Building a Data-Driven Type 2 Diabetes Intelligence Framework to Improve Care

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NHS Lothian

Our approach: Building a Data-Driven Diabetes Framework

Primary Care Focus: We're maximising the use of available data and analytics to enable high quality, evidence-based decisions that improve patient care

Collaborative Design: Series of workshops brought together analysts, clinicians, managers, researchers and policy leads to co-create our framework - **five workshops between August 2024 and September 2025**

Scalable Model: If successful, this approach can be adapted for other long-term conditions.

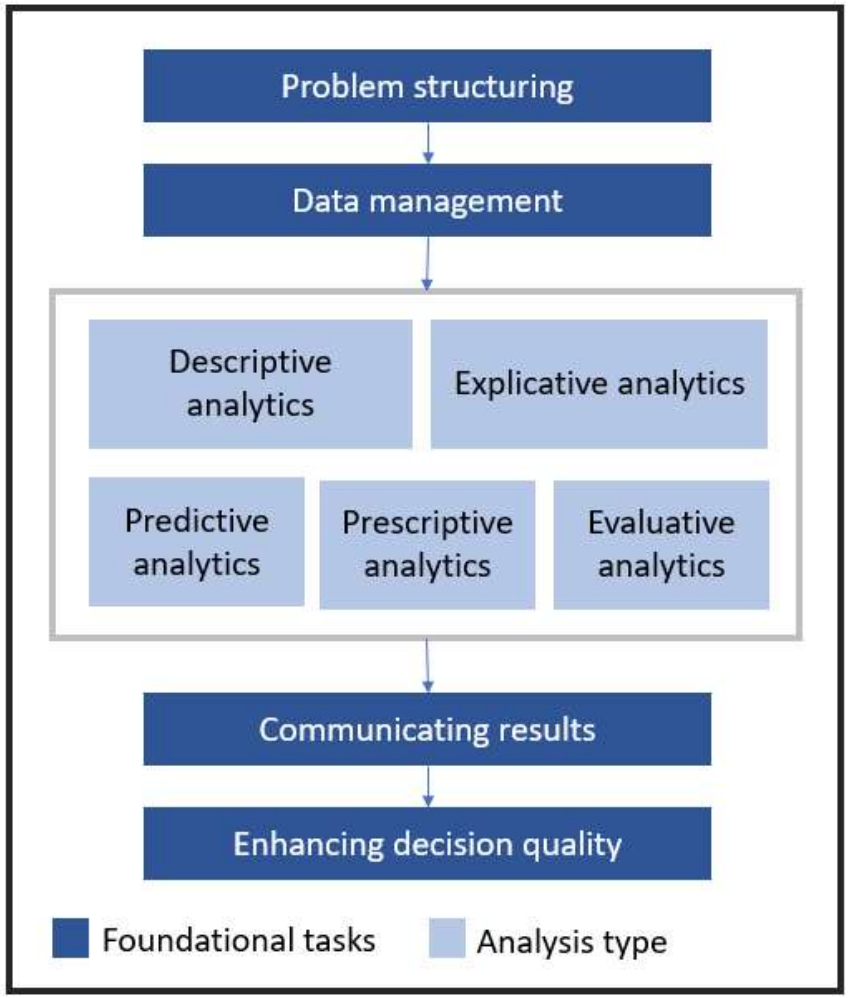
Our Aim: Deliver better care and outcomes for individual patients and support informed decision-making for the wider population by using robust data and analysis

Enabling better care through data-driven insights

- **Collaborative Data Integration:** DataLoch, a partnership between the University of Edinburgh and NHS Lothian, brings together routine data collected as part of people's day-to-day interactions with health and social care services. This covers primary and secondary care patient assessments, including medicines prescribed, outcomes and test results.
- **Empowering GP practices:** New data sharing agreements make GPs joint data controllers, allowing for timely and actionable analysis (linking with other Lothian datasets) and sharing of patient-level insights directly with practices.
- **Actionable Dashboards:** Custom dashboards help practices and clusters identify and target patient cohorts (e.g. frailty, diabetes) supporting quality improvement and improved patient outcomes.

Enabling timely, targeted interventions for better patient outcomes

Framework for Understanding Analysis



Are we consistently providing evidence-based T2D care to all appropriate patients within general practice?

Does this result in better managed diabetes and improved patient outcomes?

And does this result in reduced use of specialist secondary care services?

Can we shift to the left – support prevention of disease?

