Session 3: Determining Healthcare Costs in the United States

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Pharmaceutical Outcomes Research and Policy Program

with support from
Dr. Carrie Bennette
who provided a large
part of this material

OBJECTIVES

After this domestic costing session, workshop participants will be able to:

1. Define main differences between costing in the US compared to costing in low-income settings
2. Calculate financial costs from different perspectives with claims data
3. Adjust costs for inflation, timing, cost-charge ratio
4. Identify types of and sources for existing US cost data
5. Find best practices for conducting and reporting US cost analyses

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Costs in the US

What is different about costing in the United States compared to low-income settings?

- Opportunity costs
- Payers
- Perspective
- Transparency
- Heterogeneity
- Claims data
- Resources
- Guidelines

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US Healthcare Payers

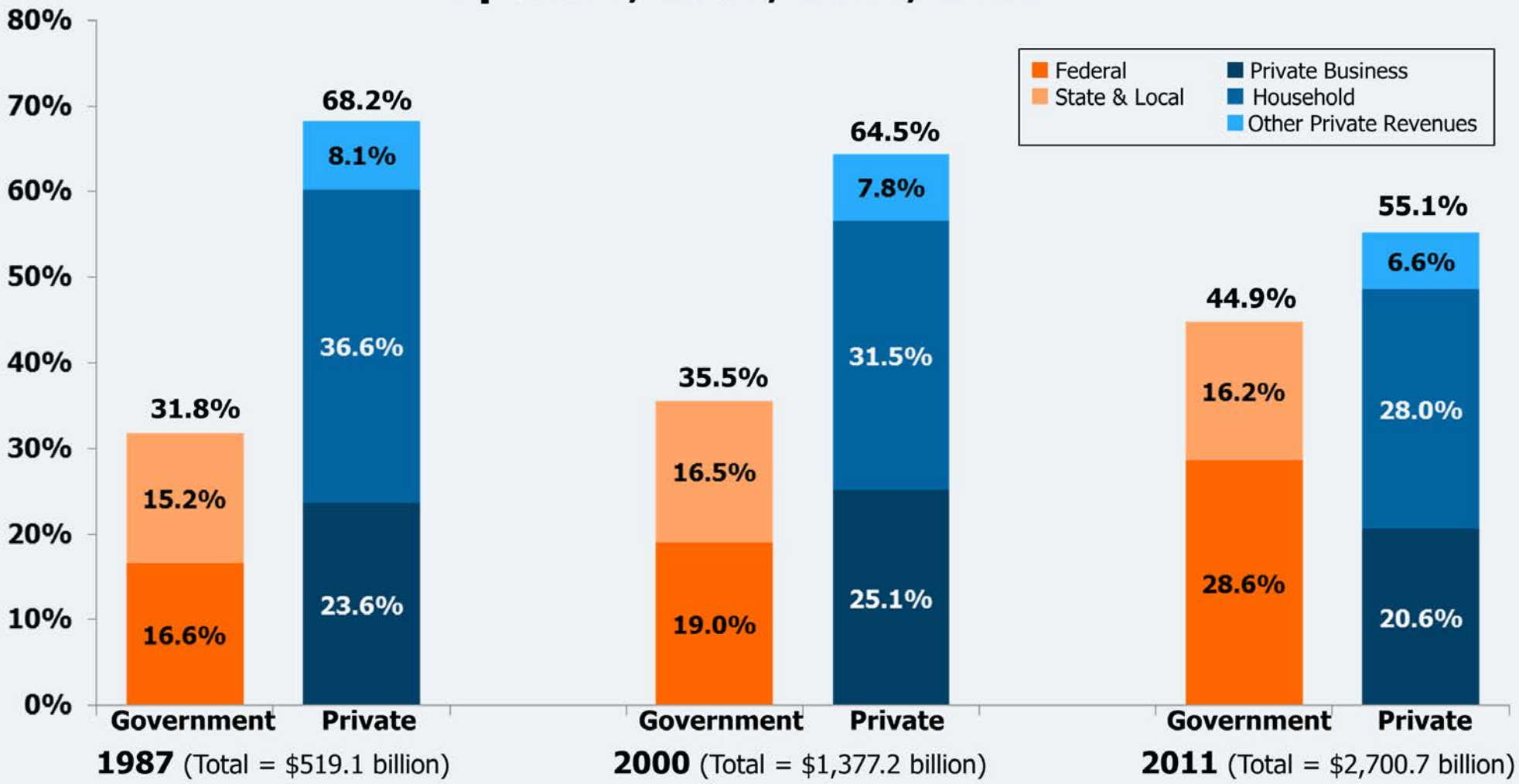
PUBLIC

- Centers for Medicare and Medicaid (CMS)
  - Medicare: national, >=65 yrs old
  - Medicaid: run by states, poor women & kids
- Public Health Service 340B program
- Veterans Affairs

PRIVATE

- Commercial insurance companies
  and their Pharmaceutical Benefits Managers
- Patient assistance programs
  - Hospitals
  - Pharmaceutical companies

Percent Distribution of National Health Expenditures, by Type of Sponsor, 1987, 2000, 2010



Notes: Starting with the 2009 NHE data, CMS expanded their focus on spending by Type of Sponsor, which provides estimates of the individual, business, or tax source that is behind each Source of Funds category and is responsible for financing or sponsoring the payments. "Federal" and "State & Local" includes government contributions to private health insurance premiums and to the Medicare Hospital Insurance Trust Fund through payroll taxes, Medicaid program expenditures including buy-in premiums for Medicare, and other state & local government programs. "Private Business" includes employer contributions to private health insurance, the Medicare Hospital Insurance Trust Fund through payroll taxes, workers' compensation insurance, temporary disability insurance, worksite health care. "Household" includes contributions to health insurance premiums for private health insurance, Medicare Part A or Part B, out-of-pocket costs. "Other Private Revenues" includes philanthropy, structure & equipment, non-patient revenues.

Source: Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group at https://www.cms.gov/NationalHealthExpendData/ (see Historical; NHE Web tables, Table 5).

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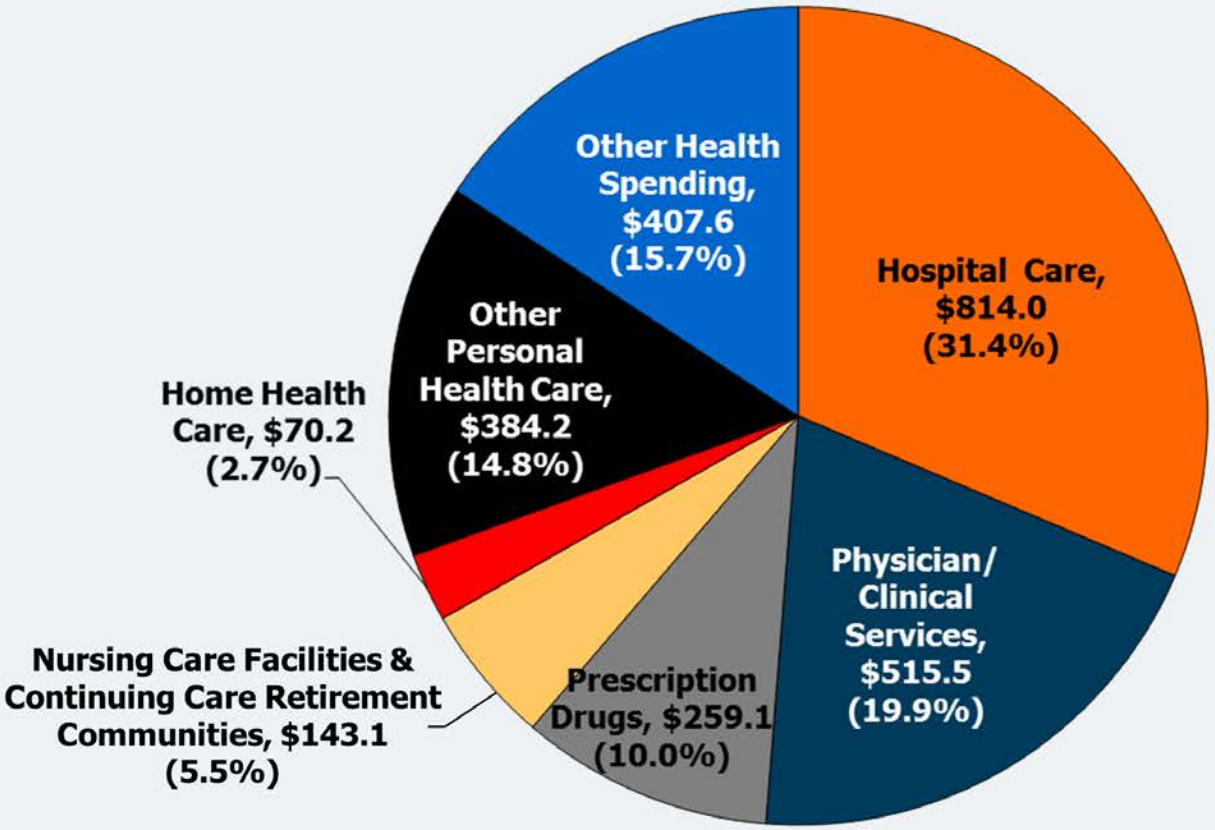
Distribution of National Health Expenditures, by Type of Service (in Billions), 2010



NHE Total Expenditures: $2,593.6 billion

Note: Other Personal Health Care includes, for example, dental and other professional health services, durable medical equipment, etc. Other Health Spending includes, for example, administration and net cost of private health insurance, public health activity, research, and structures and equipment, etc.

