

Estimating Intervention Costs

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Objectives

- At the end of the class, you should
 - Understand what micro-costing means
 - Be familiar with different micro-costing methods
 - Understand that the method you use will affect your ability to conduct meaningful subgroup analysis

Focusing Question

- What is the cost of a health care intervention?

Examples:

1. Supportive employment intervention for veterans with a spinal cord injury
2. Outreach workers to improve cancer screening
3. Education for COPD patients

Cost of Health Care

- Outside of health, most items that we purchase daily have a readily observable cost
- Not true with health care
 - Charges do not equal payments
 - Payments do not equal cost

White Board example

Cost Estimation Approaches

- Direct measurement
 - Enumerate the inputs
 - Identify price for the inputs
 - Sum (quantity*price) across all inputs
- Level of precision is critical!

Example

- Intervention used 2 FTE outreach workers for 1000 persons
- Total labor cost is \$100,000 for a year
- Method 1: Labor cost per person is $\$100,000/1,000$ or \$100
- Method 2: Track intervention time per participant. Use time estimates to apportion labor costs.
- Is method 1 or method 2 more accurate?

Poll

- Which is more accurate
 - Method 1
 - Method 2

Precision is Expensive

- It is time consuming to track staff activities.
- Form was created with input from outreach workers
- Manager reviewed them for accuracy each week

Client Contact Form					
Your Name: _____		Today's Date: _____		Time: _____	
Client's Name: _____			ID#: _____		
Type of Contact:	<input type="checkbox"/> Phone	Contact to (CHA, client, other): _____			
	<input type="checkbox"/> In person	Contact from (CHA, client, other): _____			
Where: _____					
Total Time with Client:		Travel Time:		Expenses:	
Hours	Minutes	Hours	Minutes	Mileage	Parking
				<input type="checkbox"/> County vehicle	
				<input type="checkbox"/> Own vehicle	
Reason for call/visit			Outcome		
<input type="checkbox"/> Administer pre-survey			<input type="checkbox"/> Next appt date: _____		
<input type="checkbox"/> Administer survey			Date to give reminder call: _____		
<input type="checkbox"/> Provide information			Date to check if appointment kept: _____		
<input type="checkbox"/> Check to see if she scheduled appointment			Appointment kept?		
<input type="checkbox"/> Schedule an appointment for her			<input type="checkbox"/> Yes <input type="checkbox"/> Cancelled		
<input type="checkbox"/> Remind her of appointment			<input type="checkbox"/> No, why? _____		
<input type="checkbox"/> Check if she kept appointment			Resched - New appt date/time _____		
<input type="checkbox"/> Other: _____					
Consultation/Intervention			Referrals		
<input type="checkbox"/> A. Consumer skills (blue/green/pink/yellow)			<input type="checkbox"/> B. Transportation		
<input type="checkbox"/> D. Calendar			<input type="checkbox"/> AC Transit Voucher		
Coping:			<input type="checkbox"/> C. Child care		
<input type="checkbox"/> E. Distancing			<input type="checkbox"/> I. Mental Health		
<input type="checkbox"/> F. Seeking Social Support			<input type="checkbox"/> J. Alcohol abuse		
<input type="checkbox"/> G. Escape Avoidance			<input type="checkbox"/> K. Substance abuse		
<input type="checkbox"/> H. Planful Problem Solving			<input type="checkbox"/> L. Domestic violence		
<input type="checkbox"/> Education about abnormal Paps			<input type="checkbox"/> M. Sexual abuse		
<input type="checkbox"/> Other (specify): _____			<input type="checkbox"/> V. HIV/AIDS		
Attempts to contact:					
1	<input type="checkbox"/>	Date and time of day:	10	<input type="checkbox"/>	Date and time of day:
2	<input type="checkbox"/>	Date and time of day:	11	<input type="checkbox"/>	Date and time of day:
3	<input type="checkbox"/>	Date and time of day:	12	<input type="checkbox"/>	Date and time of day:
4	<input type="checkbox"/>	Date and time of day:	13	<input type="checkbox"/>	Date and time of day:
5	<input type="checkbox"/>	Date and time of day:	14	<input type="checkbox"/>	Date and time of day:
6	<input type="checkbox"/>	Date and time of day:	15	<input type="checkbox"/>	Date and time of day:
7	<input type="checkbox"/>	Date and time of day:	16	<input type="checkbox"/>	Date and time of day:
8	<input type="checkbox"/>	Date and time of day:	17	<input type="checkbox"/>	Date and time of day:
9	<input type="checkbox"/>	Date and time of day:	18	<input type="checkbox"/>	Date and time of day:

Capturing Staff Time

- SCI-VIP program developed a CPRS app so that time spent providing supportive employment was gathered as part of the EMR documentation
- Take great care in collecting these data

