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Care processes in people in remission from type 2 diabetes: A cohort study using the National Diabetes Audit

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Abstract

Aims: People with type 2 diabetes can enter remission but may relapse or develop legacy complications. This analysis assesses whether people with remission from type 2 diabetes continue receiving annual care processes recommended in national guidelines and the potential impacts of formal recognition of remission.

Methods: People with type 2 diabetes with and without formal recognition (diagnostic code) of remission, and with and without evidence of remission (HbA_{1c} < 48 mmol/mol without prescription for glucose-lowering drugs in preceding 26 weeks), included in the 2018/19 National Diabetes Audit (NDA) for England and Wales were followed up to identify care processes received between 1 January 2019 and 31 March 2020.

Results: Of the 2,822,145 people with type 2 diabetes in the cohort, 16,460 (0.58%) were coded with remission in the 2018/19 NDA. After adjustment for age, sex, socioeconomic deprivation and ethnicity, people coded with remission were less likely to receive each care process than those without such coding irrespective of HbA_{1c} measurements (relative risk (RR) of receiving all 8 care processes 0.70 (95% CI 0.69–0.72)). For the 339,235 people with evidence of remission, irrespective of diagnostic coding compared to those without such evidence, the RR for receiving all 8 care processes was 0.94 (95% CI 0.93–0.94).

Conclusions: People coded with remission of type 2 diabetes were less likely to receive diabetes care processes than those without such coding. People with evidence of remission had only a slightly reduced likelihood of receiving care processes. Formal recognition of remission may affect the provision or uptake of care processes.

KEYWORDS

remission, routine care, type 2 diabetes

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1 | INTRODUCTION

The prevalence of diabetes (both diagnosed and undiagnosed) amongst adults aged 16 years and older in England is estimated to be 8.6% and is projected to rise to 9.7% by 2035.[1] Type 2 diabetes accounts for 90 to 95% of people with diabetes.[2] Historically type 2 diabetes was considered to be a lifelong progressive condition. However, there is now clear evidence that remission of type 2 diabetes following intensive lifestyle interventions[3–5] or bariatric surgery[6–9] is feasible. The National Health Service (NHS) in England has recently expanded a pilot program aimed at encouraging the attainment of remission through clinically significant weight loss achieved through a low-calorie diet, a total diet replacement approach in combination with behavioural support.

In England, the National Institute for Health and Care Excellence (NICE) recommends that people with type 2 diabetes are offered eight annual care processes in primary care (measurement of HbA_{1c}, lipids, creatinine, albuminuria, blood pressure and body mass index, ascertainment of smoking status and examination of the feet) to assess modifiable risk factors and facilitate the early identification of diabetic complications.[10] However, there is little known of the extent to which people in remission from type 2 diabetes continue to receive these care processes. A ninth care process, an annual retinal screening, is delivered outside of general practice, and data related to the delivery of this care process are collected through separate mechanisms.

The aim of this analysis was to investigate whether people with diagnostic coding of remission of type 2 diabetes and those with evidence of remission were more or less likely to receive the recommended care processes in the subsequent year than people with type 2 diabetes without such a diagnostic code or evidence.

Novelty statement

What is already known?

- People with type 2 diabetes can enter remission through lifestyle changes and/or bariatric surgery but may return to diabetic hyperglycaemia.

What this study found?

- 0.58% of people with type 2 diabetes in England have formal recognition of remission.
- People with formal recognition of remission of type 2 diabetes were less likely to receive the eight recommended care processes provided by primary care than those without recognition of remission.

What are the implications of this study?

- Services should ensure that people in remission of type 2 diabetes are aware of the continued need for annual checks and they are provided.

2 | METHODS

2.1 | Data source

The National Diabetes Audit (NDA) has collated data on people with diagnosed diabetes registered with a primary or specialist healthcare provider in England and Wales since 2003.[11] Individuals are included if they have a valid code for diabetes mellitus (excluding gestational diabetes) in their electronic health record. Demographic and clinical data are extracted from general practice electronic clinical systems using the General Practice Extraction Service (a national centralized data collection service for England). This is supplemented by data submitted by specialist diabetes services. The data collected each year covers a 15-month period from 1 January in the first year to 31 March in the subsequent year. In 2018/19 and 2019/20, the NDA compiled data from 97.9% to 99.2%, respectively, of general practices in England.