Descriptive Analytics	Explicative Analytics	Predictive Analytics	Prescriptive Analytics	Evaluative Analytics
What does the world look like now?	Why is the world the way it is?	What might the future hold for patients/services/ populations?	What should we do?	Did it make a difference?
Who are our different cohorts?	What is the scale of the problem?	How will risk factors influence cohort size in the future?	How might we change interventions to be more meaningful?	Are we seeing the change in cohort numbers we expected?
How do they vary between practices, clusters?	What interventions exist? How do patients engage with these interventions?	How will these changes impact the health system in terms of resource?	How will this impact patient outcomes?	How are interventions impacting patient outcomes / health system use?
How does this vary for patients with different demographics?	What are the testing rates? Under/over testing?	How does the impact of interventions change with age / multimorbidity?	How will this impact health system resource?	
Lab's data GP data Sci-diabetes	Lab's data GP data Mydiabetes, Let's Prevent Sci-diabetes	As before plus multimorbidity data, frailty (TRAK/GP data)	Interventions data	

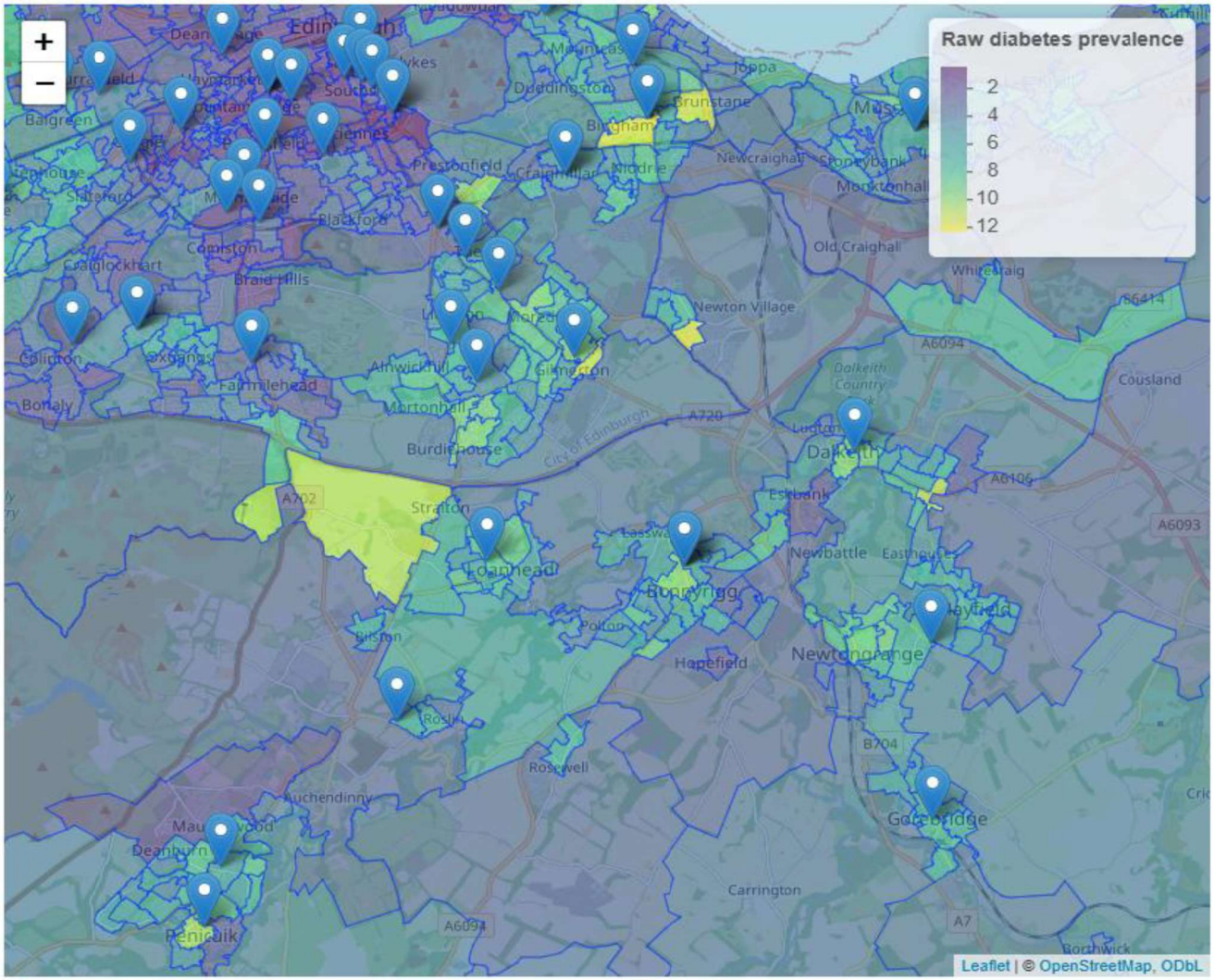
Descriptive & explicative analytics: Understanding Our Diabetes Population

Four cohorts:

1. **Diagnosed type-2 diabetes – 48,577** (4.6% of the Lothian GP population)
2. **Undiagnosed type-2 diabetes – 1,625** (0.15%)
3. **Pre-diabetes – 35,601** (3.4%)
4. **At high or very high risk – 75,220** (7%) includes gestational diabetes. At risk stratification using Leicester risk scoring.

