National Diabetes Audit, 2019-20
Type 1 Diabetes

England and Wales

12 August 2021

Information and technology
for better health and care

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NDA 2019-20: Type 1 Diabetes

Executive summary and recommendations

Executive summary

Background

This is the first NDA report dedicated to people with type 1 diabetes.

A new diagnosis validation process, which considers medication as well as recorded diagnosis, has been introduced to try to ensure that only people with true type 1 diabetes are included (see appendix).

Results are to be taken in the context of low data submission from specialist services, possibly hampered due to COVID-19.

Key Findings:

- The number of people with type 1 diabetes confirmed at an adult specialist service was low (78,585, 35.9 per cent of the total number of people with type 1 diabetes, 218,670). From 135 acute hospital trusts, some with multiple hospitals: 38 submitted the core and insulin pump datasets; 5 submitted only the pump dataset; 55 submitted only the core dataset. This is a much lower level of participation than for the National Paediatric Diabetes Audit*.
- The national median rate for HbA1c ≤ 58mmol/mol (7.5%) is 27.6 per cent, with a variation between 18.4 per cent and 40.9 per cent amongst Clinical Commissioning Groups (CCGs)/Local Health Boards (LHBs).
- Individuals with type 1 diabetes are more likely to have recommended HbA1c levels if they are on insulin pump treatment. Overall, around 10 per cent of people with type 1 diabetes use insulin pumps, but this varies appreciably by CCG/LHB locality from 3.2 per cent to 24.6 per cent. More than 70,000 people with type 1 diabetes meet one of the NICE criteria for offering insulin pump treatment as they are on basal-bolus treatment and have an HbA1c ≥ 69 (8.5%).
- Individuals with type 1 diabetes are more likely to have high HbA1c levels (>86mmol/mol) if they are young, female, of minority ethnicity, or live in an area of high deprivation.

* NPDA participation by Specialist Paediatric Diabetes Services was 100 per cent in 2018-19 and 96 per cent in 2019-20.

Recommendations

Recommendation 1

All specialist services providing type 1 diabetes care must contribute to future National Diabetes Audits which will enable them to benchmark their results and highlight areas for service improvement.

Recommendation 2

All specialist services and primary care providers should ensure provision of insulin pump treatment is equitable and as per NICE guidelines (HbA1c 69mmol/mol (8.5%) or greater and using basal-bolus insulin).

Recommendation 3

All commissioners, specialist services and primary care providers should ensure that provision of, and access to, expert diet and lifestyle guidance and support for people with type 1 diabetes and associated obesity is on a par with the rest of the population.

NDA 2019-20: Type 1 Diabetes

Introduction

Introduction

The National Diabetes Audit (NDA) provides a comprehensive view of diabetes care in England and Wales. It measures the effectiveness of diabetes healthcare against NICE Clinical Guidelines and NICE Quality Standards*,**

This is the **Type 1 Diabetes report**. It details the findings and recommendations relating to diabetes care process completion, treatment target achievement and structured education for people with type 1 diabetes. The 2019-20 audit covers the period 01 January 2019 to 31 March 2020.

Type 1 cohort

A new diagnosis validation process*** has been introduced to this report. Therefore the type 1 cohort used for this report will not be the same as the type 1 cohort used in the NDA Core Report 1 2019-20. The cohort used for this report consists of people:

- Recorded as being diagnosed with type 1 diabetes within the 2019-20 NDA core audit
- Who were submitted by a GP practice for the 2019-20 NDA core audit
- Aged 19 years and over
- Prescribed insulin treatment consistent with one of the following regimens between the period 01 January 2019 to 31 March 2020:
  - Insulin pump****
  - Basal-bolus
  - Fixed mix.

Table 1: Number and percentage of people with type 1 diabetes submitted by a GP practice, by confirmed and not confirmed at a specialist service, England and Wales, 2019-20

Specialist services	Type 1 Diabetes	
	Number	Per cent
Total	*218,670*	-
Confirmed	78,585	35.9
Not confirmed	140,085	64.1

218,670 people with type 1 diabetes were submitted by a GP practice.

* NICE Clinical Guidelines – NG17: Type 1 diabetes in adults: diagnosis and management http://www.nice.org.uk/guidance/ng17 ** NICE – Diabetes in Adults Quality Standard http://guidance.nice.org.uk/QS6 *** This validation process should minimise the number of people with type 2 diabetes inadvertently coded as type 1, but may exclude a few frail type 1 individuals who are treated compassionately with very simple insulin regimens. **** Because of low participation by specialist services insulin pump refers to people whose latest insulin prescribed was Rapid Acting Insulin in a vial rather than insulin in cartridges or pre-filled pens.

National Diabetes Audit Participation

Primary care participation stood at 99.3 per cent in 2019-20 in England and Wales.

In all but six CCGs and LHBs (136 of 142), GP practice participation was 95 per cent and over. Participation did not fall below 88 per cent at any CCG/LHB.

98 specialist services participated in 2019-20 in England*.

- 38 services submitted both the NDA core dataset and the insulin pump dataset
- 5 services submitted only the insulin pump dataset
- 55 services submitted only the NDA core dataset

Specialist services generally take the lead in care for type 1 diabetes services and also often for younger people with type 2 diabetes. Their more comprehensive involvement is important as part of the drive to improve the poorer results for these patients.

For more information on the level of participation in 2019-20 by CCG and LHB please see the *National Diabetes Audit, 2019-20 Report 1: Care Processes and Treatment Targets*.

* Two Welsh specialist services submitted insulin pump data to the NDA.

NDA 2019-20: Type 1 Diabetes

What are the characteristics of people diagnosed with type 1 diabetes?

Type 1 Diabetes: Sex, Ethnicity, Deprivation

- More males than females have type 1 diabetes, whereas there are marginally more females than males in the general population.
- The proportion of non-white ethnicities among people with type 1 diabetes is lower than that found in the general population.
- No area of deprivation is associated with a higher or lower likelihood of having type 1 diabetes.

Table 2: People with type 1 diabetes, by sex, England and Wales, 2019-20

Sex	Type 1 Diabetes		England and Wales*
	Number	Per cent	Per cent
Total	*218,670*	-	-
Male	124,430	56.9	49.4
Female	94,240	43.1	50.6
Unknown	5	0.0	N/A

Table 3: People with type 1 diabetes, by ethnicity, England and Wales, 2019-20

Ethnicity	Type 1 Diabetes			England and Wales**
	Number	Per cent	Per cent of known***	Per cent
Total	*218,670*	-	-	-
White	180,560	82.6	91.2	86.0
Asian	7,735	3.5	3.9	7.5
Black	5,025	2.3	2.5	3.3
Mixed	2,180	1.0	1.1	2.2
Other	2,405	1.1	1.2	1.0
Unknown / Not stated	20,765	9.5	N/A	N/A

Table 4: People with type 1 diabetes, by social deprivation, England and Wales, 2019-20

Deprivation	Type 1 Diabetes		By definition
	Number	Per cent	Per cent
Total	*218,670*	-	-
Most deprived	43,855	20.1	20.0
2nd most deprived	44,460	20.3	20.0
3rd most deprived	45,000	20.6	20.0
2nd least deprived	44,040	20.1	20.0
Least deprived	41,225	18.9	20.0
Unknown	95	0.0	N/A

* ONS 2019 mid-year population estimates for England and Wales. ** Data from 2011 Census (England and Wales). *** People whose ethnicity is 'Unknown / Not stated' excluded from calculation.

Type 1 Diabetes: Age and Sex

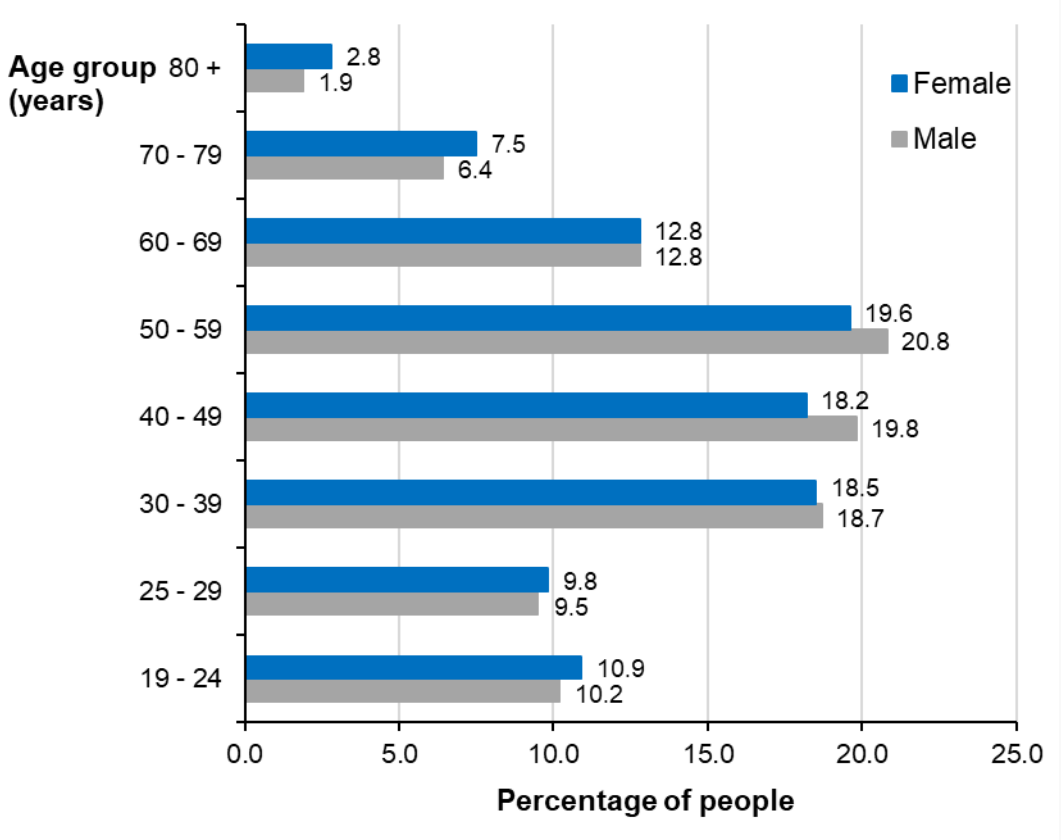
- People with type 1 diabetes have a slightly younger age profile than the general population.
- In people with type 1 diabetes, a greater proportion of females are under 30 years old and over 70 years old, compared to the proportion of males in these age groups.

Table 5: People with type 1 diabetes, by age group, England and Wales, 2019-20

Age group (years)	Type 1 Diabetes		England and Wales*
	Number	Per cent	Per cent
Total	*218,670*	-	-
19 - 24	22,935	10.5	9.5
25 - 29	21,030	9.6	8.7
30 - 39	40,630	18.6	17.2
40 - 49	41,775	19.1	16.3
50 - 59	44,300	20.3	17.4
60 - 69	27,955	12.8	13.6
70 - 79	15,130	6.9	10.9
80 +	4,920	2.2	6.5

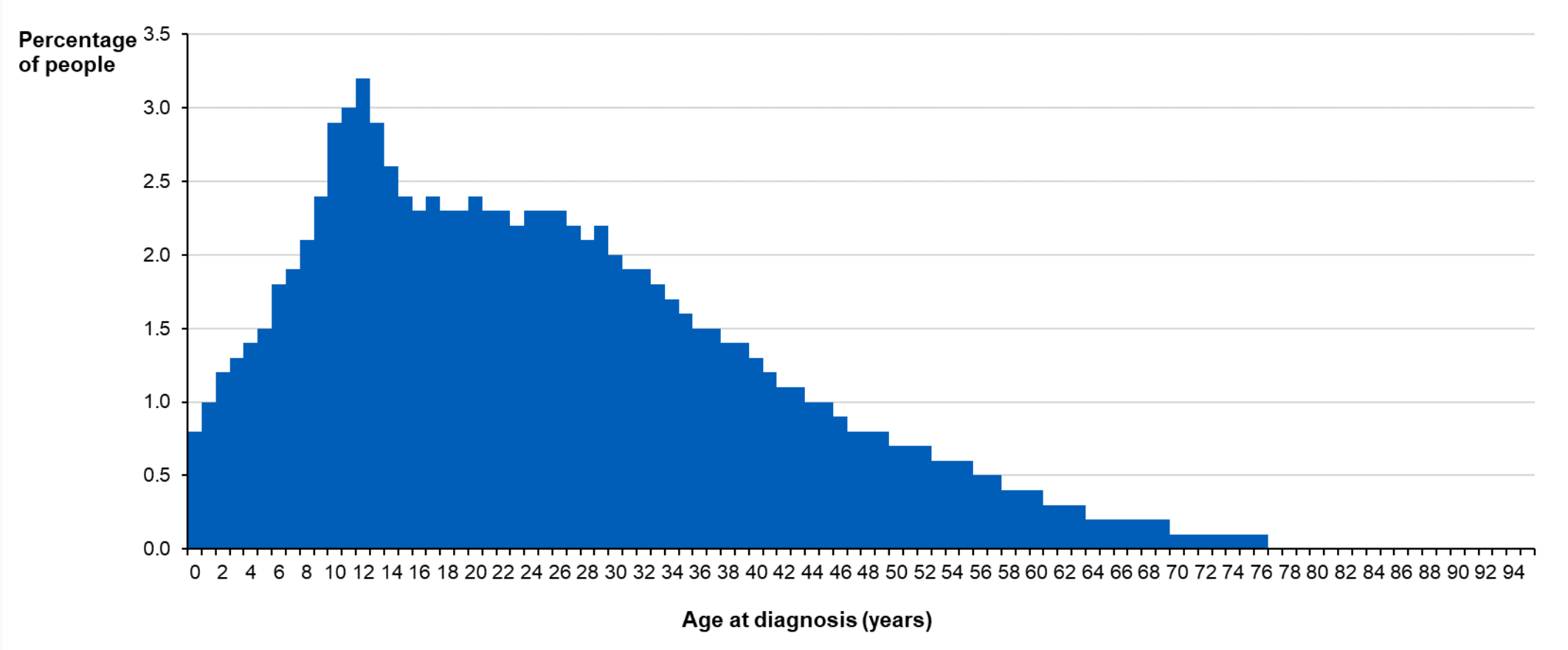
* ONS 2019 mid-year population estimates for England and Wales.

