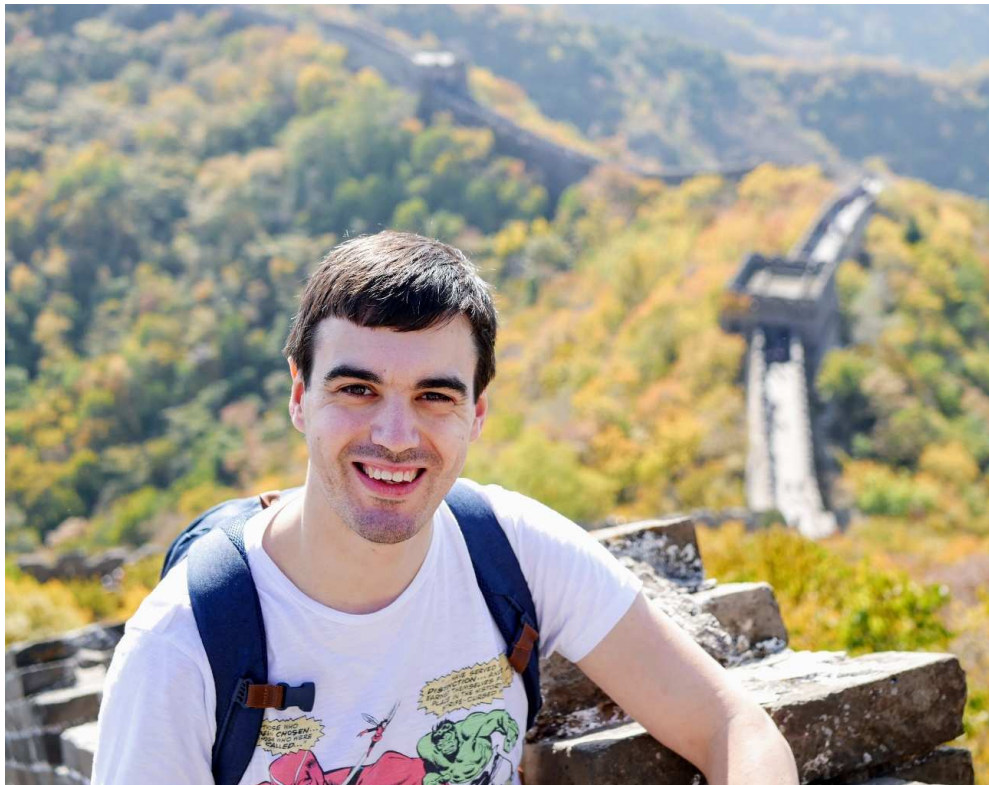


# Reducing the burden of Cardiovascular diseases (CVDs) across Greater Manchester (GM) – the CVNeed tool

## Introduction



### Matthew Conroy

- Analytical Service Lead for Primary Care at NHS Greater Manchester
- Responsible for General Practice, Community Pharmacy, Dentistry and Optometry data
- Led on General Practice data across Greater Manchester for 8 years
- Alumni of the NHS Graduate Management Training Scheme (Health Informatics stream, 2014 intake)

# NHS Greater Manchester

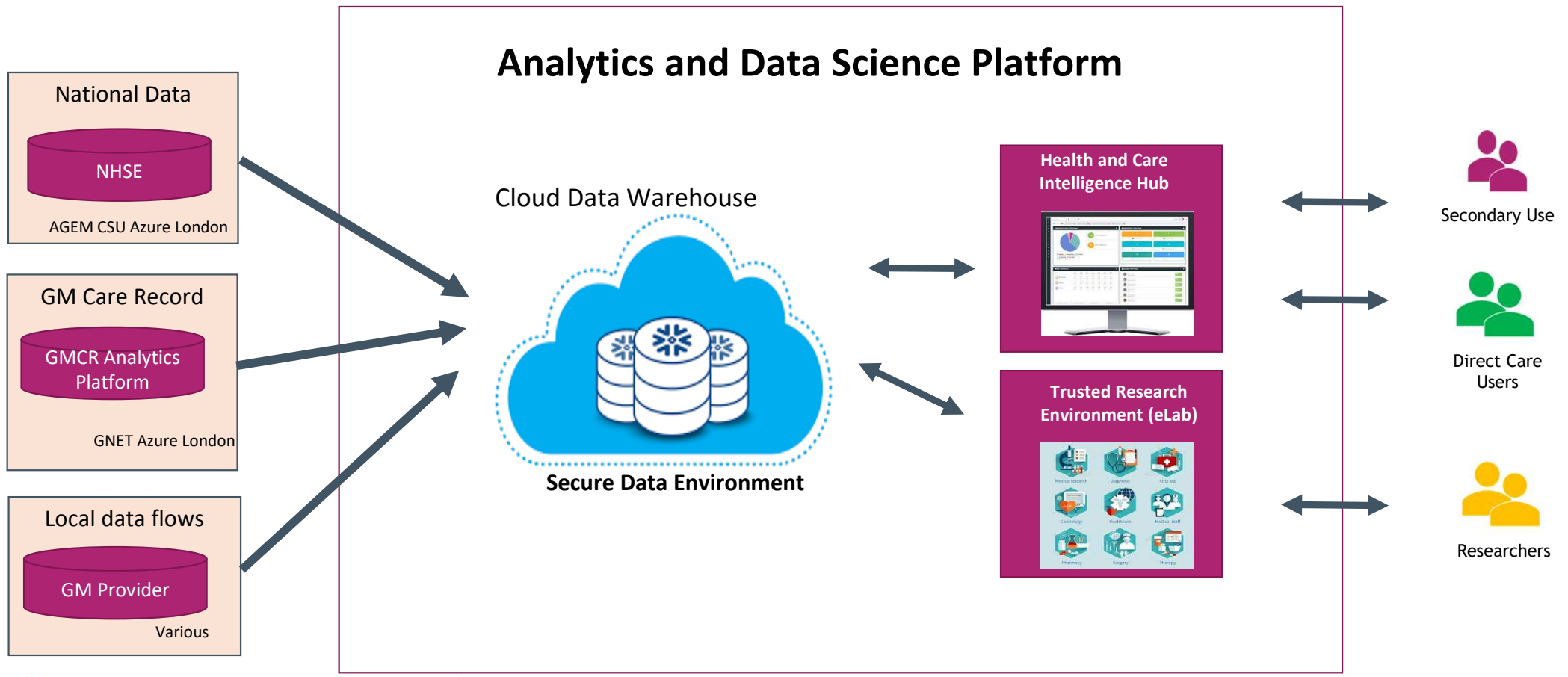
- NHS Greater Manchester brings together 10 Local Authority areas and serves a population of over 3.2 million patients
- The GM region is one of the most deprived according to the Index of Multiple Deprivation (IMD) and faces longstanding health challenges in a population that is growing faster than the UK average and with an increasingly complex burden of ageing and multiple health conditions
- Inequalities in terms of health outcomes show significant unwarranted variation at both the place and neighbourhood level within and across GM



## Cardiovascular Disease (CVD)

- A particular challenge for Greater Manchester is cardiovascular disease (CVD)
- CVD is an overarching term for a group of long-term conditions that includes Atrial Fibrillation, Chronic Kidney Disease, Coronary Heart Disease, Diabetes, Hypertension, Peripheral Arterial Disease, Stroke and TIA
- Over half a million people in GM have a **diagnosed** CVD, with 40% of patients having multiple CVDs
- GM has amongst the highest rates of heart attacks and strokes in both the North West region and England, and GM has high rates of mortality for CVD
- GM has a system-led, concerted effort to detect, diagnose and manage CVD, in particular Atrial Fibrillation
- Data is critical to understanding the impact of CVDs and reducing their burden

# GM Data and Intelligence – Analytics and Data Science Platform



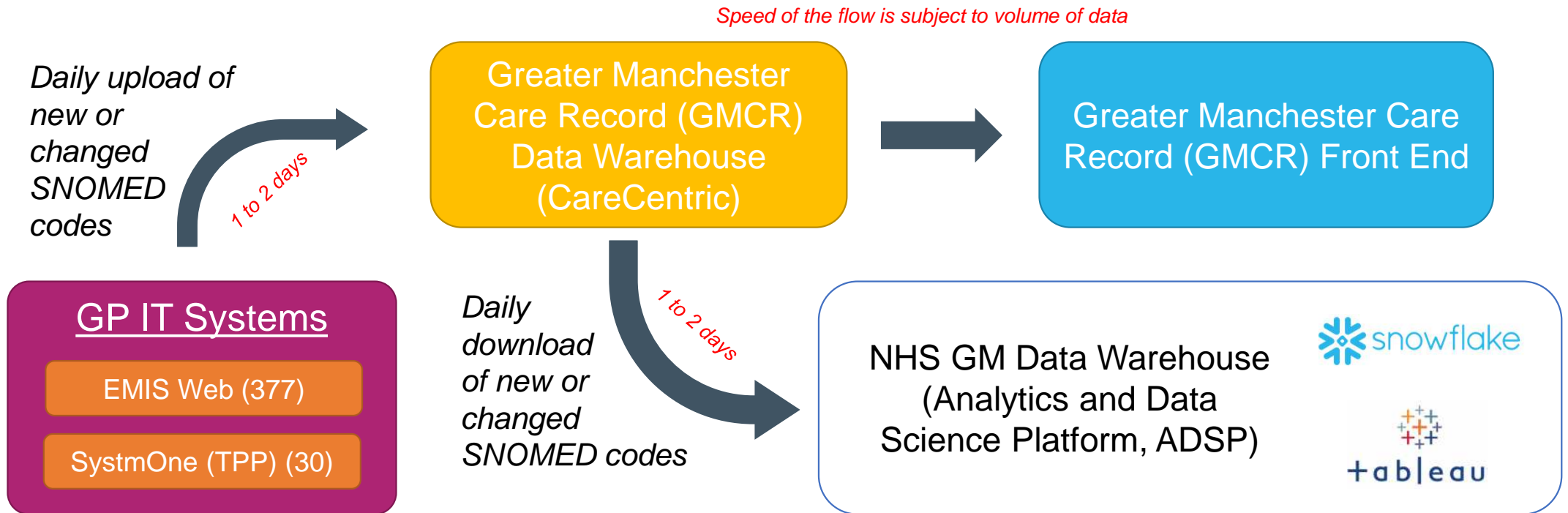
# Access to GP data

Access to identifiable, SNOMED coded, GP data, is facilitated through the Greater Manchester Care Record.

Giving health and care workers access to information within the Greater Manchester Care Record ensures you will receive the treatment you need, at the right time, in the right way.

The GM Care Record joins together our regions' different NHS and care organisations to help hospitals and other care services access your individual health and care records quickly and securely.

