

THE UNIVERSITY OF MANCHESTER

PARTICULARS OF APPOINTMENT

FACULTY OF BIOLOGY, MEDICINE AND HEALTH

SCHOOL OF HEALTH SCIENCES

DIVISION OF POPULATION HEALTH, HEALTH SERVICES RESEARCH AND PRIMARY CARE

HEALTH DATA SCIENTIST (RESEARCH ASSOCIATE)

Vacancy ref: BMH-08580

Salary: Grade 6, £30,738 to £37,768 per annum,

Hours: 1 FTE

Duration: As soon as possible until 30th April 2018

Location: Oxford Road, Manchester

Responsible to: Matthew Sperrin

Enquiries about the vacancy, shortlisting and interviews: Matthew Sperrin, Lecturer in Health Data Science Email: <u>matthew.sperrin@manchester.ac.uk</u> Tel: 0161 306 7629

ROLE BACKGROUND

We are looking for a health data scientist with advanced knowledge and skills in statistical and machine learning methods for analysis of large health datasets to contribute to an extensive programme of research. Specifically you will have central role in the MRC-supported Health eResearch Centre (HeRC). You will be based at the University of Manchester in the Centre for Health Informatics (CHI) and will work alongside the Centres' internationally renowned academic staff.

The programme is delivering new methodology and applied research findings in five areas:

- Large scale modelling of preventive and early healthcare outcomes, exploiting the heterogeneity in data sources, and simulating policy scenarios;
- Building longitudinal models of managed self-care from patient reported data;
- Developing dynamic modelling approaches to clinical outcomes with cumulative data for healthcare quality improvement and clinical decision support;
- Hybrid bio-statistical and machine learning approaches to identifying latent classes of disease risk and treatment outcome; and
- Improved design and feasibility modelling for clinical trials.



The disease areas under investigation span cardiovascular, asthma & allergies, diabetes & obesity and cancer. Applied research has strong links to extant studies and teams. You will require a thorough understanding of statistical methods in health research. You will be self-motivated independent researcher, who sets for themselves the highest professional standards with the ability to manage a complex programme of work and collaborate with a multi-national team. This is an excellent opportunity to use and develop your skills, knowledge and experience to make a significant contribution to improving the health of the population and the efficacy of the health services. You will be based at the University of Manchester with occasional national and international travel. Further information on the University, faculty and department is at the end of the description.

Specific Projects:

You will drive innovation at the interface between biostatistics, machine learning, and software engineering. Working with clinical, IT and healthcare data experts the health data scientist will be to drive the modelling of health data using state-of-the-art methods from biostatistics and machine learning. The available data will include anonymised, linked extracts of primary and secondary care records. Using these data, flows of patients can be tracked across a health system. Analyses can then uncover deviations from agreed pathways of care and potential missed opportunities in patient management; for example, issues around safe prescribing of medication. Such data can also be used for predictive modelling, and there are opportunities to build on existing statistical methodology in order to embrace and exploit the complexity of the real-world data to improve outcome prediction.

Below we list some example projects that our group is currently involved with, that the successful applicant may work on. However, we have a wide range of projects in our portfolio so can flexibly accommodate the skills and interests of the postholder.

Safe Prescribing of Medication:

Certain medications may be contra-indicated in given populations, or may require high levels of patient monitoring when used. Examples of such hazards: prescribing beta blockers to patients with asthma, or failure to test thyroid function regularly in patients receiving amiodarone. Using linked primary and secondary data, we have developed a tool to identify such medication safety hazards.. We would like to evaluate the potential impact of such hazards: i.e. if the rate of such hazards were reduced, how many medication-related hospital admissions could be prevented? We are also developing and evaluating interventions (such as dashboards) aiming to reduce the prevalence of these hazards.

Dynamic and Longitudinal Approaches to Predictive Modelling:

Clinical predictive models are used across healthcare to aid in decision making, planning and audit; these are often based on simple logistic regression models using information about a patient at a fixed point in time. We are developing methodology to exploit the richer sources of data that are now available to us. For example:

- 1) Utilising longitudinal biomarker and risk factor information: can a model be improved by using the full history of risk factor changes over time?
- 2) Responding to emerging data in an on-line fashion: as health data becomes more 'connected' can our models respond dynamically to emerging trends in outcome rates, policy changes or secular trends?
- 3) Multiple outcomes and comorbidities: can we build joint, integrated models that consider multiple outcomes simultaneously (e.g. stroke, heart attack, onset of diabetes)?



