SECOND ANNUAL AUDIT

METHODOLOGY ANNEX

Office for Health Improvement & Disparities

CVDPREVENT

NHS Benchmarking Network

(for the audit period up to March 2021)

Using data to drive CVD prevention

HQIP
Healthcare Quality Improvement Partnership

The CVDPREVENT audit is commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP). HQIP is led by a consortium of the Academy of Medical Royal Colleges, the Royal College of Nursing, and National Voices. Its aim is to promote quality improvement in patient outcomes, and in particular, to increase the impact that clinical audit, outcome review programmes and registries have on healthcare quality in England and Wales. HQIP holds the contract to commission, manage, and develop the National Clinical Audit and Patient Outcomes Programme (NCAPOP), comprising around 40 projects covering care provided to people with a wide range of medical, surgical and mental health conditions. The programme is funded by NHS England, the Welsh Government and, with some individual projects, other devolved administrations and crown dependencies. **www.hqip.org.uk/national-programmes**

The CVDPREVENT audit aims to support quality improvement in the prevention of cardiovascular disease (CVD) in primary care in England.

This report was prepared by the NHS Benchmarking Network (NHSBN) and National Cardiovascular Intelligence Network (NCVIN) team now part of the Office for Health Improvement and Disparities (OHID). The audit is delivered by a partnership between NHS Digital, NCVIN and the NHSBN. To ensure patient involvement in the audit, the NHSBN work closely with the Patients Association.

NHS BENCHMARKING NETWORK (NHSBN)

The NHS Benchmarking Network is a member led organisation promoting service improvement in the NHS through benchmarking and sharing good practice. Members are providers and commissioners of NHS services, spanning the acute, community and mental health sectors. The NHSBN team support members in sharing data to compare service provision and performance with the aim of identifying improvement opportunities. In addition, the NHSBN run national clinical audits.

NATIONAL CARDIOVASCULAR INTELLIGENCE NETWORK (NCVIN) – OFFICE FOR HEALTH IMPROVEMENT AND DISPARITIES (OHID)

NCVIN interprets and translates complex data for national and local stakeholders, to inform policy and local decision making and to improve cardiovascular services and outcomes for patients. The team produces trustworthy cardiovascular health intelligence products including profiles and specialist analyses that are innovative and focus on user needs.

NHS DIGITAL

NHS Digital is the trading name of the Health and Social Care Information Centre, which is the national provider of information, data and IT systems. The team design, develop and operate the national IT and data services that support clinicians at work, help patients get the best care, and use data to improve health and care.

PATIENTS ASSOCIATION

The Patients Association is an independent patient charity campaigning for improvements in health and social care for patients. Uniquely for a charity with a remit covering all health and care issues, it works with patients directly: they are its members and supporters, and also the people who benefit from the charity's help and advice services. Through the Patients Association's helpline they support thousands of people each year with their concerns and queries about the health and social care system. The Patients Association speak to government, the NHS and other stakeholders about patients' priorities and concerns, to ensure the patient voice is heard and acted upon.

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1. INTRODUCTION

This document supplements the CVDPREVENT Second Annual Audit Report for the period up to March 2021 (round two). It will provide detail not available in the main report and give additional information and links to explain how the audit data is collected and analysed.

2. HOW IS THE DATA COLLECTED?

CVDPREVENT data is collected by NHS Digital by their General Practice Extraction Service (GPES). GP practices are invited to participate in CVDPREVENT through their GP clinical system via the Calculating Quality Reporting Service (CQRS). By accepting the invitation, practices opt into GP system supplier-developed queries to automatically extract their data, based on the CVDPREVENT business rules set. Data about patients who do not consent for the use of GP patient identifiable data as part of national audits or collections is not extracted, referred to as a Type 1 Opt-out. The selection of clinical data from those patients who do consent is collected using SNOMED codes, as defined in the CVDPREVENT business rules set.

System suppliers went through a testing and certification process with GPES prior to the final data extraction to highlight any issues with the data and ensure the data that was extracted was acceptable and aligned to the specification. Data are extracted, cleaned and supplied to NHS Digital. NHS Digital provides audit data securely to NCVIN in flat file format.

