# Adaptive Platform Trial Scientific Meeting

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CanTreatCOVID

Canadian Adaptive Platform Trial of Treatments for COVID in Community Settings

# Enhancing the Efficiency of Adaptive Platform Trials Through the Exploration of Alternative Treatment Ranking Methods

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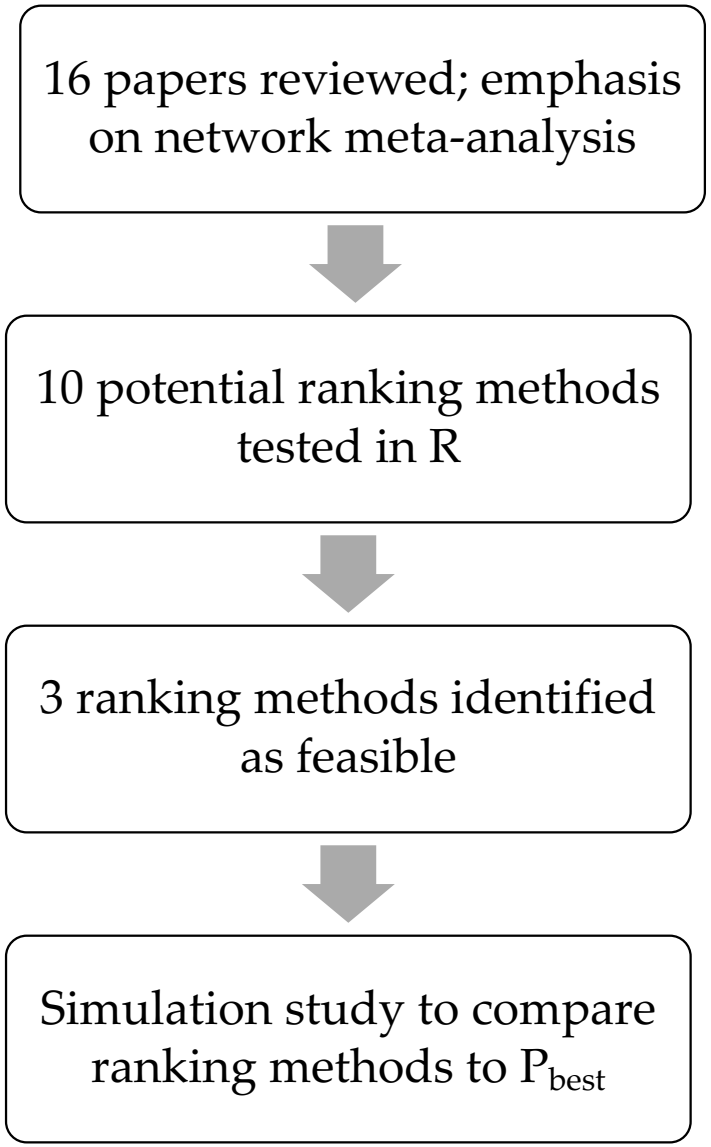
# Background

- Adaptive Platform Trials (APTs) allow for the evaluation of multiple interventions for a single disease
- The most common approach to compare interventions is to find the probability that each intervention is the best ($P_{best}$)
  - (ex. REMAP CAP, I SPY 2)
- This approach has been criticized because it does not take the full ranking distribution into account

