



British Heart Foundation Data Science Centre

Led by Health Data Research UK



HDRUK
Health Data Research UK

The Challenge

Recent decades have brought increasingly deep mechanistic understanding, reductions in age-specific incidence and mortality, and advances in the acute management and prevention of ischaemic heart disease, stroke and other cardiovascular diseases. However, these conditions still remain the world's leading causes of death as well as major global causes of disability, reduced quality of life and economic burden.

Major challenges persist for the prediction, prevention and treatment of cardiovascular diseases at population and individual level. These include rapid population ageing, major shifts in known risk factors (for example, decreasing smoking rates accompanied by increasing socioeconomic disparities, obesity, diabetes, air pollution exposure and multi-morbidity) and the emergence of new threats, such as the COVID-19 pandemic.





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The Opportunity

Large scale, data-driven approaches provide significant opportunities to address these challenges in the UK and beyond. The increasing availability of multimodal data, from large scale ‘real world’ sources and from population- and disease-based research cohorts, is a critical ingredient.

The UK has some of the richest cardiovascular health data assets in the world, in particular those arising from National Health Service (NHS) activity among its population of 68 million people. Several health datasets (such as mortality and hospital data as well as specialist cardiovascular registries) are collated nationally. However, the capability to link these to each other and to other research resources (e.g., major cohorts such as UK Biobank) at speed and scale, and to use them in novel research and innovation settings, including streamlined clinical trials, is currently limited. At the same time, datasets of potentially great value have been under-exploited, mainly because of the need for coordinated, UK-wide approaches to unearth and curate these and to enable broad, secure access.

Establishing the BHF Data Science Centre

Strategic discussions between the British Heart Foundation (BHF), leaders from across the spectrum of UK cardiovascular research, health care data custodians across all four UK nations and other key stakeholders led to a proposal for a new ‘BHF Cardiovascular Knowledge Hub’ to be embedded within Health Data Research UK (HDR UK), the UK’s national institute for health data science. In June 2019, the BHF approved an initial award to HDR UK of £10M over five years to establish the BHF Data Science Centre.

The centre’s inaugural director (Prof Cathie Sudlow) took up her post in January 2020, appointing several core staff to work with her on engaging with multiple stakeholders across the UK, setting priorities, and developing and implementing the centre’s strategy.

Vision

The centre's vision is to improve the public's cardiovascular health through the power of large-scale data and advanced analytics across the UK.

It is working with a wide range of partners to deliver this by enabling better, faster, more efficient, cost-effective, ethical, safe and scientifically robust data-driven cardiovascular research and innovation at UK-wide scale. A key goal is to ensure that bona fide researchers UK-wide (including from the NHS, academia and industry) can discover, access and analyse national healthcare data relevant to a wide range of cardiovascular research questions.

The centre's ambitions are to:

- **Drive a step change** in the UK's capability and capacity as a world-leading environment for large scale, data-driven cardiovascular research and innovation, attracting increasing investment from industry, charities, philanthropists and others
- **Advance understanding** of the causes, prevention and treatment of diseases of the heart and circulation
- **Catalyse major improvements** in the public's cardiovascular health and in quality of care and outcomes for millions of patients with cardiovascular diseases in the UK and worldwide.



Aims

The specific aims of the centre:

- **Create a centre of interdisciplinary expertise** that provides national research capability in cardiovascular data science
- **Create strong and durable partnerships with the NHS**, incorporating cardiovascular research expertise across the UK and acting as a UK-wide resource to support numerous future studies using electronic health records (EHRs) linked to a range of other multi-dimensional cardiovascular datasets
- **Engage with patients, the public and practitioners** through partnership with the BHF and other bodies to deliver a transparent and publicly acceptable approach to the governance of health data research within the cardiovascular research domain
- **Create and foster international partnerships** that enable the UK cardiovascular research community to engage with, contribute to and lead data-enabled cardiovascular research at international scale.

Strategy

Following extensive engagement with key stakeholders, the centre proposes to focus on six thematic areas:

- 1. Better use of nationally-collated, structured, coded data:** accessing, improving and using linked, national, population-wide health data.
- 2. Better use of unstructured data:** addressing the challenges of accessing, improving and using unstructured data, for example from cardiac and brain imaging, medical free text and electrocardiograms.
- 3. Personal monitoring data:** exploring how data from apps and wearables, linked to other health datasets, can inform trajectories of cardiovascular health and disease.
- 4. Computable cardiovascular phenotypes:** developing methods to define cardiovascular health and disease in computable form through a collaborative network of expertise that provides a world-leading, open, cardiovascular phenotype library of tools and protocols to enable UK and international scale collaboration.
- 5. Enhancing cohorts:** facilitating the linkage of large, 'omics-rich' cohorts to electronic health records to better understand the causes of cardiovascular diseases.
- 6. Streamlined, data-enabled clinical trials:** developing platforms for efficient, cost-effective trials, using routine health data to recruit and follow patients with cardiovascular conditions.

These thematic areas will be underpinned by centre-led **coordination and engagement**, by exemplar **driver projects** that will demonstrate their impact, and by a **talent and training** programme for PhD students and research fellows that will build capacity and capability across the UK.



The centre's integration within HDR UK enables it to interact directly with and benefit from HDR UK's:

- Core activities and infrastructures for uniting, improving and using UK health data at scale;
- Key national scientific priority programmes in advanced analytics, the human genome, understanding causes of disease, data-enabled clinical trials, improving public health and better care; and
- Domain specific activities delivered through its hub programme.



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www.hdruk.ac.uk/help-with-your-data/bhf-data-science-centre