Figure 1: People with type 1 diabetes, by age group and sex, England and Wales, 2019-20



Type 1 Diabetes: Age at diabetes diagnosis

Figure 2: People with type 1 diabetes, by age of diagnosis*, England and Wales, 2019-20



Presentations of type 1 diabetes climb steeply through childhood and peak in adolescence. They continue to present at a steady high rate to around 30 years old where they decline gradually with low rates presenting from the mid-fifties. Approximately two-thirds are diagnosed by aged 30 years old and one third thereafter.

* Zero years age at diagnosis includes people whose date of birth is the same as their date of diagnosis. In some cases this may be a data quality issue.

Type 1 Diabetes: Diabetes duration

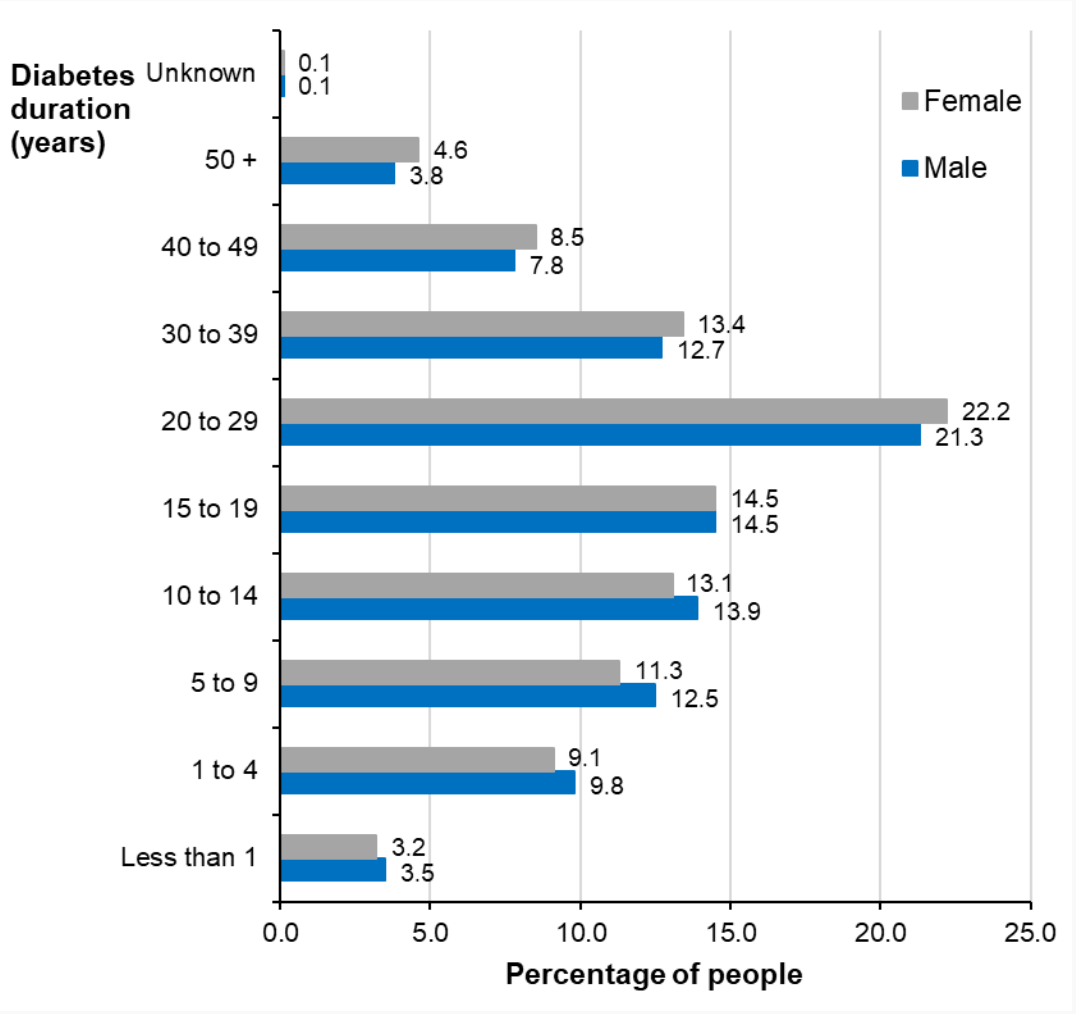
It is usually more difficult to achieve glucose control targets after five to ten years of type 1 diabetes.

- Three-quarters of people with type 1 diabetes have a diabetes duration of ten or more years.

Table 6: Distribution of diabetes duration, England and Wales, 2019-20

Diabetes duration (years)	Type 1 Diabetes	
	Number	Per cent
Total	*218,670*	-
Less than 1	7,325	3.3
1 - 4	20,810	9.5
5 - 9	26,280	12
10 - 14	29,630	13.6
15 - 19	31,745	14.5
20 - 29	47,455	21.7
30 - 39	28,465	13
40 - 49	17,650	8.1
50 or more	9,085	4.2
Unknown	230	0.1

Figure 3: Distribution of diabetes duration, by sex, England and Wales, 2019-20



NDA 2019-20: Type 1 Diabetes

What are the characteristics of people with type 1 diabetes on each type of insulin regimen?

Insulin regimens used by people with type 1 diabetes

Basal-bolus insulin treatment comprises background, slow acting (basal) insulin, self-injected once or twice daily, plus rapid acting (bolus) insulin at mealtimes.

Pump or Continuous Insulin Infusion therapy uses rapid acting insulin delivered subcutaneously under the control of a 'Pump'. Background rates are programmed and mealtime boluses are added manually.

'**Fixed Mix**' insulin combines rapid and longer acting insulin at a fixed ratio. It is usually self-injected twice daily.

Closed loop insulin infusion ('artificial pancreas') combines Continuous Glucose Monitoring with an insulin Pump. Presently uncommon, it will be included in the 2021-22 NDA core Type 1 report.

Table 7: People with type 1 diabetes, by latest insulin treatment regimen* and additional glucose lowering treatment, England and Wales, 2019-20

Latest insulin treatment regimen*	Type 1 Diabetes		Per cent on additional glucose lowering treatment			
	Number	Per cent	Metformin	SGLT2	GLP1A	Other
All	*218,670*	-	*14.4*	*1.5*	*1.0*	*1.9*
Basal-bolus	180,020	82.3	13.6	1.4	0.9	1.6
Insulin pump**	21,525	9.8	10.6	1.0	0.8	0.2
Fixed mix	17,125	7.8	28.0	3.7	2.4	6.7

Over 4 in 5 people with type 1 diabetes were prescribed Basal-bolus as their latest insulin treatment regimen. More than one in 10 people with type 1 diabetes take additional glucose lowering treatment, usually metformin.

NICE*** advises that there is no one insulin regimen that is suitable for all people with type 1 diabetes; treatment should be individualized for each person. This should take account of lifestyle and cultural aspects of insulin therapy, including diet and exercise, alcohol intake, driving, holiday and travel, insurance, fasting, and shift work. This should also aim to reduce the short term risks of hypoglycaemia and the long term risks of eye, kidney and foot complications and of cardiovascular disease (MI, Stroke, Heart Failure).

* If a person is prescribed more than one type of insulin treatment regimen on the latest prescription date, the insulin regimen recorded is determined by the following order: Insulin pump, basal-bolus, 'fixed mix'. So if a person is prescribed basal-bolus and 'fixed mix' on the latest date they will only be recorded under basal-bolus. ** Because of low participation by specialist services insulin pump refers to people whose latest insulin prescribed was Rapid Acting Insulin in a vial rather than insulin in cartridges or pre-filled pens. *** https://cks.nice.org.uk/topics/insulin-therapy-in-type-1-diabetes/

Insulin regimens for type 1 diabetes: Age, diabetes duration

Figure 4: The range of proportions of people with type 1 diabetes on different insulin treatment regimens* by CCG/LHB, England and Wales, 2019-20

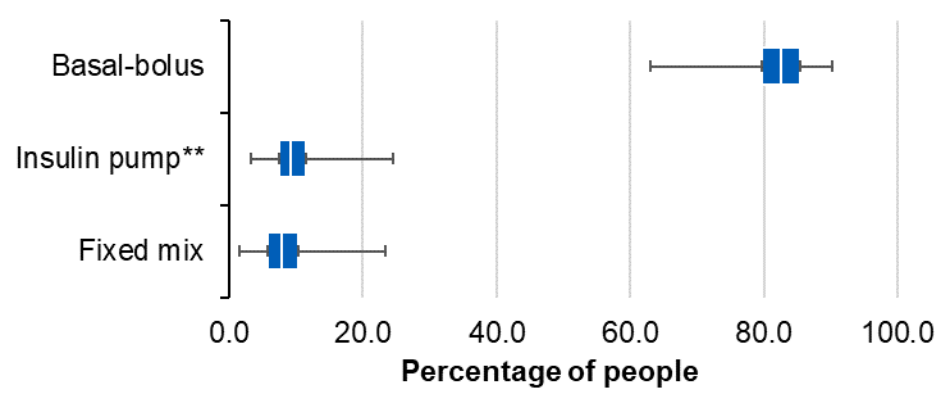


Table 8: Ages of people with type 1 diabetes, by insulin treatment regimen*, England and Wales, 2019-20

Latest insulin treatment regimen*	Number of people	Mean age	Median age	Interquartile range	Range
Basal-bolus	180,020	45.1	45.0	31.0 – 57.0	82.0
Insulin pump**	21,525	43.4	43.0	31.0 – 55.0	77.0
Fixed mix	17,125	58.1	59.0	47.0 – 71.0	79.0

Table 9: Diabetes duration of people with type 1 diabetes, by latest insulin treatment regimen*, England and Wales, 2019-20

Latest insulin treatment regimen*	Number of people	Mean diabetes duration (years)	Median diabetes duration (years)	Interquartile range	Range
Basal-bolus	179,845	20.3	18.0	9.0 - 29.0	87.0
Insulin pump**	21,500	24.8	23.0	14.0 - 35.0	91.0
Fixed mix	17,095	21.1	19.0	11.0 - 29.0	88.0

More than 80 per cent of people with type 1 diabetes use a basal-bolus insulin regimen.

Although around 10 per cent of people with type 1 diabetes use insulin pumps, this varies by locality from 3.2 to 24.6 per cent. Insulin pump users have a similar age profile to those on basal-bolus regimens, but on average have a slightly longer diabetes duration.

Fixed mix insulin is used by about 8 per cent of people with type 1 diabetes. Fixed mix users have an older age profile and a similar duration of diabetes profile to those on basal-bolus regimens.

* If a person is prescribed more than one type of insulin treatment regimen on the latest prescription date, the insulin regime n recorded is determined by the following order: Insulin pump, basal-bolus, 'fixed mix'. So if a person is prescribed basal-bolus and 'fixed mix' on the latest date they will only be recorded under basal-bolus. ** Because of low participation by specialist services insulin pump refers to people whose latest insulin prescribed was Rapid Acting Insulin in a vial rather than insulin in cartridges or pre-filled pens.

Insulin regimens for type 1 diabetes: Sex, deprivation

Basal-bolus and fixed mix insulin regimens are used by more males than females.

Insulin pumps are used by more females than males.