2.2 | Study population

The cohort of all people with type 2 diabetes registered with an English general practice in the 2018/19 data collection, who was also included in the 2019/20 data collection, and who were still alive on 31st March 2020, was identified. Those registered with one of the 24 (out of 6774) general practices that did not provide prescription data for the 2018/19 NDA data collection and those whose electronic health record did not include valid sex were excluded from the cohort. People with hospital admission for cystic fibrosis (ICD-10 codes E84) between 1 April 2010 and 31 March 2020 were excluded from the analysis as it was possible that they had incorrectly been identified as having type 2 diabetes. People with a pancreatic transplant (OPCS Classification of Interventions and Procedures version 4 (OPCS-4) code J54) between 1 April 2010 and 31 March 2019 were also excluded.

2.3 | Exposures

People were identified as 'coded as in remission' where the latest Systematized Nomenclature of Medicine (SNOMED)

code recorded in primary or specialist care between 1 January 2018 and 31 March 2019 was 703,136,005 (Diabetes mellitus in remission) or 703,138,006 (Type 2 diabetes mellitus in remission) irrespective of measures of hyperglycaemia and prescriptions for glucose-lowering medications.

People were identified as having 'evidence of remission' if they had one or more HbA_{1c} measurements less than 48 mmol/mol with no prescription for glucose-lowering drugs in the preceding 26 weeks between 1 January 2018 and 31 March 2019. In England, the usual duration of repeat prescriptions is between 1 and 3 months and, therefore, using 26 weeks without a prescription should ensure that no glucose-lowering drugs were still being taken at the time of the HbA1c measurement.

Socioeconomic deprivation was identified by linking the home postcode to the Indices of Multiple Deprivation 2019[12] and the score was grouped into quintiles. Ethnicity was extracted from the NDA with 85.7% of people in this cohort having a valid ethnicity recorded. For analysis, these were grouped into Asian, Black, mixed, other and White ethnic groups with a separate category for those with missing data.

2.4 | Outcome

The NDA notes whether an individual is recorded as having HbA_{1c}, blood pressure, cholesterol, body mass index, creatinine and urinary albumin measured, smoking status ascertained and feet examined. The time period for care process completion was 1 January 2019 to 31 March 2020.

2.5 | Statistical analysis

The proportions of people receiving each of the care processes and all eight care processes were calculated. Chi-squared tests were used to assess whether differences in the proportion of people receiving each care process by remission status were statistically significant. A series of logistic regression models were created to assess the association between receiving each of the care processes and all eight care processes having a diagnosis code for the remission of diabetes or having evidence of remission. These models assessed the odds of having the care process adjusting for age alone, for age and sex, for age, sex and deprivation and age, sex, deprivation and ethnicity. The odds ratios from the logistic regression models were converted to relative risks to aid interpretation.[13]

Data management was undertaken in SQL Management Studio 2021 and statistical analysis was performed in SAS Enterprise Guide 8.3.

2.6 | Information Governance

The legal basis for the NDA data collection and linkage is a Direction from NHS England to NHS Digital according to section 254 of the Health and Social Care Act (HSCA) 2012. All numbers taken from the NDA are rounded to the nearest five to protect confidentiality.

3 | RESULTS

The cohort included 2,822,145 people with type 2 diabetes, of whom 16,460 (0.58%) had a diagnosis code indicating remission in the 2018/19 NDA data collection irrespective of whether they had a HbA_{1c} measurement below the diabetes threshold (48 mmol/mol or 6.5%). Within the entire cohort, 339,235 (12.0%) people had evidence of remission (one or more HbA_{1c} measurements less than 48 mmol/mol with no prescription for glucose-lowering drugs in the preceding 26 weeks) in the 2018/19 NDA regardless of coding of remission. Of the 16,460 people with a diagnostic code of remission 12,065 (73.3%) also met the criteria for evidence of remission. The majority of people who had evidence of remission (327,170 or 96.4%) did not have a diagnostic code to indicate their remission status. People coded with remission and people with evidence of remission were older, more likely to live in less deprived areas and to be of White ethnicity than those in the respective comparison groups without a diagnosis code indicating remission and those without evidence of remission (see Table 1).

