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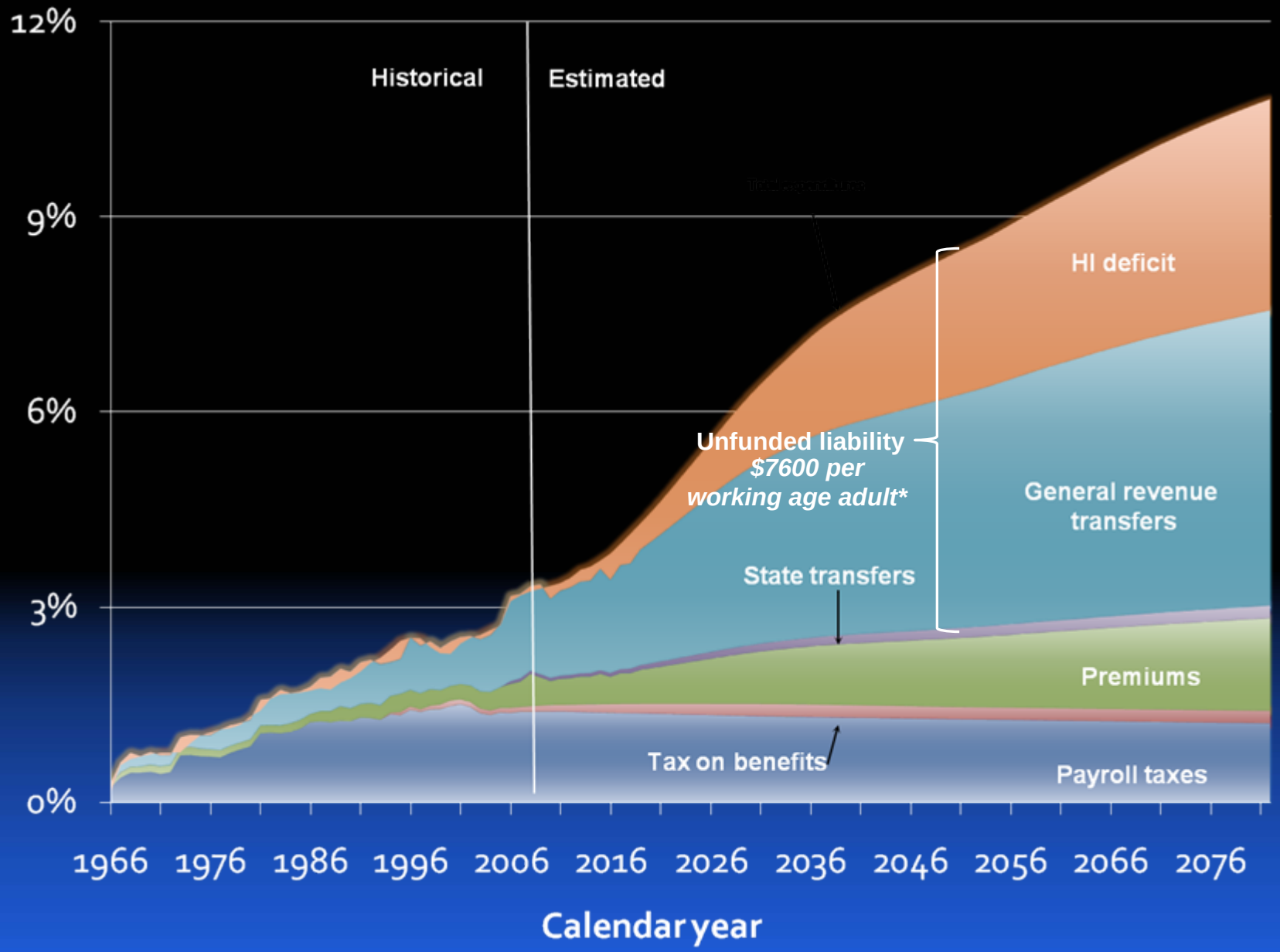
COMPARATIVE EFFECTIVENESS AND THE LIMITS OF EVIDENCE

Why is Washington interested in comparative effectiveness research?

Medicare sources of non-interest income and expenditures as a percentage of Gross Domestic Product



*In constant 2008 dollars

Source: Office of the Actuary, CMS; 2008 Medicare Trustees Report

Comparative Effectiveness Research May Reduce Expenditures

Lewin Associates: *$368 billion 10-year savings from "Center for Medical Effectiveness"*

*Lewin Associates calculations, in Bending the Curve, Commonwealth Fund Commission on a High Performance Health System, Dec. 2007

What can we hope to achieve from the collection of better evidence…

…and how can we apply it?

Overriding questions about comparative effectiveness

- Structure and funding of agency that is responsible for the research
- Priorities - which questions should be studied first?
- Data and methods - will new information be collected? What kind?
- Implementation
- *Will comparative effectiveness ignore costs?*

Priorities: How CMS Sets Evidentiary Priorities for Coverage with Evidence Development (CED)

Importance of question

Which diseases represent the greatest burden to Medicare beneficiaries?

