

On Pooling Different Levels of Data in Estimating Parameters of Continuous Meta-Analysis

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Abstract : A meta-analysis may be performed using aggregate data (AD) or an individual patient data (IPD). In practice, studies may be available at both IPD and AD level. In this situation, both the IPD and AD should be utilised in order to maximize the available information. Statistical advantages of combining the studies from different level have not been fully explored. This study aims to quantify the statistical benefits of including available IPD when conducting a conventional summary-level meta-analysis. Simulated meta-analysis were used to assess the influence of the levels of data on overall meta-analysis estimates based on IPD-only, AD-only and the combination of IPD and AD (mixed data, MD), under different study scenario. The percentage relative bias (PRB), root mean-square-error (RMSE) and coverage probability were used to assess the efficiency of the overall estimates. The results demonstrate that available IPD should always be included in a conventional meta-analysis using summary level data as they would significantly increased the accuracy of the estimates. On the other hand, if more than 80% of the available data are at IPD level, including the AD does not provide significant differences in terms of accuracy of the estimates. Additionally, combining the IPD and AD has moderating effects on the biasness of the estimates of the treatment effects as the IPD tends to overestimate the treatment effects, while the AD has the tendency to produce underestimated effect estimates. These results may provide some guide in deciding if significant benefit is gained by pooling the two levels of data when conducting meta-analysis.

Keywords : aggregate data, combined-level data, individual patient data, meta-analysis

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