| **Research area/condition** | **Project title (ISAC reference)\*** | **Lead applicant and lead institution** | **Lay summary** |
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| Dementia: South Asians | Dementia in South Asians: tailoring risk prediction by ethnicity (19\_235) | Naaheed Mukadam (UCL) | Most people want to know what puts them at risk of dementia and how to reduce this risk. So far, most of our understanding of dementia and how we might prevent or delay it, comes from studies of white? European people.  Knowledge of illnesses in populations of different ethnicities has been helpful in understanding more about cardiovascular disease and diabetes but this work has not been done for dementia. Studying the South Asian population provides an opportunity to understand more about why and how dementia develops. South Asians are the largest minority ethnic group in the UK but there is little information as to how common dementia is or the risks for it in South Asian people compared to Europeans. Studies in South Asia show that dementia is more common there than in Europe. South Asians more often have problems which are risk factors for dementia, such as diabetes and obesity. This research proposal aims to find out:  1. How common dementia is in UK-based South Asians.  2. The effect of risk factors like diabetes on dementia risk in South Asians.  3. Whether it is possible to predict someone’s risk of getting dementia by looking at all the risk factors they have.  This research will improve our understanding of how common dementia is in the UK’s biggest minority group. It will help us know what risks are particularly important for this group. It will let us work out an individual’s risk of dementia, taking their ethnicity into account. |
| Child; Adverse experience | Adverse childhood experiences: incidence, prevalence, determinants and outcomes across primary and secondary care (19\_162R) | Ruth Gilbert (Institute of Child Health) | Adverse childhood experiences (ACE) are traumatic events or stressful environments that affect children while growing up, ranging from child maltreatment to households with domestic violence or parental mental illness. Repeated exposure to ACEs can have profound effects on children's health and development and have been linked to premature death, increased health-care costs and life-long disabilities.  Most estimates of ACEs, however, relies on retrospective self-reports of adults, with limited knowledge on how and when ACEs affect families and services across the life course. The few large UK studies that follow children over time are based on hospital admissions and specific ACEs in isolation (e.g. parental substance misuse) or solely based on parental reports of ACEs. Most studies, therefore, underestimate the burden of ACEs in the general population and provide limited information to services for intervention.  We aim to estimate the burden of ACEs across services and the early life-course, and to provide ACE indicators that can help better recognise when, how and where at-risk families present to services for earlier support. To do this, we will develop a preliminary set of ACE indicators by exploring their strength of association with child maltreatment and ACE-related deaths. Second, we will describe the prevalence/trends of ACEs across GPs and hospitals, as recorded before birth (in mothers) and in children as they grow up. A better understanding of trends and correlates of ACEs across services can identify regions and periods of success, stagnation, and health loss and thereby facilitate for effective public health strategies. |
| Drug misuse | Morbidity, mortality and quality of healthcare for people who use heroin and crack cocaine: a cohort study based on linked primary care data in England (19\_142R) | Dan Lewer (UCL) | This study aims to provide an overview of the health of people who use heroin and crack cocaine in England, and to assess the quality of healthcare for heart and lung diseases among this population.  People use illegal drugs in many different ways. In the UK, heroin and crack cocaine are strongly associated with drug dependence, social exclusion (such as homelessness and imprisonment) and acute and long-term health problems, which is why we are focusing on the health of people who use these particular drugs.  Many studies have shown that people who use heroin and crack cocaine have high risk of infections, mental health problems and drug overdose. A few studies also suggest that the risk of other diseases such as cancers, heart and lung diseases is also raised, but there is less evidence.  This project will identify people who use heroin and/or crack cocaine in GP data. We will compare the way this group uses health services against the general population (i.e. people who are not known to use heroin or crack cocaine). Measures of health service use will include the number of GP appointments and A&E visits.  We will then identify patients who were diagnosed with heart and lung problems during the study, and see if and when treatment was provided. This analysis is intended to identify specific issues with health service access. For example, if we find that patients with lung disease are not given flu vaccines, we could recommend promoting flu vaccines in drug treatment services. |
| Migrants; Healthcare utilization | International migrant healthcare access in England: a population-based linked cohort study of healthcare resource utilisation and mortality amongst international migrants registered with primary care services (19\_062MnA) | Rob Aldridge (UCL) | With over one billion people on the move globally, the healthcare of international migrants is increasingly important in the design and delivery of health services. Critically, healthcare is a human right and the recently published UCL-Lancet commission on migration and health emphasises that international migrants should have equitable access to healthcare. In England, 15.6% of the population (8.6 million people) were born in another country and moved to England either for work, to study, to join families, or to flee persecution and conflict. The health service uptake by this group is poorly studied and it is unclear if their health needs are being adequately met.  This study will use a dataset that links general practice (GP) records, hospital-based healthcare, and death statistics. Our main objective is to identify migrants to England that are registered with GPs and describe their health status and healthcare usage. This will include (a) describing patterns and costs of using general practice and hospital-based healthcare services (b) describing mortality. We will study each of these in detail according to disease sub-conditions including diseases resulting in preventable hospital admissions, sexual and reproductive health conditions/interventions, and mental illness. This project is based on research priorities and acceptability of research methods established through patient and public involvement work with international migrants.  With this information, we will be able to make recommendations in order to improve policies affecting how services are delivered to meet the needs of this group as well as provide a way of studying migration health for other researchers. |
| Infection; Mother and child | Maternal infections and antibiotic treatment associated with adverse child outcomes (19\_038R2) | Ruth Gilbert (Institute of Child Health) | Some maternal infections during pregnancy can cause adverse outcomes in children (e.g. miscarriage, congenital malformations). Previous research has raised the possibility that some antibiotics used to treat infection might also cause adverse child outcomes. For example, results from some clinical studies show maternal use of macrolides antibiotics (including erythromycin, clarithromycin and azithromycin) during pregnancy, may be associated with increased risks of some rare but serious adverse outcomes in children, such as congenital malformations, and neurodevelopmental outcomes, including cerebral palsy and epilepsy. Cerebral palsy (CP) refers to a group of permanent movement disorders that appear in early childhood. We want to disentangle whether the higher risks of adverse outcomes in some children are associated with the underlying maternal infections or with the macrolide antibiotics used to treat the infection. There is inconsistency in findings from previous research about whether macrolides are associated with adverse child outcomes and a lack of consensus across guidelines and authorities regarding the safety of prescribing macrolide antibiotics during pregnancy.  We propose to study the links between macrolide antibiotics, maternal infections, and potential adverse outcomes such as CP or epilepsy in children whose mothers were prescribed antibiotics in pregnancy. Our study also aims to scope key factors with the potential to influence the impact of macrolides such timing and type of macrolide antibiotics. |
