National Cancer Institute

Projections of the Costs Associated with Cancer Care: Implications for Cost-Effectiveness of Colorectal Cancer Screening

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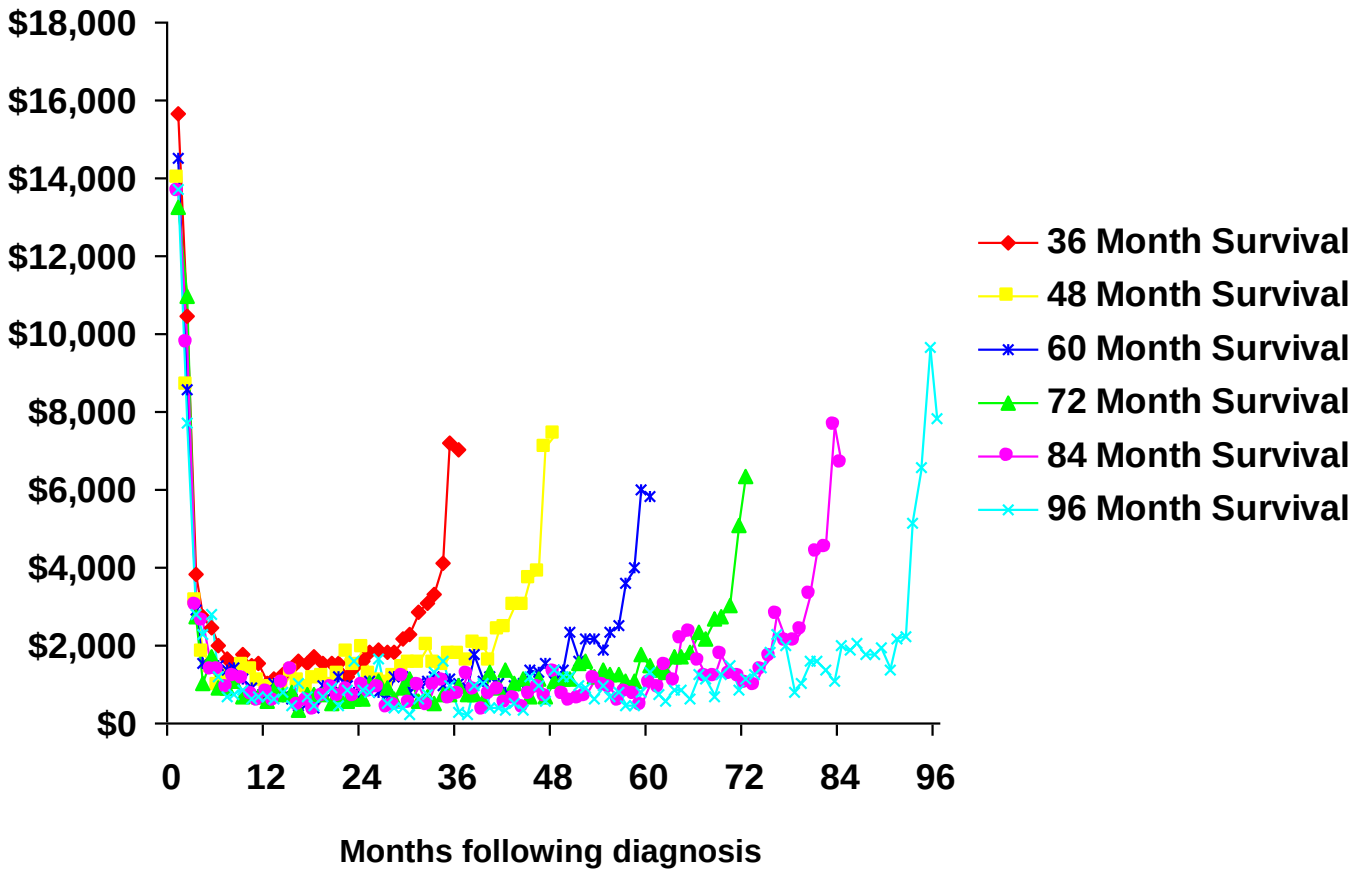
Overview

- Temporal cost patterns in cancer patients
- National projections of costs associated with cancer
- Trends in colorectal cancer treatment costs
- Cost-effectiveness of colorectal cancer screening

Monthly Medicare Payments for Colorectal Cancer Patients by Length of Survival



SOURCE: Yabroff KR, Warren JL, Schrag D, Mariotto M, Meekins A, Topor M, Brown ML. Comparison of Approaches for estimating incidence costs for colorectal cancer patients. Med Care 2009;47:7(supp 1)S56-S63..

