

Halton Joint Strategic Needs Assessment 2018

Long Term Conditions: Diabetes (update)



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Description	The document is an update of the 2014/15 JSNA for Diabetes. It describes the policy context, estimated prevalence, risk factors and sub-groups of need, current service provision and national best practice in relation to diabetes for the population of Halton.
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Related documents	JSNA: cardiovascular disease Public Health England Diabetes Profile Public Health England Diabetes Foot Health Profile JSNA Physical Activity, Healthy Eating and Healthy Weight National Diabetes Audit 2017/18 Protected Characteristics and Equality Profile: Diabetes

Please quote the JSNA

We would like to know when and how the JSNA is being used. One way, is to ask people who use the JSNA when developing strategies, service reviews and other work to quote the JSNA as their source of information.

List of Abbreviations

BMI	Body Mass Index
CCG	Clinical Commissioning Group
CHIMAT	Child and Maternal Intelligence Network
CVD	Cardiovascular Disease
DKA	Diabetic ketoacidosis
DOVE	Diabetes Outcomes versus Expenditure
DSR	Directly Standardised Rate
GP	General Practitioner
HSE	Health Survey for England
IGR	Impaired Glucose Regulation
IMD	Index of Multiple Deprivation
JSNA	Joint Strategic Needs Assessment
LSOA	Lower-layer Super Output Area
NADiA	National Diabetes Audit Inpatient Audit
NDA	National Diabetes Audit
NDIS	National Diabetes Information Service
NDPP	National Diabetes Prevention Programme
NHS	National Health Service
NHSE	NHS England
NICE	National Institute for Health and Clinical Excellence
NPID	National Pregnancy in Diabetes audit
ONS	Office for National Statistics
PHE	Public Health England
QOF	Quality Outcomes Framework
RCPCH	Royal College of Paediatrics and Child Health
STHKHT	St Helens and Knowsley Teaching Hospital NHS Trust
WAY	What Abouth YOUNG
WHFHT	Warrington & Halton Hospitals NHS Foundation Trust
WHO	World Health Organization

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Key issues for consideration by commissioners

Category	Goal	Description
Intelligence	Intelligence on diabetes that is fit for purpose	• Much of the National Diabetes Audit (NDA) data is now available at CCG level which enables a much richer understanding of diabetes care locally. However, not all is available at CCG level. Some remains at secondary care provider trust level. • There remains a need to share and integrate data and information so it enables a fully understanding of diabetes across all sectors of the population e.g. children and gestational, data on service provision and service level outcomes in a way that enables comparison with levels of need
Prevention	Primary and secondary prevention to improve levels of modifiable risk factors associated with diabetes	• Need to be able to routinely monitor adult obesity levels • The local Specialist Weight Management Services meet National Institute for Health & Care Excellence (NICE) and Public Health England (PHE) guidelines on data including outcome measures. It needs to be routinely available for analysis within Joint Strategic Needs Assessments (JSNA) e.g. at postcode level to enable comparison with levels of need • Since the introduction of new physical activity recommendations, Halton adults have similar levels of activity to England (previously it was lower). However, age and gender analysis is no longer available locally • Levels of both young people and adults eating the recommended 5 portions of fruit or vegetables a day are lower in Halton than national. Halton people eat less portions per day or both fruit and vegetables
Prevalence	Halt or reduce the rising prevalence of type 2 diabetes	• It is estimated that the prevalence of diabetes will continue to rise • There remains a small gap between overall numbers estimated and numbers diagnosed. However, this has reduced substantially and is much smaller than England. • So not only is the estimated prevalence now similar to England (8.4% Halton 8.5% England) but Halton is much better at detecting for nearly all types of diabetes • Practice level variation remains with diagnosed prevalence of between 5.4% and 9.2%. Unfortunately the updated estimation model is no longer available to GP level to determine levels of difference between estimated total population prevalence and diagnosed prevalence. Previous analysis 2013/14 showed practice-level variation of between 41.6% to 91.2% estimated population diagnosed.
Diagnosis and management in primary care	Reduce the gap at both practice and CCG level across all care processes between best and lowest performing	• There have been improvements in the take-up of the NHS Health Checks offer. Since 2014/15 the level in Halton has been above the North West and England levels • Compared to England, 2017/18 NDA data shows slightly lower proportion of all patients with diabetes receiving all 8 and achieving all three treatment targets.
Eye screening	High uptake of screening and early intervention/treatment	• There is higher uptake of routine digital screening in Halton than England. • The Central Mersey screening programme sent a lower % of

Category	Goal	Description
	for those with potential diabetes-related eye problems	result letters within 3 weeks than England but was still over 90% The programme had a lower proportion of urgent referrals to Hospital Eye Service attending within 4 weeks but a higher % of routine referrals attending within 18 weeks
Hospital admission rates	Reduce the rate of emergency admissions due to diabetes between Halton and its comparators and within the borough	- Hospital admissions rise with age and are slightly higher for men than women. - There is significant variation across electoral wards and GP practices, with medium-strong strength correlation between emergency admissions and deprivation - Admission rates for under-18s was higher in Halton than for North West and England for 2015/16 and 2016/17
Management of inpatients with diabetes	Reduction in the difference between admission levels for diabetics compared to non diabetics Continue improved in care management indicators	- The National Diabetes Inpatient Audit (NaDIA) revealed overall patient satisfaction with the level of care for their diabetes was higher in St Helens and Knowsley Teaching Hospital NHS Trust (STHKTHT) but lower in Warrington & Halton Hospitals NHS Foundation Trust (WHFHT) compared to England as a whole - WHFHT performed similar/slightly better than England for appropriate levels of blood glucose monitoring and hyperglycaemic episodes. STHKTHT performed slightly less well than England average - Despite the greater podiatrist hours available at WHFHT compared to STHKTHT and England average a lower % of WHFHT patients received a foot risk assessment or saw a Multi-Disciplinary Foot Team. However, low number admitted to WHFHT affected by foot problems may have affected these results - WHFHT had lower level of diabetic medication errors than England whilst STHKTHT had higher levels (they were in the highest quadrant nationally) - Despite this, satisfaction rates were higher in STHKTHT compared to WHFHT and England - In both hospital trusts staff awareness and knowledge was identified by patients as the area where they felt there was a need for improvement, despite relatively high levels of satisfaction with this area of care
Pregnancy and Diabetes	Continue improved in care management indicators	- Both Warrington Hospital and Whiston Hospital had a lower proportion of pregnant women with diabetes whose HbA1c was less than 48mmol/l - However, the % taking the recommended 5mg folic acid was higher than nationally
Paediatric Diabetes	Continue improved in care management indicators	- Alder Hey Hospital had a lower % of paediatric patients with diabetes receiving all 7 recommended care processes compared to Warrington Hospital, Whiston Hospital or the North West and England averages. It was especially low for Albuminuria and also, although less so, for Thyroid - Alder Hey Hospital had over half its patients living in the most deprived quintile nationally and much lower %s in the 2 least deprived quintiles. This is likely to have impacted the results
Complications	Reduce the levels of	People with diabetes have higher risk of complications for various conditions than non-diabetics

Category	Goal	Description
	complications for diabetic patients in Halton compared to England	• People with diabetes registered with Halton GPs have a greater risk than people with diabetes across England as a whole for heart failure, stroke and death but lower for myocardial infarction and renal replacement • There was a statistically higher admission rate for diabetic foot conditions in Halton than England • Halton has higher levels of both major and minor diabetic lower limb amputation than England although the difference is not statistically significant • Halton patients had higher level of admissions for Diabetic Ketoacidosis (DKA) compared to England although the difference is not statistically different
Mortality	Reduced mortality, especially premature mortality due to diabetes	• Mortality rates for diabetes are higher in Halton than in the North West and similar to England • Premature mortality (under 75 years) in Halton was lower for males but higher for females compared to England males and females • There is a strong relationship between mortality rates and deprivation with people living in the most deprived quintile in Halton being 3 times more likely to die from diabetes as a contributing factor as those living in the least deprived quintile. However, for those dying from diabetes as the primary cause there was no significant relationship with deprivation
Financial impact	Continue to deliver a positive relationship between levels of spend and outcomes	• Analysis of programme budgeting data 2013/14 compared to 2012/13 shows Halton CCG has shifted from the low spend, better outcomes quadrant (total diabetes prescribing against HbA1c 59mmol/mol or less) to the high spend better outcomes quadrant • Halton CCG is in the highest 25% nationally for its spend per QOF registered patients with diabetes at £363 per patient compared to the England average of £324.28. Just over £3million of its £26.6million total prescribing budget is spent treating diabetes

1. Introduction

Diabetes is a long term condition that affects around 3.2 million people in the UK, and a predicted additional 850,000 people who have not yet been diagnosed. Diabetes prevalence is increasing nationally and locally. The crude prevalence in England among those aged 17 and above was 4.1% in 2008/09 and has risen to 6.67% in 2016/17.^[1] Estimates suggest that the number of people with diabetes will continue to rise to 4.2 million people by 2030, affecting almost 9% of the population. It is an important health issue as diabetes increases someone's risk of a heart attack or stroke, eye problems and limb problems. Diabetes is present when there are high levels of glucose in the blood, as a result of the body not being able to use it properly. There are two main types of diabetes: Type 1 diabetes and Type 2 diabetes. According to Diabetes UK 2017 statistics (published January 2019):

- About **90%** of people with diabetes have Type 2.
- About **8%** of people with diabetes have Type 1.
- About **2%** of people have rarer types of diabetes.^[2]

Type 1 diabetes occurs when the body is unable to produce insulin, the hormone required for glucose to enter cells and be used for producing energy for the body. It is unknown why some people are unable to produce insulin, though we understand that this is usually detected early in life, and there is a likely genetic link. There is no preventative action that can be taken. Type 1 diabetes is treated by daily insulin injections, a healthy diet and regular physical activity.