Figure 5: People with type 1 diabetes, by latest insulin treatment regimen* and sex, England and Wales, 2019-20

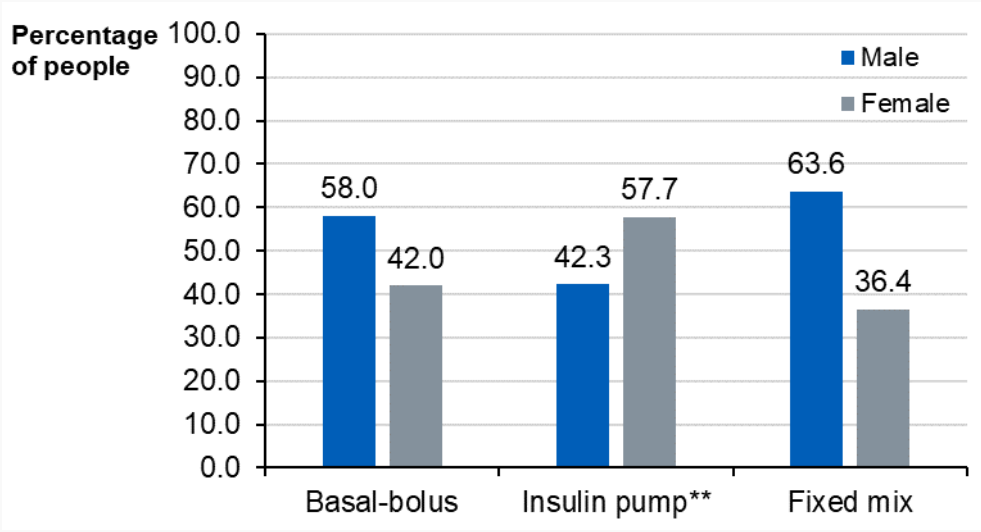
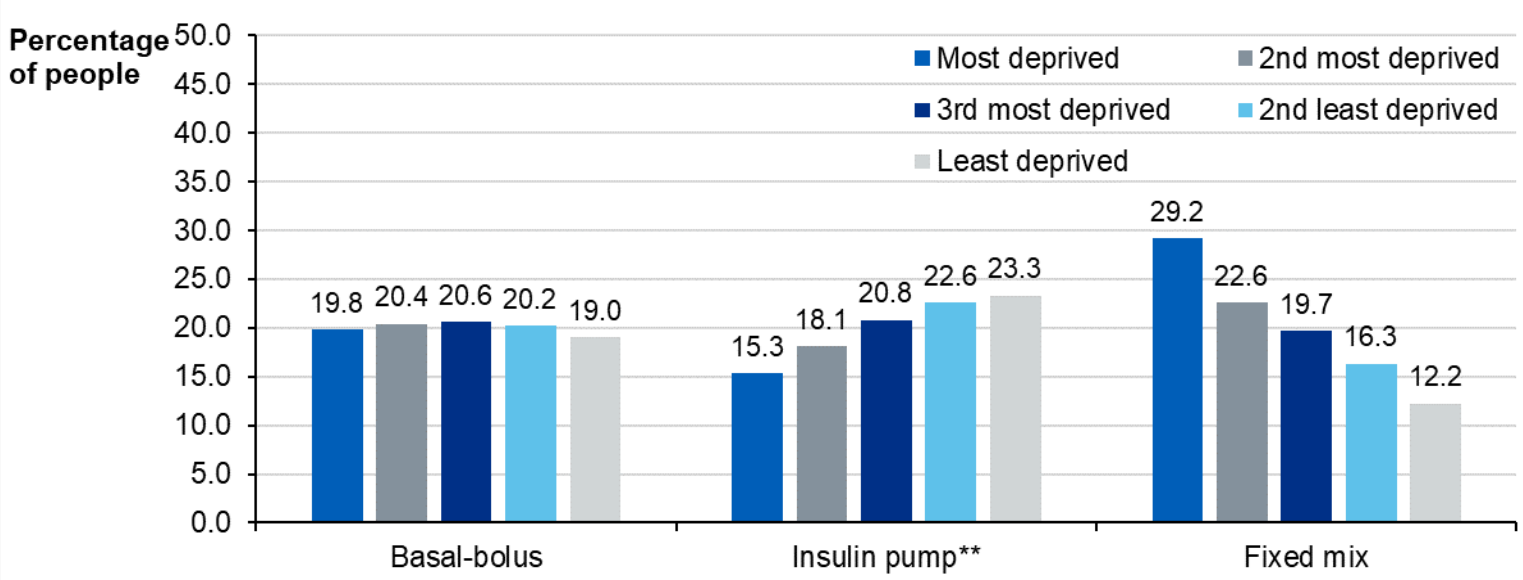


Figure 6: People with type 1 diabetes, by latest insulin treatment regimen* and social deprivation, England and Wales, 2019-20



Basal-bolus insulin regimens are used equally by people from all areas of social deprivation.

Insulin pumps are more likely to be used by people in the least deprived communities.

Whereas, fixed mix insulin regimens are more likely to be used by people from the most deprived communities.

* If a person is prescribed more than one type of insulin treatment regimen on the latest prescription date, the insulin regimen recorded is determined by the following order: Insulin pump, basal-bolus, 'fixed mix'. So if a person is prescribed basal-bolus and 'fixed mix' on the latest date they will only be recorded under basal-bolus. ** Because of low participation by specialist services insulin pump refers to people whose latest insulin prescribed was Rapid Acting Insulin in a vial rather than insulin in cartridges or pre-filled pens.

Insulin regimens for type 1 diabetes: Ethnicity

Table 10: People with type 1 diabetes, by latest insulin treatment regimen* and ethnicity, England and Wales, 2019-20

Ethnicity	Basal-bolus			Insulin pump**			Fixed mix		
	Number	Per cent	Per cent of known***	Number	Per cent	Per cent of known***	Number	Per cent	Per cent of known***
Total	*180,020*	-	-	*21,525*	-	-	*17,125*	-	-
White	149,290	82.9	91.5	18,760	87.2	94.8	12,505	73.0	83.2
Asian	5,965	3.3	3.7	450	2.1	2.3	1,325	7.7	8.8
Black	4,060	2.3	2.5	190	0.9	1.0	775	4.5	5.2
Mixed	1,805	1.0	1.1	170	0.8	0.9	205	1.2	1.4
Other	1,965	1.1	1.2	215	1.0	1.1	225	1.3	1.5
Unknown / Not stated	16,930	9.4	N/A	1,745	8.1	N/A	2,090	12.2	N/A

- A lower proportion of people on insulin pumps are people with Asian or Black ethnicity.
- A higher proportion of people on fixed mix insulin regimens are people with Asian or Black ethnicity.

* If a person is prescribed more than one type of insulin treatment regimen on the latest prescription date, the insulin regimen recorded is determined by the following order: Insulin pump, basal-bolus, 'fixed mix'. So if a person is prescribed basal-bolus and 'fixed mix' on the latest date they will only be recorded under basal-bolus. ** Because of low participation by specialist services insulin pump refers to people whose latest insulin prescribed was Rapid Acting Insulin in a vial rather than insulin in cartridges or pre-filled pens. *** People whose ethnicity is 'Unknown / Not stated' excluded from calculation.

NDA 2019-20: Type 1 Diabetes

What care structures are in place to look after people diagnosed with type 1 diabetes?

Care Structures – Systems in use

Table 11: Percentage of Trusts*,** with systems for type 1 diabetes care, England and Wales, 2019-20

System	Trust*,** with system	Trust*,** without system	Not known / Not applicable
	Per cent	Per cent	Per cent
Multi-Agency Shared local Diabetes Plan (e.g. Primary Care, Community and Specialist)	80.0	19.0	1.0
Formal Diabetes Specialist Service Leadership structure	80.0	17.0	3.0
Face to face Structured Patient Education accessible in same Trust within 12 months of referral	72.0	24.0	4.0
Face to face Structured Patient Education accessible in another location within 12 months of referral	49.0	33.0	18.0
Online Structured Patient Education referrals used partially	65.0	25.0	10.0
Online Structured Patient Education referrals used exclusively	9.0	81.0	10.0
Joint Paediatric / Adult transition pathway	86.0	8.0	6.0
Multidisciplinary Quality Improvement (QI)***	61.0	35.0	4.0

It had been hoped that this Type 1 Diabetes report would focus on specialist services, who should be taking the lead in management of this type of diabetes. However, participation by specialist services has been so limited, possibly due to pressures related to the COVID-19 pandemic, that the specialist service data cannot be considered truly representative.

* 100 organisations: 95 NHS Trusts, 3 Local Health Boards (LHBs), 2 Independent healthcare sector providers. The National Diabetes Audit Integrated Specialist Survey (NDA ISS; Care Structures survey) was sent to hospital Trusts in England and Wales on the 26th October 2020 and remained open until the 11th December 2020. During this submission window, 216 NHS Trusts and seven LHBs were open. ** Some data have been submitted on be half of hospital sites rather than on behalf of the Trust. In these cases the response chosen to represent the Trust is determined by the following order: 'Yes', 'No', 'Not known / Not applicable'; or the in case of the number of Type 1 specialist services the highest number provided is used. *** Errors, harms and benchmarked outcomes.

Care Structures – Type 1, Remote, and Out of Hours Services

Table 12: Percentage of Trusts*, with type 1 diabetes specialist services,** England and Wales, 2019-20

	Number in Trusts*,**	Trusts*,** with one or more service	Trusts*,** with no service	Not known/ Not applicable
		Per cent	Per cent	Per cent
Type 1 specialist services**	167	84.0	12.0	4.0

Table 13: Number of Trusts*, with standard working hours remote specialist services available,** England and Wales, 2019-20

	Standard working hours remote specialist services available			Trusts*,** with one or more of these
	By Phone	By Email	Using shared uploaded glucose	
Number of Trusts*,**	94	82	90	96

Table 14: Number of Trusts*, with out of hours specialist services available,** England and Wales, 2019-20

	Out of hours specialist services available			Trusts*,** with one or more of these
	Visit hospital at weekend	For non-specialist colleagues by phone	For patients by phone	
Number of Trusts*,**	30	26	15	39

Of the participating Trusts*,** in the Care Structures survey:

- Over 80 per cent of Trusts*,** had at least one Type 1 specialist service.
- Almost all Trusts*,** offered some care by telephone, email or shared uploaded blood glucose results during standard working hours.
- Over a third of Trusts*,** offered out of hours professional and patient support.

* 100 organisations: 95 NHS Trusts, 3 Local Health Boards (LHBs), 2 Independent healthcare sector providers. The National Diabetes Audit Integrated Specialist Survey (NDA ISS; Care Structures survey) was sent to hospital Trusts in England and Wales on the 26th October 2020 and remained open until the 11th December 2020. During this submission window, 216 NHS Trusts and seven LHBs were open. ** Some data have been submitted on behalf of hospital sites rather than on behalf of the Trust. In these cases the response chosen to represent the Trust is determined by the following order: 'Yes', 'No', 'Not known / Not applicable'; or the in case of the number of Type 1 specialist services the highest number provided is used.

NDA 2019-20: Type 1 Diabetes

How many people receive the care processes that are recommended to manage their type 1 diabetes?

Care Processes – NICE (annual)

All people with diabetes aged 12 years and over should receive all of the nine NICE recommended care processes and attend a structured education programme shortly after diagnosis*.

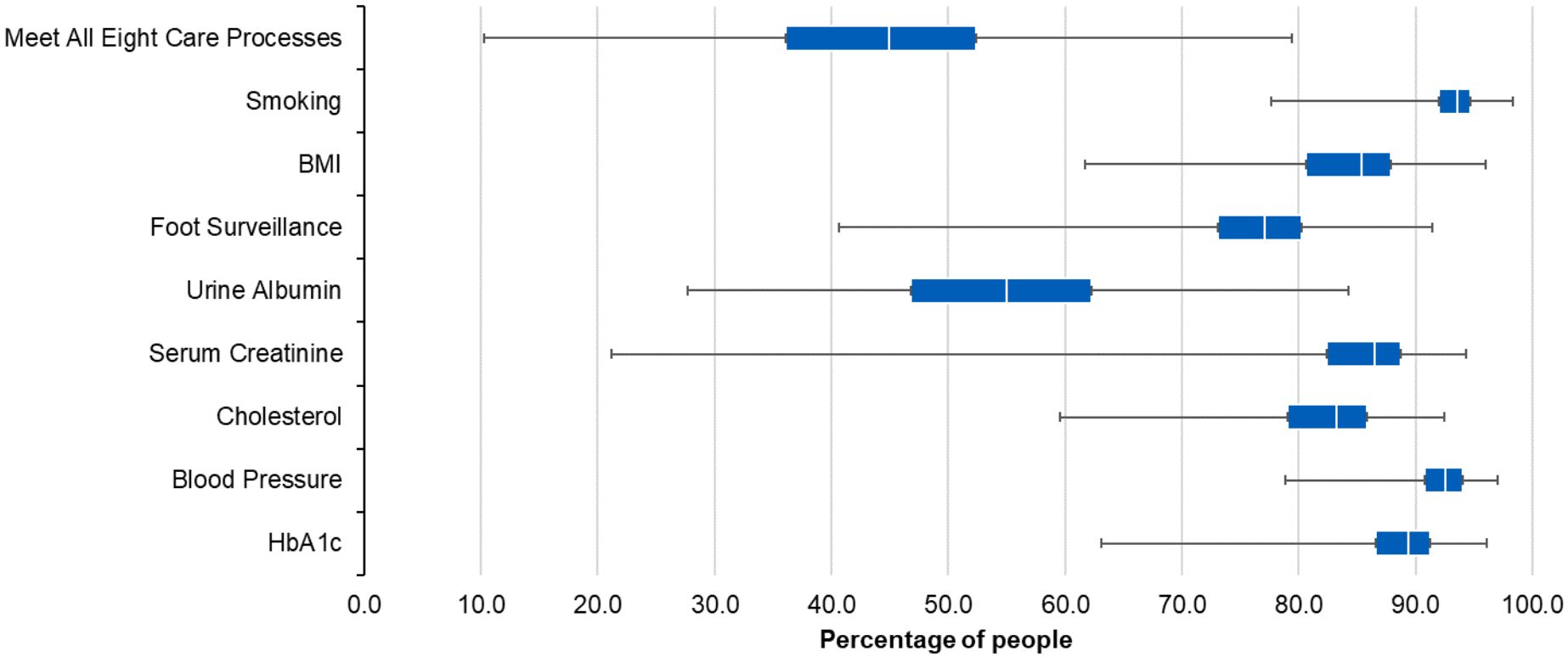
Table 15: Nine Annual Care Processes for all people with diabetes aged 12 and over	
Responsibility of Diabetes Care providers (comprising the NDA 8 Care Processes)	
1. HbA1c (blood test for glucose control)	**5. Urine Albumin/Creatinine Ratio** (urine test for risk of kidney disease)
2. Blood Pressure (measurement for cardiovascular risk)	**6. Foot Risk Surveillance** (examination for foot ulcer risk)
3. Serum Cholesterol (blood test for cardiovascular risk)	**7. Body Mass Index** (measurement for cardiovascular risk)
4. Serum Creatinine** (blood test for kidney function)	**8. Smoking History** (question for cardiovascular risk)
Responsibility of NHS Diabetes Eye Screening (NHS England, Public Health England)***	
9. Digital Retinal Screening (photographic eye test for early detection of eye disease)	