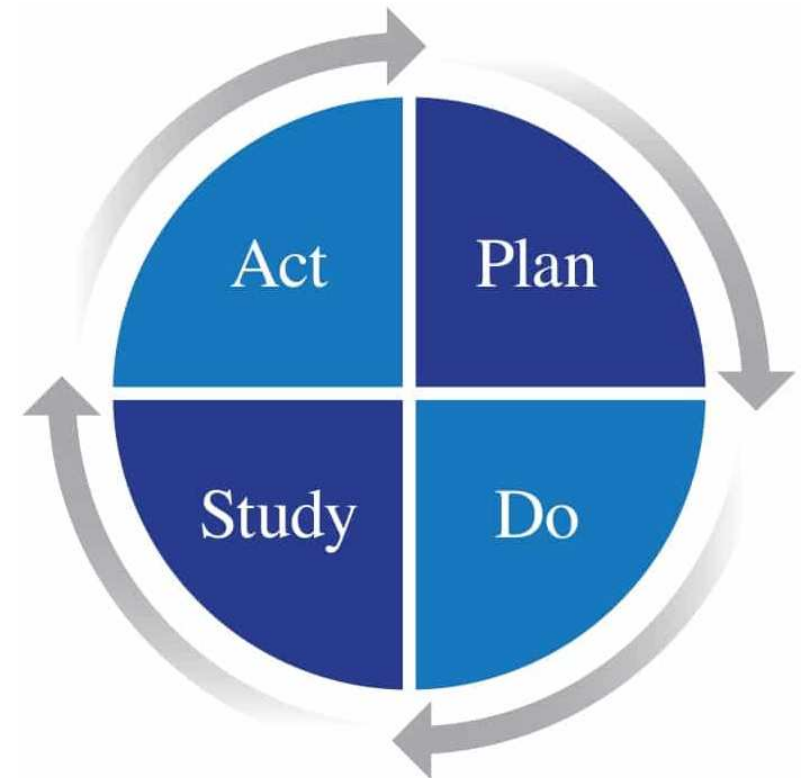
Easy access to your information is essential to front-line care and treatment.



Enabled through data sharing agreements between each GP practice and NHS GM [all practices except one]

## Aim of the CVNeed tool

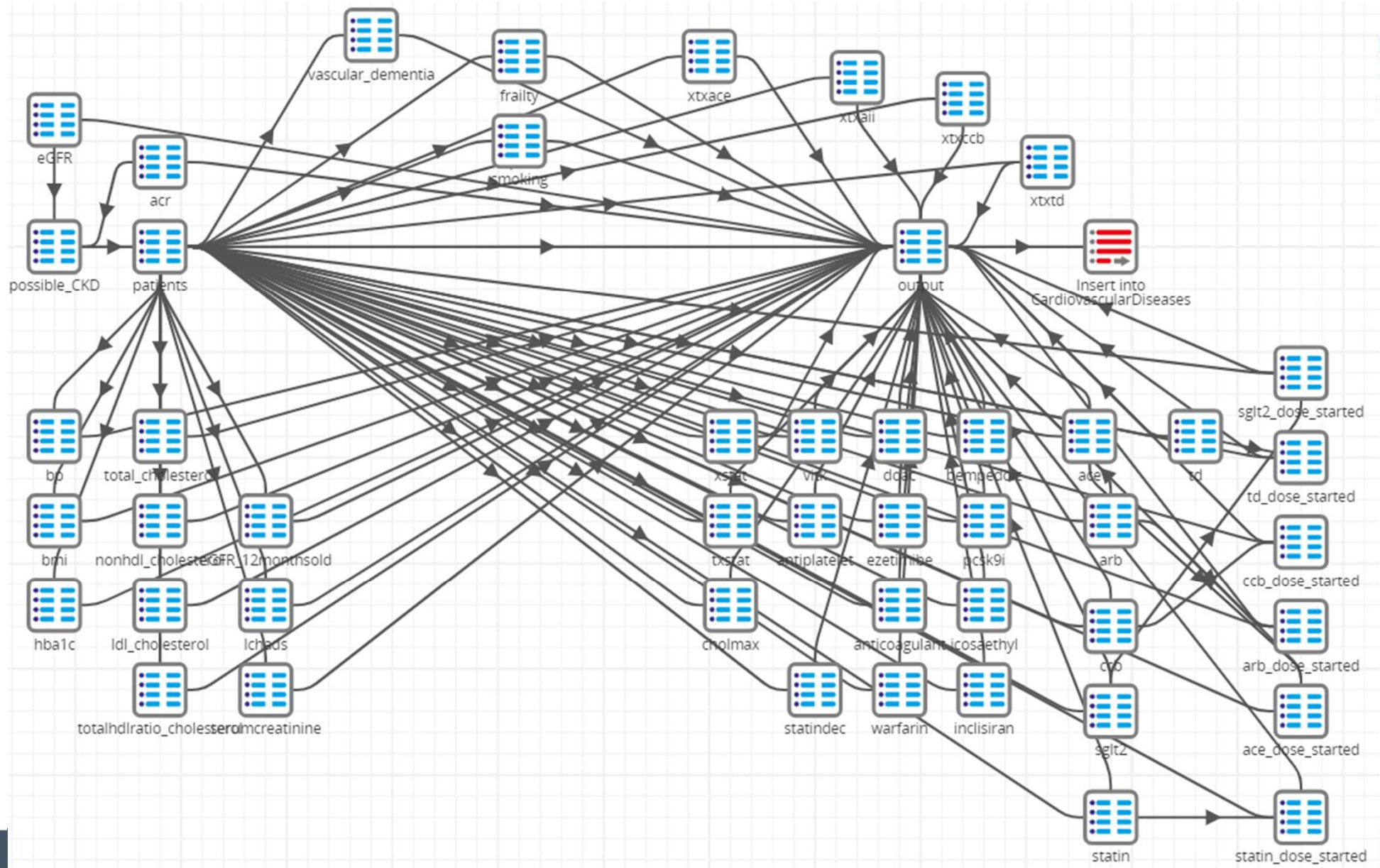
- Understand the impact and burden of CVD in GM using routinely coded GP data
- Undertake a population health management, quantifying inequalities in CVD management by demographics and protected characteristics
- Quantify the impact of multi-morbidity (multiple long term conditions)
- Identify, target and prioritise those at most risk



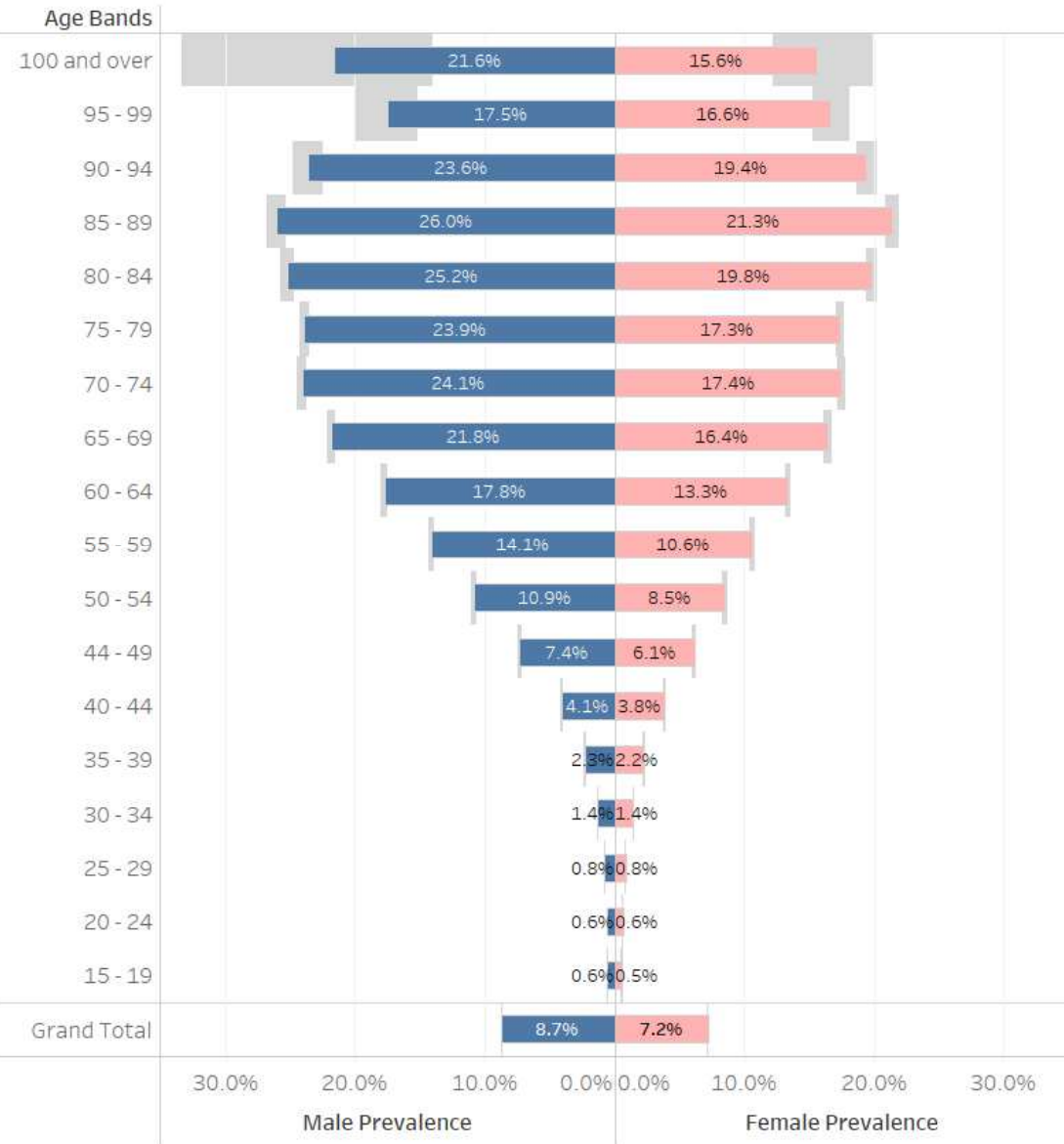
## Building the CVD data set

- Underpinning the CVNeed tool is a comprehensive, patient level, data set looking at all aspects of CVD care
- Quality and Outcomes Framework (QOF) SNOMED clusters are utilised so no additional coding is required by practices
  - Where SNOMED clusters do not exist local clusters have been created using clinical input
- Fields to identify;
  - Demographics – age, gender, ethnicity, LSOA (lower super output area)
  - Long Term Conditions
  - Quantifiers of disease control – blood pressure, HbA1c, cholesterol, CHADS-VASC, ACR, eGFR
  - Lifestyle factors – BMI, smoking status, alcohol consumption
  - Medications taken – statins, ACE inhibitors, ARBs, calcium channel blockers, thiazide diuretics