Type 2 diabetes occurs when insufficient insulin is produced, or the insulin produced does not work properly, which has the same effect on the body as Type 1 diabetes. Typically, this type of diabetes occurs later in life. It is treated with a healthy diet and regular physical exercise, and medication is often also required.

Although Type 2 diabetes is usually diagnosed in adults aged over 40, the increasing prevalence of obesity in the population means that younger people are now being diagnosed with Type 2 diabetes more often than in the past. There is a high prevalence among south Asian and black populations in whom it is more common to develop diabetes at a younger age. There is a familial link also, so people with a close family member with diabetes are at increased risk of developing it themselves.

In January 2011 the World Health Organization (WHO) recommended that glycated haemoglobin (HbA_{1c}) could be used as an alternative to standard glucose measures to diagnose type 2 diabetes among non-pregnant adults.^[3] HbA_{1c} levels of 6.5% (48 mmol/mol) or above indicate that someone has type 2 diabetes.

NICE guidance^[4] provides further categorisation of assessing a person's risk for developing diabetes, again using HbA_{1c} levels with:

- High risk: a fasting plasma glucose of 5.5–6.9 mmol/l or an HbA_{1c} level of 42–47 mmol/mol [6.0–6.4%]
- moderate risk: a high risk score, but with a fasting plasma glucose less than 5.5 mmol/l or HbA_{1c} of less than 42 mmol/mol [6.0%]
- When categorising people as low, moderate or high risk, it is important to match interventions offered to this risk from brief advice to a more intensive intervention. Retesting should be offered at tailored intervals too

Obesity is the primary modifiable risk factor for diabetes. Without the intervention of healthy diet and exercise, obesity can develop into diabetes in a relatively short period of time. The increasing prevalence of diabetes in younger people can be attributed to the obesity epidemic in these age groups. In addition to obesity, smoking and poor control of one's diabetes are risk factors for vascular complications in people with diabetes.

Other risk factors for type 2 diabetes include high blood pressure, having previously had a stroke or a heart attack, polycystic ovary syndrome and severe mental health problems.

Impaired Glucose Regulation (IGR), or non-diabetic hyperglycaemia, often called 'pre-diabetes', occurs in people with raised levels of glucose in their blood, but they are not high enough for a diagnosis of diabetes. It puts the person at increased risk of developing Type 2 diabetes and heart disease so it is important to focus on the steps that can be taken to minimize this risk. A Finnish study found that an intensive lifestyle intervention produced long-term beneficial changes in diet, physical activity, and clinical and biochemical parameters and reduced diabetes risk.^[5]

If diabetes is not controlled properly, it can lead to serious consequences, including cardiovascular disease, foot disease, amputations, kidney failure and blindness resulting from damage to both large and small blood vessels.

Diabetes in disadvantaged groups^{[6] [a]}

- The most deprived in the UK are 2.5 times more likely to have diabetes
- 80% of people with Type 2 diabetes are overweight or obese at diagnosis
- 1.3 million people with diabetes are aged over 65
- People from black and minority ethnic groups are up to six times more likely to develop diabetes
- One in five people with a severe mental illness have diabetes
- The prevalence of diabetes in nursing homes is up to 25% compared to 3% in the general population
- Complications of diabetes such as heart disease, stroke and kidney damage are three and a half times higher in the lower socio economic groups
- People from deprived or ethnic communities are less likely to have their body mass index or smoking status recorded. They are also less likely to have records for HbA1c, retinal screening, blood pressure, and neuropathy or flu vaccination
- Those who are least well educated are more likely to have retinopathy, heart disease and poor diabetes control

It is important to have both a systematic approach to reducing the risk of individuals developing diabetes as well as ensuring that the outcomes for those with diabetes are improved and unjustified variation is reduced.^[7]

The importance of improving outcomes for individuals with diabetes is reflected in the inclusion in the CCG Improvement and Assessment Framework (CCG IAF) of indicators covering:

a) see also accompanying Protected Characteristics and Equality Profile for Diabetes which can be used for conducting Equality Impact Assessments of local services

- Diabetes patients that have achieved all the NICE recommended treatment targets: Three (HbA1c (blood sugar), cholesterol and blood pressure) for adults and one (HbA1c) for children
- People with diabetes diagnosed less than a year who attend a structured education course

These have been selected because they are recognised evidence-based measures of whether patients with diabetes are being supported to successfully manage their condition.

2. Level of need in the population

2.1. Risk factors

Type 1 diabetes results from the destruction of insulin producing cells in the pancreas by an autoimmune process whose causes are still unclear. It is therefore not possible to identify particular groups who might be at higher risk of developing the disease and take action to prevent it.

In Type 2 diabetes, the body either does not produce enough insulin or has become resistant to its actions or both. Groups at higher risk of developing Type 2 diabetes are:

- White people aged over 40
- Black and Asian people aged over 25

and people with:

- parents or siblings with diabetes
- a waist measurement of 31.5 inches or over for women; 35 inches or over for Asian men and 37 inches or over for White and Black men
- high blood pressure or who have had a heart attack or a stroke
- impaired glucose regulation or impaired fasting glycaemia
- people with visceral weight gain including people with severe mental health problems

and women who have:

- polycystic ovary syndrome and are overweight
- had gestational diabetes

People with more than one risk factor are at particularly high risk of developing Type 2 diabetes. Lifestyle changes, including a healthy balanced diet, increased physical activity and, if necessary, losing weight reduce the risk and are important in treating Type 2 diabetes. Some people with Type 2 diabetes may also need medication which could include insulin injections to achieve normal blood glucose levels.

2.2. Lifestyle factors

2.2.1. Obesity

Obesity is the most potent risk factor for Type 2 diabetes. It accounts for 80– 85% of the overall risk of developing Type 2 diabetes and underlies the current global spread of the condition.^[8]

In England, most adults are overweight or obese (6 out of 10 or 61.3%) whilst one in three children (30%) between the ages of 2 and 15 are.^[9]

Both BMI and waist circumference contribute to the National Institute for Health and Care Excellence (NICE) calculation of health risk caused by overweight and obesity. By these definitions, more than half of men and women were in the increased, high or very high risk categories.

Overweight and obesity were higher for men than women, and increased with age for both sexes, though there was a slight decrease in the oldest age groups.^[10]

The proportion that were overweight, including obese, was 65.7% in men (65.4% in 2003) and 57.1% in women (55.5% in 2003) in 2016. There was a marked increase in the proportion of adults that were obese from 13% in 1993 to 26% in 2013 for men and from 16% to 24% for women.^[11]

Data on adult obesity at a local authority level is available from the national Sport England managed Active Lives survey shows a reduction in Halton levels against a background of stable levels in the North West and England, reducing the gap. Whilst two years worth of data are not enough to determine a trend, Halton levels are now similar to comparators.

Table 1: Percentage of adults (aged 18+) classified as overweight or obese

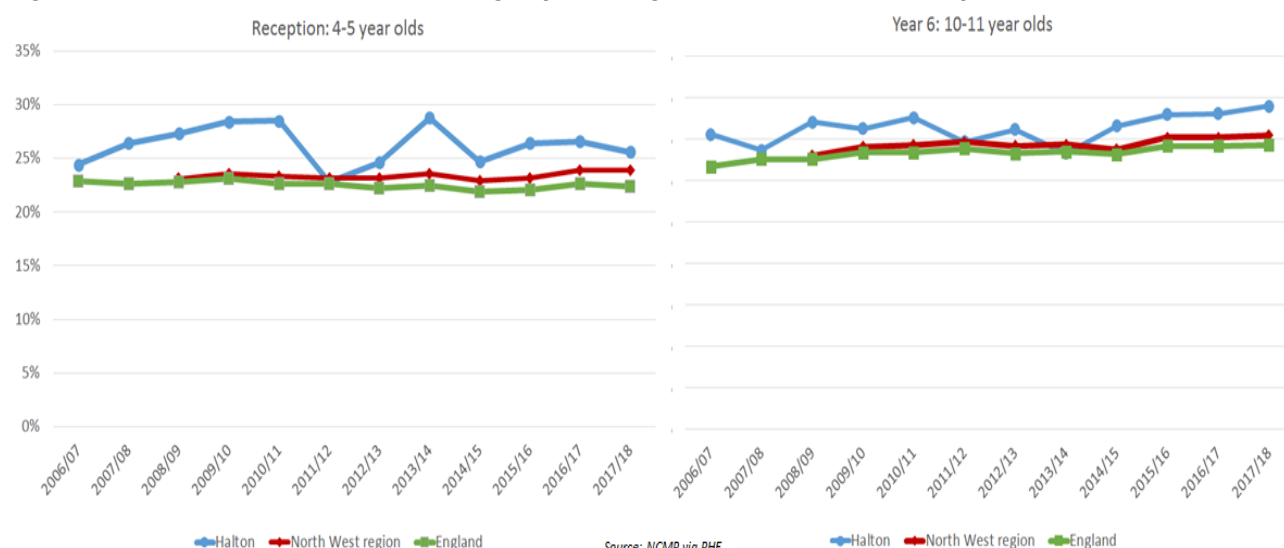
Period	Halton	North West region	England
2015/16	70.50%	63.00%	61.30%
2016/17	61.10%	63.30%	61.30%

Source: Active Lives survey, Sport England, via PHE Fingertips

In 2016, in England around one in four boys and three in ten girls (aged 2 to 15) were classed as either overweight or obese (26.0% and 29.5% respectively). This is a reduction from just over three in every ten in 2003 (32.3% boys and 31.6% girls were overweight including obese in 2003).^[12]

Locally data on overweight and obesity levels in children is routinely gathered by weighing children in Reception and Year 6. Known as the National Child Measurement Programme (NCMP), this has been running for over a decade enabling trends to be determined.

