

DIRAC AND NHS INNOVATION PLACEMENT: QUANTIFYING THE EFFECTIVENESS OF MEDICINES: LINKING HEALTH CARE OUTCOME DATA TO MEDICINE DATA

INFORMATION PACK

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In collaboration with the University of Liverpool, NHS England, and Health Data Research UK, DiRAC is pleased to invite applications for a 6-month Innovation Placement focusing on quantifying the effectiveness of medicines by linking health care outcome data to medicine data.

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Research Context



Research at University of Liverpool

Medicines are the most common intervention in human health. In the UK, £40 billion per annum is spent on medicines; however, it is not well-known whether these medicines are being used as intended or if they are having their intended effects. This is because health care outcome data is not routinely linked to medicines data, and medicines data is often siloed across primary, secondary, and specialist care.

To overcome this, we are working with partners such as NHS England (NHSE) and Health Data Research UK (HDRUK) to address these limitations by identifying and linking medicines and health care data. This work includes several work streams:

- > Identification of datasets and governance around their use.
- > Permissions and transfer of datasets into a secure data environment.
- > Curation of medicines data so they are available for healthcare and research use.
- > Linkage of medicines to primary and secondary health outcome data.
- > Analytics to support and understand medicines use in the clinical environment.

Advanced Data Capabilities

As a student or early-career researcher, you will gain the following experience in:

- > **Data Management:** Curating medicines data for use in healthcare and research.
- > **Data Governance:** Identifying datasets and understanding governance protocols.
- > **Data Security:** Ensuring permissions and transfer of datasets into a secure data environment.
- > **Data Linkage:** Linking medicines data to primary and secondary healthcare outcome data.
- > **Data Analytics:** Analysing data to support medicines use in clinical environments.
- > **Data Visualisation and Alerts:** Setting up dashboards to inform clinicians and healthcare professionals.

Academic Expertise & Industry Experience

Experience will be gained by working closely with Professor Sofat's team, which includes clinical professionals, healthcare experts, IT specialists, and data scientists. Supervisory support will also come from Professor Jeremy Yates and Dr. Maria Marcha from DiRAC, particularly in data science and machine learning.

The project will be managed via weekly supervisor meetings and monthly group meetings. A day-to-day supervisor will also be assigned to provide continuous support.

Participation in System Change

- > Develop general and disease-specific dashboards to determine how and where medicines are being used, stratifying data by demographic characteristics.
- > Create dynamic analytics that assess new patients on clinical pathways, integrating medicines changes between primary and secondary care.

Placement Details

Location: Liverpool (remote work possible)
Proposed start: January 2025

The team includes experts in medicines, physicians, pharmacists, nurses, health data science, epidemiology, software engineering, and data management. The extended team also includes statistical expertise.

The Project:

- > Creation of dashboards (general and disease-specific) to determine how and where medicines are being used, with the ability to stratify by demographic characteristics.
- > Use advanced methods to assess how changes in the use of medicines occur through a patient's treatment period and how patterns of common and rare medicines evolve.
- > Develop clinical decision support tools using rule-based and advanced analytics.

Responsibilities

The candidate is expected to be an active member of the team, engaging in the use of advanced methods to assess how patterns in the use of medicines evolve over time for patients, focusing on common and rare medicines.

With support from the team, the candidate will be expected to produce work of sufficient quality that it will be suitable for publication in peer-reviewed journals. This will also form the basis of the report submitted at the end of the placement.

Final Digital Asset

- > Creation of dashboards (general and disease-specific) to assess how and where medicines are being used, with the ability to stratify by demographic characteristics.
- > Dynamically assess new starters on a given clinical pathway, integrating and determining medicines changes as transfers occur between primary and secondary care.
- > Use advanced methods to assess how changes in the use of medicines occur over a patient's treatment period, and how patterns of common and rare medicines evolve.
- > Detect latent effects of medicines on disease physiological parameters.
- > Create clinical decision support tools using both rule-based and advanced analytics, including foundational models.

Applicant Profile, Skills & Experience

We are looking for individuals with:

- > Strong understanding of data structures and data modeling
- Experience in data science and machine learning
- > Advanced coding skills (Python and other languages) and application of these to real-world problems
- > Good working knowledge of databases, particularly SQL

Equality, Inclusion & Diversity

The NHS welcomes applications from all. All applicants will receive consideration without regard to race, national origin, gender, age, religion, disability, or any other category protected by law.

DiRAC HPC

62% of employers deem relevant work experience of significant or critical importance when searching for new recruits (UK Department for Education, Employer Skills Survey 2022)

About DiRAC

Established in 2009, DiRAC provides high performance computing (HPC) services to the UK's Scientific Research Communities in theoretical cosmology, nuclear physics, astrophysics, particle physics, and solar and planetary science. DiRAC is funded by the Science and Technology Facilities Council (STFC), part of UK Research and Innovation (UKRI). To date, capital funding for DiRAC systems has been provided by the Department for Business Innovation and Skills (BIS), the Department for Business, Energy and Industrial Strategy (BEIS), STFC and UKRI. UKRI is now part of the Department of Science Innovation and Technology (DSIT). DiRAC operations are funded by STFC.



We host three HPC services: the Extreme Scaling Service, the Memory Intensive Service, and the Data Intensive Service, with each tailored to the specific types of computational workflows needed to deliver our Science Programme. Innovation is a key part of DiRAC's activities and all our services are co-designed in collaboration with our research community, our technical and software engineering teams, and our vendor partners.

Innovation Placements

DiRAC Innovation Placements provide a superb opportunity for doctoral students and early career researchers to collaborate with industry leaders on cutting-edge research projects of mutual benefit. Projects take place over six months and address current challenges with innovative, state-of-the-art solutions, ensuring that the research is relevant and impactful for both parties.

Innovation Placements offer a unique opportunity for researchers to bridge the gap between academia and industry, contribute to impactful research, and gain practical experience in the commercial sector.

Benefits to student/ECR

- > **Practical Experience:** A placement allows you to apply theoretical knowledge in a real-world setting, enhancing your understanding of how your research can impact industry.
- > **Skill Development:** You can develop valuable skills critical to your professional development, such as project management, teamwork, and communication in a corporate environment.
- > **Enhance your Research:** Exposure to industry challenges can inspire new thinking, reasoning, and innovative approaches to your research, potentially leading to impactful findings.

Benefits to Career

- > **Improved Employability:** Experience in an industrial setting will enhance your CV, making you more attractive to employers in both academic and non-academic fields.
- > **Confidence Building:** Navigating a professional environment will build your confidence in your abilities and prepare you for future workplace challenges.
- > **Career Exploration:** It provides insight into different career paths outside academia, helping you make informed decisions about your future.
- > **Networking Opportunities:** Placements facilitate connections with industry professionals, which can lead to collaborations, mentorship, and future job opportunities.

How to apply

Download and complete the application form, which is available on our website, dirac.ac.uk/innovation-placements, or by following the QR code below, and return to us via email at:



DiRAC_placements@leicester.ac.uk

Deadline for applications is 23:59 on 20th November 2024

Placement Stipulations

Placements are open to PhD students and early career researchers, and are fully funded but you must get your supervisor or PI's permission before applying – under UKRI rules participation in the scheme is only allowed with their consent.

The successful candidate will remain based at their home university. We do our best to offer flexibility; part-time working can be arranged as long as the placement does not exceed 1 year.

