Follow-up of non-fatal and fatal events (Q40-RR24)

Collected through the BRHS General Practice (GP) Record Review (RR) and death notifications through Central Registries

Derived dataset: BRHS EventOutcomes Q40_RR24.dat

Follow-up period Q40-RR24: 40-year physical examination (Q40) to 2024 GP Record Review (RR24)

Dataset description

A total of 667 cohort participants attended the 40-year follow-up physical examination and are included in this dataset.

The dataset includes data on morbidity and mortality events (listed below) identified through the BRHS General Practice (GP) Record Review (RR) and death notifications from central registries. Events refer to those that occurred for the first time (first events) during the follow-up period.

To protect confidentiality, dates of death have been perturbed by adding a random number of days between 1 and 14 to each original date.

What is included in the dataset:

Event types for which data are available in this follow-up period and are included in this dataset are:

1) Myocardial Infarction (MI)	(non-fatal + fatal events)
2) Angina	(non-fatal events)
3) Heart failure	(non-fatal events)
4) Stroke	(non-fatal + fatal events)
5) Transient Ischaemic Attack	(non-fatal events)
6) CVD (MI or Stroke)	(non-fatal + fatal events)
7) Diabetes	(non-fatal events)
8) Atrial fibrillation (AF)	(non-fatal events)
9) Peripheral Vascular Disease (PVD)	(non-fatal events)
10) Pulmonary Embolism (PE)	(non-fatal events)
11) Deep Vein Thrombosis (DVT)	(non-fatal events)
12) Coronary artery bypass graft (CABG) or Percutaneous transluminal coronary angioplasty (PTCA)	(non-fatal events)
13) Vascular Dementia	(non-fatal events)
14) Alzheimer's disease	(non-fatal events)
15) Other Dementia (Mixed type dementia, Lewy body, Parkinsons, Alcohol related, Other type, Type not known)	
16) Any Type of Dementia (any of Vascular, Alzheimer's + Other Dementia)	

Data variables included for each event type are:

1) start and end date of the follow-up period
2) event prevalence at start of follow-up period
3) event occurrence status in follow-up period (none, non-fatal, fatal)
4) event date of the first non-fatal or fatal event occurring in the follow-up period
5) death date from any cause of death (for censoring)
6) censoring date (date of death or of exiting the study)

Detailed information can be found in table 1 below.

1. The follow-up period (Q40-RR24)

Each BRHS participant's follow-up period starts on the date of their 40-year physical re-examination in 2018-19 (Q40) and ends on the 2024 GP Record Review (RR24) end date (30 July 2024).

2. Prevalence

Prevalence data are based on GP Record Review events occurring prior to the 2018-19 physical examination date (Q40).

3. First events (combined non-fatal and fatal events)

The events included in this dataset refer to the **first occurrence** of a non-fatal or fatal event during the follow-up period. Some event types, such as myocardial infarction (MI), may occur more than once (multiple non-fatal events) for a participant during follow-up. However, only the **first event—whether non-fatal or fatal—is included under the first event data**.

4. Non-fatal events

The GP Record Review process and diagnostic criteria

The GP Record Review process and the **diagnostic criteria** for different types of non-fatal events are described in Section 2 of **Appendix A** (*BRHS Baseline (1978–80) to 2024 GP (Primary Care) Record Review.pdf*).

Reference - British Regional Heart Study cohort profile:
The British Regional Heart Study 1975-2004. Walker M, Whincup PH, Shaper AG. International Journal of Epidemiology, Volume 33, Issue 6, December 2004, Pages 1185–1192, https://doi.org/10.1093/ije/dyh295.

5. Fatal events

Follow-up of fatal events has been through central registers (the Office of Population and Census Surveys (OPCS), Health and Social Care Information Centre (HSCIC) and more recently NHS Digital). All BRHS cohort participants (n=7735) have been flagged for death notifications through Central Registries in England and Scotland since the study baseline (1978-80). Information is received on the date of death, and coded cause of death - International Classifications of Disease codes (ICD9, ICD10).

Fatal events MI, Stroke and CVD (combined MI and CVD) are derived based on the following ICD 9 codes:

Myocardial Infarction (MI):	(ICD9 410 – 4149)
Stroke:	(ICD9 430 – 4389)
CVD (MI or Stroke):	(ICD9 (ICD9 410 – 4149) or (ICD9 430 – 4389)

6. Date of death

Date of death from any cause. To reduce the risk of re-identification, dates of death have been perturbed by adding a random number of days between 1 and 14 to each original date.

7. Cause of death categories – see categories in table below

8. Censoring date

Date when the participant was lost to follow-up, withdrew from the study, or died from any cause.
Dates of death, where included, have been perturbed to reduce the risk of re-identification.

9. Non-fatal and fatal event date

This variable contains the date of a combined outcome—either a fatal or non-fatal event. To protect confidentiality, the dates of fatal events have been perturbed by adding a random number of days between 1 and 14 to each original date.

Table 1: Follow-up non-fatal and fatal events: 40-year physical examination 2018-19 (Q40) to 2024 GP Record Review (RR24)