Which diseases and their treatments are the costliest to the Medicare Program?

Value of incremental information

- Where are our greatest deficits in knowledge about the most important diseases and their treatments in the Medicare population as discussed in Questions 1 and 2?

Data and Methods: How Good Will the Evidence Be?

Options: Review existing data, or generate new information

- Randomized trials
- Registry
- Routinely collected clinical data
- Claims files and other administrative databases

Central methodological challenge: can you draw causal inferences about treatments and other health interventions from observational data?

Observational data can be refined at a cost

Common Criticisms of Observational Data

- Intervention may not be standardized
- No blinding
- Tests of statistical significance often misleading

Selection Effects

- Can they be eliminated?

  More detailed information about patient characteristics only partially mitigates

Inference Techniques

- Exploit natural experiments
  - Geographic characteristics as instrumental variables
- Matched controls without randomization
  - Constructed: propensity scores
  - "Natural": Intervention for disease whose outcome has little variability under alternative intervention

- Consider “randomization” by geography
- Declining costs of clinically detailed data will increase viability of observational approaches and decrease costs of RCTs

Should Comparative Effectiveness Research Ignore Costs?

Impact Of Selected Medical Technologies On Spending And Life Years, 2015 And 2030

Technology	Annual treatment cost ($ billions)		Increase in health care spending over status quo (%)		Cost per additional life year ($)
	2015	2030	2015	2030	
Anti-aging compound (healthy)	48.6	72.8	8.7	13.8	8,790
Cancer vaccines	0.5	0.8	0.1	0.4	18,236
Treatment of acute stroke	3.1	4.4	0.4	0.4	21,905
Anti-aging compound (unhealthy)	48.8	73.3	22.7	70.4	29,785
Telomerase inhibitors	4.4	6.4	0.2	0.5	61,884
Alzheimer's prevention	33.6	49.1	7.4	8.0	80,334
ICDs	14.0	20.7	3.6	3.7	103,095
Diabetes prevention	13.7	20.6	2.6	3.2	147,199
Anti-angiogenesis	38.8	51.9	8.8	8.0	498,809
LVADs	10.2	14.2	2.1	2.3	511,962
Pacemaker for atrial fibrillation	10.4	13.6	2.2	2.3	1,403,740

SOURCE: Simulations based on data from the Medicare Current Beneficiary Survey and the National Health Interview Study.

NOTES: All spending is in constant (1999) dollars. The exhibit shows the treatment costs, additional health care spending, and cost per additional life year associated with ten promising medical innovations. Treatment costs refer to the costs of providing the listed breakthrough technology and are based on comparisons with existing technologies as identified by expert panels. The additional health care spending differs from treatment costs because the technologies can lead to changes in disability, morbidity, and mortality, all of which are accounted for in the simulation model. Costs per additional life year do not include improvements in morbidity and disability during a lifetime and hence should be thought of as upper bounds on a cost-effectiveness ratio. ICD is intraventricular cardioverter defibrillator. LVAD is left ventricular assist device.