Source: Kaiser Family Foundation calculations using NHE data from Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group, at http://www.cms.hhs.gov/NationalHealthExpendData/ (see Historical; National Health Expenditures by type of service and source of funds, CY 1960-2010; file nhe2010.zip).

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Motivating Example

How much does it cost to have an echocardiogram in the US?

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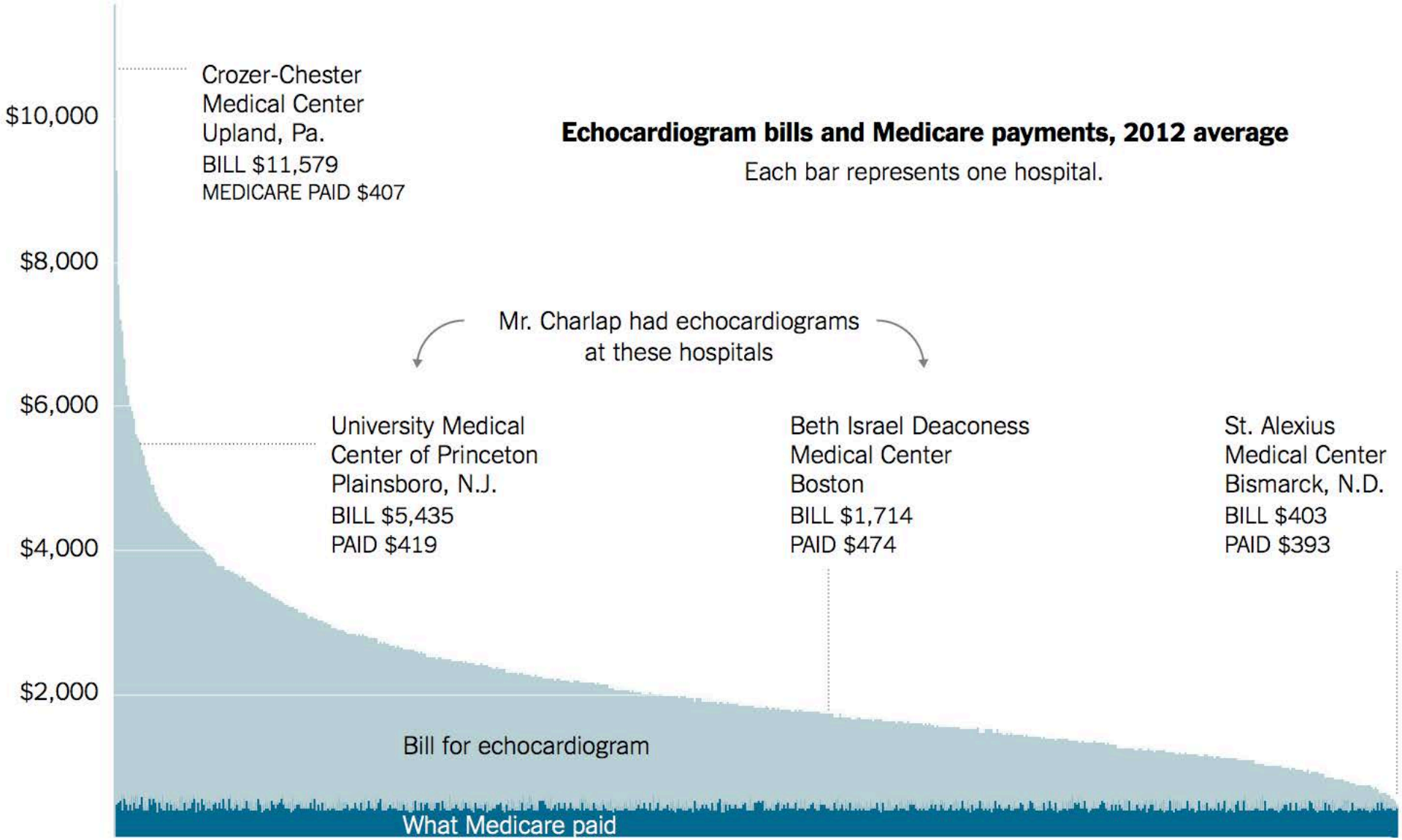
High Price for Simple Technology

The price tag for an echocardiogram in the United States can be several thousand dollars, but the actual value, according to Medicare, is several hundred.



Source: Centers for Medicare and Medicaid Services

Hannah Fairfield/The New York Times

EXAMPLE: Charge-to-Cost Ratio

Beth Israel Deaconess Medical Center (Boston)

Echocardiogram hospital charge: $1714

- Medicare reimbursement: $474
- Cost-to-charge ratio: $474/$1714 = 0.277

University Medical Center of Princeton

Echocardiogram hospital charge: $5435

- Medicare reimbursement: $419
- Cost-to-charge ratio: $419/$5435 = 0.077

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ACTIVITY

First find a partner and calculator to work with.

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2 PARTS:

Part 1: cost for an individual

Part 2: average cost for a population

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Cost of a surgery at UW

LIFEWISE

ASSURANCE COMPANY

P.O. Box 91059
Seattle, WA 98111-9159

This Is Not A Bill / No Action Required

The summary below is intended to help you understand cost and coverage for medical services received.

For services provided by UW MEDICAL CENTER on 11/18/2016

Amount Billed	25429.84	Full amount billed by your provider to your health plan.
LifeWise Network Discount if applicable	10924.49	LifeWise negotiates discounts with in-network providers on your behalf to help save you money.
Amount Paid By Your Health Plan	13926.87	Your health plan paid this portion of the Amount Billed.
Amount From Another Source if applicable	0.00	This amount could include payment from another plan or another source. See glossary for details.
Your Total Responsibility	**$578.48**	This is what you owe the provider. You may have already paid all or a portion of this amount at the time you received care or when you were billed by the provider.
Amount You Saved	**$24,851.36**	You saved 98% off of the Amount Billed. This amount includes the LifeWise Network Discount and Amount Paid By Your Health Plan.

Please see the details of your claim on page 3.

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Using Claims to Identify Cost

			Your Plan Discounts & Payments				Your Responsibility				
Service/Product	Dates of Service	Amount Billed	LifeWise Network Discount	Amount Paid By Your Health Plan	Amount From Another Source	Total Plan Discounts & Payments	Copay	Deductible	Coinsurance	Amount Not Covered	Your Total Responsibility
Pharmacy Services	11/18 - 11/18	1698.57		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Pharmacy Services	11/19 - 11/19	398.11		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Supplies	11/18 - 11/18	1025.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Blood Draw	11/18 - 11/18	39.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Blood Draw	11/19 - 11/19	39.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Lab:Transfusion Services	11/18 - 11/18	92.00		161.26	0.00		0.00	0.00	17.92	0.00	17.92
Lab:Transfusion Services	11/18 - 11/18	92.00		391.41	0.00		0.00	0.00	43.49	0.00	43.49
Lab:Transfusion Services	11/18 - 11/18	92.00		155.60	0.00		0.00	0.00	17.29	0.00	17.29
Lab Test: Blood/Plasma	11/18 - 11/18	82.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Lab Test: Blood/Plasma	11/19 - 11/19	75.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Lab Test: Tissue	11/18 - 11/18	539.00		874.21	0.00		0.00	0.00	97.13	0.00	97.13
Exam/Procedure	11/18 - 11/18	16217.00		12073.39	0.00		0.00	0.00	402.65	0.00	402.65
Anesthesia	11/18 - 11/18	3175.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Injection	11/18 - 11/18	298.90		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Injection	11/18 - 11/18	76.24		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Injection	11/18 - 11/18	77.38		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Injection	11/18 - 11/18	82.70		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Drug/Solution	11/18 - 11/18	76.50		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Drug/Solution	11/18 - 11/18	77.02		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Pharmacy Services	11/18 - 11/18	554.42		271.00	0.00		0.00	0.00	0.00	0.00	0.00
Recovery Room	11/18 - 11/18	623.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00
Totals		**$25429.84**	**$10924.49**	**$13926.87**	**$0.00**	**$24851.36**	**$0.00**	**$0.00**	**$578.48**	**$0.00**	**$578.48**

