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Health Registries for Research
Norway

Workshop on Causal Inference in Health Registry Research

Time: 30th November and 1st December 2017
Place: Runde Auditorium, Domus Medica, University of Oslo

Registration

About

In the last fifty years or so a number of nationwide health registries have been established in the Nordic countries, spurring the interest of research communities all over the world. Hundreds of highly influential papers have been based on these registries, both because of the sheer volume of information, but also because of the quality of that information. In the same period, an extensive theory on causal inference has been developed, paving the way for the use of causal frameworks in fields such as epidemiology and economics. This workshop aims to explore when causal statements are appropriate in health registry research.

The workshop will address several aspects of causal inference, including instrumental variable analysis (IVA), time-varying confounding, and mediation analysis. The randomized controlled trial (RCT) is often called the gold standard for identifying causal effects. However, causal inference from observational data typically is based on mimicking randomization using causal models. Inverse probability weighting and standardization are examples of popular methods. Another approach is instrumental variable analysis (IVA), mimicking an RCT by identifying a variable - the so-called instrument - that is associated with the treatment but not the outcome (except through the treatment). A special case of IVA is Mendelian randomization, where instruments are genetic. A genetic marker may, for example, be associated with smoking behavior but not the risk of congenital malformations. This allows for the estimation of the causal effect of smoking on the risk of congenital malformations. Time-varying confounding occurs when the relation between a confounder and the treatment, or a confounder and an outcome, changes over time. For example, health status may affect both dose of drug (treatment) and risk of death (outcome) for a certain illness. Without proper handling, it may appear as if lower doses reduce the risk of death, because these doses are only given to the healthiest patients. Mediation analysis refers to a situation where we are interested in the effect of how a treatment affects an outcome via an intermediate variable - a so-called mediator. For example, the treatment could be in-vitro fertilization, the outcome could be risk of premature birth, and the mediator could be twinning.

Organizing committee

Odd O. Aalen, Oslo Centre for Biostatistics and Epidemiology
Jon Michael Gran, Oslo Centre for Biostatistics and Epidemiology
Rolv Terje Lie, Department of Global Public Health and Primary Care, University of Bergen
Øystein Ariansen Haaland, Department of Global Public Health and Primary Care, University of Bergen

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Program

Thursday 30th November 2017

12.00 **Welcome**
Kjetil Røysland, Oslo Centre for Biostatistics and Epidemiology

12.05 **Is there a place for causal inference in health registry research?**
Rolv Terje Lie, Department of Global Public Health and Primary Care, University of Bergen

12.25 **Time-varying confounding, part 1**
Rhian Daniel, London School of Hygiene and Tropical Medicine &
Bianca de Stavola, UCL Great Ormond Street Institute of Child Health

13.25 **Lunch**

13.55 **Time-varying confounding, part 2**
Rhian Daniel, London School of Hygiene and Tropical Medicine &
Bianca de Stavola, UCL Great Ormond Street Institute of Child Health

14.55 **Break**

15.10 **Current use of instrumental variable analysis in health registry research**
Øystein Ariansen Haaland, Department of Global Public Health and Primary Care, University of Bergen

15.25 **The aspect of time in Mendelian randomization studies: A neglected source of bias**
Mats J. Stensrud, Oslo Centre for Biostatistics and Epidemiology

16.05 **Break**

16.20 -17.00 **Instrumental variables in health registry research: Challenges and possibilities**
Neil Davies, MRC Integrative Epidemiology Unit, University of Bristol

Friday 1st December 2017

09.00 **Multiple mediators, part 1**
Rhian Daniel, London School of Hygiene and Tropical Medicine
& Bianca de Stavola, UCL Great Ormond Street Institute of Child Health

10.00 **Coffee break**

10.30 **Multiple mediators, part 2**
Rhian Daniel, London School of Hygiene and Tropical Medicine
& Bianca de Stavola, UCL Great Ormond Street Institute of Child Health

11.30 **Break**

11.45 **Identification and causal inference using population wide administrative data**
Kjell G. Salvanes, Department of Economics, Norwegian School of Economics

12.25 **Closing remarks**
Jon Michael Gran, Oslo Centre for Biostatistics and Epidemiology

12.40 **End**

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Abstracts


Time-varying confounding

In this session we will give a brief review of the issues arising from time-varying confounding in the context of longitudinal data created by linkage, give an overview of the three main approaches to deal with it (g-computation, g-estimation, IPW), and discuss results from examples arising from UK-based electronic health records. *(Rhian Daniel, London School of Hygiene and Tropical Medicine & Bianca de Stavola, UCL Great Ormond Street Institute of Child Health)*


Multiple mediators

In this session we will introduce mediation analysis when it involves a single mediator and then extend it to the more likely settings that involve multiple mediators, linking them to the time-varying confounding issues addressed in session 1. We will consider alternative targets of estimation, compare their interpretation in the light of life-course studies, and illustrate them using data from UK-based cancer registry data. *(Rhian Daniel, London School of Hygiene and Tropical Medicine & Bianca de Stavola, UCL Great Ormond Street Institute of Child Health)*

Instrumental variables in health registry research: Challenges and possibilities

Epidemiologists are increasingly using instrumental variable (IV) analysis to estimate causal effects in observational data. If the IV assumptions are not valid, then the IV estimates can be more biased than other approaches. Therefore, a key aspect of any study using IVs is to assess whether the IV assumptions are plausible. In this session, I will describe some recently developed methods to evaluate the IV assumptions. *(Neil Davies, MRC Integrative Epidemiology Unit, University of Bristol)*

Identification and causal inference using population wide administrative data

More to follow. *(Kjell G. Salvanes, Department of Economics, Norwegian School of Economics)*

The aspect of time in Mendelian randomisation studies: A neglected source of bias?

There is an important temporal aspect of Mendelian Randomisation studies: The design relies on genetic variants that are carried from conception, but subjects are often recruited in (late) adulthood. First, I will explain how this time lag may introduce bias. Second, I will present a new method to adjust for survivor bias, using family data from health registries. *(Mats J. Stensrud, Oslo Centre for Biostatistics and Epidemiology)*

Is there a place for causal inference in health registry research?

This opening talk will give a brief review of the histories of health registry research and causal inference, and discuss the potential of the latter in the former. *(Rolv Terje Lie, Department of Global Public Health and Primary Care, University of Bergen)*

Current use of instrumental variable analysis (IVA) in health registry research

This talk addresses how IVA is currently being used in health registry research. We give an introduction to IVA and review the literature. *(Øystein Ariansen Haaland, Department of Global Public Health and Primary Care, University of Bergen)*

> Registration