Variable description	Units/Category labels	BRHS Variable name
Start of Follow-up period Q40 to RR24		
Start date: 40-year follow-up Physical examination (Q40) Day Start date: 40-year follow-up Physical examination (Q40): Month Start date: 40-year follow-up Physical examination (Q40): Year	Start date (Day) of Follow-p Start date (Month) of Follow-p Start date (Year) of Follow-p	Q40xd Q40xm Q40xy
End of Follow-up period Q40 to RR24		
End date: GP Record review end date: Day End date: GP Record review end date: Month End date: GP Record review end date: Year	End date (Day) - End of follow-up End date (Month) - End of follow-up End date (Year) - End of follow-up	RR24date_d RR24date_m RR24date_y
Cause of death		
Cause of death category	1= Major CHD/MI death (ICD-9 codes :410 – 4149) 2= Stroke death (ICD-9 codes: 430 – 4389) 3= Other CVD death (ICD-9 codes: 390 – 459 (excluding 410-4149 and 430-4389)) 4= Non-CVD deaths all other ICD-9 codes (i.e. excluding all ICD codes listed in 1-3) 8 = Died abroad - Cause unknown 9 = Alive 10 = Lost to follow-up	cdeath
Death date during follow-up period Q40 to RR24 **(Note: Dates of death have been perturbed)**		
Death date (from any cause): Day Death date (from any cause): Month Death date (from any cause): Year	Day Month Year	PdeathQ40_RR24_d PdeathQ40_RR24_m PdeathQ40_RR24_y
Censoring date during follow-up period Q40 to RR24 (Date when was lost to follow-up, withdrew from the BRHS study or died from any cause) **(Note: Dates of death have been perturbed)**		
Censoring date: Day Censoring date: Month Censoring date: Year	Day Month Year	PCensoredDate_d PCensoredDate_m PCensoredDate_y

Myocardial infarction (MI) fatal and non-fatal events	Units/Category labels	BRHS Variable name
MI prevalence at Q40 (MI event prior to Q40 physical examination)	0=No MI event prior to Q40 1=Prevalent MI. (An MI event occurred prior to Q40)	Q40RRprevmi
MI status in period Q40 to RR24	1=No MI event during Q40-RR24 2=Non-fatal MI event occurred during Q40-RR24 3=Fatal MI event occurred during Q40-RR24 4=non-fatal event followed by a fatal MI event during Q40-RR24	miQ40_RR24
Note: Dates for fatal events have been perturbed		
First MI event during period Q40 to RR24 Date: Day	Day	fmiQ40_RR24d
First MI event during period Q40 to RR24 Date: Month	Month	fmiQ40_RR24m
First MI event during period Q40 to RR24 Date: Year	Year	fmiQ40_RR24y
MI death during Q40-RR24 (MI deaths= Cause of death: ICD9 codes: 410 – 4149)	0=No, 1=yes	mideathQ40_RR24
MI death event during period Q40 to RR24 Date: Day	Day	mideathQ40_RR24_d
MI death event during period Q40 to RR24 Date: Month	Month	mideathQ40_RR24_m
MI death event during period Q40 to RR24 Date: Year	Year	mideathQ40_RR24_y
Stroke fatal and non-fatal events		
Stroke prevalence at Q40 (i.e. Stroke event prior to Q40 physical examination)	0=No Stroke event prior to Q40 1=Prevalent Stroke. (A stroke event occurred prior to Q40)	Q40RRprevST
Stroke status in period Q40 to RR24	1=No Stroke event during Q40-RR24 2=Non-fatal Stroke event occurred during Q40-RR24 3=Fatal Stroke event occurred during Q40-RR24 4=non-fatal event followed by a fatal Stroke event during Q40-RR24	STQ40_RR24
Note: Dates for fatal events have been perturbed		
First Stroke event during period Q40 to RR24 Date: Day	Day	fSTQ40_RR24d
First Stroke event during period Q40 to RR24 Date: Month	Month	fSTQ40_RR24m
First Stroke event during period Q40 to RR24 Date: Year	Year	fSTQ40_RR24y
Stroke death during Q40-RR24 (Stroke deaths=Cause of death: ICD9 codes: 430 – 4389)	0=No, 1=yes	STdeathQ40_RR24
Stroke death event during period Q40 to RR24 Date: Day	Day	STdeathQ40_RR24_d
Stroke death event during period Q40 to RR24 Date: Month	Month	STdeathQ40_RR24_m
Stroke death event during period Q40 to RR24 Date: Year	Year	STdeathQ40_RR24_y

Transient ischaemic attack (TIA) events	Units/Category labels	BRHS Variable name
Definite TIA status in period Q40 to RR24	0=No definite TIA event prior to Q40 1=Prevalent definite TIA. (An event occurred prior to Q40) 2=Incident definite TIA event after Q40	DefTIAQ40_RR24
First Definite TIA event during period Q40 to RR24 Date: Day First Definite TIA event during period Q40 to RR24 Date: Month First Definite TIA event during period Q40 to RR24 Date: Year	Day Month Year	fDefTIAQ40_RR24d fDefTIAQ40_RR24m fDefTIAQ40_RR24y
CVD (MI or Stroke) fatal and non-fatal events		
CVD prevalence at Q40 (CVD event prior to Q40 physical examination) (CVD is defined as an MI or a Stroke event)	0=No CVD event prior to Q40 1=Prevalent CVD. (A CVD event occurred prior to Q40)	Q40RRprevCVD
CVD status in period Q40 to RR24	1=No CVD event during Q40-RR24 2=Non-fatal CVD event occurred during Q40-RR24 3=Fatal CVD event occurred during Q40-RR24 4=non-fatal event followed by a fatal CVD event during Q40-RR24	CVDQ40_RR24
Note: Dates for fatal events have been perturbed		
First CVD event during period Q40 to RR24 Date: Day First CVD event during period Q40 to RR24 Date: Month First CVD event during period Q40 to RR24 Date: Year	Day Month Year	fCVDQ40_RR24d fCVDQ40_RR24m fCVDQ40_RR24y
CVD death during Q40-RR24 CVD deaths=Cause of death: ICD9 codes: 410 – 4149 or 430 - 4389	0=No, 1=yes	CVDdeathQ40_RR24
CVD death event during period Q40 to RR24 Date: Day CVD death event during period Q40 to RR24 Date: Month CVD death event during period Q40 to RR24 Date: Year	Day Month Year	CVDdeathQ40_RR24_d CVDdeathQ40_RR24_m CVDdeathQ40_RR24_y
Angina events	**Units/Category labels**	**BRHS Variable name**
Angina status in period Q40 to RR24	0=No Angina event prior to Q40 1=Prevalent Angina. (An event occurred prior to Q40) 2=Incident Angina event after Q40	ANGINAQ40_RR24
First Angina event during period Q40 to RR24 Date: Day First Angina event during period Q40 to RR24 Date: Month First Angina event during period Q40 to RR24 Date: Year	Day Month Year	fANGINAQ40_RR24d fANGINAQ40_RR24m fANGINAQ40_RR24y