Tradeoffs

Subgroup analysis

Example at end of lecture
About subgroup analysis

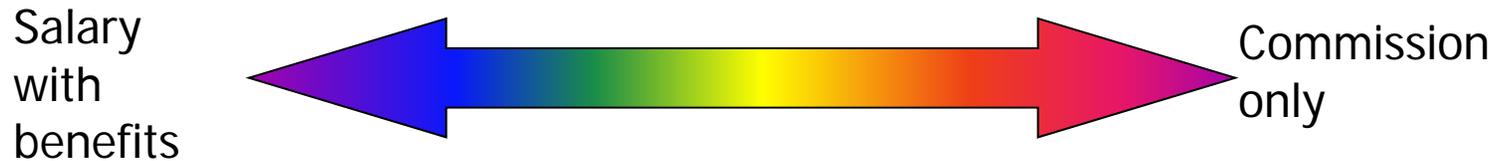


Staff Activities

- Need not be comprehensive; can sample activity but sampling can introduce bias
- Activities can produce several “products”
 - Exclude development cost
 - Exclude research-related costs
 - Should measure when program fully implemented

Staff Costs

- Pay can affect quantity and quality; attracts different types of people



- Need to include benefits (when appropriate)
- Need to include direct and indirect costs (e.g., meeting times)
- VA Labor costs
http://www.herc.research.va.gov/resources/faq_c02.asp

Scale Economies

- Created a health guide
- Guide was developed and produced by a third-party contractor.
- We paid \$14 per guide (1000 guides)
- If we ordered more, the cost of the guide would be \$3
- Which cost estimate should you use?

Poll

- Which method should you use
 - #1 or
 - #2

Besides Labor

- Also measure:
 - Supplies
 - Space
 - Education / training (if not part of labor costs)
 - Contracts

Other Micro-cost Methods

- Pseudo-bill: capture services using billing codes. Assign costs to billing codes
- Reduced cost list: use billing codes to capture biggest ticket items
- Cost regression: use statistical techniques to identify marginal costs

Cost Regression

- Large literature on analyzing cost data
- Cost data are frequently skewed
 - Skewed errors violates assumptions of Ordinary Least Squares
 - Error terms not normally distributed with identical means and variance
 - Transformation
 - Typical method: log of cost
 - Can make OLS assumptions more tenable

Duan, N. (1983) Smearing estimate: a nonparametric retransformation method, *Journal of the American Statistical Association*, 78, 605-610.

Manning WG, Mullahy J. Estimating log models: to transform or not to transform? *J Health Econ* 2001 Jul;20(4):461-94.

Basu A, Manning WG, Mullahy J. Comparing alternative models: log vs Cox proportional hazard? *Health Economics* 2004 Aug;13(8):749-65.

HERC Website

- Overview of methods

http://www.herc.research.va.gov/resources/faq_b01.asp

- How do I estimate costs with a clinical cost function?

http://www.herc.research.va.gov/resources/faq_e01.asp

- What is retransformation bias, and how can it be corrected?

http://www.herc.research.va.gov/resources/faq_e02.asp

Selecting a Method

- Data availability
- Method feasibility
- Appropriate assumptions
- Accuracy: Will it capture the effect of the intervention on resource use?

Combining Methods

- No single method may fill all needs, even within a single study
- Hybrid method may be best, e.g.
 - Direct method utilization most affected by intervention
 - Cost regression for other utilization

Example: The Cost Effectiveness of An Outreach Intervention for High-Risk Women with Abnormal Pap Smears

Wagner, T. H., Engelstad, L. P., Mcphee, S. J. & Pasick, R. J. (2007) The costs of an outreach intervention for low-income women with abnormal Pap smears, *Prev Chronic Dis*, 4, A11.

Background

- Highland Hospital (Oakland CA) treats a lot of low-income people. Routinely performs Pap smears in the ED.
- Problem: Low rates of follow-up among abnormal Pap smears (~30% follow-up)

Objective

- This study evaluates the cost-effectiveness of usual care (a mailed postal reminder) with a tailored outreach intervention compared to usual care alone

Pap Abnormality

- Atypical squamous cells of undetermined significance (ASCUS)
- Atypical glandular cells of undetermined significance (AGUS)
- Low-grade squamous intraepithelial lesion (LGSIL)
- High-grade squamous intraepithelial lesion (HGSIL)

Solomon D, Davey D, Kurman R, et al. The 2001 Bethesda System: terminology for reporting results of cervical cytology. *JAMA* 2002; 287:2114-9.

