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# Addressing Economic Evaluation in D&I Research

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# Goals

- To provide a brief overview of economic evaluation (EE)
- To understand how EE may be applied to D&I research
- To recognize approaches, resources, & help you may need for a grant or proposed study
- Discussion (open)

# Economic Evaluation (EE)

- What comes to mind when you hear the phrase “economic evaluation”?
- What does EE actually mean?
- Why do it?
  - Gives confidence to decision-makers
  - May increase influence, likelihood of uptake
  - Helps them think about adapting a program to another setting

# Prerequisite

- Obvious, but easy to forget: effectiveness is a prerequisite for EE
- No point in conducting a “cost-effectiveness” study of D&I (or an intervention) if it doesn’t work
- Remember this for grant applications (the order of aims & how, or if, they are carried out)

# Economic Evaluation measures

- What it costs to achieve a desired outcome/goal

Study Type	Benefits Measure	Question
Cost-minimization	Benefits found to be equivalent	Which is the most efficient way of achieving a desired goal? ... or ...
Cost-effectiveness analysis (CEA) 	Natural units (e.g., life years gained)	
Cost-utility analysis (CUA)	Healthy years (e.g., QALYs—quality adjusted life years)	What is the most efficient way of spending a given budget?
Cost-benefit analysis (CBA/BCA)	Dollar value (\$)	Should a given goal be pursued to a greater/lesser extent?

CEA = most widely used method in public health & medicine

# Predominance of EE = interventions

- The majority of texts, resources, and published literature on EE methods (and results) are on the evaluation of interventions
- Examples
  - Budget cuts: A department's budget must be cut by 5%. How to do this so as to minimize the effect on the public's health?
  - Grants: A number of applications have been received for a limited pool of grant dollars. How to select the winners?
  - Must choose among 3 programs & have est. costs & benefits:
    - Physical activity
    - Improved diet
    - Smoking cessation

# Fortunately...

- The methods for EE are largely the same whether studying interventions or D&I
- What we count and how we count it may be slightly different
- Raghavan chapter (reading list) explains many of the differences
- Let's briefly look at the 4 main approaches to EE

# 1. Cost minimization: lowest cost among a pre-determined goal

Program	Costs	Benefits: life years saved
<b>Physical Activity 1</b>	<b>\$475,000</b>	<b>20</b>
<b>Physical Activity 2</b>	<b>\$400,000</b>	<b>20</b>
<b>Physical Activity 3</b>	<b>\$600,000</b>	<b>20</b>

# 1. Cost minimization: lowest cost among a pre-determined goal

Program	Costs	Benefits: life years saved
Physical Activity 1	\$475,000	20
Physical Activity 2 <i>* Choose the lowest cost program</i>	\$400,000	20
Physical Activity 3	\$600,000	20

## 2. Cost effectiveness (CEA): lowest cost per outcome among alternatives

Program	Costs	Benefits: life years saved (YLS)	Cost per unit of benefit
<b>Physical Activity 2</b>	<b>\$400,000</b>	<b>20</b>	<b>\$20,000 per YLS</b>
<b>Improved Diet</b>	<b>\$800,000</b>	<b>25</b>	<b>\$32,000 per YLS</b>
<b>Smoking Cessation</b>	<b>\$300,000</b>	<b>10</b>	<b>\$30,000 per YLS</b>

## 2. Cost effectiveness (CEA): lowest cost per outcome among alternatives

Program	Costs	Benefits: life years saved (YLS)	Cost per unit of benefit
Physical Activity 2	\$400,000	20	\$20,000 per YLS <i>* Most efficient</i>
Improved Diet	\$800,000	25 <i>Largest net gain, but expensive</i>	\$32,000 per YLS
Smoking Cessation	\$300,000	10	\$30,000 per YLS

### 3. Cost-benefit analysis (CBA)

### 4. Cost-utility analysis (CUA)

- If the life years saved (YLS) are *scaled by a measure of quality of life (HRQOL)*, we have a CUA
  - E.g., possible that diet improves quality of life (morbidity) more than quantity of life (mortality)
  - Quality-adjusted life years (QALYs)
- If we value YLS in \$, we have a classic CBA
  - Net benefit?            \$ benefits - \$ costs            (positive > 0 desired)
  - Efficient?              \$ benefit / \$ cost ratio        (larger desired)
- Both are less common in D&I, but can be done
  - Scaling the benefits in these terms is additional work
  - Additional assumptions, may be controversial
  - **Add a health economist to your team if you think you need either!**

# What questions do we seek to answer?

- EE in intervention research
  - Does \$ spent on health care / PH intervention represent the best use of those funds?
- EE in implementation research
  - What are the costs of a particular dissemination approach?
  - Does deploying a formal implementation strategy make economic sense?
  - Is it necessary to use process X or can we do process Y to deliver the intervention?

