Introduction to key concepts and definitions

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Learning objectives

Twenty minutes from now, you will be able to:

- Distinguish cost analysis from cost-effectiveness analysis (CEA) from comparative effectiveness analysis.

- Define five key concepts in cost-effectiveness analysis.

Five key concepts:

1. Perspective
2. Financial vs. economic cost
3. Output vs. outcome
4. Incremental analysis
5. Sensitivity analysis

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1. Perspective

A *cost analysis* identifies inputs or resources that a program uses and their costs.

Perspective is the point of view from which the costs are calculated. It addresses the issue of which inputs or resources to include.

Training program budget

	Cost per unit	5-day computer-based training plus 3-day workshop		10-day training plus on-site visits	
		Units	Cost	Units	Cost
Trainer	$100 per day	3	$300	10	$1,000
On-site	$1,000 per site	0		5	$5,000
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Training program budget			$7,350		$12,250

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O'Malley *et al. Human Resources for Health* 2013, **11**:20
http://www.human-resources-health.com/content/11/1/20

HUMAN RESOURCES FOR HEALTH

COMMENTARY Open Access

Cost-effectiveness analyses of training: a manager's guide

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Abstract

The evidence on the cost and cost-effectiveness of global training programs is sparse. This manager's guide to cost-effectiveness analysis (CEA) is for professionals who want to recognize and support high quality CEA. It focuses on CEA of training in the context of program implementation or rapid program expansion. Cost analysis provides cost per output and CEA provides cost per outcome. The distinction between these two analyses is essential for making good decisions about value. A hypothetical example of a cost analysis compares the cost per trainee of a

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Donor perspective

	Cost per unit	5-day computer-based training plus 3-day workshop		10-day training plus on-site visits	
		Units	Cost	Units	Cost
Training program budget			$7,350		$12,250
Hotel contract	$225 per day	3	$675	10	$2,250
Donor cost			$8,025		$15,000

Societal perspective

	Cost per unit	5-day computer–based training plus 3-day workshop		10-day training plus on-site visits	
		Units	Cost	Units	Cost
Training program budget			$7,350		$12,250
Contract with venue	$225 per day	3	$675	10	$2,250
Trainees' time	$20 per day	200	$4,000	275	$5,500
Total cost			$12,025		$20,000

1. Perspective

To summarize, *Perspective* is the point of view from which the costs are calculated.

Professional guidelines from the U.S. Panel on Cost Effectiveness in Health and Medicine recommend that analysts report the total cost from the societal perspective as a reference case so costs are comparable across analyses.

2. Financial vs. economic cost

Financial cost – For goods and services that are traded on a competitive market, the opportunity cost is simply the price

where *opportunity cost* is the value of the most beneficial alternative use of the resources.

Economic cost – Value of goods and services that are not purchased such as volunteer time or for which the price is distorted

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3. Output vs. outcome

1. The cost per unit of output is valid when the two programs being compared are equally effective.

2. A cost per unit of outcome can address differences in effectiveness across programs.

3. The scope of the analysis is determined by the denominator. Only programs with a common denominator can be compared.

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Cost per unit of output

	5-day computer-based training plus 3-day workshop	10-day training plus on-site
Cost of transfer of learning		
Training	$12,025	$20,000
Supervision	$8,000	$2,000
Total cost	$20,025	$22,000

Cost per unit of intermediate outcome

	5-day computer-based training plus 3-day workshop	10-day training plus on-site
Cost of transfer of learning		
Training	$12,025	$20,000
Supervision	8,000	$2,000
Total cost	20,025	$22,000
Trainees who meet standard	15	22
Cost per trainee who met standard	$20,025/15 = $1,335	$22,000/22 = $1,000

3. Output vs. outcome

- **Cost analysis:** Compares the cost per unit of output when to programs are equally effective

- **Cost-effectiveness analysis (CEA)**: Compares cost to effectiveness, e.g. $/life years saved from intervention

- **Cost-utility**: Special case of CEA with effectiveness measured as quality-adjusted life years (QALYs)

4. Incremental analysis

Incremental cost effectiveness ratio (ICER)

$$\frac{\Delta \text{ Change in health care cost}}{\Delta \text{ Change in health outcomes}}$$

