British Heart Foundation Data Science Centre
Led by Health Data Research UK

BHF Data Science Centre: CVD-COVID-UK / COVID-IMPACT Project Proposal Form

Project reference:	CCU049
Project title:	Healthcare utilisation in individuals with Long Covid
Proposal version:	1.1
Start date (best estimate):	30/06/2022
End date (best estimate)[1]:	30/04/2023
Named project lead and institution/organisation:	Amitava Banerjee, UCL

Plain English summary
Approx. 200 words[2] overall to succinctly summarise the project in language suitable for a non-specialist lay public.[3] This summary should be written using the headings below for clarity, with approximately one paragraph for each heading.

Most analysis on how people use healthcare services is a 'rear-view mirror sport', meaning that analysis is performed after the event. We aim to change it to more of a 'through-the-windscreen sport' to demonstrate healthcare utilisation and how we can better plan during pandemics. In this project, we seize the rare opportunity to look at healthcare utilisation of individuals with Long Covid, a new syndrome that originated from the COVID-19 pandemic.

This project addresses two challenges we face in Long Covid research:

1. Identifying Long Covid patients using data from electronic health records (EHR) is difficult, as less than 2% of COVID-19 patients are recorded as having a 'post-Covid condition'. The scale is likely higher, based on an Office for National Statistics (ONS) estimate that around 12% of COVID-19 patients developed Long Covid. Therefore, we need to find a better way of identifying patients with Long Covid.
2. We know little about current healthcare utilisation in individuals with Long Covid, despite the number of COVID-19 patients estimated to have developed it, or the expected added pressure this might have on healthcare services over time. More importantly, we are unaware whether the current practice for Long Covid is the best option. This information is crucial for funding allocations, public policies and healthcare practice.

To address these problems, we will first try to identify individuals with Long Covid and explore their use of healthcare, by linking and analysing a range of EHRs, to try to help the NHS or healthcare providers plan more efficiently. We will also study the impact of the vaccination programme on healthcare utilisation in individuals with Long Covid and how this changes over different waves of the COVID-19 pandemic.

Although this project will not only focus on cardiovascular disease, it is of interest as it can act as both a risk factor and outcome of Long Covid. We will compare how people with pre-existing

[1] Current approvals extend for about three years from June 2020, although we envisage that we should be able to extend these for some projects looking at longer term outcomes, if needed.

[2] Word counts are only a guide and can be exceeded, if necessary.

[3] Your plain English summary will appear on the BHF Data Science Centre CVD-COVID-UK / COVID-IMPACT webpages. Please use the sort of language you might use to describe your project to a non-specialist friend, relative or journalist. Please avoid using technical jargon and aim to keep sentences short for ease and clarity of reading.

cardiovascular disease and those who developed cardiovascular disease post-COVID use cardiovascular services. We will also compare the healthcare utilisation of individuals with and without cardiovascular disease.

This project will also evaluate the effectiveness and cost-effectiveness of current care for those with Long Covid, which will help to identify any inefficiency in Long Covid care, provide better support to patients, and inform policy and resource allocation.

Understanding current care for Long Covid will facilitate improvements in care and allow comparisons between different care pathways. Since the first wave of the pandemic, individuals with Long Covid have raised issues about being bounced around the system, for example, to have their breathlessness and brain fog checked. The idea of having an integrated care pathway (ICP) for Long Covid, the core of this project, originates from and is informed by patient experience.

Background
Approx. 300 words[2] summarising why the question(s) you are addressing matter, and how your project fits within the broad scope of CVD-COVID-UK / COVID-IMPACT

Long Covid is estimated to have a substantial population burden, with 2 million people affected in the UK. Even in non-hospitalised individuals, up to 12% of people with COVID-19 may have persistent symptoms, suggesting major healthcare and economic burden.

Long Covid spans multiple healthcare challenges, particularly delivering sustainable, high-quality care for multimorbidity and long-term conditions (LTCs). There are inequalities in health, access to healthcare; incomplete pathways across the community and hospital care; inadequate research translation to practice; and insufficient resources. Integrated care pathways (ICPs) are structured multidisciplinary care plans of essential steps in the care of specific conditions. An effective and deliverable ICP for long Covid could reduce direct and indirect pandemic effects and improve LTC care beyond COVID-19. Long Covid services were initiated while research was, and is still, defining the disease, and guidelines are developing in the absence of evidence. An ICP approach offers coordination across specialities, investigation, treatment and rehabilitation, as well as opportunities for real-time iterative improvements in service design and delivery.