Phase of Care Approach for Estimating Cancer Costs

- Trajectory from diagnosis to death divided into clinically relevant periods or phases of care where flow of costs relatively homogeneous
  - Initial
  - Continuing
  - Last year of life
- Phases can be predefined or determined empirically
- Can be used with longitudinal monthly survival probabilities to model incidence costs for a specific cohort
- Can be used with modeled prevalence by phase of care to estimate or project prevalence costs in a given year

Estimating and Projecting National Cancer Costs

- Dynamic U.S. population projections from Census
  - Population aging and growing
- Incidence and survival rates projected based on most recent years of SEER data by cancer site and gender
  - Incidence mostly declining
  - Survival mostly improving
- Prevalence estimated and projected by phase of care for each cancer site by age and gender
- Linked SEER-Medicare data used to estimate net cost of care by cancer site, gender, and phase of care based on most recent data

Source: Mariotto AB, Yabroff KR, Shao Y, Feuer EJ, Brown ML. Projections of the costs of cancer care in the United States: 2010-2020. J Natl Cancer Inst 2011;103:117-128.

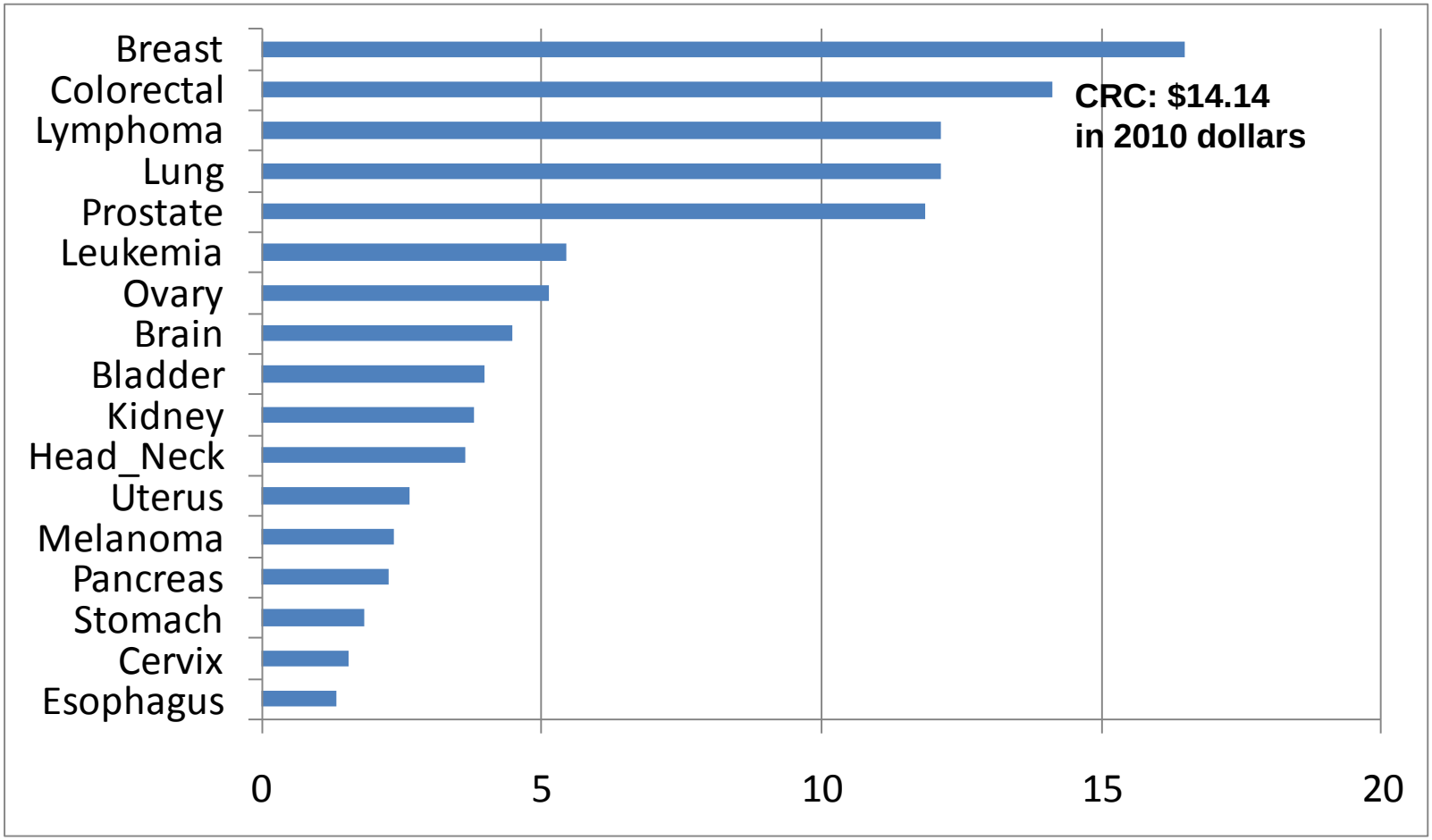
Scenarios for Projecting National Cancer Care Costs