| Obesity; Diabetes, Cardiovascular disease; Cancer; Ethnicity | Defining obesity cut-off points for the risk of type 2 diabetes, cardiovascular disease, and cancer among minority ethnic groups: a prospective cohort study using national linked electronic health records (19\_035) | Rishi Caleyachetty (University of Warwick) | People who are obese have excess body fat and are on average more likely to have long-term health problems like diabetes, heart attack, stroke and some types of cancer. Body mass index (BMI) is used to measure body fat. BMI uses your height and weight to work out if your weight is healthy. The BMI calculation divides an adult's weight in kilograms by their height in metres multiplied by itself (weight / (height x height)).  According to the NHS, an adult with a BMI of 30 or above is obese. This is based on the increased chance of death for adults from White ethnic groups at a BMI of 30 or above. Adults from minority ethnic groups including those from black, South Asian, Chinese, and Arab ethnic groups may experience increased risk of health problems or death at lower BMIs than white ethnic groups.  We do not have the correct BMI values for obesity for people from minority ethnic groups. Our research will produce new BMI values for obesity to assess risk for diabetes, heart attack, stroke, cancer (bowel cancer, breast cancer), and death, separately, among Black (Caribbean, African), South Asian (Indian, Pakistani, Bangladeshi), Chinese, Arab, and mixed ethnic groups.  To do this, we will analyse patient data routinely recorded by people’s general practitioner linked to hospital records in England. We will identify BMI values among adults from minority ethnic groups that match a BMI of 30 in white populations in relation to developing diabetes, a heart attack, stroke, cancer or death. |
| Non-cardiovascular diseases; cholesterol | Low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, triglyceride and diverse non-cardiovascular diseases: a population-based cohort study of England using linkage dataset (18\_322) | Harry Hemingway (UCL) | It is generally agreed that high levels of low-density lipoprotein cholesterol (LDL-C, which is regarded as a bad blood lipid) and triglyceride (TG), but low levels of high-density lipoprotein cholesterol (HDL-C, which is regarded as a good blood lipid), can lead to cardiovascular disease. However, some studies suggested that low LDL-C, and perhaps high HDL-C and high TG, might increase the risks of other diseases, such as, some eye diseases, Alzheimer’s disease, Parkinson’s disease, diabetes, cirrhosis, some respiratory and autoimmune diseases. However, limitations of existing evidence make it difficult to draw any conclusion. This study aims to investigate whether or not low LDL-C, high HDL-C and high TG, levels are associated with increased risks of these diseases and all-cause deaths. Use of the data from a very large number of people in England will provide comprehensive information with a wide range of cholesterol levels and variety of clinical outcomes during over 20 years of follow-up. Our study will include those who have a baseline blood lipids measurement while free of these specified diseases. We will employ statistical methods to examine whether blood lipids levels are related to the first diagnosis of these diseases. The finding of the study will provide new insight into the role of blood lipids across the whole range of values. |
| Cancer | Understanding the predictive values of symptoms, prescriptions, and investigation patterns for cancer and non-neoplastic disease in primary care consultees (18\_299R) | Georgios Lyratzopoulos (UCL) | In recent decades we have seen major improvements in patient safety, but most of these efforts focused on making treatment safer, underplaying the critical importance of accurate and timely diagnosis. The 2015 (US) Institute of Medicine report ‘Improving diagnosis in health care’ has highlighted diagnostic delays across different diseases (including cancer) as a major problem for contemporary healthcare systems. Motivated by these realisations we will generate evidence to help improve the accuracy and timeliness of diagnosis in patients who present with symptoms in primary care. We will interrogate the rich CPRD data about events that occur before diagnosis (consultations, prescriptions, and investigations) in patients with symptoms, and which of these patients are then diagnosed with cancer or other serious illnesses. Our findings will update and strengthen current evidence about how presenting symptoms can be interpreted. They will provide the basis for updating clinical practice guidelines to support doctors, when they have to decide whether to refer or investigate a patient for suspected cancer or other serious illness, or to actively monitor them. |
| Lung diseases | Fibrosing lung diseases: determinants, prognosis, and disease prediction (18\_291) | Harry Hemingway (UCL) | Fibrosing lung diseases (FLD) are a group of chronic diseases that shrink and stiffen the lungs. Patients live for only short period from diagnosis, and case numbers have been increasing every year. Moreover, FLD is often misdiagnosed and managed inappropriately resulting in a higher death rate. This study aims to identify FLD patients, with particularly emphasis on idiopathic pulmonary fibrosis (IPF), by systematically extracting information on diagnoses, prescriptions, patients’ characteristics and symptoms recorded in general practices (GPs), hospitals, and death registry. We will include patients aged 40 years and older without a history of FLD and follow them up until they transfer out of their GPs, have an FLD diagnosis, die, or end of study period. We will further monitor these patients for disease progression. Follow-up data will examine various issues, including 1) what are the risk factors of disease, 2) how is disease progressing over time, 3) which medications can lower risk of disease, and 4) how can we predict who will develop disease and how long they can survive after diagnosis. Findings from this study  can improve understanding of FLD, improve quality of care and management, and provide insight into preventive strategies for FLD. |
| Cardiovascular disease; homeless | Cardiovascular disease in homeless individuals: epidemiology, risk prediction and management (18\_283R2) | Ami Banerjee (UCL) | Cardiovascular Diseases (CVD) are the largest burden of disease in the National Health Service (NHS) and one of the commonest causes of death among homeless individuals. CVD are a group of conditions affecting the blood vessels and heart, both acutely (e.g. heart attacks, stroke) and chronically (e.g. angina). There have been great advances in the last forty years in both treatment and prevention of CVD. However, recent policy initiatives to tackle CVD fail to mention homeless populations, and the majority of health programmes targeting homeless individuals focus on communicable diseases, ignoring CVD. Homeless people are at a risk of developing illness earlier in their lives and with homelessness rising, the impact of CVD is likely to increase. The national burden of CVD among homeless people and current use of CVD services is unknown.  Our research will investigate the burden and range of CVD together with current management and service use within the NHS using routinely collected health data. We will identify existing strategies for CVD and their impact on the health of homeless populations. Our research can inform policymakers, general practitioners (GPs) and hospital doctors in the detection, prevention and treatment of CVD in homeless individuals in the NHS. |