# Applying EE (CEA) to D&I Research

Focusing on cost-effectiveness analysis (CEA):

- How do you make decisions?
- What do you count in a D&I study?
- How is it different from interventions?

# How to make decisions

- “Effectiveness” is relative, so CEA requires a comparison:
  - Something vs. nothing (status quo)
  - New vs. old intervention
- Express this as the “incremental cost-effectiveness ratio” (ICER)

$$\text{Cost-effectiveness ratio} = \frac{\text{Cost}_{\text{new intervention}} - \text{Cost}_{\text{old intervention}}}{\text{Outcome}_{\text{new intervention}} - \text{Outcome}_{\text{old intervention}}}$$

# Decision matrix for CEA

	<b>Benefits &gt; Comparator</b>	<b>Benefits &lt; Comparator</b>
<b>Costs &gt; comparator</b>	Ambiguous	Reject
<b>Costs &lt; comparator</b>	Accept	Ambiguous

# Making decisions in implementation

- Comparison
  - Implementation strategy vs. “usual” (or no) implementation
  - Express as “implementation cost-effectiveness ratio”

$$\text{Implementation Cost-effectiveness ratio} = \frac{\text{Cost}_{\text{implementation\_strategy}} - \text{Cost}_{\text{usual\_strategy}}}{\text{Outcome}_{\text{implementation\_strategy}} - \text{Outcome}_{\text{usual\_strategy}}}$$

- Single strategy
  - Use the decision matrix from previous slide
- Multiple implementation strategies
  - Prefer the smallest cost-to-outcome ratio

# Perspective in EE

- **Implementation**

- Count costs and gains from the perspective of the organization or program
  - E.g., the clinic, health system, health department
- Patient costs may also be important

- **Interventions**

- Multiple perspectives are common
- What “counts” to each is not necessarily the same
  - Payer (insurer, agency, etc.)
  - Provider
  - Individual / patient
  - Societal (social planner) = everything

# Costs of implementation strategies

- Steps
  - Create a systematic list of implementation-related activities
    - Training, supervision, ...
  - Identify costs associated with these activities using a standard way of cost estimation
  - Sum those costs
- Who does the costing?
  - Those directly engaged and overseeing the implementation are best suited to itemize this
  - Financial staff may be able to help with costs
  - Economists may review & help with costs that are hard to measure, but aren't necessarily required

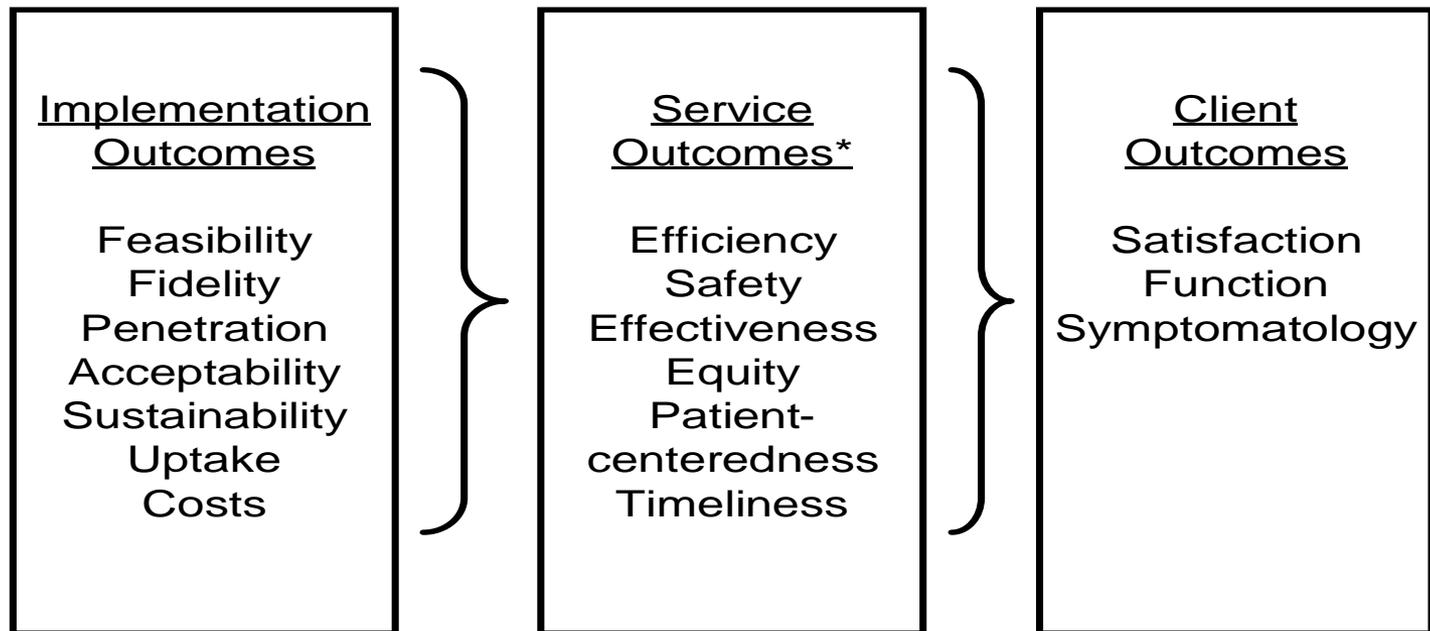
# Exercise 1: Costing

- Handout: Implementation Costs for the Breakthrough Series Collaborative
- (Example from the reading—Raghavan ch.)
- How would you adapt something like this to your research?
- *Break into groups of 3-4. Try to itemize the implementation activities & costs for a study.*