- Base case: constant current incidence rates, survival, cost based on most recent data
  - Reflects population changes only

- Recent incidence and survival trend and assumptions about cost trends
  - 2% increase annually in costs in initial and last year of life phases
  - 5% increase annually in costs in initial and last year of life phases

Source: Mariotto AB, Yabroff KR, Shao Y, Feuer EJ, Brown ML. Projections of the costs of cancer care in the United States: 2010-2020. J Natl Cancer Inst 2011;103:117-128.

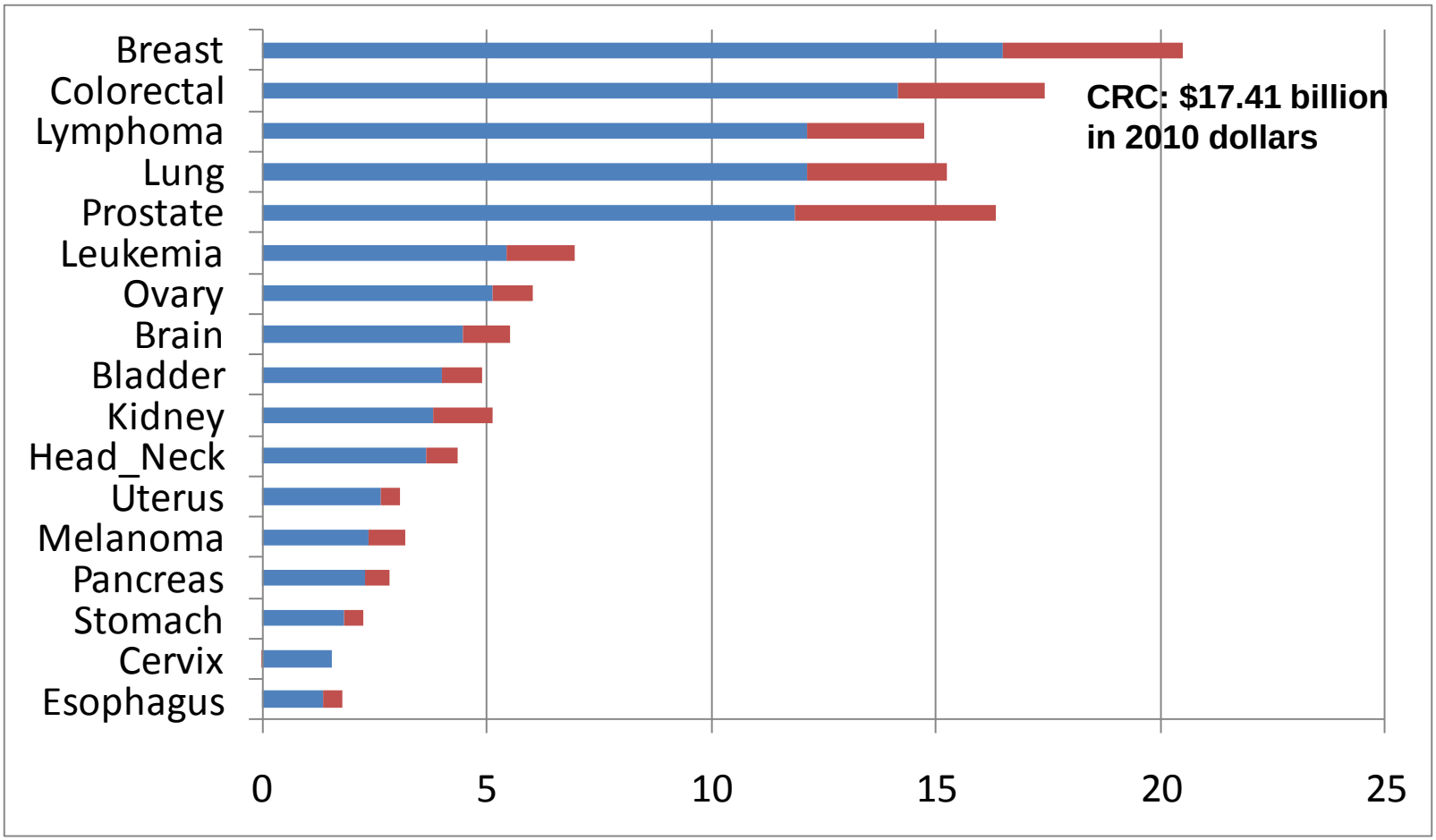
Estimated National Expenditures for Cancer Care in 2010 by Site (in billion $)