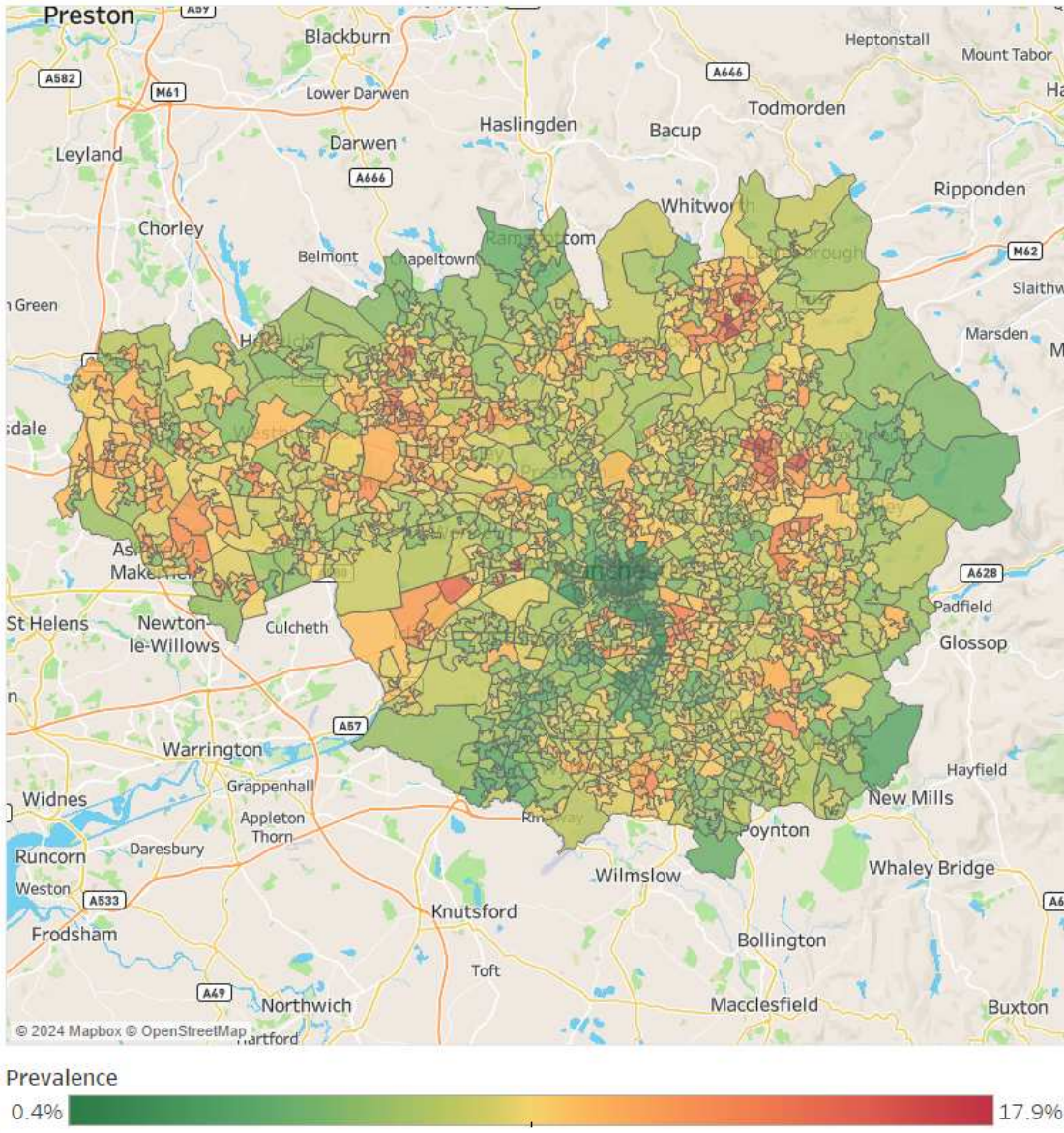




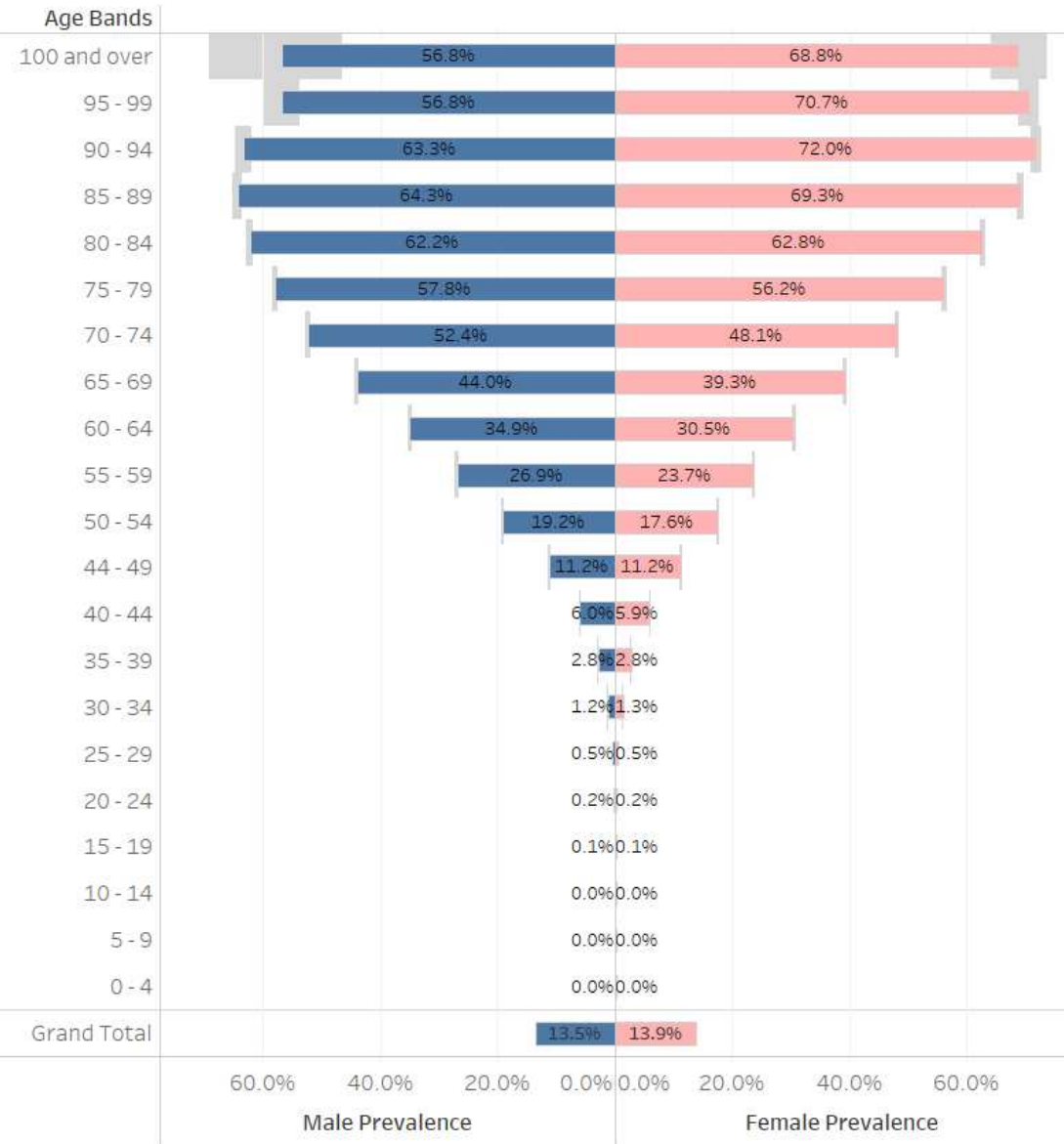
Diagnosed **Diabetes** Prevalence Population Pyramid, 30 September 2024



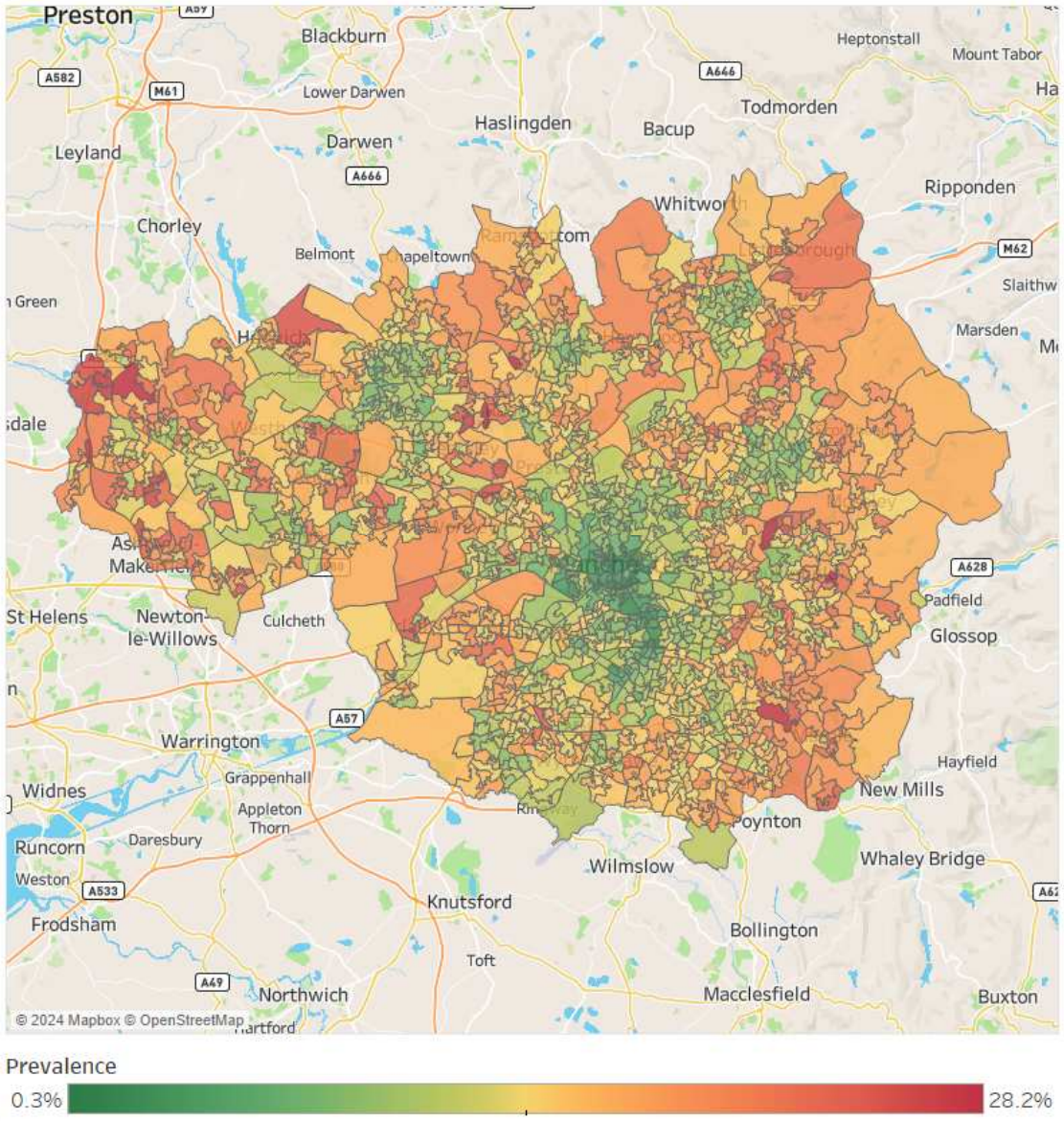
Diagnosed **Diabetes** Prevalence Heat Map, 30 September 2024



Diagnosed Hypertension Prevalence Population Pyramid, 30 September 2024



Diagnosed Hypertension Prevalence Heat Map, 30 September 2024

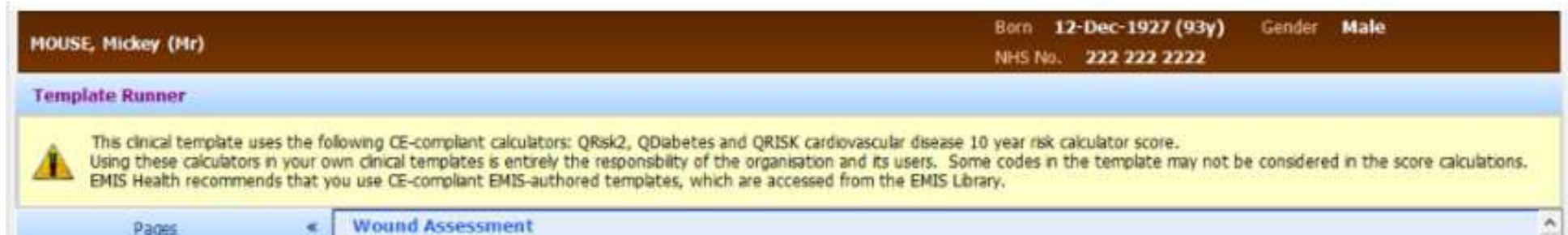


# Primary Prevention – The Problem

- Preventing the condition before it has even occurred
- Detecting illness in apparently healthy people



Greater Manchester



- QRisk3 is a CVD risk prediction tool supported by NICE to inform primary preventative care, which estimates an individual's risk of developing a heart attack or stroke over the next 10 years (QRisk2 previously)
- Patients with QRisk3  $\geq 10\%$  should be reviewed and where appropriate offered statin therapy as Primary Prevention
- All components of QRisk3 algorithm are available in GP data
- GP IT Systems can only calculate QRisk3 per patient, and the calculated QRisk3 does not update as patient conditions change (fixed in time)
  - QRisk from 3 years ago might not reflect a patient today if their blood pressure, BMI, etc. has changed significantly

# Primary Prevention – The Solution

- Preventing the condition before it has even occurred
- Detecting illness in apparently healthy people

- QRisk3 was implemented across the GP data to calculate the scores for all patients in Greater Manchester – this found nearly 147,000 patients who could be eligible for Primary Prevention:

QRisk3 Category	No QRisk Ever	QRisk increased from previous	Total
More than 20%	26,263	31,365	<b>57,628</b>
10 – 20%	34,229	54,926	<b>89,155</b>
<b>Total</b>	<b>60,492</b>	<b>86,291</b>	<b>146,783</b>

- Identifiable data shared back to practices to highlight patients, calculate QRisk3 locally and offer statin therapy where eligible

About you

Age (25-84):

Sex:  Male  Female

Ethnicity:

UK postcode: leave blank if unknown

Postcode:

---

Clinical information

Smoking status:

Diabetes status:

Angina or heart attack in a 1st degree relative < 60?

