

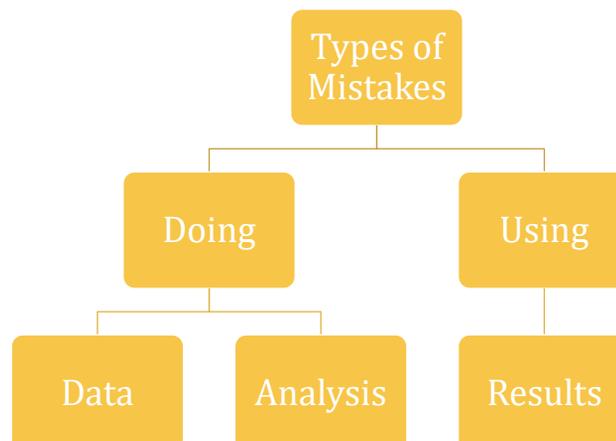
The Biggest Mistakes in Economic Evaluation

Jeffrey S. Hoch, PhD

Associate Director, Center for Healthcare Policy and Research
Professor and Chief, Division of Health Policy and Management
Department of Public Health Sciences, University of California, Davis
Adjunct Professor, University of Toronto, Canada
Health Economist, St. Michael's Hospital, Toronto, Ontario, Canada

jshoch@ucdavis.edu

Main idea: Anatomy of common mistakes



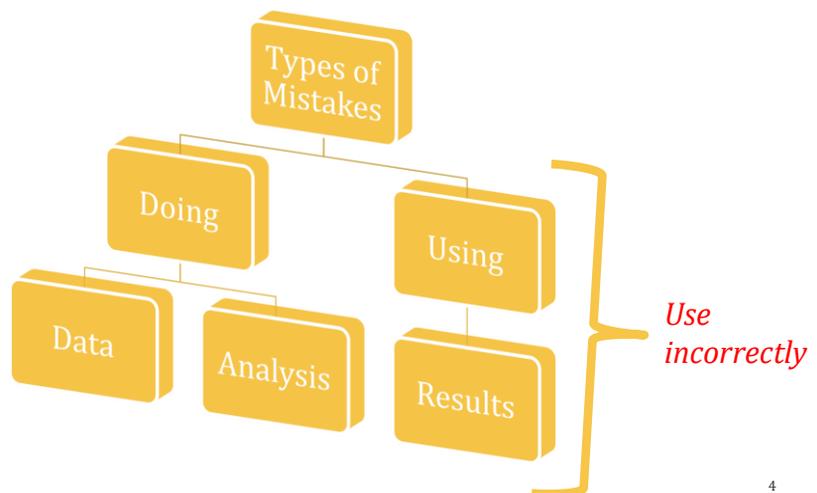
Main idea: Anatomy of common mistakes (and why they matter)



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Main idea: Anatomy of common mistakes (and why they matter)



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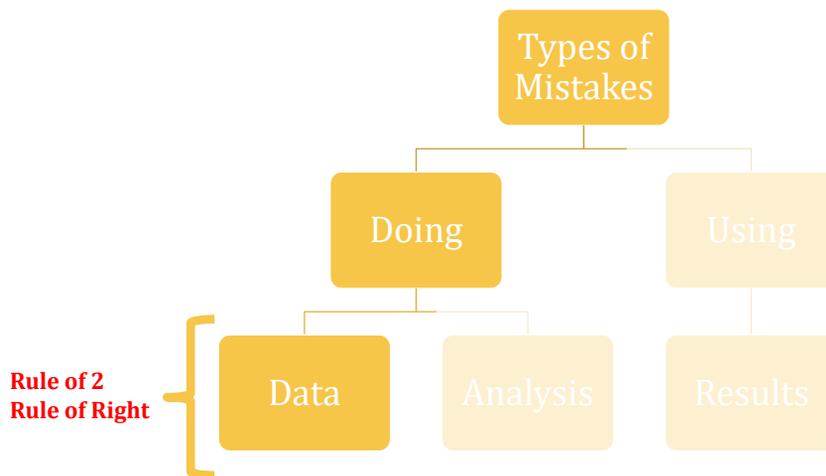
Cascade failure



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Main idea: Anatomy of common mistakes