Total Cancer Expenditure in 2010: $124.57 Billion in 2010 dollars

Source: Mariotto AB, Yabroff KR, Shao Y, Feuer EJ, Brown ML. Projections of the costs of cancer care in the United States: 2010-2020. J Natl Cancer Inst 2011;103:117-128.

Projected Increase in National Expenditures in 2020 by Cancer Site (in billion $): Population Changes Only



Total Cancer Expenditure in 2020, Base Scenario: $157.77 Billion in 2010 dollars

Source: Mariotto AB, Yabroff KR, Shao Y, Feuer EJ, Brown ML. Projections of the costs of cancer care in the United States: 2010-2020. J Natl Cancer Inst 2011;103:117-128.

Projections of National Cancer Care Expenditures in 2020

Recent incidence and survival trends, and

- 2% increase annually in costs in initial and last year of life phases

All sites: $172.8 Billion
CRC only: $16.68 Billion

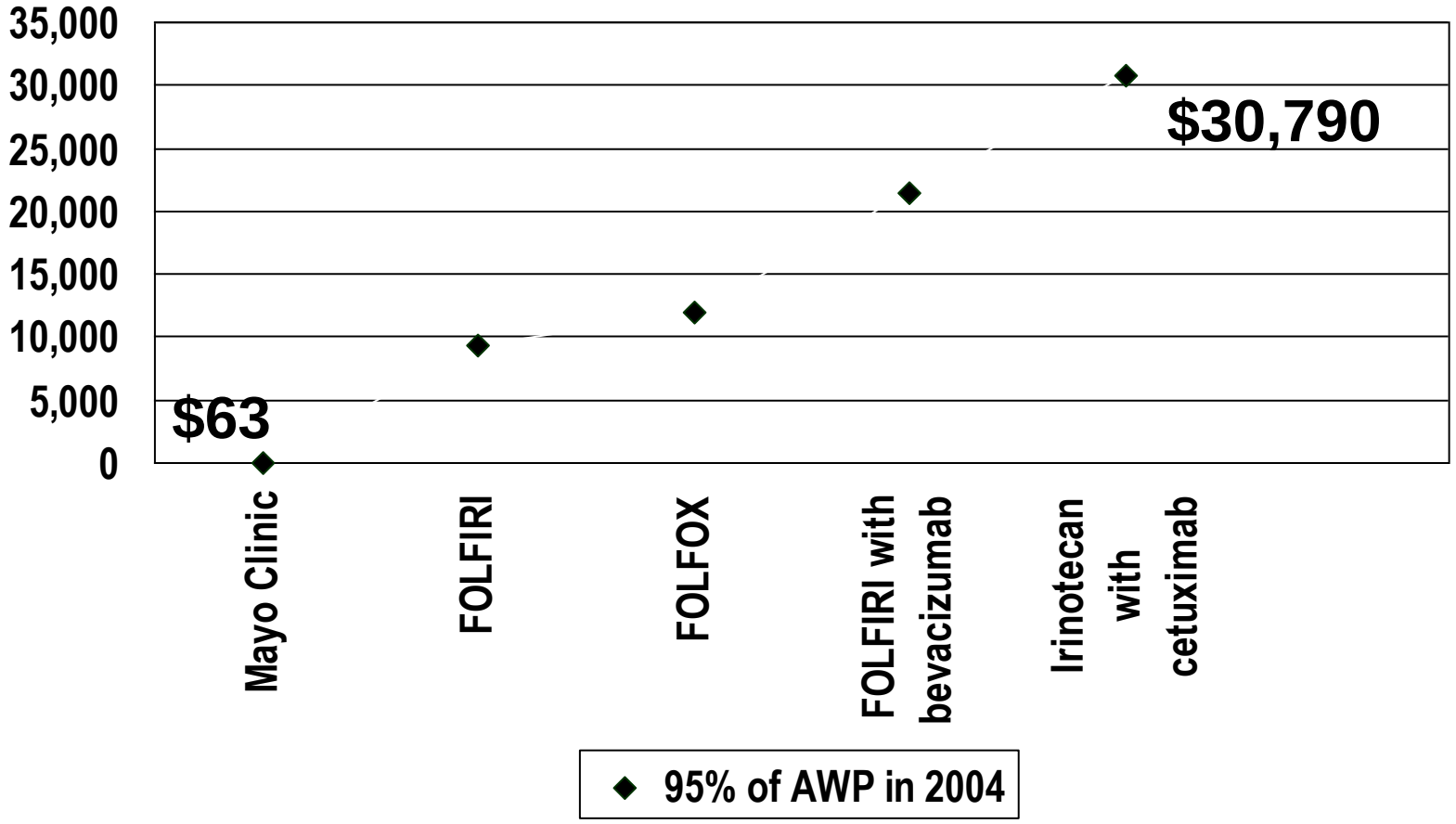
- 5% increase annually in costs in initial and last year of life phases

Overall: $206.6 Billion
CRC only: $20.39 Billion

- http://costprojections.cancer.gov/

Source: Mariotto AB, Yabroff KR, Shao Y, Feuer EJ, Brown ML. Projections of the costs of cancer care in the United States: 2010-2020. J Natl Cancer Inst 2011;103:117-128.

Estimated Drug Costs for 8 Weeks of Treatment for Metastatic Colorectal Cancer



Source: Schrag D. The price tag on progress-chemotherapy for colorectal cancer. N Engl J Med 2004;351(4):317-319.

Cost-effectiveness of Colorectal Cancer Screening

- Historically, cost-effectiveness estimates of colorectal cancer screening generally less than $20,000 per life year saved
- Lansdorp-Vogelaar used MISCAN-Colon (CISNET) microsimulation model to assess impact of increasing costs of colorectal cancer treatment
  - Well-validated model
  - Point at which screening interupts development of colorectal cancer
    - Adenoma detection and removal
    - Stage at diagnosis
  - Calculates life-years gained from screening compared to no screening
  - Stage- and phase-of-care- specific costs

Source: Lansdorp-Vogelaar I, van Ballegooijen M, Zauber A, Habbema DF, Kuipers EJ. Effect of rising chemotherapy costs on the cost savings of colorectal cancer screening. J Natl Cancer Inst 2009;101:1412-1422.