Chronic kidney disease (stage 3, 4 or 5)?

Atrial fibrillation?

On blood pressure treatment?

Do you have migraines?

Rheumatoid arthritis?

Systemic lupus erythematosus (SLE)?

Severe mental illness?  
(this includes schizophrenia, bipolar disorder and moderate/severe depression)

On atypical antipsychotic medication?

Are you on regular steroid tablets?

A diagnosis of or treatment for erectile dysfunction?

Leave blank if unknown

Cholesterol/HDL ratio:

Systolic blood pressure (mmHg):

Standard deviation of at least two most recent systolic blood pressure readings (mmHg):

Body mass index

Height (cm):

Weight (kg):

## Secondary and Tertiary Prevention – The Solution

- *Reduce the impact of a condition that has already occurred*
- *Optimising the treatment of an existing condition*
- *Reducing the risk of further events and rehabilitating people after an event*

- Clinical response to Secondary and Tertiary Prevention is similar
- High risk stratification and prioritisation is a key strategy
- A “person-centred” prioritisation provisionally dubbed “**CVNeed**” ie **CardioVascular Unmet Need** was developed
- This iterates upon the fantastic work of UCL Partners / RCGP to combine the “per-condition” prioritisation scoring to a single “per-person” score across Diabetes, High Blood Pressure, Irregular Pulse (AF), Cholesterol and Chronic Kidney Disease.
- Each disease prioritisation relates directly to clinical action and available intervention.
- Can be visualised & understood through various clinical and inequalities lenses
- *PRIOTISATION ≠ RISK PREDICTION*

### Hypertension Prioritisation, 30/09/24

Prioritisation Category	Prioritisation	CVNeed Weighting	Patients	Percentage
Very High	1 Clinic BP >= 180/120 mmHg	5	4,830	1.2%
	2 Clinic BP >= 160/110 mmHg	4	20,873	5.0%
	Total		25,703	6.2%
High	3 No BP reading in the last 18 months	3	21,860	5.3%
	Total		21,860	5.3%
Medium	4a NTTT: Stroke / TIA / CKD and ACR >= 70 mg/mol, Clinic BP > 130/80 mmHg	2	20,111	4.8%
	4b NTTT: CKD and ACR < 70 mg/mol, Clinic BP > 140/90 mmHg	2	11,734	2.8%
	4c NTTT: Age >= 80, Clinic BP > 150/90 mmHg	2	2,074	0.5%
	4d NTTT: Age < 80, Clinic BP > 140/90 mmHg	1	53,026	12.8%
	Total		86,945	20.9%
	Low	5a TTT: Stroke / TIA / CKD and ACR >= 70 mg/mol, Clinic BP <= 130/80 mmHg	0	13,420
5b TTT: CKD and ACR < 70 mg/mol, Clinic BP <= 140/90 mmHg		0	50,935	12.3%
5c TTT: Age >= 80, Clinic BP <= 150/90 mmHg		0	30,427	7.3%
5d TTT: Age < 80, Clinic BP <= 140/90 mmHg		0	185,840	44.8%
Total			280,622	67.6%
Grand Total			415,130	100.0%

### Chronic Kidney Disease Prioritisation, 30/09/24

Prioritisation Category	Prioritisation	CVNeed Weighting	Patients	Percentage
Very High	1a eGFR decrease > 25% and category change in 12 months	5	4,158	3.2%
	1b eGFR decrease > 15 ml/min/1.73 m2 in 12 months	5	1,230	1.0%
	Total		5,388	4.2%
High	2 ACR >= 70 mg/mol	4	2,111	1.6%
	Total		2,111	1.6%
Medium	0a eGFR < 30 ml/min/1.73 m2	0	7,937	6.2%
	0b ACR >= 70 mg/mol and on maximal treatment	0	2,228	1.7%
	3 ACR between 30 and 70 mg/mol	3	3,504	2.7%
	4 No eGFR reading in the last 18 months	2	4,331	3.4%
	5 No ACR reading in the last 18 months	2	37,490	29.2%
	Total		55,490	43.2%
Low	6 ACR between 3 and 30 mg/mol	1	21,724	16.9%
	7 ACR < 3 mg/mol	0	43,624	34.0%
	Total		65,348	50.9%
Grand Total			128,337	100.0%

**Atrial Fibrillation** Prioritisation, 30/09/24

Prioritisation Category	Prioritisation	CVNeed Weighting	Patients	Percentage
Very High	1a Not on Anticoagulant, Female and CHADS >= 2	4	1,718	3.1%
	1b Not on Anticoagulant, Male and CHADS >= 1	4	3,328	6.0%
	1c Not on Anticoagulant, Age >= 65	4	412	0.7%
	1d Not on Anticoagulant, Female and Estimated CHADS >= 2	4	36	0.1%
	1e Not on Anticoagulant, Male and Estimated CHADS >= 1	4	95	0.2%
	1f Not on Anticoagulant, No CHADS ever	4	1,763	3.2%
	Total		7,352	13.3%
High	2a On Anticoagulant and Antiplatelet	3	3,358	6.1%
	2b Anticoagulant prophylaxis codes only	3	1	0.0%
	Total		3,359	6.1%
Medium	3 On Warfarin or Vitamin K antagonist	2	4,208	7.6%
	4 On DOAC and no renal function test in last 12 months	1	2,369	4.3%
	Total		6,577	11.9%
Low	5 On DOAC and renal function test in last 12 months	0	37,384	67.4%
	6 Anticoagulant Not Required, Low CHADS and Age < 65	0	758	1.4%
	Total		38,142	68.8%
Grand Total		55,430	100.0%	

**Diabetes** Prioritisation, 30/09/24

Prioritisation Category	Prioritisation	CVNeed Weighting	Patients	Percentage
Very High	1 HbA1c > 86 mmol/mol	6	17,148	8.9%
	2a Moderate / Severe Frailty, HbA1c > 75 mmol/mol	4	1,924	1.0%
	2b Mild Frailty / No Frailty, HbA1c > 75 mmol/mol	5	11,190	5.8%
	Total		30,262	15.7%
	3 No HbA1c reading in the last 18 months	3	7,891	4.1%
High	Total		7,891	4.1%
Medium	4a Moderate / Severe Frailty, HbA1c > 58 mmol/mol	2	7,521	3.9%
	4b Mild Frailty / No Frailty, HbA1c > 58 mmol/mol	3	34,957	18.2%
	Total		42,478	22.1%
Low	5a Moderate / Severe Frailty, HbA1c > 48 mmol/mol	1	10,385	5.4%
	5b Mild Frailty / No Frailty, HbA1c > 48 mmol/mol	1	49,569	25.8%
	6a Moderate / Severe Frailty, HbA1c <= 48 mmol/mol	0	11,052	5.7%
	6b Mild Frailty / No Frailty, HbA1c <= 48 mmol/mol	0	40,626	21.1%
	Total		111,632	58.1%
Grand Total		192,263	100.0%	



**Lipids Management (Primary Prevention) Prioritisation, 30/09/24**

Prioritisation Category	Prioritisation	CVNeed Weighting	Patients	Percentage
Very High	1 CKD / Type 1 Diabetes at risk, no statin	5	23,816	3.9%
	2a Type 2 Diabetes and QRisk >= 20% (calculated by practice), no statin	4	5,245	0.9%
	2b Type 2 Diabetes and QRisk >= 20% (estimated centrally), no statin	4	4,899	0.8%
	Total		33,960	5.6%
High	3a Age <= 84 and QRisk >= 20% (calculated by practice), no statin	3	29,375	4.9%
	3b Age <= 84 and QRisk >= 20% (estimated centrally), no statin	3	48,829	8.1%
	4 Age >= 85, no statin	2	11,006	1.8%
	Total		89,210	14.8%
Medium	5a Type 2 Diabetes and QRisk >= 10% (calculated by practice), no statin	2	2,852	0.5%
	5b Type 2 Diabetes and QRisk >= 10% (estimated centrally), no statin	2	4,502	0.7%
	6a Age <= 84 and QRisk >= 10% (calculated by practice), no statin	1	63,845	10.6%
	6b Age <= 84 and QRisk >= 10% (estimated centrally), no statin	1	98,228	16.3%
	Total		169,427	28.0%
Low	7 Statin declined or contraindicated	1	41,754	6.9%
	8 On Statin	0	270,075	44.7%
	Total		311,829	51.6%
<b>Grand Total</b>			<b>604,426</b>	<b>100.0%</b>

**Lipids Management (Secondary Prevention) Prioritisation, 30/09/24**

Prioritisation Category	Prioritisation	CVNeed Weighting	Patients	Percentage
Very High	1a No lipids ever	3	1,292	0.9%
	1b No lipids in last 12 months, sub-optimal non-HDL / LDL	3	12,773	9.1%
	1c No lipids in last 12 months, optimal non-HDL / LDL	2	13,349	9.5%
	Total		27,414	19.5%
High	2a Not on statin therapy and eligible	3	7,754	5.5%
	2b Statin declined or contraindicated, not on alternative lipid lowering therapy	3	5,949	4.2%
	Total		13,703	9.8%
Medium	3a On suboptimal statin therapy	2	11,147	7.9%
	3b On suboptimal statin dose	2	47,273	33.6%
	Total		58,420	41.6%
Low	4a Optimal LDL (<= 1.8 mmol/L)	0	21,774	15.5%
	4b Optimal non-HDL (<= 2.6 mmol/L)	0	5,103	3.6%
	5a Consider alternative lipid lowering therapy, no LDL in last 12 months	1	1,157	0.8%
	5b Consider alternative lipid lowering therapy, LDL > 3.5	1	1,912	1.4%
	5c Consider alternative lipid lowering therapy, LDL between 2.6 and 3.5	1	3,800	2.7%
	5d Consider alternative lipid lowering therapy, LDL between 2 and 2.6	1	5,772	4.1%
	5e Consider alternative lipid lowering therapy, LDL b..	0	1,447	1.0%
	Total		40,965	29.2%
<b>Grand Total</b>			<b>140,502</b>	<b>100.0%</b>