For NDA 2019-20, **Diabetes Eye Screening (DES) data** has been collected directly from DES providers for the first time. All but one DES provider in England (Liverpool) successfully submitted data, although three providers made partial submissions. DES data was not collected for Wales.
Due to the incompleteness of DES data, this report is restricted to eight of the nine Care Processes for both England and Wales.
In the future, this report will include recording of hypoglycaemia awareness derived from Gold and Clarke scores****.

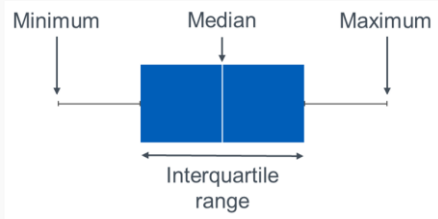
* NICE Clinical Guidelines – NG17: Type 1 diabetes in adults: diagnosis and management http://www.nice.org.uk/guidance/ng17 ** There is a potential issue with the SNOMED codes used to identify if a person has had their creatinine diabetes care process check. Two creatinine plasma codes were removed from the NDA creatinine code set during the universal SNOMED code refresh. This has affected creatinine care process completion, and potentially the all eight/nine care process, percentages for organisations/areas that still use these codes. To resolve the issue, the NDA business rules are currently being amended to add these code into future NDA data extractions. *** The screening registers are drawn from practice registers but the outcomes are recorded in screening management systems that presently cannot export data to the NDA. **** These are scores for measuring a person with diabetes' awareness of hypoglycaemia: Gold et al. Diabetes Care 1994 Jul; 17(7): 697-703.; Clarke et al. Diabetes Care 1995 Apr; 18(4): 517-522.

Care Processes – CCGs/LHBs

Figure 7: The range of CCG/LHB care process completion*, for people with type 1 diabetes,** England and Wales, 2019-20



- The lowest median care process rate and the greatest range is seen for Urine Albumin checks.
- The lower range of serum creatinine care process completion may be due to a creatinine SNOMED code issue** which affected a small number of CCGs/areas.



* The eye screening care process is not included; therefore 'eight care processes' comprises of eight care processes, which does not include eye screening. ** There is a potential issue with the SNOMED codes used to identify if a person has had their creatinine diabetes care process check. Two creatinine plasma codes were removed from the NDA creatinine code set during the universal SNOMED code refresh. This has affected creatinine care process completion, and potentially the all eight/nine care process, percentages for organisations/areas that still use these codes. To resolve the issue, the NDA business rules are currently being amended to add these code into future NDA data extractions.

Blood glucose checks

- 58.4 per cent of people in England and Wales had two or more HbA1c checks recorded over the last 15 months.
- 12.1 per cent had no HbA1c check recorded.
- The mean number of Hba1c checks per person varies between 1.0 and 4.3 across CCGs/LHBs.

Figure 8: Mean number of HbA1c checks in audit period for people with type 1 diabetes, England and Wales, 2019-20

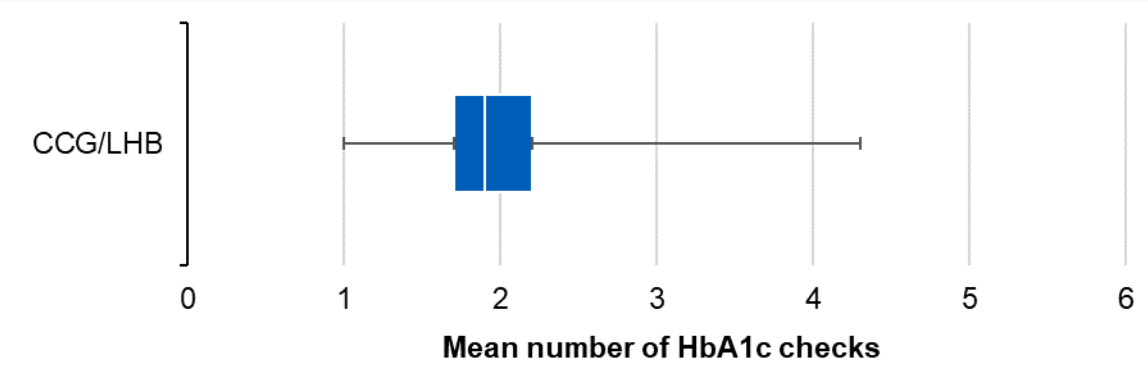


Table 16: HbA1c checks in audit period for people with type 1 diabetes, England and Wales, 2019-20

Number of checks in audit period	Type 1 Diabetes	
	Number	Per cent
Total	*218,670*	-
0	26,350	12.1
1	64,695	29.6
2	64,005	29.3
3	37,125	17.0
4	15,860	7.3
5	6,295	2.9
6	2,460	1.1
7 +	1,880	0.9

NICE* recommends that people with type 1 diabetes should have HbA1c checks every 3 to 6 months (or more often if the person's blood glucose control is suspected to be changing rapidly).

* NICE Guideline 17.1.6: https://www.nice.org.uk/guidance/ng17/chapter/Recommendations

Structured Education: Offered, Attended

NICE* recommends that people with type 1 diabetes should be offered structured education 6 to 12 months after diagnosis. If this has not been undertaken within 12 months, it should be offered at any time that is clinically appropriate and suitable for the person, regardless of duration of type 1 diabetes.

Figure 9: Percentage of people diagnosed with diabetes that have a record of being offered structured education, by year of diagnosis, England and Wales, 2019-20

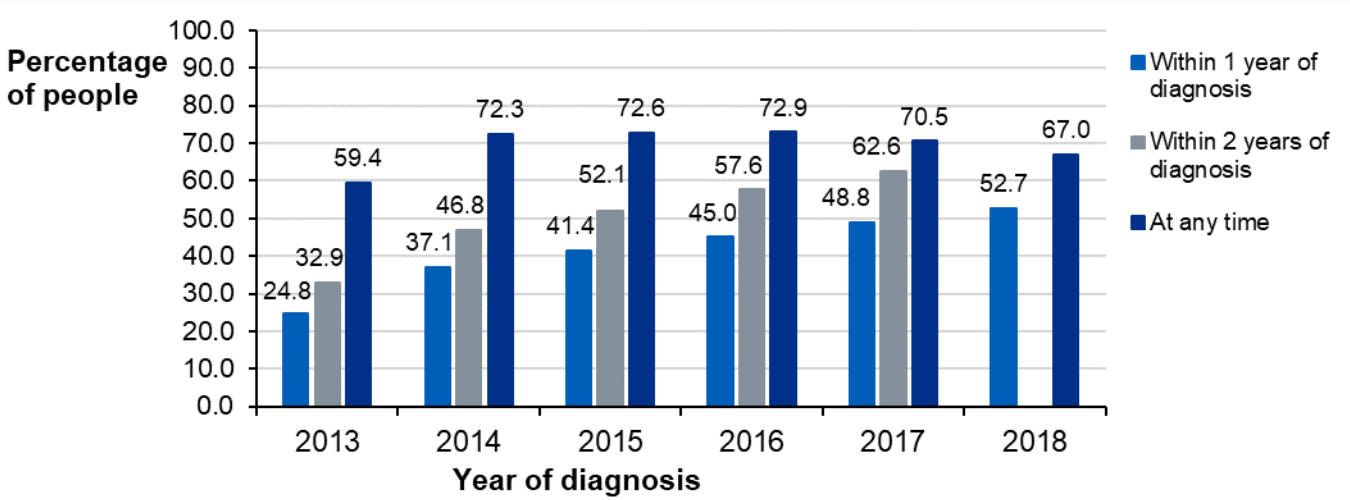
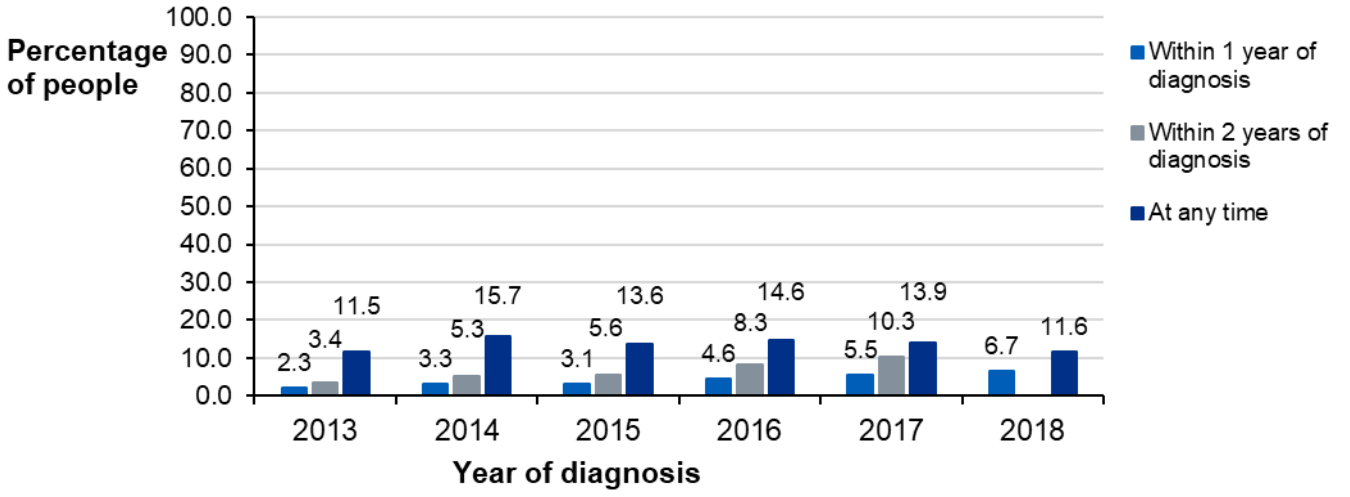


Figure 10: Percentage of people diagnosed with diabetes that have a recorded structured education programme attendance, by year of diagnosis , England and Wales, 2019-20



- Recorded rates of being offered structured education within one and two years of diagnosis have steadily increased over time.
- It is believed that poor recording means that recorded rates of attendance remain implausibly low and will likely not become realistic until education providers submit data to the NDA core.

* NICE Guideline 17.1.3: https://www.nice.org.uk/guidance/ng17/chapter/Recommendations

NDA 2019-20: Type 1 Diabetes

How many people with type 1 diabetes meet their recommended treatment targets?

Treatment target: HbA1c – Times series

NICE* recommends that people with type 1 diabetes should aim for a target HbA1c level of 48 mmol/mol (6.5%) or lower, to minimise the risk of long-term vascular complications.

NICE also recommends that diabetes services should record the proportion of adults with type 1 diabetes in their service who achieve an HbA1c level of 53 mmol/mol or lower.

The longest standing HbA1c treatment target is 58 mmol/mol (7.5%).

In 2019-20:

- 8.1 per cent achieved the NICE HbA1c target of 48 mmol/mol or lower.
- Around one in six had an HbA1c reading of 53 mmol/ml or lower (16.5 per cent), whereas 28.5 per cent achieved the HbA1c treatment target of 58 mmol/mol or lower.
- However, almost 16 per cent had a high HbA1c reading of above 86 mmol/mol.
- There has been no change in the overall proportions of people with type 1 diabetes achieving treatment targets during the last three audit periods (2017-18 to 2019-20).

