Title of PhD project	**Influenza transmission models and detecting infection outcomes in electronic health records: a big data study in OpenSafely**
Supervisor	Dr Rosalind Eggo LSHTM
Co-Supervisor	Prof Liam Smeeth LSHTM
Brief description of project	Influenza causes hospitalisations and deaths especially in older people, either resulting directly from infection or by triggering worsening of pre-existing conditions such as heart disease, or asthma. Quantifying how many health events result from influenza infection has been approached by a variety of methods, but this has not yet included dynamic transmission models. These are needed because the dynamics of influenza in groups at risk of infection vary from the general population. As examples: i) older adults are generally vaccinated, but the risk of transmission (& size of the epidemic) depends on vaccine coverage and efficacy in the entire population, ii) older adults live in households or in long-term care facilities, which have very different risks of infection. This project will build on ongoing work for combining infectious disease modelling with individual-level analysis of risk of outcomes to build methodology and the scientific evidence base for how to link influenza circulation with health outcomes (specifically hospitalisation and death). The project may also consider COVID-19 depending on the epidemiological situation during the PhD.
Skills we expect a student to develop/acquire whilst pursuing this project	- Programming and coding skills for big data - Experience handling health records - Designing infectious disease models - Fitting infectious disease models to data - Bayesian methods for parameter inference - Subject-specific expertise on key pathogens - Scientific writing and presenting - Working as part of a team
Particular prior educational requirements for a student undertaking this project	An MSc or work experience with a strong quantitative element, especially with regard modelling or estimating hazards of infection or death.

	Students can take modules at LSHTM for further formal training.
Project key words	Mathematical modelling, Epidemiology, Big Data, Methodological novelty