Between 1 January 2019 and 31 March 2020, 42.5% of people coded with remission in the 2018/19 NDA received all eight care processes compared to 60.8% for those without a diagnosis code for remission ($p < 0.0001$). Every care process had lower completion in the 2019/20 NDA for people with remission coded in the 2018/19 NDA than for those without such coding; the largest differences were for urinary albumin measurement (56.2% for those coded in remission compared to 70.8% for those not coded in remission, $p < 0.0001$) and foot examinations (64.9% for those coded in remission versus 86.0% in those not coded in remission, $p < 0.0001$). HbA_{1c} measurement, the key care process for establishing maintenance of remission, occurred in 88.9% of people coded as in remission in the 2018/19 NDA, compared to 92.3% of people without such coding (see Table 2).

There was less of a difference in care process completion in the 2019/20 NDA between people with evidence of remission in the 2018/19 NDA than those without such evidence; 57.7% of people with evidence of remission and 61.1% of those without such evidence received all 8 care processes ($p < 0.0001$). People with evidence of remission

TABLE 1 Characteristics of people with type 2 diabetes by whether or not they were coded as being in remission and whether or not they had evidence of remission

	Coded as in remission		Not coded as in remission			With evidence of remission		Without evidence of remission		
	N	%	*N*	%	% Coded as in remission	*N*	%	*N*	%	% With evidence of remission
Total	16,460		2,805,685		0.58%	339,235		2,482,910		12.0%
Sex										
Female	7820	47.5%	1,237,300	44.1%	0.63%	165,130	48.7%	1,079,995	43.5%	13.3%
Male	8640	52.5%	1,568,385	55.9%	0.55%	174,110	51.3%	1,402,915	56.5%	11.0%
Age										
<40 years	575	3.5%	92,095	3.3%	0.62%	7320	2.2%	85,350	3.4%	7.9%
40–49 years	1320	8.0%	260,405	9.3%	0.50%	20,435	6.0%	241,290	9.7%	7.8%
50–59 years	2585	15.7%	568,310	20.3%	0.45%	46,125	13.6%	524,770	21.1%	8.1%
60–69 years	3775	22.9%	730,620	26.0%	0.51%	76,190	22.5%	658,210	26.5%	10.4%
70–79 years	4660	28.3%	716,715	25.5%	0.65%	102,325	30.2%	619,045	24.9%	14.2%
80+ years	3545	21.5%	437,535	15.6%	0.80%	86,835	25.6%	354,240	14.3%	19.7%
Mean (*SD*)	68.2 (14)		65.9 (13.4)			70.3 (13.3)		65.3 (13.3)		
Deprivation										
Most deprived	3260	19.8%	673,445	24.0%	0.48%	68,990	20.3%	607,715	24.5%	10.2%
2nd most deprived	3140	19.1%	623,770	22.2%	0.50%	69,870	20.6%	557,040	22.4%	11.2%
3rd most deprived	3395	20.6%	576,575	20.6%	0.59%	70,905	20.9%	509,070	20.5%	12.2%
2nd least deprived	3520	21.4%	511,175	18.2%	0.68%	69,680	20.5%	445,010	17.9%	13.5%
Least deprived	3145	19.1%	419,960	15.0%	0.74%	59,715	17.6%	363,390	14.6%	14.1%
Missing	5	0.0%	760	0.0%	0.65%	75	0.0%	690	0.0%	9.8%
Ethnicity										
Asian	750	4.6%	399,630	14.2%	0.19%	28,745	8.5%	371,630	15.0%	7.2%
Black	405	2.5%	134,775	4.8%	0.30%	12,005	3.5%	123,175	5.0%	8.9%
Mixed	105	0.6%	29,715	1.1%	0.35%	2695	0.8%	27,120	1.1%	9.0%
Other	160	1.0%	45,160	1.6%	0.35%	3975	1.2%	41,350	1.7%	8.8%
White	12,685	77.1%	1,876,330	66.9%	0.67%	247,835	73.1%	1,641,180	66.1%	13.1%
Missing	2360	14.3%	320,075	11.4%	0.73%	43,980	13.0%	278,455	11.2%	13.6%

TABLE 2 Care processes in people with type 2 diabetes by whether or not they were coded as being in remission and whether or not they had evidence of remission