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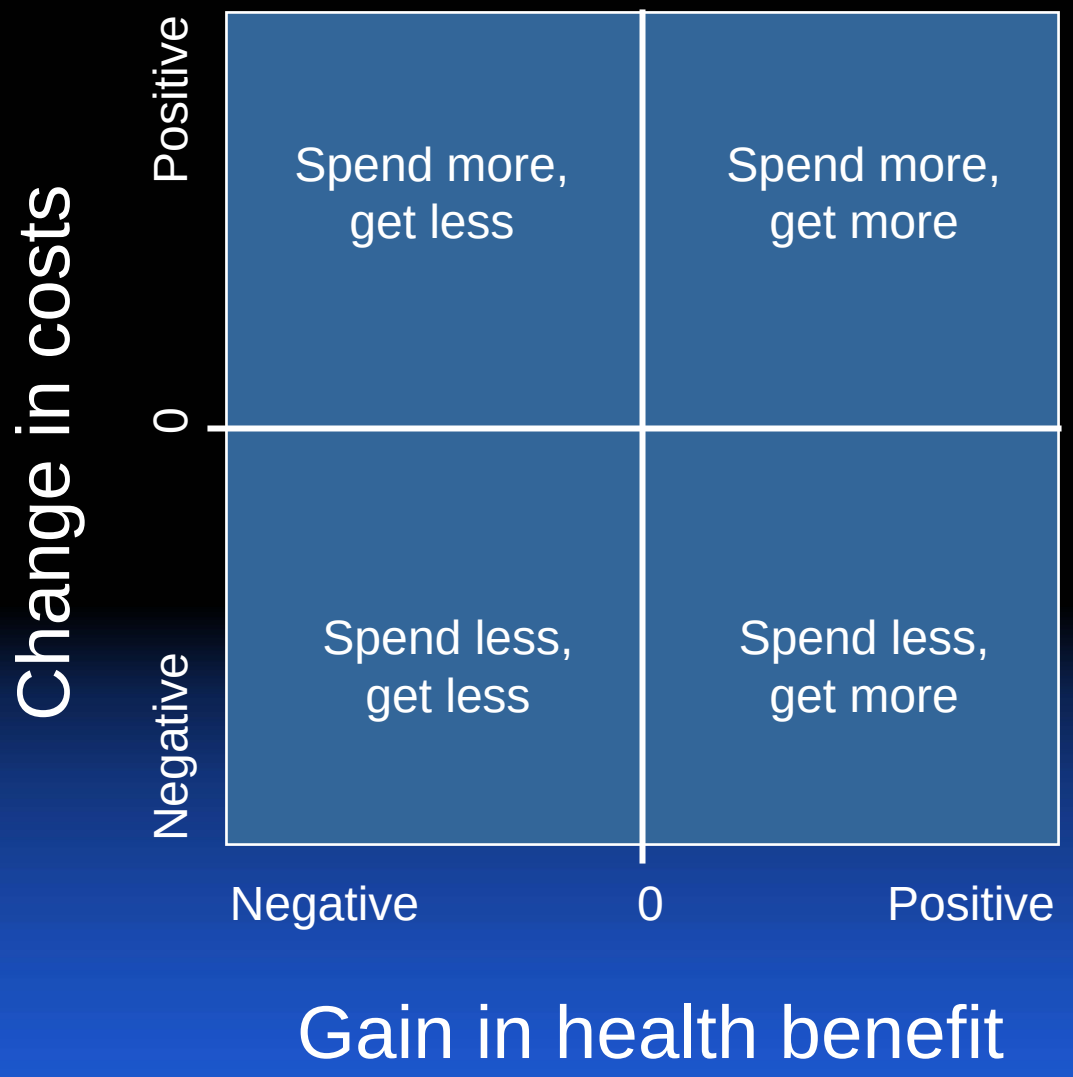
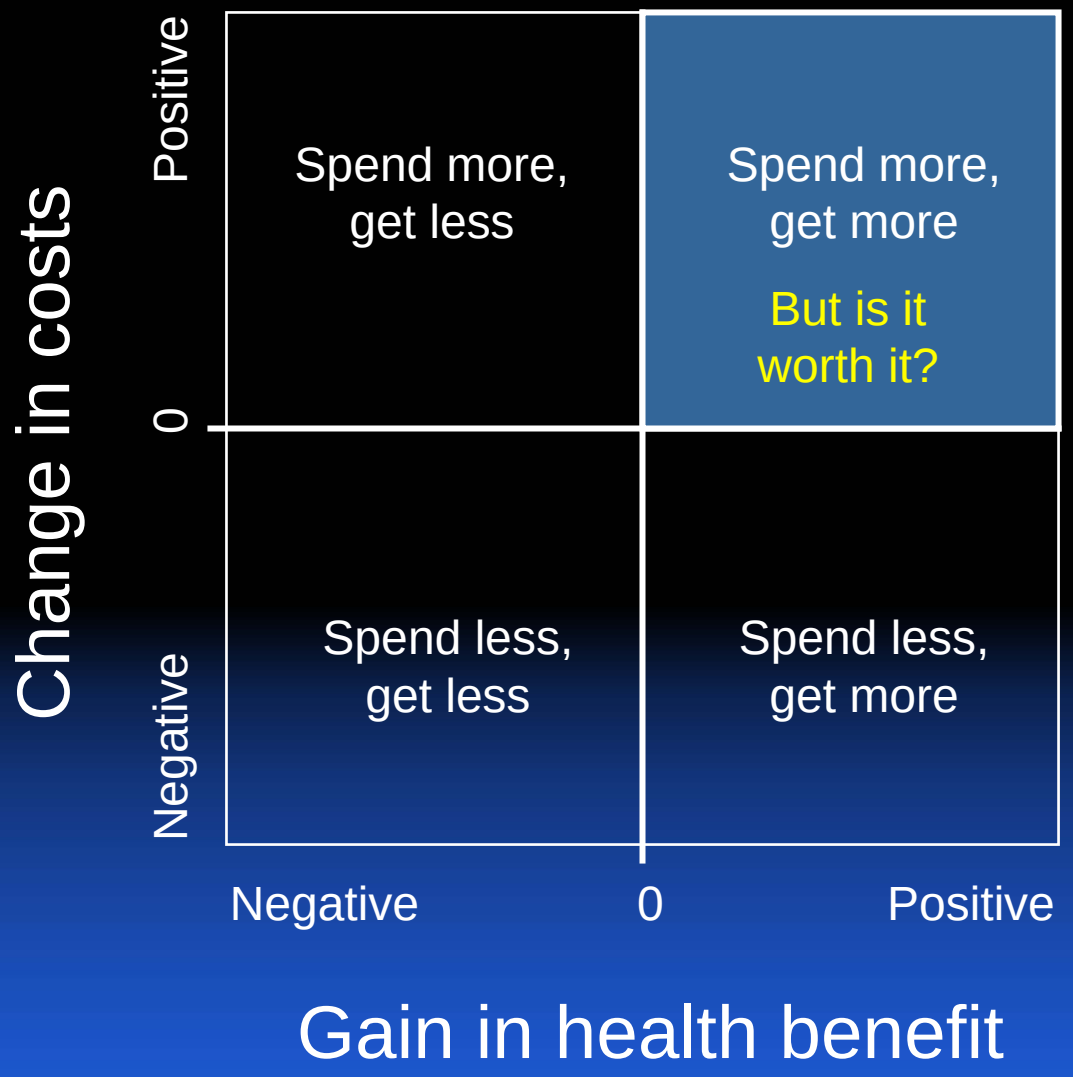
Cost-Effectiveness Analysis - A Complementary Tool

