



# When **cost-effective** interventions are **unaffordable**

*Understanding why and moving forward*

Alyssa Bilinski  
October 2018

# Cost-effective ≠ affordable



**Cost-effective**

(ICER: \$50-100K/QALY)



**Affordable**

(Cost: \$84,000/patient)

## Poll question #1

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**How experienced are you with cost-effectiveness analysis (CEA)?**

- a. I'm an expert! 😊
- b. I have performed CEA.
- c. I have read CEA but have not performed it.
- d. Not at all! (But I'm eager to learn more.)

# Economic evaluation

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## Cost-Effectiveness Analysis

Is the intervention  
*good value for money?*

# Economic evaluation

## Cost-Effectiveness Analysis

Is the intervention  
*good value for money?*

*No*

Does this conclusion  
seem wrong (e.g. on  
moral or equity  
grounds)?

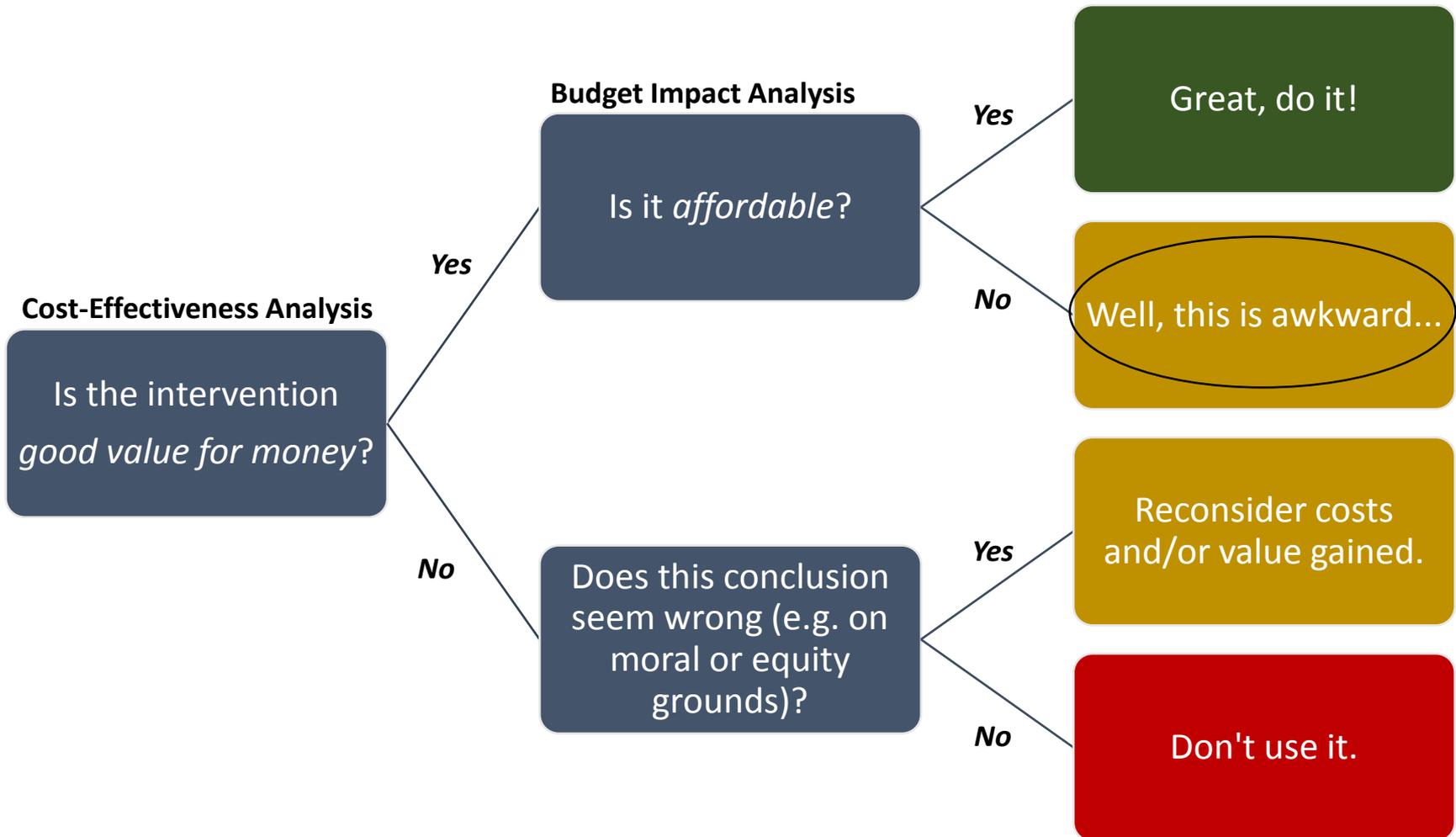
*Yes*

Reconsider costs  
and/or value gained.

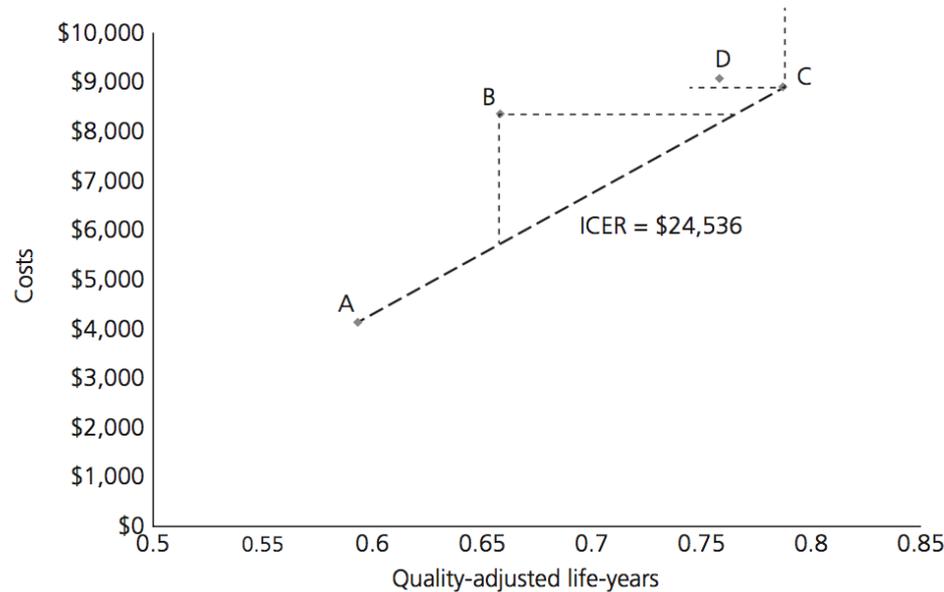
*No*

Don't use it.

