Presenting results of CEA

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Big picture

- We have already covered the most important topics
- Today we will start reviewing them
- Learning about **guidelines** for presenting results is important because
  1. It helps you focus on the important aspects of CEA
  2. It makes CEA studies easier to compare
  3. It makes writing a paper a lot easier
- Because **comparability** is so important in CEA, there are plenty of recommendations on how to present results
Sources

- The Consolidated Health Economic Evaluation Reporting Standards (CHEERS):
  
  “[An] attempt to consolidate and update previous health economic evaluation guidelines efforts into one current, useful reporting guidance.” (Husereau et al, 2013)

- Summary of CHEERS in Chapter 10 of Meunning and Bounthavong (2016)

- Drummond et al (2005), Chapter 10

- The checklist to assess economic evaluations (Chapter 3)
From Husereau et al (2013), page 766:

“Compared with clinical studies, which report the consequences of an intervention only, **economic evaluations require more reporting space** for additional items, such as resource use, costs, preference related information, and cost effectiveness results.

“This **creates challenges** for editors, reviewers, and those who wish to scrutinise a study’s findings.

“There is evidence that the **quality** of reporting of economic evaluations **varies widely** and could potentially benefit from improved quality assurance mechanisms.”

**CHEERS** created a 24-item **checklist** published in multiple journals (sponsored by ISPOR)
CHEERS guidelines are organized following the typical structure of medical papers:

1. Title and abstract
2. Introduction
3. Methods
4. Results
5. Discussion

This format makes writing medical papers easier.

One problem is that this structure combined with severe space constraints (max 3,000 to 5,000 words) tend to result in not-so-good writing.

Perhaps the culprit is the system itself: reviewers focus on technical details and nobody has the time to fix the writing (with some exceptions).

But well-written papers make reviewers’ life easier and have more chances of being accepted.
Identify the paper as an economic evaluation or even better be more specific and include the type of economic evaluation (e.g. cost study, cost-effectiveness, cost-benefit, etc)

Describe the interventions compared

Remember that it’s almost always the case that we are comparing alternatives

Catchy and/or non-informative titles are less tolerated in medical journals

Annoyingly common in other fields (e.g. “The Market for Lemons”; “The Economics of Mental Health”)

Title
The abstract is often the last thing you write but it’s an important part. Reviewers decide to review a paper based on the title and abstract. It should include:

1. Objective(s)
2. Perspective and setting (population; time horizon)
3. Methods (e.g. Markov model, decision model, data)
4. Summary of most relevant results (ICER, base case scenario, sensitivity)
5. Conclusions

Think of search engines when writing abstracts and titles.
In the first and second paragraph you typically provide **background** and **context**

It helps frame a paper’s contribution

In the last paragraph of the introduction you typically state the objective(s) and the methods. Sometimes it includes a preview of results

**Digression:** what constitutes appropriate background and context depends on your readers. **KNOW YOUR AUDIENCE!**

How to organize an introduction feels more an art than science but there are useful patterns that you can follow
This is very useful structure for an introduction:

1. **Background**: all the necessary information to understand the rest, which, of course, depends on your audience
2. **Stasis**: What is the current state in this area? What do we know about the problem? What is the typical approach to address this problem?
3. **Destabilization**: Why something that we do not known is important or what is not right about the current state
4. **Resolution**: How your paper is going to address the problem

Find a good article and see if it follows this structure
Useful books

- Plenty of books on writing scientific papers
- A good and concise one is “Writing Science” by Joshua Schimel
- “The Craft of Research” by Booth, Colomb and Williams
- It has several chapters on crafting an argument, which is essentially about **structuring**
- A great one for a system on writing and managing a large project like a dissertation is “Demystifying Dissertation Writing” by Peg Bolye Single
More on introductions

- From Schimel (2012)
- Take *all* advice with a grain of salt (except this one, of course)
Methods

- The methods section is a key part of CEA papers.
- This is the **place to get technical**. But how technical? Of course, it depends on the audience.
- If a policy or subject journal (e.g. pediatrics, general medicine), you may want to explain technical terms in simple ways.
- If *Medical Decision Making* or *Value in Health*, you may want to be more careful about the clinical side and may assume that readers know technical terms.
- Best strategy: **get past issues of your target journal** and see how much detail was included in similar papers.
Methods

- Need to be clear about the **target population** and the relevant subgroups (**treatment heterogeneity**)

- **Setting and location**: Where was the study conducted? Different country? Hospital? VA system? What details are important?