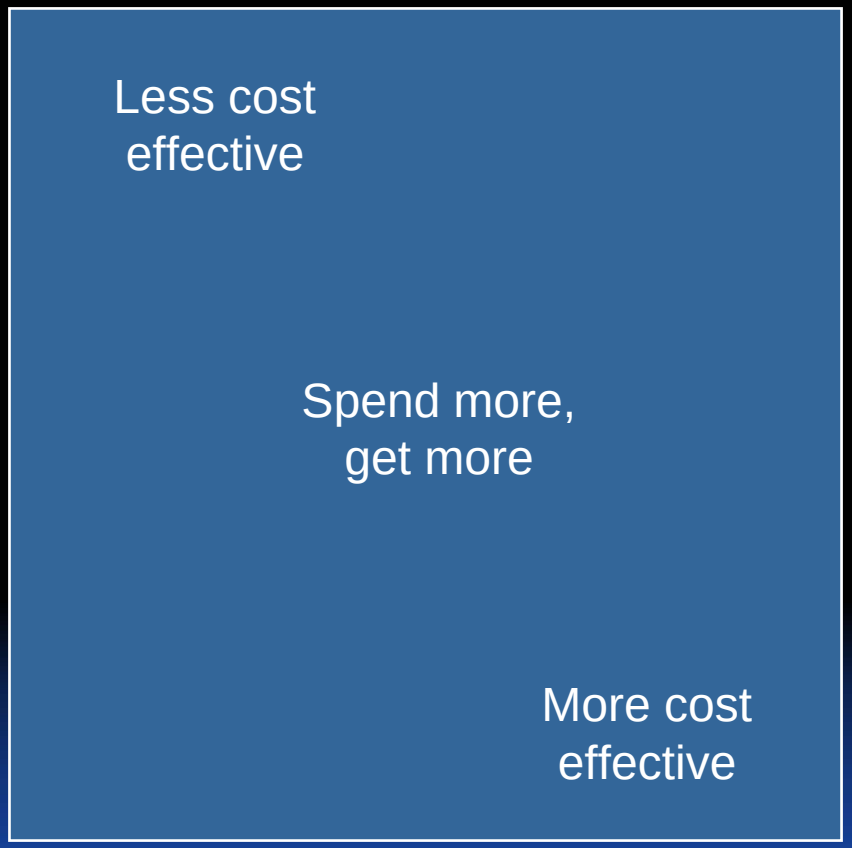
- Compare incremental costs and incremental outcomes of using a treatment or diagnostic test in a well-defined population
- Outcomes most frequently expressed as quality-adjusted life years (QALYs)


Change in costs
Positive
0
Negative
Spend more, get less
Spend more, get more
Spend less, get less
Spend less, get more
Negative
0
Positive
Gain in health benefit

