**Day 2 - Advanced multiple imputation: Longitudinal data and sensitivity analyses**

**Tuesday 19 February 2019**

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***Course Description***

Through a combination of lectures and computer practicals (Stata and R), this workshop will cover two advanced topics in multiple imputation that are critical in modern research studies.

***Multiple imputation of longitudinal data***

Longitudinal studies, collecting data from individuals over time, are central in modern health and medical research. However, the prolonged observation of individuals exacerbates the occurrence of missing data. While multiple imputation methods for handling missing data in multiple variables are widely available in mainstream statistical software, there are important considerations, both computational and conceptual, regarding their use in the longitudinal setting. Furthermore, specialised approaches have been developed. In the first part of this workshop, we will review the concepts and methods available for multiple imputation of longitudinal data and guidance on good practice.

***Sensitivity analyses to departures from the ‘missing at random’ assumption***

Standard implementations of multiple imputation are only guaranteed to provide unbiased results under the so-called “missing at random” (MAR) assumption. This roughly means that the chance of a value being missing does not depend on the value itself, given other observed data. It is therefore important to assess the plausibility of this assumption and, given that it is not testable, to perform sensitivity analyses considering scenarios where MAR does not hold (“missing not at random” (MNAR) scenarios). In the second half of this workshop, we discuss approaches to examine the plausibility of the MAR assumption, and describe an extended multiple imputation strategy that can be used to conduct such sensitivity analyses.

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| 9:00 – 10:00 | **Lecture 1**  (Kate Lee) | Recap of MI and MI methods for longitudinal data in the wide format |
| 10:00 – 10:30 | **Lecture 2**  (Margarita Moreno-Betancur) | MI methods for longitudinal data in the long format |
| 10:30 – 10:50 | *Morning tea* |  |
| 10:50 – 11:20 | **Lecture 2 (contd.)** |  |
| 11:20 – 12:30 | **Practical 1**  (Rushani Wijesuriya, Cattram Nguyen) | MI methods for longitudinal data (Stata/R) |
| 12:30 – 1:30 | *Lunch* |  |
| 1:30 – 2:15 | **Lecture 3**  (Julie Simpson) | Sensitivity analyses within the multiple imputation framework: an introduction |
| 2:15 – 3:00 | **Lecture 4**  (Margarita Moreno-Betancur) | Sensitivity analyses for multiple variables with missing data: the NARFCS procedure |
| 3:00 – 3:20 | *Afternoon tea* |  |
| 3:20 – 4:40 | **Practical 2**  (Julie Simpson, Margarita Moreno-Betancur) | Elicitation for parameter values required for sensitivity analyses  Sensitivity analyses within the multiple imputation framework (Stata/R) |
| 4:40 – 5:00 | **Wrap-up** | Discussion and questions |