| Pneumonia | Identifying population groups at risk of avoidable hospitalisations for community acquired pneumonia in the UK (18\_265R) | Julie George (Surrey County Council) | Every year about 1% of the UK population will develop pneumonia. Between 20-40% of these people will have to stay in hospital to be treated. Some of these hospital stays could be avoided through better out of hospital healthcare and public health programmes. Any unplanned hospital stay is hard on patients, can affect planned health services and costs the local health service extra money. Being able to identify which groups of people are at risk of a hospital stay for pneumonia will help to target prevention programmes to their needs.  This study will use data from the health service, as well as death certificates, to build tools which can identify groups of people at risk of a hospital stay for pneumonia. The study will also describe these groups – for example, how long they stayed in hospital, how many died, and how many had to come back to hospital after they went home. We will work with NHS staff who plan health services to develop these tools. In this way, any tools we develop should help planners to make care for patients at risk of pneumonia better. |
| Dementia | The Natural History and heterogeneity in progression of Dementia in the United Kingdom (18\_228) | Caroline Dale (UCL) | Dementia is a devastating condition that places major burdens on patients, carers and society. Despite this, very  few large studies have attempted to describe what happens to people after they receive a diagnosis of dementia.  We aim to describe the healthcare experience of people with dementia from the time they are diagnosed until their death. To do this we will bring together the different information held in nationwide databases from GPs, hospital admissions, cancer and death registries.  We will identify different clinical pathways experienced by dementia patients, including those within established clinical sub-groups of dementia (e.g. Alzheimer’s, vascular dementia). We also want to describe how dementia interacts with other health conditions common in older people; for example dementia in patients with type-2  diabetes or stroke.  This work is important as there is currently no “cure” for dementia, only a handful of medications that help with symptoms for a limited amount of time. By understanding more about the different clinical pathways of dementia patients we aim to identify opportunities to help improve their care by meeting the specific needs of these patients.  Findings will also help inform allocation of NHS resources and could improve design of clinical trials to find new medications. |
| Heart failure, atrial fibrillation, ACS | Improved characterization of the overlap syndrome of heart failure, atrial fibrillation and acute coronary syndromes (18\_217R) | Ami Banerjee (UCL) | Heart failure (HF), atrial fibrillation (AF) and acute coronary syndromes (ACS) are three of the most common cardiovascular diseases (CVD) affecting the world’s population. They frequently coexist, but are studied separately in terms of risk factors and outcomes. There is variation in definitions of these diseases across guidelines and study designs. Machine learning (ML) is a field of computer science that uses artificial intelligence to learn relationships or patterns from the data with or without the need to define them a priori. ML has been used to identify novel disease definitions, but these analyses have been restricted to single diseases and smaller samples which may not be representative of the whole population.  This study will investigate if it is possible to discover new subtypes in individuals with overlapping HF, AF and ACS. ML approaches will be used to assign patients into groups according to their clinical features (e.g. diagnoses, lab results).  Better characterisation of the overlap syndrome may improve prediction of the risk of particular outcomes, as well as providing novel insights into mechanism of action of current and new therapies. Definitions identified in this project can be validated in other EHR studies for routine use in research and practice |
| Diabetes | Do NHS Health Checks improve patient’s Diabetic Healthcare outcomes? A population-based study using the CPRD (18\_176) | Rob Aldridge (UCL) | Launched in 2009, the NHS Health Check (NHSHC) is a public health intervention aimed at identifying patients who have a high risk of developing Heart Disease, Diabetes, Kidney Disease and Stroke. The NHSHC helps patients manage their risk by referring them to programmes aimed at enabling lifestyle changes. However, there is no definitive research into the NHSHC’s effectiveness with studies suggesting that similar programmes have negligible impact on healthcare outcomes. There is currently a lack of evidence evaluating the NHSHC, leading academics to demand more research. Whilst research has contributed information on the uptake of the NHSHC, these studies have not evaluated the long-term diabetic outcomes between participants and non-participants of the NHSHC. Using the Clinical Practice Research Datalink (CPRD), we will filter those who are eligible for the NHSHC and from this subset, we will classify patients by participation status. We will then compare Diabetic outcomes (e.g. a diagnosis for Diabetes including Chronic Kidney Disease, Diabetic Retinopathy, Diabetic Foots complications and diabetic related deaths) between eligible patients who did and did not have an NHSHC. To generalise our findings, we will replicate this study with the NHS Diabetes Prevention Programme (NHSDPP) data to evaluate Public Health Intervention’s effect on Diabetic healthcare outcomes. |
| Heart failure | Differences in Heart Failure Care and Survival: A Comparison between United Kingdom, Sweden, Netherlands and Spain using Linked Electronic Health Care Records (18\_159R) | Folkert Asselbergs | Heart failure (HF) is a disease where the heart is unable to sufficiently pump blood to maintain proper blood flow in the body. A potential cause of HF could be myocardial infarction (MI), caused by the blockage of the blood vessels supplying blood to the heart itself. MI and HF are closely related health problems which force a serious burden on both the patient and the society. Components of health care systems, length of hospital admissions, number of comorbidities and medication use could be related to HF hospitalisation or death. Therefore, this study wants to 1) compare HF care and death between several European countries and, 2) see how MI and HF interplay in a modern era with advanced technology in different health care systems. In this study we hope to give an overview of the status of HF and MI care as well as potential differences in patient outlook in several European countries. Furthermore, we want to highlight differences that could be associated with medication use and death. We hope to create insight in the burden of HF and MI based on real-world evidence. |
| Dementia | Using electronic health records to assess effectiveness of national policy in dementia recognition in the UK (18\_141R) | Spiros Denaxas (UCL) | Tackling dementia has rapidly become a key priority for UK national policy, in order to address the burden of the disease, affecting over 850,000 people in the UK (1), incurring a cost of over £26 billion per annum (2). In the last two decades, there have been a range of national policies, new medications introduced, and ever-increasing awareness of the disease amongst the public and clinicians. However, it is estimated that only two thirds of those with dementia have received a formal diagnosis, and diagnoses are delayed by up to three years.  This study aims to use health information from primary care to evaluate the impact of key national policies on dementia monitoring and diagnosis in order to understand which interventions have been most effective in improving the diagnosis rates of a disease so often underdiagnosed.  With an ever-growing focus on early detection and diagnosis of dementia, the results of this study will look to inform which approach in national policy has been the most effective in incentivising dementia recognition, and as a result how best to design policies around identifying patients earlier in their disease trajectory and providing better care. |