3. DATA CONFIDENTIALITY AND SECURITY

NHS England have directed NHS Digital to establish the CVDPREVENT audit, which will support the implementation of the NHS Long Term Plan under which cardiovascular disease is identified as a clinical priority. The direction has been raised in accordance with sections 254(1) and 254(6) of the 2012 Health and Social Care Act to establish and operate the collection and analysis of information described in the Cardiovascular Disease Prevention Audit Direction Specification. Further details on the direction can be found in the Cardiovascular Disease Prevention Audit Directions 2020.

The CVDPREVENT audit is a joint collaboration between NHS England, NHS Improvement, OHID, NHS Benchmarking Network and the Healthcare Quality Improvement Partnership. These are audit partners specified within the Cardiovascular Disease Prevention Audit Direction.

Data collected by NHS Digital is analysed by OHID's NCVIN. Patient-identifiable data (PID), that may identify an individual, such as a name, date of birth or postcode is removed and pseudo-anonymised by NHS Digital before it transfers to OHID for analysis. This means that personal data are replaced with an arbitrary unique identifier ensuring no patient can be identified whilst allowing records to be linked across different extracts.

4. DATA PROCESSING

i. CLEANING AND VALIDATION

Data were automatically extracted from GP systems in England via system supplier-developed queries and GPES. Data submissions were initially checked and certified by GPES using test submissions before data was received into NHS Digital.

Once data was supplied to NCVIN, the audit team undertook a number of checks and cleaning processes. Duplicate patient records caused by people changing addresses, moving GP practice, mislabelled records or other errors were deleted. For these patients the latest record from the Journal table (see section 'Production of analysis database') was obtained and used to update the relevant patient information included in the patient record table whilst older records were deleted.

No further data alteration or removal of data was undertaken after patient de-duplication. The selection of valid patient characteristics, date ranges and plausible clinical values were applied at the time of indicator construction.

ii. PRODUCTION OF ANALYSIS DATABASE

Data was provided to NCVIN in two compressed files. The files were loaded into a secure SQL database with managed access available only to the NCVIN CVDPREVENT team.

The database includes a patient demographic table and a clinical table. The anonymised patient table includes demographic information for age, sex, ethnicity, lower super output area (LSOA11) and the patient practice. This table also includes the cohort indicator. For further details please see the CVDPREVENT quick guide.

The second file contains the clinical records and readings for each patient. Each patient can have multiple clinical records and will include metabolic and physical readings, tests, referrals and drug and therapy prescriptions for all patients.

iii. INDICATOR PRODUCTION

The CVDPREVENT business rules set populates the audit with a subset of all the recorded clinical coding for patients.

Audit analysis was undertaken by producing indicators, which present a clinical treatment process, outcome or a count of a recorded condition. The audit cannot produce complex measures such as change in patient treatment patterns over the audit period. Indicators are defined as proportions and no variable adjustment (e.g. age, ethnicity) has been applied to any total (all persons) indicator proportions by geography in this report. Wherever possible indicators are also presented with indicator sub-analyses by sex, age group, ethnicity or deprivation.

Clinical treatment indicators that require readings or measures, for example blood pressure values, are restricted within agreed plausible value ranges, as agreed with the audit clinical lead. Plausible values are available on request for each indicator.