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Data Mistakes

Rule of 2

- Must collect, analyze and report cost

• *and*

effect

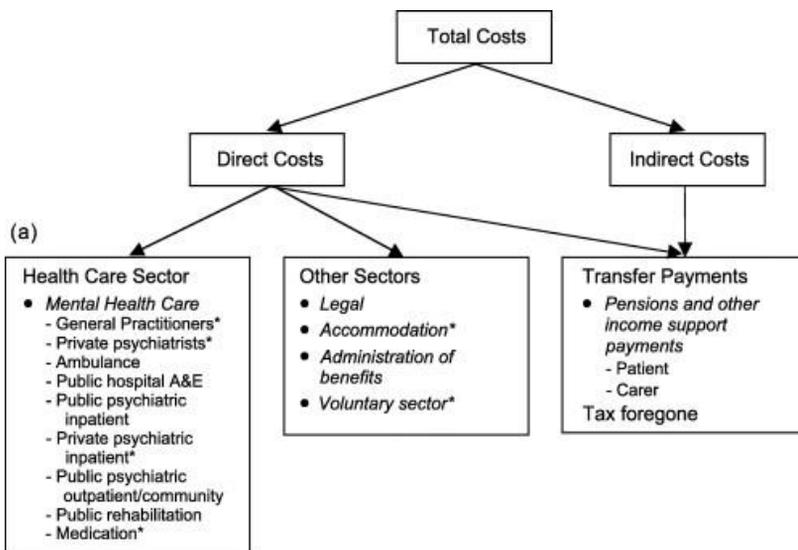
Rule of "Right"

- Should consider the "right"
 - Perspective
 - Outcome
 - Alternative

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Example:
mental
health



Carr VJ, Neil AL, Halpin SA, Holmes S, Lewin TJ. Costs of schizophrenia and other psychoses in urban Australia: findings from the Low Prevalence (Psychotic) Disorders Study. *Aust N Z J Psychiatry*. 2003 Feb;37(1):31-40.

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Original Research

Potential Effects of the Choice of Costing Perspective on Cost Estimates: An Example Based on 6 Early Psychosis Intervention Programs

The Canadian Journal of Psychiatry /
La Revue Canadienne de Psychiatrie
2016, Vol. 61(8), 474-479
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sagepub.com/journalsPermissions.nav
DOI: 10.1177/0818474416669177
TheCJPa | LaCJPa
SAGE

Effets potentiels du choix d'une perspective d'établissement des coûts sur les estimations des coûts : un exemple basé sur six programmes d'intervention précoce en psychose (IPP)

Carolyn S. Dewa, PhD, MPH^{1,2}, Lucy Trojanowski, MA¹,
Chiachen Cheng, MD, MPH, FRCPC^{1,3}, and Jeffrey S. Hoch, PhD⁴

Abstract

Objective: Because health care resources are constrained, decision-making processes often require clarifying the potential costs and savings associated with different options. This involves calculating a program's costs. The chosen costing perspective defines the costs to be considered and can ultimately influence decisions. Yet reviews of the literature suggest little attention has been paid to the perspective in economic evaluations. This article's purpose is to explore how the costing perspective can affect cost estimates.

Mental Health Example, II

Table 4. Mean differences in costs by perspective.^a

	≤12 mo		>12 mo		Difference in costs	
	Mean costs	95% CI	Mean costs	95% CI	Mean costs	95% CI
MOHLTC (no community)	\$10,199.0	(7925.6, 12,472.4)	\$12,697.6	(4561.0, 20,834.1)	-2498.6	(-10,924.1, 5926.9)
MOHLTC + community	\$15,817.6	(13,410.8, 18,224.4)	\$16,578.4	(8136.2, 25,020.6)	-\$760.8	(-9515.0, 7993.3)
MOHLTC + community + non-MOHLTC	\$19,723.5	(16,856.4, 22,590.7)	\$19,964.2	(11,448.9, 28,479.4)	-\$240.6	(-9192.9, 8711.6)
Nongovernmental	\$330.3	(196.6, 464.0)	\$61.7	(-23,434.0, 146.7)	\$268.6	(111.4, 425.9)
MOHLTC + community + non-MOHLTC + nongovernmental	\$22,627.8	(19,654.6, 25,601.1)	\$21,355.5	(12,819.9, 29,891.1)	\$1272.3	(-7731.6, 10,276.2)

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Data Mistakes

Rule of 2

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 - Alternative

• *and*

effect

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Which is best?

The Journal of Mental Health Policy and Economics
J Ment Health Policy Econ 9, 177-183 (2006)

The Cost of Schizophrenia: Lessons from an International Comparison

Åke G. Blomqvist,¹ Pierre Thomas Léger,² Jeffrey S. Hoch^{3,4}

¹PhD, Professor, Department of Economics, National University of Singapore, Singapore.

²PhD, Associate Professor, Institute of Applied Economics, HEC Montréal, CIRANO and CIRPÉE, Montreal, Quebec, Canada

³PhD, Health Economist, Centre for Research on Inner City Health, St. Michael's Hospital, Toronto, Ontario, Canada

⁴PhD, Associate Professor, Department of Health Policy, Management and Policy, University of Toronto, Toronto, Ontario, Canada

Abstract

Background: A number of studies have attempted to estimate the aggregate burden of mental illness in particular countries. It has been observed that the economic costs vary by country. This is

is less than half of Canada's. Coincidentally, if one assumes that the true prevalence rate in the UK is similar to that estimated for Canada and adjusts figures accordingly, the result is an estimate for direct costs that is quite similar to the Canadian one.