| Alzheimer’s disease | Alzheimer’s disease subtype discovery in electronic health records using cluster analysis (18\_111R) | Spiros Denaxas (UCL) | Alzheimer’s disease (AD) is the most common form of dementia affecting 850,000 people in the UK. Patients with AD can have a mixture of symptoms. This study will investigate whether there are distinct groups of patients that have a similar set of symptoms using a mathematical method called cluster analysis. Previously this type of research has been carried out using information from brain imaging and memory tests, however never in patient’s health records to date. As healthcare data is collect during across time, this will enable us to describe how the disease progresses, which might help distinguish AD groups for whom the disease progresses differently. Using this we can predict what is likely to happen to each patient who is diagnosed with AD. Lastly better understanding of these individuals may also help inform diagnosis for a proportion of individuals with dementia but for whom no further diagnosis exists. We will compare these patients to diagnosed AD patients to see if they are similar enough to indicate that they actually have AD. This research will help to inform AD patient management by finding hidden subtypes. |
| CHD, subsequent events | Identifying and Evaluating Modifiers of Subsequent Event Risk among Patients with Established Coronary Heart Disease (18\_029R2) | Riyaz Patel (UCL) | More people are surviving and living with coronary heart disease (3 million people in the UK). Some go on to have further heart problems after their first heart disease event and die prematurely, while others do not. Despite our knowledge about what causes heart disease and how to prevent it (smoking cessation, diet, exercise), we know little about factors that affect the chances of progression to a second event - which may be different. As a result we can’t tell who is at higher risk for further problems and are limited to treating the usual risk factors we know about for first events, with little evidence supporting this approach,.  In this proposal we plan to use anonymous GP and hospital records to (1) see whether our usual cardiovascular risk factors are still important in people once they have developed heart disease (2) which other risk factors and diseases are relevant for disease progression (3) whether any existing drugs we already use for other conditions have any useful effects for this group and (4) whether we can combine this information into a risk score to try and better identify those at greatest risk of recurrent or subsequent heart problems. |
| Weight change, CVD | Weight change and the onset and progression of cardiovascular diseases in a large scale cohort study from linked electronic health records (18\_010R2) | Michail Katsoulis (UCL) | Weight, weight change and obesity have all been shown in research to be associated with an increased risk of particular diseases although scientific findings to date are conflicting. In this project, we will make use of data collected from hospitals and primary care during routine clinical care to investigate the trends of weight change, along with their relationship with heart diseases. At first, we will calculate how weight changes over time at different population groups. We will also estimate the effect of different weight change patterns on cardiovascular disease and examine whether these relationships are modified at different groups of patients. A relative advantage of this study is that clinical trials, that are considered the gold standard in medical research, cannot enroll large number of participants and follow them up for a sufficient period of time to evaluate the impact of weight loss or increase on less frequent heart diseases. Finally, we will examine to what extend weight change can be useful for predicting different heart disease. |
| Methods | Methodological guidelines for the use of regression discontinuity designs in clinical settings (17\_244R) | Luke Keele (Georgetown University) | Information about patients and the care they receive is routinely collected in public hospitals and general practices. Clinicians and government agencies use this information to complement evidence from clinical trials to evaluate the benefits of different treatment options.  Unlike trial data, routine data are not collected for research purposes, and hence the investigator has no control over the way patients are allocated to different groups. In these settings, one approach that can help ensure that different groups of patients are comparable is to allocate patients according to the value of a prognostic factor. For example, anti-hypertensive drugs may be only given to patients whose blood pressure exceeds a certain level. Patients whose blood pressure is just below or above that level are expected to have similar characteristics, but may receive a different treatment. As a result, any differences in health outcome (e.g. mortality) between the treatment groups can be directly attributed to differences in treatment (anti-hypertensive drug). This approach, known as ‘regression discontinuity (RD) design’, has received little attention in clinical research.  This study aims to develop appropriate guidance for the use of RD designs to study the effects of medical interventions on patients’ health. By doing this, we seek to clarify in which circumstances RD designs can be credibly used in clinical research. |
| HIV, CVD | HIV as a risk factor in the initial presentation of a range of cardiovascular, coronary, cerebrovascular, and peripheral arterial diseases (17\_237) | Spiros Denaxas (UCL) | Due to advances in treatment, people who have HIV (human immunodeficiency virus) are now living longer; they are, however, at risk for age-related diseases, such as cardiovascular diseases (CVDs). Compared to people who do not have HIV, people who have HIV have higher risk of heart attack or stroke later in life. It is unclear if, compared to people who do not have HIV, people who have HIV are also at higher risk of developing other important CVDs, such as peripheral arterial disease, heart failure, and angina. Some studies show that women with HIV have higher risk of developing heart attacks compared to women without HIV, but evidence is mixed. We expect that as people with HIV are treated promptly, live longer, and their immune status improves to levels close that in people without HIV, the risk of developing CVDs would be almost similar in the two groups; there remains little evidence of this effect. The proposed study aims to use linked general practice and hospital data to examine the association of having HIV and developing various CVDs. Findings will guide health care professionals and policymakers in prioritising interventions and reducing the health burden and costs associated with HIV. |
| Asthma, Chronic obstructive pulmonary disorder), heart failure | Asthma, chronic obstructive pulmonary disease (COPD) and heart failure: a population-based cohort study of disease sub-classification, disease coexisting, and the underlying biological mechanism (17\_230R) | Harry Hemingway (UCL) | To improve quality of patient care, we need to identify disease subtypes and coexisting. Our purpose is to develop the way to correctly identify patients with different subtypes of asthma, chronic obstructive lung disease, and heart failure electronically recorded in general practices or hospitals, and examine the coexisting of these diseases. To achieve these, first, we will identify subtypes of diseases according to practical guidelines. Second, we will use related codes on diagnoses, prescriptions, and laboratory measurements to create algorithms for mapping COPD or HF patients into six groups, including patients with either COPD or HF, patients who firstly had COPD then developed HF or vice versa, those who had both diseases simultaneously, and individuals without enough evidence to prove diagnoses. Then death rate and clinical characteristics, such as gender, age, chronic conditions, and health behaviours of each group will be compared. Lastly, we will examine whether COPD patients who further develop HF have different levels of markers reflecting degree of inflammation, such as c-reactive protein, white blood cells, and uric acid compared with individuals who do not develop HF. Our results can lead to other research in this field, which ultimately aims to improve a quality of patient care. |