	Coded as in remission		Not coded as in remission		*p*-value	With evidence of remission		Without evidence of remission		*p*-value
	N	%	*N*	%		*N*	%	*N*	%	
Number of people	16,460		2,805,685			339,235		2,482,910		
HbA_{1c}	14,630	88.9%	2,632,430	93.8%	<0.0001	319,880	94.3%	2,327,175	93.7%	<0.0001
Blood pressure	15,275	92.8%	2,682,135	95.6%	<0.0001	327,520	96.5%	2,369,895	95.4%	<0.0001
Cholesterol	13,795	83.8%	2,569,220	91.6%	<0.0001	310,270	91.5%	2,272,745	91.5%	0.144
Creatinine	14,555	88.4%	2,594,760	92.5%	<0.0001	317,715	93.7%	2,291,600	92.3%	<0.0001
Albumin	9250	56.2%	1,986,010	70.8%	<0.0001	233,455	68.8%	1,761,805	71.0%	<0.0001
Body mass index	13,225	80.3%	2,487,195	88.6%	<0.0001	297,245	87.6%	2,203,170	88.7%	<0.0001
Smoking	15,005	91.2%	2,679,990	95.5%	<0.0001	322,495	95.1%	2,372,495	95.6%	<0.0001
Foot examination	10,675	64.9%	2,412,950	86.0%	<0.0001	273,665	80.7%	2,149,960	86.6%	<0.0001
All eight care processes	6990	42.5%	1,704,940	60.8%	<0.0001	195,650	57.7%	1,516,275	61.1%	<0.0001

in the 2018/19 NDA were more likely to have had their HbA_{1c}, blood pressure and creatinine measured (94.3%, 96.5% and 93.7%, respectively) than those without evidence of remission (93.7%, 95.4% and 92.3%, respectively; all $p < 0.0001$); whilst urinary albumin measurement, body mass index measurement, enquiry of smoking status and foot examination were less likely to have occurred in those with evidence of remission (68.8% vs 71.0%, 87.6% vs 88.7%, 95.1% vs 95.6% and 80.7% vs 86.6% respectively, all $p < 0.0001$). There was no difference between these groups for completion of cholesterol measurement (91.5% for both, $p = 0.144$) (see Table 2).

After adjusting for age, sex, socioeconomic deprivation and ethnicity, a diagnosis code of remission in the 2018/19 NDA was associated with a relative risk (RR) of 0.70 (95% CI 0.69–0.72) for subsequently receiving all eight care processes. For all individual care processes, a remission code was associated with a lower chance of having received the care process with the greatest difference found in the measurement of urinary albumin (RR 0.79 95% CI 0.78–0.80) and foot examinations (RR 0.76 95% CI 0.75–0.77) (see Table 3). Differences in the likelihood of receiving care processes between those with evidence of remission compared to those without evidence of remission were smaller after adjustment for age, and only slightly attenuated by further adjustment for sex, socioeconomic deprivation and ethnicity. Having evidence of remission in the 2018/19 NDA was associated with a RR of 0.94 (95% CI 0.93–0.94) for subsequently receiving all eight care processes. After adjustment for age, sex, socioeconomic deprivation and ethnicity, having evidence of remission was associated with a RR of 0.96 (95% CI 0.95–0.96) for urinary albumin measurement, 0.99 (95% CI 0.99–0.99) for body mass measurement and 0.92 (95% CI 0.92–0.93) for foot examinations whilst the chance of receiving the other five care processes did not significantly vary by whether there was evidence of remission (see Table 3). For reference, the odds ratios for these associations are included in Table S1.

4 | DISCUSSION

This study identified the proportions of people receiving care processes in over 2.8 million people with type 2 diabetes in England using two different approaches to identifying diabetes remission. Those with a diagnostic code indicating remission of type 2 diabetes in the 2018/19 NDA were less likely to receive each of the eight care processes in the subsequent year. A different pattern was seen for those in the 2018/19 NDA with evidence of remission but who had not necessarily been recognized and coded. The latter group had generally smaller differences and varying directions across the care processes, with an overall modestly lower likelihood of receiving all eight care processes. These smaller differences reached statistical significance due to the large cohort size and the differences found are unlikely to represent a clinically significant difference in the care processes received. This suggests that recognition or communication of remission of type 2 diabetes, implied by such coding, may be associated with a negative effect on the subsequent likelihood to offer or accept care processes, with greater effect size than having evidence of remission. This may relate to a number of possible patient, clinician, and system factors and warrants further exploration.