Table 17: People with type 1 diabetes, by HbA1c reading (mmol/mol),** England and Wales, 2019-20

Audit period	Total	HbA1c ≤ 48		48 < HbA1c ≤ 53		53 < HbA1c ≤ 58		58 < HbA1c ≤ 70		70 < HbA1c ≤ 86		HbA1c > 86		Unknown	
	Number	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
2019-20	192,320	15,630	8.1	16,175	8.4	22,940	11.9	58,395	30.4	48,140	25.0	30,495	15.9	545	0.3
2018-19	194,715	16,160	8.3	16,195	8.3	23,110	11.9	59,265	30.4	48,655	25.0	30,735	15.8	600	0.3
2017-18	193,235	15,710	8.1	16,030	8.3	22,730	11.8	59,025	30.5	48,375	25.0	30,745	15.9	615	0.3

* NICE Guideline 17.1.6: https://www.nice.org.uk/guidance/ng17/chapter/Recommendations** Only includes people who had a recorded HbA1c check within the audit period.

Treatment target: HbA1c – Insulin regimen

Table 18: HbA1c readings (mmol/mol) of people with type 1 diabetes, by latest insulin treatment regimen*, England and Wales, 2019-20

Latest insulin treatment regimen*	Number of people	Mean HbA1c	Median HbA1c	Interquartile range	Range
Basal-bolus	157,665	70.5	67	58 - 80	173
Insulin pump**	19,020	63.5	62	54 - 71	146
Fixed mix	15,090	70.8	68	57 - 81	161

- Insulin pump treatment is associated with a lower mean and median HbA1c value, as well as a narrower range of HbA1c values.

NICE*** recommends that people with type 1 diabetes are offered basal–bolus insulin regimens, rather than twice-daily mixed insulin regimens, as the insulin injection regimen of choice for all adults with type 1 diabetes.

Insulin pump treatment is recommended**** if attempts to achieve target HbA1c levels with multiple daily injections result in the person experiencing disabling hypoglycaemia or if HbA1c levels have remained high (i.e. at 69 mmol/mol or above) on multiple daily injections therapy (including, if appropriate, the use of long-acting insulin analogues) despite a high level of care. 74,505 people on basal-bolus treatment have an HbA1c ≥ 69 (8.5%) and therefore they meet one of the NICE criteria for offering insulin pump treatment.

* If a person is prescribed more than one type of insulin treatment regimen on the latest prescription date, the insulin regimen recorded is determined by the following order: Insulin pump, basal-bolus, 'fixed mix'. So if a person is prescribed basal-bolus and 'fixed mix' on the latest date they will only be recorded under basal-bolus. ** Because of low participation by specialist services insulin pump refers to people whose latest insulin prescribed was Rapid Acting Insulin in a vial rather than insulin in cartridges or pre-filled pens. *** NICE Guideline 17.1.7: https://www.nice.org.uk/guidance/ng17/chapter/Recommendations **** NICE Guideline TA151.1: https://www.nice.org.uk/guidance/TA151/chapter/1-Guidance

HbA1c – contributing factors (HbA1c ≤ 58mmol/mol)

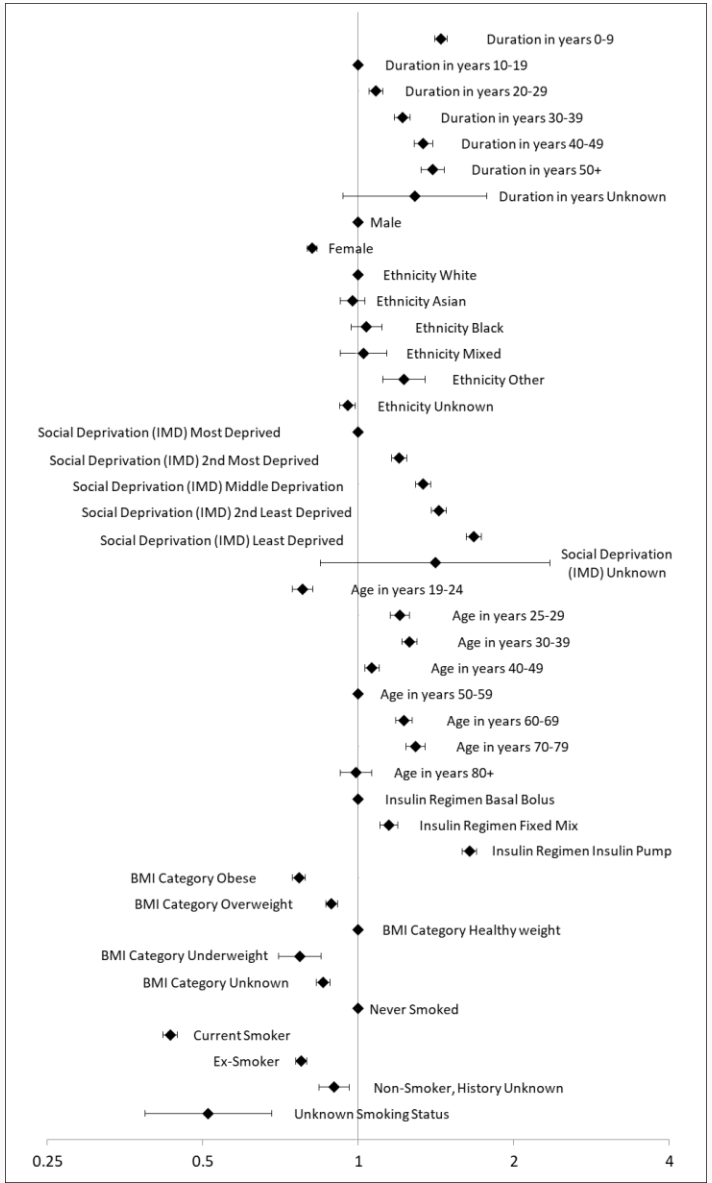


Figure 11: Individual person characteristics in people with type 1 diabetes and likelihood of meeting the HbA1c ≤ 58mmol/mol treatment target , England and Wales, 2019-20

Figure 11 shows a forest plot of odds ratios which illustrate the individual person characteristics associated with HbA1c ≤ 58mmol/mol treatment target achievement. These odds ratios were derived from a logistic regression model*.

- Non-modifiable factors associated with reduced likelihood of an HbA1c ≤ 58mmol/mol (7.5%):
  - Diabetes duration between 10 and 19 years
  - Being female
  - Living in a more deprived area
  - Age in years: 19-24

- Modifiable factors associated with likelihood of an HbA1c ≤ 58mmol/mol (7.5%):
  - Healthy weight (BMI 18.5-24.9)
    - Overweight, obesity and underweight are all associated with lower rates of HbA1c ≤ 58
  - Being on an Insulin Pump
  - Not being a current smoker

* For explanations of odds ratios, logistic regression and forest plot interpretation please see Additional Information: 'Definitions – Statistical terms'.

HbA1c – contributing factors (HbA1c > 86mmol/mol)

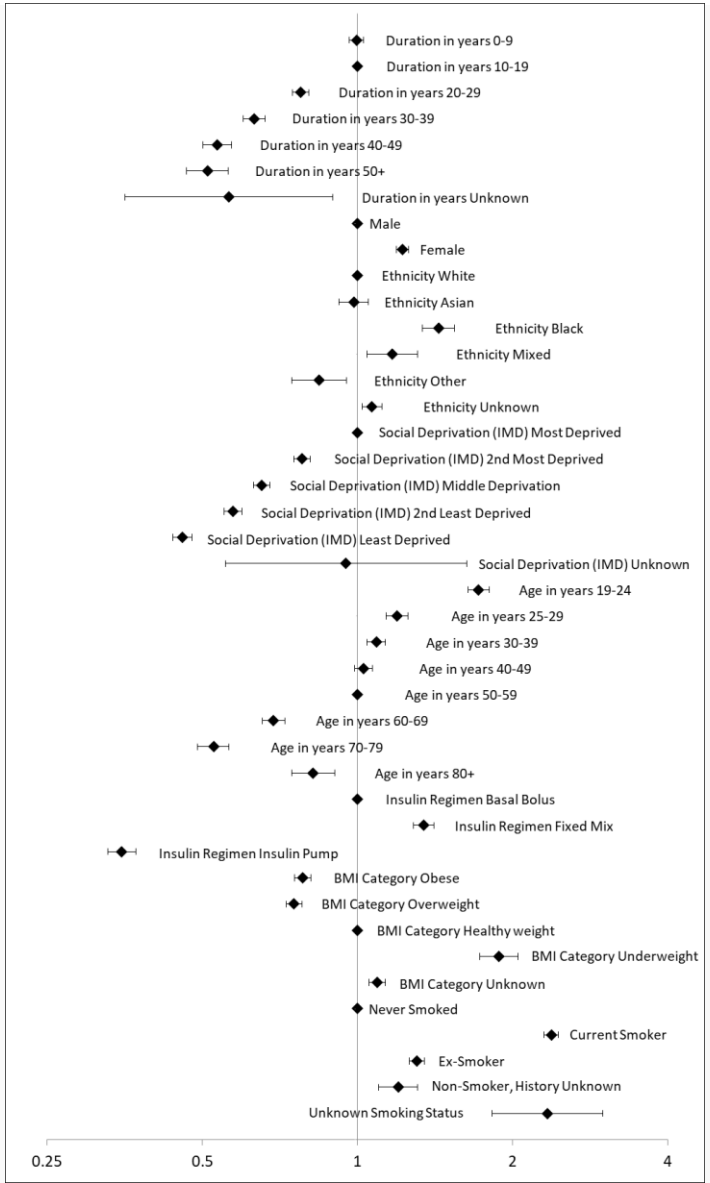


Figure 12: Individual person characteristics in people with type 1 diabetes and likelihood of HbA1c greater than 86mmol/mol, England and Wales, 2019-20

Figure 12 shows a forest plot of odds ratios which illustrate the individual person characteristics associated with an HbA1c value greater than 86 mmol/mol. These odds ratios were derived from a logistic regression model*.

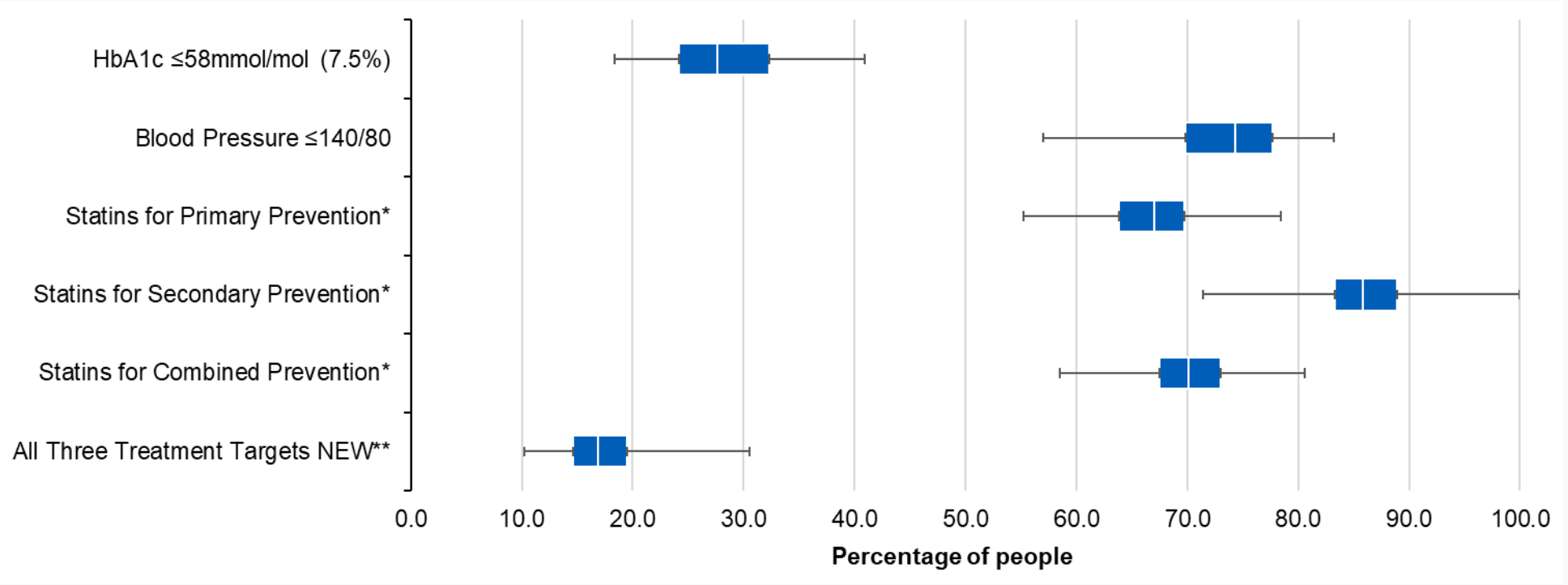
- Non-modifiable factors associated with likelihood of a high HbA1c:
  - Younger age
  - Shorter duration of diabetes
  - Female sex
  - Black or mixed ethnicity
  - Living in more deprived area.

