Understanding and clustering trajectories of multimorbidity

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This project sits within the ACRC Academy, a dedicated Centre for Doctoral Training, co-located with the Advanced Care Research Centre (ACRC), a new multi-disciplinary research centre at the University of Edinburgh. The ACRC’s students will deliver key aspects of the ACRC research agenda through a new doctoral-level research and training programme that will also equip them for careers across a wide range of pioneering and influential leadership roles in the public, private and third sectors.

The PhD with Integrated Study in Advanced Care is a novel, structured, thematic, cohort-based, programme of 48 months duration. Each PhD research project within the Academy has been devised by a supervisory team comprising academic staff from at least two of the three colleges within the University of Edinburgh. Each annual cohort of around twelve will include students with disciplinary backgrounds spanning from engineering and data science to humanities, social science, business and commerce, social work, medicine and related health and care professions. This unique level of diversity is a key attribute of our programme.

Project:

Aim

This project will develop machine learning methods for modelling trajectories of multimorbidity, and clustering individuals in meaningful groups based on these trajectories in both survey (ELSA) and routine (CPRD) data and will assess the significance of these clusters in predicting adverse events in later life.

Objectives

- Develop statistical machine learning methods, e.g., state space models, for understanding and clustering trajectories of multimorbidity in individuals in a principled manner
- Find stable and consistent clusters of multimorbidity trajectories in routine (CPRD) and survey (ELSA) data and interpret these clusters
- Compare these clusters against clusters derived from existing approaches to assess their consistency and reproducibility
- Explore the operationalisability of these clusters in predicting adverse outcomes in later life through, e.g., survival analysis.

Description

Multimorbidity is defined as the co-existence of two or more chronic conditions and is associated with a wide range of adverse outcomes in later life. The pattern of multimorbidity experienced by individuals vary widely and clustering them in meaningful groups has received considerable interest [1, 2, 3] in both routine and survey data. Although clustering of conditions in cross-sectional
data has been extensively studied, clustering of multimorbidity trajectories has received relatively less attention due to the complexity of the problem and the lack of quality data. This project aims to explore this area by developing novel machine learning methods, e.g., state space modelling, to understand and cluster trajectories of multimorbidity and assess the significance of these clusters in predictive adverse outcomes.

**Eligibility:**

We are specifically looking for applicants who will view their cutting-edge PhD research project in the context of the overall vision of the ACRC, who are keen to contribute to tackling a societal grand challenge and who can add unique value to – and derive great benefit from – training in a cohort comprising colleagues with a very diverse range of disciplines and backgrounds. We advise prospective candidates to engage in dialogue with the named project supervisor and/or the Director of the Academy prior to submitting an application.

**Recruitment:**

We are running a rolling recruitment process. Projects will be advertised until they are recruited to, and you are advised to apply as early as possible to maximise your chances.

You must read [How to apply](#) prior to application

Please [Apply here](#)

**Newcastle**

We encourage students on projects with a Newcastle supervisor to spend time with our academic partners in Newcastle University to access and benefit from their complementary world-leading, innovative and interdisciplinary research in ageing.

Short visits to Newcastle (say a few days to a small number of weeks) will be funded by the ACRC Academy, while for long visits (say over 6 months) the expectation would be for students to make their own arrangements from within their stipend.

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**References**

[3] 10.1371/journal.pone.0248844