			Your Plan Discounts & Payments				Your Responsibility				
Service/Product	Dates of Service	Amount Billed	LifeWise Network Discount	Amount Paid By Your Health Plan	Amount From Another Source	Total Plan Discounts & Payments	Copay	Deductible	Coinsurance	Amount Not Covered	Your Total Responsibility
Exam/Procedure	11/18 - 11/18	4119.10	1891.26	2005.06	0.00	3896.32	0.00	0.00	222.78	0.00	222.78
Totals		**$4119.10**	**$1891.26**	**$2005.06**	**$0.00**	**$3896.32**	**$0.00**	**$0.00**	**$222.78**	**$0.00**	**$222.78**

What is the "cost" of a hysterectomy at UW?

A) $29,585

B) $801

C) $12,475

D) $15,932

E) Other

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ACTIVITY

First find a partner and calculator to work with.

2 PARTS:

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Charge -> Cost

- Influenza hospital charge: $10,000
- Create cost-to-charge ratio for a hospital using all costs & charges for a DRG:

DRG	Total Charges	Covered Charges	Medicare Reimbursement	Number of Discharges	Average Days
79	$3,153,694,276	$3,120,337,113	$1,323,306,929	171,606	8.5

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CLAIMS DATA

When you have time and/or money to do an analysis using

1. MEPS
2. Truven MarketScan
3. Premera
4. Medicare and Medicaid

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MEPS – 1 of 2

Medical Expenditure Panel Survey (MEPS)

- "MEPS collects data on the specific health services that Americans use, how frequently they use them, the cost of these services, and how they are paid for, as well as data on the cost, scope, and breadth of the health insurance held by and available to U.S. workers"
- Annual data releases since 1996 – surveys of families, individuals and their medical providers (doctors, hospitals, pharmacies, etc) and employers.
- Free and publicly available, nationally representative

Provided by Carrie Bennette

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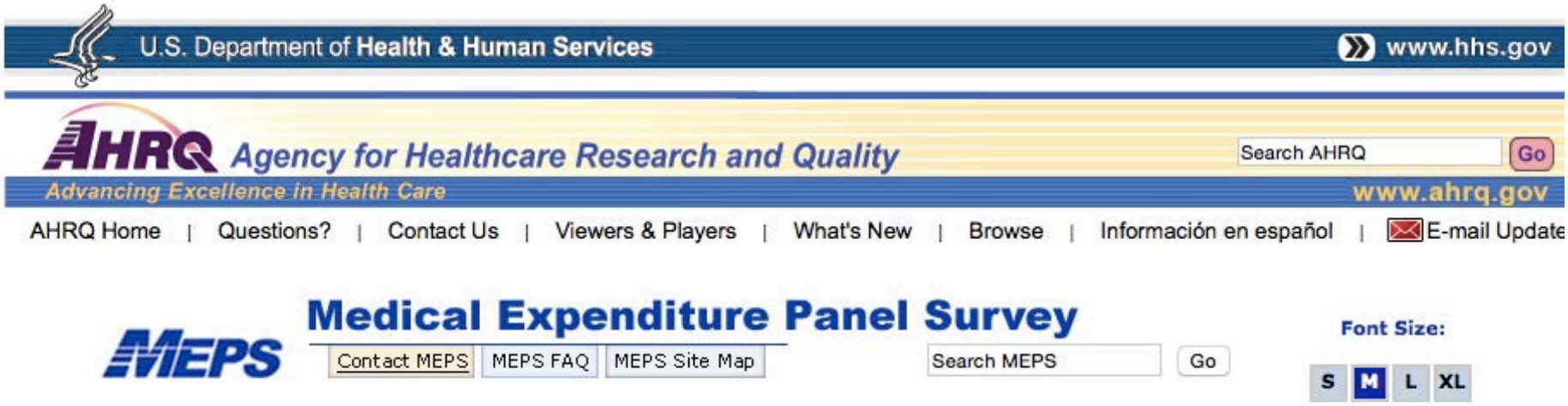
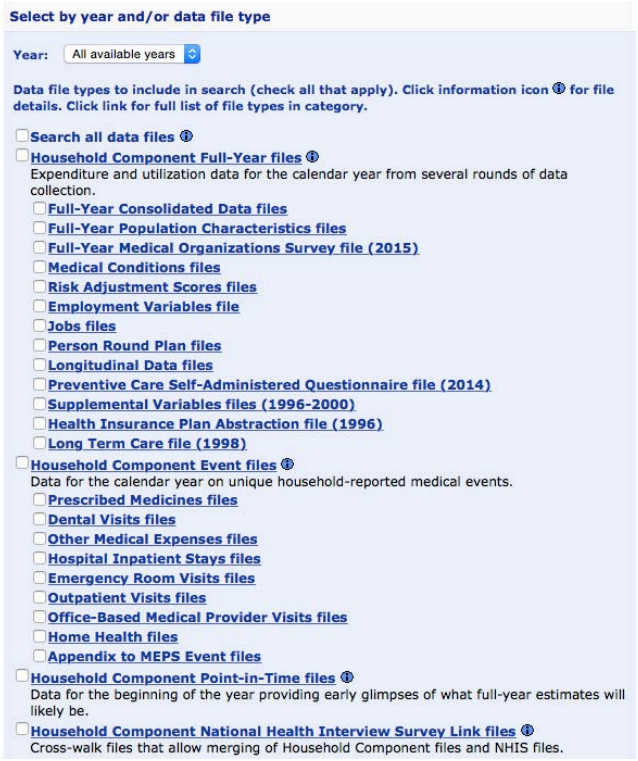
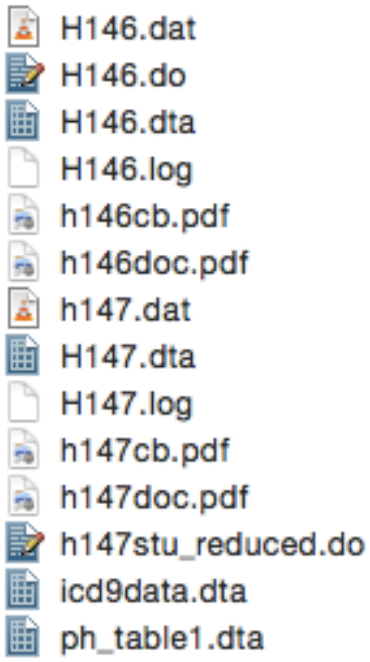
MEPS – 2 of 2







https://meps.ahrq.gov/mepsweb/data_stats/download_data_files.jsp

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MarketScan Databases

TRUVEN HEALTH ANALYTICS™
an IBM Company

More Than Data.
Answers.

- "Fully integrated patient-level data (inpatient, outpatient, drug, laboratory, health and productivity management… dental, and benefit design)"
- Commercial, Medicare, and Medicaid claims reflect real-world treatment patterns
- Population: 1.4 million people followed over time
- Proprietary (UW Department of Pharmacy pays $$$ for access)

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DATA

How to find some things easily online

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Summary of Resources

- Literature Search (start here)
- Centers for Medicare and Medicaid (CMS)
- Veterans Affairs
- Bureau of Labor Statistics
- MEPS
- Truven MarketScan Databases
- Premera
- Healthcare Cost and Utilization Project (HCUP)

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Practical Tip

- Start with a literature review
- Look for cost & cost-effectiveness studies
- What methods have similar studies used?
  - Critically evaluate methods
- Consider that medical practice & technology has changed considerably in the past 10-20 years

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Provided by Carrie Bennette

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Medicare

Centers for Medicare and Medicaid (CMS)

Physician Fee Schedule Search

http://www.cms.gov/apps/physician-fee-schedule/

- Based on Current Procedural Terminology (CPT) codes (also called HCPCS Level I)

- Research Data Assistance Center (ResDAC) offers free assistance to academics and non-profits
- Explore www.data.gov/health for other publicly available sources

Provided by Carrie Bennette

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ACTIVITY

Divide into four groups and bring your computer.

