SA44

Meta-analysis of time-to-event oncology outcomes for health economic modeling

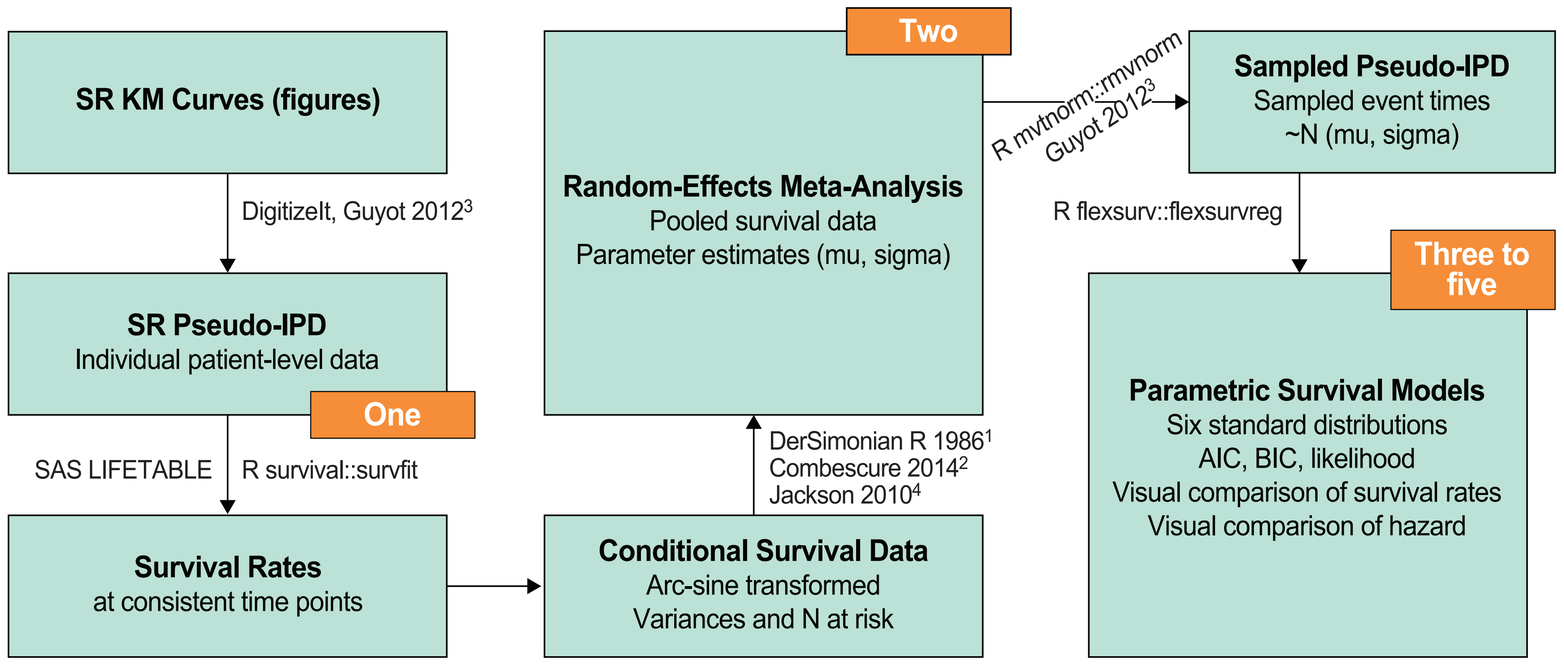
Lang BM[1]; Young K[2]; Abderhalden L[1]; Srirangan D[1]; Gelb D[1]; Amonkar MM[2]; Simmonds M[3]

[1]MSD Switzerland, Zurich, Switzerland;
[2]Merck & Co., Inc., Rahway, NJ, USA;
[3]Centre for Reviews and Dissemination, University of York, York, UK

