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To Merge Randomized Controlled Trials and Real-world Evidence with Bayesian Network Meta-regression: A Case Study in Patients with Myelodysplastic Syndromes

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Background & Objective

- Randomized controlled trials (RCTs) and real-world evidence (RWE) are often synthesized separately in health technology assessment (HTA).

- One reason is that RCTs and RWE show great heterogeneity in methodology and risk of bias which makes merging the two data sources technically difficult.

- To address this problem, Bayesian Network Meta-regression (BNMR) models have been applied for evidence synthesis in the HTA setting.

- Hence, we aimed to estimate and compare the performance of existing BNMR models in a case study of Myelodysplastic Syndromes (MDS).

Method - Meta-analysis

Case

- **Data source:** Song et al. (2021);
- **Target population:** Patients with acute myeloid leukemia and myelodysplastic syndromes;
- **Intervention:** Reduced intensity conditioning (RIC);
- **Comparator:** Myeloablative conditioning (MAC);
- **Outcomes of interest:** Overall survival (Binary outcome).

Identification of BNMR models using the snowballing approach, according to Wohlin (2016)
- Website that supports the snowballing approach:
Connected Papers;
- Starting from two identified reviews of appraisal tools: Jenkins et al. (2021) & Zhang et al. (2019)
- Eligibility criteria: (1) Bayesian model; (2) The model supported binary outcomes; (3) Codes for running a model were available.

Data collection & preparation
- Characteristics of BNMR models;
- Codes used to run the BNMR models;
- Covariates: age, duration of follow up.

Model running
- R package: Crossnma & R2jags;
- Initial value set in the BNMR models: Null;
- Number of iterations of Bayesian meta-regression: 50000;
- Number of burn-in iterations: 20000;
- Number of Markov chains: 4
- Number of thining of Markov chains: 1.

Model comparison
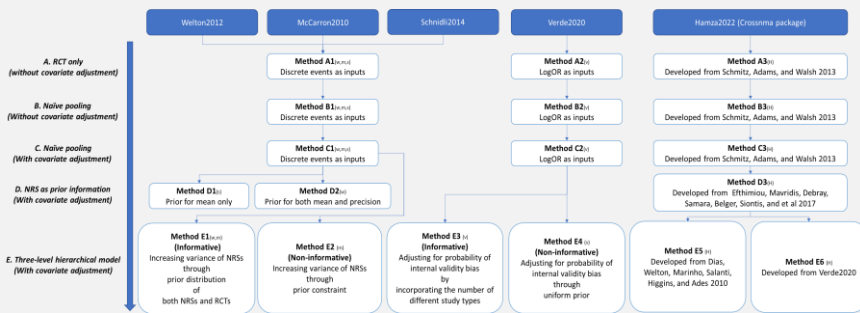- Comparison of mean and confidence interval in a forest plot.

RESULTS

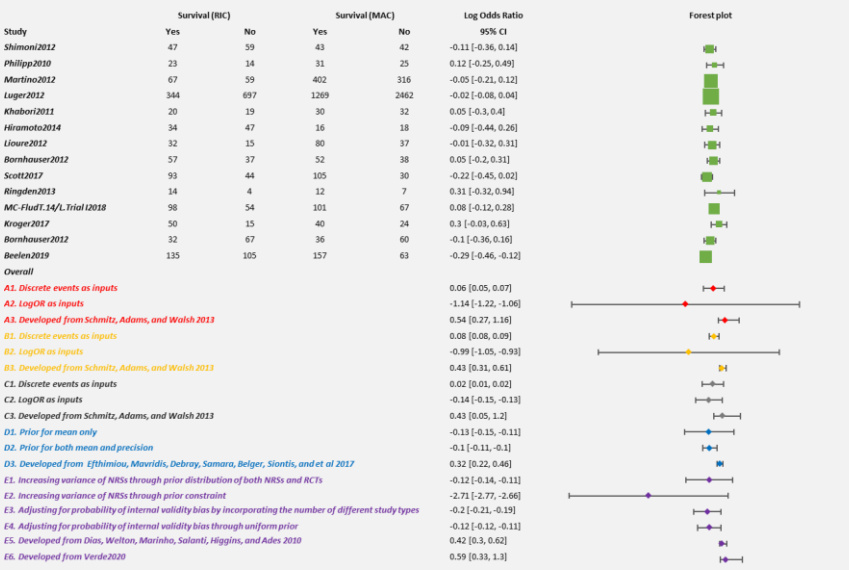**Figure 1. Flow chart of the BNMR models for comparison**

Figure 2. Forest plot

CONCLUSION

- Estimates obtained from the BNMR models are sensitive to model algorithms.

- Further research is needed to confirm our findings by validating these algorithms in other case studies.

Reference
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Zhang K, Arora P, Sati N, Béliveau A, Troke N, Veroniki AA, Rodrigues M, Rios P, Zarin W, Tricco AC. Characteristics and methods of incorporating randomized and nonrandomized evidence in network meta-analyses: a scoping review. Journal of Clinical Epidemiology. 2019 Sep 1;113:1-0.
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