Intervention

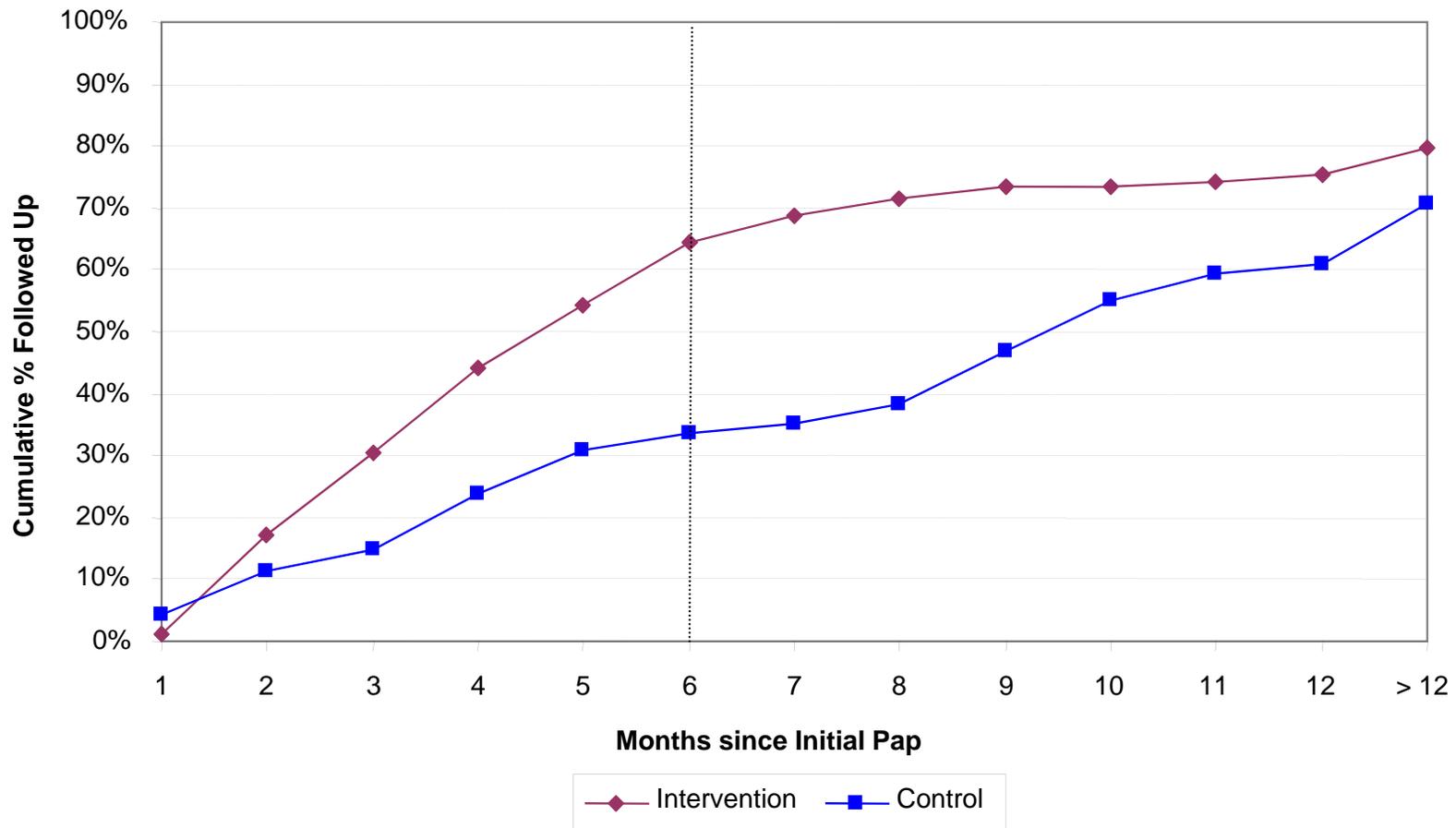
- Randomized, controlled trial
- Randomization without consent; QI with 6-month rescue
- Usual care: notified by telephone or mail, depending on the degree of abnormality
- Intervention: Usual care plus outreach and tailored individual counseling

Costing

- Societal & provider perspective(s)
- Micro-costed the intervention
 - Variable cost: outreach worker forms
 - Fixed cost: Space, QA, Supplies
- Payroll provided overhead costs
 - Sensitivity analysis used 85% “efficiency” assumption

Effectiveness

Abnormal Pap Follow-up at Highland Hospital
non-OB Patients



Unit Costs (2002\$)

	Intervention (n=178)	Usual care (n=170)
Provider Costs		
Outreach worker costs	\$142±105.2	\$0
Travel costs at \$.365 per mile	\$4±7.0	\$0
Office space and supplies	\$28±0	\$0
Outreach worker quality assurance	\$19±0	\$0
Usual care	\$1±1.0	\$1.00±\$1.0
Subtotal	\$47±0	\$0
Patient Travel Costs for Follow-up	\$19±8.9	\$9.9±17.9
Total unit cost from societal perspective	\$214±\$113.6	\$10.9±17.9
Cost to add intervention from provider perspective	\$194±\$108.7	\$0