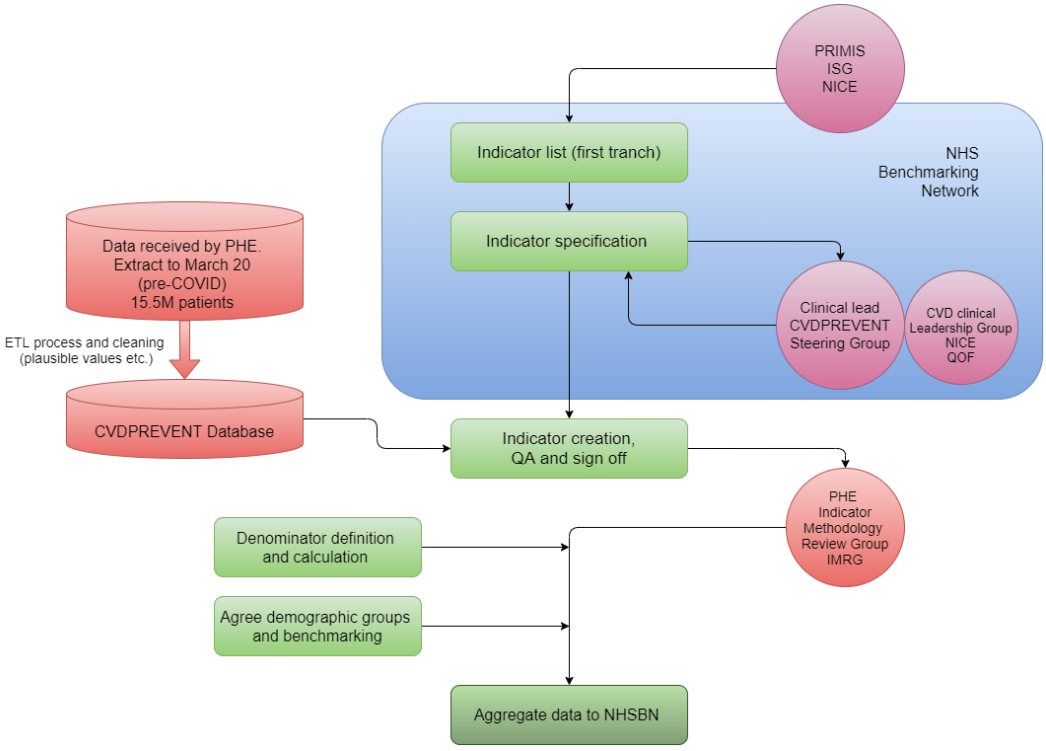
Case finder indicators search for the patients that have no coded diagnosis of any of the six high-risk conditions or existing CVD but have an entry in their record that suggest they are at risk of developing or may have an undiagnosed high-risk condition.

Patients were excluded from the final indicators who had missing data in any of the variables for age, sex or LSOA11. A 'missing' ethnic category was created for ethnic display of the indicators in order to show the impact of the large amount of missing ethnic data.

Any presentation of data by deprivation groups only includes patients who are resident within England, so the small number of practice patients who reside in Wales or Scotland but were registered with English practices, were excluded for indicators displayed by deprivation.

5. INDICATOR DEFINITIONS

Some indicators were defined prior to receipt of the data using the CVDPREVENT business rules set. A number were based on the original work from the PRIMIS feasibility study[1]. First consideration was given to indicators which related directly to the national ABC (atrial fibrillation (AF), blood pressure and high cholesterol) priorities. All indicators were described and defined by the combined CVDPREVENT team (NCVIN and NHSBN) with clinical overview from the CVDPREVENT (workstream 3) clinical lead, input from the CVDPREVENT Audit Steering Group and methodological support from PHE's Indicator Methodology Review Group. The second round of indicators were defined in the same way.



The agreed indicators are listed in the table below:

[1] The University of Nottingham: PRIMIS team (2018). CVDPREVENT: A National Primary Care Audit. Feasibility Report. https://www.bhf.org.uk/for-professionals/healthcare-professionals/innovation-in-care/cvdprevent

6. FIRST & SECOND ROUND INDICATORS

First Round	
Prevalence of GP recorded atrial fibrillation in patients aged 18 and over.	CVDP001AF
Prevalence of GP recorded hypertension in patients aged 18 and over.	CVDP001HYP
Prevalence of GP recorded chronic kidney disease with classification of categories G3a to G5 (previously stage 3 to 5) in patients aged 18 and over.	CVDP001CKD
Prevalence of GP recorded possible, probable or confirmed familial hypercholesterolaemia all ages.	CVDP002FH
Prevalence of genetically confirmed familial hypercholesterolaemia all ages.	CVDP003FH
The percentage of all patients (male and female) aged 18 and over with GP recorded atrial fibrillation and a record of a CHA2DS2-VASc score of 2 or more who are currently treated with anticoagulation drug therapy.	CVDP002AF
The percentage of patients aged 18 to 79 years with GP recorded hypertension, in whom the last blood pressure reading within the preceding 12 months is equal to 140/90 mmHg or less.	CVDP002HYP
The percentage of patients aged 80 years or over, with GP recorded hypertension, in whom the last blood pressure reading within the preceding 12 months is 150/90 mmHg or less.	CVDP003HYP
The percentage of patients aged 18 and over with GP recorded hypertension who have had a blood pressure reading within the preceding 12 months.	CVDP004HYP
The percentage of patients aged 18 and over with GP recorded CVD (including CHD, stroke, TIA and AAA), with a previous prescription for lipid lowering therapy.	CVDP001CHOL
The percentage of patients aged 18 and over with GP recorded chronic kidney disease with classification of categories G3a to G5 (previously stage 3 to 5), with a previous prescription for lipid lowering therapy.	CVDP002CHOL