Figure 1: Trend in levels of excess weight (overweight and obese combined) in children



2.2.2. Exercise

According to physical activity guidelines for adults from the UK Chief Medical Officers adults should aim to be active daily. Over a week, activity should add up to at least 150 minutes (2½ hours) of moderate intensity activity in bouts of 10 minutes or more – one way to approach this is to do 30 minutes on at least 5 days a week. Alternatively, comparable benefits can be achieved through 75 minutes of vigorous intensity activity spread across the week or combinations of moderate and vigorous intensity activity. Adults should also undertake physical activity to improve muscle strength on at least two days a week. All adults should minimise the amount of time spent being sedentary (sitting) for extended periods.^[13]

The Health Survey for England suggests 65.2% of adults are considered active (150+ minutes moderate intensity equivalent minutes per week), with the percentage of men who are active being higher than the percentage of women; 64.5% and 59.9% respectively.^[14] Whilst it is generally recognised that self-reported methods of eliciting physical activity levels tend to show an over-reporting of activity and under-reporting of time spent sedentary, especially in those with higher BMI and/or least active^{[15][16][17]} and/or with long-term conditions,^{[18][19][20]} this would apply equally to the national and regional results as it would for Halton residents.

Data at a local level is available from the Sport England Active Lives survey. Historical data showed Halton adult physical activity levels were statistically worse than England and the North West. However, since the change in the method by which physical activity and inactivity is measured, the data shows an increase in the proportion of Halton adults who are physically active, to a level which was higher than the North West in 2016/17; there is a marginal difference between Halton adult residents who are physically active (65.2%) and England (66.0%).

Figure 2: Physically active and inactive adults, 2016/17

Source: Sport England via PHE Fingertips

% adults (19+) meeting CMO physical activity recommendations (150+ moderate intensity equivalent minutes/week)



Historical data showed there are also differences by gender, age and social class. Participation levels are higher for males than females, for younger age bands than older age bands and amongst more

affluent social class groups than less affluent ones, and were much lower amongst those indicating they had a disability. However, this data is no longer available at a local level.

2.2.3. Diet and Nutrition

Poor diet is responsible for over half of all coronary heart disease and also contributes to stroke, hypertension, obesity, diabetes and some cancers. It is estimated that 70,000 premature deaths in the UK could be avoided each year if UK diets matched nutritional guidelines.^[21] Healthy eating and being physically active are particularly important for children and adolescents. This is because their nutrition and lifestyle influence their wellbeing, growth and development. The nutritional requirements of children and adolescents are high in relation to their size because of the demands for growth, in addition to requirements for body maintenance and physical activity.

Government guidelines state that everyone should eat at least five portions of a variety of fruit and vegetables every day. The '5 A DAY' guidelines were developed based on the recommendation from the World Health Organization (WHO) that consuming 400g fruit and vegetables a day can reduce risks of chronic diseases, such as heart disease, stroke, and some cancers.^[22]

Data from the What about YOUth (WAY) survey of 15 year olds and the Health Survey for England (HSE) 2016/17 provides a useful comparative measure, and shows that consumption of at least five portions of fruit and vegetables per day is lower in Halton than is common across the country. As such a lower proportion of Halton 15 year olds and Halton adults achieve the recommended 5-a-day portions of fruit & vegetables.

Table 2: Average consumption of 5-a-day fruit and vegetables

	Halton	North West	England
Proportion of the population meeting the recommended "5-a-day" at age 15	39.9%	48.7%	52.4%
Average number of portions of fruit consumed daily at age 15	2.03	2.33	2.39
Average number of portions of vegetables consumed daily at age 15	2.04	2.22	2.40
Proportion of the adult population meeting the recommended '5-a-day' on a 'usual day' (aged 16+)	51.5%	54.8%	57.4%
Average number of portions of fruit consumed daily (aged 16+)	2.58	2.61	2.65
Average number of portions of vegetables consumed daily (aged 16+)	2.45	2.60	2.70
Compared with benchmark Better Similar Worse			
Source: WAY survey(15 year olds) and Active Lives Survey (16+) via PHE Fingertips			

2.3 Deprivation

Deprivation is strongly associated with higher levels of obesity, physical inactivity, unhealthy diet, smoking and poor blood pressure control. All these factors are inextricably linked to the risk of diabetes or the risk of serious complications for those already diagnosed.^[23]

It is difficult to get clear evidence of absolute risk related to deprivation. The Health Survey for England 2011 found that men in the lowest quintile of equivalised household income were 2.3 times more likely to have diabetes than those in the highest quintile, and for women the risk was 1.6 times

higher. For people in the most deprived quintile of the Index of Multiple Deprivation, men had a 1.8 times increased risk and women had 3.1 times increased risk.^[24] Diabetes has not been examined in the HSE since 2011 although obesity is examined regularly.

Data from the National Diabetes Audit 2011/12 suggested that people in the most deprived quintile are 1.5 times more likely to have diabetes than those in the least deprived.^[25] The variation in deprivation and diabetes is only seen in those with Type 2 diabetes. Deprivation has no effect on developing Type 1 diabetes, which is unsurprising as it is not lifestyle related. The National Diabetes Audit no longer analyses prevalence by deprivation. However, it is unlikely that this position will have changed. The NDA does provide a breakdown of the percentage of each GP practice population in each quintile, as well as CCG-level and England level.

Halton is a relatively deprived borough, the 27th most deprived local authority in England, according to the Index of Multiple Deprivation 2015. There is also variation within the borough. The most deprived electoral ward is Windmill Hill, whilst the least deprived is Birchfield. The most deprived lower super output area in Halton is in Halton Castle ward.

Table 3: Breakdown of patients by deprivation quintile and diabetes type, at GP-practice level, NDA 2017/18

		Type 1					Type 2				
		IMD most deprived	IMD 2nd most deprived	IMD 3rd most deprived	IMD 2nd least deprived	IMD least deprived	IMD most deprived	IMD 2nd most deprived	IMD 3rd most deprived	IMD 2nd least deprived	IMD least deprived
N81011	Bevan Group	30.00	30.00	10.00	30.00	20.00	27.2	23.2	13.3	22.5	13.9
N81019	Castlefields	66.67	8.33	8.33	8.33	8.33	80.2	9.0	2.4	6.6	1.8
N81035	Appleton Village	36.36	18.18	9.09	27.27	18.18	34.5	23.5	12.6	17.7	11.8
N81037	Beeches	33.33	44.44	11.11	11.11	11.11	42.7	36.0	5.6	11.2	5.6
N81045	Peelhouse Plaza	23.53	29.41	11.76	23.53	11.76	34.1	30.7	15.1	14.5	6.2
N81054	Weaver Vale	66.67	11.11	11.11	11.11	11.11	73.8	4.7	3.7	15.9	1.9
N81057	Tower House	28.57	21.43	21.43	14.29	14.29	32.9	27.1	14.7	16.5	8.2
N81064	Newtown	50.00	16.67	16.67	16.67	16.67	47.7	28.4	11.4	10.2	2.3
N81066	Grove House	40.00	30.00	10.00	10.00	10.00	39.4	31.3	12.5	12.5	5.0
N81072	Murdishaw	60.00	20.00	20.00	20.00	20.00	59.8	11.8	6.9	18.6	2.9
N81096	Brookvale	75.00	12.50	12.50	12.50	0.00	74.5	5.9	7.8	8.8	2.0
N81119	Hough Green	50.00	16.67	16.67	16.67	16.67	53.1	10.2	14.3	14.3	6.1
N81619	Oaks Place	50.00	50.00	50.00	50.00	0.00	55.2	27.6	10.3	6.9	3.5
N81651	Upton Rocks	25.00	25.00	25.00	25.00	25.00	7.7	15.4	26.9	15.4	38.5
01F	NHS Halton CCG	43.09	21.95	9.76	16.26	9.76	47.8	21.2	10.5	14.0	6.5
England	England	20.14	20.28	20.39	19.94	19.21	24.2	22.2	20.4	18.2	15.0

Source: NDA 2017/18 via NHS Digital

2.4. Non-diabetic hyperglycaemia

Non-diabetic hyperglycaemia (or impaired glucose regulation (IGR)) describes blood glucose levels that are above the normal range but are not high enough for the diagnosis of Type 2 diabetes. The risk factors for it are the same as those for Type 2 diabetes – the greatest single risk factor being obesity. Women with a history of gestational diabetes are also at greater risk of developing non-diabetic hyperglycaemia and diabetes. Before people develop Type 2 diabetes they almost always have non-diabetic hyperglycaemia, although it is asymptomatic and can often go undiagnosed for many years. In the absence of intervention the majority of individuals with non-diabetic hyperglycaemia are likely to develop Type 2 diabetes within 5-10 years. There is good evidence,

however, to suggest that Type 2 diabetes can be prevented or delayed in people with non-diabetic hyperglycaemia. Evidence shows that modest lifestyle changes can significantly postpone the onset of Type 2 diabetes in high risk individuals and that lifestyle intervention is more effective than diabetes drugs such as metformin in reducing the incidence of diabetes in non-diabetic hyperglycaemia patients.^[26]

During winter 2012, IGR specific insight work undertaken across Merseyside resulted in the introduction of a Merseyside IGR Pathway in Halton January 2014. The Department of Health's NHS Health Checks modelling assumes a non-diabetic hyperglycaemia prevalence amongst adults aged 40-74 years of 2.3%. Since the Merseyside work PHE have introduced an estimate of the prevalence of non-diabetic hyperglycaemia in the whole adult (16+ years) population. In line with WHO and NICE guidelines, the measure defines non-diabetic hyperglycaemia as an HBA1c value between 6.0% (42mmol/mol) and 6.4% (47mmol/mol), excluding those who had already been diagnosed with diabetes with an HBA1c value in this range. The estimates take into account the age, ethnicity and the estimated body mass index (BMI) of the local area. It shows that the level in Halton is estimated to be the same as that of England at 11.4%, equating to 11,595 adults.

