Einladung zum Biometrischen Kolloquium
On invitation of Martin Posch & Georg Heinze

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AN INTRODUCTION TO MENDELIAN RANDOMIZATION

Summary

In this talk, we shall present an introduction to (with some illustrations of) Mendelian Randomization, an approach for obtaining causal inference on the effect of a modifiable risk factor on an outcome of interest from observational data. This is a special case of a more general technique called "instrumental variables'', where genetic information is used as an instrument. Under some assumptions about this instrument, it is theoretically possible to estimate a (causal) effect which is adjusted for unknown confounders, which is not attenuated in presence of measurement errors, and which is not affected in presence of reverse causation, as we can also nicely verify via simulations. Limitations of the method include the partly unverifiable assumptions about the instrument, the problematic of a "weak instrument" yielding a huge loss of statistical power, and that it does not readily extend to the estimation of a causal odds-ratio in case of a binary outcome. On the other hand, the technique of instrumental variables is useful to consistently estimate a treatment effect in a clinical trial with non-compliance, where the potential drawbacks listed above are much less problematic. We thus end up with a kind of paradox: While the original goal of the method was to improve inference in observational studies, trying to get ``closer to'' clinical trials in this regard, its most successful application might be at the end to improve inference in clinical trials, which thus remain (and even more than before) a gold standard to assess causal inference.

Wiener Biometrische Sektion
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