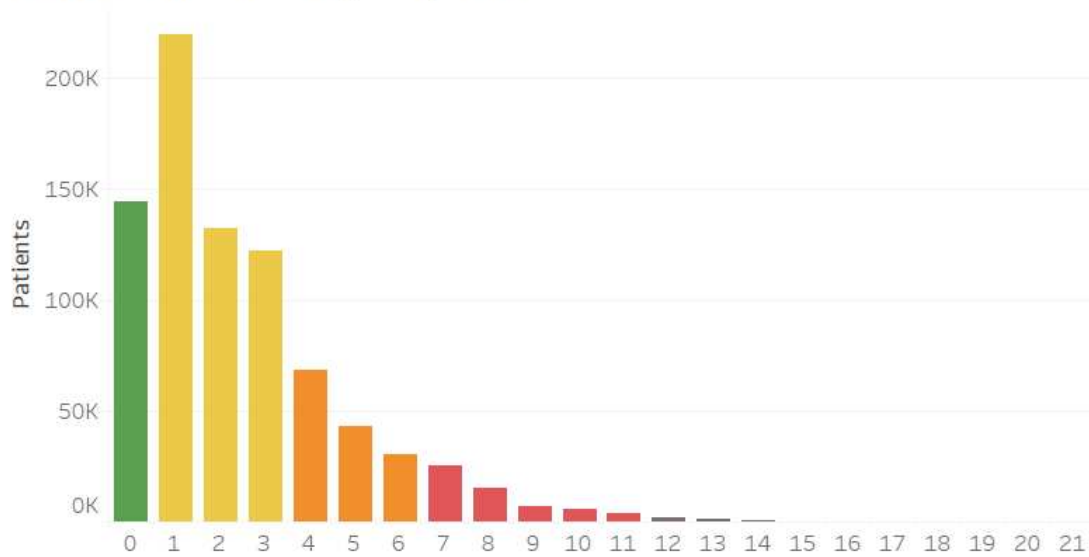
### Demographics Weight, 30 September 2024

Patients with any of the below categories:

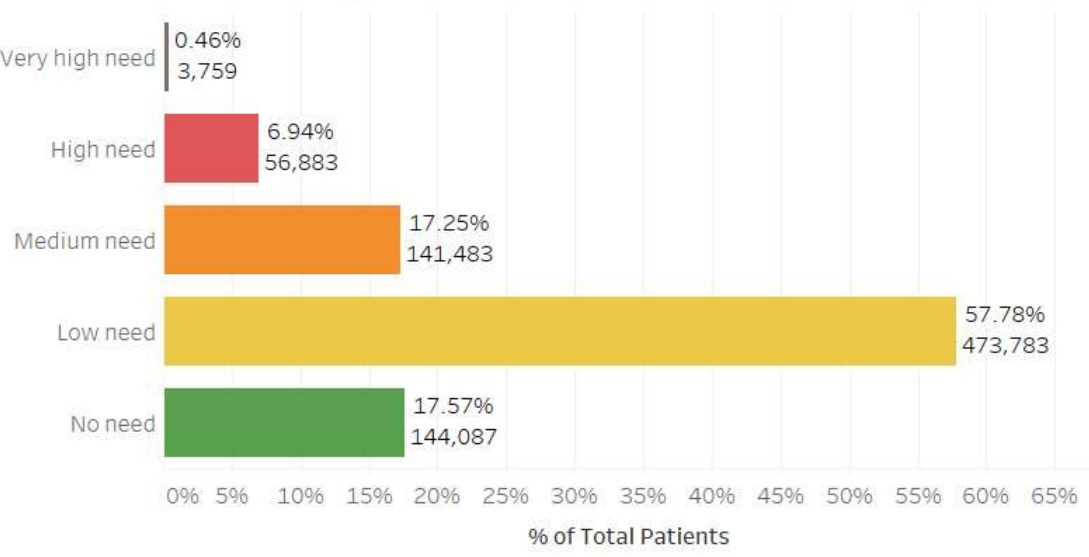
- Black, Asian or Ethnic Minority Group [1.0]
- Heavy or Very Heavy Smoker [1.0]    - Moderate Smoker [0.75]    - Light or Trivial Smoker [0.5]
- Obesity Class 3 [1.0]    - Obesity Class 2 [0.75]    - Obesity Class 1 [0.5]
- Homeless [0.75]    - Housebound [0.5]
- Alcohol Misuse [0.5]    - Substance Misuse [0.5]
- Learning Disability / Autism / Severe Mental Illness / Vascular Dementia [0.5]
- Moderate Frailty [0.5]    - Severe Frailty [0.25]

	Patients	Percentage
4.5	3	0.0%
4.25	6	0.0%
4	11	0.0%
3.75	31	0.0%
3.5	69	0.0%
3.25	252	0.0%
3	455	0.1%
2.75	1,270	0.2%
2.5	2,098	0.3%
2.25	7,540	0.9%
2	9,843	1.2%
1.75	21,307	2.6%
1.5	43,149	5.3%
1.25	44,567	5.4%
1	134,725	16.4%
0.75	67,604	8.2%
0.5	237,094	28.9%
0.25	9,262	1.1%
0	240,709	29.4%
<b>Grand Total</b>	<b>819,995</b>	<b>100.0%</b>

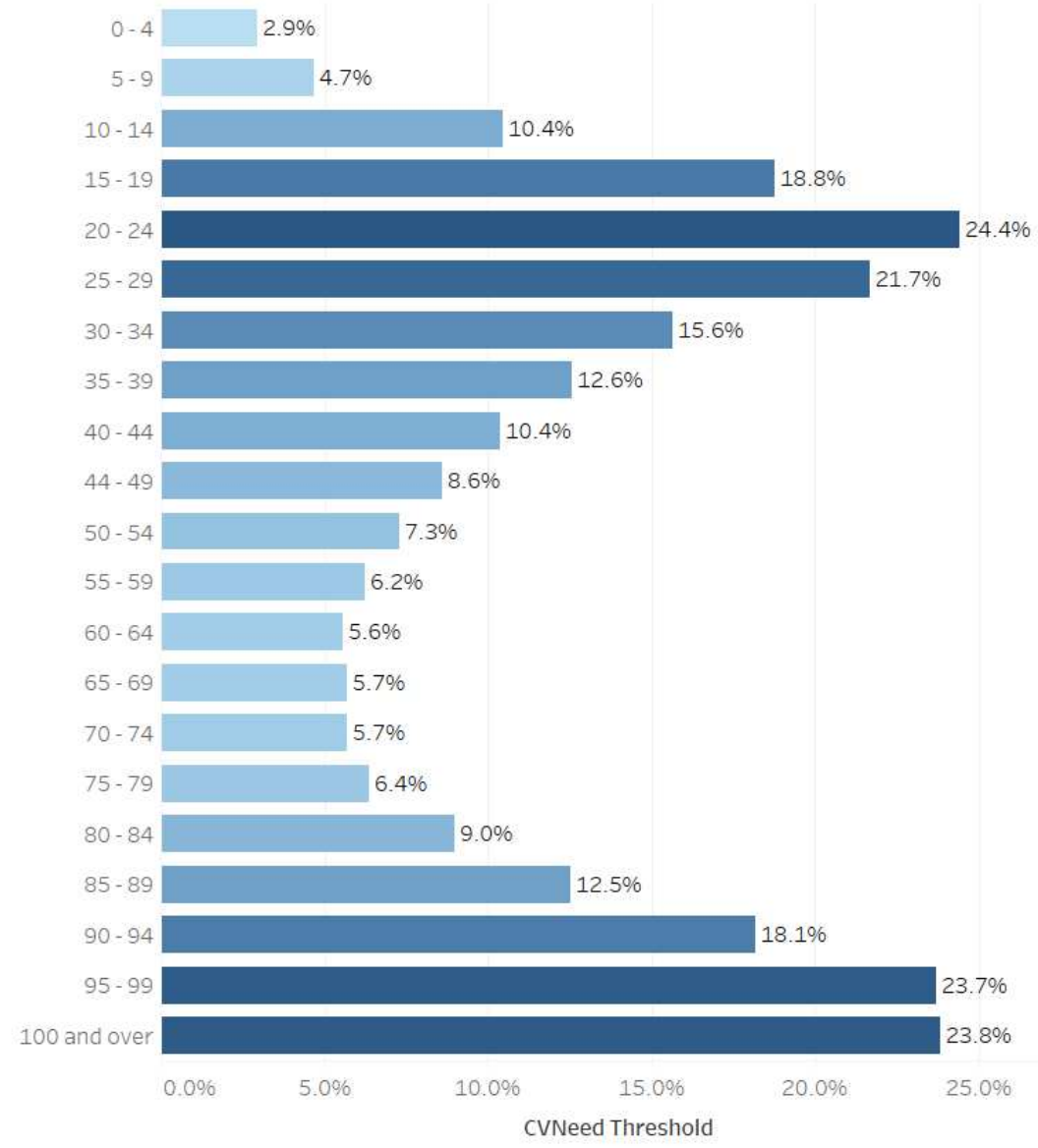
### Total CVNeed Distribution, 30 September 2024



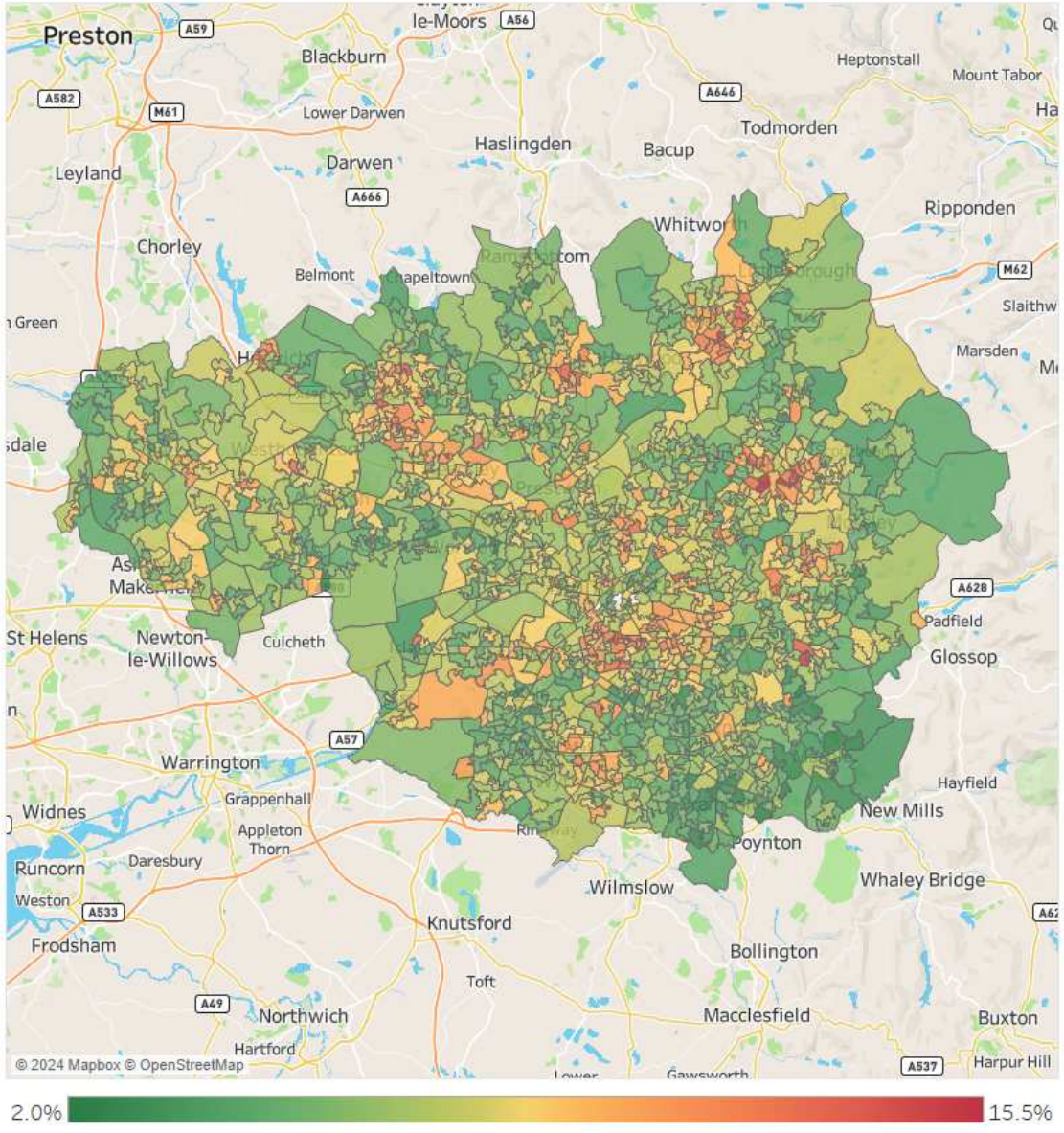
### Total CVNeed Distribution, 30 September 2024



