

# Health Economic Analysis and Methods

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# Educational Objectives

- **Types of Economic Evaluations in Health Care**
- **Economic Perspectives: Societal, Institutional**
- **Datasets: Measures of Cost and Effectiveness**
- **Medicare Data: Use and Implications**

# I. Types of Economic Evaluations

- **Four approaches to analyzing costs:**
  - **Cost Identification Analysis (CIA)**
  - **Cost Effectiveness Analysis (CEA)**
  - **Cost Benefit Analysis (CBA)**
  - **Cost Utility Analysis (CUA)**

Gold MR, Siegel JE, Russell LB, et al. *Cost-Effectiveness in Health and Medicine*. New York: Oxford University Press, 1996.

# I. Cost Identification Analysis (CIA)

- Also called “Cost Minimization Analysis”
- Answers the question, “What is the cost per service or program?”
- Goal is to select the least cost option
- Assumes health outcomes are the same for the two programs / interventions
- Ignores benefits or health outcomes

# I. Cost Effectiveness Analysis (CEA)

- Includes both costs and outcomes
- Numerator of Cost Effectiveness Ratio (CER) reflects change in cost
- Denominator reflects change in outcome (e.g., lives saved, complications averted, cases of illness prevented)

$\Delta$  Cost

$\Delta$  Outcome

# I. Cost Effectiveness Analysis (CEA)

- Testing to see if health outcomes are the same under two interventions/strategies
- If one of the interventions/strategies is cheaper and more effective, it “dominates” the other
- If an intervention/strategy is more expensive and more effective, it’s cost effective if the extra benefit justifies the extra cost

# I. Cost Effectiveness Analysis (CEA)

- Can only compare interventions whose benefits are measured in the same units of effectiveness
- Cannot inform decisions about how much to spend on housing, food, or education in relation to health care

# I. Cost Benefit Analysis (CBA)

- Answers the question, “Is the benefit worth the extra cost?”
- Aggregates all effects (benefits and costs) into dollar amounts
  - *This can be controversial: it involves asking consumers what they are willing to pay to avoid an injury or illness, for example*



# I. Cost Benefit Analysis (CBA)

- Provides no distinction between cost and effect, input or outcome
- Broader application than CEA
- Can inform decisions about how much to spend on housing, food, or education in relation to health care

# I. Cost Utility Analysis (CUA)

- A variant of CEA
- Measures outcomes in life-years of survival or quality-adjusted life years (QALYs)
- Can not typically perform CUA with claims data alone...

$\Delta$  Cost

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$\Delta$  QALYs

## II. Economic Perspectives

Whose costs/benefits should be considered?

- ***Societal Perspective*** (“gold standard”)
  - Health care institutions, patients, caregivers
- ***Institutional Perspective***
  - Health care institutions, third party payers

# II. Economic Perspectives

Whose costs/benefits are considered?

- ***Societal Perspective*** (“gold standard”)
  - Direct medical expenses
    - » Hospital Inpatient (IP)
    - » Outpatient care (OP)
    - » Prescriptions (Rx)
    - » Supplies, labs (e.g. x-rays, blood tests, etc.)

# II. Economic Perspectives

Whose costs/benefits are considered?

- ***Societal Perspective*** (“gold standard”)
  - Indirect medical expenses (accounting definition)
    - » Overhead (utilities)
    - » Facility (rent)
    - » Capital financing
  - Patient’s time (travel time, time lost from work/leisure)
  - Caregiver’s time (travel time, time caring for patient)