# Economic evaluation



# Cost-effectiveness analysis (CEA)

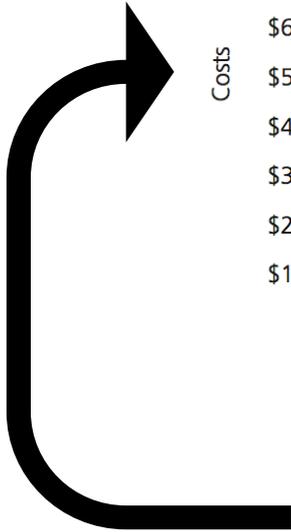
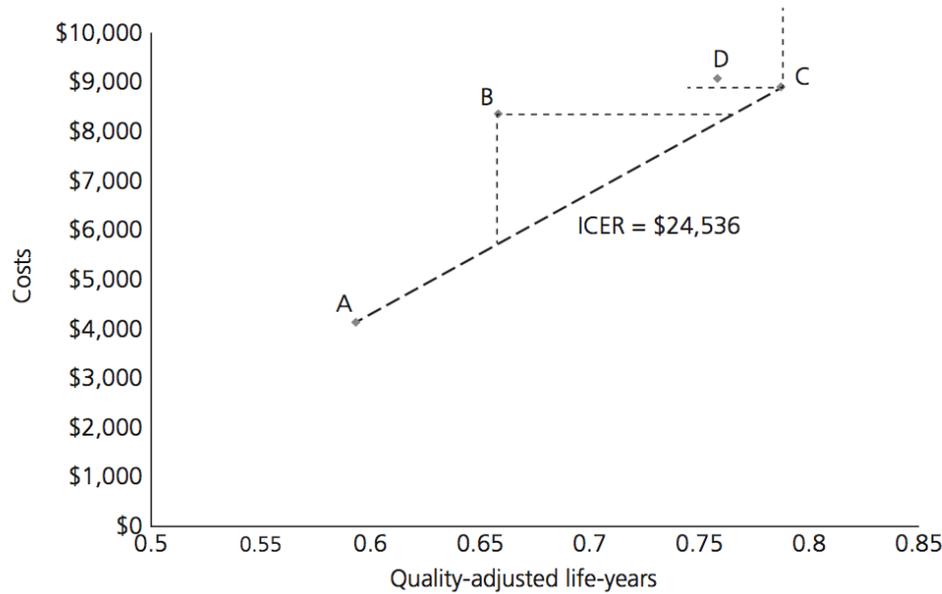


**Incremental cost-effectiveness ratio (ICER):**  $\frac{\text{Cost}_{\text{new}} - \text{Cost}_{\text{old}}}{\text{Benefits}_{\text{new}} - \text{Benefits}_{\text{old}}}$

**Willingness to pay (WTP) threshold:** highest ICER you can “afford”  
(without giving up something better)

**If ICER < WTP, 👍. If not, 👎.**

# Budget impact analysis (BIA)



**Budget impact: Short-term cost for payer of providing intervention to defined population**

If this seems reasonable, 👍. If not, 👎.

# Roadmap

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- 1. What does the literature say?**
- 2. What do experts say?**
- 3. How does this connect to theory?**
- 4. What are some practical suggestions?**

# Roadmap

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- 1. What does the literature say?**
2. What do experts say?
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# Literature review

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## What does the literature tell us about the affordability of cost-effective interventions?

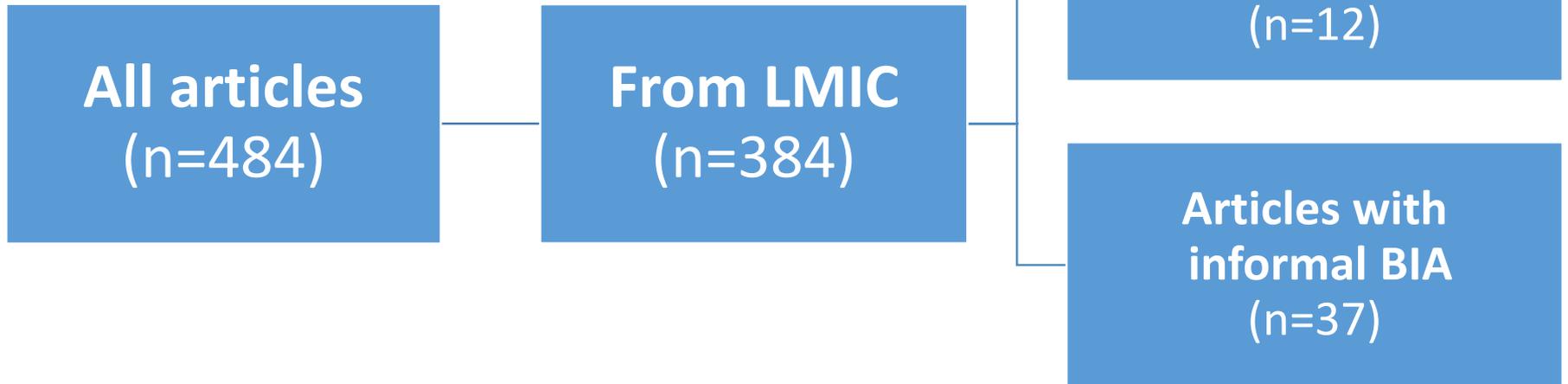


ESSAY

When cost-effective interventions are unaffordable:  
Integrating cost-effectiveness and budget impact in priority  
setting for global health programs