Each group will try to find the "price" of a drug using a different method or source.

Report back to large group: $ and time to find

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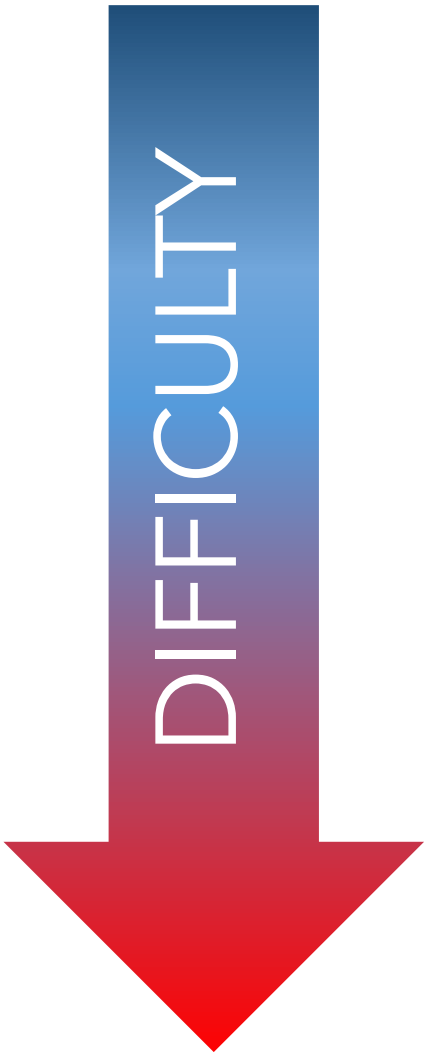
EXERCISE: online resources



Define the cost of a 30-day supply of Truvada using:

1. Retail Pharmacy prices: GoodRx.com
2. Veterans Affairs: National Acquisition Center Pharmaceutical Catalog Search Tool
3. Redbook Average Wholesale Price: UpToDate Database (UW Library)
4. Medicaid State Drug Utilization Data
5. MEPS
6. MarketScan

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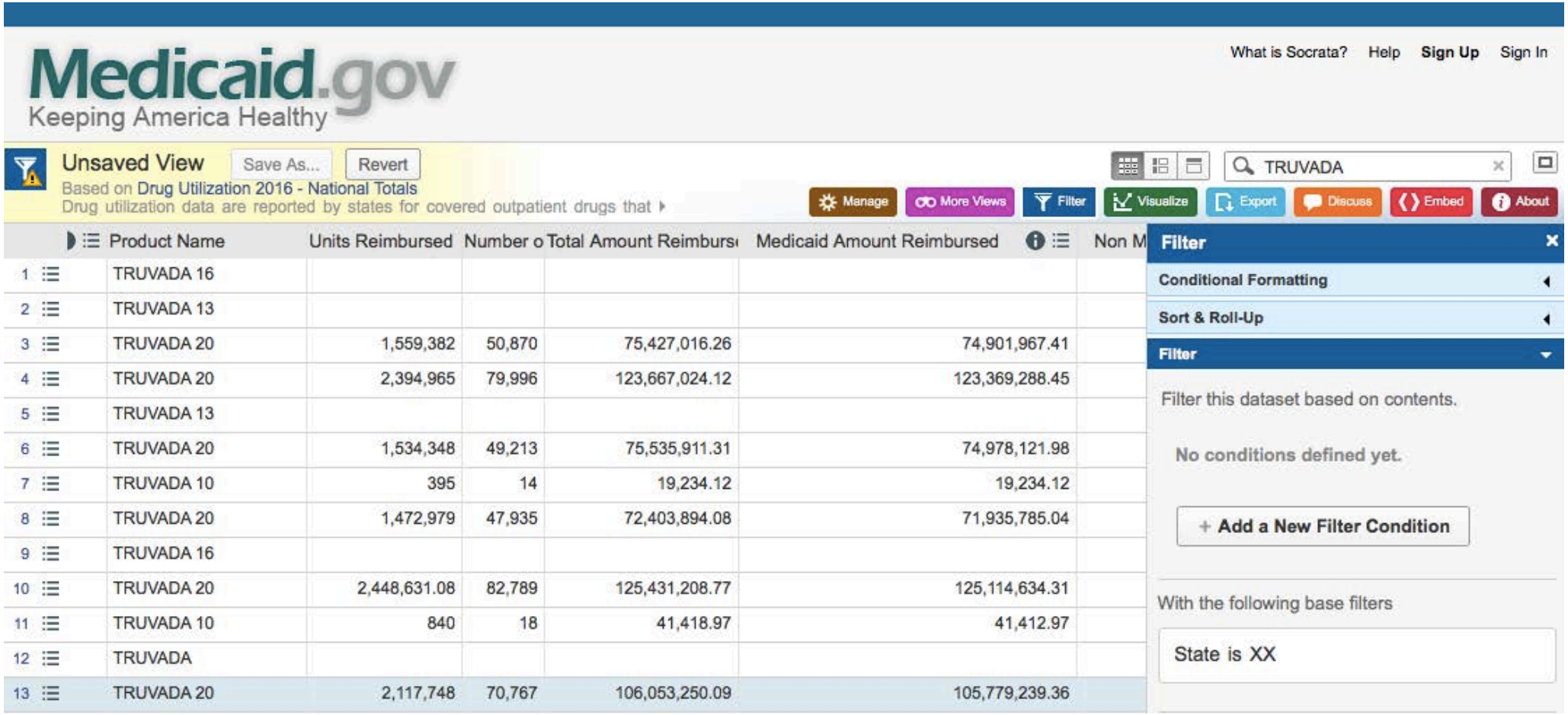


https://www.medicaid.gov/medicaid/prescription-drugs/state-drug-utilization-data/index.html