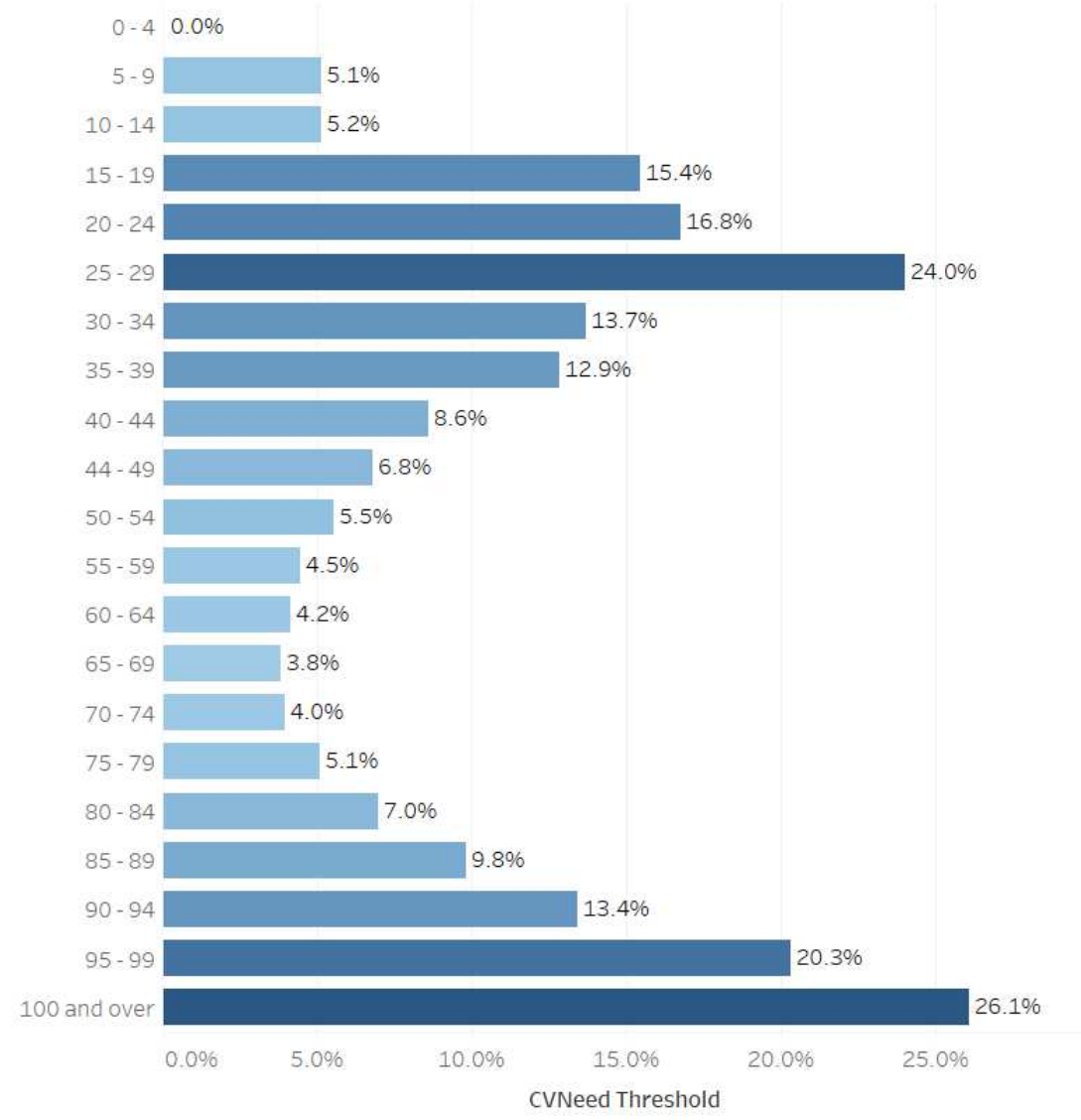
Percentage of patients with a CVNeed Score  $\geq 7$  by Age Bands, 30/09/24



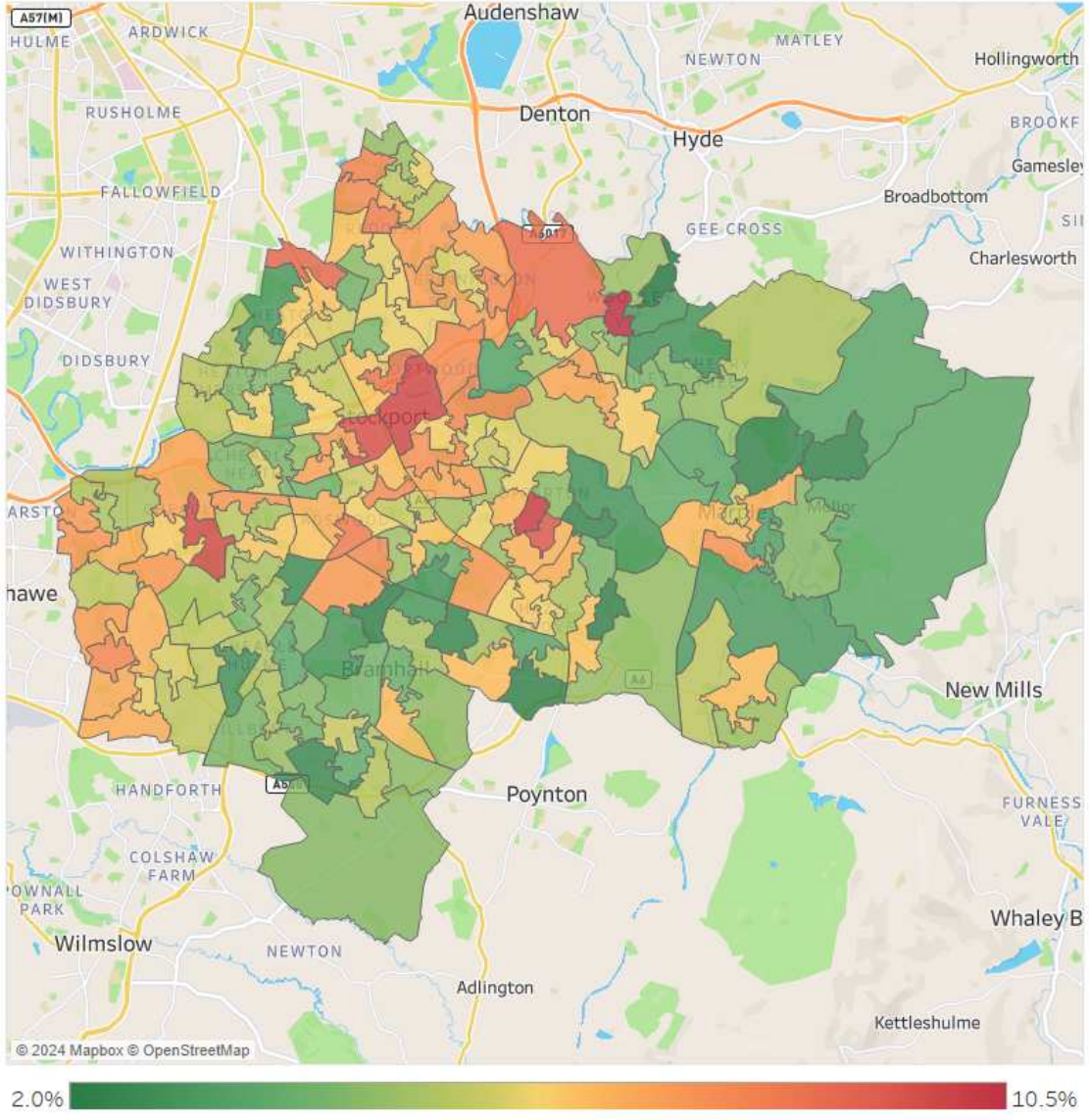
Percentage of patients with a CVNeed Score  $\geq 7$  by resident LSOA, 30/09/24



Percentage of patients with a CVNeed Score  $\geq 7$  by Age Bands, 30/09/24 - Stockport



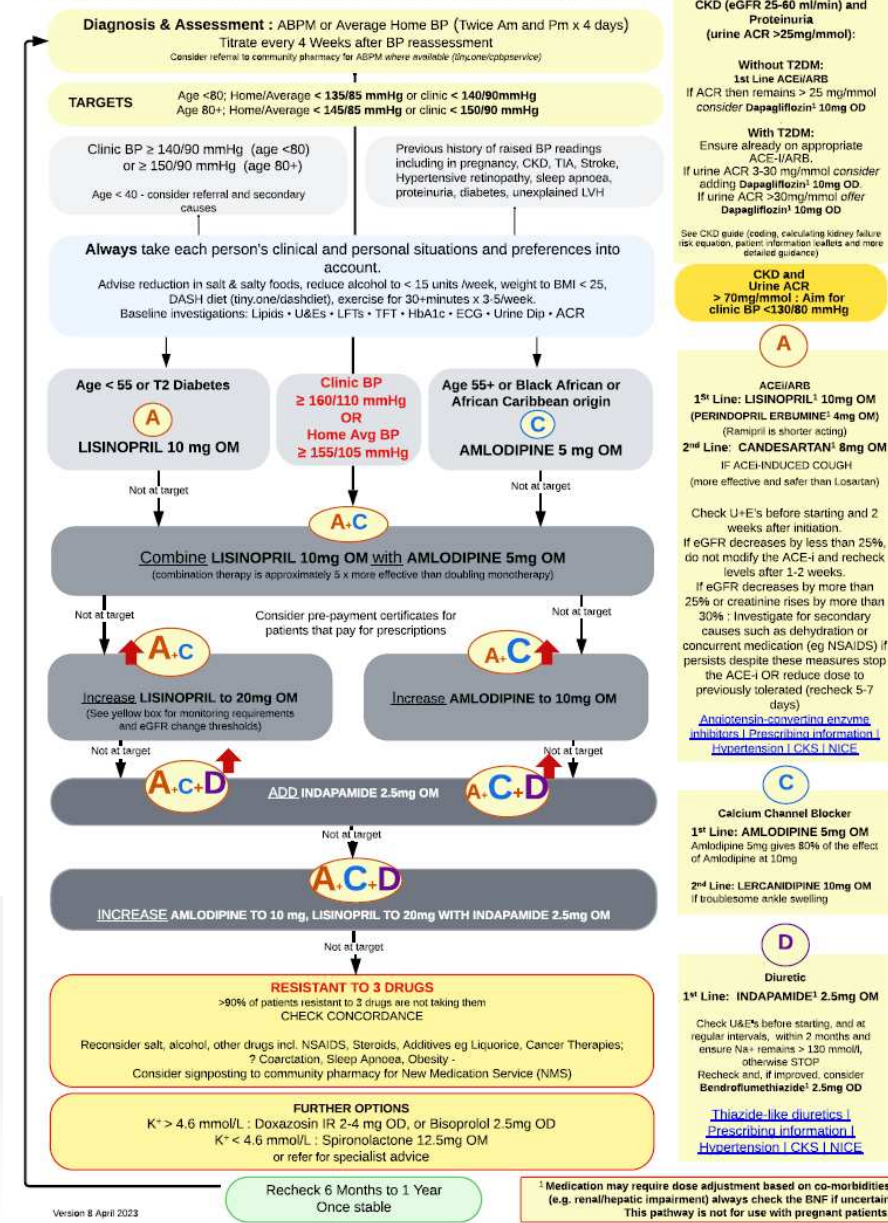
Percentage of patients with a CVNeed Score  $\geq 7$  by resident LSOA, 30/09/24 - Stockport



