Abstract:
Network meta-analysis (NMA) of randomised controlled trials is now well established as a method for deciding which treatment is most effective or cost-effective, out of several alternatives. It is an extension of meta-analysis that allows relative effects for all treatment comparisons to be obtained, as long as the treatments form a connected network.

In the UK, NMA of randomised controlled trials is used routinely in Clinical Guidelines for the National Health Service and Technology Appraisals for reimbursement, carried out by NICE. Treatment efficacy results from NMAs are used as inputs to an economic model which aims to establish whether a particular intervention (or set of interventions) is cost-effective and should be recommended for use.

Although the basic NMA methods are well established, NMAs with multiple treatments can present complex statistical challenges when data are reported in different formats or when there are many variations of the treatment definitions such as slightly different drug formulations believed to have the same mode of action, or slightly different delivery methods of essentially the same treatment etc. In addition, it is often the case that several measures are used to assess patients’ response to treatment (outcomes). Separate analyses of each outcome, typically using different subsets of trials, can lead to conflicting conclusions. This is a major problem when multiple outcomes are used to decide on the benefits and costs of treatments in an economic model. Outcome relationships can often be incorporated in the NMA and have the advantage of producing joint relative effect estimates which appropriately account for the correlation in the outcomes.

Using examples from published NICE guidelines, I will describe the Bayesian NMA modelling framework and its assumptions. Some key examples will include models incorporating within-trial correlations (i.e. in the likelihood) and outcome relationships, based on what is known from the data generating process. I will discuss some of the challenges in providing outputs that lead to coherent treatment decisions and how expert clinical opinion informed the models used.

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