

Non-collapsibility: the root of all evil when estimating and interpreting marginal hazard ratios

In time-to-event or survival analysis, the Cox proportional hazard model is a widely used approach for estimating relative exposure effects. The effect parameter of interest is the (log) hazard ratio with respect to exposure status, conditional on covariates being included in the model for the purpose of confounding control. Similar to the odds ratio, the hazard ratio is a non-collapsible effect measure. Non-collapsibility implies that the effect parameter is not the same for different sets of covariates that are conditioned on, even if these covariates are independent of the exposure. Furthermore, the conditional hazard ratio differs to the marginal hazard ratio that has, under certain assumptions, a causal interpretation.

In my talk, I will elaborate on the formal relationship between the conditional and marginal hazard ratio and associated incompatibilities regarding the proportional hazards assumption. I will provide surprising insights on how censoring does affect the magnitude of the marginal hazard ratio and demonstrate that the degree of censorship diminishes non-collapsibility effects.