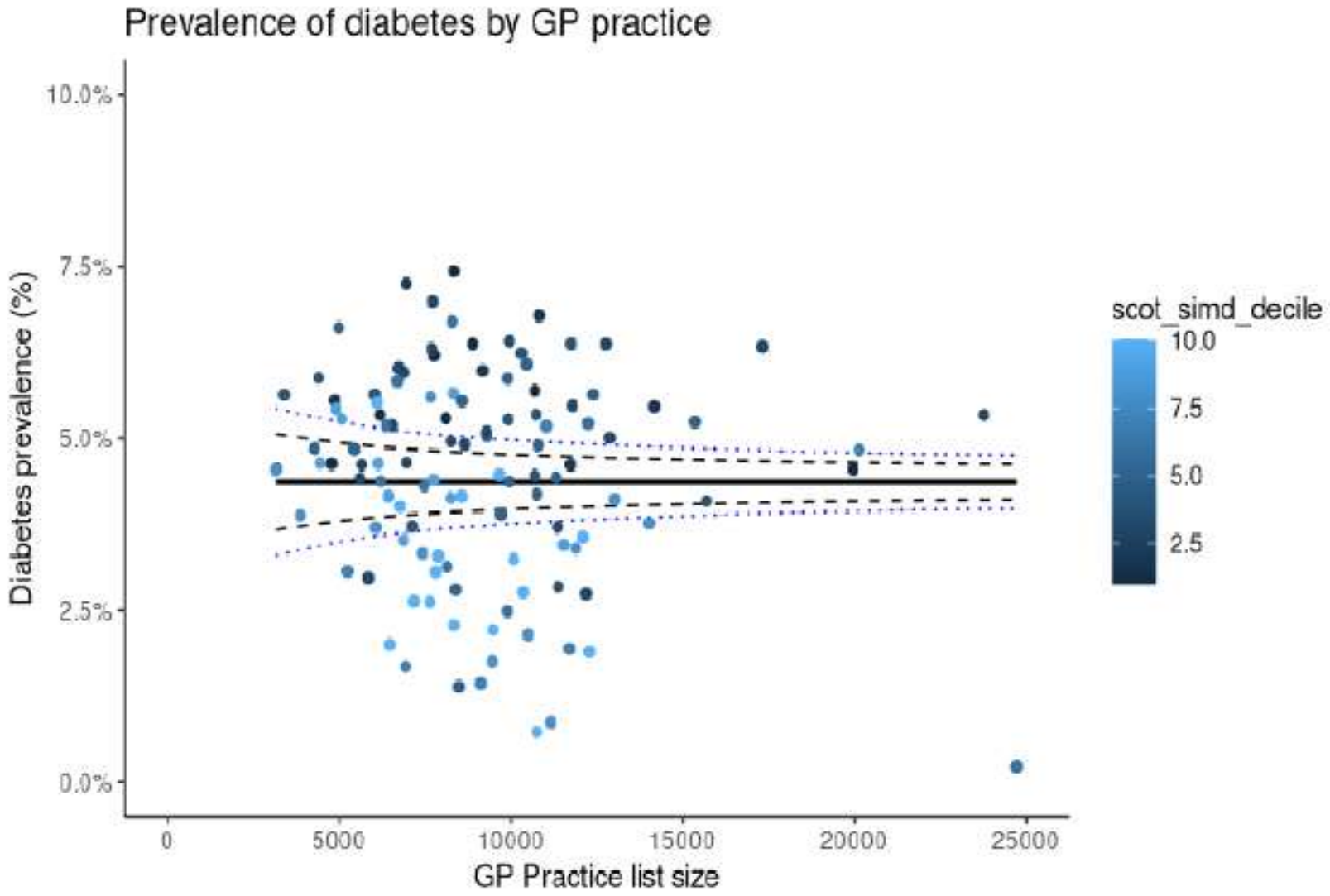
Knowing our cohorts means we can target interventions where they'll have the greatest impact.