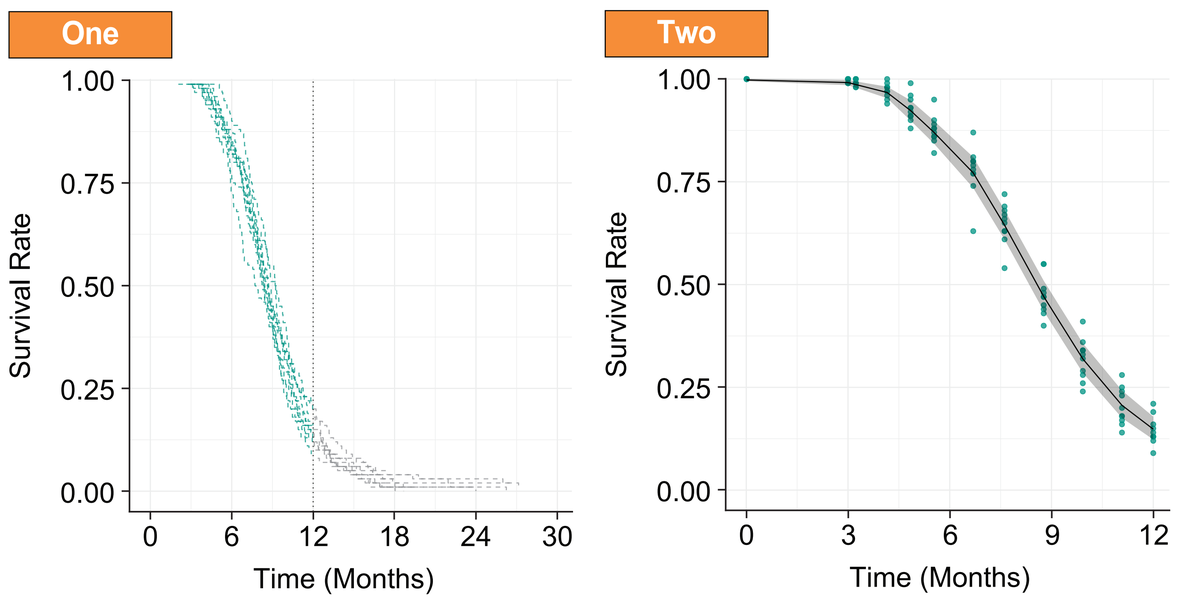
Background

- Systematic reviews (SR) and meta-analyses (MA) of survival data are often used to support reimbursement submissions of treatments assessed in single-arm studies
- The use of hazard ratios for construction of survival curves for comparator interventions is a common approach, but this may violate proportional hazards assumptions
- MA can be conducted at specified time points, or on median survival, but conducting an MA on the entire survival curve allows the user to use all available data
- Kaplan-Meier (KM) curves provide information on the entire curve and are a commonly presented clinical endpoint used in health economic models
- Individual-level data for the whole survival curve can be digitally extracted from KM curves for use in modeling
- We present a workflow for pooling survival data extracted from KM curves included in SRs for use in health economic models, which avoids proportionality assumptions

Methodology



Example with simulated data



Three

Distribution	logLik	AIC	BIC
Weibull PH	-347.4	698.8	710.8
gamma	-349.3	702.6	714.6
log-logistic	***-349.3***	***702.7***	***714.7***
Gompertz	-350.5	704.9	717.0
log-normal	-355.0	714.1	726.1
exponential	-411.4	824.9	830.9

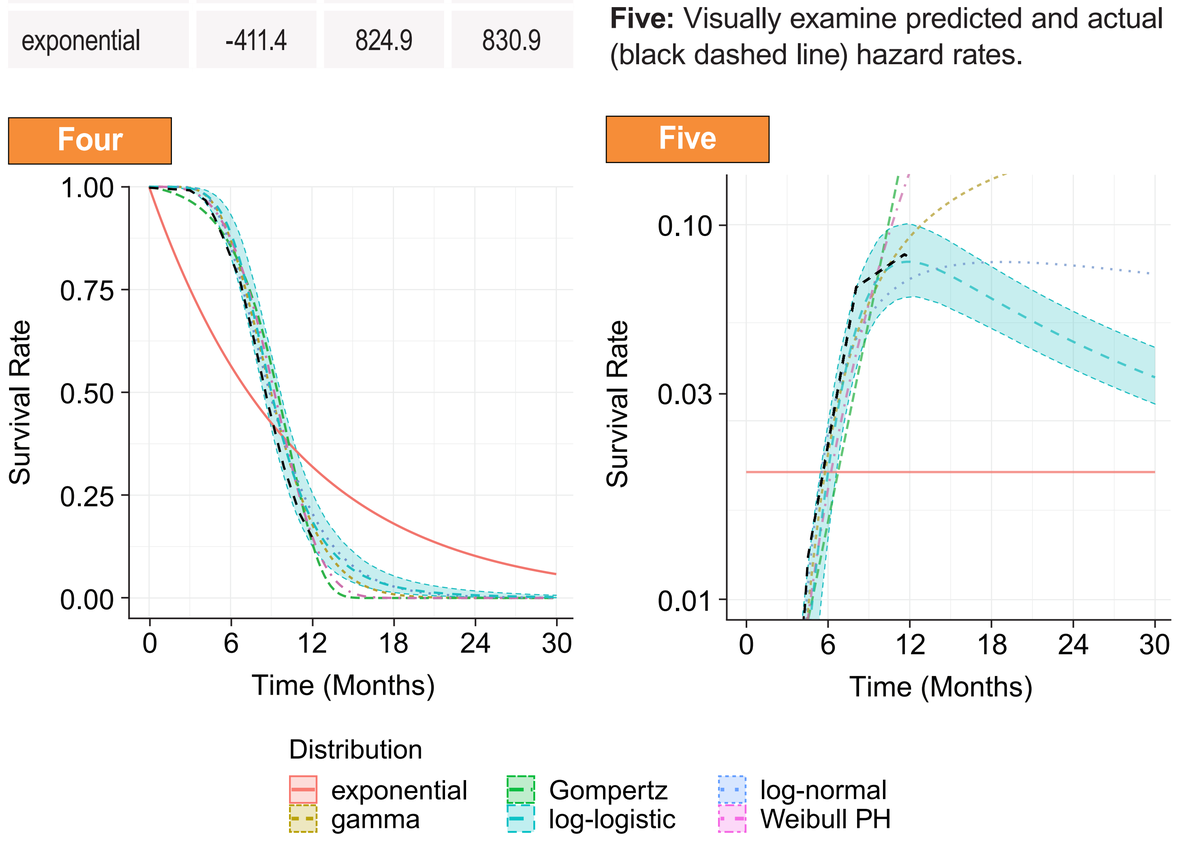
One: Ten studies (KM curves) with follow-up limited to 12 months are identified.

