**Adjusting for treatment by center interaction in survival data**

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In survival analysis, assessing the existence of potential centre effects on the baseline hazard or on the effect of fixed covariates on the baseline hazard, such as treatment-by-centre interaction, is a frequent clinical concern in multicentre studies. Survival models with random effects on the baseline hazard and/or on the effect of the covariates of interest have been largely applied, for instance, to investigate potential centre effects. We aimed to develop a procedure to routinely test for multiple random effects in survival analyses. We propose a statistic and a permutation approach to test whether all or a subset of components of the variance-covariance matrix of random effects are non-zero in a mixed-effects Cox model framework. Performances of the proposed permutation tests are examined under different null hypotheses corresponding to the different components of the variance-covariance matrix, i.e., to the different random effects considered on the baseline hazard and/or on the covariates effects. Several alternative hypotheses are evaluated using simulations. The results indicate that the permutation tests have valid type I error rates under the null and achieve satisfactory power under all alternatives. The procedure is applied to two European cohorts of haematological stem cell transplants in acute leukaemia to investigate the heterogeneity across centres in leukaemia-free survival and the potential heterogeneity in prognostic factors effects across centres.