Discussion and Limitations: With respect to direct costs, a key finding in the paper is the very large difference in the per capita cost

Got outcome?

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Screening for Prostate Cancer A Decision Analytic View

Murray D. Krahn, MD, MSc, John E. Mahoney, MD, Mark H. Eckman, MD, et al.

> Author Affiliations

JAMA. 1994;272(10):773-780. doi:10.1001/jama.1994.03520100035030

Abstract

Objective. —To determine the clinical and economic effects of screening for prostate cancer with prostate-specific antigen (PSA), transrectal ultrasound (TRUS), and digital rectal examination (DRE).

Design. —Decision analytic cost-utility analysis comparing four screening strategies with a strategy of not screening. We assumed that the cancer detection rate and stage distribution were predicted by each combination of tests and that localized cancer was treated with radical prostatectomy. For each strategy, we calculated life expectancy, quality-adjusted life expectancy (QALE), and cost-utility ratios for unselected and high-prevalence populations.

Data. —Probabilities and rates for clinical events were gathered from published data. We assessed utilities by the time-trade-off method using urologists, radiation oncologists, and internists as subjects. The Clinical Cost Manager at the New England Medical Center provided cost data.

Results. —In unselected men between the ages of 50 and 70 years, screening with PSA or TRUS prolonged unadjusted life expectancy but diminished QALE. Screening with DRE alone yielded no reduction in mortality at any age. All programs increased costs. Results were sensitive only to assumptions about the efficacy of treatment. In high-prevalence populations, screening produced a similar pattern: gains in unadjusted life expectancy, losses in QALE, and increased costs.

Conclusions. —Our analysis does not support using PSA, TRUS, or DRE to screen asymptomatic men for prostatic cancer. Screening may result in poorer health outcomes and will increase costs dramatically. Assessment of comorbidity, risk attitude, and valuation of sexual function may identify individuals who will benefit from screening, but selecting high-prevalence populations will not improve the benefit of screening (*JAMA*. 1994;272:773-780)

“In unselected men between... 50-70 years, screening with PSA... prolonged unadjusted life expectancy but diminished quality-adjusted life expectancy (QALE)”

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Cost-Effectiveness of Two Vocational Rehabilitation Programs for Persons With Severe Mental Illness

Lisa Dixon, M.D., M.P.H.
 Jeffrey S. Hoch, Ph.D.
 Robin Clark, Ph.D.
 Richard Bebout, Ph.D.
 Robert Drake, M.D., Ph.D.
 Greg McHugo, Ph.D.
 Deborah Becker, M.Ed.

Objective: This study sought to determine difference in effectiveness of two vocational programs: individual placement and support (IPS), in which employment specialists within a mental health system help patients obtain competitive jobs and provide

Table 2

Competitive employment and total wages over 18 months for participants in an individual placement and support program (IPS) and an enhanced vocational rehabilitation (EVR) program

Outcome	IPS (N=73)		EVR (N=76)		t ^a	df ^b
	Mean	SD	Mean	SD		
Competitive work						
Hours	326	572	28	125	4.37	78 ^c
Weeks	15	21	1	6	5.44	81 ^c
Combined earnings ^c	\$1,997	\$3,405	\$2,005	\$2,951	-0.02	147

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Data Mistakes

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Something old, something new, something borrowed, something blue: a framework for the marriage of health econometrics and cost-effectiveness analysis

Jeffrey S. Hoch^{a*}, Andrew H. Briggs^b and Andrew R. Willan^c

^aDepartment of Epidemiology and Biostatistics, University of Western Ontario

^bHealth Economics Research Centre, University of Oxford, UK

^cDepartment of Clinical Epidemiology and Biostatistics, McMaster University,

What about change in
year, location or
situation?

Methods and data

Direct treatment costs across the one year intervention period were examined from the perspective of the state mental health authority. Housing status was chosen as the main effectiveness measure because of its established validity as a primary outcome for homeless persons with SPMI [24]. A day of stable housing was defined as living in a non-institutionalised setting not intended to serve the homeless (e.g., independent housing, living with family, etc.). Subjects randomised to the comparison usual care condition had access to services usually available to homeless persons in the city of Baltimore. Lehman *et al.* [23] offer more detail about the study's methodology. ¹⁵