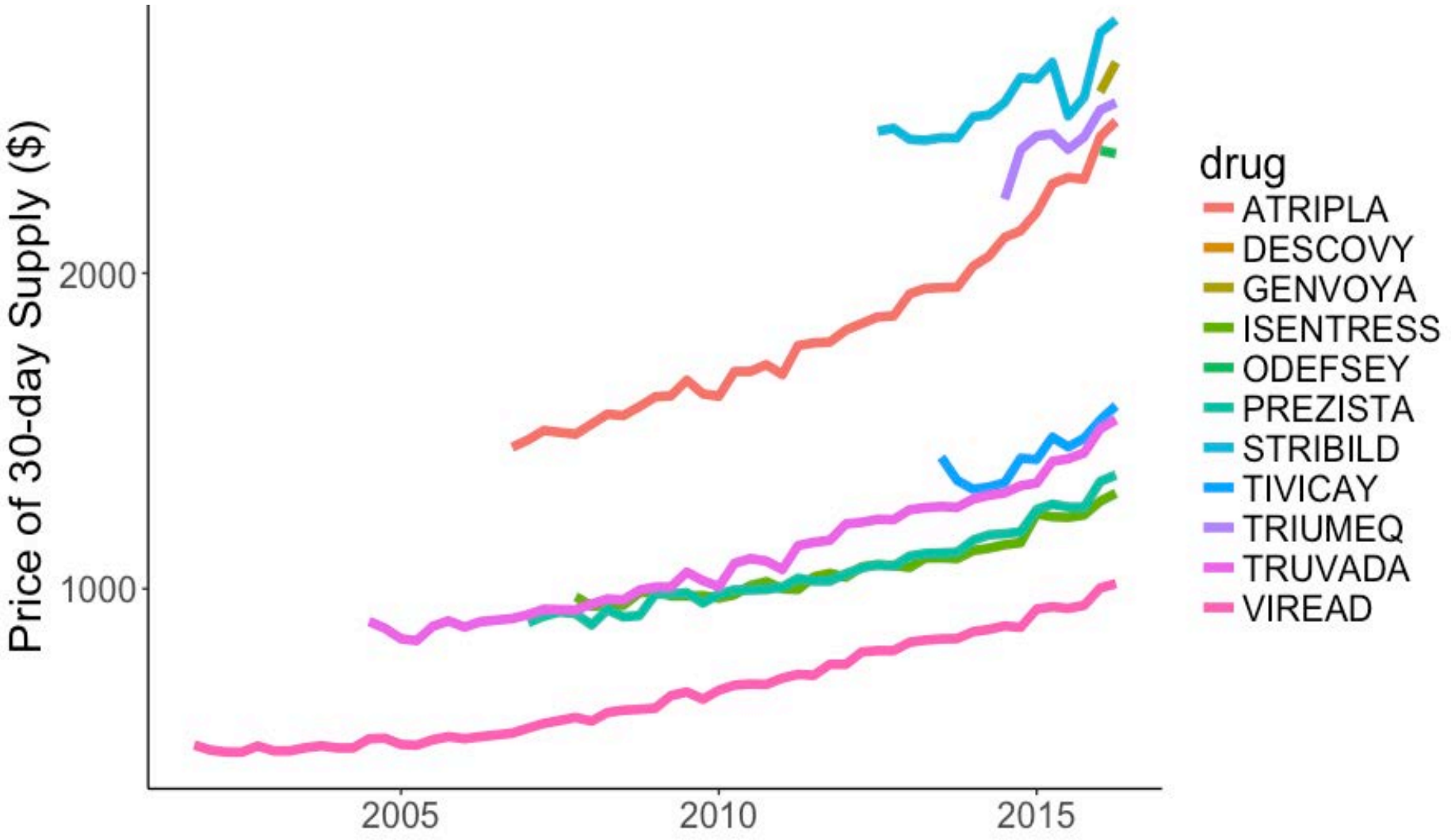
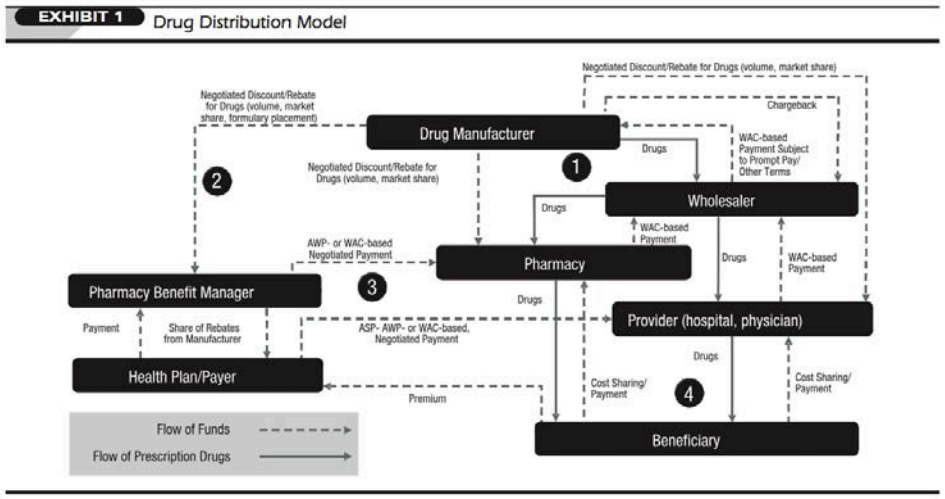


Figure 1. Average Medicaid reimbursement for a 30-day supply of first-line HIV drugs have increased 5% each year after adjusting for medical inflation (2016 US$).

Payment Benchmarks



COMPLEX DRUG PURCHASING & PAYMENT SYSTEM IN THE US

- Wholesale acquisition cost (WAC) "list price"
- Average wholesale prices (AWP) "sticker price"
- Average sales prices (ASP) Medicare Part B Fee Schedule
- Average Manufacturer Price (AMP) includes discounts and rebates
- Maximum Allowable Cost (MAC) top secret within private payers

"The AMCP Guide to Pharmaceutical Payment Methods"
http://www.amcp.org/WorkArea/DownloadAsset.aspx?id=9856

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EXCERCISE

Grab your partner and calculator.

We are going to do a mini-microcosting in cancer.

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EXERCISE: microcosting

Cetuximab

Trade name Erbitux©

Treatment for metastatic colorectal cancer.

This monoclonal antibody is given by weekly infusion.

Worldwide sales of $1.9 B

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EXERCISE: microcosting

What is the total cost of Cetuximab for for metastatic colorectal cancer (mCRC)?

- Unit cost: ASP for cetuximab: $49.73/10 mg; physician visit: $133; infusion cost/hour: $141
- Dose: IV: Initial dose of 400mg/square meter, followed by 250mg/square meter weekly
- Average body surface area: 1.76m^2
- Treatment duration: 1.9 months
- 1 physician visit and 1 hour infusion time per infusion

Example provided by Carrie Bennette

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BEST PRACTICES

Recommendations from the 2nd US Panel and the SMDM-ISPOR Good Research Practices Task Forces

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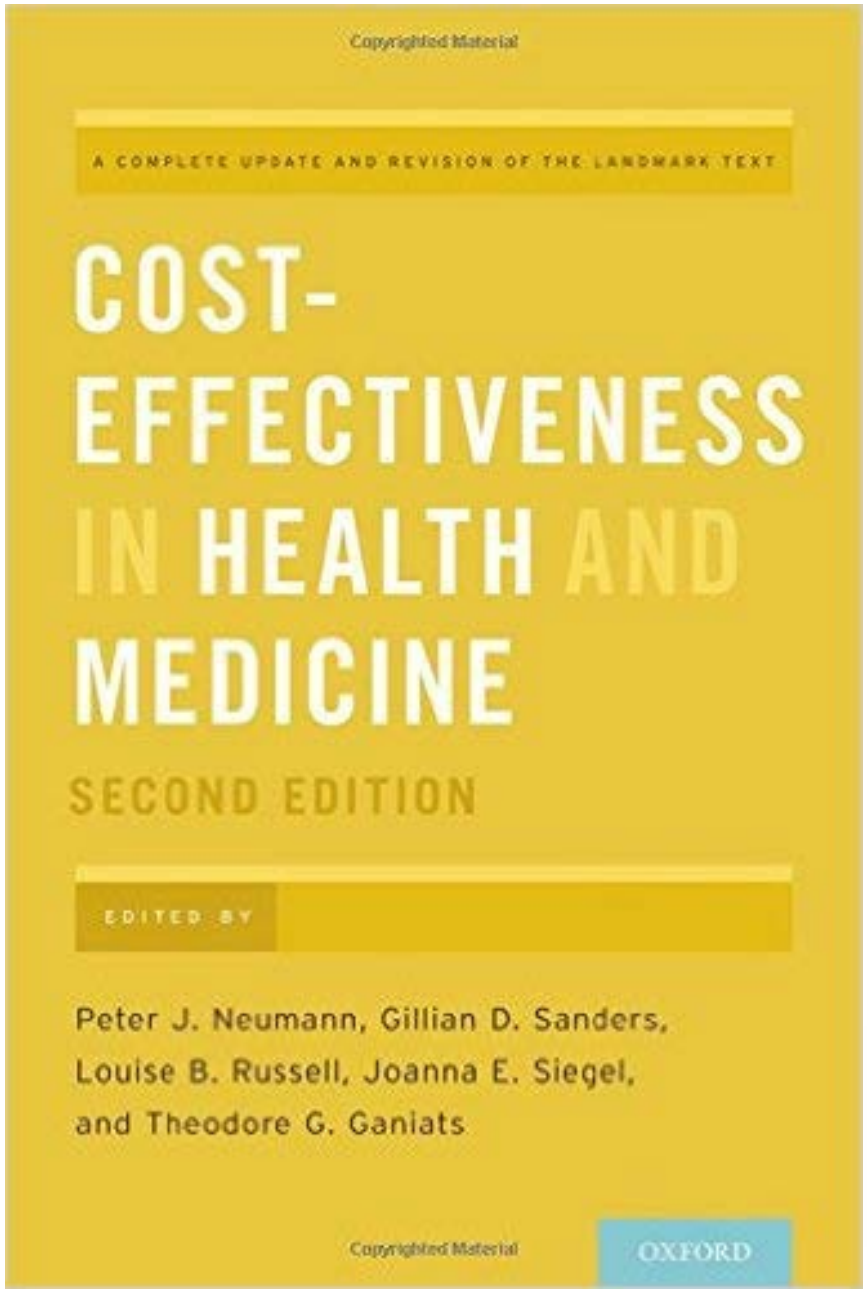
Second US Panel

- CEA methods reference
- 1997 & 2017
- Chapter 8: "Costs" by Anirban Basu
- Recommended Perspectives:
  - Health Sector (includes other healthcare costs)
  - Societal Perspectives (includes non-medical costs and earnings)