Table 4: Estimates of adult (16+) registered population with non-diabetic hyperglycaemia in Cheshire and Merseyside

Estimated prevalence of non-diabetic hyperglycaemia for adults aged 16 and over in England 2015				Proportion - %	
Area	Count	Value		95% Lower CI	95% Upper CI
England	5,047,891	11.4		-	-
Cheshire and Merseyside NHS region	-	-		-	-
NHS Southport And Formby...	12,808	13.4*		-	-
NHS Eastern Cheshire CCG	20,311	12.4*		-	-
NHS West Cheshire CCG	22,859	12.0*		-	-
NHS St Helens CCG	17,015	11.7*		-	-
NHS South Sefton CCG	15,273	11.6*		-	-
NHS Wirral CCG	30,197	11.5*		-	-
NHS Vale Royal CCG	9,567	11.5*		-	-
NHS Halton CCG	11,595	11.4*		-	-
NHS South Cheshire CCG	16,696	11.4*		-	-
NHS Warrington CCG	18,240	10.8*		-	-
NHS Knowsley CCG	12,702	10.8*		-	-
NHS Liverpool CCG	39,060	10.0*		-	-

Source: National Cardiovascular Intelligence Network, Public Health England

A local audit of Halton GP practice patient lists shows 7,728 people are known to have non-diabetic hyperglycaemia (or impaired glucose regulation (IGR)). This is 3,867 less than the estimate or 66.7% (just under 2 out of 3). So whilst great strides have been made in identifying this at risk group, Halton remains some way from identifying all those with non-diabetic hyperglycaemia.

Table 5: Number of Halton CCG registered patients known to have non-diabetic hyperglycaemia (or impaired glucose regulation (IGR)), as at February 2018

Practice	Practice population	Number of patients with IGR coded	Patients with HbA1c test recorded in last 12 months and on IGR register	Patients with HbA1c test <u>NOT</u> recorded in last 12 months and on IGR register	Patients with HbA1c test recorded in last 24 months and on IGR register	Patients with HbA1c test <u>NOT</u> recorded in last 24 months and on IGR register
Newtown	7364	378	344	34	375	3
Upton	3631	117	78	39	109	8
Weaver Vale	9116	417	358	59	406	11
Oaks	3365	223	163	60	205	18
Brookvale	8371	741	670	71	728	13
Hough Green	4625	232	155	77	223	9
Appleton	10072	572	455	117	537	35
Murdishaw	7822	552	398	154	521	31
Bevan	14636	901	712	189	854	47
Grove	13692	668	464	204	610	58
Beeches	8197	625	417	208	543	82
Castlefields	12670	793	580	213	740	53
Tower	13219	928	707	221	861	67
Peelhouse	14431	581	344	237	519	62
Totals	131211	7728	5845	1883	7231	497

Source: Halton CCG via St Helens & Knowsley Health Information Service

Since 2014 Halton has offered patients identified as having IGR lifestyles change support via the Health Improvement Team Fresh Start Service^[b]. The Service is commissioned by Halton Borough Council with Health Trainers based in Halton GP practices. Fresh Start offers free sessions for up to 10-weeks with 6-months additional support.

The NHS Health Checks Programme also has a diabetes prevention element and is offered to patients aged 40-74 who are not already diagnosed with a long-term health condition. The simple check takes about 30-minutes and looks for signs of diabetes (and also blood pressure, kidney disease, heart disease, and risk of stroke and dementia).

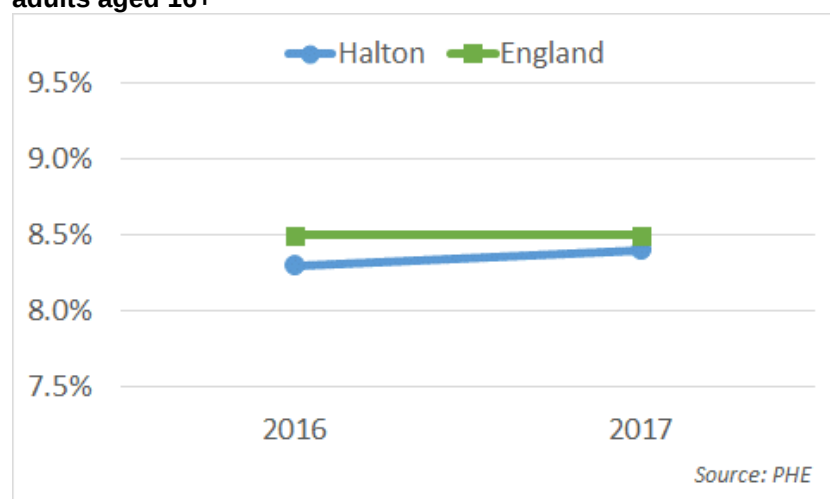
From July 2018 the Health & Care Partnership for Cheshire & Merseyside began roll out of the National Diabetes Prevention Programme (NDPP) 'Healthier You.' This includes provision in Halton in addition to continuation of the existing Health Improvement Team service. It offers sessions both during daytime but also evening and weekends. It is currently commissioned in Halton until July 2020. During this period discussions will be needed with the Cheshire & Merseyside Health & Care Partnership to identify how the work can continue effectively and efficiently across Cheshire and Merseyside.

^b <https://hit.activehalton.co.uk/project/fresh-start-halton-free-weight-loss-programme/>

2.5. Prevalence of diabetes

The Association of Public Health Observatories (now Public Health England (PHE)) estimated that, in 2009, just 70% of Halton people with diabetes had their condition recorded on registers in general practices leaving a potential 2,017 people with undiagnosed diabetes. This has significantly improved since then to nearly 100%. For 2017, PHE figures estimate that in Halton 8.4% of the adult population has diabetes (8,826 people aged 16+).

Figure 3: Estimated total population prevalence of diabetes (diagnosed and undiagnosed), adults aged 16+



There has been a steady increase in the diagnosed prevalence of diabetes since 2009/10. As Figure 4 shows Halton has consistently had a higher diagnosed prevalence than the North West and England. It is not possible to determine the extent to which this difference is due to higher population prevalence (diagnosed and undiagnosed) and to what extent practice and systems in primary care are resulting in better identification locally and hence higher diagnosed prevalence.

Figure 4: Trend in diagnosed diabetes (ages 17+) prevalence 2012/13 to 2017/18

Source: QOF via NHS Digital

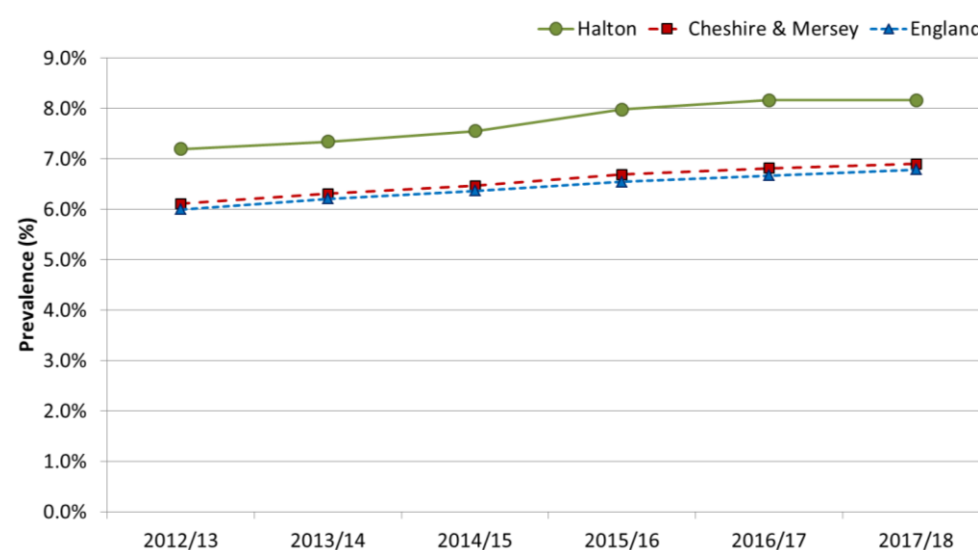
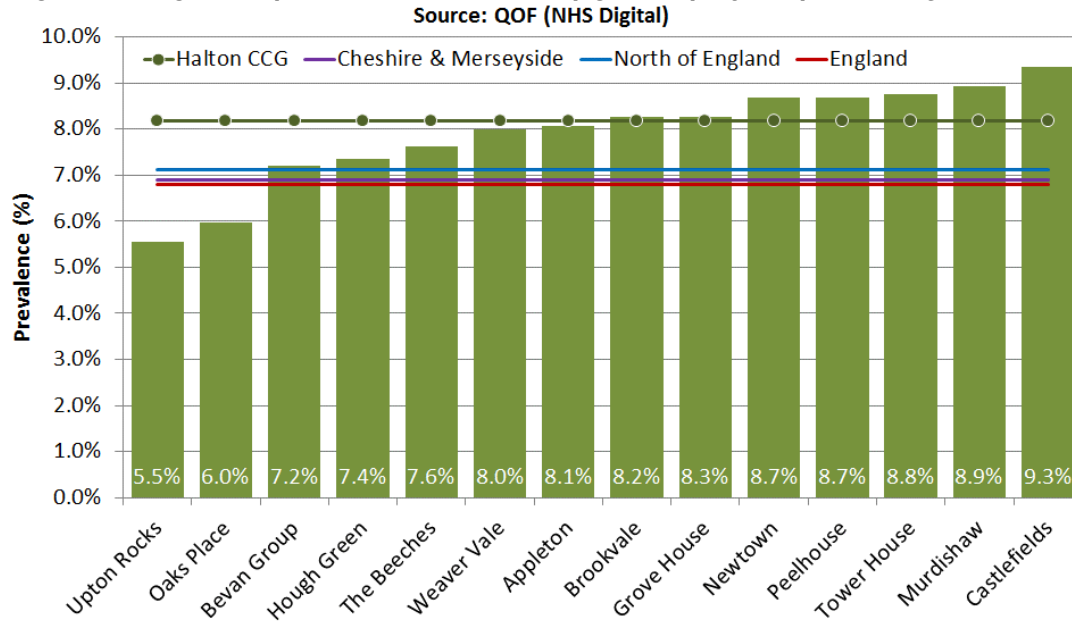