Data Mistakes

Rule of 2

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• *and*

effect

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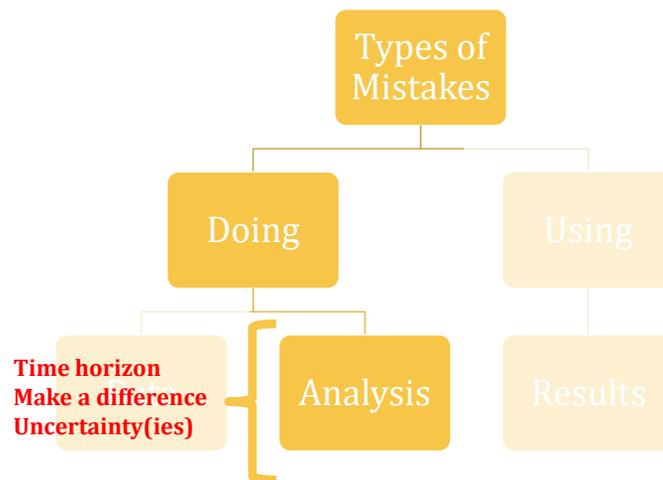
Mistakes

- Data
 1. Not both cost and effect
 2. Wrong cost perspective
 3. Wrong outcome
 4. Fake or wrong alternative

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Main idea: Anatomy of common mistakes



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Improving chronic disease prevention and screening in primary care: results of the BETTER pragmatic cluster randomized controlled trial

Per chronic disease prevented?

Eva Grunfeld^{1,2*}, Donna Manca^{3†}, Rahim Moineddin^{1†}, Kevin E Thorpe^{4,5†}, Jeffrey S Hoch^{6,7,9,10†}, Denise Campbell-Scherer^{3†}, Christopher Meaney^{1†}, Jess Rogers^{8†}, Jaclyn Beca^{6,7†}, Paul Krueger^{1†},

1) general and 2) moderate mental illness. The interventions involved a multifaceted, evidence-based, tailored practice-level intervention with a Practice Facilitator, and a patient-level intervention involving a one-hour visit with a Prevention Practitioner where patients received a tailored 'prevention prescription'. The primary outcome was a composite Summary Quality Index of 28 evidence-based chronic disease prevention and screening actions with pre-defined targets, expressed as the ratio of eligible actions at baseline that were met at follow-up. A cost-effectiveness analysis was conducted.

Results: 789 of 1,260 (63%) eligible patients participated. On average, patients were eligible for 8.96 (SD 3.2) actions at baseline. In the adjusted analysis, control patients met 23.1% (95% CI: 19.2% to 27.1%) of target actions, compared to 28.5% (95% CI: 20.9% to 36.0%) receiving the practice-level intervention, 55.6% (95% CI: 49.0% to 62.1%) receiving the patient-level intervention, and 58.9% (95% CI: 54.7% to 63.1%) receiving both practice- and patient-level interventions (patient-level intervention versus control, $P < 0.001$). The benefit of the patient-level intervention was seen in both strata. The extra cost of the intervention was \$26.43CAN (95% CI: \$16 to \$44) per additional action met.

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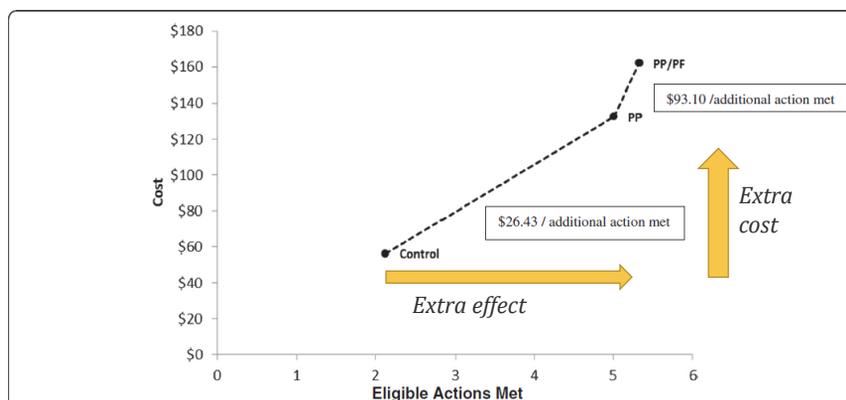


Figure 4 Costs and effects for control and treatment groups. The ratio of the difference in costs between two groups to the difference in eligible actions accomplished represents the incremental cost-effectiveness ratio (ICER) (dotted line). PP/PF: Combined practice-level and patient-level intervention. NB: The PF intervention is within the "efficiency frontier" so it is not considered an efficient use of resources.