Alyssa Bilinski , Peter Neumann, Joshua Cohen, Teja Thorat, Katherine McDaniel, Joshua A. Salomon

# BIA is uncommon.



1

**BIA performed in 3-13% of articles.**

# BIA is uncommon.



**All cost-per-QALY articles**

**All articles  
(n=4021)**

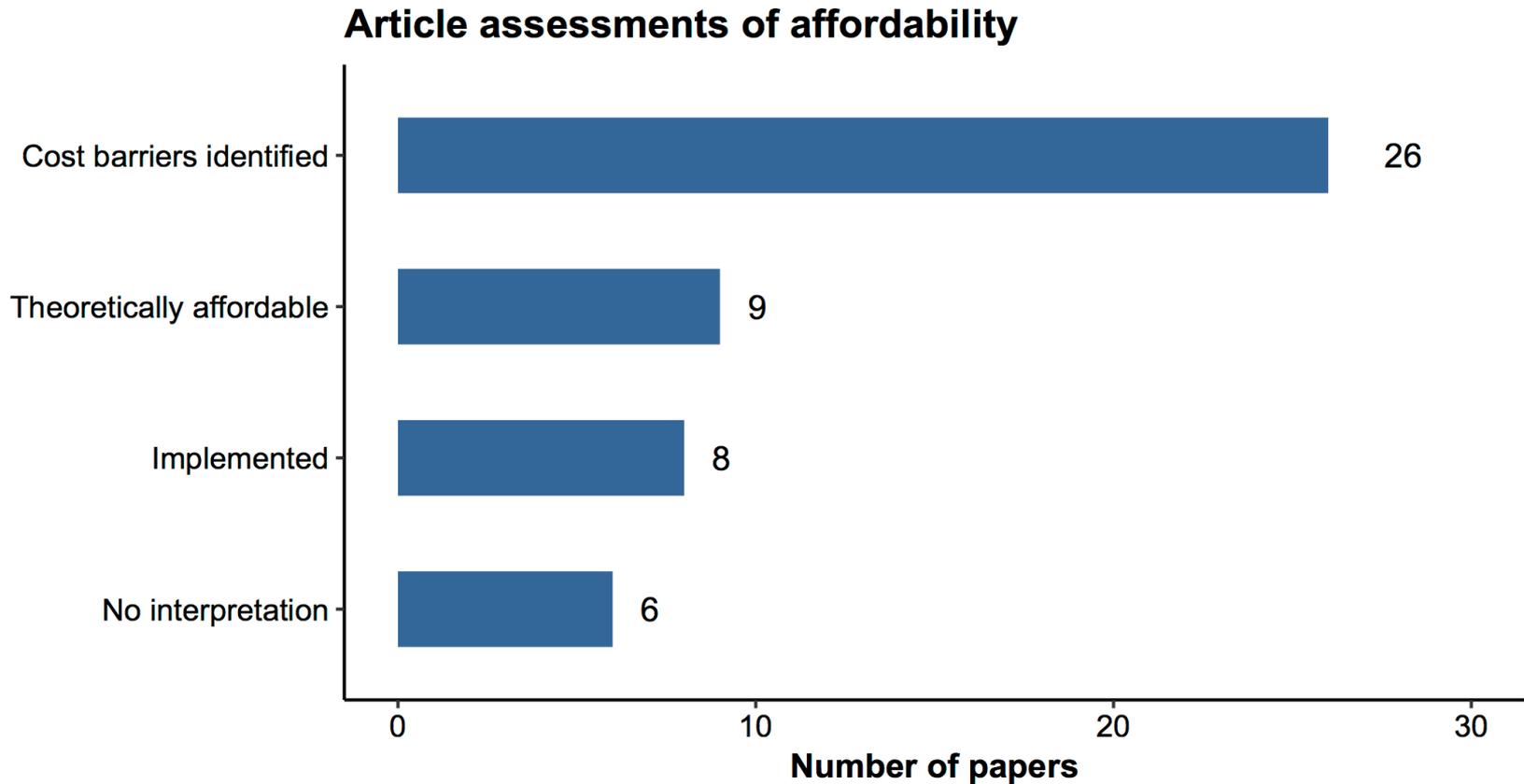
**With PDFs  
(n=1940)**

**Articles with  
“budget impact” in  
full-text search  
(n=114)**

1a

**BIA performed in  
6% of articles.**

# Clash between BIA and CEA exists.



2

**53% of articles with BIA mention affordability concerns.**

# Takeaway

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**We often lack important information about affordability when interpreting cost-effectiveness analysis.**

