Advanced survival analysis for cohort studies (ws13 - 1)

January 21 - 25, 2013

Faculty

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Introduction

Cohort studies are a central study design for observational epidemiology and clinical and health services research. They have gained further prominence in recent years, with specific funding mechanisms becoming available in several countries. However the analysis of data from cohort studies presents challenges, dealing appropriately with exposures and confounders that change over time, hazards that are not proportional across exposure categories, competing risks of different outcomes (death, for example, is a competing risk of many other outcomes), and examining and dealing with biases.

Recent methodological advances have clarified the circumstances in which it is possible to make causal inferences from cohort studies. In the presence of time-dependent confounders that are affected by prior treatment or exposure, commonly used statistical methods provide measures of association that lack a causal interpretation, even when the investigator 'adjusts for' all potential confounders in the analysis. Methods such as marginal structural modelling, which provide estimates that can be endowed with a causal interpretation, have become more widely used in recent years.

This course will focus on advanced issues in survival analysis of longitudinal data and present a framework for causal inference from observational data. The application of these methods will be illustrated using data from HIV cohort studies.

It is essential that course participants are familiar with regression models and Stata or R statistical software. Please note that analysis of repeated measures using random-effects models is outside the scope of this course.

Course objectives

By the end of this short course participants will be able to:

- Manage and manipulate person-time data, derive graphical displays appropriate for survival analysis, and interpret these;
- Understand how to use causal diagrams to identify the presence of confounding and variables that should and should not be controlled for in analyses;
- Analyse cohort data using Poisson, Cox and parametric (e.g. Weibull) regression models and understand the links between these approaches;
- Understand how to model time-varying covariates in survival analysis;
- Use regression models, propensity scores and inverse probability weighting to control confounding;
- Explain why standard regression models are not appropriate in the presence of time-dependent confounders that are affected by prior treatment, and use marginal structural models to overcome this problem.

Participants will gain practical experience in performing analyses in Stata® and R.

What you have to bring

Students will bring their own portable computers. A course license of Stata® will be available if required, to be installed by University of Bern IT staff on arrival on Sunday. Wi-Fi will be available free of charge in the course room and lobby area.

Outline of course

The course will run over five days and consist of lectures, group work and computer practicals. We start early in the morning with a review of the previous day. During the extended break in the afternoon participants review course materials, catch up on emails or go skiing. We reconvene at 5 pm for the computer sessions.

Sunday evening

- Installation of Stata® software on students' laptop computers, and possibility of self-directed session for students wishing to refresh themselves with this package.

Monday

- Review of survival analysis, rates and person-time data
- Analysing time to event data in Stata®
- Life tables and Kaplan-Meier plots
- Computer practicals

Tuesday

- Causal diagrams and a causal definition of confounding
- Selection bias
- Stratified and regression analysis of rates
- Splitting follow up time
- Computer practicals

Wednesday

- Cox regression
- Parametric regression models for survival analysis
- Dealing with variables that change over time
- Choice of method and choice of time axis
- Computer practicals

Thursday

- Investigating the proportional hazards assumption and dealing with non-proportional hazards
- Dealing with competing risks: cause-specific hazards and cumulative incidence functions
- Competing risks regression models
- Computer practicals

Friday

- Selection bias and time-dependent confounding
- Propensity scores and inverse probability weights
- Marginal structural models
- Computer practicals

Maximum number of participants

The maximum number of participants on this course will be 25.

Course hotel

Course participants will stay at the Hotel JUNGFRAUBLICK in Wengen. See http://www.jungfraublick.com/ for details on the hotel.

Course fee and hotel costs

Course fee: CHF 1000

Hotel (including breakfast buffet and three-course dinner, transfer from train station):

Arrival January 20, departure January 26 (six nights)
Double occupancy with balcony CHF 850.-
Double occupancy without balcony CHF 780.-
Single occupancy with balcony CHF 955.-
Single occupancy without balcony CHF 885.-

Please note that the hotel bill will have to be settled by each participant upon departure.