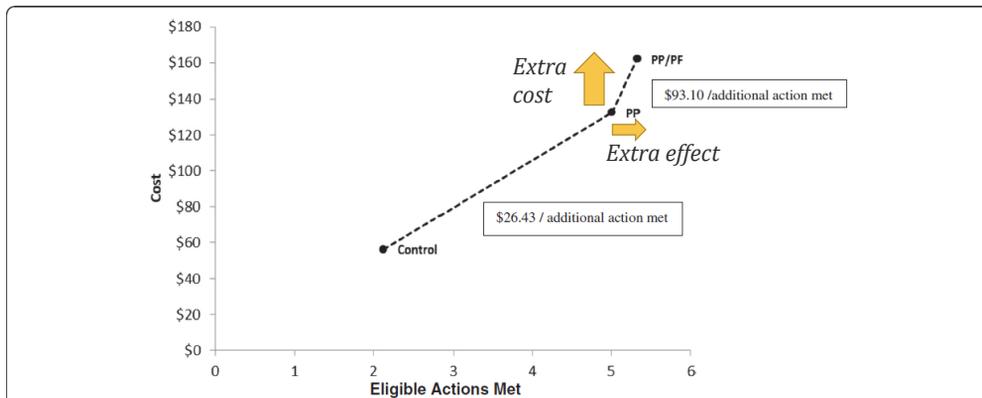


Figure 4 Costs and effects for control and treatment groups. The ratio of the difference in costs between two groups to the difference in eligible actions accomplished represents the incremental cost-effectiveness ratio (ICER) (dotted line). PP/PF: Combined practice-level and patient-level intervention. NB: The PF intervention is within the "efficiency frontier" so it is not considered an efficient use of resources.

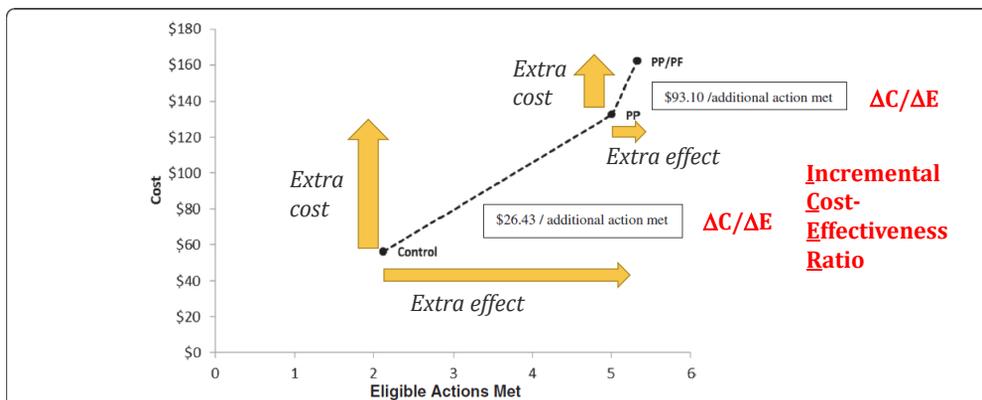
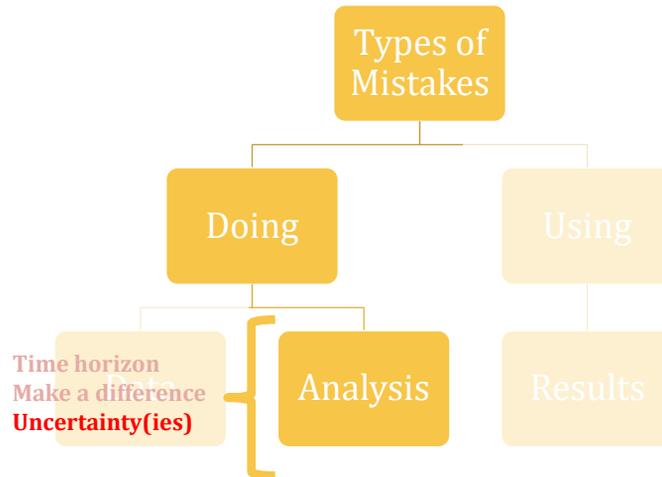


Figure 4 Costs and effects for control and treatment groups. The ratio of the difference in costs between two groups to the difference in eligible actions accomplished represents the incremental cost-effectiveness ratio (ICER) (dotted line). PP/PF: Combined practice-level and patient-level intervention. NB: The PF intervention is within the "efficiency frontier" so it is not considered an efficient use of resources.

Main idea: Anatomy of common mistakes



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Uncertainty

- What to do if you don't have or don't know something for your analysis?
- 2 key questions:
 - 1) Is it important?
 - Why not check?
 - 2) Would doing your "experiment" a bunch of times help?
 - To "characterize" the uncertainty

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Uncertainty: Sensitivity analysis

Can J Psychiatry 2014;59(10 Suppl 1):S34-S39

Chapter 5

When Could a Stigma Program to Address Mental Illness in the Workplace Break Even?

Carolyn S Dewa, MPH, PhD¹; Jeffrey S Hoch, PhD²

¹Head, Centre for Research on Employment and Workplace Health, Centre for Addiction and Mental Health, Toronto, Ontario; Senior Scientist and Health Economist, Centre for Addiction and Mental Health, Toronto, Ontario; Professor, Department of Psychiatry and Institute of Health Policy, Management and Evaluation, University of Toronto, Toronto, Ontario.

Correspondence: Centre for Addiction and Mental Health, 33 Russell Street, Toronto, ON M5S 2S1; carolyn.dewa@camh.ca.