Long Covid is an umbrella term likely to include multiple conditions. The “syndemic” of COVID-19 (convergence of infectious disease, under-treated non-communicable diseases and social, geographical and economic determinants of health) necessitates ICP strategies, which could inform other LTCs. Predictors of poor acute COVID-19 outcomes are established, but epidemiology, clinical trajectory, healthcare utilisation and effectiveness of current care for Long Covid are unknown.

Among all the related diseases of COVID-19, there is considerable evidence that cardiovascular diseases are a main risk factor for poor COVID outcomes. Evidence also suggests that development of cardiovascular disease is a common symptom associated with long COVID.

Research question(s)

We will explore the healthcare utilisation due to Long Covid, from which we will find out the effectiveness and cost-effectiveness of current care for Long Covid.

1. *Healthcare utilisation:* What is the current healthcare utilisation of individuals with Long Covid (including primary care, admitted patient care, outpatient visits, critical care, emergency, procedures, tests and medication)? And what is the difference in utilisation between individuals with cardiovascular disease (pre-COVID and post-COVID) and those without cardiovascular disease.
2. *Trajectory*: What are the trajectories of Long Covid patients? In people with Long Covid who develop cardiovascular disease, what is the difference in trajectory compared with those who did not develop cardiovascular disease?
3. *Effectiveness*: Could current care for Long Covid effectively alleviate or resolve Long Covid symptoms? Does it equally effective between people with cardiovascular disease and those without cardiovascular disease?
4. *Cost-effectiveness*: Is current care for Long Covid cost-effective compared with alternative care? (e.g., compared to the trial in the STIMULATE-ICP, a nationally funded Long COVID research programme) Is there any difference in cost-effectiveness between people with cardiovascular disease and those without cardiovascular disease?

Patient/public contributor involvement

The BHF DSC works with patients and the public to ensure transparency, and to build trust in the use of health data for research. Please complete the relevant section below, to indicate your plans for involving patient/public contributors throughout your project.

Please contact bhfdsc@hdruk.ac.uk if you would welcome an initial conversation with the BHF DSC team and patient/public contributors, or any other support regarding patient/public contributor involvement in your project.

The research team **has** consulted with the public/patients on plans for this project.

STIMULATE-ICP (**S**ymptoms, **T**rajectory, **I**nequalities and **M**anagement: **U**nderstanding **L**ong **C**ovid to **A**ddress and **T**ransform **E**xisting **I**ntegrated **C**are **P**athways) is a national, urgent public health priority research programme to study the epidemiology and the management of Long Covid at scale. It has been enriched by the robust patient and public involvement and engagement (PPIE). Institutions and collaborators have established PPIE systems that will be involved throughout. The proposal has been informed by existing engagements with patients in research, clinical practice, policy, and lived experience or through organisations, such as Long Covid SOS and UK Doctors #Longcovid. Patients have been central in setting research questions, designing, writing and organisation, including focusing on care pathways, improved diagnostics and health inequalities.

Lyth Hishmeh (Long COVID SOS), Dr Emily Attree (UK Doctors #LongCovid), Dr Nisreen Alwan (University of Southampton), Mr Lere Fisher and Miss Jasmine Hayer are co-investigators with lived experience. They have informed us of policy developments, whether nationally (UK Doctors #LongCovid has contributed to the development of NICE guidance and published a research manifesto(51) or internationally (Hishmeh spoke at the United Nations: https://www.courthousenews.com/in-plea-to-keep-fighting-virus-un-agency-warns-oflong-covid/). We have also had input from Survivor Corps and Long COVID Wales.