Accounting for Value



Accounting for Value

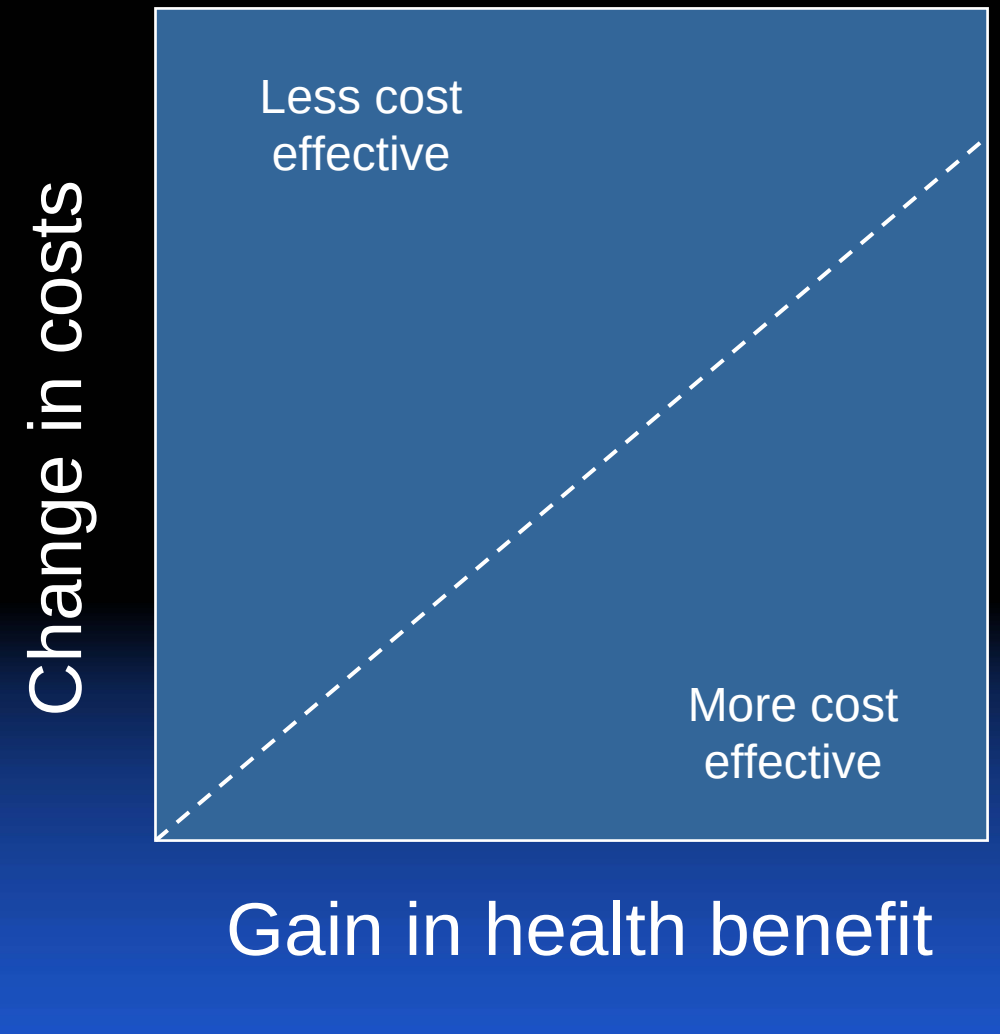


Accounting for Value

- **Health benefit measured in QALYs**
- **Value accounted by incremental cost-effectiveness ratio (CER)**