Cost Effectiveness of Colorectal Cancer Screening

- Multiple screening strategies evaluated
  - No screening
  - Hemoccult II
  - Immunochemical FOBT
  - Flexible sigmoidoscoy
  - Colonoscopy
  - Flexible sigmoidoscopy + Hemoccult II
- Near-future treatment scenario
  - Improved survival
  - Treatment with newer chemotherapy (e.g., 5-FU with oxaliplatin (FOLFOX))
  - Higher cost of treatment for stage III/IV and last year of life

Source: Lansdorp-Vogelaar I, van Ballegooijen M, Zauber A, Habbema DF, Kuipers EJ. Effect of rising chemotherapy costs on the cost savings of colorectal cancer screening. J Natl Cancer Inst 2009;101:1412-1422.

When Treatment is More Costly, Colorectal Cancer Screening Becomes Cost-Savings

- Lifetime average treatment savings larger than lifetime average screening costs
  - Hemoccult II ($1398 vs $859)
  - Immunochemical FOBT ($1756 vs $1565)
  - Flexible sigmoidoscopy ($1706 vs $1575)
  - Flexible sigmoidoscopy + Hemoccult II ($1931 vs $1878)
- Lifetime average screening costs larger than lifetime average treatment savings for colonoscopy ($2254 vs $1958)

Source: Lansdorp-Vogelaar I, van Ballegooijen M, Zauber A, Habbema DF, Kuipers EJ. Effect of rising chemotherapy costs on the cost savings of colorectal cancer screening. J Natl Cancer Inst 2009;101:1412-1422.

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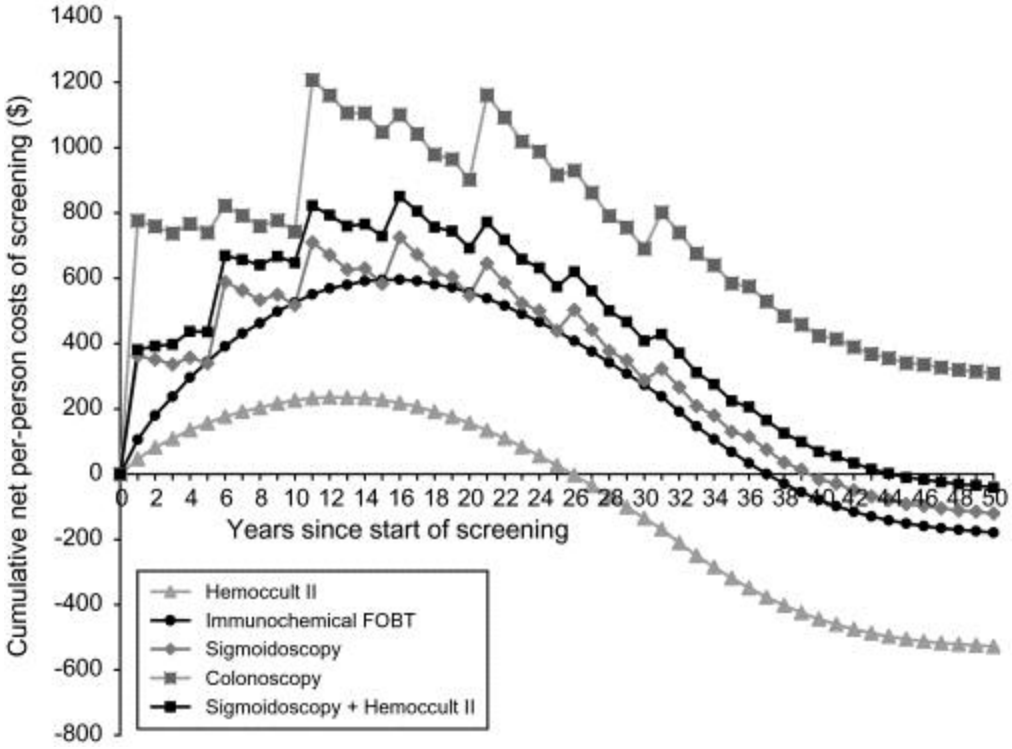

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Summary

- Costs associated with cancer projected to increase due to population changes, if treatment costs increase, impact even greater
- Cost of treating metastatic colorectal cancer increasing dramatically
- Simulation models can be used to simultaneously incorporate effects of changes in incidence, survival, screening, treatment patterns, and costs of care
- When treatment is more costly, colorectal cancer screening becomes “cost-savings”