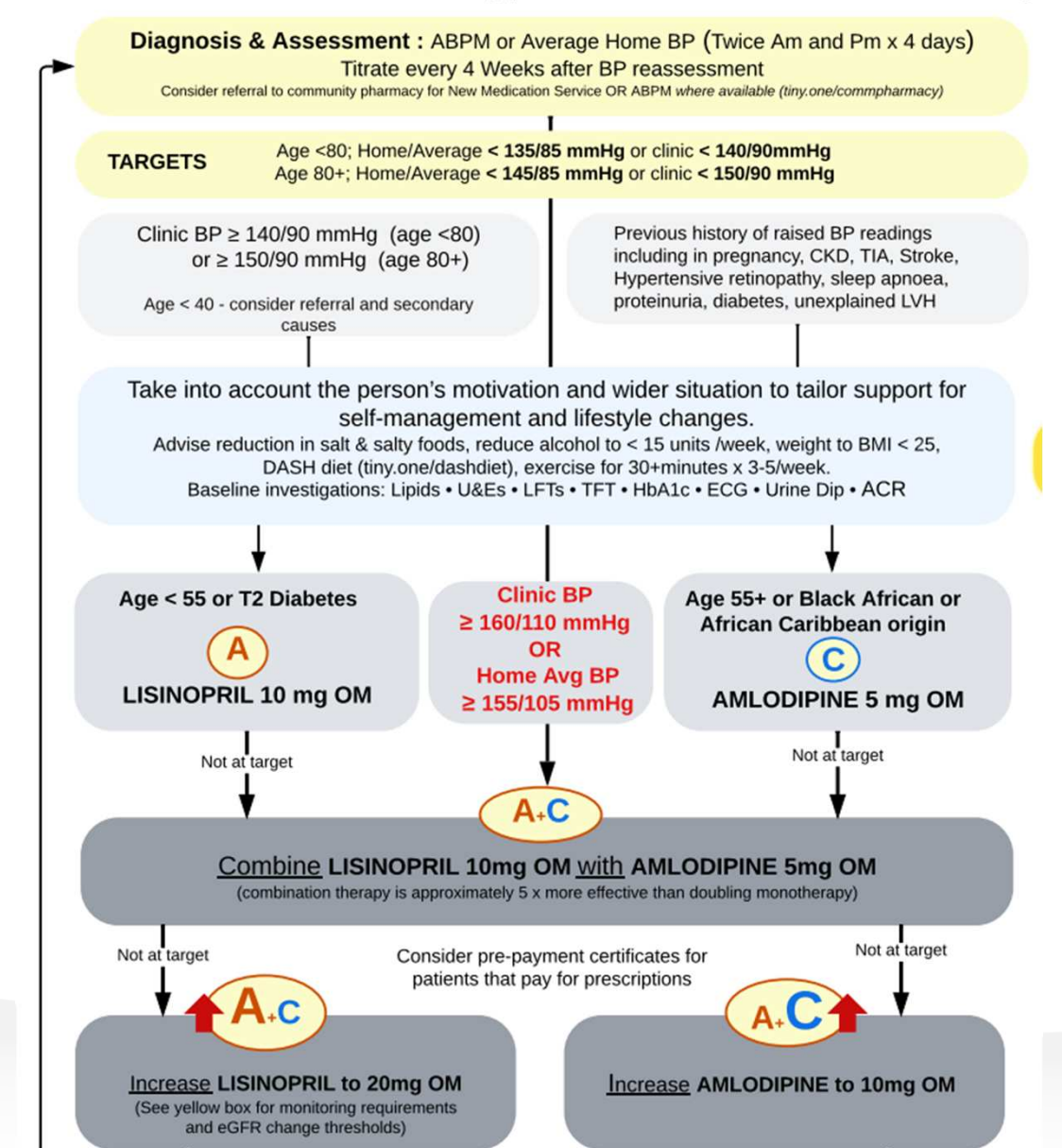
## Making the data actionable

- The data, analysis and insight provided so far is useful at a population level
- Real change can only be undertaken on a per patient level
- The data underpinning the CVNeed tool is at a patient level
- How can the tool support clinicians to manage patients as best they can?

# Greater Manchester Adult Hypertension Medication Pathway



# Greater Manchester Adult Hypertension Medication Pathway



PseudoID	Readings Required	Suggested Medication Actions	CVDs	CVNeed Score	Total Actions
apfZvU	Cholesterol; ACR; Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 80mg;	3	8.25	5
33Am8w	ACR; Blood Pressure;	Increase Ramipril to 10mg; Review Dapagliflozin dosage (eGFR < 45 ml/min/1.73 m2);	4	7.50	4
QihSRG	ACR; Blood Pressure;	Start Lisinopril 10mg; Offer Atorvastatin 20mg;	3	7.00	4
gyWMIE	Cholesterol; ACR; Blood Pressure;	Offer Atorvastatin 80mg;	3	10.25	4
tr2YHm	Cholesterol; ACR; Blood Pressure;	Start Amlodipine 5mg;	2	5.50	4
a3prGi	Cholesterol; ACR; Blood Pressure;	Offer Atorvastatin 80mg;	5	9.75	4
MgjLW1	Cholesterol; Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 80mg;	2	6.50	4
8cRP2g	ACR; Blood Pressure;	Start Lisinopril 10mg; Offer Atorvastatin 20mg;	4	12.50	4
hcN6DB	Cholesterol; ACR;	Start Indapamide 2.5mg; Offer Atorvastatin 80mg;	5	7.00	4
THteQW	Cholesterol; ACR;	Start Lisinopril 10mg; Offer Atorvastatin 80mg;	7	13.50	4
s0LQsh	Blood Pressure;	Start Amlodipine 5mg; Offer Atorvastatin 20mg;	1	5.50	3
GrSZbX	ACR;	Start Amlodipine 5mg; Offer Atorvastatin 20mg;	3	9.50	3
4yeibq	ACR; Blood Pressure;	Offer Atorvastatin 20mg;	3	10.50	3
8kne8Q	Cholesterol; ACR; Blood Pressure;	None	4	9.00	3
j0d44l	None	Increase Telmisartan to 40mg; Increase Felodipine to 10mg; Offer alternative lipid lowering therapy;	1	5.50	3
kNAdRF	Blood Pressure;	Start Lisinopril 10mg; Offer Atorvastatin 20mg;	1	5.00	3
Tt6ouY	ACR; Blood Pressure;	Start Amlodipine 5mg;	3	8.50	3
X2Uz7u	Blood Pressure;	Increase Ramipril to 10mg; Offer Atorvastatin 20mg;	1	5.00	3
QJVC8j	Cholesterol; ACR;	Offer Atorvastatin 80mg;	4	9.75	3
YoHbDD	ACR;	Start Lisinopril 10mg; Review Diltiazem dosage;	4	8.75	3
UXrnOx	Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 20mg;	2	12.00	3
SDiybE	Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 20mg;	1	1.00	3
Pir30M	None	Increase Ramipril to 10mg; Increase Amlodipine to 10mg; Offer Atorvastatin 20mg;	1	6.25	3
6WXfWI	Blood Pressure;	Increase Lisinopril to 20mg; Offer Atorvastatin 20mg;	1	6.75	3
YOrxBu	ACR;	Increase Lisinopril to 10mg; Offer alternative lipid lowering therapy;	3	7.00	3
8CYMGE	ACR; Blood Pressure;	Offer Atorvastatin 20mg;	2	10.50	3
enCF9o	Blood Pressure;	Increase Lisinopril to 20mg; Offer Atorvastatin 20mg;	1	6.75	3
oN0N1p	None	Start Indapamide 2.5mg; Review Dapagliflozin dosage (eGFR < 45 ml/min/1.73 m2); Offer Atorvastatin 20mg;	3	8.00	3
T8ThUF	Blood Pressure;	Start Amlodipine 5mg; Offer Atorvastatin 20mg;	1	5.50	3
1oBCIX	Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 20mg;	1	3.00	3
v2ENrg	None	Start Lisinopril 10mg; Start Amlodipine 5mg; Offer Atorvastatin 20mg;	1	7.25	3
KMsT7P	Blood Pressure;	Start Lisinopril 10mg; Offer alternative lipid lowering therapy;	3	5.75	3
htG3yn	Cholesterol;	Increase Nifedipine to 90mg; Offer Atorvastatin 80mg;	2	5.00	3
kggGjU	Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 20mg;	1	8.50	3
dcavuS	Blood Pressure;	Increase Amlodipine to 5mg; Offer Atorvastatin 20mg;	1	5.00	3
Bf7JHF	Cholesterol; Blood Pressure;	Start Indapamide 2.5mg;	2	10.50	3
UZ4ik5	Cholesterol; Blood Pressure;	Offer Atorvastatin 80mg;	2	8.75	3

PseudoID	Readings Required	Suggested Medication Actions	CVDs	CVNeed Score	Total Actions
apfZvU	Cholesterol; ACR; Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 80mg;	3	8.25	5
33Am8w	ACR; Blood Pressure;	Increase Ramipril to 10mg; Review Dapagliflozin dosage (eGFR < 45 ml/min/1.73 m2);	1	7.50	3
QihSRG	ACR; Blood Pressure;	Start Lisinopril 10mg; Offer Atorvastatin 20mg;	1	7.50	3
gyWMIE	Cholesterol; ACR; Blood Pressure;	Offer Atorvastatin 80mg;	1	7.50	3
tr2YHm	Cholesterol; ACR; Blood Pressure;	Start Amlodipine 5mg;	1	7.50	3
a3prGi	Cholesterol; ACR; Blood Pressure;	Offer Atorvastatin 80mg;	1	7.50	3
MgjLW1	Cholesterol; Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 80mg;	1	7.50	3
8cRP2g	ACR; Blood Pressure;	Start Lisinopril 10mg; Offer Atorvastatin 20mg;	1	7.50	3
hcN6DB	Cholesterol; ACR;	Start Indapamide 2.5mg; Offer Atorvastatin 80mg;	1	7.50	3
THteQW	Cholesterol; ACR;	Start Lisinopril 10mg; Offer Atorvastatin 80mg;	1	7.50	3
s0LQsh	Blood Pressure;	Start Amlodipine 5mg; Offer Atorvastatin 20mg;	1	7.50	3
GrSZbX	ACR;	Start Amlodipine 5mg; Offer Atorvastatin 20mg;	1	7.50	3
4yeibq	ACR; Blood Pressure;	Offer Atorvastatin 20mg;	1	7.50	3
8kne8Q	Cholesterol; ACR; Blood Pressure;	None	1	7.50	3
j0d44l	None	Increase Telmisartan to 40mg; Increase Felodipine to 5mg;	1	7.50	3
kNAdRF	Blood Pressure;	Start Lisinopril 10mg; Offer Atorvastatin 20mg;	1	7.50	3
Tt6ouY	ACR; Blood Pressure;	Start Amlodipine 5mg;	1	7.50	3
X2Uz7u	Blood Pressure;	Increase Ramipril to 10mg; Offer Atorvastatin 20mg;	1	7.50	3
QJVC8j	Cholesterol; ACR;	Offer Atorvastatin 80mg;	1	7.50	3
YoHbDD	ACR;	Start Lisinopril 10mg; Review Diltiazem dosage (eGFR < 45 ml/min/1.73 m2);	1	7.50	3
UXrnOx	Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 20mg;	1	7.50	3
SDiybE	Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 20mg;	1	7.50	3
Pir30M	None	Increase Ramipril to 10mg; Increase Amlodipine to 5mg;	1	7.50	3
6WXfWI	Blood Pressure;	Increase Lisinopril to 20mg; Offer Atorvastatin 20mg;	1	7.50	3
YOrxBu	ACR;	Increase Lisinopril to 10mg; Offer alternative lipid lowering therapy;	1	7.50	3
8CYMGE	ACR; Blood Pressure;	Offer Atorvastatin 20mg;	1	7.50	3
enCF9o	Blood Pressure;	Increase Lisinopril to 20mg; Offer Atorvastatin 20mg;	1	7.50	3
oN0N1p	None	Start Indapamide 2.5mg; Review Dapagliflozin dosage (eGFR < 45 ml/min/1.73 m2); Offer Atorvastatin 20mg;	3	8.00	3
T8ThUF	Blood Pressure;	Start Amlodipine 5mg; Offer Atorvastatin 20mg;	1	5.50	3
1oBCIX	Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 20mg;	1	3.00	3
v2ENrg	None	Start Lisinopril 10mg; Start Amlodipine 5mg; Offer Atorvastatin 20mg;	1	7.25	3
KMsT7P	Blood Pressure;	Start Lisinopril 10mg; Offer alternative lipid lowering therapy;	3	5.75	3
htG3yn	Cholesterol;	Increase Nifedipine to 90mg; Offer Atorvastatin 80mg;	2	5.00	3
kggGjU	Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 20mg;	1	8.50	3
dcavuS	Blood Pressure;	Increase Amlodipine to 5mg; Offer Atorvastatin 20mg;	1	5.00	3
Bf7JHF	Cholesterol; Blood Pressure;	Start Indapamide 2.5mg;	2	10.50	3
UZ4ik5	Cholesterol; Blood Pressure;	Offer Atorvastatin 80mg;	2	8.75	3