$$\text{CER} = \frac{\text{Chg in \$}}{\text{Chg in QALYs}}$$

- **Greater CER means less cost effectiveness**

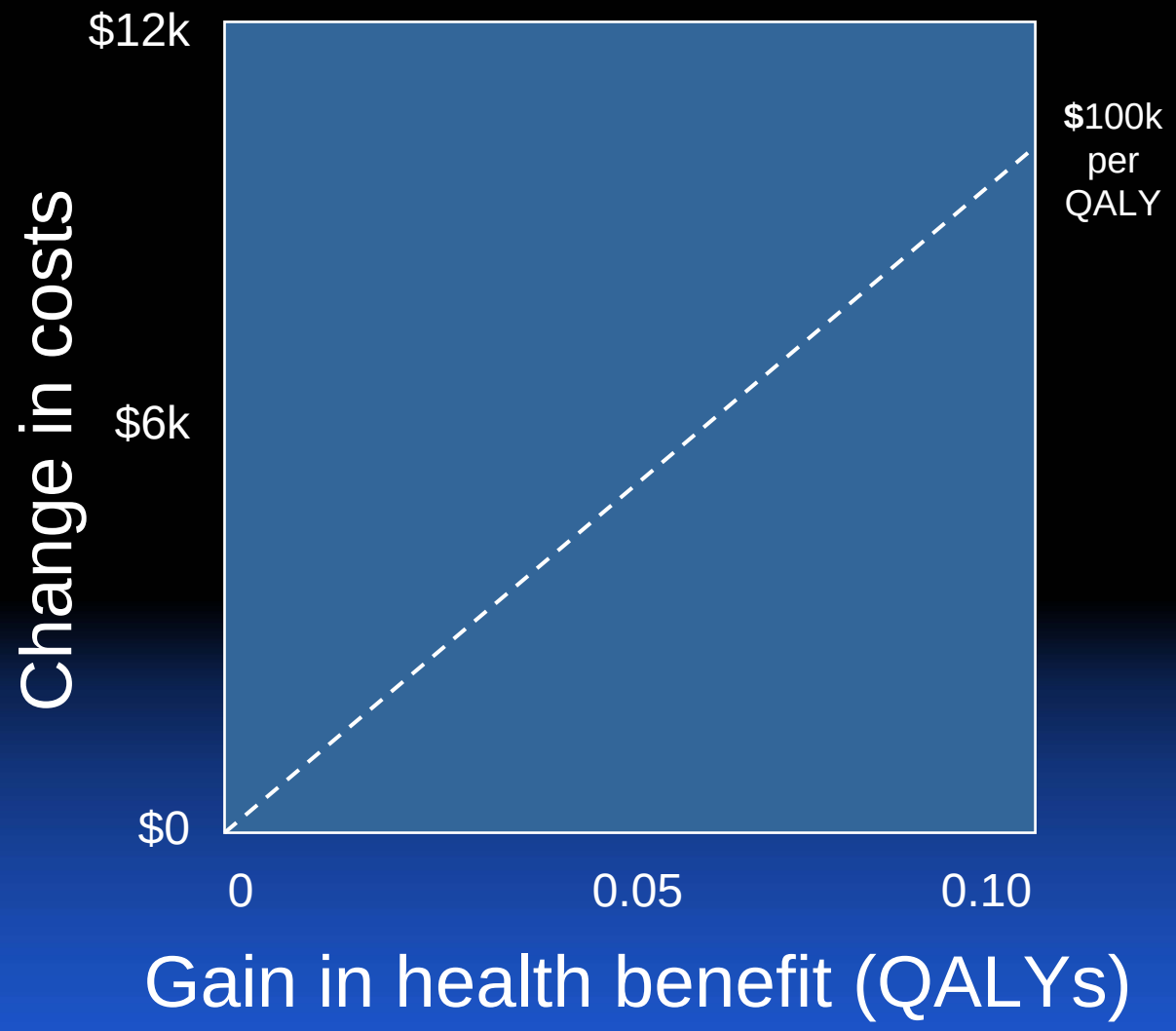


Applying Cost-Effectiveness Analysis:

COX-2 Inhibitors

COX-2 Inhibitors vs NSAIDS

Comparator: Naproxen



Source: Spiegel et al., The Cost-Effectiveness of Cyclooxygenase-2 Selective Inhibitors in the Management of Chronic Arthritis, Ann Intern Med. 2003;138:795-806.