Each of our work packages has a PPIE co-lead, alongside clinical and academic co-leads, and PPIE will feature in our regular management and oversight meetings. In this project, PPIE will inform the patient and service outcome evaluation, and the selection of other long-term conditions for comparison. Public and patients will be involved in other stakeholder engagement and our ultimate policy recommendation including our dissemination plans. Our team is supporting patient organisations in the press and public relations and providing training through UCL "Community for Engagers" for patient representatives. PPIE has been funded in line with NIHR guidance (https://www.nihr.ac.uk/documents/payment-guidance-for-researchers-and-professionals/27392).

Examples of PPIE involvement which has informed this Long Covid research include the aim of effectiveness and cost effectiveness of current care, and investigating the impact of different definitions of Long Covid, based on duration of symptoms and other characteristics.

Methods
*Provide a **brief overview** of methods to be used - a detailed plan is not required.*
Please also complete the table on the next page for information on TRE(s), datasets and years of data required and the analyst(s) who you propose will work with the data in the TRE(s)

The first step is to identify individuals with Long Covid in TRE datasets. We will identify people with Long Covid based on phenotype extraction, time duration of healthcare resource utilisation after infecting SARS-CoV-2, diagnosis of Long Covid related conditions, and, perhaps the most challenging one, the symptoms and signs of Long Covid. We may find a portion of individuals with Long Covid using each method, however, to find a more complete group of people with Long Covid, we need to combine the findings from each method, and sometimes make adjustments to the search criteria. For example, we may use 12-36 weeks after SARS-CoV-2 infection rather than 12-24 weeks as the time duration of healthcare resource utilisation.

Once we have identified Long Covid patients, we will use propensity score matching (based on age, gender, ethnicity and pre-existing conditions) to find three different control groups:

1. Individuals with COVID-19 who did not develop Long Covid (this is to find out the difference due to developing Long Covid from COVID-19);
2. Pre-pandemic controls matched by age and sex: this historic control population will allow us to find out the difference between Long Covid patients and people who have never been infected with SARS-CoV-2);
3. People who have never been infected with SARS-CoV-2: contemporary control (this is to find out the difference between Long Covid patients and people who have never been infected with SARS-CoV-2).

By comparing individuals with Long Covid with these three control groups separately, we can find out the extra healthcare utilisation (including primary care, admitted patient care, outpatient visits, procedures, prescriptions or dispensed medication) that people with Long Covid incur. After calculating the cost following the National Reference cost, we will find out the cost of Long Covid. By combining the outcomes for individuals with Long Covid(e.g. recovery) with the cost, we will be able to calculate the cost-effectiveness of current care. To further explore cardiovascular disease, we will compare the difference in the results between people with cardiovascular disease (pre- and post-COVID) and people without cardiovascular disease.

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Trusted Research Environments (TRE)
England: NHS Digital TRE for England
Scotland: Scottish National Data Safe Haven *(for more information, view the COVID-19 Research Database Dataset and Variable Specification)*
Wales: Secure Anonymised Information Linkage Databank (SAIL)
Northern Ireland: Northern Ireland Honest Broker Service

***** FOR COVID-IMPACT[4] PROJECTS, PLEASE COMPLETE THE ANALYST AND DATA SOURCE DETAILS FOR ENGLAND ONLY *****

DATA ANALYSTS

	PLEASE COMPLETE THIS COLUMN
TRE	**Analyst(s) requiring TRE access – please provide name, institution, and email if not already in the consortium**
England	Yi Mu (funded by STIMULATE-ICP), Ashkan Dashtban (funded by STIMULATE-ICP), Mohamed Mohamed (funded Clinical lecturer), Chris Tomlinson, Ana-Caterina Pinho-Gomes (funded Clinical Lecturer), Mehrdad Mizani (BHF DSC)
Scotland	As above
Wales	As above
Northern Ireland	

DATA SOURCES

						PLEASE COMPLETE THESE COLUMNS		
TRE	**Category**	**Dataset Name**	**Year data available from**	**Time lag**	**Available in TRE**	**Required (X)**	**Years of data required (ALL or range)**	**Brief justification of why you need each dataset / date range**
England	Primary care	GDPPR: GPES Data for Pandemic Planning and Research	From the start of each individual's records[5]		Yes	X	ALL	To identify Long Covid patients using conditions, durations and phenotypes, describe healthcare utilisation in primary care

[4] COVID-related research projects not directly linked to cardiovascular disease

[5] Includes patients with active, current registrations at participating practices and deceased patients with a date of death on or after 1 November 2019. Note: prescriptions and numeric values (e.g. BP, laboratory test results) only go back two years.