| Methods | Improving statistical methods for estimating treatment effects from electronic health records in health economic evaluation (17\_215) | Manuel Gomes (UCL) | Information about patients and the care they receive is routinely collected in public hospitals and general practices. Government agencies use this information to evaluate the benefits and value-for-money of different treatment options, for example for managing long-term conditions such as heart disease. However, policy-makers are worried that the incorrect use and interpretation of routine data may lead to incorrect decisions and poor use of taxpayer’s money. Unlike clinical trials, routine data are not collected for research purposes. Therefore, the investigator has no control over the way patients are allocated to different treatment groups. In such studies, the resulting treatment effect may be misleading (confounded) because there are common factors which affect both the treatment patients receive and how well they respond to that treatment. This problem is known as confounding. Additionally, routine data tend to be incomplete because patients often do not respond to health questionnaires or fail to attend routine appointments.  This study will address these concerns by carefully developing, comparing and translating statistical methods to address confounding and non-response in health economic evaluation that use routine data. By achieving this, the proposed research will help future studies to provide more reliable evidence of which treatments are most worthwhile. |
| CVD | Investigating mortality risks up to and after the first presentation of cardiovascular disease: a CALIBER proposal using linked CPRD-MINAP-HES-ONS data (17\_209R) | Harry Hemingway (UCL) | Cardiovascular disease (CVD) is a class of illness involving the heart or blood vessels. In the past, studies have tended to look at either the development of new CVD in healthy people or the progression of CVD in patients who already had the disease. Studies that examine both CVD development and progression are rare, but allow researchers to compare the risk of death in healthy people and patients with different types of CVD. This comparison may help identify patients at particular risk of death, for example in men compared to women, ethnic groups, and across different age groups. It will also allow researchers to study whether patients at greater risk of death differ from low-risk patients in terms of the care they received and what their risk factors are. The results may allow researchers to identify how doctors can ensure the best care for all patients. We therefore use data available for patients admitted to hospital with CVD in England linked to general practice and death certificate data to investigate what people then go on and die from in healthy people and CVD patients. |
| Atrial fibrillation | Natural History of Atrial Fibrillation in the United Kingdom (17\_205RMn2) | Rui Providencia (UCL) | Atrial fibrillation (AF) is the most frequent arrhythmia in clinical practice and it is associated with an increased risk of death. We aim to clarify the natural history, causes of hospitalization and death in patients diagnosed with AF, and ascertain which (if any) are more frequent in patients with this arrhythmia. AF can behave in very different ways, and we want to identify and characterize different presentations of AF within AF patients in the UK (i.e. AF in patients with cancer, dementia, and heart failure). We will be using a nationwide database with patient information collected by GPs, and hospital admissions, for identifying patients with a diagnosis of AF. These patients will be compared with similar patients without arrhythmia (i.e. controls). This may allow us to identify individuals with a higher risk of specific types of mortality/comorbidities (i.e. cardiovascular, cancer, dementia, heart failure, etc.). This is of importance, as these individuals may benefit from particular forms of treatment (drugs, control of risk factors, healthier life-style measures, etc.) if identified in early stages of disease. Also, we may identify potentially correctable causes of death that may be more frequent in this patient-group, and that we may currently be neglecting. |
| Cancer | Developing a Clinical Decision Support Tool for the Early Diagnosis of Malignant Tumours of the Pancreas (17\_173RA2) | Stephen Pereira (UCL) | Background: Pancreatic cancer is often diagnosed at an incurable stage when it has already spread outside of the pancreas. This is because until the cancer is quite advanced, it does not cause specific symptoms. However, patients often present to their GP several times before diagnosis with symptoms that could be a sign of early pancreatic cancer. Identifying these patients earlier could lead to earlier diagnosis when the cancer is less advanced, so more patients could undergo surgery with potential cure. Purpose of the study: Using the CALIBER resource of over ten million patients, we will compare the symptoms of patients later diagnosed with pancreatic cancer to patients with the same symptoms who did not have pancreatic cancer. We will also look at their medical history and medications to identify other risk factors for pancreatic cancer. Potential importance of the findings: We aim to create an electronic risk calculator (known as a ‘clinical decision support tool’). After reviewing a patient with suspicious symptoms, doctors could enter in the patient’s risk factors and other relevant medical information and the tool would estimate the risk that that patient’s symptoms are caused by pancreatic cancer, prompting referral for further investigations or a specialist opinion. |
| Type 2 diabetes | Utility and performance of prognostic algorithms for cardiovascular disease in type 2 diabetes patients (17\_155RMn2) | Floriaan Schmidt (UCL) | Diabetes increases the risk of heart disease (heart attack and stroke). While most patients receive treatments to manage heart disease risk, long-term interventions are costly and not without risks themselves. Ideally, treatments should be tailored to those in most need, who will likely benefit most as well.  A number of heart disease prediction rules are available, aiding medical professionals in quantifying a patients’ risk, and tailoring treatment regimes. It is currently unclear: which prediction rule performs best in the United Kingdom, if rules predicting any heart disease are sufficient or if heart disease specific rules are more relevant (e.g., separately predicting heart attack or stroke), and whether there is a need for subgroup-specific rules (e.g., for gender, age, duration of diabetes). Finally, it is unclear after how much time rules should be updated to correct for changes in patient- and treatment-characteristics, and whether the usual practice of predicting 10 years risk is sufficiently relevant for diabetes patients.  By harnessing electronic healthcare data, we will for the first time, systematically compare prediction rules within the same data, tackling the above stated knowledge gaps and deriving novel prediction rules accounting for difference between patients, and type of heart disease. |
| Cancer | The associations between inFLAmmatory and non-inflammatory oral Mucosal diseases and hEad and Neck squamous Cell carcinOma (FLAMENCO) (17\_078R) | Stefano Fedele (UCL) | Head and neck cancer (HNC) is a significant public health problem worldwide due to its high mortality and morbidity. It is classified as one of the ten most common cancers that present in human body. Most head and neck cancers arise from the lining of the mouth and throat. Certain factors such as tobacco use, alcohol consumption and human papilloma virus (HPV) infection are well documented as major risk factors. Other common chronic oral diseases are known to increase the risk of HNC development. These include oral lichen planus, oral submucous fibrosis, leukoplakia, and periodontal diseases.  In the UK, little is known about the relationships between these diseases and HNC. Consequently, it is unclear whether individuals with HNC arising on the background of these diseases might have more aggressive behaviour comparing to others without. Previous studies suggested that following their primary cancer; these patients were likely to develop more cancers in the mouth and throat and hence increase the rate of death. In our study, we plan to use data from a large number of patients in order to assess the association between these common oral diseases and the development of HNC. The finding of the study will improve our knowledge about the behaviour of this cancer in these oral diseases as well as gather information that could help doctors to improve their management of patients with/without risk of HNC |