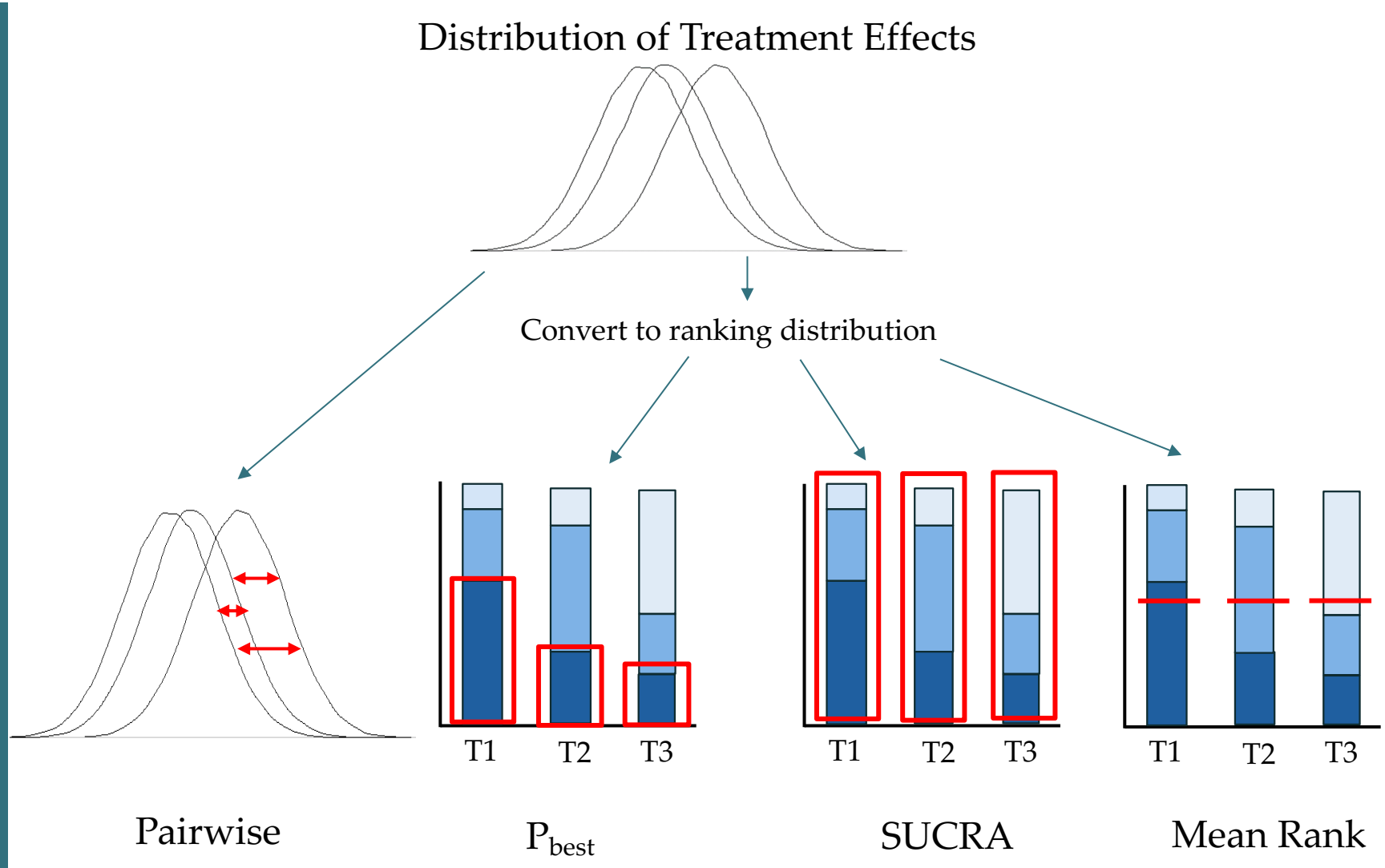
# Research Goal

- Limited research has been done to determine if $P_{best}$ is the most suitable ranking method or whether alternative methods exist
- Our goal is to identify the best way to compare multiple treatments in an APT to save time, resources, and ultimately patient lives

