Time-to-event outcome analysis in cluster randomised trials

Background

Cluster randomised trials (CRTs) are trials in which intact social units, such as medical practices, hospitals, or communities, are randomised to intervention or control conditions while outcomes are assessed on individuals within such clusters. This study design is a natural choice to evaluate the impact of public health or health system interventions delivered at the cluster level, and their use is rapidly increasing. In CRTs, outcomes assessed on individuals from a given cluster tend to be more similar than outcomes of individuals from different clusters. This clustering must be accounted for in statistical analysis, to avoid an increased risk of Type I error. Most of the developments performed to account for the clustering in the analysis of CRTs have considered continuous or binary outcomes. Conversely, very few results are available for time-to-event outcomes, which measure the time from the beginning of an observation period to an event of interest. When this event is not observed during follow-up, time-to-event is censored, which constitutes the major challenge in survival analysis. Currently available methods to estimate intervention effect for correlated time-to-event outcomes include shared frailty models, which incorporate a random effect shared by members of the same cluster, marginal proportional hazard models, which assume an average baseline hazard for all individuals and nonparametric methods such as clustered logrank test. These different methods have not been widely assessed in the context of CRTs.

Objectives

The objectives of this internship will be

1/ to identify, via literature search, suitable strategies for time-to-event outcome analysis in CRTs
2/ to apply those methods on data from a real cluster randomised trial
3/ the final goal will be to compare different methods using a simulation study

Profile

- Bac+5 (ENSAI, ISUP, Master 2 in Biostatistics,…)

- Knowledge in mixed-effects models, survival models

- Proficient in programming (preferably with R)

Working environment

The fellow will be welcomed in Inserm Unit SPHERE 1246 in Tours, (37) France. Opportunity to continue after the internship with a PhD (funding already available).

Duration 4 to 6 months

Supervisor and contact Dr Agnès Caille, agnes.caille@med.univ-tours.fr