Heart failure (HF) (non-fatal events)		
Heart failure (HF) status in period Q40-RR24	0=No Heart failure event prior to Q40 1=Prevalent Heart failure. (An event occurred prior to Q40) 2=Incident Heart failure event after Q40	HeartFailQ40_RR24
First Heart Failure (HF) event during period Q40 to RR24 Date: Day	Day	fHeartFailQ40_RR24d
First Heart Failure (HF) event during period Q40 to RR24 Date: Month	Month	fHeartFailQ40_RR24m
First Heart Failure (HF) event during period Q40 to RR24 Date: Year	Year	fHeartFailQ40_RR24y
Diabetes events		
Diabetes status in period Q40 to RR24	0=No Diabetes event prior to Q40 1=Prevalent Diabetes. (An event occurred prior to Q40) 2=Incident Diabetes event after Q40	DIABQ40_RR24
First Diabetes event during period Q40 to RR24 Date: Day	Day	fDIABQ40_RR24d
First Diabetes event during period Q40 to RR24 Date: Month	Month	fDIABQ40_RR24m
First Diabetes event during period Q40 to RR24 Date: Year	Year	fDIABQ40_RR24y
Atrial fibrillation (AF) events		
Atrial fibrillation (AF) status in period Q40 to RR24	0=No AF event prior to Q40 1=Prevalent AF. (An event occurred prior to Q40) 2=Incident AF event after Q40	AFQ40_RR24
First Atrial fibrillation (AF) event during period Q40 to RR24 Date: Day First Atrial fibrillation (AF) event during period Q40 to RR24 Date: Month First Atrial fibrillation (AF) event during period Q40 to RR24 Date: Year	Day Month Year	fAFQ40_RR24d fAFQ40_RR24m fAFQ40_RR24y
Coronary artery bypass graft (CABG) or Percutaneous transluminal coronary angioplasty (PTCA)		
(CABG)/(PTCA) status in period Q40 to RR24	0=No (CABG)/(PTCA) event prior to Q40 1=Prevalent (CABG)/(PTCA). (An event occurred prior to Q40) 2=Incident (CABG)/(PTCA) event after Q40	CABGPTCAQ40_RR24
First (CABG)/(PTCA) event during period Q40 to RR24 Date: Day First (CABG)/(PTCA) event during period Q40 to RR24 Date: Month First (CABG)/(PTCA) event during period Q40 to RR24 Date: Year	Day Month Year	fCABGPTCAQ40_RR24d fCABGPTCAQ40_RR24m fCABGPTCAQ40_RR24y

Pulmonary Embolism (PE) events		
Pulmonary Embolism (PE) status in period Q40 to RR24	0=No PE event prior to Q40 1=Prevalent PE. (An event occurred prior to Q40) 2=Incident PE event after Q40	PEQ40_RR24
First Pulmonary Embolism event during period Q40 to RR24 Date: Day First Pulmonary Embolism event during period Q40 to RR24 Date: Month First Pulmonary Embolism event during period Q40 to RR24 Date: Year	Day Month Year	fPEQ40_RR24d fPEQ40_RR24m fPEQ40_RR24y
Peripheral Vascular Disease (PVD) events		
PVD status in period Q40 to RR24	0=No PVD event prior to Q40 1=Prevalent PVD. (An event occurred prior to Q40) 2=Incident PVD event after Q40	PVDQ40_RR24
First PVD event during period Q40 to RR24 Date: Day First PVD event during period Q40 to RR24 Date: Month First PVD event during period Q40 to RR24 Date: Year	Day Month Year	fPVDQ40_RR24d fPVDQ40_RR24m fPVDQ40_RR24y
Deep Vein Thrombosis (DVT) events		
DVT status in period Q40 to RR24	0=No DVT event prior to Q40 1=Prevalent DVT. (An event occurred prior to Q40) 2=Incident DVT event after Q40	DVTQ40_RR24
First DVT event during period Q40 to RR24 Date: Day First DVT event during period Q40 to RR24 Date: Month First DVT event during period Q40 to RR24 Date: Year	Day Month Year	fDVTQ40_RR24d fDVTQ40_RR24m fDVTQ40_RR24y

Vascular Dementia events (BRHS event code H1)		
Vascular Dementia (VD) status in period Q40 to RR24	0=No VD event prior to Q40 1=Prevalent VD. (A VD event occurred prior to Q40) 2=Incident VD event after Q40	VDEMENTQ40_RR24
First Vascular Dementia (VD) event during period Q40 to RR24 Date: Day	Day	fVDEMENTQ40_RR24d
First Vascular Dementia (VD) event during period Q40 to RR24 Date: Month	Month	fVDEMENTQ40_RR24m
First Vascular Dementia (VD) event during period Q40 to RR24 Date: Year	Year	fVDEMENTQ40_RR24y
Alzheimer's disease events (BRHS event code H2)		
Alzheimer's (ALZH) status in period Q40 to RR24	0=No ALZH event prior to Q40 1=Prevalent ALZH. (An ALZH event occurred prior to Q40) 2=Incident ALZH event after Q40	ALZHQ40_RR24
First Alzheimer's (ALZH) event during period Q40 to RR24 Date: Day	Day	fALZHQ40_RR24d
First Alzheimer's (ALZH) event during period Q40 to RR24 Date: Month	Month	fALZHQ40_RR24m
First Alzheimer's (ALZH) event during period Q40 to RR24 Date: Year	Year	fALZHQ40_RR24y
Other Dementia (BRHS event codes: HO, H3, H4, H5, H6, H8)		
Other Dementia status in period Q40 to RR24 (see note 1 below)	0=No Other Dementia event prior to Q40 1=Prevalent Other Dementia. (Other Dem event occurred prior to Q40) 2=Incident Other Dementia event after Q40	OTHDEMENTQ40_RR24
First Other Dementia event during period Q40 to RR24 Date: Day	Day	fOTHDEMENTQ40_RR24d
First Other Dementia event during period Q40 to RR24 Date: Month	Month	fOTHDEMENTQ40_RR24m
First Other Dementia event during period Q40 to RR24 Date: Year	Year	fOTHDEMENTQ40_RR24y
Any Dementia events		
Any Type of Dementia status in period Q40 to RR24 (Any Type = BRHS event codes: H0, H1, H2, H3, H4, H5, H6, H8) See Note 1 below for codes	0=No "Any" Dementia event prior to Q40 1=Prevalent "Any" Dementia. (An event occurred prior to Q40) 2=Incident "Any" Dementia event after Q40	ANYDEMENTQ40_RR24
First Any type of Dementia event during period Q40 to RR24 Date: Day	Day	fANYDEMENTQ40_RR24d
First Any type of Dementia event during period Q40 to RR24 Date: Month	Month	fANYDEMENTQ40_RR24m
First Any type of Dementia event during period Q40 to RR24 Date: Year	Year	fANYDEMENTQ40_RR24y