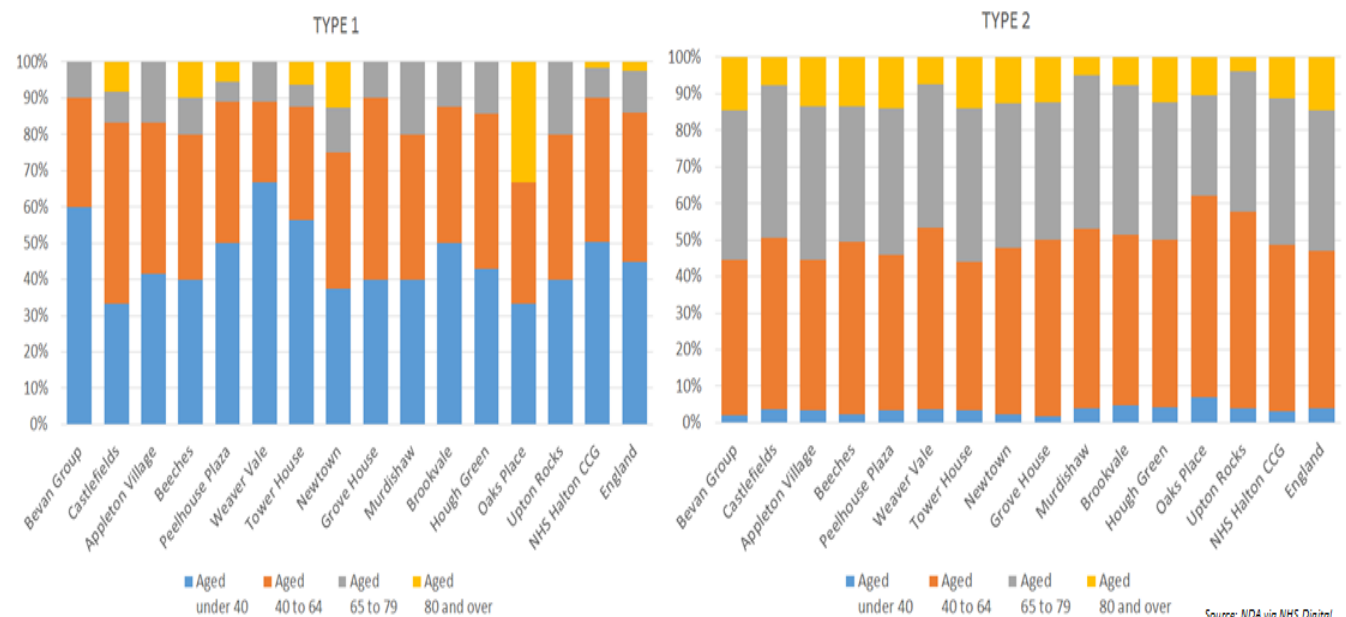
Figure 5: Diagnosed prevalence of diabetes (ages 17+), by GP practice, QOF 2017/18



In the GP practices in Halton, the majority of those who have Type 2 diabetes are aged 40+ - 90%+ in each GP practice. This rings true with all GP practices in Halton, but there is some variation in the proportion of the person's with diabetes population that is aged under 40. Oaks Place practice has 6.9% of it's person's with diabetes population aged under 40, which is over three times higher than the Grove House with 1.9%.

However, with type 1 diabetes, a different pattern emerges. Most people with type 1 diabetes in Halton GP practices are aged under 65, the majority of practices have 80%+ of their patients who are diagnosed with type 1 diabetes, under the age of 65.

Figure 6: Proportionate prevalence of type 1 and type 2 diabetes by age group, GP practice level, 2017/18



2.6. Estimated compared to diagnosed prevalence

PHE estimated prevalence of diabetes amongst CCG populations for 2017 has been compared to the actual prevalence figure for 2017/18 from QOF; illustrated in Table 6. Whilst the first column might indicate Halton has much higher prevalence than England and the other CCGs across Cheshire & Merseyside, the difference column shows that a greater proportion of Halton CCG patients who have diabetes, have been diagnosed, with only a 0.2% difference between the actual prevalence and the estimated. Not only is the Halton actual prevalence the closest to its estimated prevalence, but it is the closest of the 209 CCGs in England.

Table 6: Cheshire and Merseyside actual and estimated prevalence of diabetes^c

Indicator	Diabetes: QOF prevalence 2017/18 (aged 17+)	Estimated Prevalence 2017 (aged 16+)	Difference
England	6.8%	8.5%	-1.7%
NHS Eastern Cheshire CCG	6.2%	8.5%	-2.3%
NHS Halton CCG	8.2%	8.4%	-0.2%
NHS Knowsley CCG	7.6%	8.6%	-1.0%
NHS Liverpool CCG	6.3%	8.1%	-1.8%
NHS South Cheshire CCG	6.9%	8.3%	-1.4%
NHS South Sefton CCG	7.0%	8.9%	-1.9%
NHS Southport and Formby CCG	7.2%	9.5%	-2.3%
NHS St Helens CCG	7.7%	9.0%	-1.3%
NHS Vale Royal CCG	7.2%	8.4%	-1.2%
NHS Warrington CCG	6.7%	7.9%	-1.2%
NHS West Cheshire CCG	6.5%	8.2%	-1.7%
NHS Wirral CCG	7.2%	8.9%	-1.7%

Source: QOF and PHE via PHE Fingertips

2.7. Child and Maternal Prevalence

There is no routinely collected data on child, maternal or gestational diabetes levels at local authority or CCG level. Applying national and regional rates to Halton's population aged under 18 gives an estimate of between **51 to 58** children with diabetes. This will predominantly be Type 1 diabetes, with the peak age for diagnosis of Type 1 diabetes being between 10 and 14 years.^[27]

^c Estimated prevalence is based on those aged 16+ and actual prevalence is based on those aged 17+

Table 7: Estimated number of Halton children with diabetes

Age Group	National prevalence	Halton estimated number
0-4 years	0.027%	2
5-9 years	0.138%	11
10-14 years	0.297%	24
15 years	0.389%	6
16 years	0.409%	6
17 years	0.344%	5
0-17 years	0.207%	58
0-17 years: North West rate	181.3 per 100,000	51

Source: BHF 2013 and ONS 2018

Gestational diabetes, when women cannot produce enough insulin to meet the extra demands of pregnancy, affects about 5% of all pregnancies. Women who are overweight or obese have a higher risk of developing this complication. Studies looking at the risk of developing type 2 diabetes post gestational diabetes have varied considerably in their diagnosis criteria used and follow-up period amongst other things.^[28] Marked heterogeneity across studies of women with previous gestational diabetes with regard to the diagnostic criteria used, duration of follow-up, and cohort demographics limits the ability to compare findings across studies. However, regardless of which criteria are used, a history of gestational diabetes confers a large excess risk of progression to type 2 diabetes in later life, and the risk factors predicting progression remain similar across cohorts.^[29] After the baby is born, 5%-10% of mothers who had gestational diabetes will have type 2 diabetes. Of those this does not happen to, there is a 20%-50% chance of developing type 2 diabetes within 10 years.^[30]

Diabetes in pregnancy, whether pre-existing or gestational, increases the risks of stillbirth, perinatal death and congenital anomaly as well as complications during delivery.^[31] Maternal overweight and/or gestational diabetes affect Caesarean section rates, induction rates and birthweight.^[32] The number of pregnancies complicated by diabetes is increasing because of the increasing prevalence of obesity and Type 2 diabetes in young women. Children born to women who had gestational diabetes are more likely to develop diabetes as well as other problems such as heart disease.^[33] It is therefore important for both the woman and child that the gestational diabetes is managed well^[d] and a healthy lifestyle is adopted.

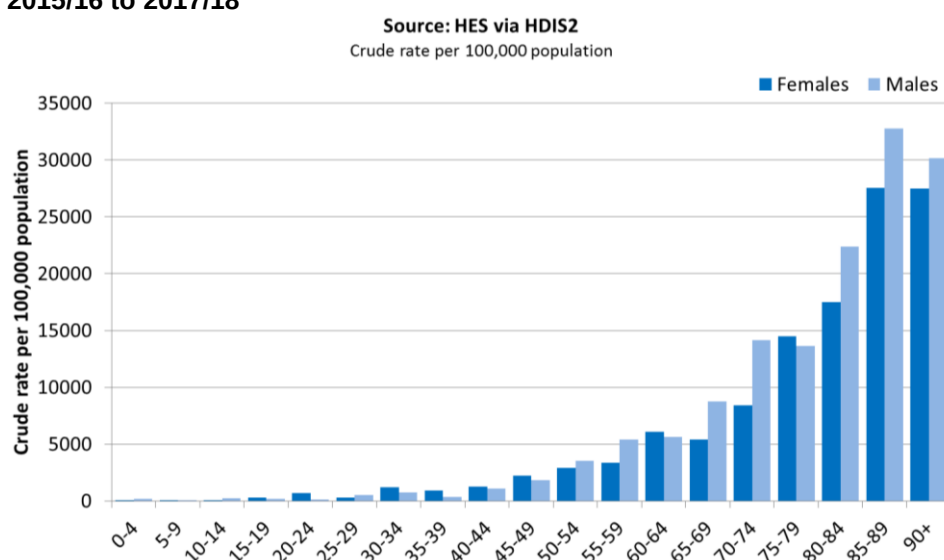
Gestational diabetes is usually diagnosed through a blood test at 24–28 weeks into pregnancy. In 2016 there were around 1,500 maternities to Halton mothers. Based on national rates it can be estimated that about 75 Halton women will develop gestational diabetes in any one year. Whilst no routinely collected data is available to determine the actual number of Halton women of childbearing age (15 to 45 years) with diabetes an audit of primary care data carried out by the Health Informatics Service showed a much higher level, at nearly twice the estimated number. In the 12-month period to February 2018 the number of patients recorded as having gestational diabetes in Halton was 145, or 9.5%. This would need to be repeated regularly to determine if this is an accurate population prevalence or a one-off high rate.