# Outcomes for implementation strategies

- Steps
  - Define the domain of “what counts”... which may vary
  - Intervention study
  - Service outcomes (perhaps)
  - Patient outcomes (perhaps)
- Who does this?
  - Again, those directly engaged and overseeing the implementation are best suited to itemize this
  - Again, an economist may be optional for CEA
  - If you want to measure these in \$ or utility (CBA or CUA), get an economist

# How to get outcomes for implementation strategies?



\*IOM Standards of Care

# Exercise 2: Costs, Outcomes, & Study Design

- Handout: Ride et al. *BMJ Open* (2014) article (reading list)
  - “Protocol for economic evaluation alongside a cluster-randomised controlled trial of a psychoeducational intervention for the primary prevention of postnatal mental health problems in first-time mothers”
- What costs are included? (or omitted?)
- How are they measured?
- What is the perspective?
- What are the outcomes?
- What type(s) of EE are proposed?
  
- *Break into groups of 3-4. Tackle as much as you can in a few minutes. But first, let's discuss....*
- *Do this exercise on your own if needed.*

# Discussion

- Uncertainty is inevitable; do sensitivity analysis
- What is your proposed research problem?
- Who do you need on the team to do it?
- What outcomes do you propose to quantify in your research?
- What costs?
- Strong, but flexible design, and a good team will lead to the best peer review
  - Co-I or consultant economists (does not necessarily need to be a lot of effort)

# Resources: texts & guides

- Brownson RC, Colditz GA, Proctor EK. *D&I Research in Health*. Oxford UP, 2012.
- Raghavan R. The role of economic evaluation in D&I research. (Ch 5 in Brownson et al., p. 94-113.)
- Ritzwoller DP, Sukhanova A, Gaglio B, Glasgow RE. Costing behavioral interventions: a practical guide to enhance translation. *Ann Behav Med*. 2009 Apr;37(2):218-27.
- Gold MR, Siegel JE, Russell LB, Weinstein MC. *Cost-Effectiveness in Health and Medicine*. Oxford UP, 1996.
- Drummond MF, Jefferson TO. Guidelines for authors and peer reviewers of economic submissions to the BMJ. *BMJ*. 1996;313:275. <http://dx.doi.org/10.1136/bmj.313.7052.275>

# Resources: cost & data collection instruments

- Dadoo MS, Krist AH, Cifuentes M, Green LA. Start-up and incremental practice expenses for behavior change interventions in primary care. *Am J Prev Med*. 2008;35(5 Suppl):S423-30.
- *Prescription for Health*. Guide for collecting expenditure data in a clinical intervention in a primary care practice.  
[http://prescriptionforhealth.org/results/P4H\\_exp\\_template/hndt3\\_dtacolgd.pdf](http://prescriptionforhealth.org/results/P4H_exp_template/hndt3_dtacolgd.pdf)
- The Diabetes Prevention Program. Costs associated with the primary prevention of type 2 diabetes mellitus in the diabetes prevention program. *Diabetes Care*. 2003;26(1):36-47.
- <https://www.niddkrepository.org/studies/dpp/>
- Krist AH, Cifuentes M, Dadoo MS, Green LA. Measuring primary care expenses. *J Am Board Fam Med*. 2010;23(3):376-83.

# Resources: examples & study protocols

- Fishman PA, Cook AJ, Anderson M, Ralston JD, Catz SL, Carrell D, Carlson J, Green BB. Improving BP control through electronic communications: an economic evaluation. *Am J Manag Care*. 2013;19(9):709-16.
- Ritzwoller DP, Sukhanova AS, Glasgow RE, Strycker LA, King DK, Gaglio B, Toobert DJ. Intervention costs and cost-effectiveness for a multiple-risk-factor diabetes self-management trial for Latinas: economic analysis of ¡Viva Bien! *Transl Behav Med*. 2011;1(3):427-435.
- Ride J, Rowe H, Wynter K, Fisher J, Lorgelly P. Protocol for economic evaluation alongside a cluster-randomised controlled trial of a psychoeducational intervention for the primary prevention of postnatal mental health problems in first-time mothers. *BMJ Open*. 2014;4:e006226. doi:10.1136/bmjopen-2014-006226

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