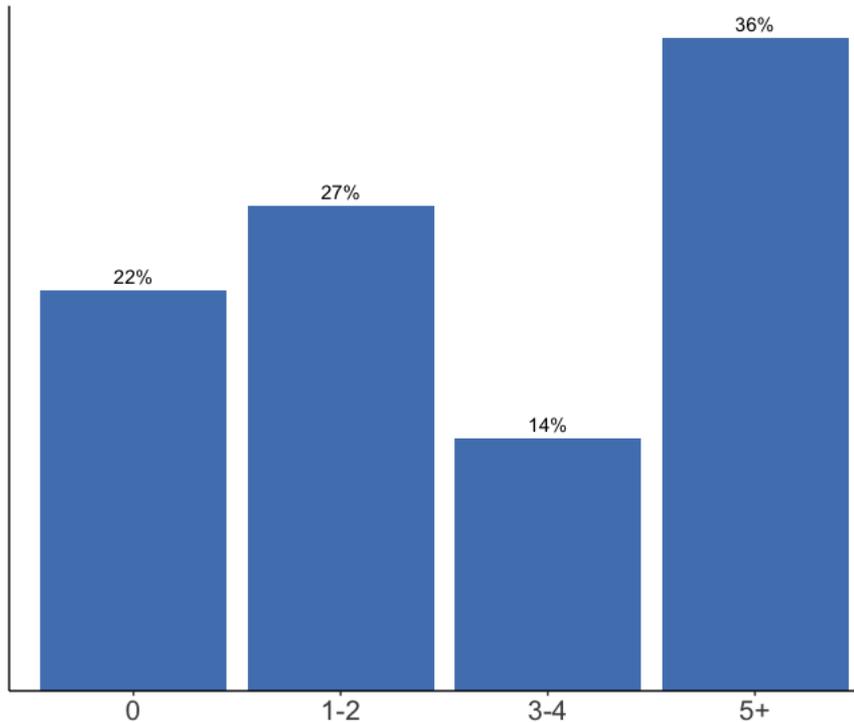
# Roadmap

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1. What does the literature say?
2. **What do experts say?** \* Preliminary results\*
3. How does this connect to theory?
4. What are some practical suggestions?

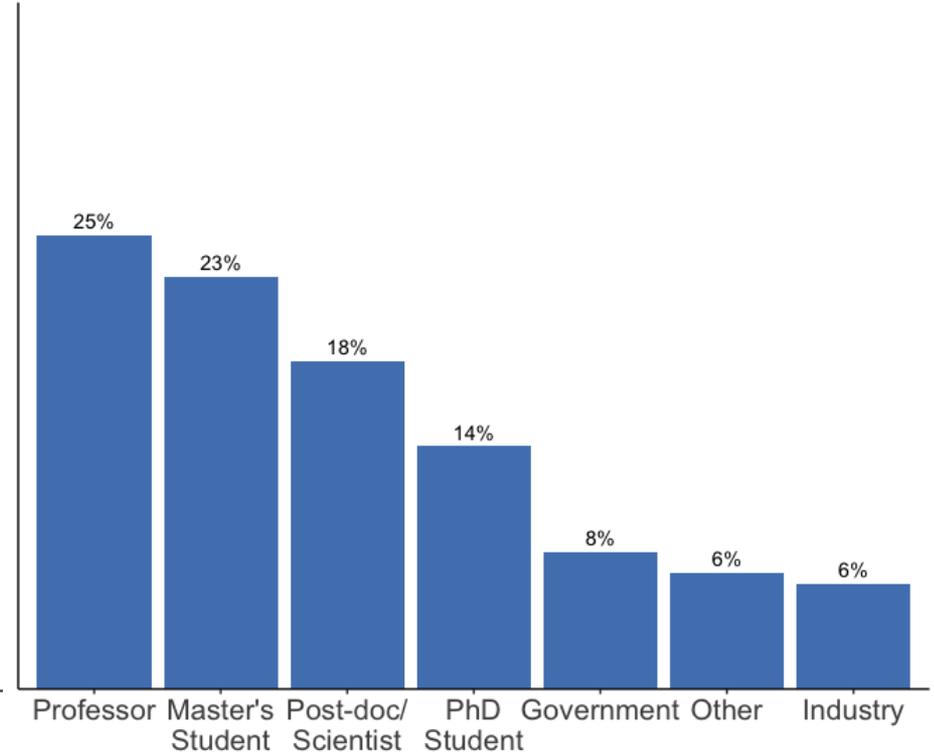
# Survey of researchers (n = 170)

## Number of CEAs



**78% performed  $\geq 1$  CEA**

## Current Position



**80% academia**

## Poll question #2

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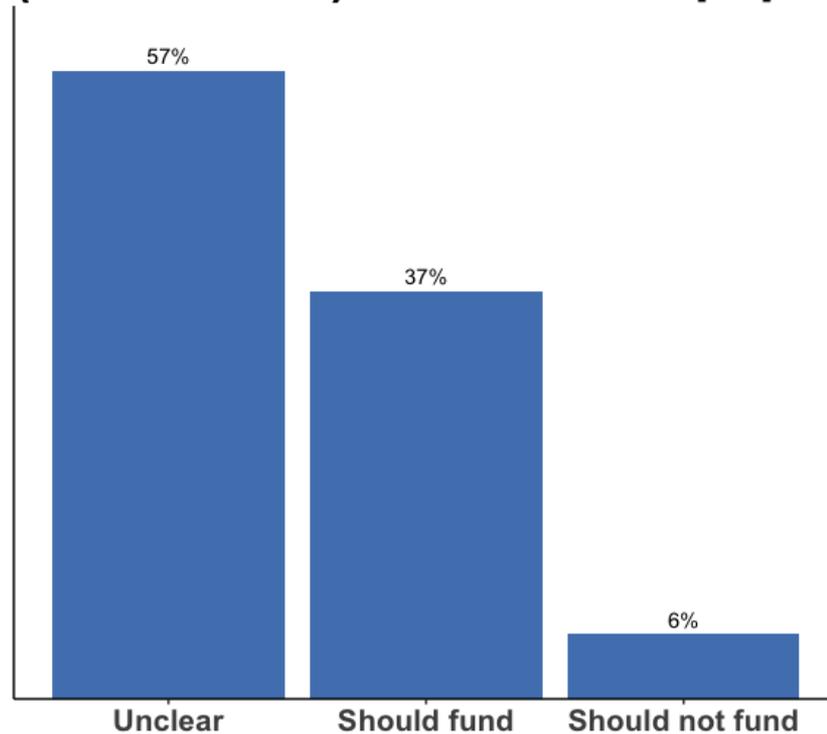
**You are a researcher conducting a cost-effectiveness analysis on a new drug, Drug X in Massachusetts. You find that the drug has an incremental cost-effectiveness ratio of \$40,000/QALY (compared to a typical threshold of \$50,000-\$100,000 QALY) over a lifetime time horizon. To provide the drug to the entire eligible population would cost about 20% of the current Medicaid budget over the next 3 years.**