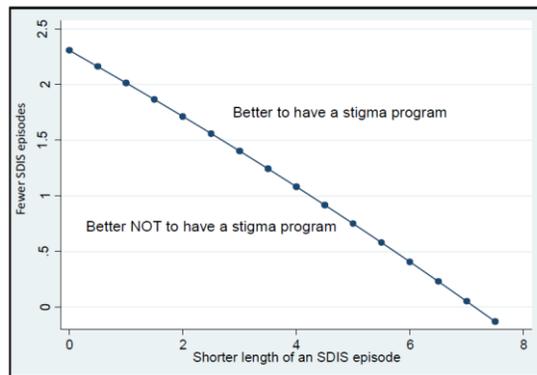
²Director, Centre for Excellence in Economic Analysis Research (CLEAR), St Michael's Hospital, Toronto, Ontario; Associate Professor, Institute of Health Policy, Management and Evaluation, University of Toronto, Toronto, Ontario.

Key Words: stigma, mental

Objective: To explore basic requirements for a stigma program to produce sufficient savings to pay for itself (that is, break even).

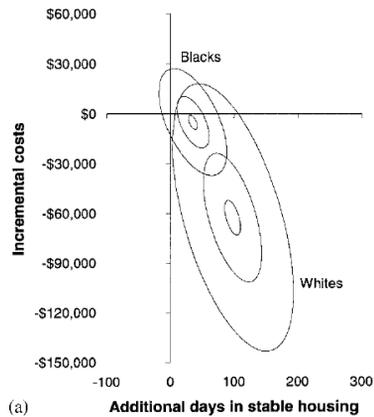
The ROI is X or the CBA shows Y vs. based on your beliefs, this is how things could turn out...

Figure 2 Conditions to break even for a stigma program related to fewer and shorter short-term disability (SDIS) episodes



Uncertainty

- What to do if you don't have or don't know something for your analysis?
- 2 key questions:
 - 1) Is it important?
 - Why not check?
 - 2) Would doing your "experiment" a bunch of times help?
 - To "characterize" the uncertainty



HEALTH ECONOMICS
Health Econ. 11: 415-430 (2002)

ECONOMETRICS AND HEALTH ECONOMICS ■ ■
 ■ ■
 Published online 31 January 2002 in Wiley InterScience (www.interscience.wiley.com). DOI:10.1002/hec.678

**Something old, something new, something borrowed,
 something blue: a framework for the marriage of health
 econometrics and cost-effectiveness analysis**

Jeffrey S. Hoch^{a*}, Andrew H. Briggs^b and Andrew R. Willan^c

Uncertainty: Statistical analysis

95% confidence interval (or something like that)

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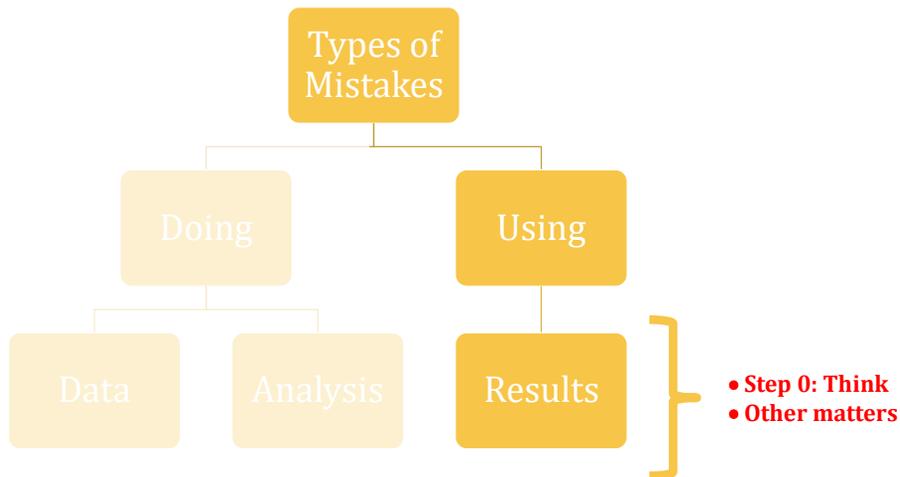
Mistakes

- Data
 1. Not both cost and effect
 2. Wrong cost perspective
 3. Wrong outcome
 4. Fake or wrong alternative
- Analysis
 5. Not the right time horizon
 6. Not a difference ($\Delta \Delta \Delta!$) or ratio of Δ 's
 7. Only an estimate, no uncertainty
 8. Only 1 type of uncertainty (e.g., SA)

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Main idea: Anatomy of common mistakes



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PharmacoEconomics Open
DOI 10.1007/s41669-017-0018-3

ORIGINAL RESEARCH ARTICLE

Methodological Issues in Economic Evaluations Submitted to the Pan-Canadian Oncology Drug Review (pCODR)

