Assessing causal effects in the presence of treatment switching through principal stratification

A seminar by Fabrizia Mealli

Università degli Studi di Firenze

Friday 27 Jan 2023 | 12:30 p.m.
Room Benvenuti and live Zoom
Department of Statistical Sciences

Clinical trials often allow patients in the control arm to switch to the treatment arm if their physical conditions are worse than certain tolerance levels. For instance, treatment switching arises in the Concorde clinical trial, which aims to assess causal effects on the time to disease progression or death of immediate versus deferred treatment with zidovudine among patients with asymptomatic HIV infection. The Intention-To-Treat analysis does not measure the effect of the actual receipt of the treatment and ignores the information of treatment switching. Other existing methods reconstruct the outcome a patient would have had s/he not switched under strong assumptions. We re-define the problem of treatment switching using principal stratification, contrasting it with other estimand strategies, and focus on causal effects for patients belonging to subpopulations defined by the switching behavior under control. We use a Bayesian approach to inference taking into account that (i) switching happens in continuous time; (ii) switching time is not defined for patients who never switch in a particular experiment; and (iii) survival time and switching time are subject to censoring.
We apply this framework to analyze synthetic data based on the Concorde study.
Our data analysis reveals that immediate treatment with zidovudine increases survival time for never switchers, and that treatment effects are highly heterogeneous across different types of patients defined by the switching behavior.
Keywords: Bayesian causal inference, Censoring, Competing risks, Noncompliance, Potential outcomes, Survival.

Joint work with Alessandra Mattei and Peng Ding

800 1222·2022 ANNI
UNIVERSITÀ DEGLI STUDI DI PADOVA
DIPARTIMENTO DI SCIENZE STATISTICHE