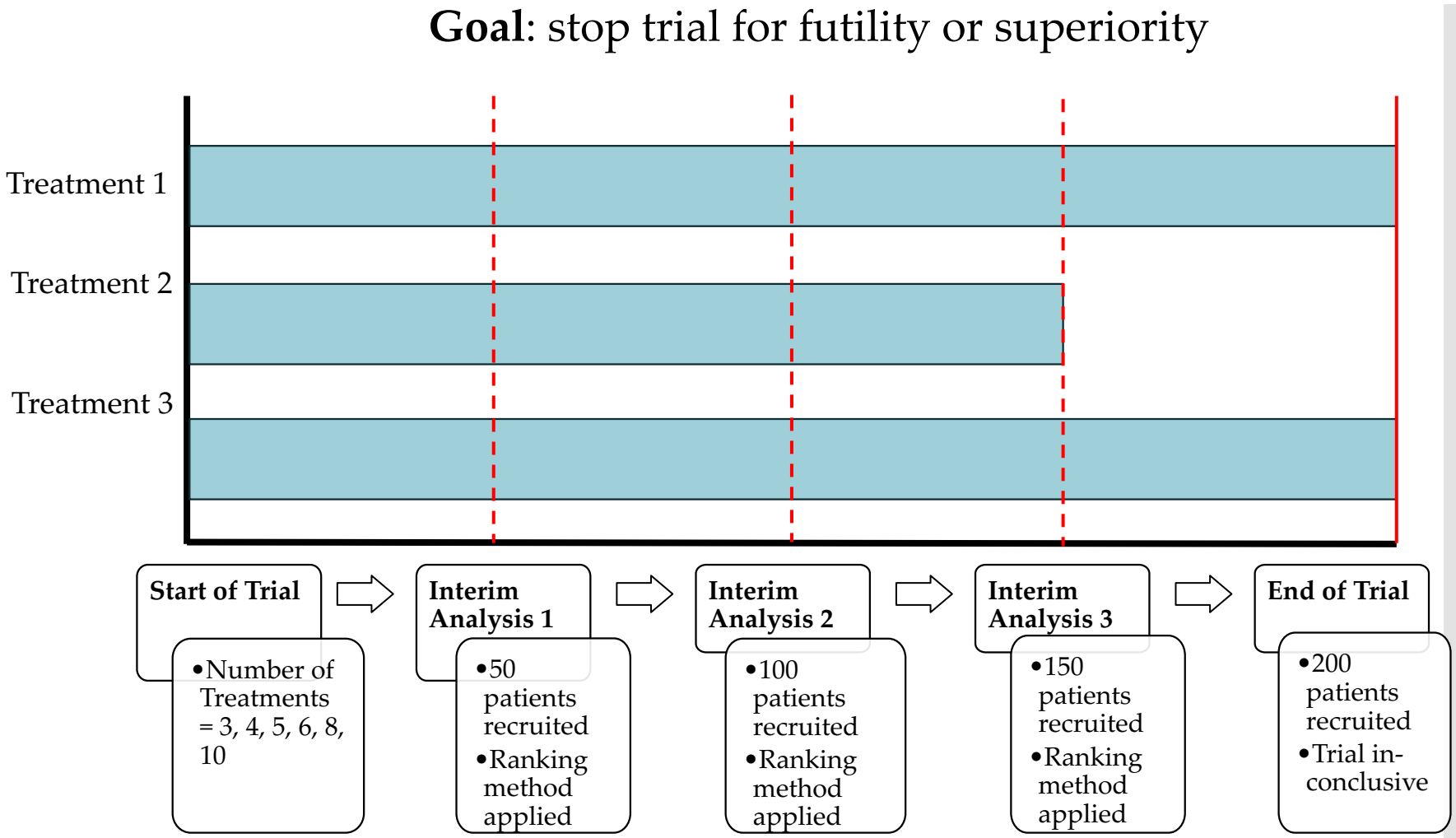
# Approach


16 papers reviewed; emphasis on network meta-analysis
10 potential ranking methods tested in R
3 ranking methods identified as feasible
Simulation study to compare ranking methods to $P_{best}$