Diabetes prevalence by data zone and GP practice



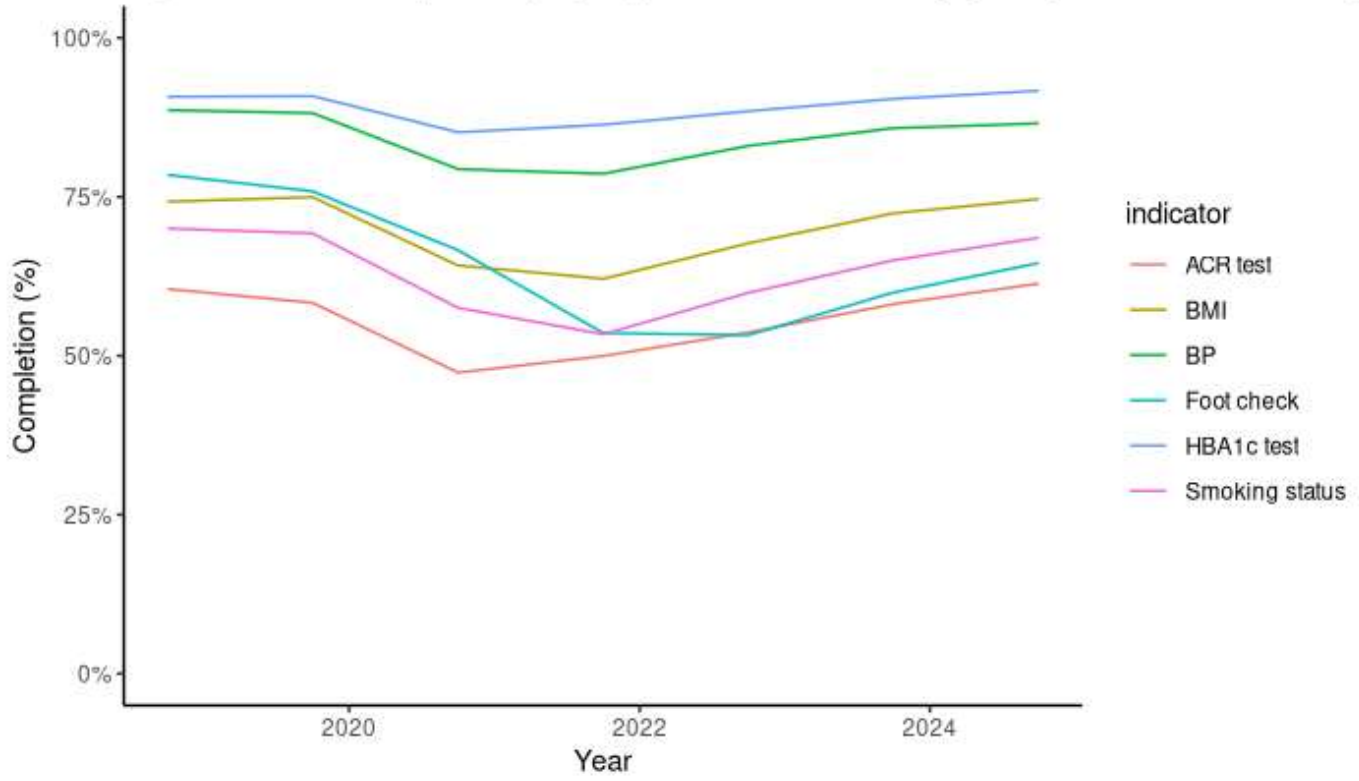
Prevalence can be mapped geographically to support targeted interventions

Variation in prevalence across practices



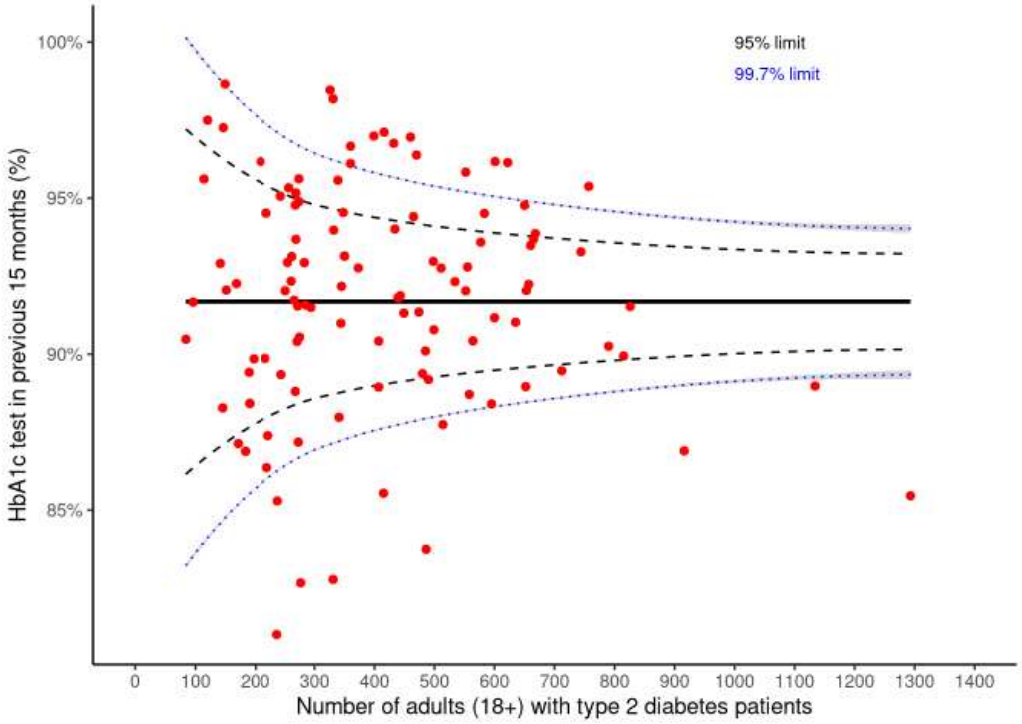
Processes of care completion

Fig 9: Lothian completion (%) of processes of care by year (1st Oct 2018-2024)



Variation HbAc1:
Average completion 91.7%

Fig 5. Percentage of adults with type 2 diabetes who had a HBAc1 test in the previous 15 months