- Need to include
  1. Study perspective
  2. Interventions being compared: Remember Chapter 3: **can you tell who did what to whom, where, and how often?**
  3. Time horizon
  4. Discount rate

- A lot of studies forget to explain what is “usual care”
Methods

- **Measure of effectiveness**: Where does the evidence come from? If meta-analysis, how was it conducted?

- **What is the measure of benefit?**
  1. Natural units
  2. Life years
  3. Quality-adjusted life years

- Note that natural units may need some justification. Why is that measure relevant?

- More important, what do we do with the ICER ($/over unit of benefit)?

- Can we compare it to other studies? Remember, we do not have a threshold for, say, cases detected
Methods

- Measurement of valuation of **preference-based** outcomes
- Where does the information on preferences come from? How was it measured? What instruments were used?
- Disease specific instruments?
- Whose preferences were used?
- Estimation of resources and costs; **quantities** and **prices**
Methods

- If Markov model, present a transition diagram
- If decision model, present a decision tree
- Do everybody a favor and don’t confuse the two
- Be clear about the assumptions of the model. Ideally, readers should be able to replicate the model
- Many times researchers and reviewers play a game of hide and seek. Asymmetric information: authors know more about limitations
- Sadly, sometimes it does work (reviewers are busy people). But it also works on your favor to be clear (reviewers are also grumpy people)
Results

- This is the part where you **show findings**
- Not a place for explaining how you did things (that’s the methods section)
- Interpreting results is fuzzy here (usually you can’t explain too much)
Results


<table>
<thead>
<tr>
<th>Service</th>
<th>Use of resources, mean (s.d.)</th>
<th>Unit cost or range (£)</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MACT (N = 197)</td>
<td>TAU (N = 200)</td>
<td></td>
</tr>
<tr>
<td>Hospital services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychiatric in-patient</td>
<td>4.7 (18.1)</td>
<td>4.1 (15.7)</td>
<td>115–172</td>
</tr>
<tr>
<td>Other in-patient</td>
<td>2.0 (7.8)</td>
<td>3.3 (17.5)</td>
<td>52–1203</td>
</tr>
<tr>
<td>Accident &amp; emergency</td>
<td>1.7 (4.6)</td>
<td>1.7 (3.2)</td>
<td>36–88</td>
</tr>
<tr>
<td>Psychiatric/psychology out-patient</td>
<td>4.3 (9.1)</td>
<td>3.2 (7.0)</td>
<td>40–296</td>
</tr>
<tr>
<td>Other out-patient</td>
<td>1.3 (2.9)</td>
<td>1.5 (5.9)</td>
<td>25–1054</td>
</tr>
<tr>
<td>Day hospital</td>
<td>2.5 (13.5)</td>
<td>3.1 (22.1)</td>
<td>25–76</td>
</tr>
<tr>
<td>Community health services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community psychiatric/psychology</td>
<td>3.0 (6.5)</td>
<td>1.8 (5.3)</td>
<td>56–283</td>
</tr>
<tr>
<td>Community counselling</td>
<td>1.3 (6.9)</td>
<td>0.6 (2.6)</td>
<td>27</td>
</tr>
<tr>
<td>CPN/CMHT</td>
<td>1.8 (5.4)</td>
<td>2.7 (6.9)</td>
<td>52–75</td>
</tr>
<tr>
<td>Community physical therapy</td>
<td>0.8 (4.6)</td>
<td>0.7 (3.7)</td>
<td>37–47</td>
</tr>
<tr>
<td>Primary care</td>
<td>10.5 (10.3)</td>
<td>9.5 (8.7)</td>
<td>27–118</td>
</tr>
<tr>
<td>Other community health services</td>
<td>2.3 (5.6)</td>
<td>2.3 (4.9)</td>
<td>Various</td>
</tr>
</tbody>
</table>
Cost-effectiveness table

- From Muennig and Bounthavong (2016):