The data examined in this study relates to a period of time predominately prior to the Coronavirus disease (COVID-19) pandemic. In the context of widespread

TABLE 3 Relative risk of having received care processes associated with the coding of remission or evidence of remission compared to the absence of such coding or evidence respectively, with adjustment for age, sex, deprivation and ethnicity

	Adjusted for age	Adjusted for age and sex	Adjusted for age, sex and deprivation	Adjusted for age, sex, deprivation and ethnicity
	RR (95% CI)	RR (95%CI)	RR (95% CI)	RR (95%CI)
Coded as in remission				
HbA_{1c}	0.94 (0.94–0.95)	0.94 (0.94–0.95)	0.94 (0.94–0.95)	0.95 (0.94–0.95)
Blood pressure	0.96 (0.96–0.97)	0.96 (0.96–0.97)	0.96 (0.96–0.97)	0.97 (0.96–0.97)
Cholesterol	0.91 (0.91–0.92)	0.91 (0.91–0.92)	0.91 (0.91–0.92)	0.92 (0.91–0.92)
Creatinine	0.95 (0.94–0.96)	0.95 (0.94–0.96)	0.95 (0.95–0.96)	0.95 (0.95–0.96)
Urinary albumin	0.79 (0.77–0.8)	0.79 (0.78–0.8)	0.78 (0.77–0.79)	0.79 (0.78–0.8)
Body mass index	0.91 (0.9–0.91)	0.91 (0.9–0.91)	0.91 (0.9–0.91)	0.91 (0.9–0.91)
Smoking	0.96 (0.95–0.96)	0.95 (0.95–0.96)	0.95 (0.95–0.96)	0.96 (0.96–0.96)
Foot examination	0.75 (0.75–0.76)	0.76 (0.75–0.76)	0.75 (0.75–0.76)	0.76 (0.75–0.77)
All eight care processes	0.69 (0.68–0.71)	0.69 (0.68–0.71)	0.69 (0.68–0.71)	0.70 (0.69–0.72)
Evidence of remission				
HbA_{1c}	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.01 (1.01–1.01)	1.00 (1.00–1.00)
Blood pressure	1.01 (1.00–1.01)	1.01 (1.00–1.01)	1.01 (1–1.01)	1.01 (1.00–1.01)
Cholesterol	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Creatinine	0.99 (0.99–0.99)	1.01 (1.01–1.01)	1.01 (1.01–1.01)	1.01 (1.01–1.01)
Urinary albumin	0.95 (0.95–0.96)	0.96 (0.95–0.96)	0.95 (0.95–0.96)	0.96 (0.95–0.96)
Body mass index	0.99 (0.99–0.99)	0.99 (0.99–0.99)	0.98 (0.98–0.98)	0.99 (0.99–0.99)
Smoking	1.00 (0.99–1.00)	0.99 (0.99–1.00)	0.99 (0.99–1.00)	1.00 (1.00–1.00)
Foot examination	0.92 (0.92–0.92)	0.92 (0.92–0.92)	0.92 (0.92–0.92)	0.92 (0.92–0.93)
All eight care processes	0.93 (0.93–0.94)	0.93 (0.93–0.94)	0.93 (0.93–0.94)	0.94 (0.93–0.94)

encouragement of risk stratification during the pandemic to prioritize clinical reviews for those with greater clinical need, such as those with poorer glycemic control, there may be a need to consider mitigations in view of the already lower likelihood of receiving care processes for those previously identified as having remission, as demonstrated in this study. This is particularly relevant for HbA_{1c} measurement, the key care process for establishing whether remission has been maintained.

With the recent announcement of the expansion of the NHS Low-Calorie Diet Programme in England,[14] providing thousands of people with the opportunity to follow a total diet replacement approach to achieve expected 10 to 15 kg weight loss and potentially remission of type 2 diabetes, we advise health services, policymakers and clinicians to consider the possible impact of recognition and communication of remission on subsequent care process delivery and to take appropriate steps in promoting the importance of such monitoring to both healthcare professionals and people with diabetes.

The strength of this study is the large cohort size. In 2018/19, the NDA included data from 6774 (97.9%) primary care practices in England[15] and therefore this cohort provides a representative picture of the clinical care provided in primary care for people with type 2 diabetes in England. Previous analyses of the NDA data have shown that older people, those from White ethnic groups and those living in less deprived areas are more likely to receive the recommended care processes.[16] Adjusting for these characteristics had minimal impact on the relative risks of receiving each care process. However, by including these adjustments, we provide an indication of the comparative risk of receiving care processes for people coded as in remission compared to those with similar characteristics without such a diagnostic code, as well as for those with evidence of remission compared to those with similar characteristics without such evidence. As the NDA did not receive data directly from the retinal screening programmes across England for the time periods used in this analysis and the varying quality and completeness of data on retinal screening recorded in general practice records this analysis was not able to provide an accurate picture of how the receipt of retinal screening varied by remission status.

