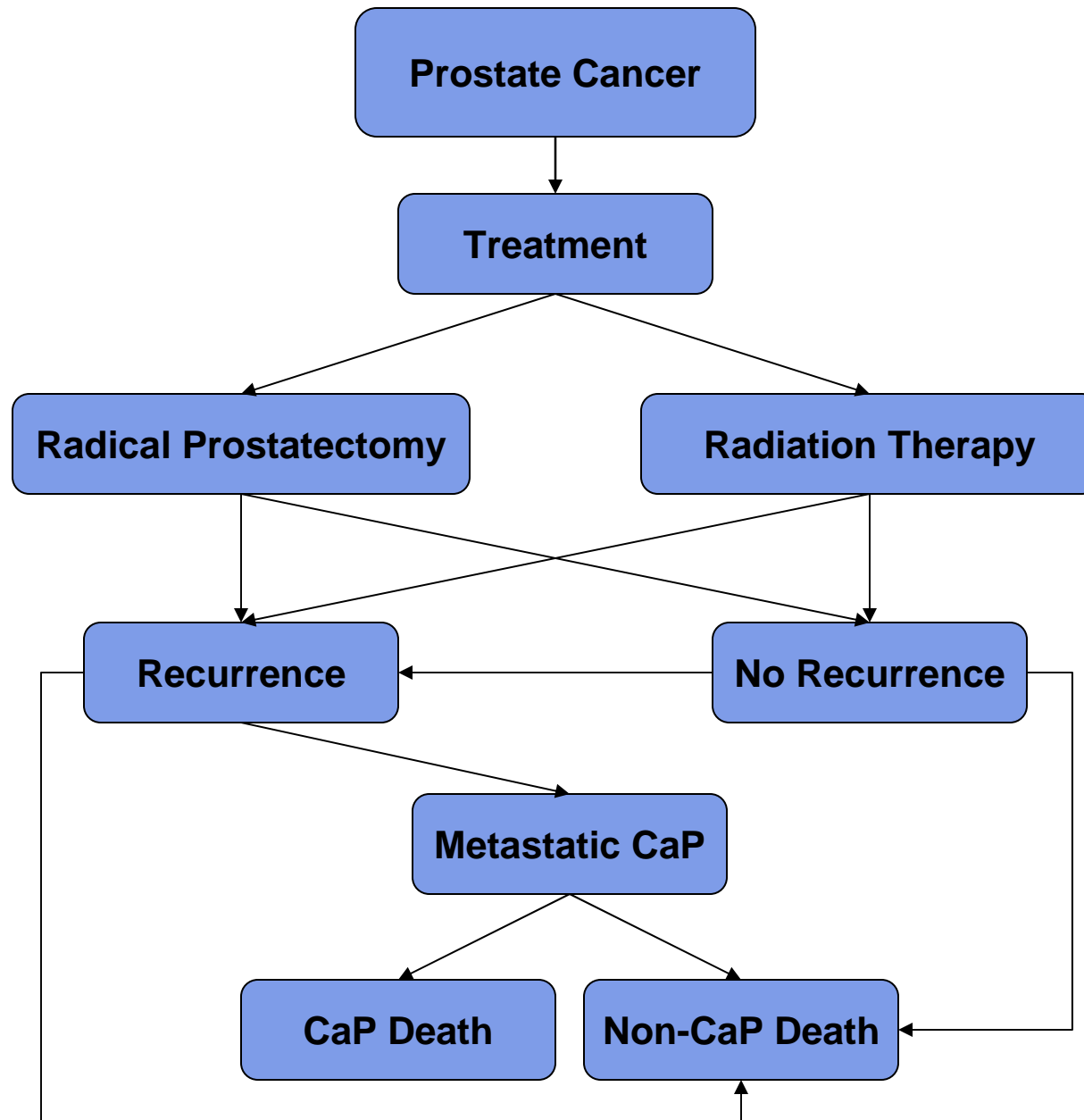
- Societal Perspective
  - Exception: omission of costs for purchase and installation of robot
- Time horizon
  - Lifetime horizon
  - Discounting of future costs and QALYs at 3% annually

