

The impact of time-dependent bias in proportional hazards modelling.

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In the clinical literature, time-dependent exposure status has regularly been analysed as if known at time origin (VAN WALRAVEN et al. 2004). Such an analysis is generally considered to yield biased results when analysing the effect on the time until some endpoint of interest. In this work, we study in detail the bias arising in a proportional hazards analysis. We show that the biased hazard ratio estimate will always be less than the unbiased one; this leads to either an inflated or a damped effect of exposure, depending on the sign of the correct log hazard ratio estimate. We find an explicit formula of the asymptotic bias based on generalized rank estimators (SCHUMACHER et al. 1987), and we investigate the role of censoring, which may prevent an individual from being considered as baseline exposed in the biased analysis. We illustrate our results with data on hospital infection status and different, artificially introduced censoring patterns.

References

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VAN WALRAVEN C, DAVIS D, FORSTER A and WELLS G (2004): Time-dependent bias was common in survival analyses published in leading clinical journals. *Journal of Clinical Epidemiology*, 57, 672–682.