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England	Secondary care	HES: Hospital Episode Statistics **- Admitted Patient Care**	1997		Yes	X	ALL	To identify Long Covid patients using conditions, durations and phenotypes, describe healthcare utilisation in Admitted Patient Care
England	Secondary care	**- Adult Critical Care**	2013		Yes	X	ALL	To identify Long Covid patients using conditions, durations and phenotypes, describe healthcare utilisation in Adult Critical Care
England	Secondary care	**- Outpatients**	2019		Yes	X	ALL	To identify Long Covid patients using conditions, durations and phenotypes, describe healthcare utilisation in Outpatients
England	Secondary care	**- Accident & Emergency**	2007		Yes	X	ALL	To identify Long Covid patients using conditions, durations and phenotypes, describe healthcare utilisation in Accident & Emergency
England	Secondary care	SUS: Secondary Uses Service	2019 / earlier		Yes	X	ALL	To identify Long Covid patients using conditions, durations and phenotypes, describe healthcare utilisation
England	Secondary care	**SUS/Uncurated Low Latency Hospital Data (Admitted Patient Care, Outpatients, Critical Care)**			Yes	X	ALL	To identify Long Covid patients using conditions, durations and phenotypes, describe healthcare utilisation
England	Secondary care	Emergency Care Data Set (ECDS)			Expected TBC	X	ALL	To look at healthcare utilisation of Long Covid patients
England	COVID testing	COVID-19 SGSS: Second Generation Surveillance System[6]	From start of records (2020)		Yes	X	ALL	To identify Covid patients (as control group)
England	COVID testing	Pillar 2 Antigen	April 2020		Yes	X	ALL	To identify Covid patients (as control group)
England	COVID testing	Pillar 3 Antibody	September 2020		Yes	X	ALL	To identify Covid patients (as control group)

[6] Pillar 1 and 2 positive tests

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England	COVID testing	**Variant strain data (COG-UK)**			Expected TBC	TBC		
England	COVID vaccinations	**Vaccination Status**	December 2020		Yes	X	ALL	To explore whether vaccination could potentially reduce healthcare utilisation by Long Covid patients
England	COVID vaccinations	**Vaccination Adverse Reactions**	December 2020		Yes	X	ALL	To explore whether vaccination could potentially reduce healthcare utilisation by Long Covid patients
England	Deaths	**Civil Registration – Deaths** (ONS guidance / NHSD mortality data review)	1993		Yes	X	ALL	To find out the effectiveness/outcome of current care for Long Covid
England	ITU	**ICNARC: Intensive Care National Audit and Research Centre**			Yes	X	ALL	To identify Long Covid patients and describe healthcare utilisation in intensive care
England	ITU/HDU admissions	**COVID-19 SARI-Watch (formerly CHESS: COVID-19 Hospitalisation in England Surveillance System)**	From start of records (2020)		Yes	X	ALL	To identify Long Covid patients and describe healthcare utilisation in intensive care
England	Prescribing/ dispensing	**Medicines Dispensed in Primary Care (NHS BSA)**	April 2015		Yes	X	ALL	To describe medicines given to Long Covid patients in primary care
England	Prescribing/ dispensing	**Secondary Care Prescribed Medicines (EPMA)**			Yes	X	ALL	To describe medicines given to Long Covid patients in secondary care
England	NICOR CVD audits	**NICOR – MINAP: Myocardial Ischaemia National Audit Project**			Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
England	NICOR CVD audits	**NICOR – PCI: Percutaneous Coronary Interventions**			Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
England	NICOR CVD audits	**NICOR – NHFA: National Heart Failure Audit**			Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
England	NICOR CVD audits	**NICOR – NACSA: National Adult Cardiac Surgery Audit**			Expected TBC	X	ALL	To look at healthcare utilisation of Long Covid patients
England	NICOR CVD audits	**NICOR – NACRM: National Audit of Cardiac Rhythm Management**			Expected TBC	X	ALL	To look at healthcare utilisation of Long Covid patients
England	NICOR CVD audits	**NICOR – NCHDA: National Congenital Heart Disease Audit**			Yes	X	ALL	To look at healthcare utilisation of Long Covid patients