| Liver disease | Using electronic health records to identify patients at high risk of severe liver disease (17\_067R) | Andrew Hayward (UCL) | Liver disease causes more and more deaths in the UK. There are several reasons why the disease can develop from several reasons including viral infections, heavy alcohol use, being very badly overweight, or some reactions to medicines. ReceivingGetting a new liver through a transplant can help treat serious disease but a new liver can be found only for less than 5% of seriously ill patients and most of these patients will never see a liver transplant doctor. Liver disease can be prevented and blood tests can help doctors identify patients at risk. There are, however, many high-risk patients who cannot be identified based on these tests. It is also possible that the tests indicate additional problems with other organs such as the heart. We wish to understand which patients with abnormal liver blood tests develop severe liver disease and heart problems. We also wish to understand how to better identify those high-risk patients who are not picked up using liver blood tests. We will use the Clinical Practice Research Datalink which includes GP records from about 8% of the population of the UK. This will allow us to follow up thousands of patients, identify whether they develop disease and investigate factors that may predict the development of severe liver disease |
| Epilepsy | (17\_071 approved?) | Colin Josephson (University of Calgary) | Epilepsy is a condition in which a person suffers from unpredictable seizures. It is a common disease affecting 1 out of every 100 people in the United Kingdom. In the last 40 years the risk of epilepsy his risen five-fold in the elderly.  This is becoming a major issue as health care resources are becoming increasingly strained as the population ages. This is particularly true for elderly individuals with multiple medical conditions. A diagnosis of epilepsy is expected to worsen this situation since it, in and of itself, is associated with many physical and mental health issues. Previous studies have suggested a link between epilepsy, heart disease, osteoporosis, and mental health disorders. Therefore, health care use in the elderly with epilepsy may be even greater than that of their peers without the disease. Few studies have comprehensively examined patterns and predictors of health care use in this unique patient population. We propose using large, linked primary and secondary electronic health records to determine the frequency with which elderly patients with epilepsy attend their GP practice, A&E department, and hospitals in comparison to their peers. We will then develop models to predict health care use in the elderly with epilepsy. |
| Epilepsy | Epilepsy in the elderly: optimising care for a growing, yet critically under-recognised, population (17\_064R) | Colin Josephson (University of Calgary) | Epilepsy is a condition in which a person suffers from unprovoked seizures. It is a common condition affecting 1 out of every 100 people in the United Kingdom (UK). However, epilepsy is not as common as other diseases, such as heart disease or diabetes, making it a challenge to study using traditional methods with small cohorts. This is problematic since the disease is estimated to cost over £2 billion annually in the UK. Epilepsy is also associated with a greater risk of certain other illnesses (especially mental health issues) and death.  The risk of epilepsy in the elderly has almost tripled over the past 40 years yet this population remains understudied compared to other age groups. Previous studies have suggested a link between epilepsy, heart disease, osteoporosis, mental health issues, and death. The risk of these conditions may be even higher for the elderly with epilepsy. However, the overall number of people with elderly with epilepsy makes it difficult recruit sufficient patients to draw precise conclusions. We propose comprehensively examining the risk of other physical and mental disorders, and death, in the elderly with epilepsy using large, linked electronic health records to improve care for this vulnerable and disadvantaged population. |
| Liver disease, health care utilisation | Exploring the effects of non-alcoholic fatty liver disease (NAFLD) on non-communicable disease and healthcare utilization (17\_062R) | Harry Hemingway (UCL) | Non-alcoholic fatty liver disease (NAFLD) is the term used for a build-up of fat in the liver, in the absence of significant alcohol intake. Risk factors are thought to include obesity and diabetes. It is estimated that up to one in every three people in the UK may have early stages of NAFLD. NAFLD may progress to liver scarring (non-alcoholic steatohepatitis – NASH), ultimately causing liver failure (cirrhosis). The underlying inflammation in the liver may be a further risk factor for heart disease and cancer, due to the important roles of the liver in a number of pathways including the immune system, cholesterol metabolism and blood thinning regulation. We will use a large database of electronic health records to explore a) how common NAFLD is and how often it progresses to significant liver scarring c) whether NAFLD is associated with a range of cardiovascular diseases and cancers d) how people with NASH cirrhosis use healthcare services. Our findings, may allow for new screening strategies in individuals at risk of these conditions. |
| Infection | The use and protective effect of antibiotics against complications of infection in patients in primary care: a cohort study using linked data from CPRD, HES, and ONS (17\_048R) | Andrew Hayward (UCL) | We all rely on antibiotics to treat infections, but our supply of antibiotics that work is running out. Some bacteria that cause infections have become highly resistant to antibiotics. This “antibiotic resistance” is much more likely to happen if we use antibiotics too often when we don’t really need them. In the NHS, three-quarters of all antibiotics are prescribed by general practitioners (GPs). Often antibiotics are the right treatment for patients but sometimes patients are prescribed antibiotics for viral infections like coughs and colds, where antibiotics don’t work. Some patients receive lots of antibiotics, others get them very rarely. Some GPs seem to prescribe antibiotics more often than others. The aim of this study is to use anonymous GP medical records (so individual patients can’t be identified) to find out more about when and why antibiotics are prescribed in General Practice. We want to understand why some patients get antibiotics more often than others and when patients really need an antibiotic. We will use our work to develop computer simulations to help GPs decide when to prescribe antibiotics. By reducing the number of times that antibiotics are prescribed unnecessarily we will help to keep our current antibiotics working for longer. |
| Familial Chylomicronaemia Syndrome | The Prevalence and Clinical Burden of Familial Chylomicronaemia Syndrome in the UK (17\_033RA) | Riyaz Patel (UCL) | Primary Chylomicronaemia (PC) is a genetic condition which is characterised by very high levels of a particular type of cholesterol (triglycerides) leading to frequent nausea, severe abdominal pain, regular hospitalisation with life threatening complications and can lead to further lifelong diseases including diabetes. A rare subtype of PC is called familial chylomicronaemia syndrome (FCS) and presents with severe complications early in life. Until now treatment options have been limited for individuals with PC, but recent breakthroughs mean new therapies are in development and may soon be available.  Using routinely collected electronic health data from general practices, hospital admissions and death registry sources we aim to estimate the potential number of people in the United Kingdom with PC and its rarer subtype FCS, their rates of death compared with the general population and their usage of healthcare services. We also propose to estimate the risk of acute pancreatitis and abdominal pain in these patients compared to similar patients without the disease. We will also explore the risks of PC patients developing diabetes and heart diseases long term.  With the findings of this study we aim to create an overall picture of the impact PC has on patients and healthcare services in the United Kingdom. This information will support the development and cost effectiveness analyses of new treatments for PC. |