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IMPACT INVENTORY

Sector	Type of Impact (list category within each sector with unit of measure if relevant)[a]	Included in This Reference Case Analysis From...Perspective?		Notes on Sources of Evidence
		Health Care Sector	Societal	
Formal Health Care Sector				
Health	Health outcomes (effects)			
	Longevity effects	☐	☐	
	Health-related quality-of-life effects	☐	☐	
	Other health effects (eg, adverse events and secondary transmissions of infections)	☐	☐	
	Medical costs			
	Paid for by third-party payers	☐	☐	
	Paid for by patients out-of-pocket	☐	☐	
	Future related medical costs (payers and patients)	☐	☐	
	Future unrelated medical costs (payers and patients)	☐	☐	
Informal Health Care Sector				
Health	Patient-time costs	NA	☐	
	Unpaid caregiver-time costs	NA	☐	
	Transportation costs	NA	☐	
Non–Health Care Sectors (with examples of possible items)				
Productivity	Labor market earnings lost	NA	☐	
	Cost of unpaid lost productivity due to illness	NA	☐	
	Cost of uncompensated household production[b]	NA	☐	
Consumption	Future consumption unrelated to health	NA	☐	
Social Services	Cost of social services as part of intervention	NA	☐	
Legal or Criminal Justice	Number of crimes related to intervention	NA	☐	
	Cost of crimes related to intervention	NA	☐	
Education	Impact of intervention on educational achievement of population	NA	☐	
Housing	Cost of intervention on home improvements (eg, removing lead paint)	NA	☐	
Environment	Production of toxic waste pollution by intervention	NA	☐	
Other (specify)	Other impacts	NA	☐	

Sanders et al, JAMA 2017

"Bottom-up, ingredients-based approach: **Price x quantity** – The number of resources used x the unit cost"

Sensitivity analyses MUST incorporate uncertainty in US prices – preferably with an appropriate distribution (gamma or log-normal)

Reporting Checklist

Standards include:

- Statement of costing year (ie, the year to which all costs have been adjusted for the analysis; eg, 2016)
- Statement of method used to adjust costs for inflation
- Statement of type of currency
- Source and methods for obtaining expert judgment if applicable
- Statement of discount rates
- Disaggregated results for important categories of costs
- Results of sensitivity analysis

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Figure 2. Reporting Checklist for Cost-effectiveness Analyses

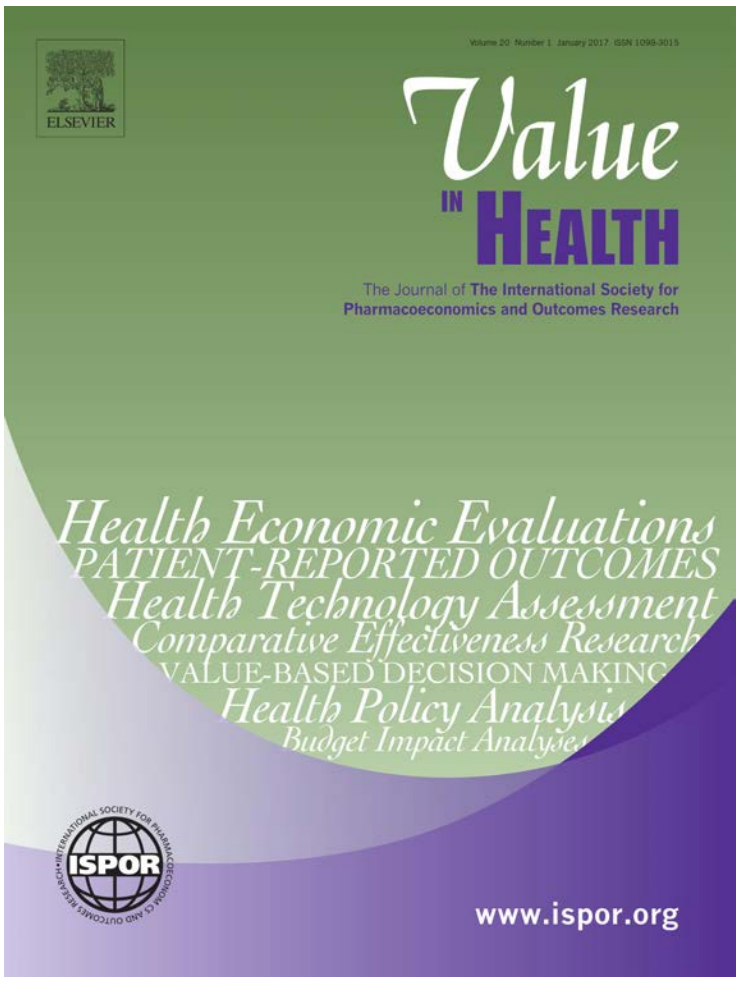
Element	Journal Article	Technical Appendix
Introduction		
Background of the problem		
Study Design and Scope		
Objectives		
Audience		
Type of analysis		
Target populations		
Description of interventions and comparators (including no intervention, if applicable)		
Other intervention descriptors (eg, care setting, model of delivery, intensity and timing of intervention)		
Boundaries of the analysis; defining the scope or comprehensiveness of the study (eg, for a screening program, whether only a subset of many possible strategies are included; for a transmissible condition, the extent to which disease transmission is captured; for interventions with many possible delivery settings, whether only one or more settings are modeled)		
Time horizon		
Analytic perspectives (eg, reference case perspectives [health care sector, societal]; other perspectives such as employer or payer)		
Whether this analysis meets the requirements of the reference case		
Analysis plan		
Methods and Data		
Trial-based analysis or model-based analysis. If model-based:		
Description of event pathway or model (describe condition or disease and the health states included)		
Diagram of event pathway or model (depicting the sequencing and possible transitions among the health states included)		
Description of model used (eg, decision tree, state transition, microsimulation)		
Modeling assumptions		
Software used		
Identification of key outcomes		
Complete information on sources of effectiveness data, cost data, and preference weights		
Methods for obtaining estimates of effectiveness (including approaches used for evidence synthesis)		
Methods for obtaining estimates of costs and preference weights		
Critique of data quality		
Statement of costing year (ie, the year to which all costs have been adjusted for the analysis; eg, 2016)		
Statement of method used to adjust costs for inflation		
Statement of type of currency		
Source and methods for obtaining expert judgment if applicable		
Statement of discount rates		
Impact Inventory		
Full accounting of consequences within and outside the health care sector		
Results		
Results of model validation		
Reference case results (discounted and undiscounted): total costs and effectiveness, incremental costs and effectiveness, incremental cost-effectiveness ratios, measures of uncertainty		
Disaggregated results for important categories of costs, outcomes, or both		
Results of sensitivity analysis		
Other estimates of uncertainty		
Graphical representation of cost-effectiveness results		
Graphical representation of uncertainty analyses		
Aggregate cost and effectiveness information		
Secondary analyses		
Disclosures		
Statement of any potential conflicts of interest due to funding source, collaborations, or outside interests		
Discussion		
Summary of reference case results		
Summary of sensitivity of results to assumptions and uncertainties in the analysis		
Discussion of the study results in the context of results of related cost-effective analyses		
Discussion of ethical implications (eg, distributive implications relating to age, disability, or other characteristics of the population)		
Limitations of the study		
Relevance of study results to specific policy questions or decisions		

Sanders et al, JAMA 2017

ISPOR Resources

International Society for Pharmacoeconomics and Outcomes Research (ISPOR)

- Task force recommendations
- Annual Meetings
- Journal: Value in Health
- >20,000 members
- Student membership benefits
- Active UW Chapter



Volume 13 • Number 1 • 2010
VALUE IN HEALTH

Good Research Practices for Measuring Drug Costs in Cost Effectiveness Analyses: Issues and Recommendations: The ISPOR Drug Cost Task Force Report—Part I

