Investigating people with multimorbidity to support unscheduled care in later life using machine learning based predictive models

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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

The project aims to develop, validate and disseminate machine learning based predictive models to support triage for people with multimorbidity presenting to unscheduled care services in later life.

Objectives

- Define target population with multimorbidity and identify specific a priori clusters of interest.
- Explore and compare the structure of multimorbidity in routine and administrative data (e.g., DataLoch, EAVE II) by conducting exploratory analysis of how multimorbidity appear in the data.
- Develop machine learning driven competing risk models for people with multimorbidity presenting to unscheduled care services (e.g., NHS24, GP out of hours, ambulance service, A&E) and predicting mortality, return to A&E or other unscheduled care within 7 days, hospital admission, length of hospital stay, or requirement of escalation to high-dependency care unit (HDU) or intensive care unit (ICU). Calibrate and adjust models in men and women and in specific multimorbid subgroups (both a priori defined and found in a data-driven manner).
- Validate the algorithm measurement using similar routine data (e.g., SAIL data).

Description

Multimorbidity is a key concept in population ageing and clinical practice. In the context of population ageing and resource constrained services, risk prediction tools have great potential to ensure the delivery of care in the most cost-effective way. Using statistics and machine learning, this project will conceptualise multimorbidity and build predictive models for competing
risks with key prediction outcomes such as mortality, return to unscheduled care, hospital admission, length of hospital stay, or requirement of escalation to high-dependency care unit or intensive care unit among people with multimorbidity presenting to unscheduled care in later life (e.g., NHS24, GP out of hours, ambulance service, A&E) using routinely linked health data.

**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:**

The current round of recruitment will end on 26 November. Thereafter, if places remain we will recruit on a rolling basis.

It is essential to read the How to Apply section of our website before you apply:

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