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England	NICOR CVD audits	**NICOR – TAVI: Transcatheter Aortic Valve Implantation**			Expected TBC	X	ALL	To look at healthcare utilisation of Long Covid patients
England	Stroke audit	**SSNAP: Sentinel Stroke National Audit Programme**			Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
England	National Vascular Registry	**National Vascular Registry Audit**			Expected TBC	X	ALL	To look at healthcare utilisation of Long Covid patients
England	Other	Diagnostic Imaging Dataset			Expected TBC	X	ALL	To look at healthcare utilisation of Long Covid patients
England	Other	Improving Access to Psychological Therapies (IAPT)	April 2012		Expected TBC	X	ALL	To look at healthcare utilisation of Long Covid patients
England	Other	Maternity Services Data Set			Expected TBC			
England	Other	Mental Health Services Data Set			Expected TBC	X	ALL	To look at healthcare utilisation of Long Covid patients
England	Other	**Mental Health of Children and Young People**			Expected TBC			
England	Other	Patient Reported Outcome Measures (PROMs)			Expected TBC	X	ALL	To look at healthcare utilisation of Long Covid patients
Scotland	Primary care	Primary care[7]			Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Scotland	Secondary care	Outpatient Appointments and Attendances - Scottish Morbidity Record (SMR00)	1997		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Scotland	Secondary care	General Acute Inpatient and Day Case - Scottish Morbidity Record (SMR01)	1997		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Scotland	Secondary care	Accident & Emergency	2007		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients

[7] Data provided comprises a single cut of the data as at June 2020 with no current updates. Based on data used in the EAVEII project.

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Scotland	COVID testing	**COVID-19 laboratory and lighthouse testing (ECOSS)**[8]	From start of records (2020)		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Scotland	COVID testing	**Covid Tests**[9]			Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Scotland	COVID testing	**Variant strain data (COG-UK)**			Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Scotland	COVID vaccinations	**Vaccination data**			Yes	X	ALL	To look at healthcare utilisation of Long Covid patients, and to address potential heterogeneity in healthcare utilisation between vaccinated patients and non vaccinated patients
Scotland	Deaths	**Deaths**			Yes	X	ALL	To look at outcomes of Long Covid patients
Scotland	ITU	**Intensive care data - Daily (SICSAG)**[10]			Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Scotland	ITU	**Intensive care data - Episodes (SICSAG)**[11]			Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Scotland	Prescribing/ dispensing	**Dispensed/Prescribed/Paid (Prescribing Information System)**	2015		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Scotland	Stroke audit	**Scottish Stroke Care Audit**	TBC		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients, and to analyse patient healthcare utilisation based on their existing conditions
Scotland	Other	**Diabetes covariates**			Yes	X	ALL	To look at healthcare utilisation of Long Covid patients, and to analyse patient healthcare utilisation based on their existing conditions

[8] Contains the first positive test result per person or earliest test result if they have never tested positive (dataset not updated after August 2021 – replaced by Covid Tests)
[9] Contains all test results (positive and negative) and replaced the ECOSS dataset from August 2021.
[10] Additional approval process required for this dataset.
[11] Additional approval process required for this dataset.

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Scotland	Other	**Scottish Renal Registry**[12]	2019		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients, and to analyse patient healthcare utilisation based on their existing conditions
Wales	Primary care	**GPCD: Welsh Longitudinal General Practice (Daily COVID codes only)**	2020		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Wales	Primary care	WLGP: Welsh Longitudinal General Practice	2000		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Wales	Secondary care	CCDS: Critical Care Dataset	2007		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Wales	Secondary care	EDDD: Emergency Department Dataset Daily	2010		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Wales	Secondary care	EDDS: Emergency Department Dataset	2009		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Wales	Secondary care	OPDW: Outpatient Dataset for Wales	2004		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Wales	Secondary care	OPRD: Outpatient Referral Dataset	2009		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Wales	Secondary care	PEDW: Patient Episode Dataset for Wales	1995		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Wales	COVID testing	PATD: COVID-19 Test Results (Laboratory Information Management System [Pillar 1&2 NHS/Lighthouse Labs Results & Pillar 3 Antibody Results])	March 2020		Yes	X	ALL	To identify COVID-19 patients, then from this cohort, identify Long Covid patients
Wales	COVID testing	CTTP: COVID-19 Test, Trace and Protect			Yes	X	ALL	To identify COVID-19 patients, then from this cohort, identify Long Covid patients
Wales	COVID testing	CVSP: COVID-19 Shielded People List	May 2020		Yes	X	ALL	To identify COVID-19 patients, then from this cohort, identify Long Covid patients