# II. Economic Perspectives

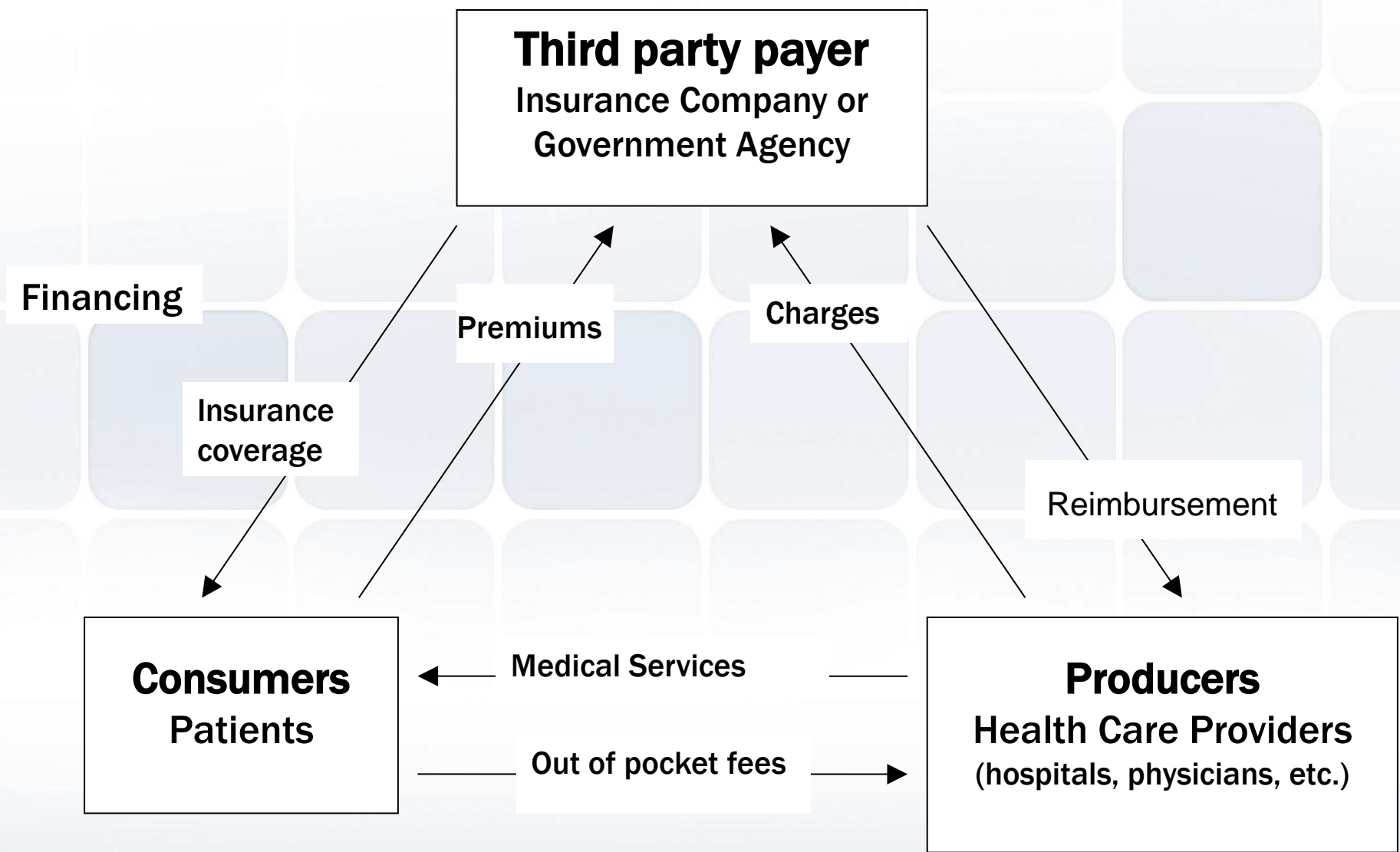
Whose costs/benefits are considered?

- *Institutional Perspective: (e.g. hospital or third party payer)*
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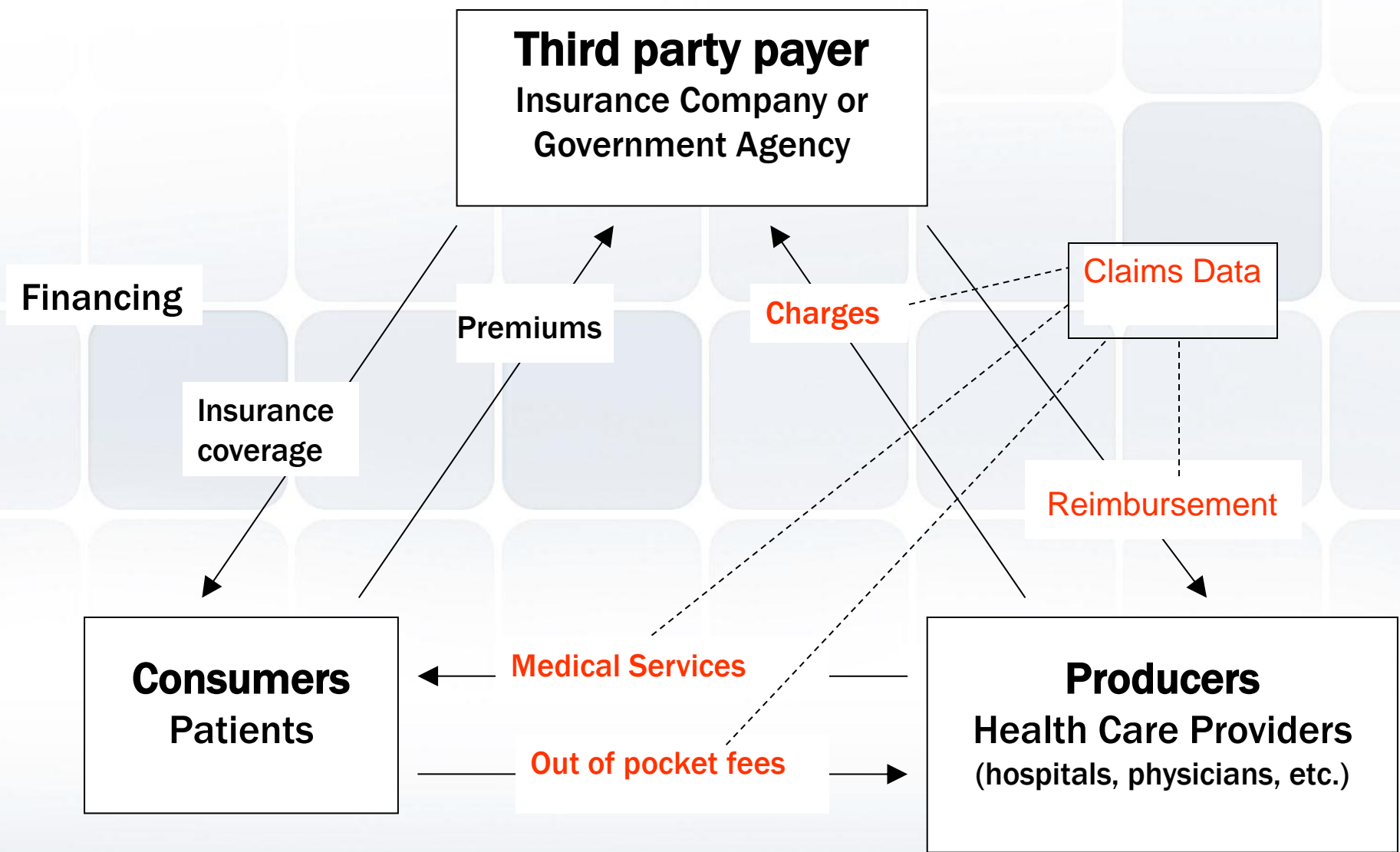
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    - » Capital financing