Note 1

H1=Vascular Dementia, H2=Alzheimer's, H3=Mixed Type Dementia, H4=Lewy Body Dementia, H5=Parkinsons Disease Dementia,
H6=Alcohol Related Dementia, H8=Other Type of Dementia, H0=Dementia - Type Not Known.

APPENDIX A

Follow-up of BRHS cohort participants through

General Practice (GP) records
(i.e. primary care records)

The GP (primary care) Record review

Baseline (1978-1980) to 2024 (30 July 2024)

Contents

Appendices

1. Follow-up of BRHS participants through primary care records

The General Practice (GP) record review

The GP record review is a review of BRHS participants' GP records (i.e. primary care records) for specified events mostly related to non-fatal cardiovascular disease, although this has subsequently been extended to include additional cardiovascular events and treatment, diabetes, cancer, dementia and frailty (table 1). The aim of the GP record review has been to identify and record the date of these events. The reviews have been carried out since baseline (1978-80) at intervals of typically every one or two years. A list of events including their definitions is provided for undertaking the review (Appendix 1). The reviewers are asked to search through the participants' medical records, identify events that match the definition terms, and record the first date of the events' occurrence on a form supplied for each participant (Record review form in Appendix 2). The start of data collection varied for different events, as shown in table 2.

Reference: The British Regional Heart Study 1975-2004. Walker M, Whincup PH, Shaper AG. International Journal of Epidemiology, Volume 33, Issue 6, December 2004, Pages 1185–1192, https://doi.org/10.1093/ije/dyh295

Table 1 Events included in the GP record review

Event type	Alternative terms used in the search	Other points noted in review
*Myocardial infarction	Heart attack, coronary thrombosis	
*Acute Coronary Syndrome	ACS	
Angina	Angina pectoris	Exertional or stress related chest pain
*Stroke	Cerebrovascular accident, CVA, cerebral thrombosis, embolism, or haemorrhage	
Transient ischaemic attack	TIA, Little / Minor Stroke	Transient cerebrovascular event (Complete recovery within 24 hours)
Diabetes	NIDDM, IDDM, Type 1 diabetes, Type 2 diabetes	
*Heart Failure	Congestive heart failure (CCF) Left ventricular failure (LVF) Pulmonary oedema	
Peripheral arterial disease	Peripheral vascular disease (PVD) Intermittent claudication Lower limb ischaemia Gangrene of foot/toes	
Abdominal Aortic aneurysm	Including complications (rupture and dissection)	
*Deep vein thrombosis (DVT)	Blood clot in the leg	
*Pulmonary embolism (PE)	Blood clot in the lung	
Atrial fibrillation (AF)		
Procedures for: Coronary Artery Bypass Graft (CABG) Coronary Angioplasty (PTCA)	Percutaneous coronary angioplasty, balloon treatment. Insertion of stents	
Cancer diagnosis and site		
Dementia - Vascular Dementia – Alzheimer Dementia - Other type Dementia - Type not known	Mixed typed, Lewy body, Parkinson's disease, Alcohol related, other type	
COVID-19		
Frailty/Frailty score	Electronic frailty index (eFI), other frailty assessment systems	

* Events requiring additional information. Reviewers are asked to complete a further enquiry form (validation form) and/or send a photocopy of the hospital summary sheet or discharge letter.

Table 2 Year data collection commenced for each event type

Event type	BRHS Event code	Year when data collection for events commenced*	Additional confirmatory information collected
Myocardial infarction (MI)	1	Baseline (1978)	Yes, since 1978
Angina	2	Baseline (1978)	
Stroke	3	Baseline (1978)	Yes, since 2000
Transient ischemic attack (TIA)	4	Baseline (1978)	
Coronary artery bypass graft (CABG)	5	1983	
Percutaneous transluminal coronary angioplasty, (PTCA)	7	1983	
Diabetes	6	1988	
Heart failure (HF)	D	1996	Yes, since 2000
Cancer	8	1996	
Peripheral vascular disease (PVD)	A	1998	
Deep vein thrombosis (DVT)	B	2000	Yes, since 2000
Pulmonary embolism (PE)	C	2000	Yes, since 2000
Abdominal aortic aneurysm	X	2000	
Atrial fibrillation (AF)	G	2014	
Dementia	H	2014	
Dementia - Type not known	H0		
Dementia - Vascular	H1		
Dementia - Alzheimer	H2		
Dementia - Mixed typed	H3		
Dementia - Lewy body	H4		
Dementia - Parkinson's disease	H5		
Dementia - Alcohol related	H6		
Dementia - Other type	H8		
COVID-19	Z	2020	
Frailty/Frailty score		2020	

*This is the year when data collection commenced and continued prospectively.