JOB SPECIFICATION

Key responsibilities, accountabilities and duties:

- Expert statistical analyses to support and drive research outputs in the Centre for Health Informatics (CHI).
- Methodological and applied scientific excellence in support of CHI.
- Provide expert data analyses with a range of biomedical and healthcare problems and datasets.
- Contribute to the development and management of a world-renowned research capability focused on extracting knowledge from large repositories of anonymised healthcare data.
- Work with HeRC and CHI software engineers to embed frequently required analytical processes into the software and workflows.
- Prepare statistical training materials with the learning and development team.
- Work with clinical researchers affiliated to HeRC, and CHI to ensure scientific synergy, and good scientific practice.
- Contribute to the development and management of a scientific network to support and enhance HeRC and CHI objectives.
- Work with colleagues to promote HeRC research, including applying for new research projects and grants.
- Contribute to scientific goal-setting, and the development of scientific excellence.
- Ensure effective communication with the CHI and HeRC senior management teams.
- Contribute to communications with CHI, HeRC staff & affiliates, key stakeholders, opinionleaders, policy-makers, and public and patient interest groups, as required.

All posts are subject to a Criminal Records Bureau check

PERSON SPECIFICATION

Essential Knowledge, Skills and Experience:

- Previous relevant experience in academia or industry encompassing a strong mathematical element and significant statistical knowledge - preferably with experience in the analysis of complex healthcare problems and datasets.
- A PhD in Statistics, Machine Learning, or related fields; OR a higher degree in Statistics, Machine Learning, or related fields, with significant and relevant research/industry experience.
- A proven ability to work effectively within a team to achieve timely and valued objectives.
- Significant statistical modelling and programming experience.
- Demonstrable experience of balancing challenging workloads.
- Experience of publishing material in peer-reviewed journals

Desirable:

- Broad-based experience in:
 - o statistical and machine learning analyses of health, biological or social datasets
 - o epidemiological models and causal inference
 - o multi-level regression models
 - o training others in statistics and/or machine learning
- Excellent presentation skills.



- Ability to explain complex statistical issues to a non-statistical audience.
- Strong publication record.

The University of Manchester:

The University of Manchester is Britain's largest and most popular university, with a distinguished history of academic achievement and an ambitious agenda for the future. The University, with income in excess of £780 million, has four Nobel Prize winners amongst its current academic staff, and has embarked on an exciting and bold course which aims to make us one of the top 25 universities in the world, as set out in the University's strategic vision for 2020: <u>Strategic Vision 2020</u>.

The University of Manchester was established in 1824, bringing together The Victoria University of Manchester and UMIST to form The University of Manchester. It has an excellent track record in research, as demonstrated by a research power exceeded only by Oxbridge in the RAE 2008 and specifically by the award of two Nobel prizes in physics in 2010. The University's research strategy can be found via the following link: <u>UoM Research Strategy</u>.

The academic structure of The University of Manchester is made up of Faculties and Schools. There are four Faculties and further information about each Faculty and its related Schools can be found at <u>UoM Faculties and Schools</u>.

The Centre for Health Informatics:

The Centre for Health Informatics, led by Professor Iain Buchan, hosts a newly funded MRC HeRC, which is dedicated to world-leading research into innovative and trustworthy uses of health data. HeRC provides a centre of excellence for North England. The Centre is tasked to deliver advanced methodological research and innovation to harness health data; and to build capacity across Health Informatics. HeRC is a founding partner of The Farr Institute of Health Informatics which has been set up to create a physical and electronic environment to support UK wide collaboration across Health Informatics. It has also created an environment for industry and academia to collaborate over UK health data, methods and expertise in in a timely, cost effective and citizen-engaged way, benefiting the UK economy. The Centre runs a portfolio of research with over 20 projects/programmes with a value in excess of £40M.

The Centre is actively involved in delivering major initiatives including: NIHR programmes, covering the Greater Manchester Collaboration for Leadership in Applied Health Research and Care (CLARHC) and one of the two National Patient Safety Research Centres (Manchester Translational Research Centre for Primary Care Patient Safety: MATRiC-PCPS); large European programmes such as EHR4CR, EMIF and the EU data stewardship initiative; and transatlantic collaborations in Health Informatics.

The Greater Manchester Connected Health City:

The Greater Manchester Connected Health City (GM CHC), led by Dr Niels Peek, is part of a recent £20m investment from the Department of Health to seed learning health systems in North of England. Its aim is to pilot a data-intensive health service optimisation methodology and understand how this can work efficiently across a city region, delivering improved patient outcome as well as economic growth opportunities. The devolution of Health and Social Care across Greater Manchester creates a unique opportunity to use information to deliver more effective, efficient and equitable healthcare and to generate new economic activity across the region. The foundation of this is a cohesive informatics infrastructure that shares and links data,



enabling health and social care providers to coordinate their activities across the whole conurbation and enable engagement with its 2.8m citizens. The informatics infrastructure needs a corresponding data analytics capability that provides the methods and computing facilities that enable the transformation of data into knowledge that is appropriately actionable by professional users and citizens. The data analytics capability needs skilled health informatics professionals to generate insights and evidence from data.