An empirical investigation of the impact of different methods for synthesising evidence in a network meta-analysis

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Background: Network meta-analysis (NMA) is a method to synthesise evidence from multiple treatments. Two broad approaches are available to synthesize data across networks: arm-based and contrast-based, with a range of models that can be fitted within each. It is unclear how the two approaches compare and there has been limited empirical evaluation comparing results from different network meta-analysis methods applied to a large number of networks.

Objectives: To compare five different network meta-analysis models through the re-analysis of published networks of interventions with binary outcomes using five NMA models and investigate if characteristics of the network modify any differences.

Methods: We re-analysed a subset of 158 networks from a cohort of 456 published networks of randomised trials. The subset of networks included those where the primary outcome was binary, the number of events and participants were reported for each direct comparison, and there was no evidence of inconsistency in the network. We re-analysed the networks using five methods, three of which are contrast-based and two of which are arm-based models. We compared the estimated treatment effects, their standard errors, treatment ranks, and the metric on which the ranks are based, and the between-trial heterogeneity variance, across the network meta-analysis methods. We investigated if differences in the results are modified by network characteristics.

Results and conclusions: Preliminary results show good agreement between the contrast-based, Bayesian and frequentist methods in terms of effect estimates and treatment ranks. However, differences are apparent in the effect estimates and ranks when comparing the arm-based method to the contrast-based methods.