<table>
<thead>
<tr>
<th>Row Intervention</th>
<th>Total Cost</th>
<th>Total Effectiveness</th>
<th>Incremental Cost</th>
<th>Incremental Effectiveness</th>
<th>Incremental Cost-Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usual care</td>
<td>Cost of usual care</td>
<td>Total QALYs in usual care cohort</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention 2</td>
<td>Cost of intervention — savings from intervention</td>
<td>Total QALYs in intervention cohort</td>
<td>A2 – A1 (= C2)</td>
<td>B2 – B1 (= D2)</td>
<td>C2/D2</td>
</tr>
<tr>
<td>Intervention 3</td>
<td>Cost of intervention — savings from intervention</td>
<td>Total QALYs in intervention cohort</td>
<td>A3 – A2 (= C3)</td>
<td>B3 – B2 (= D3)</td>
<td>C3/D3</td>
</tr>
</tbody>
</table>

*Note: Interventions are first ranked by their effectiveness, with least effective interventions listed first. The incremental cost and incremental effectiveness values are then sequentially calculated. Finally, the incremental cost-effectiveness ratios are presented.*
Results - sensitivity analyses

- For sensitivity analyses, it’s useful to report the range values used and/or the assumed **probability distribution** (more on this next class)

- It is difficult to present all possible sensitivity analyses; a good paper explains why some are more important than others

- Some of them are obvious: if a new medication, the price of the medication is important

- If a prevention study, ICER without discounting is important
Some items that should be in the results section:

1. Most influential variables
2. How the most influential variables affected the ICER
3. Sensitivity analysis of the discount rate (usually, 0%, 3%, and 5%)
4. Statistical analyses and case scenarios (next class)
“Model-based economic evaluation: Describe the effects on the results of uncertainty for all input parameters, and uncertainty related to the structure of the model assumptions.”

Difficult to follow. Ideally, we conduct one-way sensitivity analyses for all parameters as a way to check the model but only present the most important results (tornado diagram)

Remember: a cost effectiveness paper without sensitivity analyses is not a good paper
Discussion

- Summarize key findings in general terms; do not present results again (with the exception of ICER)
- Summarize results by subgroups
- Summarize key elements of the sensitivity analyses (for example, if the results are very sensitive to a particular parameter)
- At some point, explain limitations
Discussion sections are challenging. By the time you reach the discussion, you probably have about 500 words left.

Medical journals do not like *speculation* or *opinion* in discussion sections.

In Chapter 3, one item in the checklist was: Do the results apply to other settings?

Hard to include a comprehensive discussion of all settings in a discussion section.
Transferring results to other settings

- There are plenty of challenges when transferring results to other settings
  1. Demographic characteristics and disease prevalence
  2. Variability in clinical practice
  3. Discount rates
  4. Incentives/payments
  5. Prices/costs

- Pick the most relevant or unusual aspect of your setting

- Again, hard to address all issues in a short paper. And again, knowing your audience helps
Articles should contrast ICERs to those of other papers in the literature and thresholds.

This can be difficult because of variations in methods and comparisons.

An ICER calculated from a societal perspective is not the same as an ICER from a payer’s perspective.

Comparing a new intervention to “current treatment” is completely different to comparing the new treatment to a “do-nothing” alternative.

Ideally, a paper considered all relevant alternatives, but not always the case.
Technical appendix

- In some CEA studies, the appendix is longer than the paper
- The paper must be self-contained
- The appendix should not be needed to understand the paper
- The appendix is a good place for details of simulations, graphs, and more sensitivity analyses
- Some journals do not accept more than 3 or 4 graphs in the paper
- The appendix could include transition diagrams and trees
Going back to Chapter 3, assessment of economic evaluations

- Chapter 3 provided a 10-item checklist to evaluate economic evaluations
- It overlaps with guidelines on how to present results
- However, when you think about writing a CEA paper, you realize how difficult it could be to address all the items in the checklist
Guidelines in presenting results are similar to guidelines on how to assess economic evaluation studies.

If you ever need to write a CEA paper, go over the guidelines to make sure that you have covered the most important aspects.

Useful to cover guidelines here because it also serves as a review of all the material we have covered so far.

Next class, more about uncertainty in CEA.