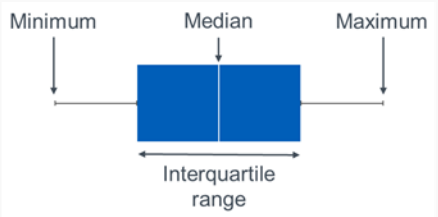
- Modifiable factors associated with reduced likelihood of a high HbA1c:
  - Being on an insulin pump.

* For explanations of odds ratios, logistic regression and forest plot interpretation please see Additional Information: 'Definitions – Statistical terms'.

Treatment target – CCG/LHB

Figure 13: The range of CCG/LHB treatment target achievement*, for people with type 1 diabetes,** England and Wales, 2019-20





- The median rate of achieving HbA1c ≤ 58mmol/mol (7.5%) is 27.6 per cent, but varies between 18.4 and 40.9 per cent.
- The median and range for those specialist services that participated was similar (28.9 per cent, 15.2 to 66.7 per cent) (See appendix).

* Achievement rates of statins for Primary, Secondary and Combined Prevention only include people eligible for statins in calculation. ** Defined as having HbA1c ≤58mmol/mol, blood pressure ≤140/80 and for people falling in the combined prevention CVD group: receiving statins.

Treatment target – HbA1c achievement rates

Table 19: CCGs and specialist services with highest rates of HbA1c ≤ 58mmol/mol for people with type 1 diabetes, England and Wales, 2019-20

142 CCGs/LHBs	78* Specialist Services
Top Ten	**Top Ten**
NHS Tower Hamlets CCG	St Thomas' Hospital
NHS City and Hackney CCG	Royal Sussex County Hospital
NHS Brighton and Hove CCG	Manchester Royal Infirmary
NHS Central London (Westminster) CCG	Chelsea & Westminster Hospital
NHS Oxfordshire CCG	Homerton University Hospital
NHS Trafford CCG	King's College Hospital (Denmark Hill)
NHS Berkshire West CCG	Churchill Hospital
NHS Basildon and Brentwood CCG	Kingston Hospital
NHS Bassetlaw CCG	St George's Hospital (Tooting)
NHS Ipswich and East Suffolk CCG	Ipswich Hospital

* 99 specialist services participated in the NDA core 2019-20. Top ten list derived from specialist services which submitted 400 or more people with type 1 diabetes.

Smoking status, Body Mass Index

NICE* recommends that smoking should be assessed annually as it is cardiovascular risk factor.

They also recommended that adults with type 1 diabetes who smoke should be given advice on smoking cessation and use of smoking cessation services. These messages should be reinforced annually for those who currently do not plan to stop smoking.

People with type 1 diabetes have similar smoking habits to the general population despite having much greater cardiovascular risk.

Table 21: People with type 1 diabetes, by smoking status****, England and Wales, 2019-20

Smoking status	All Type 1 Diabetes			England*****
	Total	Number	Per cent	Per cent
Current smoker	202,960	36,195	17.8	16.5
Ex-smoker		47,505	23.4	23.4
Never smoked		114,910	56.6	60.1
Non-smoker******		4,210	2.1	N/A
Unknown		140	0.1	N/A

Table 20: People with type 1 diabetes, by BMI status**, England and Wales, 2019-20

BMI status	All Type 1 Diabetes			England***
	Total	Number	Per cent	Per cent
BMI < 18.5	183,495	3,060	1.7	1.9
18.5 ≤ BMI < 25		58,625	31.9	34.5
25 ≤ BMI < 30		61,885	33.7	36.7
30 ≤ BMI < 35		31,030	16.9	17.1
35+ BMI		15,460	8.4	9.7
Unknown		13,440	7.3	N/A

Weight management is beneficial for people with type 1 diabetes as it is for people without diabetes.

Given the associations between low achievement of glucose control targets and overweight or obesity, it is of concern that over seven per cent of people with type 1 diabetes did not have a BMI recorded in the 15 month audit period.

* NICE Guideline 17.1.13: https://www.nice.org.uk/guidance/ng17/chapter/Recommendations ** To be included the person must have received the BMI care process within the audit period. *** Health Survey for England 2019: Adult and child overweight and obesity, NHS Digital. Adults aged 16 and over. Weighted for non-response. **** To be included the person must have received the smoking care process within the audit period. ***** Health Survey for England 2019: Adults' health-related behaviours, NHS Digital. Adults aged 16 and over. Categories: 'Never regularly smoked cigarettes', 'Used to smoke cigarettes regularly', 'Current smoker'. Weighted for non-response. ****** History unknown.

NDA 2019-20: Type 1 Diabetes

Additional information

Definitions

Diabetes

Diabetes is a condition where the amount of glucose in the blood is too high because the pancreas doesn't produce enough insulin. Insulin is a hormone produced by the pancreas that allows glucose to be used as a body fuel and other nutrients to be used as building blocks. There are two main types of diabetes: Type 1 diabetes (no insulin); Type 2 diabetes (insufficient insulin).

Urine Albumin-to-Creatinine Ratio (UACR)

UACR is a ratio between two measured substances urine albumin and urine creatinine. Unlike a urine dipstick test for albumin, UACR is unaffected by variation in urine concentration.

Specialist Service

This is a service (often hospital based but sometimes delivered in a community setting) which includes diabetes specialists working in multidisciplinary teams. These teams usually comprise physicians (diabetologists), diabetes specialist nurses and dieticians; it may also include clinical psychologists.

Annual Review

This is a GP appointment where the annual NICE recommended Care Processes are undertaken

Care Processes (NICE recommends all of these at least once a year)

Blood Pressure is a measurement of the force driving the blood through the arteries. Blood pressure readings contain two figures, e.g.130/80. The first is known as the systolic pressure which is produced when the heart contracts. The second is the diastolic pressure which is when the heart relaxes to refill with blood.

BMI measurement – Body Mass Index is calculated from weight and height and used to classify body weight as low, normal, overweight and obese.

Serum creatinine – this is a blood test used to measure kidney function.

Urinary albumin – this urine test detects the earliest stages of kidney disease.

Cholesterol - this blood test measures a type of fat that can damage blood vessels.

Foot check - this examination checks the blood supply and sensation (feeling) in the feet. Loss of either is a risk for foot disease.

Smoking Status - this records whether the person is a smoker. Smoking increases the diabetic risk for heart attacks and stroke.

HbA1c – this is a blood test for average blood glucose levels during the previous two to three months.

Treatment Targets (NICE defines target levels to reduce risks of complications for people with diabetes)

HbA1c - the closer this is to normal (less than 42mmol/mol) the lower is the risk of all long term complications of diabetes.

Cholesterol – reducing cholesterol levels lowers the risk of heart attacks and strokes.

Blood Pressure – high levels are a risk for heart attacks and strokes; they also drive progression of eye and kidney disease.

Primary prevention of CVD – the prescription of statins for people with diabetes aged 40 to 80 years with no history of cardiovascular disease (CVD) to reduce the risk of CVD.

Secondary prevention of CVD – the prescription of statins for people with diabetes (any age) with a history of cardiovascular disease (CVD) to reduce the risk of CVD.

Combined prevention of CVD – the prescription of statins for people with diabetes that fall into either of the primary or secondary prevention groups.

Meeting all 3 treatment targets –
Old – having HbA1c ≤58mmol/mol, cholesterol <5mmol/L and blood pressure ≤140/80.

New – having HbA1c ≤58mmol/mol, blood pressure ≤140/80 and for people falling in the combined prevention CVD group: receiving statins.

Definitions: Statistical terms

Where a result is flagged as **significant at 0.05 level**, there is only a 5 per cent probability that the result is due to chance.

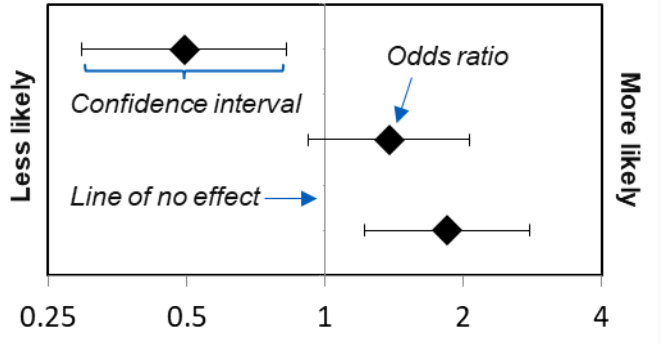
Logistic regression is used to examine the relationship between an outcome (e.g. HbA1c ≤ 58 mmol/mol) and related variables (e.g. insulin treatment regimen). Backwards elimination is used to remove variables found not to be significant at 0.05 level, producing a final model that includes variables with significant associations only.

Two outputs are particularly useful when interpreting the results of a logistic regression model:

- The **c-statistic** can be used to assess the goodness of fit, with values ranging from 0.5 to 1.0. A value of 0.5 indicates that the model is no better than chance at making a prediction of membership in a group and a value of 1.0 indicates that the model perfectly identifies those within a group and those not. Models are typically considered reasonable when the c-statistic is higher than 0.7 and strong when the c-statistic exceeds 0.8 (Hosmer and Lemeshow, 2000*).
- **Odds ratios** (OR) illustrate how strongly a particular value of a variable is associated with the outcome. The further from one the ratio is (either above or below), the stronger the association between it and the outcome. For example, an odds ratio of 0.764 would suggest a stronger association than an odds ratio of 0.830. An odds ratio of one would show that the variable value has no bearing on how likely the outcome is.

  The degree of uncertainty inherent in the odds ratio is described by the confidence interval. The wider the confidence interval, the less certainty there is in the odds ratio. If the confidence intervals are either side of 1 (the line of no effect) this indicates that the value taken by the variable (e.g. female) has no bearing on how likely the outcome is (e.g. HbA1c ≤ 58 mmol/mol). Where the confidence interval approaches 1 this indicates that the association with the outcome may be weak. Odds ratios can be displayed on a forest plot (see example forest plot right).

Forest plot showing odds ratios indicating how strongly variables are associated with the outcome



* Hosmer DW, Lemeshow S (2000) Applied Logistic Regression (2nd Edition) New York, NY: John Wiley & Sons.

Notes and Additional Information

Suppression:

- Disclosure control has been applied to mitigate the risk of patient identification. Zeros are reported, and all numbers are rounded to the nearest 5, unless the number is 1 to 7, in which case it is rounded to ‘5’. This allows for more granular data to be made available.

- Rounded numbers are used to calculate percentages such as care process completion and treatment target achievement. At CCG/LHB level and above this makes virtually no difference to the resultant percentages. At Specialist Service Provider level, where the numbers can be small, this rounding can have a relatively large impact. However, where numbers are small, percentages are volatile and should already be treated with caution.

Prepared in collaboration with:

The National Diabetes Audit (NDA) 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

NHS Digital is the trading name for the Health and Social Care Information Centre (HSCIC). NHS Digital managed the publication of the annual report.

Diabetes UK is the charity leading the fight against the most devastating and fastest growing health crisis of our time, creating a world where diabetes can do no harm.

Supported by:

The National Cardiovascular Intelligence Network (NCVIN) is a partnership of leading national cardiovascular organisations which analyses information and data and turns it into meaningful timely health intelligence for commissioners, policy makers, clinicians and health professionals to improve services and outcomes.

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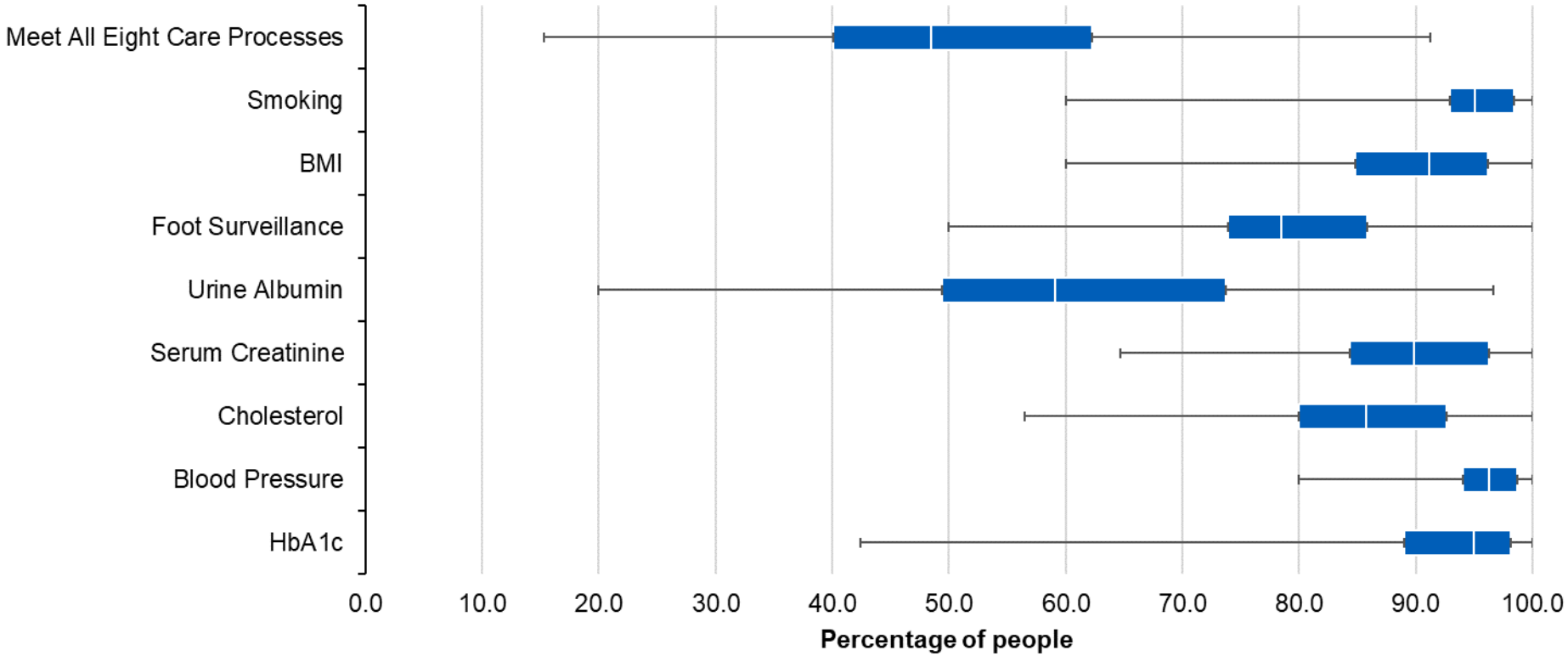
NDA 2019-20: Type 1 Diabetes

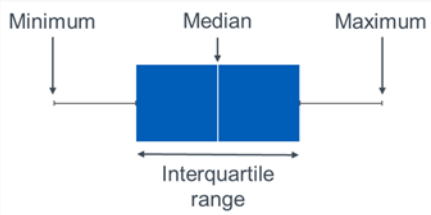
Appendix

Care Processes – Specialist services

Figure 14: The range of specialist service care process completion*, for people with type 1 diabetes confirmed at a specialist service,** England and Wales, 2019-20



- The lowest median care process rate and the greatest range is seen for Urine Albumin checks.