Note: events that occurred prior to the specified year were collected retrospectively but could only be collected for those participants who were still alive and whose GP records were available. GP records of deceased participants are not kept by the General Practices once a patient dies and therefore retrospective data collection was not possible on deceased participants.

2. Diagnostic criteria – definitions of non-fatal events identified through the GP record review

2.1. Myocardial Infarction

Non-fatal Myocardial Infarction events are classified as definite or possible. The case criteria for each are described below.

Definite Myocardial Infarction:

Criteria for definite Myocardial Infarction included: A history of typical features including chest pain, supported by ECG evidence consistent with MI, and/or abnormal cardiac enzyme (or troponin) levels (WHO criteria). Presence of two out of three of these criteria were classed as definite MI.

Possible Myocardial Infarction:

The criteria for a possible MI are met when only one of the following characteristics is present: a clinical diagnosis only, based on typical features including chest pain, MI picked up by routine ECG without typical history, and, cardiac enzyme/troponin changes.

2.2 Stroke

Non-fatal stroke diagnosis is based on an acute disturbance of cerebral function of presumed vascular origin lasting 24 hours or more as reported from GP records. Include subarachnoid haemorrhage, cerebral haemorrhage or thrombosis. Excludes cases where another diagnosis (e.g. cerebral neoplasm) is made.

2.3. Angina

Typical effort or stress-related chest pain.
Diagnosis was based on a doctor-confirmed diagnosis of Angina from General Practice (primary care) records.

2.4 Transient ischaemic attack (TIA)

Disturbance of cerebral function of vascular origin, lasting < 24 hours and leaving no residual deficit
Diagnosis was based on a doctor-confirmed diagnosis of Transient ischaemic attack (TIA) from General Practice (primary care) records.

2.5 Heart Failure

Diagnosis was based on a doctor-confirmed diagnosis of heart failure from General Practice records (including hospital and clinic correspondence). All cases were verified by a review of clinical information from primary and secondary care records to ensure diagnosis was consistent with current recommended heart failure diagnosis.

2.6 Diabetes (NIDDM Type 2 / IDDM Type 1)

Diagnosis was based on a doctor-confirmed diagnosis of diabetes from General Practice (primary care) records.

2.7 Atrial fibrillation (AF)

Diagnosis was based on a doctor-confirmed diagnosis of Atrial fibrillation from General Practice (primary care) records.

2.8 Peripheral Arterial Disease (PAD, PVD)

Intermittent claudication or lower limb ischaemia.
Diagnosis was based on a doctor-confirmed diagnosis of PVD from General Practice (primary care) records.

2.9 Deep Vein Thrombosis (DVT)

Blood clot in the leg.
Diagnosis was based on a doctor-confirmed diagnosis of Deep Vein Thrombosis (DVT) from General Practice (primary care) records.

2.10 Pulmonary Embolism (PE)

Blood clot in the lung.
Diagnosis was based on a doctor-confirmed diagnosis of Pulmonary Embolism (PE) from General Practice (primary care) records.

2.11 Aortic Aneurysm

Rupture or dissection.
Diagnosis was based on a doctor-confirmed diagnosis of Aortic Aneurysm from General Practice (primary care) records.

2.12 Coronary artery bypass graft (CABG)

Recorded CABG procedure in General Practice (primary care) record.

2.13 Percutaneous transluminal coronary angioplasty (PTCA)

Recorded PTCA procedure in General Practice (primary care) record.

2.14 Cancer

Diagnosis was based on a doctor-confirmed diagnosis of Cancer (including cancer site) from General Practice (primary care) records.

2.15 Dementia

Diagnosis was based on a doctor-confirmed diagnosis for different types of Dementia from General Practice (primary care) records. Types of dementia included:

Vascular dementia

Alzheimer's disease

Mixed type dementia

Lewy body dementia

Parkinsons disease dementia

Alcohol related dementia

Other type of dementia

2.16 COVID-19

Diagnosis was based on a doctor-confirmed diagnosis of COVID-19 from General Practice (primary care) records.

3. Events with additional confirmatory information

For specific non-fatal cardiovascular disease events, an extended enquiry is carried out where additional confirmatory information relating to the events is collected from the GP records. General practices are asked to complete a separate enquiry form (validation forms in Appendix 3) and/or send a copy of the hospital summary sheet or discharge letter to help validate events. This process is carried out for the following types of events:

Myocardial infarction (MI)

Stroke

Heart Failure

Deep Vein Thrombosis

Pulmonary Embolism

3.1 Myocardial infarction (MI)

Additional confirmatory information used for MI event validation.

Questions included in the additional enquiry form (MI event validation form in Appendix 3**)**

Re: Myocardial Infarction

1. Did he have prolonged chest pain lasting at least half an hour? Yes No
   If not, how did he present? _____
2. Did he have an ECG? Yes No
   If yes, what was the result? _____
3. Did he have cardiac enzyme levels measured? Yes No
   If yes - what were these results? _____
4. Did he have troponin levels measured? Yes No
   If yes - what were the results? _____

3.2 Stroke event - additional confirmatory information

The additional confirmatory information has been collected since 2000.

Questions included in the additional enquiry form (Stroke event validation form in Appendix 3**)**

1. Did signs/symptoms last for longer than 24 hours? 1= Yes 2=No 3=Don't know
2. Did he have definite hemiparesis or hemiplegia (weakness affecting one side on the body)?
   If No, how did he present? _____
3. Did he have a CT/MRI scan? 1=Yes 2=No 3=Don't know

   If yes, what was the CT/MRI Scan result?