Second Round	
Prevalence of GP recorded cardiovascular disease (wide definition) in patients aged 18 and over.	CVDP001CVD
Percentage of GP registered patients aged 18 and over, with 2 low eGFRs (<60ml/min/1.73m2) and no GP recorded CKD categories G3a to G5 (previously stage 3 to 5).	CVDP002CKD
Percentage of GP registered patients aged 18 and over, where the latest eGFR reading is low (<60ml/min/1.73m2) with no GP recorded CKD categories G3a to G5 (previously stage 3 to 5).	CVDP003CKD
Percentage of patients aged 18 and over with GP recorded CKD categories G3a to G5 (previously stage 3 to 5) with a record of a urine albumin:creatinine ratio (or protein:creatinine ratio) test in the preceding 12 months.	CVDP004CKD
Percentage of patients aged 18 and over, with GP recorded CKD categories G3a to G5 (previously stage 3 to 5), hypertension and proteinuria, currently being treated with renin-angiotensin system antagonists.	CVDP005CKD

Percentage of GP registered patients of all ages, whose cholesterol values are in the at risk range (TC >=7.5mmol/l aged 29 and under or TC >=9.0mmol/l aged 30 and over) for FH with no GP record of FH diagnosis or investigation.	CVDP004FH
Percentage of GP registered patients aged 18 and over, whose latest blood pressure value is in the at risk range (systolic >=140mmHg and diastolic >=90mmHg) for hypertension with no GP recorded hypertension.	CVDP005HYP
Percentage of patients aged 18 and over with GP recorded hypertension, prescribed at least one anti-hypertensive treatment with last systolic BP 100mmHg or less and a subsequent antihypertension medication prescription date.	CVDP006HYP
Percentage of patients aged 18 and over, with a GP recorded QRISK score of 20% or more, on lipid lowering therapy.	CVDP003CHOL
Percentage of patients aged 18 and over, with a GP recorded QRISK score of 10% or more, on lipid lowering therapy.	CVDP006CHOL

7. DATA QUALITY REPORT

i. COVERAGE

CVDPREVENT is a sample dataset from all practices in England. The collection process requires GP practices in England to 'opt in' to the extraction. Individual patients can also request that their data is not included.

There are several ways of measuring participating rates for practices - the 93% quoted in the Second Annual Audit Report is the NHSD Calculating Quality Reporting Service (CQRS) participation rate i.e., the percentage of total practices in England that agreed to participate in the audit. This is as at 1st June 2021. Data reported in the First Annual Audit Report (including patients registered with a practice on 31st March 2020) were extracted from the GP systems in January 2021 and at this time the NHSD CQRS participation rates were 91%. However, there are several reasons why data may not be included from all the practices who have signed up to CVDPREVENT such as supplier choosing not to participate in the extract due to its complexities (e.g. Cegedim), dormant practices, etc. The practice coverage (for analytical purposes) is therefore calculated as the number of practices for which data has been received as a proportion of practices in England. This coverage was 79% for the base extract used in the First Annual Audit Report rising to 93% for the extract of data used in the Second Annual Audit Report (patients registered with a practice on 31st March 2021).

The population coverage was calculated from the GP list size of contributing practices against the total GP patient registered population in England. List sizes are taken from the time period closest to the CVDPREVENT audit extraction date. The population coverage is calculated at England, clinical commissioning group (CCG), strategic transformation partnership (STP) and primary care network (PCN) areas and is displayed in the CVDPREVENT Data and Improvement Tool.

ii. MISSING DATA AND SPECIFIC DATA ITEM ISSUES

There was 0.2% of missing data across LSOA11, sex and age fields. However, the ethnicity code was missing for over a fifth (21%) of patients in the first extract, this was lower for the second extract at 18.3%. The amount of missing data due to individual patient opt-outs in any practice is unknown.