[12] Contains data to identify patients receiving hospital based renal replacement therapy – haemodialysis – only (from January 2019).

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Wales	COVID testing	**CVSD: COVID-19 Sequence Data**[13]			Yes	X	ALL	To identify COVID-19 patients, then from this cohort, identify Long Covid patients
Wales	COVID vaccinations	**CVVD: Covid Vaccination Dataset**			Yes	X	ALL	To look at healthcare utilisation of Long Covid patients, and to address potential heterogeneity in healthcare utilisation between vaccinated patients and non vaccinated patients
Wales	Deaths	**ADDD: Annual District Death Daily (ONS Deaths)**	2016		Yes	X	ALL	To look at outcomes of Long Covid patients
Wales	Deaths	**ADDE: Annual District Death Extract (ONS Deaths)**	1996		Yes	X	ALL	To look at outcomes of Long Covid patients
Wales	Deaths	**CDDS: COVID-19 Consolidated Deaths**	2019		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Wales	ITU	**ICCD: ICNARC – Intensive Care National Audit & Research Centre *(COVID-19 only admissions)***	March 2020		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Wales	ITU	**ICNC: ICNARC – Intensive Care National Audit & Research Centre *(All admissions)***			Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Wales	Prescribing/ Dispensing	**WDDS: Wales Dispensing Dataset**	2015		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Wales	NICOR CVD audits	**NICO: NICOR Audits and Registers**			Expected TBC			
Wales	Stroke audit	**HQIP: HQIP Stroke Audit**			Expected TBC			
Wales	National Vascular Registry	**NVR: National Vascular Registry**			Expected TBC			
Wales	Other	**ADBE: Annual District Birth Extract**	1996		Yes	X	ALL	To identify newborns in the dataset, which allows us to look at heterogeneity in healthcare utilisation of Long Covid patients

[13] Additional approval process required for this dataset

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Wales	Other	MIDS: Maternity Indicators Dataset	2014		Yes	X	ALL	To identify pregnant women and newborns in the dataset, which allows us to look at heterogeneity in healthcare utilisation of Long Covid patients
Wales	Other	NCCH: National Community Child Health			Yes	X	ALL	To identify children and their medical hisotry in the dataset, which allows us to look at heterogeneity in healthcare utilisation of Long Covid patients
Wales	Other	CARE: Care Homes Index	2018		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Wales	Other	CARS: (CARIS – Congenital Anomaly Register and Information Service)	1998	1-2 months	Yes	X	ALL	To identify individuals with congenital anomaly, which allows us to look at heterogeneity in healthcare utilisation of Long Covid patients
Wales	Other	CENW: Office of National Statistics Census (2011)[14]	March 2011 only		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Wales	Other	RTTD: Referral to Treatment Times	2012		Yes	X	ALL	To look at how waiting time from referral to hospital admission could affect healthcare utilisation of Long Covid patients
Wales	Other	SDEC: SAIL Dementia e-Cohort	March 2019		Yes	X	ALL	To identify individuals with dementia, which allows us to look at heterogeneity in healthcare utilisation of Long Covid patients
Wales	Other	WASD: Welsh Ambulance Services NHS Trust	2013		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Wales	Other	WDSD: Welsh Demographic Service Dataset	1990		Yes	X	ALL	To look at healthcare utilisation of Long Covid patients
Wales	Other	WRRS: Welsh Results Reporting Service			Yes	X	ALL	To look at healthcare utilisation of Long Covid patients

[14] Additional approval process required for this dataset (4-6 week lead time).

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Northern Ireland		**TBC**			Expected TBC			