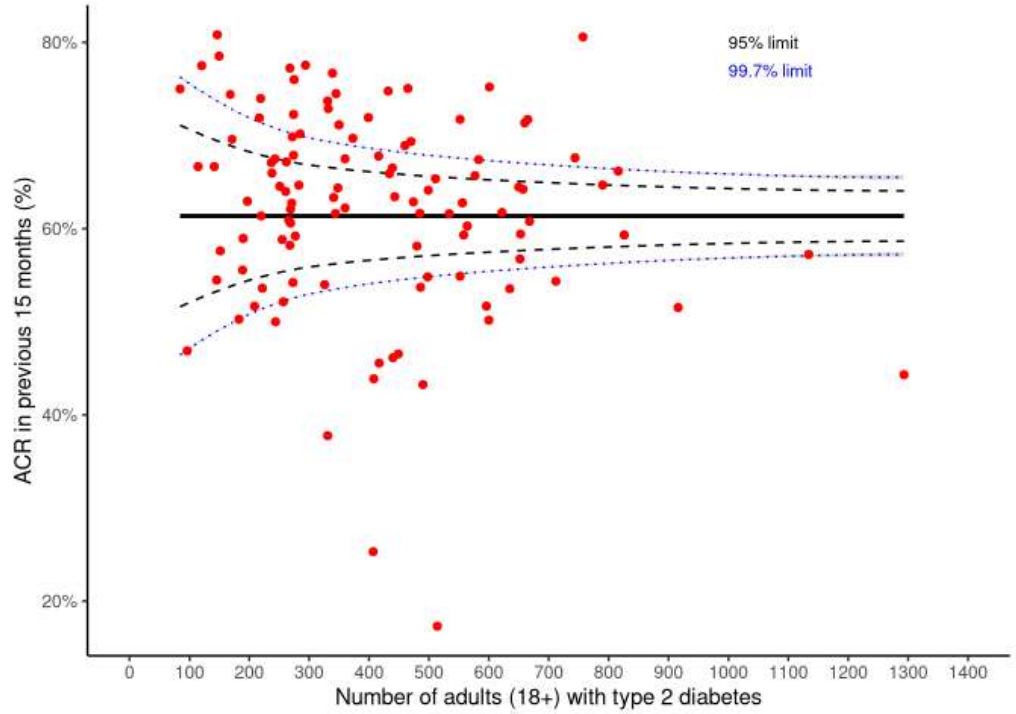


Funnel plot identifies outliers

- practices below average need further review
- practices above average could be examples of best practice

Variation ACR:
Average completion 61.4%

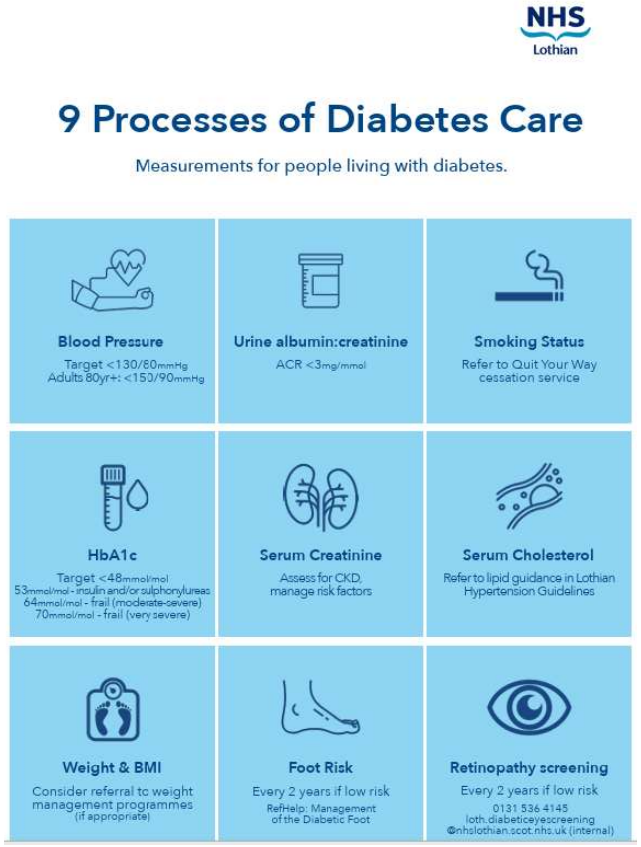
Fig 1. Percentage of adults with type 2 diabetes who had a ACR test in the previous 15 months



Explicative analytics:
Variation shows opportunities for improvement

NICE guidance: “completion of the 9 key care processes to monitor and manage type 2 diabetes can help to reduce the risk of complications and identify any complications earlier”

- Variation in the system – both across processes and practices.
- Opportunity for improvement – can we reduce variation through benchmarking / providing data insights, and learn from best practice?



Dashboards Driving Quality Improvement in Diabetes Care

Features:

- Comprehensive benchmarking: Dashboards provide process and outcome measures available at both practice and cluster levels, covering 8 key care processes and treatment targets (HbA1c, BP, cholesterol)
- Longitudinal tracking: Data trends can be monitored, supporting continuous improvement.
- Patient finder tool: Plans underway to add a ‘case finder’ for identifying specific patient cohorts (see data included on next slide).