Plausible values were determined for treatment readings used in the construction of CVDPREVENT indicators as described below (8iii).

8. ANALYTICAL ISSUES

i. DATA PERIOD

Practice list sizes are not constant and on a national level practices constantly open, close and merge together. Practices also operate within PCNs and CCGs which change and do not have defined geographical boundaries. This complicates the reporting of primary care data and has been exacerbated by the considerable delay in the data being extracted from practices. The base extract included people who were registered with a practice on 31st March 2020, and who were selected into the CVDPREVENT audit with qualifying conditions set out in the CVDPREVENT business rules set. The system suppliers took data from practices in January 2021 and included all relevant data to the end of March 2020 to form the base extract. This time lag meant there was an intervening period of 10 months during which there were changes to organisational structures and patient movement. As a result, the distribution of patients in our base extract does not accurately represent the GP registered populations in March 2020. It has therefore not been possible to determine accurate list sizes and reliably map practices to PCNs. This is particularly problematic when calculating prevalence values which require a baseline (denominator) from published population figures and for this reason the prevalence indicators are only reported at CCG geographies and above.

The second extract was taken from practices in May 2021 and included people registered at 31 March 2021.

The first round of clinical indicators are published at PCN level using the May 2021 GP to PCN mapping which are not the same as at the extract end date (March 2020). The second round of indicators used GP to PCN mapping from December 2021.

ii. CALCULATION OF PREVALENCE INDICATORS

The indicators include GP recorded prevalence and clinical treatment indicators. The term GP reported refers to 'General Practice' reported, which means that records from any member of the General Practice team are included in the counts. For all the prevalence and treatment indicators patients who have a specific condition resolved code have been removed from the numerator or denominator of the indicator prior to analysis.

The numerator of the GP recorded prevalence indicators count the number of people with a GP record of the condition, after any people with a resolved disease code are removed. The denominators of the indicators are the GP list sizes published by NHS Digital taken from the time period closest to the CVDPREVENT audit extraction date (please see below). All age and age specific GP recorded prevalence have been calculated (age groups: 18 to 39, 40 to 59, 60 to 79, 80 and over).

- Atrial fibrillation

CVDP001AF (round one) this indicator includes all patients over the age of 18 with GP recorded AF without a subsequent resolved AF code present in the record.

- Blood pressure

CVDP001HYP (round one) includes all patients over the age of 18 with GP recorded hypertension without a subsequent resolved hypertension code present in the record.

- Chronic kidney disease

CVDP001CKD (round one) includes all patients over the age of 18 with GP recorded chronic kidney disease with classification of categories G3a to G5 (previously stage 3 to 5).

- Familial hypercholesterolaemia and hyperlipidaemia

Two round one hyperlipidaemia indicators were developed. The first used NHS Digital defined codes to describe probable, possible and confirmed FH (CVDP002FH). The second (CVDP003FH) describes the prevalence of genetically confirmed FH, based on a refined set of codes developed in conjunction the CVDPREVENT (workstream 3) clinical lead and advice from an external clinical stakeholder, as a subset of the NHS Digital codes for genetically confirmed FH. Both the indicators looked at patients of all ages. The code sets used to calculate these indicators are available on request.

- Cardiovascular disease

CVDP001CVD (round two) indicator includes all patients over the age of 18 with GP recorded cardiovascular disease including coronary heart disease (CHD), stroke, transient ischaemic attack (TIA), peripheral arterial disease (PAD), heart failure and abdominal aortic aneurism (AAA).

iii. CALCULATION OF TREATMENT INDICATORS

Details of the SNOMED codes and rules for the indicator definitions are available on request from NCVIN ncvin@phe.gov.uk

For the treatment indicators the numerators and denominators are generated from within the audit collection. The denominator includes all people who are technically eligible for an intervention and the numerator is the number of people receiving the intervention. CVDPREVENT does not collect all codes which GPs use to indicate that the patient may not benefit from treatment or have opted out of treatment through personal choice. This means that some patients who are not clinically eligible for treatment may appear in the numerator and the denominator of the treatment indicators.