**Snapshot:** 30 September 2024

**PseudoID:** apfZvU

**Age and Sex:** 80 year old Male

**CVNeed Score:** 8.25

**CVDs:** 3

**Atrial Fibrillation:** N/A

**Chronic Kidney Disease:** Not coded, assumed stage G3A A2 based on last eGFR 54mL/min/1.73m2 (2024-07-25) and last ACR 3.1 mg/mmol (2014-11-12)

**Diabetes:** N/A

**Hypertension:** Last Home BP 137/82 mmHg (2023-04-17); Treated to target (Age >= 80) of 125/75 mmHg

**Peripheral Arterial Disease:** N/A

**Primary / Secondary Prevention:** TIA: Last LDL of 2.5 mmol/L (2023-01-24, Suboptimal (>= 1.8 mmol/L)) and last NonHDL of 2.8 mmol/L (2023-01-24, Suboptimal (>= 2.5 mmol/L))

**Demographics:** Obesity Class 2; Alcohol Misuse;

**Current Medication:** Ramipril 10mg;

**Total Actions:** 5

**Readings Required:** Cholesterol; ACR; Blood Pressure;

**Suggested Medication Actions:** Start Indapamide 2.5mg; Offer Atorvastatin 80mg;



PseudoID	Readings Required	Suggested Medication Actions	CVDs	CVNeed Score	Total Actions
apfZvU	Cholesterol; ACR; Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 80mg;	3	8.25	5
33Am8w	ACR; Blood Pressure;	Increase Ramipril to 10mg; Review Dapagliflozin dosage (eGFR < 45 ml/min/1.73 m2);	4	7.50	4
QihSRG	ACR; Blood Pressure;	Start Lisinopril 10mg; Offer Atorvastatin 20mg;	3	7.00	4
gyWMIE	Cholesterol; ACR; Blood Pressure;	Offer Atorvastatin 80mg;	3	10.25	4
tr2YHm	Cholesterol; ACR; Blood Pressure;	Start Amlodipine 5mg;	2	5.50	4
a3prGi	Cholesterol; ACR; Blood Pressure;	Offer Atorvastatin 80mg;	5	9.75	4
MgjLW1	Cholesterol; Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 80mg;	2	6.50	4
8cRP2g	ACR; Blood Pressure;	Start Lisinopril 10mg; Offer Atorvastatin 20mg;	4	12.50	4
hcN6DB	Cholesterol; ACR;	Start Indapamide 2.5mg; Offer Atorvastatin 80mg;	5	7.00	4
THteQW	Cholesterol; ACR;	Start Lisinopril 10mg; Offer Atorvastatin 80mg;	7	13.50	4
s0LQsh	Blood Pressure;	Start Amlodipine 5mg; Offer Atorvastatin 20mg;	1	5.50	3
GrSZbX	ACR;	Start Amlodipine 5mg; Offer Atorvastatin 20mg;	3	9.50	3
4yeibq	ACR; Blood Pressure;	Offer Atorvastatin 20mg;	3	10.50	3
8kne8Q	Cholesterol; ACR; Blood Pressure;	None	4	9.00	3
j0d44l	None	Increase Telmisartan to 40mg; Increase Felodipine to 10mg; Offer alternative lipid lowering therapy;	1	5.50	3
kNAdRF	Blood Pressure;	Start Lisinopril 10mg; Offer Atorvastatin 20mg;	1	5.00	3
Tt6ouY	ACR; Blood Pressure;	Start Amlodipine 5mg;	3	8.50	3
X2Uz7u	Blood Pressure;	Increase Ramipril to 10mg; Offer Atorvastatin 20mg;	1	5.00	3
QJVC8j	Cholesterol; ACR;	Offer Atorvastatin 80mg;	4	9.75	3
YoHbDD	ACR;	Start Lisinopril 10mg; Review Diltiazem dosage;	4	8.75	3
UXrnOx	Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 20mg;	2	12.00	3
SDiybE	Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 20mg;	1	1.00	3
Pir30M	None	Increase Ramipril to 10mg; Increase Amlodipine to 10mg; Offer Atorvastatin 20mg;	1	6.25	3
6WXfWI	Blood Pressure;	Increase Lisinopril to 20mg; Offer Atorvastatin 20mg;	1	6.75	3
YOrxBu	ACR;	Increase Lisinopril to 10mg; Offer alternative lipid lowering therapy;	3	7.00	3
8CYMGE	ACR; Blood Pressure;	Offer Atorvastatin 20mg;	2	10.50	3
enCF9o	Blood Pressure;	Increase Lisinopril to 20mg; Offer Atorvastatin 20mg;	1	6.75	3
oN0N1p	None	Start Indapamide 2.5mg; Review Dapagliflozin dosage (eGFR < 45 ml/min/1.73 m2); Offer Atorvastatin 20mg;	3	8.00	3
T8ThUF	Blood Pressure;	Start Amlodipine 5mg; Offer Atorvastatin 20mg;	1	5.50	3
1oBCIX	Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 20mg;	1	3.00	3
v2ENrg	None	Start Lisinopril 10mg; Start Amlodipine 5mg; Offer Atorvastatin 20mg;	1	7.25	3
KMsT7P	Blood Pressure;	Start Lisinopril 10mg; Offer alternative lipid lowering therapy;	3	5.75	3
htG3yn	Cholesterol;	Increase Nifedipine to 90mg; Offer Atorvastatin 80mg;	2	5.00	3
kggGjU	Blood Pressure;	Start Indapamide 2.5mg; Offer Atorvastatin 20mg;	1	8.50	3
dcavuS	Blood Pressure;	Increase Amlodipine to 5mg; Offer Atorvastatin 20mg;	1	5.00	3
Bf7JHF	Cholesterol; Blood Pressure;	Start Indapamide 2.5mg;	2	10.50	3
UZ4ik5	Cholesterol; Blood Pressure;	Offer Atorvastatin 80mg;	2	8.75	3

Actions for Hypertension patients based on Medication Pathway, 30 September 2024

	No action	Reading required			Medication action		Drug resistant		None	Grand Total
	No action, hypertension treated to target	Never had a blood pressure reading	Blood pressure reading more than 12 months old	Repeat blood pressure after recent medication change	Start new medication	Increase dosage of existing medication	Resistant to 3 Drugs	Resistant to Drugs (one or more contraindicated)	No suggestions, patient has heart failure	
1 Clinic BP >= 180/120 mmHg			19.5% (940)	26.9% (1,299)	28.9% (1,398)	17.2% (831)	2.6% (124)	1.1% (54)	3.8% (186)	100.0% (4,832)
2 Clinic BP >= 160/110 mmHg			16.3% (3,406)	21.9% (4,577)	33.8% (7,056)	21.3% (4,449)	1.9% (398)	1.2% (258)	3.5% (728)	100.0% (20,872)
3 No BP reading in the last 18 months		1.6% (348)	98.4% (21,512)							100.0% (21,860)
4a NNTT: Age >= 80, Clinic BP > 150/90 mmHg			5.2% (223)	8.4% (360)	44.2% (1,890)	29.5% (1,262)	0.9% (39)	1.7% (72)	10.1% (430)	100.0% (4,276)
4b NNTT: Stroke / TIA / CKD and ACR >= 70 mg/mol, Clinic BP > 130/80 mmHg			6.3% (846)	6.1% (809)	41.1% (5,482)	35.1% (4,674)	2.7% (357)	2.1% (282)	6.6% (881)	100.0% (13,331)
4c NNTT: CKD and ACR < 70 mg/mol, Clinic BP > 140/90 mmHg			4.4% (288)	11.8% (775)	37.9% (2,479)	35.1% (2,297)	3.0% (194)	2.5% (161)	5.4% (354)	100.0% (6,548)
4d NNTT: Age < 80, Clinic BP > 140/90 mmHg			7.3% (3,845)	15.9% (8,434)	43.4% (23,040)	29.0% (15,388)	1.9% (1,034)	1.1% (571)	1.3% (715)	100.0% (53,027)
5a TTT: Age >= 80, Clinic BP <= 150/90 mmHg	92.7% (59,444)		7.3% (4,648)							100.0% (64,092)
5b TTT: Stroke / TIA / CKD and ACR >= 70 mg/mol, Clinic BP <= 130/80 mmHg	93.4% (7,858)		6.6% (554)							100.0% (8,412)
5c TTT: CKD and ACR < 70 mg/mol, Clinic BP <= 140/90 mmHg	94.1% (30,170)		5.9% (1,876)							100.0% (32,046)
5d TTT: Age < 80, Clinic BP <= 140/90 mmHg	91.0% (169,049)		9.0% (16,782)							100.0% (185,831)
Grand Total	64.2% (266,521)	0.1% (348)	13.2% (54,920)	3.9% (16,254)	10.0% (41,345)	7.0% (28,901)	0.5% (2,146)	0.3% (1,398)	0.8% (3,294)	100.0% (415,127)

## Next steps

- Initial testing of patient level suggested actions has yielded around an 80% success rate
- Suggested actions are only as good as coded data on patient records
- Reidentification is due to launch GM wide in Spring 2025
- Currently working with NHS Bristol, North Somerset and South Gloucestershire ICB and onecare GP Federation to implement in their region
- Subject to successful implementation code could be published on GitHub for wider use and feedback

**Thank you for listening.**

**A huge and sincere thanks to Dr Aseem Mishra, Clinical Lead for Cardiovascular Disease Prevention in NHS Greater Manchester, who has been instrumental in driving this work and providing clinical input and feedback.**

**A huge thanks to my wife Becky, for her help and moral support with this and all my work and personal endeavours.**