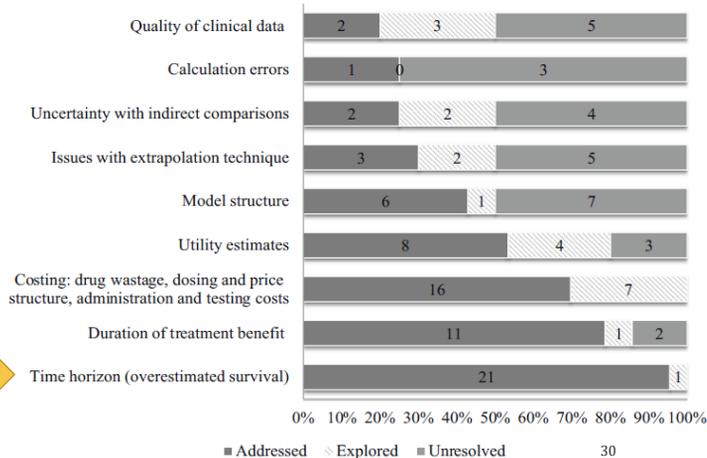
Lisa Masucci¹ · Jaclyn Beca² · Mona Sabharwal³ · Jeffrey S. Hoch^{1,4}

Abstract
Background Public drug plans are faced with increasingly difficult funding decisions. In Canada, the pan-Canadian Oncology Drug Review (pCODR) makes funding recommendations to the provincial and territorial drug plans responsible for cancer drugs. Assessments of the economic models submitted by pharmaceutical manufacturers are publicly reported.
Objectives The main objective of this research was to identify recurring methodological issues in economic models submitted to pCODR for funding reviews. The secondary objective was to explore whether there exists any observed relationships between reported methodological issues and funding recommendations made by pCODR's expert review committee.
Methods Publicly available Economic

reviews with a final funding recommendation (N = 34) were independently examined by two authors. Major methodological issues from each review were abstracted and grouped into nine main categories. Each issue was also categorized based on perception of the reviewer's actions to manage it.
Results The most commonly reported issues involved costing (59% of reviews), time horizon (56%), and model structure (36%). Several types of issues were identified that usually could not be resolved, such as quality of clinical data or uncertainty with indirect comparisons. Issues with costing or choice of utility estimates could usually be addressed or explored by reviewers. No statistically significant relationship was found between any methodological issue and funding recommendations from the expert

by parties who submit or review economic evidence. It continuous improvement and consistency in economic modeling, reporting, and decision making.

Is what you are seeing making sense clinically?



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Other matters

Not *initially* cost-effective \neq don't fund it



Price

Can the cost-effectiveness be improved?



Can the budget impact be improved?



Are there other factors that matter to decision makers?

Other matters

Not *initially* cost-effective \neq don't fund it



Price

Can the cost-effectiveness be improved?

- Reduced price will reduce ΔC
- Targeted use will increase ΔE

Other matters

Not *initially* cost-effective \neq don't fund it



Can the budget impact be improved?

- Reduced price will reduce $\underline{C} \times N$
- Targeted use will reduced $C \times \underline{N}$

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Other matters

Not *initially* cost-effective \neq don't fund it



Are there other factors that matter to decision makers?

- Equity?
- Voter appeal (social pressure)?

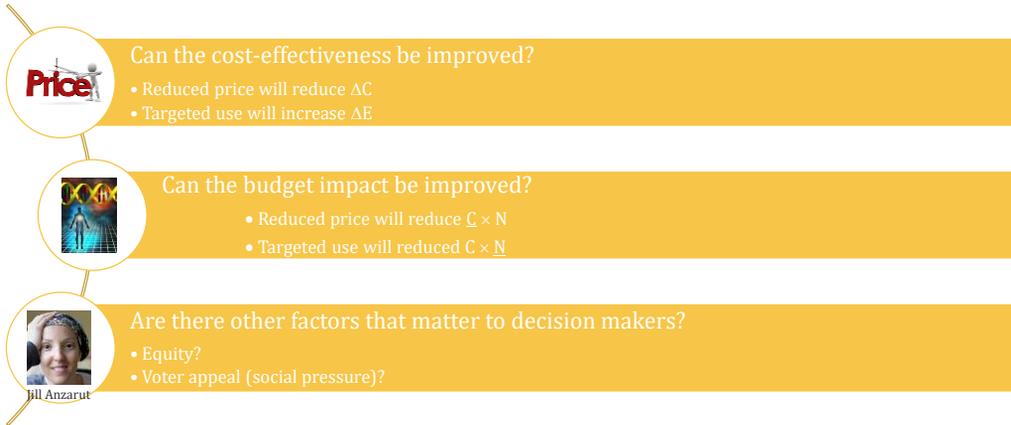
Jill Anzarut
PROSTATECTOMY

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Other matters

Not *initially* cost-effective \neq don't fund it



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Special areas

- Willingness to pay more for treatments in
-
- A) Cancer
 - B) Blood Safety
 - C) Mental illness / Drug Addiction
 - D) Neonates, babies, children
 - E) Some of above