- Atrial fibrillation

Indicator CVDP002AF (round one) measures the proportion of patients over 18 with AF (and no code for resolved AF) and a CHA2DS2-VASc or CHADS score of 2 or over who have a prescription for anticoagulation in the previous 6 months.

- Blood pressure

Round one indicators CVDP002HYP and CVDP003HYP measure the proportion of patients achieving the appropriate age-related threshold reading for blood pressure in the last 12 months. Blood pressure readings falling outside the agreed plausible range were not included: Plausible values for systolic readings are between 70 and 300mmHg and diastolic blood pressure values between 20 and 150mmHg.The third round one blood pressure treatment indicator, CVDP004HYP measures the proportion of patients who have had a blood pressure reading recorded in the last 12 months.

- Cholesterol

Introduced in round one, CVDP001CHOL, measures the proportion of patients with GP recorded CVD (including stroke, AAA, CHD and TIA) who have received a prescription for lipid lowering therapy, based on their most recent prescription date, but including prescriptions at any time. Also for round one, CVDP002CHOL is the proportion of patients with GP recorded CKD of categories G3A to G5 (previously stage 3 to 5) in their record who have a prescription for lipid lowering therapy, also based on the most recent prescription date.

A further two cholesterol indicators were introduced in round two. They measure the proportion of patients without GP recorded CVD (including stroke, AAA, CHD, HF and TIA) with a GP recorded QRISK score of 10% or more (CVDP006CHOL) and a subgroup of these patients with a GP recorded QRISK score of 20% or more (CVDP003CHOL) who have a prescription for lipid lowering therapy in the last 7 months.

- Chronic kidney disease

CVDP004CKD, (round two) indicator measures the percentage of patients aged 18 and over with GP recorded CKD categories G3a to G5 (previously stage 3 to 5) with a record of a urine albumin:creatinine ratio (or protein:creatinine ratio) test in the preceding 12 months.

CVDP005CKD (round two) percentage of patients aged 18 and over, with GP recorded CKD categories G3a to G5 (previously stage 3 to 5), hypertension and proteinuria, currently being treated with renin-angiotensin system antagonists.

iv. CALCULATION OF CASE FINDER INDICATORS

The case finder indicators include data from the case finding cohort which includes patients that have no coded diagnosis of any of the six high-risk conditions or existing CVD but have an entry in their record that suggest they are at risk of developing or may have an undiagnosed high-risk condition.
There is less information collected about this group of patients compared to the other two cohorts. For more details about the case finder cohort please see the CVDPREVENT quick guide or the CVDPREVENT business rules.

- Blood pressure

CVDP005HYP (round two) prevalence of patients aged 18 and over whose latest blood pressure value is in the at risk range for hypertension (systolic >=140mmHg and diastolic >=90mmHg), with no GP recorded hypertension.

- Familial hypercholesterolaemia

CVDP004 FH (round two) prevalence of people whose cholesterol values are in the at risk range for FH (TC >=7.5mmol/l aged 29 and under or TC >=9.0mmol/l aged 30 and over), with no GP record of FH diagnosis or investigation.

- Chronic kidney disease

Two case finding indicators for CKD were introduced in round two of the audit. The first, CVDP002CKD shows the prevalence of patients aged 18 and over without CKD with two low estimated glomerular filtration rates (eGFRs<60ml/min) more than 3 months apart and the second, CVDP003CKD, patients with a single low estimated glomerular filtration rate (eGFR<60ml/min).

v. CALCULATION OF POSSIBLE OVER TREATMENT INDICATORS

- Blood pressure

A possible over-treatment indicator for patients with hypertension was added in the second round of the audit. This indicator CVDP006HYP identifies people with hypertension and a recent low BP (systolic BP<=100mmHg) who have received antihypertensive medication subsequent to the low BP reading. It is possible that the follow up prescription has resulted in a reduction in dose of antihypertensive medication, so the values reported in this indicator over-estimate people with a low BP reading who are receiving a non-reviewed antihypertensive medication.