^d See section 3.7 for management of diabetes during pregnancy

2.8. Hospital admissions

The majority of people with diabetes are managed well in primary care and do not require hospital treatment. However, either directly because of a person's diabetes or being admitted with a condition in which diabetes is an important factor in treatment, a person may be admitted to hospital diagnosed with a diabetes related condition.^e Broadly, hospital admissions follow the age and gender profile of diabetes prevalence.

Figure 7: All diabetes-related-emergency admissions split by 5 year age bands and sex, 2015/16 to 2017/18



The rate of admissions varies across the borough with seven electoral wards having rates that are statistically significantly higher (Appleton, Broadheath, Halton lea, Hough Green, Kingsway, Riverside and Windmill Hill) than the borough average and seven having rates that are statistically lower (Beechwood, Birchfield, Daresbury, Farnworth, Hale, Heath and Norton North).

During the time period 2015/16 to 2017/18 there were 14,192 emergency diabetes-related admissions amongst Halton residents. The top 20 primary causes account for 57% of the admissions, each with over 200 admissions during the time period. In terms of primary cause of diabetes-related admissions, Influenza and pneumonia is the top cause, accounting for 9% of the 14,192 admissions, with diseases of the circulatory system being important causes.

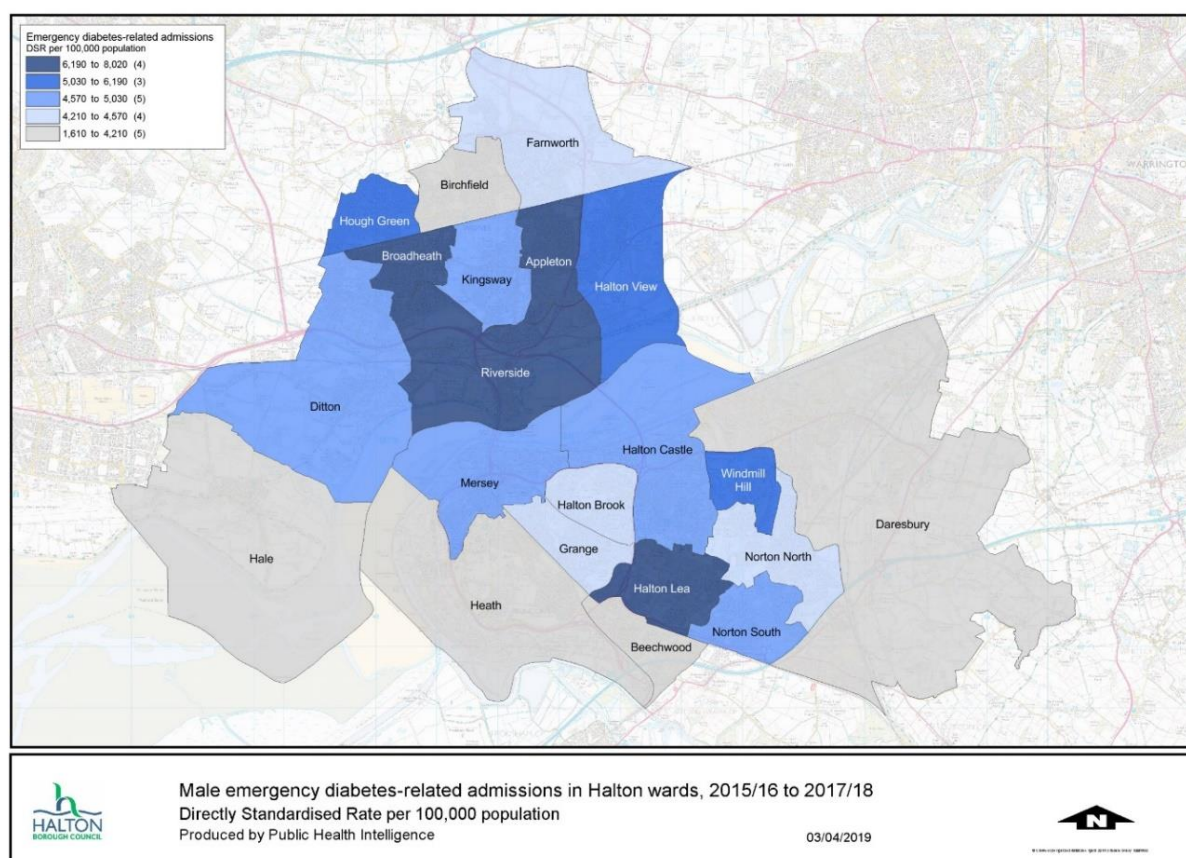
^e Diabetes-related means that a diabetes diagnosis code (ICD-10 code: E10-E14) appeared in the primary or secondary (1-12) cause of admission; Diabetes-specific admissions only include those that have a diabetes diagnosis code (ICD-10 code: E10-E14) in the primary cause of admission

Table 8: Emergency diabetes-related admissions; top 10 primary causes of admission, 2015/16 to 2017/18, Halton resident population

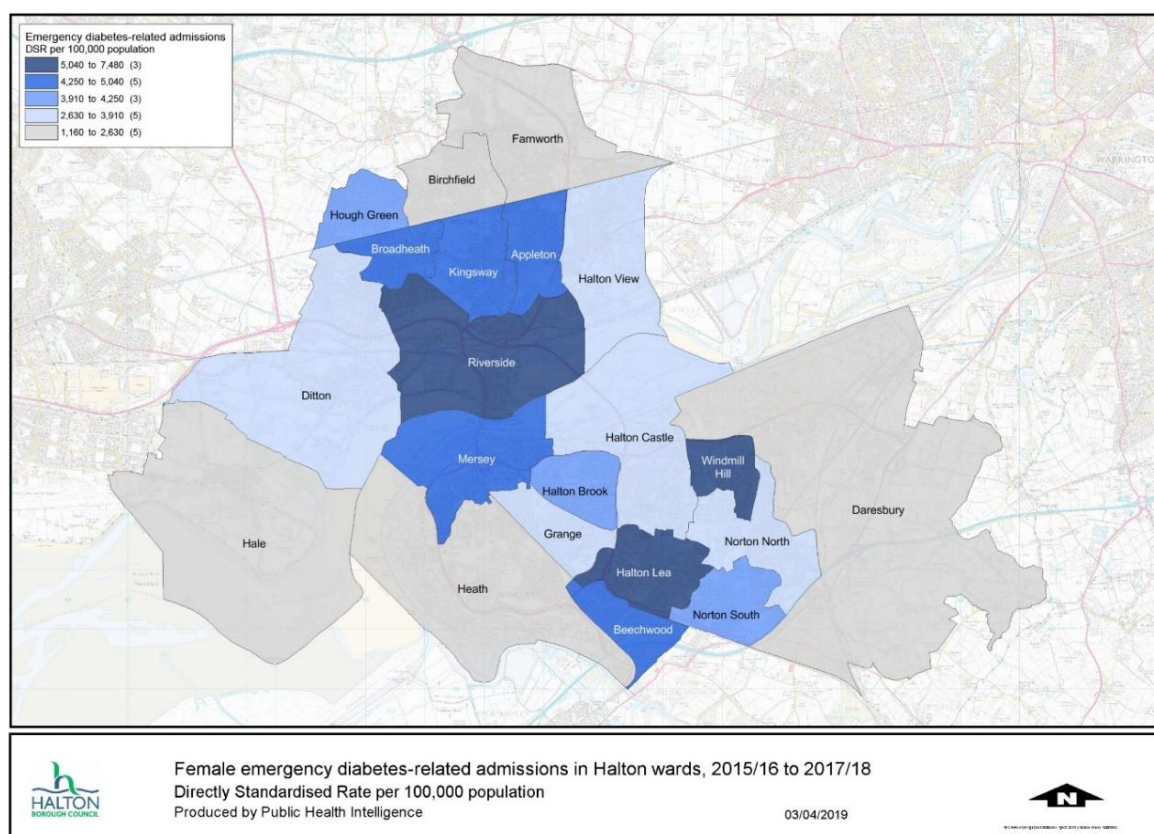
Primary Cause of Admission	Total	% of total
Influenza and pneumonia	1275	9.0%
Other forms of heart disease	830	5.8%
Diabetes mellitus	684	4.8%
Symptoms & signs involving the circulatory & respiratory systems	629	4.4%
Other diseases of urinary system	627	4.4%
Ischaemic heart diseases	605	4.3%
Chronic lower respiratory diseases	538	3.8%
Other sepsis	493	3.5%
Infections of the skin and subcutaneous tissue	439	3.1%
General symptoms and signs	393	2.8%
Grand Total (all causes)	14192	

Source: HES via HDIS2, NHS Digital

This pattern of geographical variation is generally seen for both males and female admission rates, as Maps 1 and 2 show. As seen in Figure 8 rates are higher for males than females. The ward with the highest male specific rate is Riverside and Windmill Hill has the highest female.