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Mistakes

- Data
 1. Not both cost and effect
 2. Wrong cost perspective
 3. Wrong outcome
 4. Fake or wrong alternative
- Analysis
 5. Not the right time horizon
 6. Not a difference ($\Delta \Delta \Delta!$) or ratio of Δ 's
 7. Only an estimate, no uncertainty
 8. Only 1 type of uncertainty (e.g., SA)

Using the results

9. Don't ask, "Do the results make sense?"
10. Believe the economic results are the only thing that matters

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Implications

- An economic evaluation must fill in the **letters** in the statement:
 - In **A** years, it will cost **\$B** to get one more unit of **C** when using **D** instead of **E** in patients of type **F** in context **G**.
- Different choices for A – G create different cost-effectiveness “results”.
- When the analysis has different A – G's from your ideal, it is problematic.

Hoch J. The economic attractiveness of targeted radiotherapy: Value for money? In R. Reilly (Editor), Monoclonal Antibody and Peptide-Targeted Radiotherapy of Cancer. 543-570, 2010.

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Questions?

jshoch@ucdavis.edu

Questions and answers appear on the next pages...



Q: How can I find recordings of the previous talks?

Google search

Cost NAPCRG

Products:

- *Measuring and Including Practice Structural Transformation in Evaluations of Medical Home Interventions.* A Workshop at the NAPCRG Annual Meeting, November 2013. Presenters: Mark Friedberg, Miranda Moore.
- *Costing Primary Care for Research and Practice Improvement.* A Workshop at the NAPCRG Annual Meeting, November 24, 2014. Presenters: Dale McMurchy, Miranda Moore, and Charles Normand.
- *Economic Evaluation Methods for Primary Care Research and Practice Improvement.* A Workshop at the NAPCRG Annual Meeting, October 25, 2015. Presenters: Andrew Pinto, MD, MSc, CCFP, FRCP(C); Dale McMurchy, Richard A. Young.
- *Introduction to Economic Evaluation* - Introduction to economic evaluation. A webinar given on May 18, 2016. Presented by Wanrudee Isaranuwachai. View the webinar recording.



- *Introduction to the Analysis of Cost Effectiveness Data.* A webinar given on September 28, 2016, presented by Ahmed Bayoumi. View the webinar recording.



Questions, continued

- Q: What are some suggestions for integrating CEA into research grants?

Response

CEA can be introduced as a “third aim” into a research grant. Typically, the outcome is already decided upon (in order to calculate sample size for the grant) and the outcome data are being collected as part of the study. A key decision is whether it is worth it (and how) to collect some resource use data (eg., hospitalizations, emergency room use and doctor visits). Once the data on cost and outcome exist, it is possible to analyze them using cost-effectiveness methods for a cost-effectiveness data set. Alternatively, data from the trial could be used to build a decision model. The decision model can extend past the trial and/or consider other outcomes or populations. For example, see <http://tinyurl.com/y8hovts6> and <http://tinyurl.com/y7znzhws>

Also, see the two previous (referenced on the previous slide) talks for other ideas and examples.

- Q: Would you recommend any analyses that split patients/people by latent classes, so the final statement then will become several statements?

Response

Yes, I think hypothesis generation with patient subgroups is a great idea. If you are analyzing a cost-effectiveness data set, you can do stratification, add interaction terms, or use methods for latent classes. If you are making a decision model, introducing latent classes can be difficult; however, creating subgroups is not hard--make a separate model (either structure or data) for each separate group.

- As an example, Mahoney and colleagues studied the “Long-term cost-effectiveness of early and sustained clopidogrel therapy for up to 1 year in patients undergoing percutaneous coronary intervention after presenting with acute coronary syndromes without ST-segment elevation”. Her [Figure 4](#), shows the likelihood of cost-effectiveness for 4 different groups.

Questions, continued, continued

- Q: I’m often asked to do CEA or CBA on interventions. Many times I have difficulty finding a good match for a control group. Do you have any broad guidance around matching?

Response

Yes, this can be tricky. The “real world” evidence people and the observational data crowd continue to struggle with this. I don’t feel there are any easy answers beyond trying to make the two groups comparable. One trick I sometimes use is to say, “How much would this unknown variable need to be before the new intervention is not economically attractive?” This type of threshold analysis or break even analysis can help counter the lack of a good match in control group by allowing you to see how sensitive your results are to the parameter estimate you don’t have (or do have but is not precisely estimated). Missing a good control group afflicts both outcomes as well as economic evaluation studies.

- Q: Could we get the slides

Response

Certainly. I will email them to the organizers.