Post-doctoral researcher position (18 months)

Description of the position:

The INSERM SPHERE Unit U1246 is part of both the Universities of Tours and Nantes and aims to contribute to high-quality research in methods on patient-centered outcomes and health research. We are looking for a motivated scientific staff member to join our team and engage in our research project QUARTET.

Summary of the project:

Cluster randomised trials (CRTs) are trials in which intact social units, such as hospitals, medical practices or communities, are randomized to intervention or control conditions while outcomes are then assessed on individuals within such clusters. The use of CRTs to evaluate clinical and public health interventions has been rising in recent years.

In CRTs, outcomes assessed on individuals from a given cluster are correlated. This clustering has to be taken into account at the planning stage, leading to an increased sample size to reach the same power as a comparable individually randomized trial. Analysis methods of a CRT must also account for the correlated nature of the outcomes within clusters. This can be done by using either mixed-effects models, in which clusters are treated as random effects, or marginal models estimated with generalized estimating equations (GEEs). When reporting the results of a CRT, a measure of intracluster correlation should be reported, usually the intracluster correlation coefficient.

Most of the developments to quantify and account for clustering in the analysis of CRTs have considered continuous or binary outcomes. Conversely, limited methods and recommendations are available for time-to-event (TTE) outcomes, which measure the time from the beginning of an observation period to an event of interest. In practice, TTE outcomes in CRTs are often inappropriately analysed, by treating them either as clustered binary outcomes or as TTE outcomes but ignoring correlation. The performance of existing analysis methods for correlated TTE outcomes has not been compared in the context of CRTs and the intracluster correlation coefficient (or any other measure of intracluster correlation) for TTE outcomes has not been clearly defined.

The main objective of the present project is to identify optimal analysis methods for TTE outcomes in CRTs including appropriate methods of estimating the degree of clustering for TTE outcomes in CRTs.

First, we will complete a review of recently published CRTs to obtain an overview of existing practices. Second, we will search the methodological and statistical literature to identify all available methods to analyse correlated TTE data. Where gaps are identified, we will develop novel methods appropriate for CRTs. Existing and novel methods will be compared by simulation. A similar approach will be used for measures of clustering. This part of the project will consist of both theoretical work to develop new methods as well as computer simulation to evaluate methods. Finally, real data from three CRTs (for which we already have the agreement from the scientific coordinators) will be used to illustrate our findings.

Ease of use of the selected methods and ease of interpretation of the results produced by these methods will be evaluated by surveying a panel of clinicians and statisticians. We will use a Delphi method to reach consensus. The objective of this innovative step is to balance statistical properties with ease of use and ease of interpretation in the development of final guidelines for analysis and measures of clustering.

Recommended methods will be implemented in user-friendly R packages to be available to the wider scientific community.
At the end, this project will provide practical guidelines for TTE outcomes in CRTs, with a special focus on balance between statistical aspects and interpretability for future users.

Your tasks:
The post-doctoral researcher will work specifically on measures of clustering for time-to-event outcomes in cluster randomised trials. This will include analytical developments and simulations.

The position will include teaching activity and a master's thesis supervision.

The position will be based in the office space of the SPHERE unit in the teaching hospital of Tours. The applicant will have his/her own office with an adequately powered computer.

The position will start on the 1/1/2021 (earliest).

Requirements:

Please be sure to highlight your strengths pertaining to the following elements to help us in accurately evaluating your application.

- Completion of a PhD in a relevant discipline (e.g. biostatistics, medical statistics, bioinformatics).
- Knowledge in the methodology and the statistical analysis of randomised controlled trials.
- Advanced user (programming skills) in the statistical software program R/RStudio.
- Strong knowledge in written and spoken English.

Project-specific elements (at least one of the two elements is required):

- Demonstrated experience in statistical methods for cluster randomised trials or any other situation with correlated data.
- Demonstrated experience in survival analysis.

Further desirable elements:

- Scientific writing skills as demonstrated by prior research publication.
- Experience in simulation studies.

How to apply:

Please send all application documents, e.g. cover letter, curriculum vitae, certificates, attestations, etc. to the following address agnes.caille@med.univ-tours.fr

Do not hesitate to ask content related questions to
Dr Agnès Caille
agnes.caille@med.univ-tours.fr