Map 1: Emergency diabetes related admissions (all admission methods), 2015/16 to 2017/18 Directly Standardised Rate per 100,000 population, Males

Map 2: Emergency diabetes-related admissions (all admission methods), 2015/16 to 2017/18
Directly Standardised Rate per 100,000 population, Females

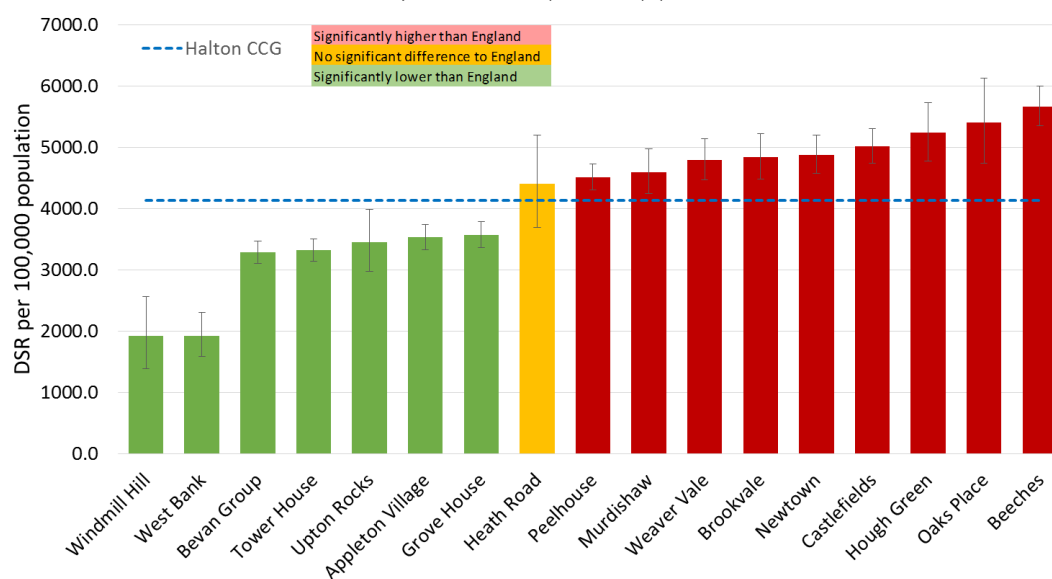


At a GP practice level, rates of admissions due to diabetes-related conditions vary from a directly age standardised rate per 100,000 population of 1916.7 at Windmill Hill practice to 5670.1 at Heath Road practice, with the CCG average being 4,103.6.

Figure 8: Emergency diabetes-related admissions (all admission methods), 2015/16 to 2017/18
Directly Standardised Rate per 100,000 population, GP practice level

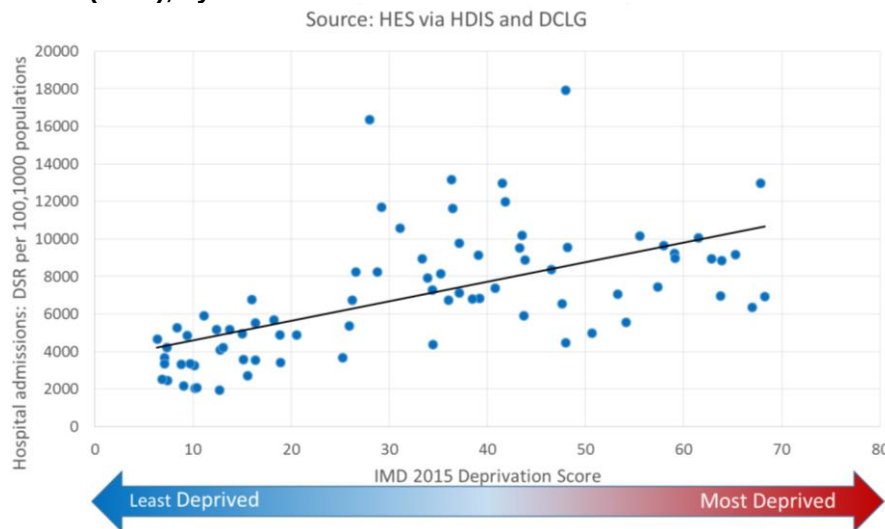
Source: HES via HDIS2, PHE

Directly Standardised Rate per 100,000 population



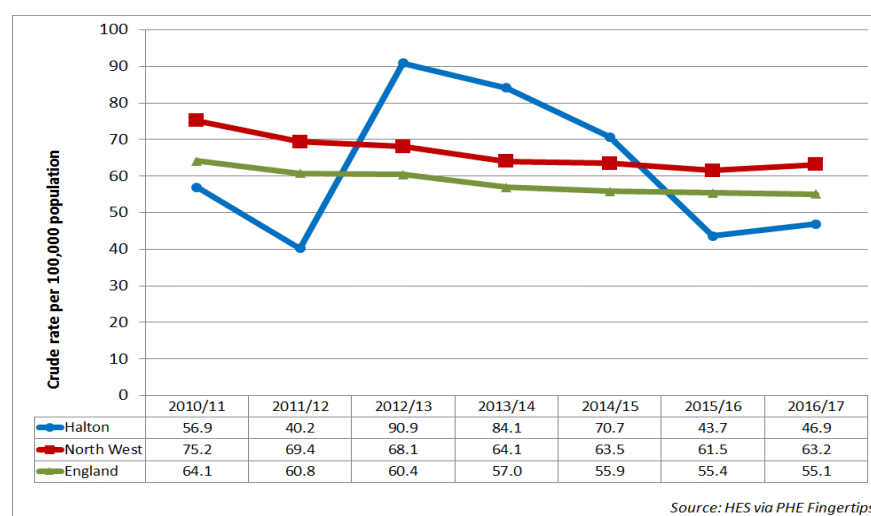
Deprivation is strongly linked to higher levels of obesity, physical inactivity, unhealthy diet and poor mental health. All these are risk factors for diabetes, so it is not surprising that people living in the 20% most deprived neighbourhoods in England are 56% more likely to have diabetes than those living in the least deprived areas.^{[34][35]} Analysis of diabetes related hospital admissions shows that there is a medium-strong strength relationship (correlation of 0.682) between admissions and deprivation. However, deprivation can only explain just under half of the reason for variations in admissions ($r^2 = 0.4646$).

Figure 9: Emergency diabetes related admissions (2015/16 to 2017/18) against deprivation score (2015), by LSOA



Young people with Type 1 diabetes can experience difficulty in achieving good blood glucose control as they go through puberty and their bodies' demands change.^[36] This can lead to hospital admissions for diabetic emergencies and, coupled with the social demands of adolescence and their desire not to be different from their peers, puts young people with Type 1 diabetes at high risk of developing complications.^[37] There is a need to engage with them effectively in developing tailored diabetes services to motivate adolescents to take an active part in their care.

Analysis of admission to hospital amongst children aged 0-18 years of age is provided by the Child and Maternal Intelligence Network 's (CHIMAT) Disease Management Information Toolkit (DMIT).^[38] Data is available for 2010/11 to 2016/17 and shows that until 2012/13 Halton's emergency admission rate for diabetes was lower than that seen in North West or for England as a whole. Though the spike in 2012/13 does not appear to be a unique event, there has been a general downward trend since, which has resulted in such admissions falling below the national and regional levels once more in 2015/16. Despite the higher than comparator rates between 2012/13 to 2014/15 rates have been statistically similar to England and the North West throughout the period.

Figure 10: Trend in emergency admissions for diabetes for children and young people aged under 19 years

2.9. Complications due to diabetes

2.9.1. Foot care

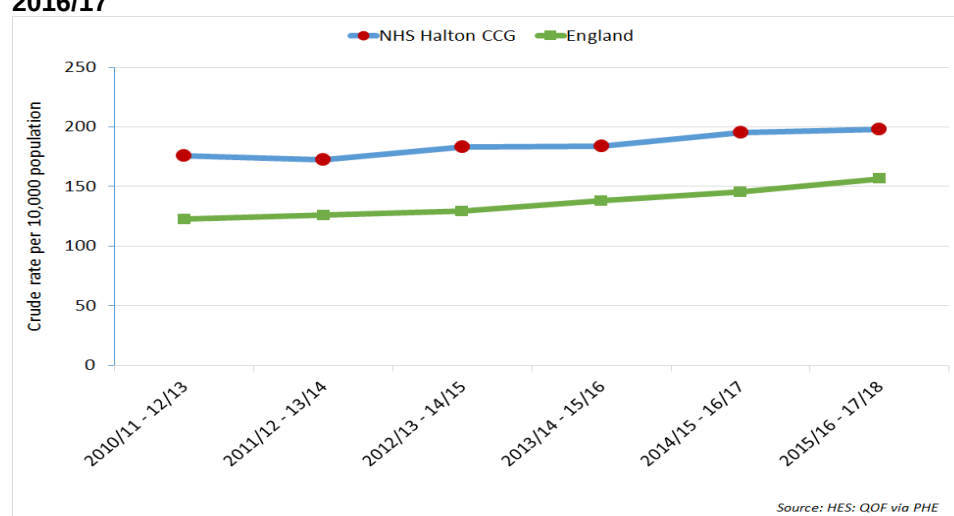
Data on admissions to hospital for diabetic foot disease can be based on a discharge diagnosis (foot, leg or pressure ulcer, cellulitis, osteomyelitis, gangrene or atherosclerosis) or a procedure performed (amputation or debridement of a foot or leg wound).

The National Foot Care Profiles, published by PHE^f, show that, for Halton CCG patients, there have been 502 spells in hospital for diabetic foot disease between 2016/17-2017/18, an increase on the previous reporting period which saw 478 spells between 2014/15 - 2016/17.