**You are asked to advise the Massachusetts health commission on whether and how to adopt Drug X in its Medicaid budget. Which of the following best summarizes how you would advise them?**

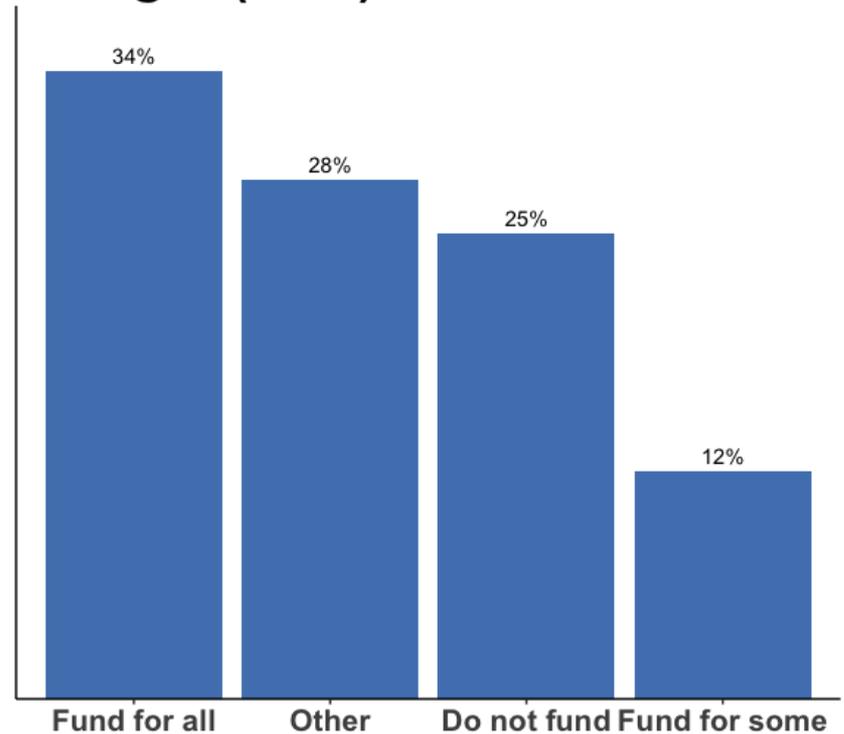
- a. Recommend funding Drug X for all eligible patients
- b. Refuse to fund Drug X at its current price. Wait for a lower price or competitors.
- c. Only fund Drug X for half of the eligible population (chosen at random) to reduce budget impact concerns

# Varied views on high cost, high value “Drug X”

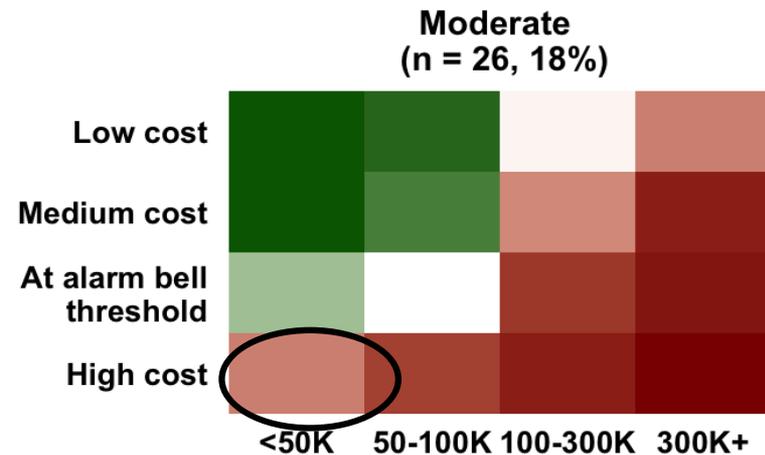
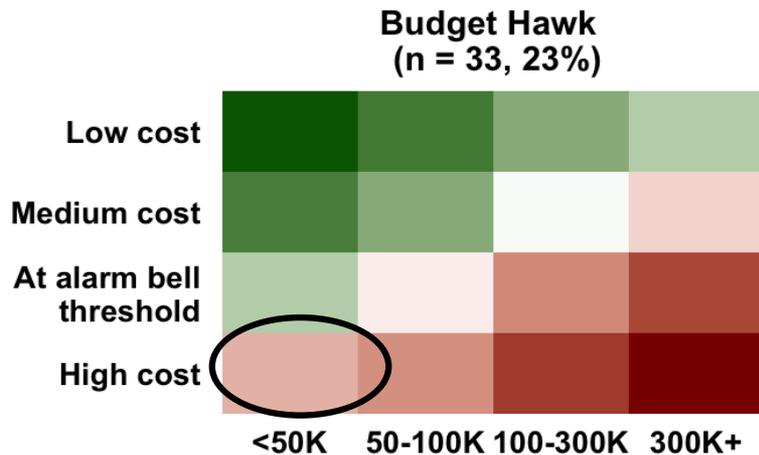
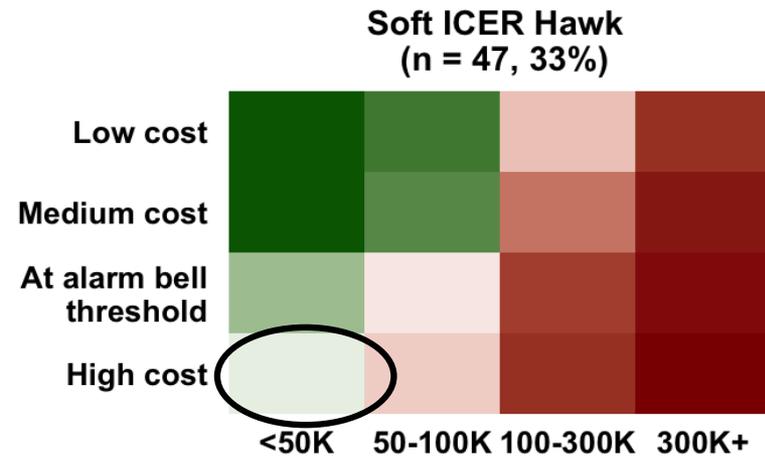
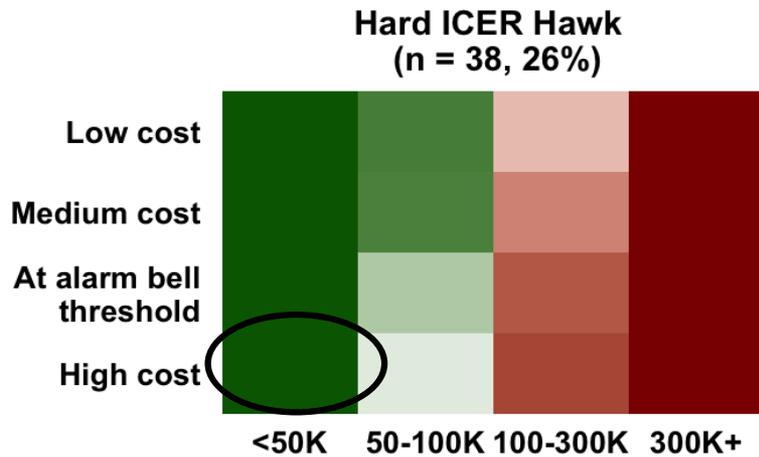
**Evaluation of Drug X  
(\$40K/QALY) in academic paper**