Engagement and Impact:

- Active usage: Over 250 dashboard views by multiple users (May 2025); ~50 practices regularly engaged (Sept 2025)
- Practice support: Dashboards underpin QI projects and facilitate targeted follow-up with cluster leads through Practice Quality Leads events.

Lothian Primary Care Portal

This portal contains dashboards to support GP Practice staff and other primary care management staff in NHS Lothian. Click on the links to take you to the relevant dashboard. Contact Analysts.PrimaryCare@nhslothian.scot.nhs.uk for any queries.
Please note GP Practice dashboards are for practice staff.

PRIMARY CARE ACTIVITY

In-hours General Practice Activity

In-hours activity data for practices registered with Data Loch. Includes weekly/monthly trend data for encounters at practice level and an overview for continuity of care.

Go to Practice dashboard
Go to Mgmt. dashboard

Frequent Attenders

For practices that are consistently recording encounters data. This dashboard identifies frequent attenders to help practices understand the workload impact and characteristics of this group.

Go to Practice dashboard

CTAC Services

This dashboard provides attendance and non-attendance data for CTAC services by appointment location, type and GP practice. Only currently available for Edinburgh and East Lothian.

Go to Practice dashboard
Go to Mgmt. dashboard

Out of Hours Activity

This dashboard includes weekly/monthly trend data for Out of Hours attendances and waiting time breaches. Due to ongoing issues with Adastra, data for August and September 2022 is not available.

Go to dashboard

Board Reporting

In-hours and Out of hours primary care activity for NHS Lothian board reporting purposes.

Go to dashboard

DEMOGRAPHICS

Demographics and List Size

Practice list size by age, gender and deprivation. This dashboard also monitors weekly changes in list size using Data Loch.

Go to dashboard

Practice Boundary Maps

A data visualisation showing practice population in relation to the practice boundary.

Go to dashboard

QUALITY IMPROVEMENT

Lothian Quality Data Framework

A set of indicators available at GP practice/cluster level for quality improvement work.

Go to Practice dashboard
Go to Mgmt. dashboard

PRESCRIBING

National Therapeutic Indicators

A set of prescribing indicators available at GP practice/cluster/HSCP level for quality improvement work

Go to dashboard

PUBLIC HEALTH

Bowel Screening

This dashboard includes practice uptake rates by age/gender and deprivation. Note the most recent data is not yet included but will be available soon.

Go to Mgmt. dashboard
Go to Practice dashboard

Cervical Screening

This dashboard includes practice uptake rates by age/gender and deprivation.

Go to Mgmt. dashboard
Go to Practice dashboard

Diabetes

Diabetes processes of care and treatment target indicators available at GP practice level for quality improvement work.

Go to Practice dashboard
Go to Cluster dashboard

Rockwood Frailty LES

This dashboard is designed to help practices improve frailty coding and understanding of frail populations.

Go to LES Practice dashboard
Go to Practice dashboard
Go to Mgmt. dashboard

Multimorbidity

This dashboard is based on the Lothian multimorbidity Data Loch report. Data will include most common long term conditions and multimorbidity by age/deprivation