COX-2 Inhibitors vs NSAIDS

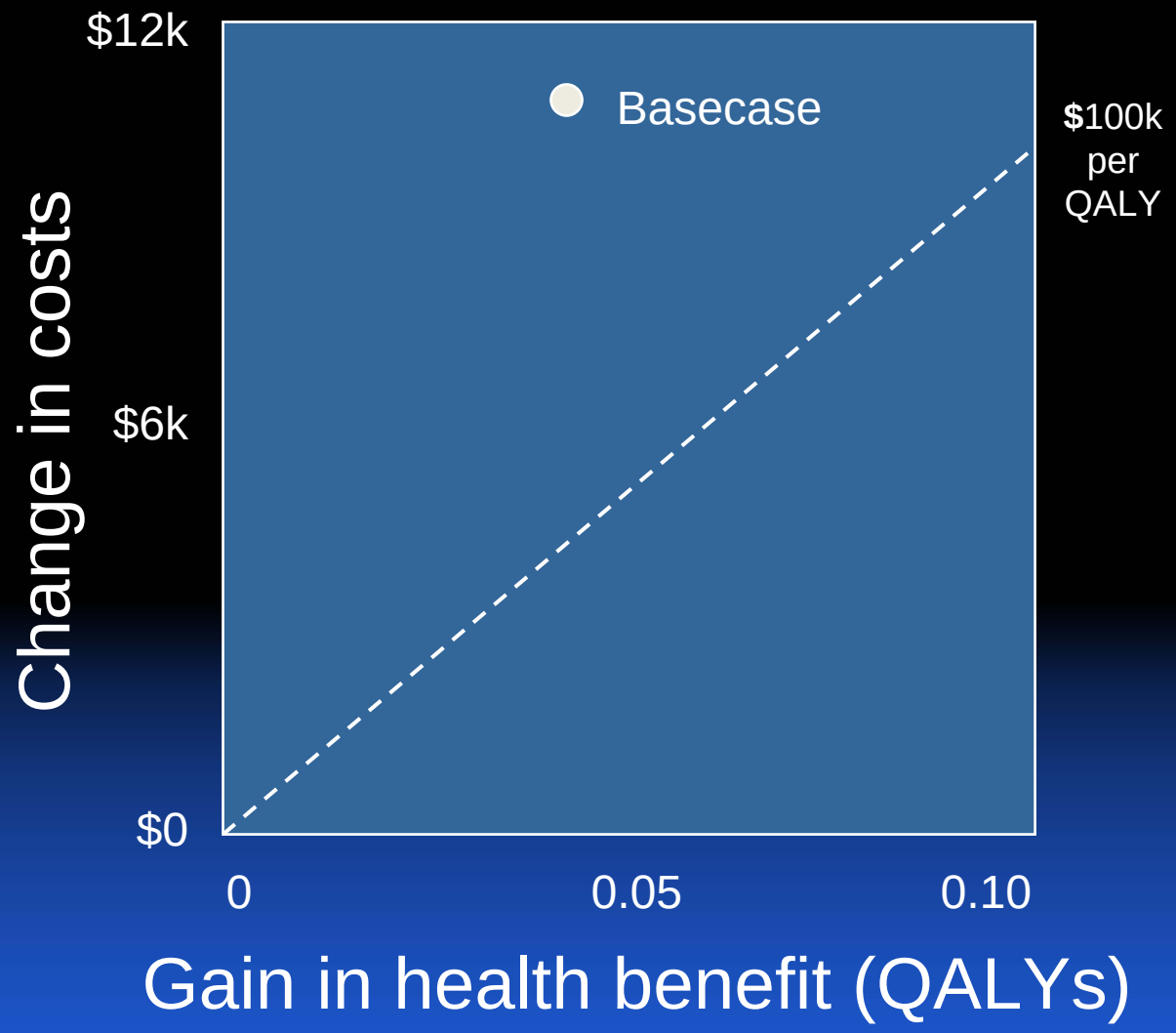
Comparator:
Naproxen

Assumption:
Excludes effects on heart

Change in cost:
$11,600

Change in benefit:
0.04 QALYs

Incremental CER:
$290,000/QALY



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COX-2 Inhibitors vs NSAIDS

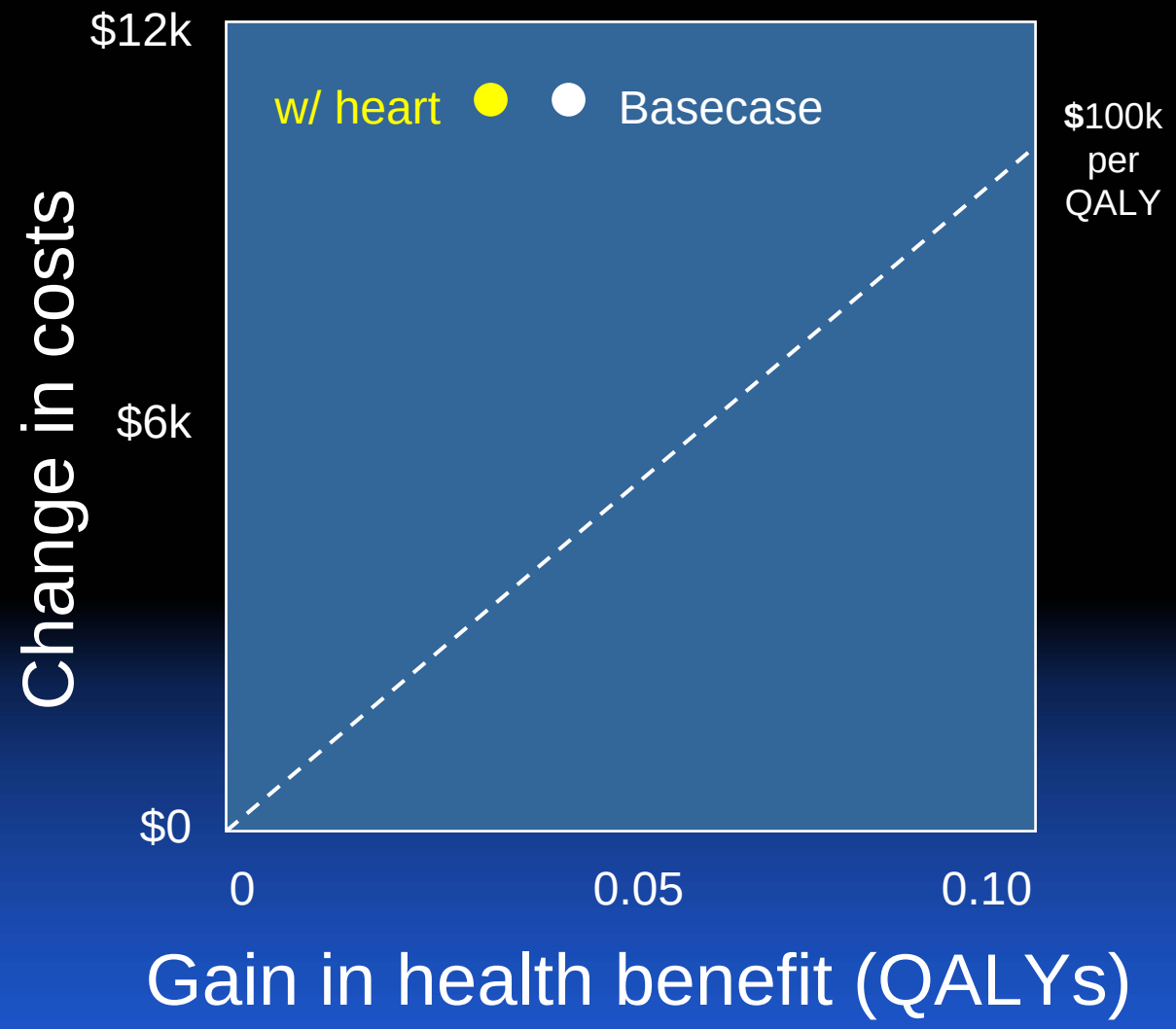
Comparator:
Naproxen

Assumption:
INCLUDES
effects on heart

Change in cost:
$11,600

Change in benefit:
0.03 QALYs

Incremental CER:
$395,000/QALY



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COX-2 Inhibitors vs NSAIDS

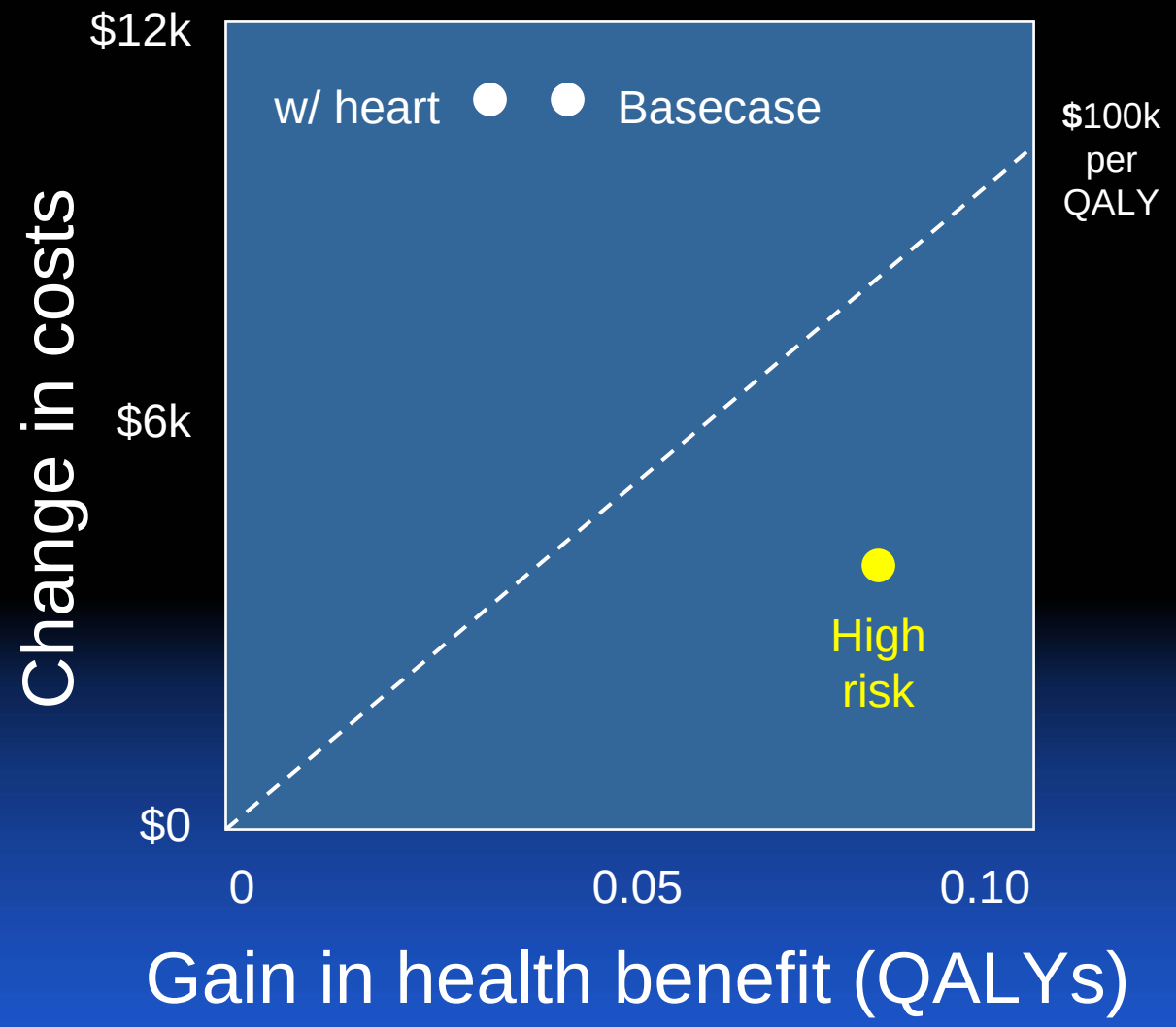
Comparator:
Naproxen

Assumption:
High-risk patients

Change in cost:
$4,720

Change in benefit:
0.08 QALYs

Incremental CER:
$56,000/QALY



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Should There Be a Role for Cost-Effectiveness?

- Modeling will almost always be needed to assess global effectiveness
- Comparative effectiveness = relevant comparisons
  - But doesn't address costs
  - Effect on costs uncertain

Applying Evidence of Effectiveness - And Value

- Agency conducting research need not make coverage decisions
- Information can be used to guide practice standards, identify high-performing hospitals and physicians, assist in benefit design
- May be used to negotiate prices