Can real world data support drug development with better trial design and real-world evidence?

Our work with our partner Datametrix uncovers how use of statistical analytics methodologies on electronic health records can build synthetic control arms to supplement clinical trial data for better clinical and regulatory decisions.

Poster: Emulating the Main Outcomes of Randomised Controlled Studies Through Statistical Analysis of Real World Data Directly Extracted from Electronic Medical Records.

Objective:

To demonstrate that analysis of EMR can be used effectively to emulate patient and response patterns reflecting the results observed in randomized controlled trials (RCT).

Technical approach:
For this evaluation, we have looked at the outcomes for Chemotherapy and Checkpoint Inhibitor treatments in Advanced Melanoma Patients, evaluating results from an RCT and comparing it against an analysis of data extracted from deidentified EMR from 13 sites in 6 countries.

We have reviewed the data in context to patient care, treatment outcomes. The approach included the review and assessment of RCT endpoints against the available RWD datapoints, and the identification of the relevant data points in the RWD to match/approximate the data underpinning the RCT endpoint definition, to allow for a meaningful comparison.

RCT data set: The reference study is an RCT extracted from clinicaltrials.gov, "Study of Pembrolizumab (MK-3475) Versus Chemotherapy in Participants with Advanced Melanoma"

RWD data set: Our database was built using data from Clinerion's hospital network following the same inclusion and exclusion criteria as the RCT study.

We performed an analysis of overall survival (OS) and progression-free survival (PFS) using the weighted Cox regression model with Bayesian approach. The inverse probability of treatment weighted (IPTW) method based on the propensity score was performed to adjust for selection bias. A Bayesian analysis was done to improve survival results.

Results:
The analysis showed that, with the weighted Bayesian approach, the checkpoint inhibitor (Pembrolizumab) performed better in terms of OS (HR=0.45 [95% confidence interval [CI] 0.25, 0.82], p= 0.0023) and PFS (HR=0.16 [95% confidence interval [CI] 0.08, 0.25], p <0.0001) compared to Chemotherapy.

Conclusion:
We have been able to emulate some of the results from RCT in RWD, comparing the treatment effect of Chemotherapy and Checkpoint Inhibitor treatments in Advanced Melanoma Patients. Most notably we have been able to confirm the overall outcome of RCT in terms of Overall Survival and Progression Free Survival.

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