Go to dashboard

Processes and Outcomes Dashboard – cluster level

Type 2 Diabetes: Cluster summary chart

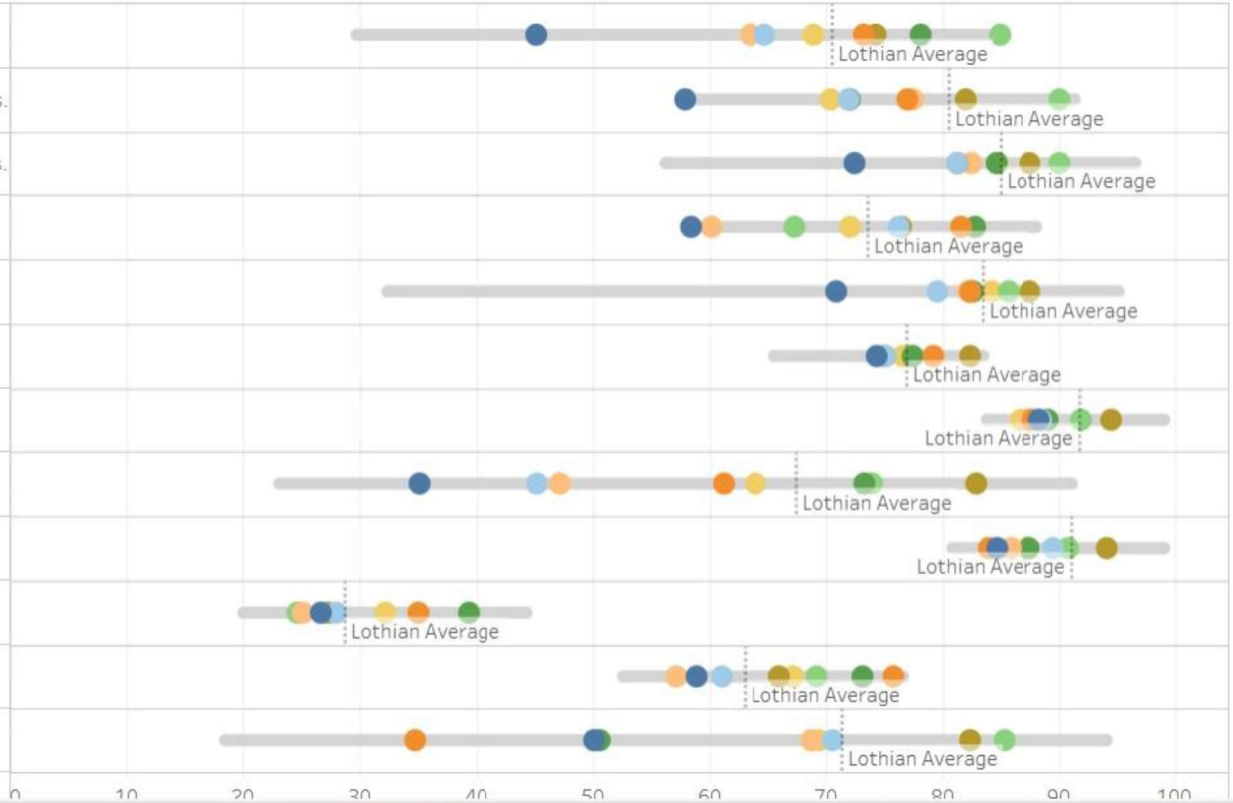
Cluster: Edinburgh North West - Bridge

GP Practice: (All)

Source: Vision/EMIS | Updated monthly. Last Updated: 01/02/2026 | Contact: Analysts.PrimaryCare@nhslothian.scot.nhs.uk

Cluster summary chart - indicator percentages for each practice

Indicator Code	Short description
DIAB01	% of adults with type 2 diabetes who had an ACR test in the previous 15 months.
DIAB02	% of adults with type 2 diabetes who had a BMI reading in the previous 15 months.
DIAB03	% of adults with type 2 diabetes who had a SBP reading in the previous 15 months.
DIAB03a	% latest reading: <= 140/90 mmHg
DIAB04	% of adults with type 2 diabetes who had a cholesterol measurement in the previous 15 months.
DIAB04a	% latest reading: <= 5mmol
DIAB05	% of adults with type 2 diabetes who had a eGFR measurement in the previous 15 months.
DIAB06	% of adults with type 2 diabetes who had a foot check in the last 15 months for medium risk and 27 months for low risk.
DIAB07	% of adults with type 2 diabetes who had a HbA1c test in the previous 15 months.
DIAB07a	% latest reading: <= 48mmol/mol
DIAB07b	% latest reading: <= 58 mmol/mol
DIAB08	% of adults with type 2 diabetes who had a smoking status recorded in the previous 15 months.



Patient Identifiable Data: Type 2 Diabetes Cohort Patient listing

GP practice [redacted]

Age Group: All

Ethnicity: All

SIMD Quintile: All

Rockwood Clinical Frailty Score: All

BMI 30 or over: All

Smoking Status: All

Diagnosis: All

BP over 140/90: All

HbA1c over 90: All

HbA1c in last 15months: All

HbA1c group: All

Foot risk: All

Secondary Care Interaction
Hover for more info.
Y N

Source: Vision/EMIS | Dashboard last updated on 16/02/2026. Includes data up to Wednesday of the previous week. | Contact: Analysts.PrimaryCare@nhslothian.scot.nhs.uk

Type 2 Diabetes patient listing

CHI	Age In Years	Date of diagnosis	Latest BP	Latest BP Date	Latest HbA1c	Latest HbA1c Date	Latest BMI	Latest BMI Date	Foot risk	Latest foot risk date	
[redacted]	74	10/05/2022	139/65	23/05/2025	44	16/05/2025	22.3	23/05/2025	NA	NA	
	73	28/04/2025	122/74	28/04/2025	50	24/04/2025	24.2	28/04/2025	NA	NA	
	53	21/11/2014	120/74	03/01/2024	60	08/08/2024	34.1	03/01/2024	low	2021-05-10	
	73	18/04/2024	166/86	17/09/2025	47	20/10/2025	39.8	18/07/2025	NA	NA	
	73	21/08/2012	138/80	24/12/2025	59	24/12/2025	26.1	24/12/2025	NA	NA	
	68	22/12/2006	172/71	05/12/2025	51	28/11/2025	32.8	05/12/2025	low	2021-03-04	
	61	16/02/2024	139/85	04/03/2024	49	16/02/2024	39.3	04/03/2024	NA	NA	
	78	08/03/2021	118/71	03/06/2025	52	06/08/2025	28.4	18/10/2024	NA	NA	
	73	27/05/2019	147/85	13/01/2026	44	05/01/2026	27.9	13/01/2026	low	2019-09-10	
	74	24/07/2025	148/79	24/07/2025	62	24/07/2025	39.2	24/07/2025	NA	NA	
	54	30/07/2025	NA	Null	Null	Null	38.1	30/07/2025	NA	NA	
	80	06/08/2025	137/85	06/06/2025	47	10/04/2025	24.7	06/05/2025	NA	NA	
	53	09/06/2006	126/82	13/09/2024	49	16/10/2025	31.7	28/10/2024	low	2016-01-29	
	37	30/05/2025	140/87	05/09/2025	33	05/09/2025	36.8	05/09/2025	NA	NA	
	55	18/07/2024	147/88	24/10/2025	48	17/10/2025	34.5	27/11/2008	NA	NA	
	78	14/11/2000	142/73	20/11/2025	44	27/06/2025	35.4	13/11/2025	low	2024-07-05	
	43	14/07/2022	94/74	13/05/2025	49	30/04/2025	40.5	13/05/2025	NA	NA	