* The eye screening care process is not included; therefore 'eight care processes' comprises of eight care processes, which does not include eye screening. ** There is a potential issue with the SNOMED codes used to identify if a person has had their creatinine diabetes care process check. Two creatinine plasma codes were removed from the NDA creatinine code set during the universal SNOMED code refresh. This has affected creatinine care process completion, and potentially the all eight/nine care process, percentages for organisations/areas that still use these codes. To resolve the issue, the NDA business rules are currently being amended to add these code into future NDA data extractions.

Blood glucose checks: Mean, Age group, Deprivation

- The mean frequency of HbA1c checks* is slightly higher for those confirmed at specialist services.
- Younger age groups received fewer HbA1c checks.
- There is little difference between deprivation quintiles.

Figure 16: Mean number of HbA1c checks in audit period for people with type 1 diabetes, England and Wales, 2019-20

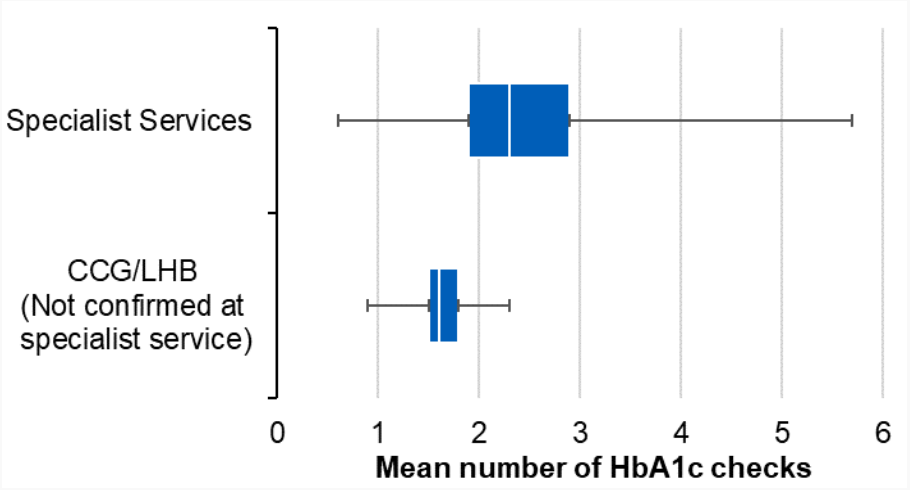


Figure 15: Number of HbA1c checks in audit period for people with type 1 diabetes by age group, England and Wales, 2019-20

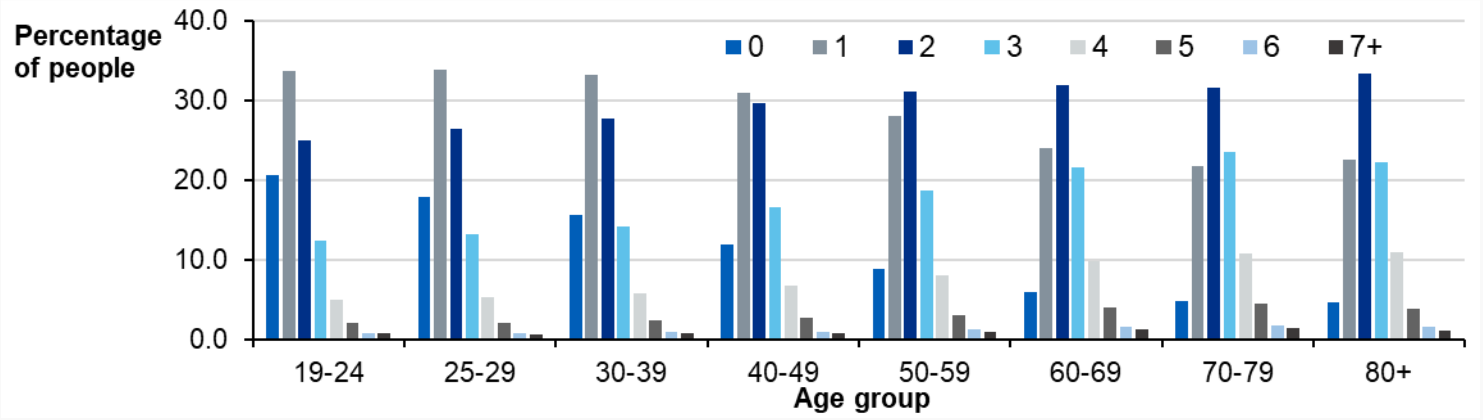
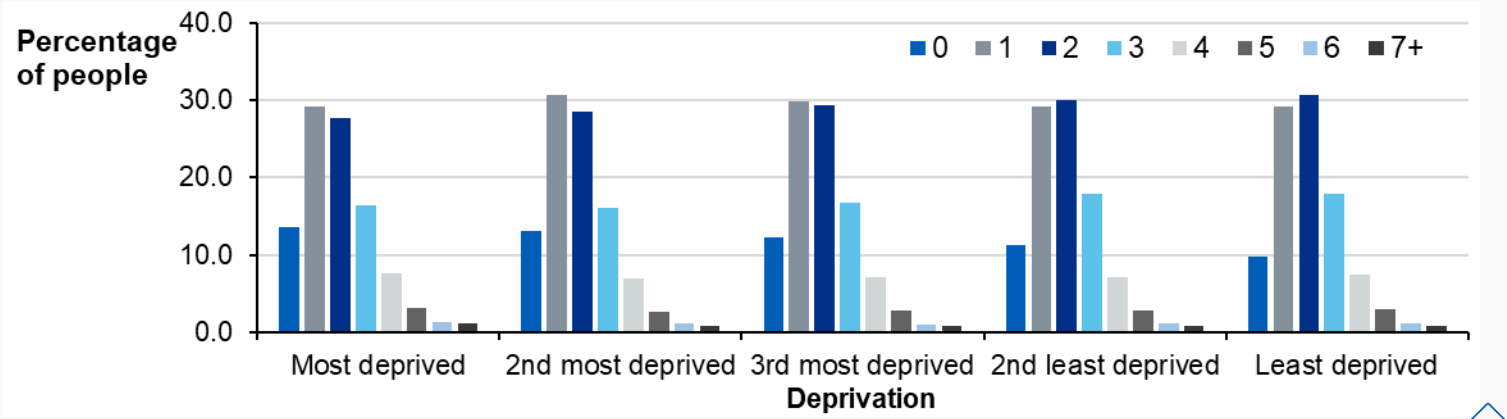


Figure 17: Number of HbA1c checks in audit period for people with type 1 diabetes by social deprivation, England and Wales, 2019-20



* NICE Guideline 17.1.6: https://www.nice.org.uk/guidance/ng17/chapter/Recommendations NICE recommends that people with type 1 diabetes should have HbA1c checks every 3 to 6 months (or more often if the person's blood glucose control is suspected to be changing rapidly).

Statins

In the absence of a frailty measure (available from 2020-21), primary statin prevention is recommended for anyone with diabetes aged 40 to 80 years with no history of cardiovascular disease. Secondary prevention is recommended for anyone with diabetes with a history of cardiovascular disease, irrespective of age.

There is potential to improve primary prevention considerably in all care settings.

Figure 18: People with type 1 diabetes, by statin prevention status*, England and Wales, 2019-20

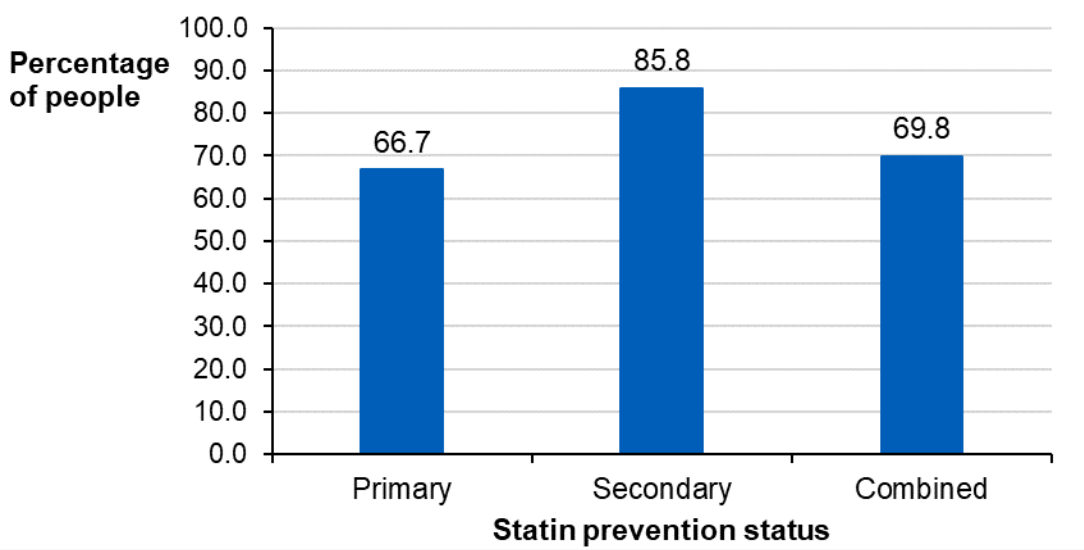


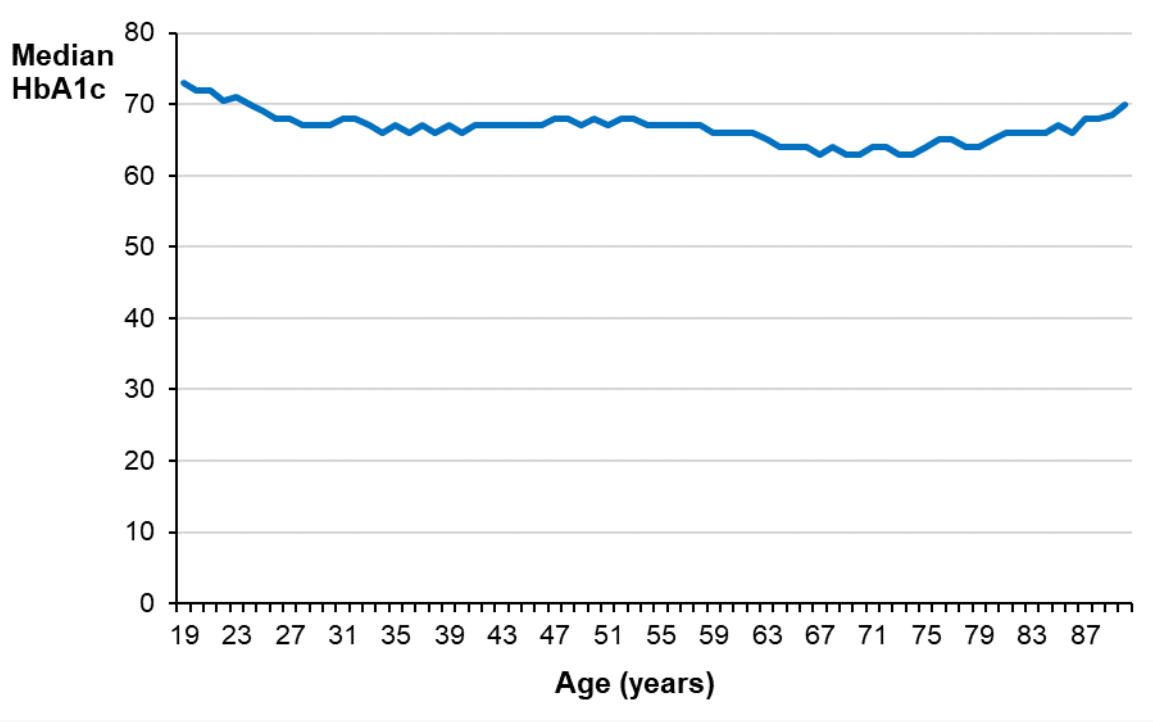
Table 22: People with type 1 diabetes, by statin prevention status* and service registration, England and Wales, 2019-20

Statin prevention status	All Type 1 Diabetes			Confirmed at specialist service		
	Total	On statins		Total	On statins	
		Number	Per cent		Number	Per cent
Primary	111,035	74,035	66.7	38,770	26,520	68.4
Secondary	21,845	18,750	85.8	7,710	6,665	86.4
Combined	132,880	92,785	69.8	46,475	33,185	71.4

* Only includes people eligible for statins.