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ABSTRACT

Objectives: The assignment of prices or costs to pharmac[illegible]icals c[illegible] be crucial to results and conclusions that are derived from [illegible]armac[illegible]nomic cost effectiveness analyses (CEAs). Although numer[illegible] pharm[illegible]economic practice guidelines are available in the literature [illegible]d have [illegible]en promulgated in many countries, these guidelines are either [illegible] about how drug costs should be established or measured. T[illegible] particularly problematic in pharmacoeconomic studies performed fro[illegible]he "societal" perspective, because typically the measured cost of a b[illegible] name pharmaceutical is not a true economic cost but also include[illegible]sfer payments from some members of society (patients and third party [illegible]) to other members of society (pharmaceutical manufacturer stockho[illegible]) in large part as a reward for biomedical innovation. Moreover, there [illegible] numerous and complex institutional factors that influence how drug cost[illegible] should be measured from other CEA perspectives, both internationally and within the domestic US context. The objective of this report is to provide guidance and recommendations on how drug costs should be measured for CEAs performed from a number of key analytic perspectives. **Methods:** ISPOR Task Force on Good Research Practices—Use of Drug Costs for Cost Effectiveness Analysis (Drug Cost Task Force [DCTF]) was appointed with the advice and consent of the ISPOR Board of Directors. Members were experienced developers or users of CEA models, worked in academia, industry, and as advisors to governments, and came from several countries. Because how drug costs should be measured for CEAs depend on the perspectives, five Task Force subgroups were created to develop drug cost standards from the societal, managed care, US government, industry, and international perspective. The ISPOR Task Force on [illegible] ...he ISPOR web site.
Results: [illegible] ...to the [illegible] spectiv[illegible]EAs performed [illegible] should apply a typical or average disc[illegible]ndentiality.
Conclusions: Drug transaction prices not only ration current use of medication but also ration future biomedical research and development. CEA researchers should tailor the appropriate measure of drug costs to the analytic perspective, maintain clarity and transparency on drug cost measurement, and report the sensitivity of CEA results to reasonable drug cost measurement alternatives.
Keywords: cost effectiveness analysis, drug costs, drug research and development, health-care market segmentation, health-care reimbursement, payer perspective.

SUMMARY of resources

Medicare Physician Fee Schedule
https://www.cms.gov/apps/physician-fee-schedule/license-agreement.aspx
and
https://www.cms.gov/apps/physician-fee-schedule/help/How_to_MPFS_Booklet_ICN901344.pdf

Publicly Available US Data
www.data.gov/health

HCPCS
https://www.cms.gov/Medicare/Coding/MedHCPCSGenInfo/index.html?redirect=/medhcpcsgeninfo/

CPT Codes from AMA
https://www.ama-assn.org/practice-management/cpt

FDA National Drug Code Directory
https://www.fda.gov/Drugs/InformationOnDrugs/ucm142438.htm

Retail Pharmacy Prices
www.GoodRx.com

National Acquisition Center (NAC) Contract Catalog Search Tool (CCST) from Veterans Affairs
https://www.va.gov/nac/

Medicaid Prescription Drug Utilization Database
https://www.medicaid.gov/medicaid/prescription-drugs/state-drug-utilization-data/index.html

MEPS – Medical Expenditure Panel Survey
https://meps.ahrq.gov/mepsweb/data_stats/download_data_files.jsp

CDC Vaccine Price List
https://www.cdc.gov/vaccines/programs/vfc/awardees/vaccine-management/price-list/#modalIdString_CDCTable_1

Bureau of Labor Statistics Data
https://www.bls.gov/data

Inflation Calculators
https://www.bls.gov/data/inflation_calculator.htm
and
http://www.halfhill.com/inflation_js.html

Recommendations from the Second Panel on Cost-Effectiveness
"Cost-Effectiveness in Health and Medicine" – see Chapter 8: Costs
https://www.amazon.com/Cost-Effectiveness-Health-Medicine-Peter-Neumann/dp/0190492937/ref=sr_1_1?ie=UTF8&qid=1492585733&sr=8-1&keywords=cost-effectiveness+in+health+and+medicine

AMCP Guide to Pharmaceutical Payment Methods
http://www.amcp.org/WorkArea/DownloadAsset.aspx?id=9856

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Questions?
Thank you!

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Special thanks to **Dr. Carrie Bennette** who provided a large part of this material

Supplemental Material

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ADJUSTMENT

Standardization to account for inflation and timing

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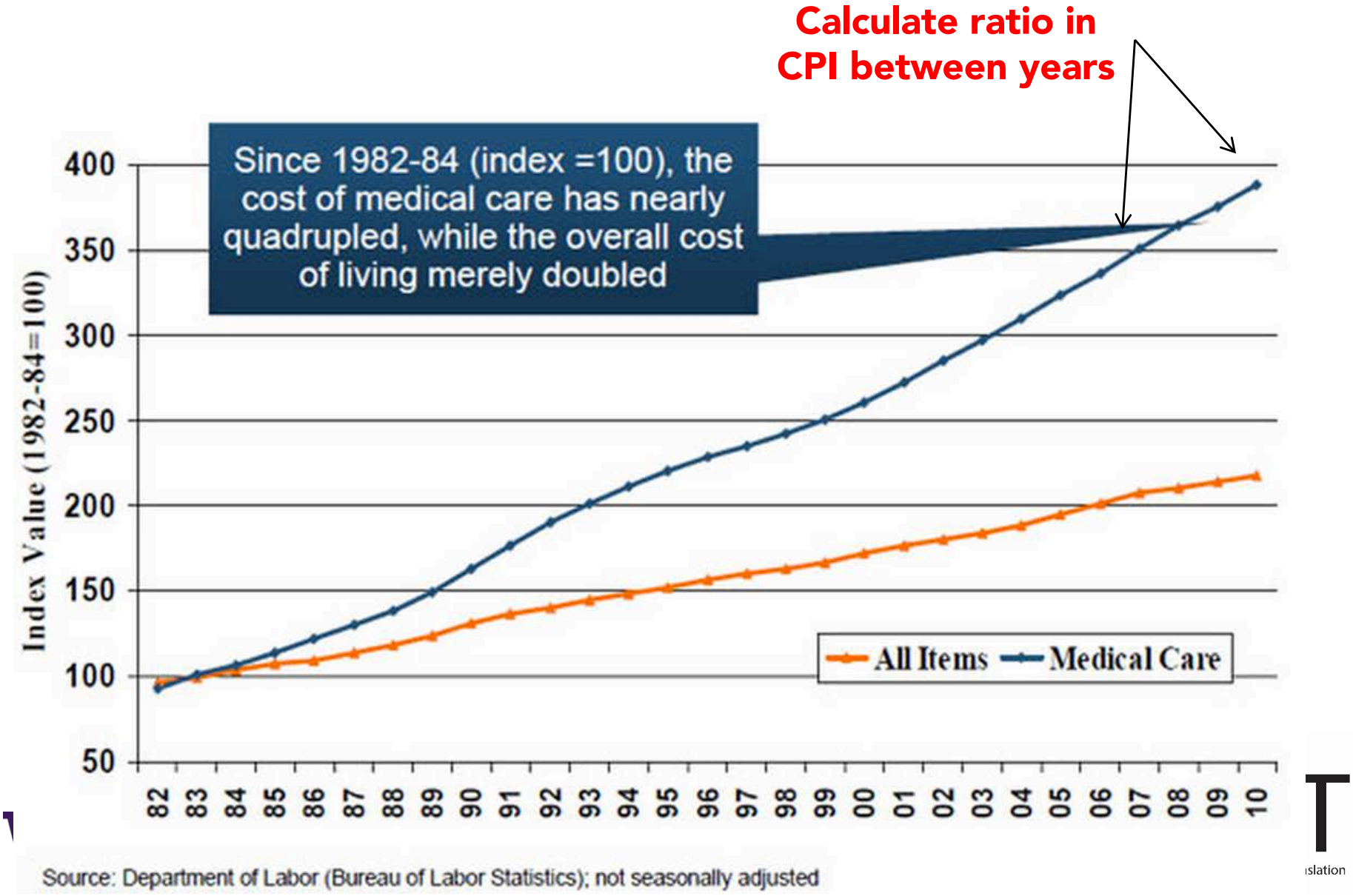
Adjusting for inflation: Standardization

- Standardization of costs from different years
  - Apply current year costs to resource estimates from different years
  - Adjust costs using medical inflation rates

Medical Resources used to treat mild infection	Cost estimate for each resource	Cost year	Cost adjusted to 2005 dollars
Office visit	$115	2003	$125.46
Laboratory service to culture organism	$50	2004	$52.75
Antibiotic medication	$28.84	2005	$28.84
Total			$206.55