| CVD, Methods | Selective-recruitment designs for prospective observational studies of cardiovascular diseases using primary care electronic health records (17\_032R) | Spiros Denaxas (UCL) | In order to investigate whether certain lifestyle factors or patient characteristics (such as smoking or high blood pressure) are harmful or benefical to our health researchers commonly recruit individuals onto a clinical study and follow them over time. Large databases of electronic patient health information offer a unique opportunity to organise this type of research more efficiently. Instead of researchers waiting for suitable patients to arrive at the clinic they can now potentially search electronic health records to identify eligible patients and directly invite them to participate in the study. In particular, the “most informative” patients (in terms of the study objectives) can be identified and invited to participate. Selectively recruiting the most informative individuals means that fewer patients are required for a successful study overall. This reduces costs and means that patients who are not recruited are free to participate in alternative studies instead. This allows both patients and researchers to contribute more efficiently to the acquisition of medical knowledge. Our aim is to use health records from the Clinical Practice Research Datalink to simulate studies that select the most informative patients in order to assess the potential advantages and drawbacks of this approach. |
| Dementia | Using electronic health records to facilitate earlier diagnosis of dementia (17\_019RA) | Maxine Mackintosh (UCL) | There are over 850,000 people in the UK living with dementia(1) and though there are currently no cures, early diagnosis is a key priority for the National Health Service (NHS). Presently, the primary purpose of early detection is timely access to information, services, as well as care planning. In the future, any pharmacological intervention would be applied during the early stages of disease development in order to prevent or slow cognitive decline. However, given the chronic and progressive nature of the condition, identifying dementia in its earliest stages is challenging.  Electronic health records provide a complete timeline of an individual’s health, and therefore allow us to investigate how early cognitive decline develops into dementia. In this study, we will use sophisticated analytical approaches to identify and explore what signs and symptoms are recorded in a patient’s electronic health record that could potentially help researchers and clinicians identify the early stages of cognitive decline associated with dementia.  The results of this study will make steps towards maximizing the value and use of routinely collected electronic health record data for early diagnosis of dementia, support identifying high-risk individuals, facilitate research in early-stage dementia and improve dementia care planning. |
| Heart Failure | Pharmacological Heart Failure Treatment in a Population-Based Cohort using Linked Electronic Health Records (CALIBER) (17\_015R) | Folkert Asselbergs (UCl) | Heart failure (HF) patients experience increased morbidity and mortality, and this is often accompanied by high health care costs. HF is a significant burden for both the individual patient and society and new treatment strategies are needed to manage this chronic disease. The gold standard to evaluate therapy is conducting a randomised clinical trial (RCT). RCT’s generally have strict in- and exclusion criteria, patients are usually more compliant to treatment due to frequent hospital visits and there is a relatively short follow-up duration. These conditions may not be representative of real world patients using pharmacological treatment for HF. For example, elderly individuals and women are underrepresented in RCTs. With this study we will i) investigate the validity of linked EHR data for HF research by mimicking HF trials and secondly ii) investigate the effectiveness of pharmacological HF treatments in real world patients without these and compare this to the effects observed in typical RCT patients. This study will lead to better insights of the benefits and harms of pharmacological treatment in subgroups of HF patients who are currently underrepresented in RCTs as well as determine the validity of linked EHR sources for HF research. |
| Down Syndrome | Down Syndrome: co-morbidities, life expectancy and causes of mortality (17\_009R) | Andrew Hayward (UCL) | Approximately 1 out of every 1000 new-born babies in the UK are diagnosed with Down Syndrome. Throughout their lifetime individuals with Down Syndrome are more likely to have various health problems, compared with the general population. These health problems include congenital heart disease, hormone disorders, problems with the immune system, leukaemia and disorders of the eyes and ear. Despite this, there are no accurate estimates of the proportion of individuals who have these health problems over their lifetime. There is also limited information on the causes of death.  This study aims to use a large, anonymous dataset to estimate how common specific health problems are among individuals with Down Syndrome and the causes of death. This findings will inform clinicians about the health problems they might encounter when caring for individuals with Down Syndrome; It may be possible to screen for some of these conditions, resulting in earlier diagnosis and treatment. The results will also inform patients and families about the health problems they may develop and guide researchers and funding bodies towards the areas of greatest need. |
| CVD, pre-eclampsia, pregnancy | Exploration of long term cardiovascular outcomes following pregnancy complicated by hypertensive disorders or pregnancy (16\_280RMn2A) | Fergus McCarthy (St Thomas’ Hospital) | Cardiovascular disease is the leading cause of death in the UK accounting for 31% of all mortality. Pre-eclampsia is a pregnancy specific problem which causes high blood pressure and protein in the urine and affects 3-5% of pregnancies. It is a common cause of preterm delivery as the only cure is delivery of the baby and placenta. In addition to the short term problems which result from pre-eclampsia,  women who develop pre-eclampsia are also at increased risk of long term complications which include high blood pressure and increased risk of heart attack and stroke. The impact of other hypertensive disorders of pregnancy including chronic hypertension and gestational (pregnancy induced) hypertension on long term maternal health also remains unclear. We plan to analyse data from a resource called CALIBER, which links records for millions of patients from general practitioners, hospitals and nationally recorded statistics to investigate the association between problems with high blood pressure in pregnancy and the long term risk of heart disease. This research will give vital information to help doctors understand the long term cardiac implications of women whose pregnancies are complicated by hypertensive disorders and may lead to interventions investigating the long term complications associated with high blood pressure in pregnancy. |
| Gastrointestinal diseases | Utilising electronic health records to investigate liver function tests and onset of gastrointestinal disease (16\_250R) | Harry Hemingway (UCL) | Gastrointestinal diseases are a major cause of ill health. Blood tests called liver function tests (LFTs) are commonly performed in clinical practice. Bilirubin is part of the liver function test panel, and is an important chemical as it prevents damage to the cells in our body. Some studies have suggested that higher levels of bilirubin may be protective in certain cancers (e.g. in the lung and colon) and inflammatory disorders (e.g. fatty liver disease). Other LFTs such as GGT, ALT & AST are associated with inflammation and cancer in the liver and gut. We will compare bilirubin levels (and other LFTs) with these conditions within a large database containing anonymised electronic health records. These findings may lead to the discovery of drug targets that alter the levels of these liver products in our body |
