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| Host department: QMUL |
| Project Title: |
| Uncovering the disease trajectories of atrial fibrillation: a machine learning approach  |
| Proposed supervisory team: Jianhua Wu – Professor of Biostatistics and Health Data ScienceJohn Robson – Clinical Reader in Primary Care Research & Development, Cardiovascular diseaseChris Gale – Professor of Cardiovascular Medicine |
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| Potential for cross consortium networking and educational opportunities: |
| The project will involve collaboration with multiple institutes and the opportunities for placement.  |
| Project description:Background Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia, with a lifetime risk of 1 in 4 in the general population and an increasing prevalence as the population ages. Effective treatment of patients with AF includes not only rate control and prevention of stroke, but also management of cardiovascular risk factors and comorbid diseases. Although AF is associated with increased risk of major cardiovascular events such as stroke and heart failure, the absolute and relevant event rates of these competing outcomes are not well described. The disease trajectories and the transitions among disease states after AF are lesser known given the uprising use of direct oral anticoagulants (DOACs) in recent years comparing with traditional anticoagulants, such as warfarin.Aims and objectivesThe aim of the project is to study, using big health data and health informatics techniques, the disease trajectories of patients with atrial fibrillation. Patients with atrial fibrillation will be identified from Hospital Episode Statistics (estimated analytical cohort n ~ 1.2 million) and linked to primary care for comorbidities and prescription data.Method(s)A machine learning approach through hierarchical clustering or neural networks will be used to explore the disease trajectory of atrial fibrillation through this big electronic health database. Statistical modelling approach will also be applied to quantify the absolute and relevant event rates.Impact This project will provide a national overview of the profile of patients with atrial fibrillation and quantify the subsequent major cardiovascular and non-cardiovascular events and disease trajectories. Accessing national individual patient data will provide a high resolution and granularity to this AF population. |

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| Training and development provision by host: |
| Formal training:Bespoke training will be provided to the successful candidate depending on their learning needs and experience. This will include attending training courses on programming and quantitative methods (including statistical techniques and machine learning) both within and outside QMUL. The PhD student will also be encouraged to consider training courses that will benefit their wider development. |
| Informal training: The PhD will be carried out within a supportive multi-disciplinary environment at QMUL including statisticians, and clinical expertise in cardiovascular medicine, general practice, and public health. There are many opportunities to attend seminars and lectures within the Wolfson Institute of Population Health and indeed the wider University. |
| PPIE: The candidate will have the opportunity to consult existing PPI groups at QMUL and develop the project together with PPI members. |