

Project Details	
Project Code	MRC21PHBr de Vocht
Title	Development of universal 'nowcasting' methodology to evaluate the impact of service interventions and transformations in the NHS
Research Theme	Population Health
Summary	This PhD is a unique opportunity to work with the Universities of Bristol and Bath and the regional NHS Modelling and Analytics Unit to apply state-of-the-art data science methodologies to develop an analytic framework for the routine evaluation of complex healthcare interventions. This ambitious project will include the development of promising methods and their use for 'real life' interventions, in order to facilitate implementation across the NHS.
Description	<p>The prognosis for UK healthcare systems will be poor if they are not able to balance the true cost-effectiveness of interventions against the opportunity cost of their implementation. Randomised controlled trials are not always feasible, practical, or desirable when it comes to evaluating complex health care interventions. Generally speaking, the current ability to reliably measure the efficacy of interventions is on the whole lacking within healthcare systems in the UK, and this is as a result of an inability to understand the counterfactual (i.e. if the intervention had not taken place). To be able to readily assess the efficacy of what could typically be a large number of interventions implemented at any one time, and avoid the need for time-consuming bespoke undertakings, a generic and re-useable methodology is needed. 'Nowcasting' is a methodology to obtain counterfactuals of the recent past, the current or the near future, and can be used to estimate the impact of interventions such as policy changes. However, the scope of the variety of available methods has not been thoroughly explored in these settings, and neither have any been routinely implemented. The proposed PhD is therefore a unique opportunity to apply state-of-the-art statistical and machine learning approaches to advance the data science capabilities across the interface between academia and the NHS. The resulting methodology will be designed to be re-useable across a variety of healthcare settings and systems to evaluate the effectiveness and impact of interventions. The proposed PhD project will consist of four phases: (1)</p> <p>Systematic Review (Yr 1). The student will conduct a systematic review regarding the use of nowcasting in healthcare research. A preliminary scoping search only identified 126 peer-reviewed publications in total and before any exclusions indicating there is an important research gap to address in the proposed PhD. (2)</p> <p>Methodological development (Yr 1-2). The student will devise the most promising statistical and machine learning (ML) methods (identified in phase 1 or new ML methods) to create counterfactuals for the evaluation of interventions. Their performance will be evaluated and compared using synthetic (artificial) data. (3) "Real world" exemplars (Yr 2-3). The methodological development in Yrs 1-2 then provides the unique opportunity to evaluate "real world" exemplar healthcare interventions. We envision that 2 exemplars will be selected with stakeholders in year 2/3 of the PhD based on their contemporary importance. Possible exemplars that are already available, and are likely still important in 2 years' time: a. Secondary care: As a result of</p>

	<p>the COVID-19 pandemic new counterfactuals will have to be developed from a new “baseline” to enable evaluation of interventions to, for example, reduce waiting lists and patient outcomes. b. Mental health: Mental health services will need to adjust the ways in which care is delivered. A business case is being written which will include service-level interventions planned for introduction in the coming years. c. Social care: As part of the recent successful south west Better Care Partnership application, there are efforts to model and improve the interaction between acute, community and social care. It will be important to understand the extent to which any associated interventions are working. (4) Implementation (Yr 3-3.5). The final part of the project will involve the development of a generic tool (likely in the R Shiny environment to facilitate implementation across the NHS) that can readily be applied to any intervention within any regional healthcare system. Addressing this challenge will be an exciting PhD opportunity offering high-quality healthcare data science doctoral training in cutting-edge methodologies. This body of research can have a significant impact on the way these evaluations are conducted across the NHS nationally in future.</p>
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