vi. EXTERNAL VALIDATION

CVDPREVENT indicators were compared to QOF indicators where they were similar. In order to do this, practices that contributed both to QOF and CVDPREVENT were matched and the rest removed. Both data sources reflect patient counts and treatments measured at the same date point of end of March, so were expected to align where business rules were similar for certain indicators. Both the counts of numerators and proportions for similar clinical indicators in hypertension, atrial fibrillation and chronic kidney disease, were matched. For hypertension and atrial fibrillation CVDPREVENT prevalence, all-age list sizes were used as denominators to more closely resemble QOF. For round one, denominators were taken from April 2020 and CVDPREVENT data was compared to QOF 2019/20. For round two, denominators were taken from April 2021 and CVDPREVENT data was compared to QOF 2020/21.

Indicators developed for round two that did not relate to QOF indicators were externally validated using a variety of published references and data sources. These sources included the Indicators No Longer in QOF (INLIQ), the National CKD Audit and research publications. It was not possible to find external validation for several of the indicators as they are newly developed indicators, so the CVDPREVENT clinical lead and other interested clinical input advised on the face validity of the findings.

9. REPORTING

i. ORGANISATIONAL AREAS AND GEOGRAPHIES

Patient demographic data in the audit includes a GP practice code, and the administrative geographic area where the patient's residence is located called a lower super output area (LSOA11) derived from a matching post code by NHSD.

CVDPREVENT reports indicators by organisational area by mapping the patient practice with the most recent publicly available lookups linking GP practices to both PCN and CCGs. The second round reporting of CVDPREVENT uses 2021 statutory boundary areas for CCGs and PCNs at December 2021.

The prevalence indicators are reported by CCG, STP and England levels and the clinical treatment indicators by PCN, CCG, STP and England levels where numbers are large enough.

Some of the breakdowns by age, sex, ethnicity and deprivation may not be available by all the above geographies.

i. Age groups

The reporting age groups were selected to align with other key CVD related age groupings including the age specific hypertension treatment targets and the NHS Health Check attendees. They also provide some granularity while avoiding small number disclosure issues.

ii. Ethnicity

NHS Digital supplied a lookup for individual SNOMED ethnicity codes to the wider census groups. We used these groups to aggregate and report the standard ethnic categories reported in the audit data. These were White, Black, Asian, Mixed, Other, Not stated and Missing. The ethnic group category 'Not stated' represents a group of people who do not wish to state their ethnic group. The category 'Missing' is a group where there is no record of ethnic group.

iii. Deprivation

Each patient has an LSOA11 derived from their residence. LSOA11s were matched to the Index of Multiple Deprivation 2019 (IMD 2019), which is published at LSOA11 geography for all of England.

IMD 2019 is a summary index score for England published by the Ministry of Housing, Communities & Local Government, which relates a small geographical area called a lower super output area (LSOA11). The LSOA11 is an administrative boundary of roughly 1,600 homes. The IMD is based on 7 deprivation domain indicators that provide relative measures of deprivation for small areas across England. Each LSOA11 was mapped geographically to the statutory geographical boundary of a CCG and higher geographies and data was aggregated at these levels into 5 equal groups, or quintiles, based on their rank within England. Quintile number 1 represents the most deprived quintile and quintile 5 represents the least deprived quintile. In some CCG areas this means that highest and lowest quintiles have limited data, due to unequal relative deprivation within the area.

PCNs are not geographically defined, so no IMD matching is available and thus deprivation analysis is not possible using this method.

Note that deprivation reporting is based on geographic matching of patients, whereas all persons, sex, age and ethnicity reporting are based on practice matching.

iv. Adjusted effect of age on deprivation

Initial analysis of prevalence indicators by deprivation quintile was likely to be influenced by the known difference in age structure of areas with different levels of deprivation. Areas with higher deprivation tend to have younger populations and the high-risk conditions for CVD are often more prevalent with increasing age. To account for this and allow a comparison of prevalence of deprivation data both between and within areas, directly age-standardised prevalence estimates were created for each deprivation group.