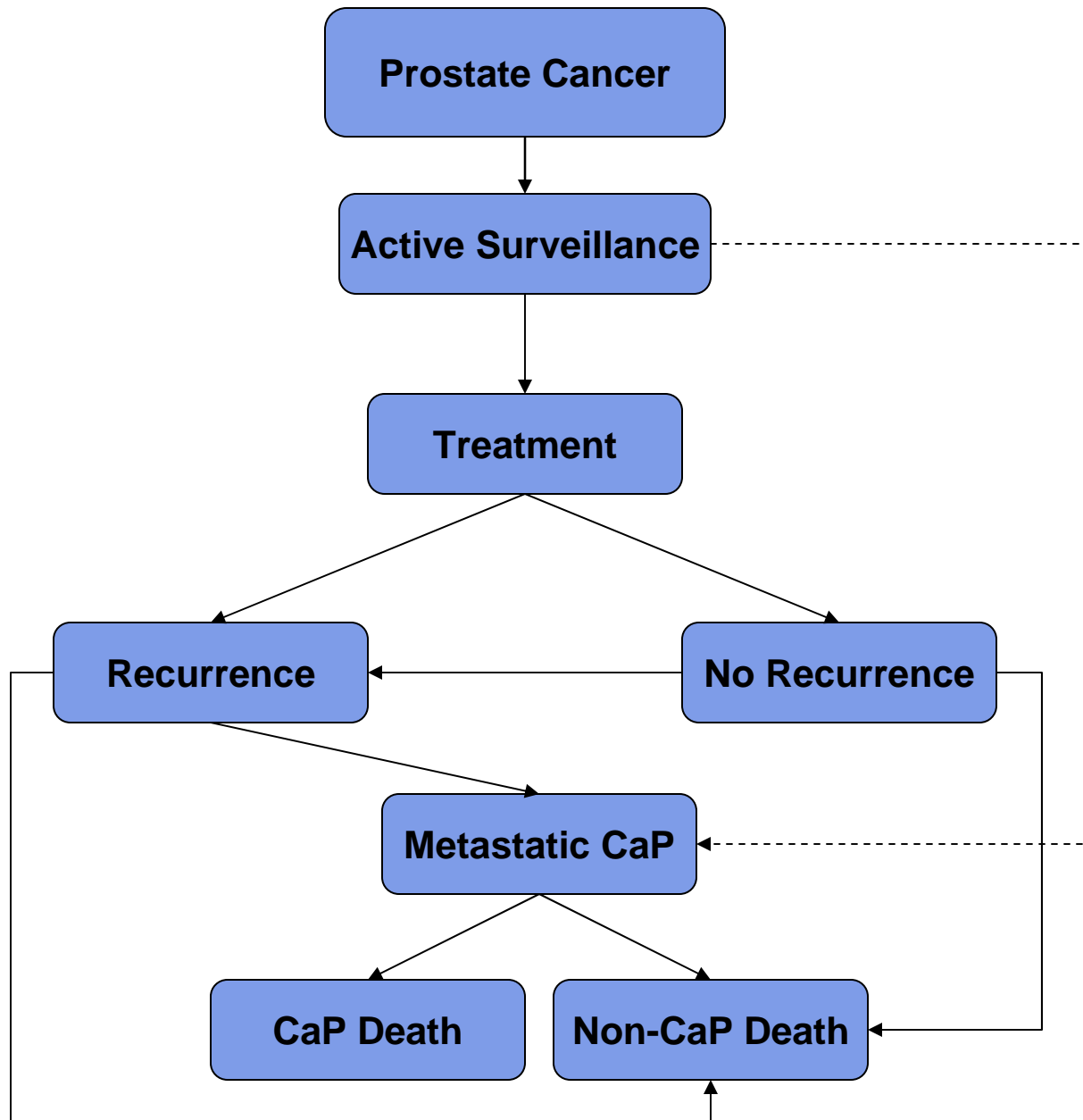
# Model Overview

- Treatment strategies evaluated
  - Initial treatment at diagnosis
    - Radical Prostatectomy
      - Open
      - Laparoscopic
      - Robot-assisted laparoscopic
    - IMRT
    - Brachytherapy
  - Active surveillance
    - Treated upon clinical progression
    - Treated based on patient decision without progression