**Adopt Drug X in Medicaid  
budget (20%)?**

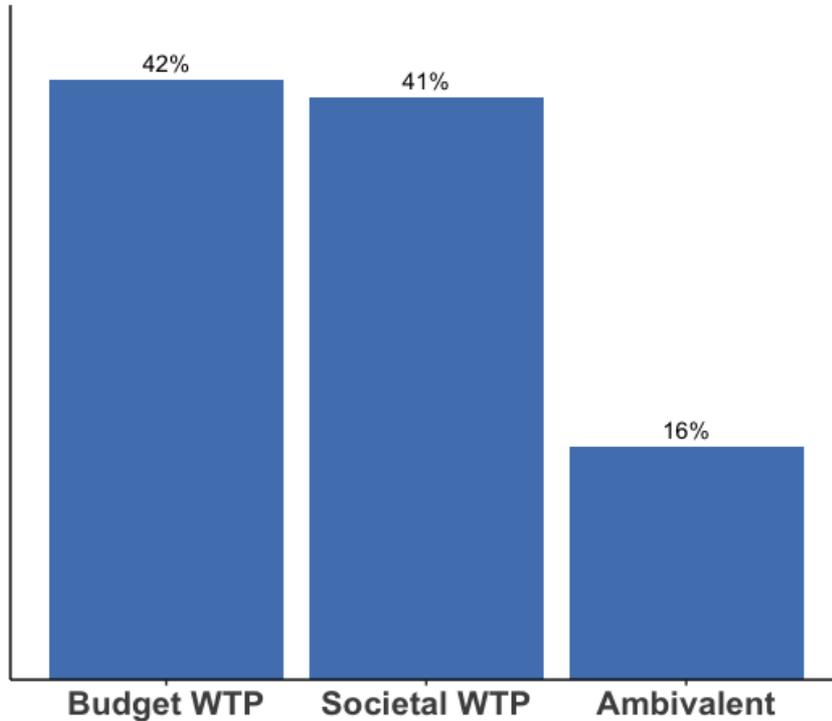


# Broad differences between researchers

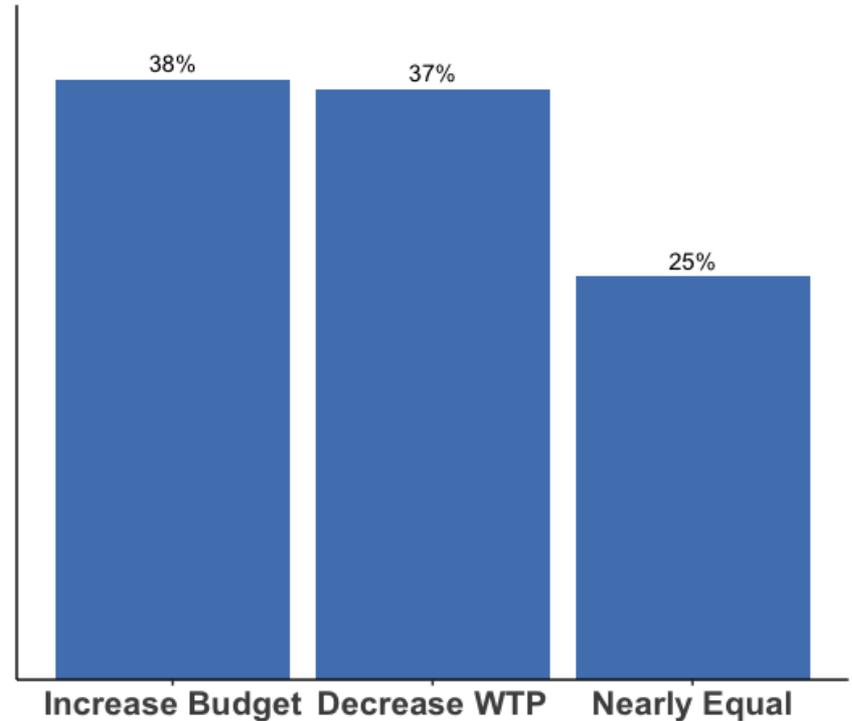


# Underlying theory

**The willingness to pay threshold should reflect:**



**If a program is CE but not affordable, we should...**



# These views inform our conversations.

Jul 24

Reminder @TEDTalks: **something cannot be** cost-effective and not affordable  
@McCabeC\_IHE #ValueBasedCare

May 14

This @Gladwell quote (on @EricTopol 's podcast) is the best position I've seen, which is why Sovaldi (\$1000 per pill but \$30k/QALY) is fine by me. Reward cost-effective products even if their prices are high; cost-ineffective gets the 'low-value' label

# Takeaway

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**There are large ongoing disagreements about how to deal with cost-effective but unaffordable interventions.**

# Roadmap

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1. What does the literature say?
2. What do experts say?
- 3. How does this connect to theory?**
4. What are some practical suggestions?

