

Wednesday 24 July 2024

16:00-17:30 Invited Session 8 (Main Room)

Combining RWD and randomized clinical trials (Chair: Nikos Demiris)

Bayesian nonparametric meta-analysis, bias correction methods, and real-world evidence synthesis

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Introduction: Bayesian nonparametric (BNP) meta-analysis models have been developed to relax assumptions of random effects distributions. These types of models account for possible clustering of the random effects and are attractive to complex settings like real-world evidence synthesis. However, real-world evidence synthesis involves the combination of results from observational studies that can be susceptible to multiple forms of biases, and BNP models do not explicitly address bias corrections.

Methods: In this work, we present the bias-corrected BNP model (BC-BNP). This model is built upon two sub-models: a parametric meta-analysis model of interest, and a model of bias correction. The model of bias follows a Dirichlet-Process that handles nonparametrically studies' internal validity bias. We extend the BC-BNP model by adding a meta-regression model to explain systematic variation in real-world evidence synthesis.

Results: We illustrate the BC-BNP model with two real case studies. The first one assesses potential risk factors for COVID-19 patients, and the second one aims to bridge efficacy and effectiveness in diabetic patients.

Conclusions: We show that the BNP meta-analysis models that ignore bias correction could be misleading when studies of different quality and types are combined. In addition, when bias correction involves non identifiable parameters, subjective information plays an important role in sensitivity analysis of results.

References:

Verde PE. (2021) A bias-corrected meta-analysis model for combining, studies of different types and quality. *Biom J.* 2021 Feb;63(2):406-422. doi: 10.1002/bimj.201900376. Epub 2020 Sep 30. PMID: 32996196.

Verde PE (2023). jarbes: Just a Rather Bayesian Evidence Synthesis_. R package version 2.1.2, <<https://CRAN.R-project.org/package=jarbes>>.

Verde PE, and Rosner GL (2024) A Bayesian Nonparametric Approach and the Bias-Corrected Meta-Analysis Model for Combining Disparate Studies. *Biometrical Journal* (under review).