Count of patients in list

545

Cohort filters

Diabetes known			At risk / pre-diabetes		
Diabetes known > 12 months	Diabetes known < 12 months	Diabetes known in remission	At risk (high / v. high)	Pre-diabetes coded	Pre-diabetes not coded

Patient demographics / characteristic filters

Age	Ethnicity	SIMD	Multimorbidity	Frailty (Rockwood)	BMI

Risk flag filters

BP>140/90	Cholesterol > 5mmol	Hba1c> 90	No HbA1c last 15 mths	BMI >= 30	0 care processes last 15 mths	Diabetic polypharmacy 3+

Intervention data

No. of care processes complete	Latest BP date / result	Latest cholesterol date / result	Latest HbA1c date & result	% point change in HbA1c (12 mths post diagosis) [1]	Weight mgmt status referral / WL /attended	Diabetes related prescriptions

Engagement (Primary/Secondary care)

Primary Care encounters – 12 mths	Continuity of Care Measure (UPCI)	Secondary Care attendances - 12 mths

Pre-diabetes definition

- No diabetes code (type 1 and type 2) in GP data – read codes C10…
- Most recent diabetes read code is C11y2 (Impaired glucose tolerance), C11y3 (Impaired fasting glycaemia), C11y5 or R102.[D](Pre-diabetes)

OR latest HbA1c >= 42mmol/mol and HbA1c < 48mmol/mol (IFCC scale)

OR latest fasting glucose >= 6.1mmol/l and fasting glucose < 7.0mmol/l (GP tests only [1])

- Aged >= 18 and age <= 80

Pre-diabetes data: cohort generation

- Automated weekly cohort files
  - track cohort numbers over time
  - provide weekly snapshot of current population

- Patient level movement file
  - track cohort movements between the cohorts

Data to allow us to evaluate interventions at both individual and population level and support decision-making

Patient level data cohort pre-diabetes

- Patient characteristics
  - CHI, age, sex, SIMD, frailty, BMI, ethnicity
- Pre-diabetes info
  - date of diagnosis, source, prescribing, latest hbA1c, high risk review code, hypertension coding
- Secondary care referrals, interventions data (to be added)

This information could be used to stratify the cohort according to risk

Cohort movement file

pseudo_id	cohort	entry_date	leaving_date	movement_index_asc	is_current
10772	At risk	15/12/2025	22/12/2025	1	0
10772	Undiagnosed T2DM	22/12/2025	29/12/2025	2	0
10772	Known T2DM	29/12/2025		3	1
15056	Undiagnosed T2DM	15/12/2025	22/12/2025	1	0
15056	Known T2DM	22/12/2025		2	1
49863	At risk	15/12/2025	22/12/2025	1	0
49863	Pre-diabetes	22/12/2025		2	1
110454	Known T2DM	15/12/2025		1	1
141304	At risk	15/12/2025	22/12/2025	1	0
141304	Pre-diabetes	22/12/2025		2	1

Pre-diabetes LES

- New Lothian specific enhanced service - practices to complete work on formalising their pre-diabetes coding and registers.
- Dashboard patient listing supports this coding work – practices are engaging well with this
- Patient list supplied to identify those with an abnormal HbA1c in the pre-diabetes range that does not have a pre-diabetes code that need to be reviewed.
- By end March 2026 – practices should have a register in place that allows for annual recall and review of this group of patients.

Next steps

- **Identify and engage the 'unknown' cohort:** Continue providing feedback to practices to support the ~400 patients whose diabetes status is unclear.
- **Deepen analysis of interventions and outcomes:**
  - Further explore intervention data (e.g. Mydiabetes, GLP-1 medication)
  - Assess outcome measures:
    - How well is diabetes being controlled?
    - What proportion are meeting key targets?
    - What is the patient experience?
- **Advance Predictive and Prescriptive Analytics:**
  - Now able to identify the pre-diabetic cohort and at risk cohorts at patient level.
  - Develop GP Local Enhanced Service to support interventions for pre-diabetic patients.
  - Use data to inform the Lothian Healthy Weight and T2D Prevention Oversight Group.
- **Evaluate Impact:** Assess whether interventions are making a measurable difference, and support decision-making for resource allocation to deliver best outcomes possible.