| Cancer, infection, asthma, exzema, child | Impact of affluence, atopy and childhood infections on Hodgkin’s Lymphoma incidence in the UK (16\_237) | Andrew Hayward (UCL) | Hodgkin’s Lymphoma is a cancer of white blood cells. In the UK, it affects 2,000 new people each year and this number has increased by almost 20% over the last decade. The reasons for this increase are unknown. Hodgkin’s Lymphoma can occur at any age, but is most common in teenagers and young adults. Worldwide studies have shown that the age that people get Hodgkin’s Lymphoma differs between countries and is related to the country’s wealth. Wealthier countries have higher numbers of Hodgkin’s Lymphoma and it occurs later in life. It has been suggested this could be due to children in wealthy countries having more hygienic upbringing with less childhood infections. This affects their immune system development, making them more likely to develop diseases such as Hodgkin’s Lymphoma.    This study looks at age of Hodgkin’s Lymphoma diagnosis in different social classes in the UK over time to see the effect of wealth within the UK population; and, if having childhood infections or allergic diseases (asthma, hay-fever and eczema) are risk factors for developing Hodgkin’s Lymphoma. Understanding who gets Hodgkin’s Lymphoma and risk factors for developing it will help us understand why numbers are increasing and how we can address this. |
| Cancer | Estimating the effect of statin and metformin on cancer incidence and mortality in national linked electronic health records: a CALIBER study (16\_221R) | Miguel Hernan (Harvard T.H. Chan School of Public Health) | Existing research on the association of statins (a cholesterol lowering medication) and metformin (an oral diabetes medication controlling blood sugar levels) on cancer and death are inconsistent, with conflicting results reported between observational studies and randomized clinical trials. Clinical trials often do not recruit a sufficient number of participants or do not follow participants up for a long period in order to comprehensively evaluate the risk-benefit profile of these drugs, particularly for rare outcomes such as cancer. Given the widespread use of these medications, even rare outcomes can lead to high absolute numbers and therefore raise serious public health concerns. Our research will use large existing health datasets, such as the Clinical Practice Research Datalink, combined with novel analytical and statistical methods to see if a relationship between these two medications and cancer or death exists. |
| CVD, statin | Statin Usage in England from 1997 to 2016 (16\_218) | Folkert Asselbergs (UCL) | Since their introduction almost 30 years ago, statins remain the most successful class of drugs in the prevention of cardiovascular events through reducing low-density lipoprotein cholesterol (LDL-C, also known as “bad cholesterol”). In the United Kingdom, there are five types of statins available to patients at a range of doses and regimens; their effectiveness in reducing LDL-C as evaluated in clinical trials (published 1985 - 2003) informs current guidelines of their usage in patients at risk of cardiovascular events. Against the background of improving public health and quality of health care, including a shift towards more positive lifestyle-related factors (e.g. diet, exercise, smoking cessation) and better concomitant drug use; it is therefore of great interest and importance to evaluate the dose-response characteristics in a contemporary population at scale using linked electronic health records. This study will be the most comprehensive examination of statin effectiveness in the UK to date; we anticipate its findings will provide evidence that will support current clinical practice and development of future guidelines. |
| Chronic rhinosinusitis | How do we better understand the current management of patients with chronic rhinosinusitis within the NHS? (16\_200R) | Claire Hopkins (Guy’s and St Thomas’ NHS Foundation Trust) | People with Chronic Rhinosinusitis (CRS) suffer from inflammation or infection of the nose and sinuses, lasting 3 months or more, and experience symptoms such as a blocked and runny nose, loss of smell, facial pain, tiredness and breathing problems. More than 10% of adults in the UK have CRS and this can greatly affect their quality of life.    Patients may receive a variety of different treatments from their GP such as saline nasal drops and drugs including antibiotics and some will also be referred to an Ear, Nose and Throat (ENT) specialist, when they may be offered further medical treatment or sinus surgery. However, the success of both medical treatment and surgery in treating CRS is unclear and so there may be variation across the UK in how doctors treat people with the condition.    Using electronic data collected in daily practice by GPs and hospitals, our research will investigate in detail how patients with CRS are currently treated and managed within the NHS. We will then estimate the benefits of each different treatment strategy on patients’ health and calculate the cost of those treatment strategies, informing policymakers and future practice of GPs and hospital doctors within the NHS |
| Hearing, dementia | Hearing problems in adults; mapping the patient pathway and burden recorded within the NHS (16\_185) | Hannah Evans (UCL) | Hearing is key to our ability to communicate and is a key component for health and wellbeing. Hearing loss affects people socially, emotionally and physically and has been linked to dementia, a condition in which progressive mental decline and memory loss become severe enough to interfere with daily life. It is estimated that over 10 million UK people suffer from hearing loss costing the economy £30 billion a year. With our population ageing this impact is set to increase. UK figures on healthcare utilisation for hearing loss, based on routine NHS data, are missing.  We will utilise GP and hospital data to study the adult patient pathway from initial complaint of hearing loss to the provision of hearing aids: exploring how often hearing tests are performed, hearing loss diagnoses made, and hearing aids provision are recorded in medical records. We will use this information to better understand how hearing loss impacts on healthcare utilisation and patients’ health.  This research will raise awareness of the impact of hearing loss on people and the NHS. This research is vital for future research looking into preventing and treating hearing loss and to design services that enhance healthy ageing. |
| Blood electrolytes | Understanding the role of serum electrolytes in the presentation of specific fatal and non-fatal cardiovascular disease syndromes: a research proposal using linked CPRD-HES-ONS data (16\_176RMn) | Sandosh Padmanabhan (University of Glasgow) | Blood levels of electrolytes (salts like sodium or chloride) are normally maintained within very narrow limits by a variety of mechanisms in the body. These salts are part of a standard panel of blood tests performed during medical assessment by doctors. Very high or very low levels of these salts in the blood are indicators of serious disease and require immediate treatment. However, there is evidence that minor changes in the blood levels of these salts (i.e. within the range considered normal) are markers of cardiovascular diseases like heart attacks and stroke. Thus if these tests can be used to identify those individuals at high risk of developing heart attack or stroke in the future, then this can be used for starting early preventive measures without performing additional expensive tests. Moreover, conducting a detailed study of these salts will enable us to have a deeper understanding of the possible mechanisms that is indicated by these tests and will help up discover new treatments. To do this we propose to examine the relationship between these blood tests and risk of developing or dying from a range of diseases health records within the already established CALIBER dataset. |