Cardiovascular safety of new oral anticoagulants: re-analysis of 27 randomized trials based on Bayesian network meta-analysis

Andrea Messori

HTA unit, ESTAV Toscana Centro, Regional Health Service, 50100 Firenze, Italy

While the study by Loke et al. [1] has addressed an important issue concerning the safety of the new oral anticoagulants, one methodological point deserves further scrutiny. In their network meta-analysis, Loke et al. employed frequentist statistics (the Bucher method [2]) which are recognized to have some intrinsic limitations. In fact, one drawback is that the Bucher method tends to overemphasise the statistical significance of the results. Another limitation is represented by the fragmentation of its approach because as many separate analyses are needed as the number of comparisons being studied [3–6].

In recent years, the Bayesian method has increasingly been considered the new standard in the field of network meta-analysis. This approach has one main advantage in that all treatments included in the comparisons are incorporated into a single model (‘all-in-one’ approach). Another advantage is that the Bayesian technique enables rank ordering of the treatments concerned [7–11].

To test whether the results reported by Loke et al. were influenced by the adoption of the Bucher method, we reanalyzed the raw data of their analysis by applying the Bayesian method of network meta-analysis (random-effect model). The model employed in our re-analysis has been developed by the NICE Support Unit (UK) [12]. Our end point was the occurrence of acute coronary syndrome. The data included in our re-analysis were those reported in Figures 2–4 of Loke et al.’s article [1].

Figure 1 shows the ranking histograms generated by the probabilistic analysis of our Bayesian statistics. As regards the values of odds ratio, our results based on the Bayesian method proved to be nearly identical to those obtained by Loke et al. using the Bucher method. In fact, the odds ratio estimated by our Bayesian statistics was 0.54 (95% credible interval 0.38, 0.76) for the comparison of rivaroxaban vs. dabigatran and 0.60 (95% credible interval 0.41, 0.81) for the comparison of apixaban vs. dabigatran. The corresponding estimates reported by Loke et al. were 0.54 (95% confidence interval 0.39, 0.76) and 0.61 (95% confidence interval 0.44, 0.85), respectively. Like in Loke et al.’s analysis, the indirect comparison of rivaroxaban vs. apixaban showed, in our analysis, a result that remained far from statistical significance (odds ratio = 0.91, 95% credible interval 0.71, 1.20).

In conclusion, our re-analysis indicates that, in studying this data set, the performance of the Bucher method was excellent in comparison with that of the Bayesian method. From a practical viewpoint, our re-analysis has provided a useful confirmation of the scientific robustness of the results derived from these interesting datasets.

Conflict of interests

The author has completed the Unified Competing Interest form at www.icmje.org/col_disclosure.pdf (available on request from the corresponding author) and declares no support from any organization for the submitted work, no financial relationships with any organizations that might have an interest in the submitted work in the previous 3 years and no other relationships or activities that could appear to have influenced the submitted work.
REFERENCES


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CORRESPONDENCE
Dr Andrea Messori, HTA Unit, Area Vasta Centro Toscana, Regional Health System, Via San Salvi 12, 50100 Firenze, Italy.
Tel.: +39 33 8951 3583
Fax: +39 05 7470 1319
E-mail: andrea.messori.it@gmail.com