Rascati, 2009

Adjusting for timing: Standardization



ACTIVITY

Practice adjusting for inflation

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Consumer price index (CPI)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	HALF1	HALF2
2005	316.8	319.3	320.7	321.5	322.2	322.9	324.1	323.9	324.6	326.2	328.1	328.4	323.2	320.6	325.9
2006	329.5	332.1	333.8	334.7	335.6	336.0	337.0	337.7	338.3	339.3	340.1	340.1	336.2	333.6	338.8
2007	343.510	346.457	347.172	348.225	349.087	349.510	351.643	352.961	353.723	355.653	357.041	357.661	351.054	347.327	354.780
2008	360.459	362.155	363.000	363.184	363.396	363.616	363.963	364.477	365.036	365.746	366.613	367.133	364.065	362.635	365.495
2009	369.830	372.405	373.189	374.170	375.026	375.093	375.739	376.537	377.727	378.552	379.575	379.516	375.613	373.286	377.941
2010	382.688	385.907	387.142	387.703	387.762	388.199	387.898	388.467	390.616	391.240	391.660	391.946	388.436	386.567	390.305
2011	393.858	397.065	397.726	398.813	399.375	399.552	400.305	400.874	401.605	403.430	404.858	405.629	400.258	397.732	402.784
2012	408.056	410.466	411.498	412.480	413.655	415.345	416.759	417.123	418.039	418.359	418.653	418.654	414.924	411.917	417.931
2013	420.687	423.221	424.154	423.815	422.834	424.264	424.836	426.866	428.026	428.082	427.740	427.089	425.134	423.162	427.107
2014	429.621	432.769	433.369	434.054	434.874	435.352	435.924	435.777	436.575	437.027	438.445	439.720	435.292	433.340	437.245
2015	440.969	442.783													

A paper published in 2010 reports that the cost of a treatment is $100.

What is the value in 2014 USD?

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http://data.bls.gov/

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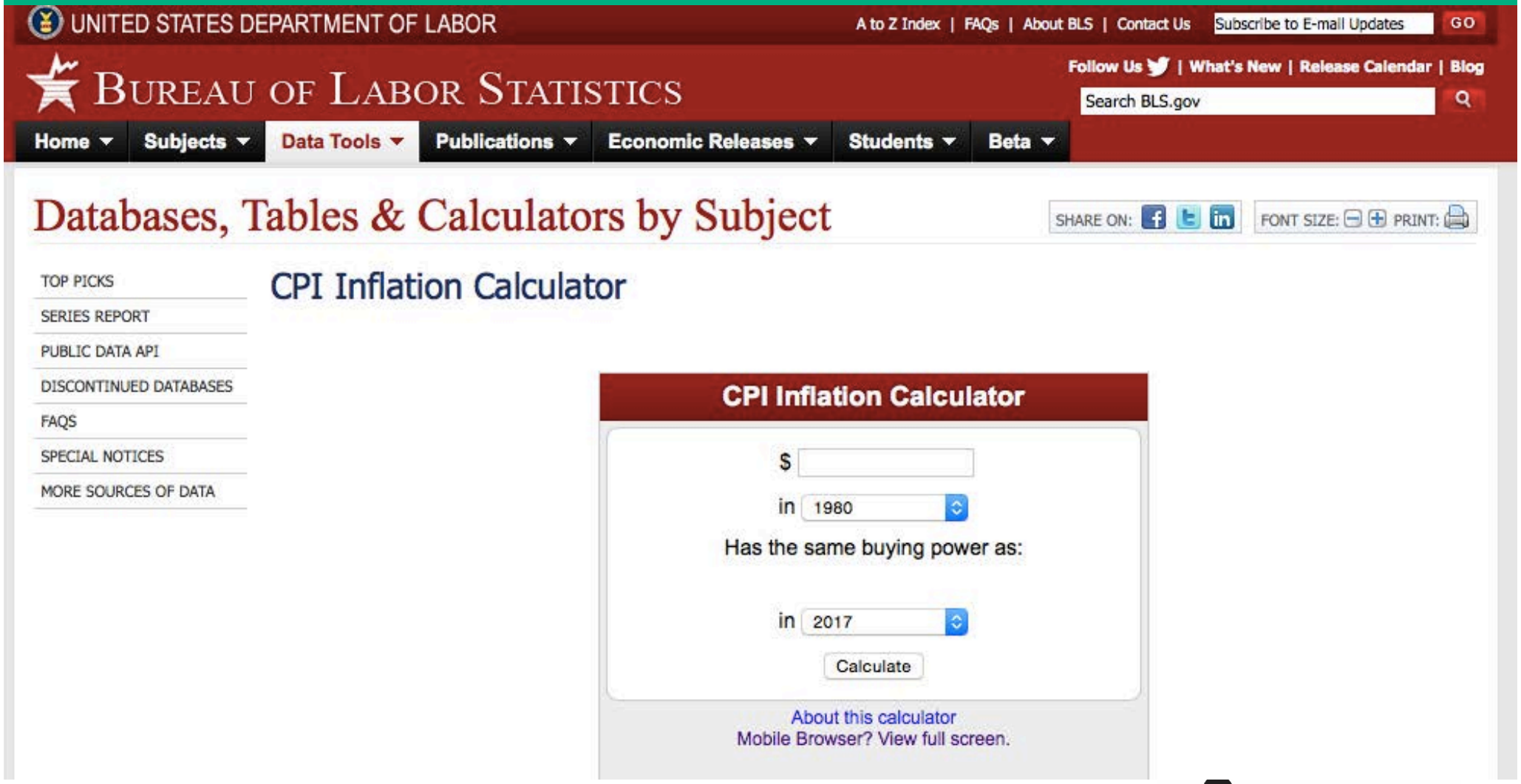
Inflation Calculator



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https://www.bls.gov/data/inflation_calculator.htm

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Inpatient Hospital Stay

Medical services: e.g. office visits, procedures

- CMS Physician Fee Schedule: based on Current Procedural Terminology (CPT) codes (also called HCPCS Level I)

Inpatient Hospital Costs: Diagnosis Related Group (DRG) and Prospective Payment System (PPS)

- Medicare pays most hospitals for inpatient hospital services at a predetermined rate for each discharge

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Personnel

- Time spent in activity X salary plus benefits
- Wage rates from Bureau of Labor Statistics (www.bls.gov)

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Valuing non-market costs

Non-market resource inputs such as volunteer time, leisure time, travel and waiting time can be estimated using marketplace proxies. 3 approaches:

1) Human capital: use the labor opportunity cost for the individual.
   - E.g., volunteer time could be valued using a market wage rate (per hour) for the volunteering individual.

2) Replacement cost: value time based upon the cost of a replacement worker.
   - E.g., value of (informal or unpaid) homecare services for a spouse would be based on the cost of hiring a worker to perform those duties.

3) Friction cost method: cost involved in replacing a worker
   - E.g., recruiting, training

CMS: Drugs

- According to the Medicare Prescription Drug, Improvement and Modernization Act of 2003, Medicare B drugs will be reimbursed for 106% of their Average Sales Price (ASP) beginning in 2005.
- The types of drugs covered will include drugs provided incident to a physician's service, drugs provided under the Durable Medical Equipment (DME) benefit and certain oral anti-cancer and oral immunosuppressive drugs.
- Drug manufacturers must submit the ASP and volume of sales for each National Drug Code (NDC) on a quarterly basis. The ASP for a given NDC is equal to the manufacturer's sales to all purchasers in the US for a quarter divided by the number of units of that NDC sold by the manufacturer in that quarter

Adverse Event Costs

Adverse event per episode costs

	Unit Cost per Dose/Procedure ($)	Daily Dose/Procedure / Hospitalization Frequency [a]	Duration of Treatment (days)	Cost [b] ($)
Abdominal Pain (Grade 3/4)				
Outpatient oncology visit	$129.18	1	n/a	$129.18
Total				***$129.18***
Acne or rash (Grade 3/4)				
Outpatient oncology visit	$129.18	1	n/a	$129.18
Cleocin T gel	$84.00	1	1	$84.00
Total				***$213.18***
Confusion (Grade 3/4)				
Outpatient oncology visit	$129.18	1	n/a	$129.18
Total				***$129.18***
Non-neutropenic Infection (Grade 3/4)				
Hospitalization for infection	$4,821.80	10%	n/a	$482.18
Inpatient oncology visit	$206.44	1	n/a	$206.44
Inpatient consultation (follow-up)	$97.76	1	n/a	$97.76
Chest x-ray	$71.77	1	1	$71.77
Total				***$858.15***
Other Pain (Grade 3/4)				
Outpatient oncology visit	$129.18	1	n/a	$129.18
Total				***$129.18***

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