Ischaemic stroke	1
Haemorrhagic stroke	2
Normal scan	3
Other pathology	4
Not a stroke	5
Results unavailable / Not known	6

4. What was the final diagnosis?

Ischaemic stroke	1
Haemorrhagic stroke	2
Subarachnoid haemorrhage	3
Stroke of uncertain pathological type	4
Not a stroke at all	5
Possible stroke	6
Transient Ischaemic Attack	7
Aneurysm/ Arteriovenous malformation	8
Vascular Dementia	9
Chronic Cerebrovascular Disease	10
Subdural Haematoma	11

5. Was he admitted to hospital? 1=Yes 2=No 3=Don't know

3.3 Heart Failure – additional confirmatory information collected since 2000

Questions included in the additional enquiry form (Heart Failure event validation form in Appendix 3)

1. Was an echocardiogram (cardiac ultrasound) performed? Yes No
2. If yes, did it show a diminished left ventricular ejection fraction? Yes No
3. Left ventricular ejection fraction (if available) _____%
4. If other factors were important in making the diagnosis of heart failure, please indicate which ones:
   - Good response to diuretic treatment
   - Chest X-ray result
   - Radionuclide scan result
   - Cardiac catheterisation result
   - Other (please give details)_____
5. Cause of heart failure _____
6. Is there a hospital diagnosis of heart failure? Yes No

3.4 Deep Vein Thrombosis (DVT) - additional confirmatory information collected since 2000.

Questions included in the additional enquiry form (DVT event validation form in Appendix 3)

1. Was the Deep venous thrombosis investigated by?
   - Duplex ultrasound scan Yes No
   - Venogram Yes No
   - D-dimer test Yes No
2. Did the results of the test show evidence of DVT?
   - Duplex ultrasound scan Yes No
   - Venogram Yes No
   - D-dimer test Yes No
3. What was the D dimer result (if available)_____

3.5 Pulmonary Embolism (PE) - additional confirmatory information collected since 2000.

Questions included in the additional enquiry form (PE event validation form in Appendix 3)

1. Was the Pulmonary Embolism investigated by:
   - Ventilation-perfusion scan Yes No
   - CT scan Yes No
   - Pulmonary angiogram Yes No
   - D-dimer test Yes No
2. Did the results of the test show evidence of PE?
   - Ventilation-perfusion scan Yes No
   - CT scan Yes No
   - Pulmonary angiogram Yes No
   - D-dimer test Yes No
3. What was the D dimer result (if available)

4 Data collection process of the GP record review (i.e. primary care records)

General Practices

The BRHS cohort participants were recruited from their General Practice, most of whom have remained with that practice over the study period. Those who moved ("removals"/migrants) were traced to their new General Practice using data from Primary Care registration services and NHS Digital and continued to be followed.

The General Practice record review procedure

1. The BRHS clinical director (Peter H Whincup) writes to the GP Partners and Practice Manager of the original 25 General Practices from where BRHS participants were recruited, seeking

   a) ongoing consent for the GP Record Review of BRHS participants within their practice, and
   b) a named person who can liaise with the BRHS team about the undetaking of the review. This person is normally the Practice Co-ordinator.

2. A BRHS Record Review pack is sent to the General Practice Co-ordinator.

The BRHS Record Review pack includes:

- Cover letter to the General Practice Co-ordinator with instuctions on how to carry out the review
- A list of the specified events with agreed definitions to be used in the medical record search for events. (Appendix 1).
- A Record Review form for each participant registered at the General Practice. The review forms include some necessary personal identifiers such as the BRHS study identifier, name, address, NHS number and date of birth to ensure correct participant identification (Appendix 2).
- Blank event validation forms for Myocardial Infarction (MI), Stroke, Heart Failure (HF), Deep Vein Thrombosis (DVT), Pulmonary Embolism (PE). The validation forms are used to collect additional confirmatory event information for event validation (Appendix 3).
- Labelled tamper proof envelope for the return of the record review and validation forms back to the BRHS Study Co-ordinator.

3. The General Practice Co-ordinator completes the record review form confirming:

1. the participant is still registered at the General Practice
2. the participant's contact details are correct
3. the participant has consulted at the practice in the specified time frame as shown on the record review form
4. whether any of the specified health outcomes (events) listed on the record review form have occurred
5. Attaches **event validation forms/ additional confirmatory information form** or any other necessary additional documents such as hospital summaries, and discharge letters related the following events:

   1) Myocardial infarction (MI)
   2) Stroke
   3) Heart Failure
   4) Deep Vein Thrombosis
   5) Pulmonary Embolism

Participants who moved home or General Practice

Participants no longer registered at their GP practice because they moved home or genral practice are traced through Primary Care registration services/ NHS Digital to their new General Practice. Contact is made with their new practice and follow-up is arranged/continues with the new practice.

Non-response from General Practices

Reminders to the General Practices are sent four weeks after the initial mailing.

Data update and storage

On completion of the GP record review process, information is updated on the BRHS database held on the university's (UCL) Data Safe Haven (DSH). The date of completion of the record review is recorded. Identifiable information on paper records is redacted and the paper records are filed in a locked BRHS storeroom.

BRITISH REGIONAL HEART STUDY RECORD REVIEW 2022

FURTHER DETAILS OF DIAGNOSES

NOTE: If the patient has had a diagnosis of Heart Attack, Acute Coronary Syndrome, Stroke, Heart Failure, Pulmonary Embolism or Deep Vein Thrombosis please complete the relevant coloured validation sheet or send a copy of the hospital summary sheet or discharge letter.