Two: Fit random-effects MA model (black line, grey ribbon) on summarized data (blue points).

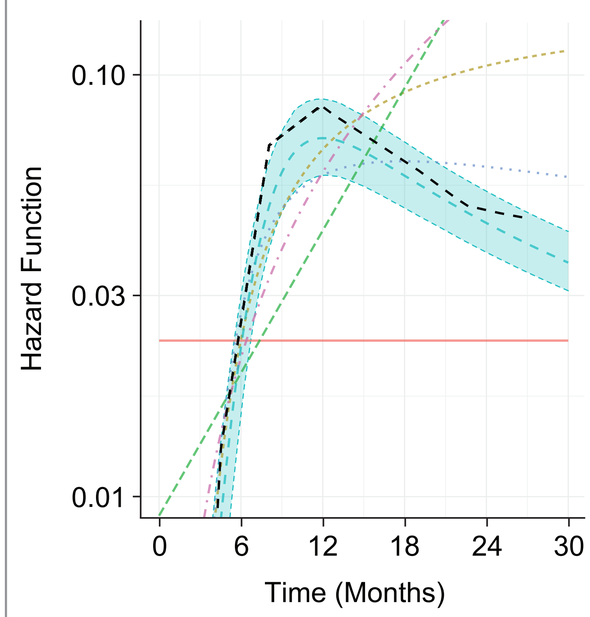
Three: Fit 6 standard parametric distributions to data simulated from model.

Four: Visually examine predicted and actual (black dashed line) survival rates.

Five: Visually examine predicted and actual (black dashed line) hazard rates.



Best case scenario



Distribution	logLik	AIC	BIC
log-logistic	***-409.9***	***823.8***	***835.8***
gamma	-414.5	833.1	845.1
log-normal	-419.0	841.9	853.9
Weibull PH	-422.6	849.2	861.2
Gompertz	-442.4	888.8	-409.8
exponential	-471.2	944.3	950.3

In comparison to the example, where we had no censoring and follow-up truncated at 12 months, when following the workflow on simulated data with complete follow-up, we successfully recapture the simulated distribution and parameters.

Conclusions

- Random-effects meta-analysis can be carried out on summarized KM data giving a distribution-free approach to MA on TTE endpoints
- Model fit parameters from the MA model can be used to simulate events
- The six standard parametric models can be fit to these simulated events for health economic modeling needs
- With this, statisticians and health economic analysts can perform evidence synthesis on systematic review data in order to leverage collections of studies for their reimbursement dossier needs

References

1. DerSimonian R, et al. *Control Clin Trials*. 1986;7(3):177-188.
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3. Guyot P, et al. *BMC Med Res Methodol*. 2012;12:9.
4. Jackson D, et al. *Stat Med*. 2010;29(12):1282-1297.

Presented at ISPOR Europe 2022; Vienna, Austria; November 6-9, 2022.