# CEA assumes a “shopping spree.”

- 1 **Set budget.** Suppose it's \$2.5 million.
- 2 **Rank interventions by ICER.**

Intervention	Cost	QALYs gained	ICER
A	\$200,000	4	\$50,000
B	\$300,000	80	\$3,750
C	\$2,000,000	100	\$20,000
D	\$3,000,000	20	\$150,000
E	\$500,000	4	\$125,000

# CEA assumes a “shopping spree.”

- 1 **Set budget.** Suppose it's \$2.5 million.
- 2 **Rank interventions by ICER.** Spend until budget exhausted.

Intervention	Cost	QALYs gained	ICER
B	\$300,000	80	\$3,750
C	\$2,000,000	100	\$20,000
A	\$200,000	4	\$50,000
E	\$500,000	4	\$125,000
D	\$3,000,000	20	\$150,000

# CEA assumes a “shopping spree.”

- 1 **Set budget.** Suppose it's \$2.5 million.
- 2 **Rank interventions by ICER.** ICER of last intervention is the WTP threshold.

Intervention	Cost	QALYs gained	ICER
B	\$300,000	80	\$3,750
C	\$2,000,000	100	\$20,000
A	\$200,000	4	<b>\$50,000</b>
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# CEA assumes a “shopping spree.”

- 1 **Set budget.** Suppose it's \$2.5 million.
- 2 **Rank interventions by ICER.** Replace interventions if a better option comes along.

Intervention	Cost	QALYs gained	ICER
B	\$300,000	80	\$3,750
C	\$2,000,000	100	\$20,000
F	\$200,000	10	<b>\$20,000</b>
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**Cost-effective = affordable.**

## But in practice...

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# The Incidental Economist

The health services research blog

Blindly applying cost effectiveness to coverage decisions is dumb. That's why nobody does it.

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8 November 25, 2015 at 7:45 am  Austin Frakt

## But in practice...

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We estimate **cost** and **QALYs gained**, but...

- 1 **Only evaluate a few interventions.**
- 2 **WTP is set independently of the budget.**  
(Often per capita GDP.)
- 3 **There is waste in the system.**

**Cost-effective ≠ affordable.**

# Understanding differences: threshold

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**Use a lower (“empirical”) threshold.**

## **Challenges**

1. Empirical thresholds are difficult to estimate.  
(Claxton et. al., Woods et. al.)
2. There may not be a “fixed budget.”
3. It may not be possible to get rid of waste.

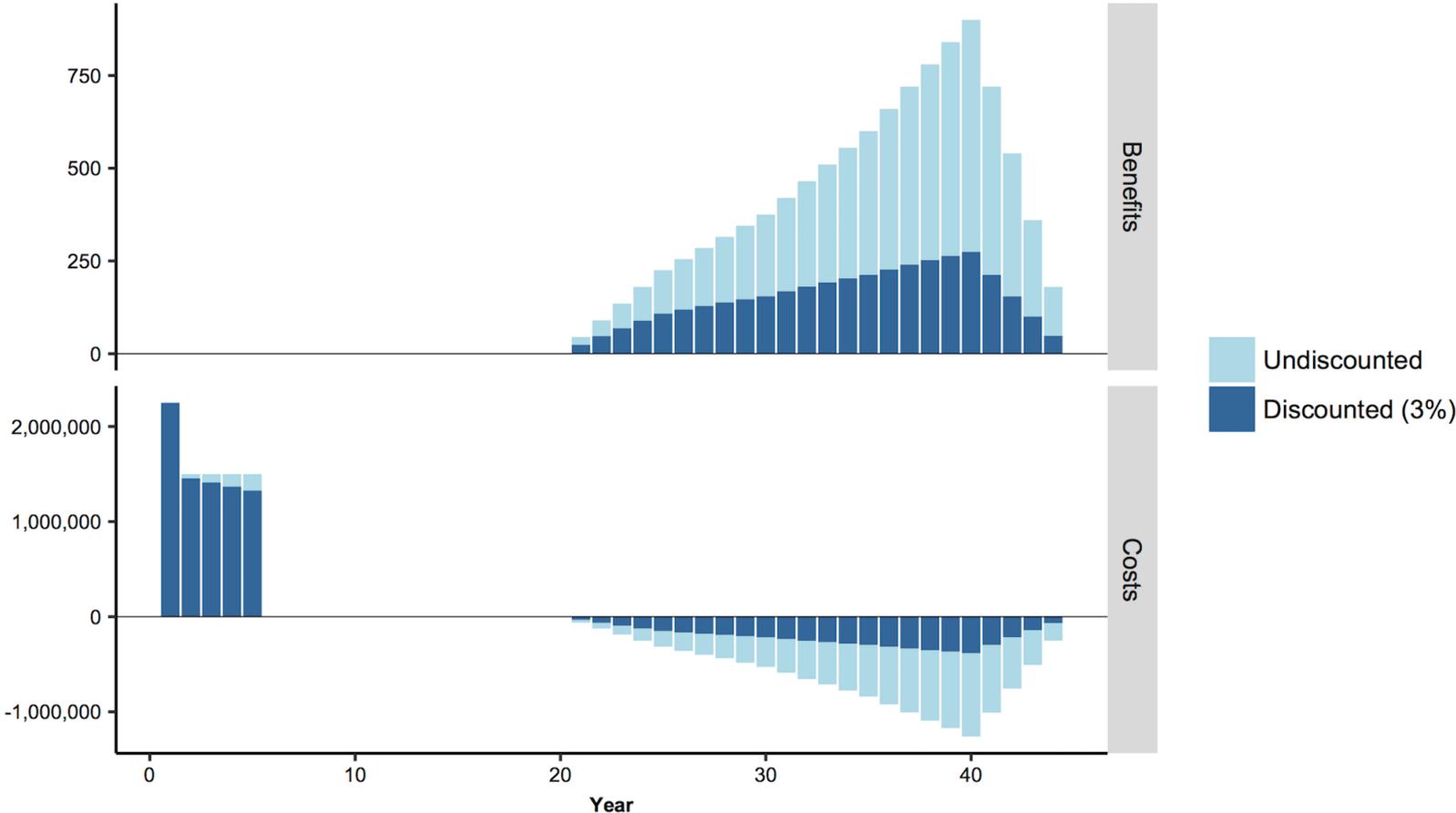
# It's not just the threshold.