This paper shows the very low prevalence of diagnostic codes indicating remission compared to the proportion of people with clinical evidence of remission of type 2 diabetes. This means that there is no reliable way to simply identify people who have been diagnosed with type 2 diabetes who subsequently enter remission through healthcare records either to provide ongoing care to these individuals or for population-level analyses to add to the understanding of characteristics, co-morbidities and prognosis. The low use of diagnostic codes to indicate remission of type 2 diabetes is likely to be, at least in part, due to a lack of understanding of the potential for the remission of type 2 diabetes and awareness of the relevant diagnostic codes. There is therefore a need to increase the awareness and appropriate use of these diagnostic codes within primary care and caution should be used when assessing data defined in this way until improvements in the data have been demonstrated.

We were not able to find any previously published studies that examined the receipt of routine care in people in remission of type 2 diabetes. However, relapse following the achievement of remission of type 2 diabetes is well recognized when remission has been achieved both through lifestyle interventions[4] and through bariatric surgery.[16] In a previous analysis of the incidence of remission of type 2 diabetes using NDA data showed that short-term relapse to diabetic hyperglycaemia was approximately 9% over a median of 190 days.[17] This highlights the importance of ongoing diabetes-related care delivery to identify a potential relapse and future macro and microvascular risk for those achieving remission.

This analysis has highlighted that people with a diagnostic code for the remission of type 2 diabetes are considerably less likely to subsequently receive the recommended care processes to assess relapse, modifiable risk factors, and to identify complications. However, the scale of the difference between the chance of receiving care processes varies by type of care process and is much reduced when people with evidence of remission are compared to those without evidence of remission. It is relevant to note that the care process where there was the greatest difference between those coded as in remission and those without such a diagnostic code was albuminuria testing. NICE guidelines suggest consideration of SGLT-2 inhibitors for all people diagnosed with type 2 diabetes and persistent albuminuria irrespective of glycemic control and therefore an opportunity for risk reduction in this group may be missed due to less frequent assessment of albuminuria.

There are currently no explicit guidelines for the routine monitoring of people in remission of type 2 diabetes but the NICE guidelines for the management of type 2 diabetes[10] still apply to this group. People in remission from type 2 diabetes are at high risk of returning to diabetic hyperglycaemia and therefore regular HbA_{1c} measurements are imperative to allow appropriate treatment strategies to be implemented at the earliest opportunity. Other care processes that identify risk factors for, or early signs of, macro and microvascular disease and other complications of diabetes are also likely to be beneficial and should be encouraged. However, further research is needed to establish the absolute and relative risks of macro and microvascular complications in this group of individuals which would inform the development of appropriate guidelines for the routine monitoring and screening of people who have been diagnosed with type 2 diabetes but who subsequently enter remission. With the expansion of the NHS England Low-Calorie Diet Programme across England, it is hoped that the incidence of remission of type 2 diabetes will increase, making the appreciation and awareness of future potential relapse, and the importance of ongoing routine monitoring and care delivery, more important.

AUTHOR CONTRIBUTIONS

The study was designed by JV, CB and NH. NH undertook the statistical analysis. All authors reviewed the methods, assisted in writing the paper and reviewed the final manuscript. NH is the guarantor and accepts full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish.

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CONFLICT OF INTEREST

KK, BY and JV are members of the NDA Research Advisory Group. KK has acted as a consultant, speaker, or received grants for investigator-initiated studies for Astra Zeneca, Novartis, Novo Nordisk, Sanofi-Aventis, Lilly, and Merck Sharp & Dohme, Boehringer Ingelheim, Bayer, Berlin-Chemie AG / Menarini Group, Janssen and Napp. NS has

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DATA AVAILABILITY STATEMENT

Information governance for the National Diabetes Audit prevents the sharing of the individual-level data used for this analysis. Extracts of the National Diabetes can be requested through the NHS Digital Data Access Request Service (DARS) https://digital.nhs.uk/services/data-access-request-service-dars.

ETHICS STATEMENT

Secondary analyses of the National Diabetes Audit do not require ethnic committee approval.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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