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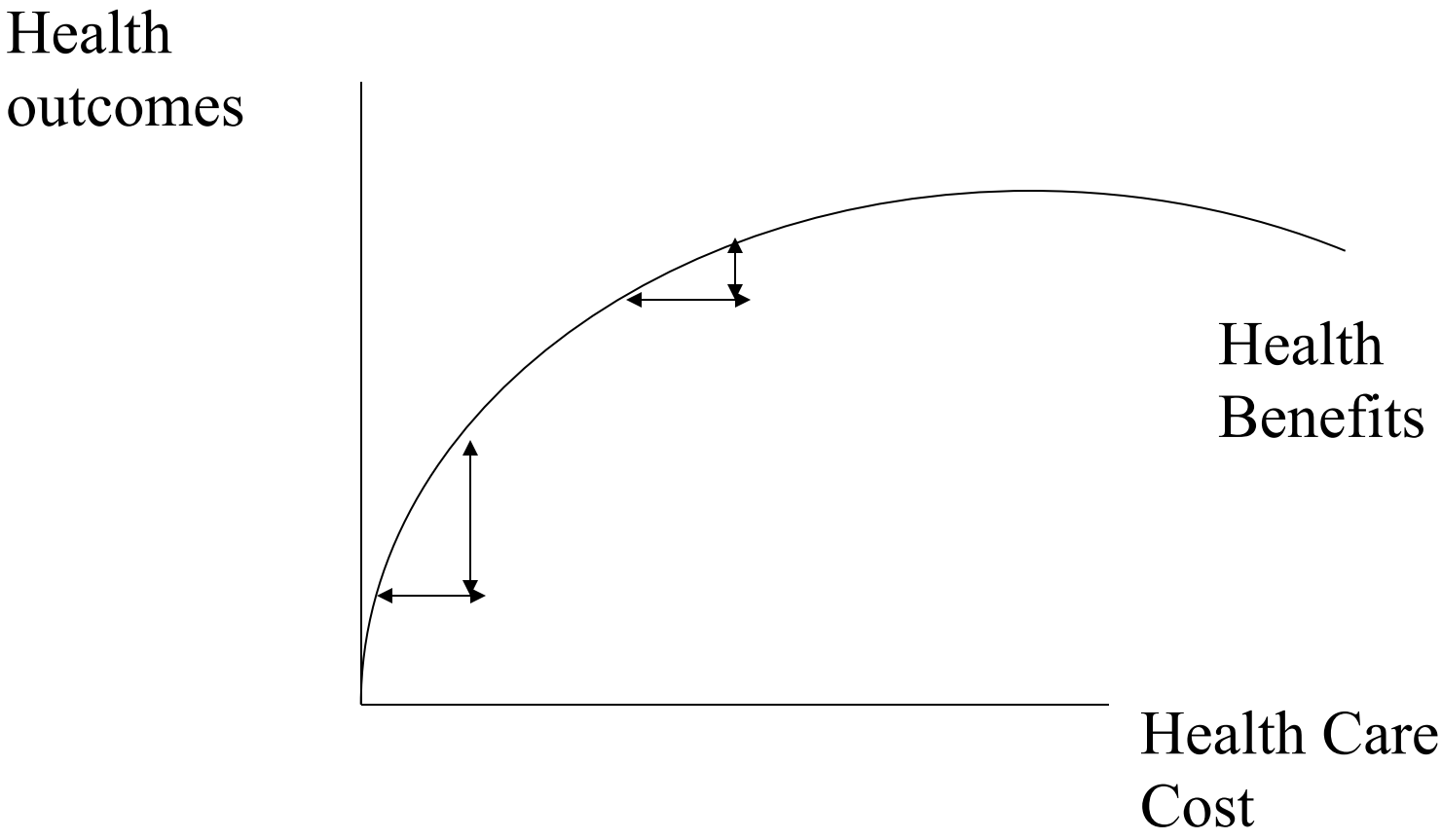
ICER is a slope



PMTCT Cost per HIV infection averted

	Pre-training	Post-training
Program cost		
Remuneration	$80,000	$84,000
Supplies	15,000	18,000
Capital	5,000	10,000
Total Cost	$100,000	$112,000
Number of mother-infant pairs	1,000	1,200
Base case-vertical transmission	25%	25%
Number of HIV infections averted	1,000*.25*.63=158	1,200*.25*.63=189
Incremental cost	$112,000 - $100,000 = $12,000	
Incremental effectiveness		189 – 158 = 31
ICER		$12,000/31 = $381

5. Sensitivity analysis

- Calculation of alternative cost-effectiveness results when there is uncertainty about one or more parameters.