	ALTERNATIVE TERMS USED	OTHER POINTS
HEART DISEASE AND STROKE		
***Myocardial infarction**	Heart attack, coronary thrombosis	
***Acute Coronary Syndrome**	ACS	
Angina	Angina pectoris	Exertional or stress related chest pain
***Stroke**	Cerebrovascular accident, **CVA**, cerebral thrombosis, embolism, or haemorrhage	
Transient ischaemic attack	**TIA**, Little / Minor Stroke	Transient cerebrovascular event (Complete recovery within 24 hours)
Diabetes	NIDDM, IDDM, Type 1, Type 2 diabetes	
***Heart Failure**	Congestive heart failure (CCF) Left ventricular failure (LVF) Pulmonary oedema	

OTHER CARDIOVASCULAR DISEASES		
Peripheral arterial disease	Peripheral vascular disease (PVD) Intermittent claudication Lower limb ischaemia Gangrene of foot/toes	
Aortic aneurysm	including complications (rupture and dissection)	
***Deep vein thrombosis (DVT)**	Blood clot in the leg	
***Pulmonary embolism (PE)**	Blood clot in the lung	

*** If Yes, please complete the appropriate coloured forms or send a photocopy of the hospital letter or discharge summary**

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NAME: : **Address:** **DOB:** **NHS No:**	Please tick if address is correct ☐	New address:

Serial No: xxxxx

BRHS (men) Record Review 2022

THE QUESTIONS ON THIS PAGE RELATE TO THE PERIOD FROM **1ST JULY 2020** TO PRESENT

YES NO

1 Is the above patient still registered with you? ☐ ☐

2 Has he **consulted** you since 1st July 2020? ☐ ☐

3 Was any consultation for a **new episode** of: (day, month, year)

***Myocardial Infarction** (MI) Heart attack, Coronary thrombosis	☐ ☐	Date: ……..*
***Acute Coronary Syndrome**	☐ ☐	Date: ……..*
Angina Exertional or stress related chest pain	☐ ☐	Date: ……
***Stroke** Cerebrovascular accident (CVA), cerebral thrombosis, haemorrhage embolism	☐ ☐	Date: ……..*
Transient Ischaemic Attack (TIA/ TCIA) Cerebrovascular disturbance (<24 hours); leaving no residual damage	☐ ☐	Date: ……
Diabetes (NIDDM Type 2 / IDDM Type 1)	☐ ☐	Date: ……
***Heart Failure** Congestive Cardiac Failure (CCF) or Left Ventricular Failure (LVF)	☐ ☐	Date: ……..*

Other Cardiovascular disease:

Peripheral Arterial Disease (PAD,PVD) Intermittent claudication, lower limb ischaemia	☐ ☐	Date: ……
Aortic Aneurysm- rupture, dissection	☐ ☐	Date: ……
***Deep Vein Thrombosis** (DVT) blood clot in the leg	☐ ☐	Date: ……..*
***Pulmonary Embolism** (PE) blood clot in the lung	☐ ☐	Date: ……..*

*** If Yes, please send a copy of the hospital letter or discharge summary**

YES NO

4 Has he been referred to a Consultant for any new cardiovascular condition? ☐ ☐ Date: ……

Diagnosis: ……..

5 Have any of the following procedures taken place: **YES NO**

Coronary Artery Bypass Graft (CABG)	☐ ☐	Date: ……
Coronary Angioplasty (PTCA) Percutaneous coronary angioplasty, balloon treatment. Insertion of stents ☐	☐ ☐	Date: ……

6 Has he had a Cancer diagnosis? ☐ ☐ Date: ……

Site: ……..

7 Has there been a diagnosis of: **YES NO**

COVID-19	☐ ☐	Date: ……
Atrial Fibrillation	☐ ☐	Date: ……
Dementia	☐ ☐	Date: ……

If yes, please give details of the type of dementia:

Vascular dementia ☐

Alzheimer's disease ☐

Other ☐ please give details ……..

Dementia type not known ☐

8 **Frailty** Has a frailty score been calculated? Yes, eFI score ☐ Yes, other score ☐ No frailty score calculated ☐

If yes, please provide details – enter **last** frailty score recorded in each year.

Date of Frailty Score	**Electronic *frailty* index (eFI)**	**Other** Frailty Assessment System		Do you consider this patient to be clinically frail?
Month / Year	**eFI Score**	Name of score	Grade/value	**YES NO NOT ASSESSED**
……../2020				☐ ☐ ☐
……../2021				☐ ☐ ☐
……../2022				☐ ☐ ☐

Signed …… Date:……..

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Tel: 020 8016 8021 Email: l.lennon@ucl.ac.uk

VALIDATION FORM: HEART ATTACK / MI / ACUTE CORONARY SYNDROME

Study No:

Name:

Address:

DOB:

NHS:

BRITISH REGIONAL HEART STUDY

Dear Doctor,

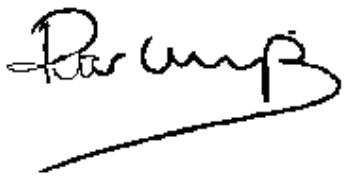
Thank you for supplying information on the above patient who took part in the British Regional Heart Study. We note that he has had a major IHD event recently and would be most grateful if you could complete the following brief enquiry to provide documentation for our record, **OR send us a photocopy of the hospital letter or discharge summary.** This information is critical for the validation of our case criteria.

Re: Myocardial Infarction **Date of event:** _____

		Yes	No
1.	Did he have prolonged chest pain lasting at least half an hour? If not, how did he present? History of typical features including chest pain? Yes/No	☐	☐
2.	Did he have an ECG? If yes, what was the result? Is ECG evidence consistent with MI? Yes/No	☐	☐
3.	Did he have cardiac enzyme levels measured? If yes - what were these results? Abnormal Cardiac enzyme (WHO criteria)? Yes/No	☐	☐
4.	Did he have troponin levels measured? If yes - what were the results? Abnormal Troponin level (WHO criteria)? Yes/No	☐	☐

We are extremely grateful for the co-operation we have received from so many GPs and hope to provide valuable information for the treatment and prevention of IHD in the future.

Yours sincerely



Prof Peter H Whincup
Professor of Cardiovascular Epidemiology

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VALIDATION FORM: STROKE

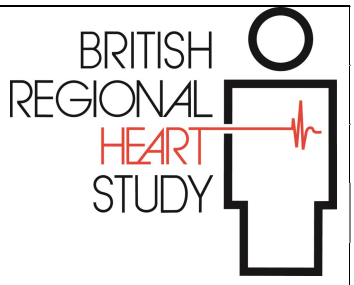
Study No:

Name:

Address:

DOB:

NHS:



Dear Doctor,
Thank you for supplying information on the above patient who took part in the British Regional Heart Study. We note that he has had a major CVA event recently and would be most grateful if you could complete the following brief enquiry to provide documentation for our record, **OR send us a photocopy of the hospital letter or discharge summary.** This information is critical for the validation of our case criteria.