# Model Overview

- Monte Carlo model
- 3 month cycle length
- Patient population
  - Low-risk disease (D'Amico criteria)
    - Gleason  $\leq 6$ , PSA  $< 10$ , stage  $\leq T2a$
  - Base case: 65 year old man
    - Limited analyses will be conducted for 55 year old man, varying selected age-specific risks





# Model Overview

- Health states will reflect presence or absence of treatment- and disease-related symptoms
  - Short- and long-term complications of treatment
  - Progression of symptoms on AS
- Utilities will be assigned to each health state
- Major cost categories will include
  - Treatment and complications
  - Active surveillance protocol and symptom management

# Model Overview Assumptions: Disease Course

- No men die of prostate cancer within 6 months of diagnosis
- All men who recur after definitive therapy recur biochemically
- Probability of progressing from BCR to metastatic disease same for all low-risk patients regardless of treatment

# Model Overview Assumptions: Disease Course

- Men die of prostate cancer only after the development of metastatic disease
- The probability of progressing from metastatic disease to death is the same regardless of treatment

# Model Overview: Active Surveillance

- AS protocol consists of
  - Visits with PSA every 3 months, DRE every 6 months
  - Biopsy one year after diagnosis
  - Biopsy every 3 years thereafter
- Symptoms on AS (ED, urinary obstruction) increase with time
- Men may be treated as a result of progressive disease or patient choice

# Model Overview Assumptions: Active Surveillance

- Men on AS subsequently treated have same disease-related outcomes as men treated at diagnosis
  - Exception: men who progress to intermediate-risk disease
- Patients who progress on AS are treated with RP if under age 65; IMRT if age 65 or older
  - Intermediate risk at treatment: IMRT plus 6 months ADT

# Model Overview Assumptions: Radical Prostatectomy

- RP techniques are equivalent in terms of disease-related outcomes
- In these low-risk patients, adjuvant or salvage radiation therapy will not be modeled

# Model Overview: Symptoms and Complications

- Health states reflect presence or absence of treatment-related complications
  - Short and long term complications of all treatments
    - Short term side effects: present within 90 days of treatment
    - Long term side effects: present from 90 days to two years after treatment
  - No correlation between incidence of symptoms or complications
    - Varying degrees of overlap permitted
  - All symptoms and complications treated

# Model Overview: Symptoms and Complications

- Symptoms on AS
  - ED, obstructive urinary symptoms
- Treatment complications: RP
  - Short term complications:
    - Perioperative mortality
    - Major (e.g. stroke, MI, DVT/PE, systemic infection, major bleed, bowel injury)
    - Minor (e.g. ileus, lymphocele, UTI)
  - Long term complications:
    - Urinary symptoms (incontinence, anastomotic stricture)
    - Erectile dysfunction
  - Base-case assumption: Incontinence and ED persist for the lifetime of the patient

# Model Overview: Utilities

- Utilities assigned to each health state
  - Utilities for disease states (e.g. metastatic disease)
  - Utilities for complications of treatment
    - Disutility associated with long term complications remains constant for life
    - Sensitivity analysis to assess improving utilities with time
  - Sources:
    - Stewart et al: utilities elicited for men over 60 years using standard gamble methodology; 50% prostate cancer patients
    - Surgical short-term complication utilities: weighted average using data from national utility catalogues

# Categories of Costs: AS

- Visit, PSA every 3 months; DRE every 6 months
- Biopsy year 1, then every 3 years
- Treatment of urinary obstructive symptoms, ED
- Patient time for treatment and testing

# Categories of Costs: RP

- Treatment costs
  - Medicare reimbursement rate equal among 3 RP techniques
    - Preliminary estimate: \$10,500
- Costs for management of complications
  - Based on Medicare reimbursement rates for prostatectomy with major and minor complications
    - Preliminary estimates:
      - Minor complications: \$7,500
      - Major complications: \$17,500

# Categories of Costs: RP

- Costs of follow up visit, PSA, DRE
  - Every 6 months for 5 years, then annually