ISPOR Virtual Conference, 15 May to 18 May 2022

VISUALIZING NETWORK META-ANALYSES IS NOT TRIVIAL – A NOVEL TAKE ON THE NETWORK DIAGRAM

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Background

- Traditionally, feasibility assessments and results for network meta-analyses (NMAs) have been characterized using network diagrams (often repeated per outcome to reflect differential outcome reporting), trial and patient characteristic summaries, pairwise outcome results, and treatment rankings.
- This can lead to challenges in interpreting and presenting an NMA, given the need for numerous distinct summary figures to convey the underlying methods and results.
- Visualizations displayed here are tailored towards an audience familiar with NMAs, and there is still a place for more traditional visualizations that are more intuitive to a non-technical audience.

Objective

To create a novel visualization framework that concisely describes several feasibility assessment, network, and NMA output features simultaneously.

Methods

- Randomly generated plausible datasets from hypothetical trials were used to construct these visualizations.
- Typically, for an NMA project with *T* treatments, *P* patient characteristics, and *O* outcomes, there can be up to:
  - *P* sets of figures for displaying patient characteristics across and within trials.
  - *O* sets of network diagrams to highlight outcome reporting.
  - *T*(T – 1)*O/2* unique comparisons.
- The framework developed here offers a concise method for providing a snapshot of all this information within a single visualization.
- A complete description of network features displayed in the two example networks is highlighted in **Table 1**.
- Visualizations were created using custom functions and the *ggplot2* (v3.3.5) library in *R* (v4.0.3).

Disclosures and contact information

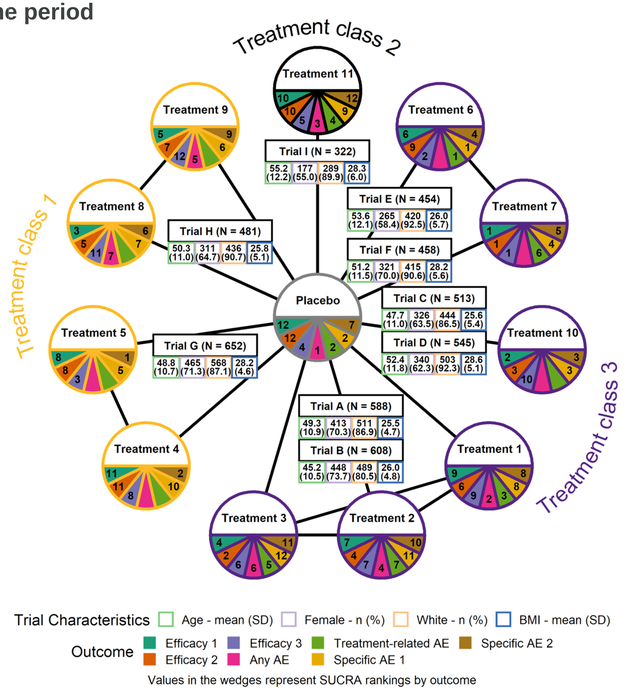
The authors of this study did not receive any funding for this work. For any questions regarding this project, please contact: epopoff@broadstreetheor.com

Results

Table 1: Features represented in network diagrams

Feature	How it can be represented
Network geometry	Traditional layout of network diagrams (**Figures 1** and **2**)
Treatment classes	Coloring of treatment nodes and outer labels (**Figures 1** and **2**)
Relative trial sizes	Represented next to trial names (**Figures 1** and **2**)
Patient characteristics across trials	Rectangles under trial names (**Figure 1**)
Outcome reporting	Wedges reporting a SUCRA value for a given outcome (**Figure 1**)
Reported hazard ratios	Rectangles under trial names (arrows point to reference treatment) (**Figure 2**)
NMA results	SUCRA rankings in wedges under treatment names (**Figure 1**) Survival percentages in wedges under treatment names (**Figure 2**)

Figure 1: Example network with continuous and binomial outcomes over a single time period

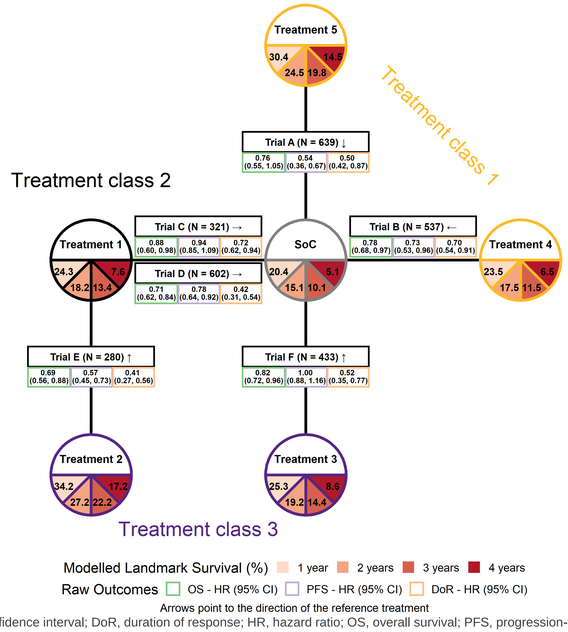


Abbreviations: AE, adverse event; BMI, body mass index; SD, standard deviation; SUCRA, surface under the cumulative ranking curve

Results cont.

- **Figure 1** highlights an example network incorporating continuous and binomial outcomes (3 efficacy and 4 safety outcomes), while **Figure 2** showcases the incorporation of time-varying survival outcomes (OS, PFS, and DoR).
- These networks provide a concise but comprehensive summary of study features, data inputs, and a summary of assessed outcomes, suitable for executive summaries and presentations.
- Limitations include visualizing non-star-shaped networks with repeated trial labels, networks with many trials, and the omission of some measures of dispersion.

Figure 2: Example network with time-varying survival outcomes



Abbreviations: CI, confidence interval; DoR, duration of response; HR, hazard ratio; OS, overall survival; PFS, progression-free survival; SoC, standard of care

Conclusions

- **This visualization framework presents a novel way to communicate the inputs and outputs of NMAs.**
- **This technique works best for star-shaped networks and adaptations may be required for other geometries or applications outside NMAs.**