RE: STROKE **Date of Event** _____

		Yes	No	Don't Know
1.	Did signs/symptoms last for longer than 24 hours?	☐ 1	☐ 2	☐ 3
2.	Did he have definite hemiparesis or hemiplegia? (weakness affecting one side on the body)	☐ 1	☐ 2	☐ 3

2.1 If No, how did he present? _____

		Yes	No	Don't Know
3.	Did he have a CT/MRI scan?	☐	☐	☐

3.1 If Yes, what was the CT/MRI Scan result?

- Ischaemic stroke ☐ 1
- Haemorrhagic stroke ☐ 2
- Normal scan ☐ 3
- Other pathology, not a stroke ☐ 4
- Results unavailable / Not known ☐ 5

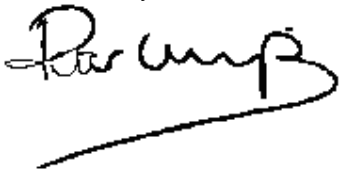
4. What was the final diagnosis?

- Ischaemic stroke ☐ 1
- Haemorrhagic stroke ☐ 2
- Subarachnoid haemorrhage ☐ 3
- Stroke of uncertain pathological type ☐ 4
- Not a stroke at all ☐ 5
- Possible stroke ☐ 6
- Transient Ischaemic Attack ☐ 7
- Aneurysm/ Arteriovenous malformation ☐ 8
- Vascular Dementia ☐ 9
- Chronic Cerebrovascular Disease ☐ 10
- Subdural Haematoma ☐ 11

		Yes	No	Don't Know
5.	Was he admitted to hospital?	☐	☐	☐

We are extremely grateful for the co-operation we have received from so many GPs and hope to provide valuable information for the treatment and prevention of strokes in the future.

Yours sincerely



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VALIDATION FORM: HEART FAILURE

Study No:

Name:

Address:

DOB:

NHS:

BRITISH REGIONAL HEART STUDY

Dear Doctor,

Thank you for supplying information on the above patient who took part in the British Regional Heart Study. We are seeking further information about diagnoses of heart failure, particularly to take account of the results of investigations (particularly echocardiograms) performed. We note from our records that this patient has had a diagnosis of heart failure and would be most grateful if you could complete the enclosed brief enquiry to provide documentation for our records, **or send us a photocopy of the hospital letter or discharge summary**. This information is critical for the validation of our case criteria.

RE: Heart Failure **Date of Diagnosis:** _____

		Yes	No
1.	Was an echocardiogram (cardiac ultrasound) performed?	☐	☐
2.	If yes, did it show a diminished left ventricular ejection fraction?	☐	☐

3. Left ventricular ejection fraction (if available)_____%

4. If other factors were important in making the diagnosis of heart failure, please indicate which:-

(please tick if important)

Good response to diuretic treatment ☐

Chest X-ray result ☐

Radionuclide scan result ☐

Cardiac catheterisation result ☐

Other (please give details)_____

5. Cause of heart failure

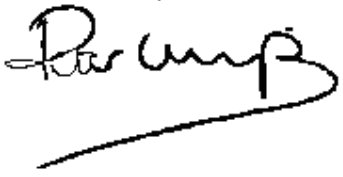
Please write the cause of heart failure below if known - if not known please write `not known'

_____

		Yes	No
6.	Is there a hospital diagnosis of heart failure?	☐	☐

We are extremely grateful for the co-operation we have received from so many GPs and hope to provide valuable information for the treatment and prevention of cardiovascular disease in the future.

Yours sincerely



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VALIDATION FORM: DEEP VEIN THROMBOSIS and / or PULMONARY EMBOLISM

Study No:

Name:

Address:

DOB:

NHS:

BRITISH REGIONAL HEART STUDY

Dear Doctor,

Thank you for supplying information on the above patient who took part in the British Regional Heart Study. We are seeking further information about diagnoses of a Deep Vein Thrombosis and / or Pulmonary Embolism that have occurred since the re-examination 1998-2000, particularly to take account of the results of investigations performed.

We note from our records that this patient has had a diagnosis of Deep Vein Thrombosis and / or Pulmonary Embolism and would be most grateful if you could complete the enclosed brief enquiry to provide documentation for our records, **or send us a photocopy of the hospital letter or discharge summary**.

This information is will be very helpful for the validation of our case criteria.

RE: DEEP VEIN THROMBOSIS **Date of Diagnosis:** _____

1 Was the deep venous thrombosis investigated by

	Yes	No
Duplex ultrasound scan	☐	☐
Venogram	☐	☐
D-dimer test	☐	☐

2 Did the results of the test show evidence of DVT?

Duplex ultrasound scan	☐	☐
Venogram	☐	☐
D-dimer test	☐	☐

3 What was the D dimer result (if available)_____

RE: PULMONARY EMBOLISM **Date of Diagnosis:** _____

1 Was the Pulmonary Embolism investigated by

	Yes	No
Ventilation-perfusion scan	☐	☐
CT scan	☐	☐
Pulmonary angiogram	☐	☐
D-dimer test	☐	☐

2 Did the results of the test show evidence of PE?

Ventilation-perfusion scan	☐	☐
CT scan	☐	☐
Pulmonary angiogram	☐	☐
D-dimer test	☐	☐

3. What was the D dimer result (if available)_____

We are extremely grateful for the co-operation we have received from so many GPs and hope to provide valuable information for the treatment and prevention of cardiovascular disease in the future.

Yours sincerely

Prof Peter H Whincup
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