Presenting data & results in Network Meta-Analysis
Outline

- Graphs presenting the data

- Graphs presenting the results
  - Relative treatment effects
  - Treatment ranking
Presenting the data
Diagram showing the comparisons involved in the individual studies of the network

[Example in Hoaglin et al. 2011]
Network graph showing the available direct comparisons in the network

[Examples in Hoaglin et al. 2011 & Jonas et al. 2013]
Network graph showing the presence of multi-arm trials & table showing the network structure; the available study designs in the network

[Examples in Lu et al. 2011]
Network graph with weighted and/or colored nodes and edges

[Examples in Chaimani et al. 2013]
Matrix showing the available direct comparisons in the network

[Example in Ioannidis 2006]
Graph showing the data provided by the individual studies of the network

[Example in Lu & Ades 2006]
Graph showing the contribution of each direct comparison in the network estimates

[Example in Chaimani et al. 2013]
Presenting the results

*relative treatment effects*
relative treatment effects for efficacy
SMD<0 favor the treatment in column
relative treatment effects for dropout rate
OR>1 favor the treatment in column

significant effects are in bold and competing treatments underscored font

Table showing all the pairwise relative treatment effects with their 95% CI for one or two outcomes

[Example in Cipriani et al. 2011]
Forest plot with the treatment effects estimates for the pairwise comparisons

[Examples in Hawkins et al. 2009 & Hoaglin et al. 2011]
‘Hsu mean–mean plot’ showing the network estimates with the 95% CI for all pairwise comparisons

[Example in Senn et al. 2013]
Shade plot showing the p-values of the treatment effects for all pairwise comparisons in the network

[Example in Senn et al. 2013]
Network graph presenting the relative treatment effects for each pairwise comparison

[Example in Fadda et al. 2011]
Presenting the results

treatment ranking
Ranking based on probabilities

- Using probability of being the best
- Using probabilities of being at each possible rank
- Using SUCRAS
### Bubble-plot including the ranking probabilities for all treatments

[Example in Hawkins et al. 2009]

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Most effective</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Least effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erlotinib</td>
<td>0.85</td>
<td>0.10</td>
<td>0.04</td>
<td>0.02</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pemetrexed</td>
<td>0.12</td>
<td>0.39</td>
<td>0.18</td>
<td>0.23</td>
<td>0.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Docetaxel</td>
<td>0.03</td>
<td>0.34</td>
<td>0.47</td>
<td>0.14</td>
<td>0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gefitinib</td>
<td>0.00</td>
<td>0.16</td>
<td>0.30</td>
<td>0.52</td>
<td>0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Placebo</td>
<td>0.00</td>
<td>0.00</td>
<td>0.01</td>
<td>0.09</td>
<td>0.90</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
- The probabilities of being at each possible rank.
- The size proportional to the probability.

**Possible ranks:**
- Competing treatments
‘Rankograms’ showing the probability for each treatment of being at a specific rank

[Example in Salanti et al. 2011]
Bar plots showing the probability for each treatment of being at a specific rank

[Example in van Valkenhoef et al. 2012]
Cumulative Probability

Aspirin + Dipyridamole

Aspirin

Thienopyridines + Aspirin

Thienopyridines

Rank of F

The cumulative probability for each treatment of being up to each possible rank.

The larger the surface under the curve the ‘better’ the treatment. It can be also expressed as a percentage.

‘SUCRA plots’ showing the cumulative probability for each treatment of being up to a specific rank.

[Examples in Salanti et al. 2011 & Salanti et al. 2010]
Using P(best) to rank treatments can be misleading.

Ranking based on SUCRAs accounts better for the uncertainty in the estimated treatment effects.
Different means – Equal variances

\[ x \sim N(10, 4) \]
\[ y \sim N(9, 4) \]
\[ z \sim N(8, 4) \]

\[
\begin{array}{ccc}
\text{Sucras} & 0.60 & 0.50 & 0.40 \\
\text{P(best)} & 0.44 & 0.33 & 0.23 \\
\text{P(sec)} & 0.33 & 0.35 & 0.32 \\
\text{P(third)} & 0.22 & 0.32 & 0.44 \\
\end{array}
\]
Equal means – Different variances

\[ x \sim \mathcal{N}(10.0, 5) \]
\[ y \sim \mathcal{N}(10, 4) \]
\[ z \sim \mathcal{N}(10, 10) \]

<table>
<thead>
<tr>
<th></th>
<th>( x )</th>
<th>( y )</th>
<th>( z )</th>
</tr>
</thead>
<tbody>
<tr>
<td>P(best)</td>
<td>0.25</td>
<td>0.31</td>
<td>0.44</td>
</tr>
<tr>
<td>P(sec)</td>
<td>0.50</td>
<td>0.38</td>
<td>0.12</td>
</tr>
<tr>
<td>P(third)</td>
<td>0.25</td>
<td>0.31</td>
<td>0.44</td>
</tr>
<tr>
<td>Sucras</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
</tr>
</tbody>
</table>
Using $P(\text{best})$ to rank treatments can be misleading.

Ranking based on SUCRAs accounts better for the uncertainty in the estimated treatment effects.

SUCRAs are conditional on a set of treatments being compared:
- This means SUCRAs and possibly the ranking will change if the subset of the treatments are compared.

Ranking measures are not a substitute for relative treatment effects:
- They are not the only useful measure for clinicians.
**Scatterplot showing jointly the ranking results for two different outcomes**

[Example in Chaimani et al. 2013]
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Efficacy (SMD with 95% CI)</th>
<th>Dropout rate (0% with 95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAL</td>
<td>0.95/0.47</td>
<td>-0.06 (0.22 to 0.11)</td>
</tr>
<tr>
<td>RIS</td>
<td>0.94/0.78</td>
<td>-0.67 (0.22 to 1.08)</td>
</tr>
<tr>
<td>OLZ</td>
<td>0.78/0.81</td>
<td>-0.14 (0.21 to 0.11)</td>
</tr>
<tr>
<td>QTP</td>
<td>0.64/0.70</td>
<td>-0.06 (0.34 to 0.20)</td>
</tr>
<tr>
<td>ARI</td>
<td>0.61/0.57</td>
<td>-0.07 (0.34 to 0.20)</td>
</tr>
<tr>
<td>ASE</td>
<td>0.55/0.36</td>
<td>-0.06 (0.34 to 0.20)</td>
</tr>
<tr>
<td>VAL</td>
<td>0.50/0.48</td>
<td>-0.06 (0.34 to 0.20)</td>
</tr>
<tr>
<td>ZIP</td>
<td>0.47/0.41</td>
<td>-0.06 (0.34 to 0.20)</td>
</tr>
<tr>
<td>LAM</td>
<td>0.40/0.21</td>
<td>-0.06 (0.34 to 0.20)</td>
</tr>
<tr>
<td>PBO</td>
<td>0.36/0.30</td>
<td>-0.06 (0.34 to 0.20)</td>
</tr>
<tr>
<td>TOP</td>
<td>0.23/0.09</td>
<td>-0.06 (0.34 to 0.20)</td>
</tr>
<tr>
<td>GBT</td>
<td>0.13/0.12</td>
<td>-0.06 (0.34 to 0.20)</td>
</tr>
</tbody>
</table>

competing treatments ordered according to their relative ranking for efficacy

Table showing all the pairwise relative treatment effects with their 95% CI for one or two outcomes along with the SUCRA values
References

- Fadda V, Maratea D, Trippoli S, Messori A: Network meta-analysis: Results can be summarised in a simple figure. *BMJ* 2011, 342: d1555.