Treatment target: HbA1c – Age

Figure 19: Median HbA1c of people with type 1 diabetes, by age (years)*, England and Wales, 2019-20

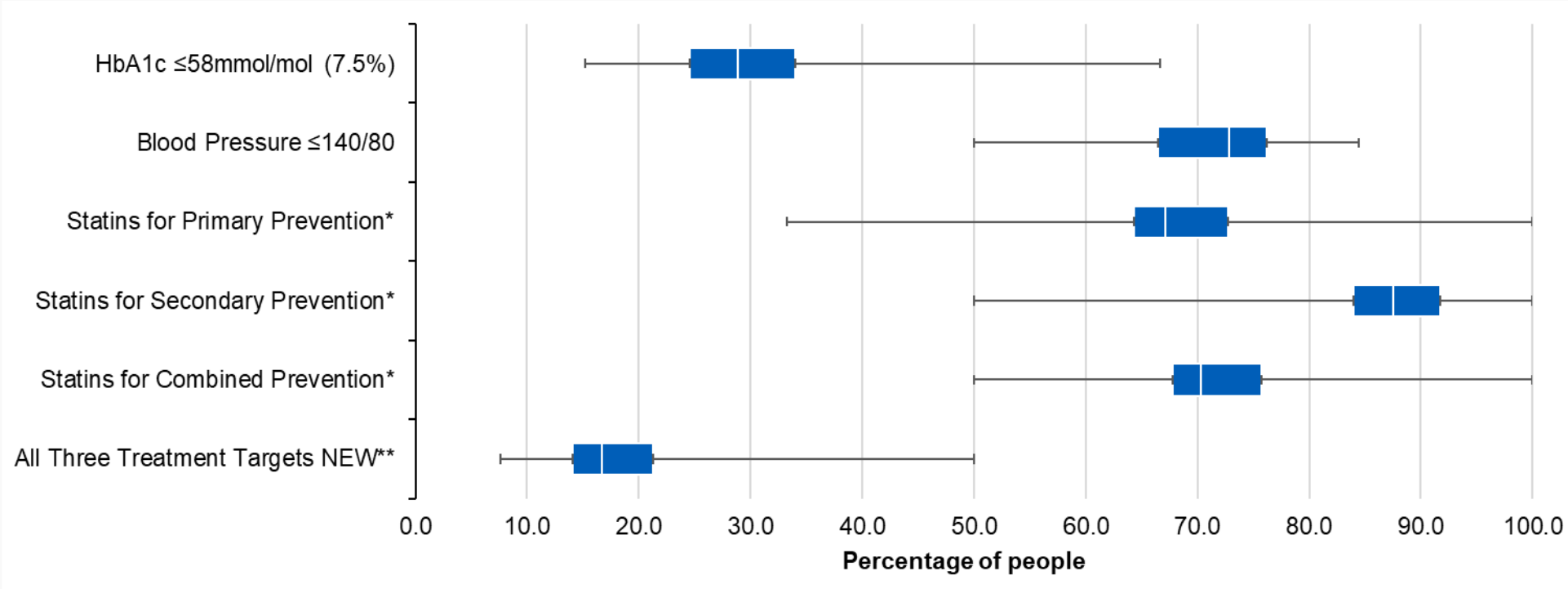


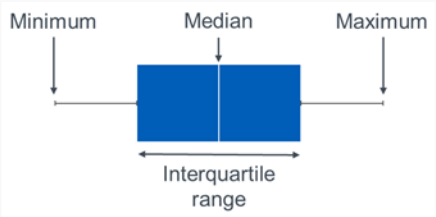
- The median HbA1c peaks at 19 years old with a value of 73 mmol/mol, then decreases up until the late twenties where it begins to plateau.
- The median HbA1c starts to decrease again from the late fifties, but then shows an upward trend from the mid-seventies.

* Only includes ages between 19 and 90 years old inclusive.

Treatment target – Specialist services

Figure 20: The range of specialist service treatment target achievement*, for people with type 1 diabetes confirmed at a specialist service,** England and Wales, 2019-20





- The median of treatment target achievement rates is similar in all care setting groupings.

* Achievement rates of statins for Primary, Secondary and Combined Prevention only include people eligible for statins in calculation. ** Defined as having HbA1c ≤58mmol/mol, blood pressure ≤140/80 and for people falling in the combined prevention CVD group: receiving statins.

Blood pressure – contributing factors

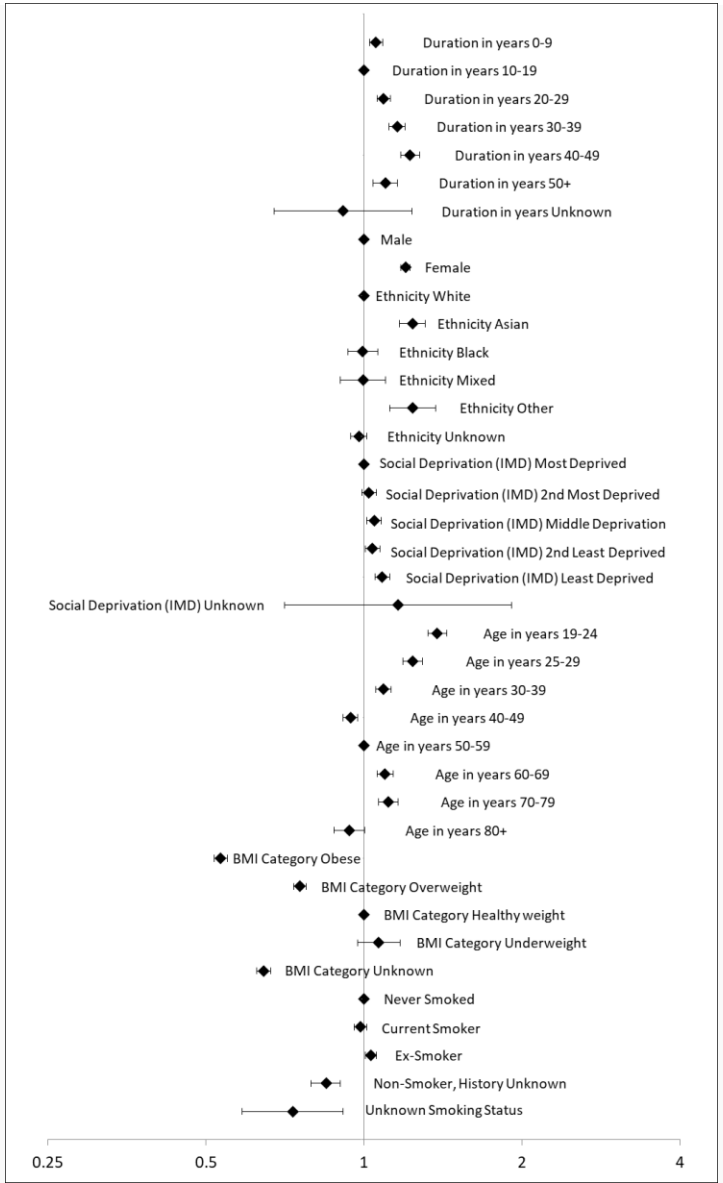


Figure 21: Important characteristics associated with people with type 1 diabetes meeting blood pressure treatment target of ≤ 140/80, England and Wales, 2019-20

Figure 21 shows a forest plot of odds ratios which illustrate the individual person characteristics associated with blood pressure ≤ 140/80 treatment target achievement. These odds ratios were derived from a logistic regression model*.

- Variation in blood pressure is not as well explained by these variables compared to HbA1c.
- Insulin regimen and statin use are not significant in this modelling.
- Younger people are more likely to have a lower blood pressure.
- People who are classified as obese are far less likely to meet the blood pressure target.
- The modifiable factor that has the greatest impact is BMI.

* For explanations of odds ratios, logistic regression and forest plot interpretation please see Additional Information: 'Definitions – Statistical terms'.

Cardiovascular risk in Type 1 Diabetes

People with type 1 diabetes are at much higher risk of developing cardiovascular disease (CVD) than people without diabetes.

In order for people with diabetes to reduce their cardiovascular risk, they should aim to:

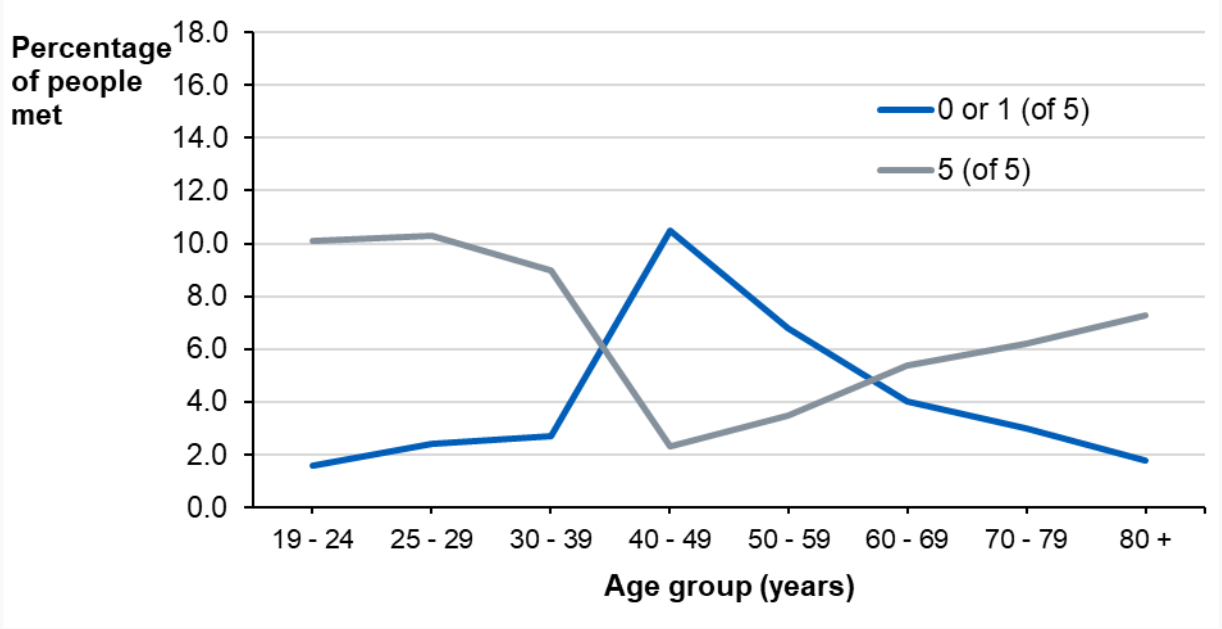
- Lower their blood glucose (HbA1c ≤ 58 mmol/mol)
- Lower their blood pressure (BP ≤ 140 / 80)
- Lower their weight (BMI < 25)
- Take statins (if necessary for primary/secondary CVD prevention)
- Stop smoking (if a current smoker)

Information on all five of these CVD risk strands is available for 152,835 people with type 1 diabetes (69.9 per cent)*.

Table 23: People with type 1 diabetes, by number of cardiovascular disease (CVD) reduction criteria met, England and Wales, 2019-20

CVD reduction criteria met	All Type 1 Diabetes		
	Total	Number	Per cent
0 of 5	152,835	435	0.3
1 of 5		7,360	4.8
2 of 5		34,800	22.8
3 of 5		63,135	41.3
4 of 5		37,930	24.8
5 of 5		9,175	6.0

Figure 22: Percentage of people with type 1 diabetes, by number of cardiovascular disease (CVD) reduction criteria met and age group, England and Wales, 2019-20



- 28.9 per cent have HbA1c 58 mmol/mol or lower.
- 73.9 per cent have blood pressure reading of 140/80 or lower.
- 35.8 per cent have BMI under 25.
- 82.1 per cent are receiving statins where recommended
- 82.8 per cent do not currently smoke.

* To be included the person must not have missing or unknown data for these five criteria and they must have received the following care processes within the audit period: HbA1c, blood pressure, BMI, and smoking.