# Ranking Methods

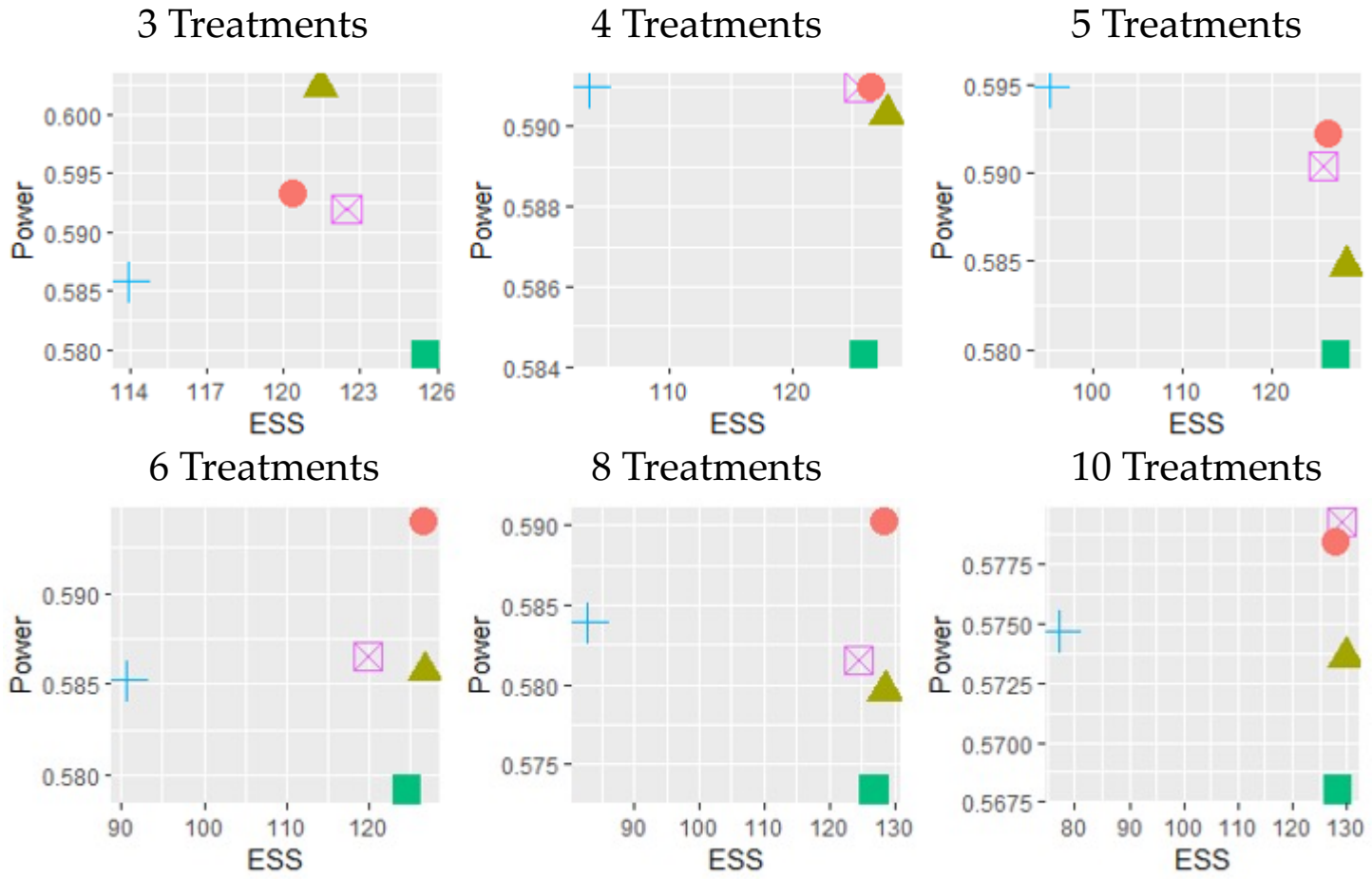


# Simulation Design



# Preliminary Results: Superiority

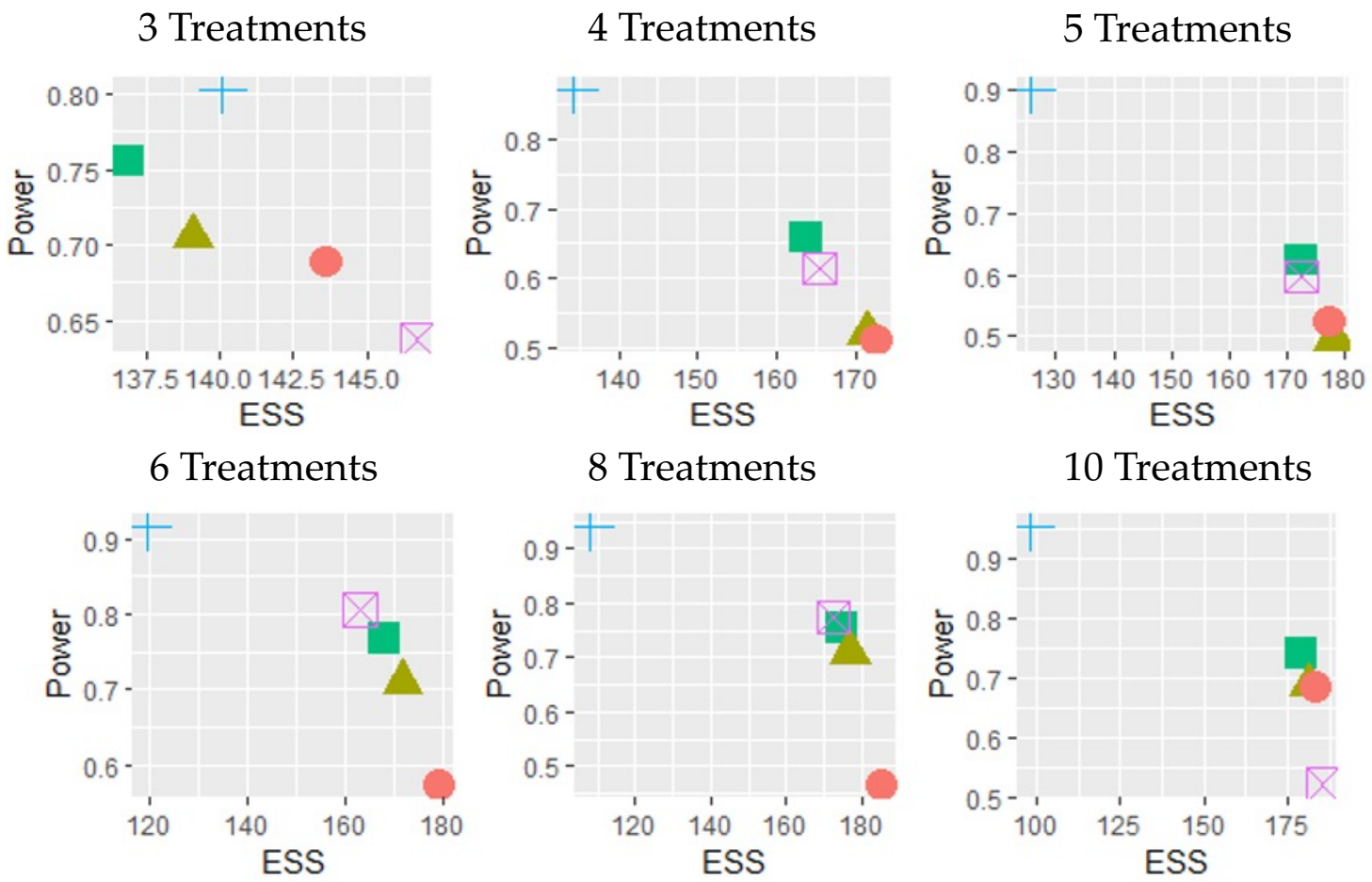
Power and Expected Sample Size (ESS) Per Method by Varying Number of Treatments




$P_{best}$: + SUCRA: ☒ Pairwise (d=0): ▲ Pairwise (d=0.1): ■ Mean Rank: ●

# Preliminary Results: Futility

Power and Expected Sample Size (ESS) Per Method by Varying Number of Treatments




$P_{best}$: + SUCRA: ☒ Pairwise (d=0): ▲ Pairwise (d=0.1): ■ Mean Rank: ●

# Conclusion & Next Steps

- **Conclusion**
  - $P_{best}$ performs best in terms of power and expected sample size for superiority and futility scenarios
  - Alternative ranking methods have been identified and could be useful in practice
- **Next Steps**
  - Extend to trials with non-normal outcomes
  - Increase complexity of trial design (i.e. add treatment arms during the trial)

# References


1) Morris, Tim P et al. “Using simulation studies to evaluate statistical methods.” Statistics in medicine vol. 38,11 (2019): 2074-2102. doi:10.1002/sim.8086

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3) Rücker, G., Schwarzer, G. Ranking treatments in frequentist network meta-analysis works without resampling methods. BMC Med Res Methodol 15, 58 (2015). https://doi.org/10.1186/s12874-015-0060-8

4) Sambucini, Valeria. ‘Bayesian vs Frequentist Power Functions to Determine the Optimal Sample Size: Testing One Sample Binomial Proportion Using Exact Methods’. Bayesian Inference, InTech, 2 Nov. 2017. Crossref, doi:10.5772/intechopen.70168.

5) Dalal, S. R., and W. J. Hall. “Approximating Priors by Mixtures of Natural Conjugate Priors.” Journal of the Royal Statistical Society. Series B (Methodological), vol. 45, no. 2, 1983, pp. 278–86. JSTOR, http://www.jstor.org/stable/2345533. Accessed 13 July 2023.