# III. Datasets: Measures of Cost

- **Third Party Payer:**

- **Claims data** represent reimbursement
  - » CMS files:
    - MedPAR
    - Standard Analytical Files (SAFs)

- **Hospital or Institution:**

- **Charges** represent institutional direct costs + overhead (indirects) + profits
- **Cost of services** represent institutional direct costs
  - » Medicare Claims & Cost Reports → cost to charge ratio

# III. Datasets: Measures of Cost

## ■ Societal Perspective:

- Cost of services represent institutional direct costs
  - » Medicare claims & Cost Reports → need to use cost to charge ratio
- If QALYs do not account for the value of patient's time lost from work, travel costs, and value of caregiver time, include these costs in numerator of CER
  - » Medicare claims & Master Beneficiary Summary files contain patients' zipcodes → calculate distance traveled to see providers
  - » CMS files: Provider of Service (POS) files contain institutions' zipcodes or Cost Report website
- NOT in CMS files:
  - » Time lost from work
  - » Caregiver's time

# III. Datasets: Measures of Effectiveness

- **QALYs - not in Medicare claims data**
- **Mortality**
  - Deaths (CMS data: MedPAR, Denominator/Master Beneficiary Summary file)
- **Morbidity measures**
  - LOS in hospital (CMS data: MedPAR, SAFs)
  - LOS in ICU (CMS data: MedPAR, SAFs)
  - Re-interventions & complications (CMS data: MedPAR, SAFs)

# III. Datasets: Measures of Effectiveness

## ■ Comorbidity measures

- Chronic conditions: CCW Master Beneficiary Summary Files contain indicator variables for chronic conditions
- Risk adjustment scores: use diagnoses (Dx) codes in claims files to calculate risk adjustment scores (e.g. Charlson, ACGs)
  - » May want to include all SAFs (e.g. Skilled Nursing Facilities (SNF), Home Health (HH), Hospice) for outpatient analyses
- Health & functional status measures are not in CMS claims data
  - » e.g. # Activities of Daily Living (ADLs)
  - » e.g. # Independent Activities of Daily Living (IADLs)

# III. Datasets: Measures of Effectiveness

- **Comorbidity measures**

- **Assessment datasets**

- » **Minimum Data Set (MDS)** – clinical assessment data for nursing home residents
    - » **Outcome and Assessment Information Set (OASIS)** – assessment data for home care patients
    - » **Inpatient Rehabilitation Facilities - Patient Assessment Instrument (IRF-PAI)**
    - » **Medicare Current Beneficiary Survey (MCBS) Access to Care Files** – health and functional status measures

# IV. Datasets: Use and Implications

- **Medicare**

1. Payment or reimbursement (claims)
2. Charges (vary by institutions)
3. Cost (what we're really trying to measure!)
4. Cost to charge ratios (calculation)

# IV. Datasets: Use and Implications

- **Medicare**

1. **Payment or Reimbursement**

- » Claims data
- » May or may not cover a specific institution's costs or charges
- » Offers standardized approach to measuring costs



# IV. Datasets: Use and Implications

## ■ Medicare

### 2. Charges

- » Lots of variation across hospitals
- » Within hospitals, lots of variation across departments
- » Accounting systems allow for cross subsidizing across departments
- » In theory, no upper limit on charges

# IV. Datasets: Use and Implications

## ■ Medicare

### 3. Cost (what we're really trying to measure!)

» Derived using Cost to Charge Ratios (CCR)

■  $CCR = \text{Cost} / \text{Charge}$

■  $\text{Cost} = \text{Charges} * CCR$

» Lots of variation across hospitals in overall CCRs

» Lots of variation in departmental CCRs within hospitals

# IV. Datasets: Use and Implications

## ■ Medicare

4. Cost to Charge Ratios (CCR) = Cost/Charge

» CCR < 1 → Cost < Charge → making \$\$

» CCR > 1 → Cost > Charge → losing \$\$

» Accounting systems allow for cross subsidizing across departments