Cost per follow-up

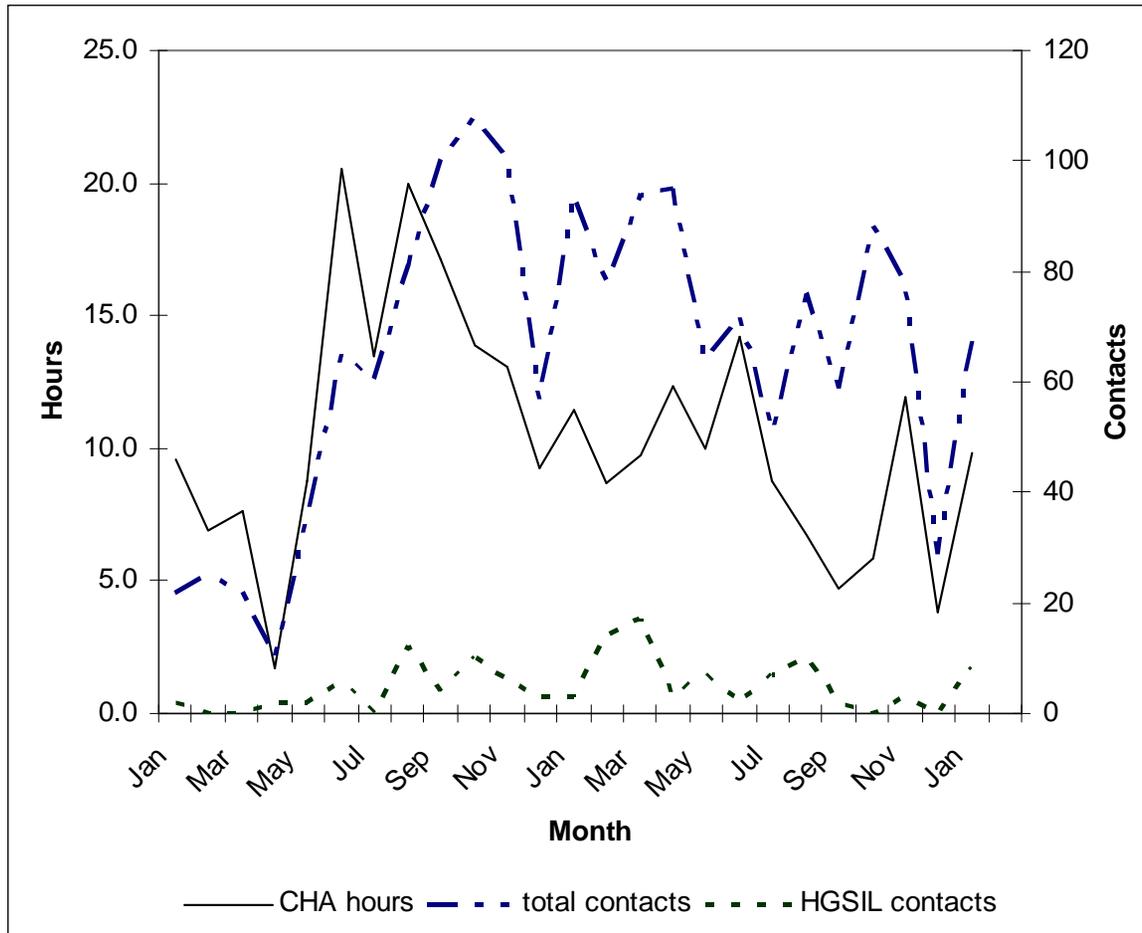
	Cost	Inc. Cost	Effect.*	Inc. Effect.	ICER
Societal Perspective					
Control	\$11		0.32		
Intervention	\$214	\$203	0.61	0.28	\$724
95% CI					(417 - 1015)

* Effectiveness is proportion of women in group who received follow-up for the abnormal Pap smear.

Subgroup Analysis

	Cost	Incremental cost	Effectiveness	Incremental effectiveness	Incremental cost-effectiveness
Societal Perspective					
ASCUS/AGUS	\$75		0.32		
	347	\$272	0.57	0.25	\$1,090
LGSIL	\$74		0.30		
	374	\$300	0.64	0.34	\$882
HGSIL	\$105		0.43		
	405	\$300	0.87	0.44	\$681

CHA Time and Contacts Over Time



Next Class

March 25, 2009

Inpatient and Outpatient Costs from DSS

[Jean Yoon, Ph.D.](#)