NHS Digital publish GP list sizes by patient residence using their LSOA11 area, but not by patient residence and age. For round one synthetic denominator populations were created by deprivation group and age to use in the calculations of the standardised figures by using a technique called iterative proportional fitting[2]. This technique used GP list sizes by patient residence and GP list sizes by age combined with the age and deprivation population distribution of mid-year estimates published by the Office for National Statistics. For round two synthetic denominators were created by applying the proportional age-splits of deprivation data within the Office for National Statistics mid-year estimates directly to the GP list size data.

v. Time Series

There may be minor differences between data extracts where there are changes to NHS Digital code sets. The code sets are clusters of SNOMED codes used within the business rules and are constantly reviewed by NHS Digital's clinicians. There may be inclusions or deletions to already existing SNOMED codes and clusters. There is also likely to be variation in the way coding occurs within practices and codes may therefore be erroneous, biased or even missing. It will be necessary to be mindful of the potential limitation of inconsistent coding practices and policy changes when interpreting results.

[2] Deming, W. E., Stephan, F. F. (1940). On a Least Squares Adjustment of a Sampled Frequency Table When the Expected Marginal Totals are Known. Annals of Mathematical Statistics 11 (4): 427-444

vi. Comparison with QOF indicators

Some of the initial CVDPREVENT GP recorded prevalence and clinical treatment indicators are similar to the prevalence and treatment measures in the QOF reporting mechanism, however, the two processes are not identical, and this results in differing results for each system. CVDPREVENT and QOF indicators differ for several reasons.

- CVDPREVENT has incomplete coverage which means that not all the same GP practices within an area (e.g. CCG) will report to CVDPREVENT and some practices not included in the audit may report to QOF.
- There are no date limiters on either QOF or the audit for finding SNOMED codes. QOF uses the latest date of diagnosis to extract patients, whilst the audit uses the earliest date of the diagnosis.
- CVDPREVENT indicators are collected on different dates to the QOF indicators. Even when the audit data collection period is the same as the QOF period, differences in date of collection mean that the GP list sizes between QOF and CVDPREVENT may differ markedly for some practices. For this reason, direct comparisons between patient numbers with similar indicators between QOF and CVDPREVENT is not advisable.
- CVDPREVENT does not collect information from patients within practices who opt out of audit data collection, but these patients are included in QOF indicator counts.
- CVDPREVENT reports 18 and over prevalence for hypertension and AF. This is not the case for the equivalent QOF indicators which include all ages.
- For the treatment indicators QOF has the option to remove people either not clinically eligible for treatment or who decline treatment from the numerator and denominator. CVDPREVENT does not always collect this exception information so includes all people technically (not clinically) eligible for the intervention in the numerator and denominator.

vii. Comorbidities reporting (First Annual Audit Report)

Comorbidity analysis was based on all people with GP recorded hypertension in the audit. All people in the audit with a GP record of hypertension were identified and the presence of a GP record of any of the following conditions was then flagged. CHD; stroke; PAD; aortic aneurism; heart failure; dyslipidaemia; CKD; non- diabetic hyperglycaemia (NDH); diabetes mellitus (DM); AF and obesity.

Each person was classified by the number of comorbidities that are recorded from zero up to 10 comorbidities. Counts of people with hypertension and the differing numbers of comorbidities were generated. Proportions of people with different numbers of comorbidities were derived using all people with GP recorded hypertension as the denominator.

The hypertension recorded audit population was split into different subgroups of people based on age, sex and ethnicity. Proportions for each subgroup were derived using the same methods as above, to describe variation in the number of comorbidities by these factors.

viii. Impact on CVD prevention of the Covid-19 pandemic reporting (Second Annual Audit report)

Investigation of the blood pressure and cholesterol readings by month over the two-year period required the analysis of both CVDPREVENT extracts (i.e. to the end of March 2020 and the end of March 2021). To ensure that the data is comparable a sample of the practices present in both extracts was taken. The sample included approximately half the practices in England. For ease of interpretation the data has been displayed on the same graph.

ix. Disclosure control

We applied NHS Digital disclosure rules that were defined for Hospital Episode Statistics (HES) in 2019. These rules round sub-national counts and denominators to the nearest 5 and suppresses any which are between 1 and 7. Displayed proportions are rounded to one decimal place.

10. PARTICIPATION REPORT

The participation rates by STP, CCG and PCN can be found in the Data and Improvement Tool. Participation by number of GP practices as well as by the number of registered patients, were calculated.