- It shows the extent to which uncertainty about a parameter would substantially affect the estimate.

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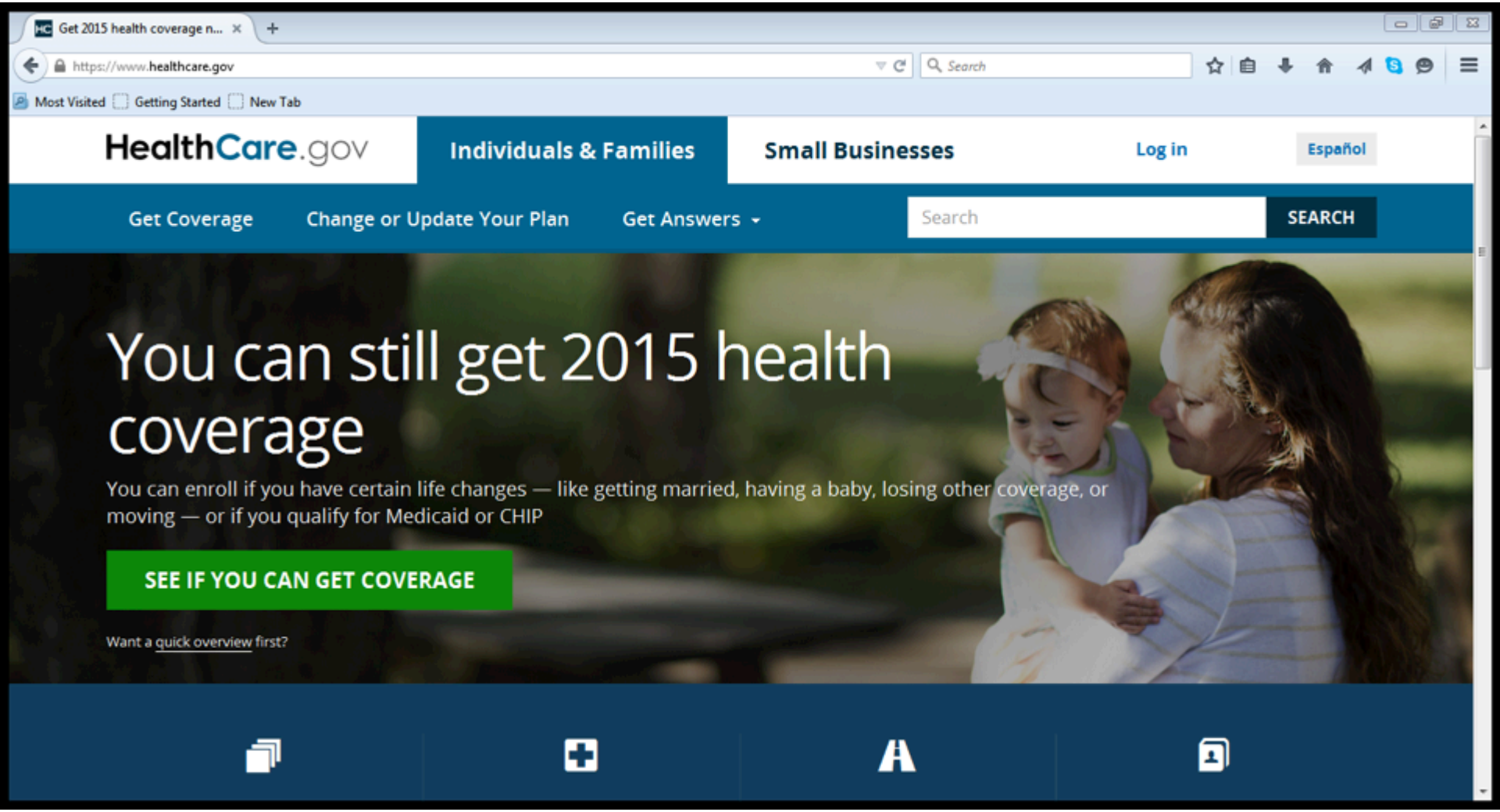
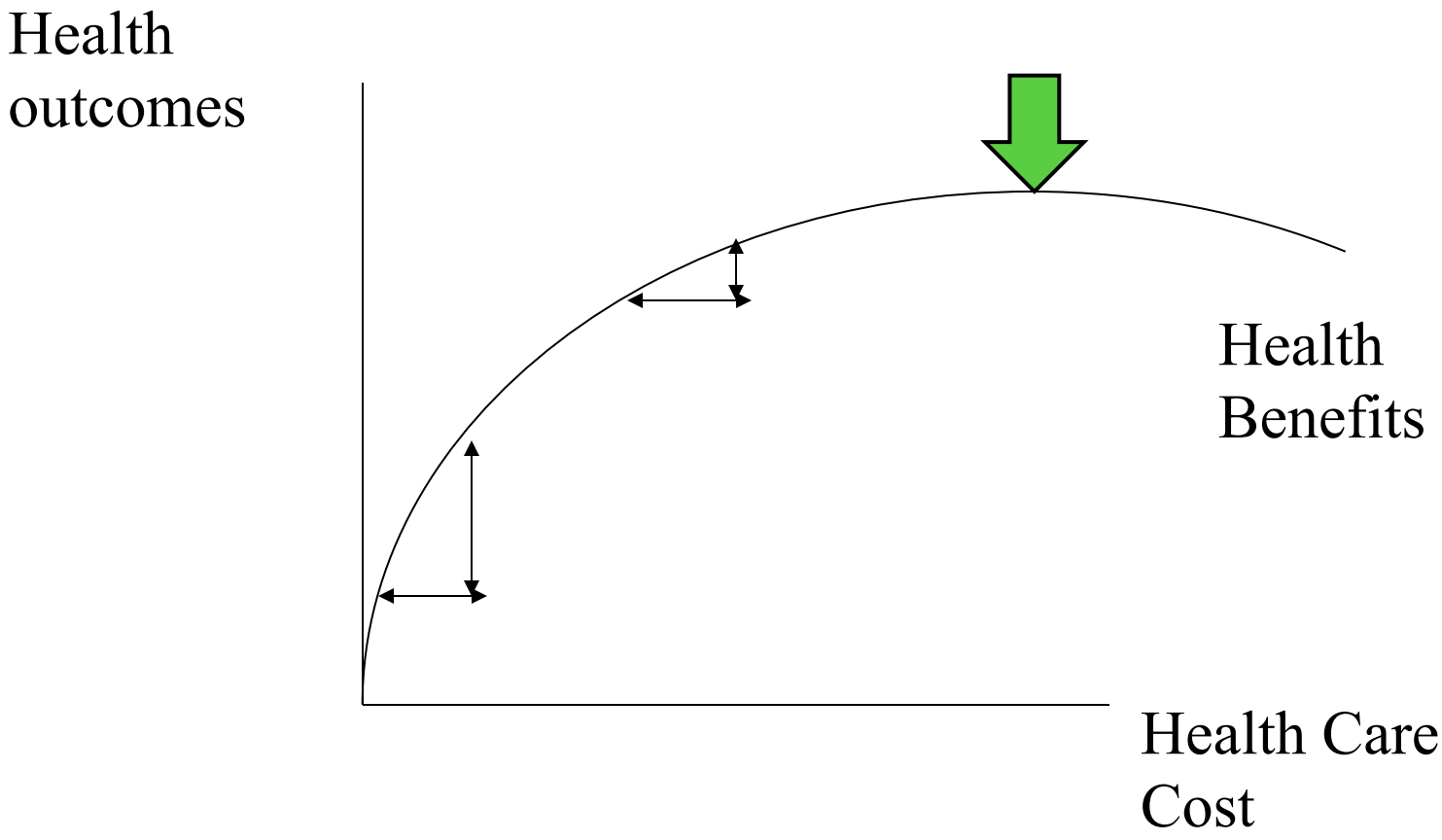
PMTCT CEA with uncertainty

	Pre-training	Post-training
Total Cost	$100,000	$112,000
Number of mother-infant pairs	1,000	1,200
Base case-vertical transmission	25%	25%
Lower bound	19%	19%
Upper bound	30%	30%
Incremental cost	$112,000 - $100,000 = $12,000	
ICER – base case		$12,000/31 = $381
Lower bound		$12,000/24 = $501
Upper bound		$12,000/38 = $317

Comparative effectiveness



“Flat of the Curve” Medicine



Questions?

Photo by: Charles Steinberg

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