***Costs measured in CEA*** do not reflect ***budget impact***.

	CEA	BIA
<b>Perspective</b>	Societal	Payer
<b>Time Horizon</b>	Long enough for all benefits	A budget cycle (1-5 years)
<b>Discounting</b>	Costs and benefits	None

**Cost-effective (with correct threshold) ≠ affordable.**

# This picture...



# Takeaway

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**Translating from the theory to real-world scenarios is difficult.**

# Roadmap

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1. What does the literature say?
2. What do experts say?
3. How does this connect to theory?
4. **What are some practical suggestions?**

# Change the language

COLUMN

MICHAEL HILTZIK

BUSINESS

## Is that \$100,000 hepatitis treatment worth the price? Yes, but can society afford it?



By MICHAEL HILTZIK JAN 15, 2016 | 2:35 PM



## Cost-Effectiveness and Budget Impact of Hepatitis C Virus Treatment With Sofosbuvir and Ledipasvir in the United States

[Jagpreet Chhatwal](#), PhD,<sup>1</sup> [Fasiha Kanwal](#), MD, MSHS,<sup>2,3</sup> [Mark S. Roberts](#), MD, MPP,<sup>4</sup> and [Michael A. Dunn](#), MD, FACP<sup>5</sup>

### Conclusions

Go to:

HCV treatment is cost-effective in the majority of patients, but additional resource and value-based patient prioritization are needed to manage HCV patients.

# Change the language

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- 1** **Cost-effectiveness is not binary.**  
**“More” vs “less” NOT “Yes” vs “No”**  
Not all “cost-effective” interventions fit into the budget.
- 2** **Budget impact analysis should be a routine part of economic evaluation.**

# For researchers

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- 1 Perform BIA.**  
Report undiscounted, short-term payer costs.  
How does this compare to CEA results?
- 2 Interpret in light of threshold and current budget.**

# For implementers

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- 1 Check costs.**  
Often, we underestimate these.
- 2 Check threshold.**  
Was it **empirical** (likely fits in current budget) or **societal** (not related to budget)?

## For implementers

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- 3 Look at what you're giving up.** How are you obtaining funding? What is the ICER of that program?
- 4 Get creative. (Negotiate.)**

# Back to Sovaldi



- 1. VA:** initially funded for small group, increased funding when price fell
- 2. Australia:** delayed funding until deal was negotiated
- 3. Also proposed:** government acquisition of license

## Poll question #3

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**What idea resonated most with you from this presentation?**

- a. Cost-effectiveness should not be discussed as a binary.
- b. We should differentiate clearly between when we are using *empirical* vs. *societal* thresholds.
- c. We should look at the ICER of our funding source to see if we are making a good trade-off.
- d. Even with an empirical threshold, we may need to be creative about funding high-cost, high-value programs.
- e. Other (please type response)

**Thank you!**

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# Questions?

**Collaborators:** Joshua A. Salomon, Peter Neumann,  
Joshua Cohen, Teja Thorat, Katherine McDaniel,  
Ankur Pandya, Evan MacKay

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**@ambilinski**

# Appendix. Summary table

		Research	Policy/Advocacy
<b>Conducting BIA</b>		<b>Add BIA to CEA</b>	<b>Request CEA and BIA</b>
	<i>Costs and savings</i>	Report undiscounted payer costs and savings over 1–5 year time horizon in current country currency	<b><i>In most cases, not all “cost-effective” interventions will fit into the budget.</i></b> Compare the relative cost-effectiveness of different strategies. All else equal, choose interventions with lower ICERs. Aim to reduce spending on interventions with high ICERs, and increase spending on those with low ICERs.
	<i>Benchmark</i>	Benchmark cost as a percentage of the current budget	
	<i>Context</i>	Indicate programs that might be reduced or eliminated to add new interventions	
<b>Combining BIA and CEA</b>		<b>Compare CEA and BIA</b>	<b>Use BIA to inform CEA</b>
	<i>Time horizon</i>	Report costs and benefits accrued per year	Seek external support for programs with favorable ICERs but high upfront costs.
	<i>Perspective</i>	Report health sector, societal, and payer ICERs	Identify opportunities for allocating costs across sectors, particularly when benefits are shared among different sectors.
	<i>Discounting</i>	Report discounted and undiscounted ICERs	Work with researchers to ensure that discounting reflects local preferences and investment opportunities.

Abbreviations: BIA, budget impact analysis; CEA, cost-effectiveness analysis; ICER, incremental cost-effectiveness ratio.

<https://doi.org/10.1371/journal.pmed.1002397.t002>