Comparison of Cure Versus Standard Parametric Models Using Advanced Melanoma Data

MSR74

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Conclusion

- Mixture cure models, which account for the different survival behaviours of cured and uncured patients, may reflect life expectancy more accurately than standard parametric models. Hence, we recommend using mixture cure models for advanced melanoma and other oncology indications

Background

- The treatment landscape for advanced melanoma has undergone a revolutionary change in recent times owing to the emergence of a diverse range of new therapies
- The Mixture Cure Model (MCM) has been widely used in survival analysis, but only a few studies have explored the comparison of MCM versus standard parametric models (SPM) on life expectancy
- In contrast with SPM which considers that all patients will eventually experience the event of interest, MCM assumes the population as a mixture of two groups - “cured” and “not cured” while extrapolating the survival data

Objective

- To compare the results of MCM with the SPM while estimating the long-term survival probability of the patients treated with nivolumab

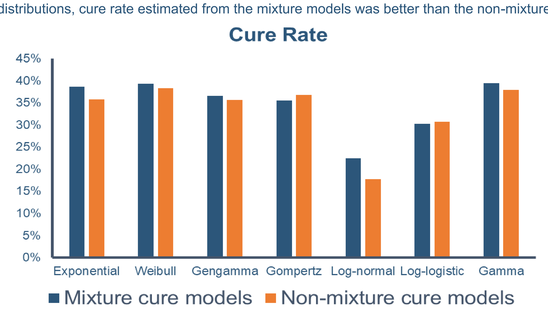
Methodology

- The survival data in this study was extracted from the Kaplan-Meier (KM) estimates of survival in the overall population comparing nivolumab with different treatment groups
- The pseudo-individual patient-level data were generated using the Guyot algorithm. The mixture and non-mixture cure models were fitted by using “flexsurvcure”, and the standard parametric models were fitted by “flexsurv” packages in R (v4.2.1), respectively
- In mixture and non-mixture cure models, the survival of cured and uncured patients was modeled separately by using different statistical distributions, assuming only general population mortality were applied to the “cured” patients
- The Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) were used to compare the models. The lower value of AIC and BIC values indicate better the model fit
- Visual inspection of survival curves was considered for validating the clinical plausibility

Results

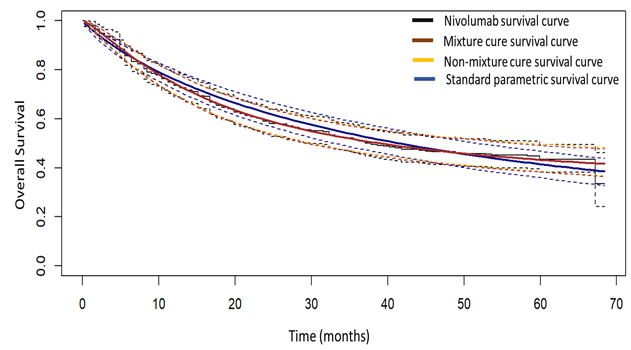
- Except for Gompertz distribution, all mixture and non-mixture cure models showed lower values of AIC and BIC than standard parametric models
- The log-logistic distribution was best fitted in the mixture and non-mixture cure models with the lowest AIC of 1786.71 and 1786.73, whereas BIC of 1797.98 and 1797.99, respectively
- In contrast with cure models, AIC and BIC values for the best-fitted model for the SPM were 1795.44 and 1802.95, respectively

- The cure rate calculated from various statistical distributions of the mixture and non-mixture cure models were 38.6%, 35.7% for exponential; 39.3%, 38.3% for Weibull; 36.6%, 35.6% for generalized gamma; 35.4%, 36.7% for Gompertz; 22.3%, 17.67% for lognormal; 30.3%, 30.7% for log-logistic; and 39.3%, 38.1% for gamma
- Except Gompertz and log-logistic distributions, cure rate estimated from the mixture models was better than the non-mixture cure models



Results (Cont’d)

- The best fitted distribution (i.e., log-logistic) from mixture cure, non-mixture cure and standard parametric models, along with the KM curve is presented in below figure



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Disclosure

- Shubhram Pandey, Barinder Singh, Akanksha Sharma are employees of Pharmacoevidence; Parampal Bajaj is employee of Heorlytics, the authors, declare that they have no conflict of interest; the authors, declare that they have no conflict of interest

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Sponsorship
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