Of the 293 patients, 32% had more than one spell over the three years. This equates to a rate of 198.2 (Confidence Intervals: 181.2-216.3) per 10,000 population, a rate that is statistically significantly higher than the England rate of 156.6 (Confidence Intervals: 155.8-157.4), as it has been during the total period 2010/11-2012/13 to 2015/16-2017/18.

Previously, in 2012/13 to 2014/15, the rate of inpatient spells for diabetic foot disease in Halton was 183.2 per 10,000 population-years. This indicates no significant change in the rate of inpatient spells for diabetic foot disease between the periods assessed. In England, there has been a significant increase in the rate of spells between 2012/13 to 2014/15 and the most recent analysis period

^f The full profile can be found at <https://fingertips.phe.org.uk/profile/diabetes-footcare>

Figure 11: Episodes of inpatient care for diabetic foot disease, 2011/12-2013/14 to 2014/15 - 2016/17

During the period 2015/16 to 2017/18, patients from NHS Halton CCG spent a total of 6,305 (an increase on the previous period of 5,654 days) in hospital for diabetic foot disease. The average (median) length of stay for diabetic foot disease, for patients from NHS Halton CCG during 2015/16 to 2017/18, was 7 days. This compares to an England median length of stay of 8 days. The sex and age adjusted mean length of hospital stay for diabetic foot disease - outliers removed (days) was 9.4 compared to England average of 8.9.

Diabetic Lower-Limb Amputations

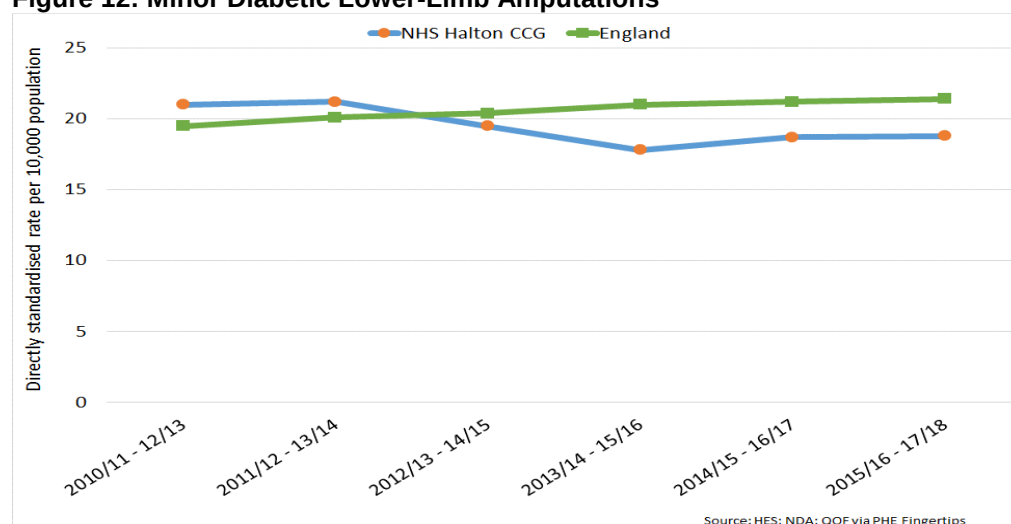
A major lower-limb amputation (above the ankle) can be an adverse outcome of diabetes. The rate at which major amputations occur in a population with diabetes can be used as a good overall proxy measure of the effectiveness of healthcare and the diabetic foot care system. Survival rates and quality of life for patients following a major diabetic lower-limb amputation can often be poor. Unlike a major amputation, a minor amputation can be considered a preventative treatment, e.g. removal of dead tissue with the expectation that healing will follow.

The level of both minor and major amputation in Halton is not statistically different to England.

Minor Diabetic Lower-Limb Amputations

In the most recent period of 2015/16 to 2017/18, there were 62 minor lower-limb amputation procedures carried out on patients with diabetes in NHS Halton CCG. This equates to a directly standardised rate (DSR) of 18.8 minor amputations per 10,000 population-years. This can not be identified as statistically different when benchmarked against the England rate of 21.4.

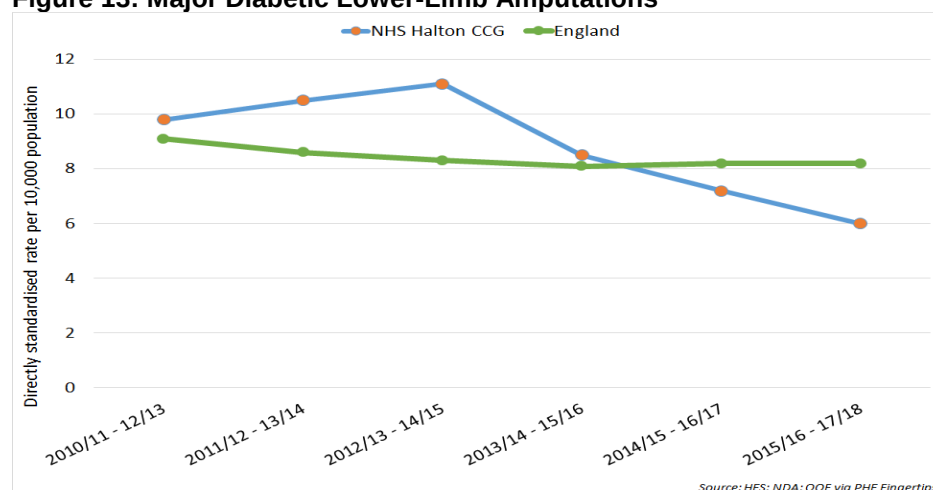
Previously, during 2012/13 to 2014/15, there were 56 minor amputation procedures carried out to patients of NHS Halton CCG giving a DSR of 19.5 per 10,000 population-years. This can not be identified as statistically significant change in the rate of minor amputations between the periods assessed. In England, there has been a statistically significant increase over the same period.

Figure 12: Minor Diabetic Lower-Limb Amputations

Major Diabetic Lower-Limb Amputations

In the most recent period of 2015/16 to 2017/18, there were 17 major lower-limb amputation procedures carried out on patients with diabetes in NHS Halton CCG. This equates to a directly standardised rate (DSR) of 6.0 major amputations per 10,000 population-years. This can not be identified as statistically different when benchmarked to the England rate of 8.2.

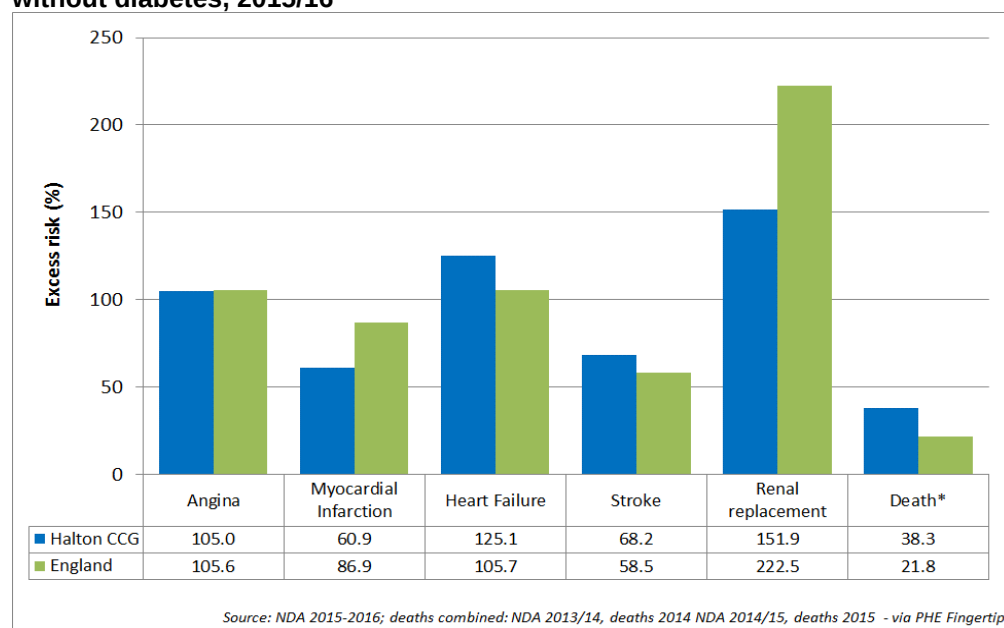
Previously, in 2012/13 to 2014/15, there were 31 major amputation procedures carried out to patients of NHS Halton CCG giving a DSR of 11.1 per 10,000 population-years. This can not be identified as statistically significant change in the rate of major amputations between the periods assessed. In England, there has not been a statistically significant change between the same two periods.

Figure 13: Major Diabetic Lower-Limb Amputations

2.9.2. Other complications

The National Diabetes Audit (NDA) presents findings on key care processes and treatment target achievement rates in all age groups in England and Wales. Whilst 2012/13 audit showed that for Halton CCG the level of complication for person's with diabetes compared to patients without diabetes was generally higher than the England rates, this has changed somewhat by the 2015/16 audit. Whilst, rates remain higher for heart failure, stroke and deaths the level of excess risk is statistically similar to England for all complications.

Figure 14: Level of excess risk of complications between patients with diabetes and patients without diabetes, 2015/16*



2.9.3. Diabetic ketoacidosis and coma

Diabetic ketoacidosis (DKA) is a serious problem that can occur in people with diabetes if their body starts to run out of insulin. It occurs when the body starts breaking down fat at a rate that is much too fast. Ketones are normally produced when the liver breaks down fat after a long time between meals. When ketones are produced too quickly and build up in the blood and urine, they can be toxic by making the blood acidic. This condition is known as ketoacidosis.

DKA happens when the signal from insulin in the body is so low that:

- Glucose (blood sugar) can't go into cells to be used as a fuel source
- The liver makes a huge amount of blood sugar
- Fat is broken down too rapidly for the body to process

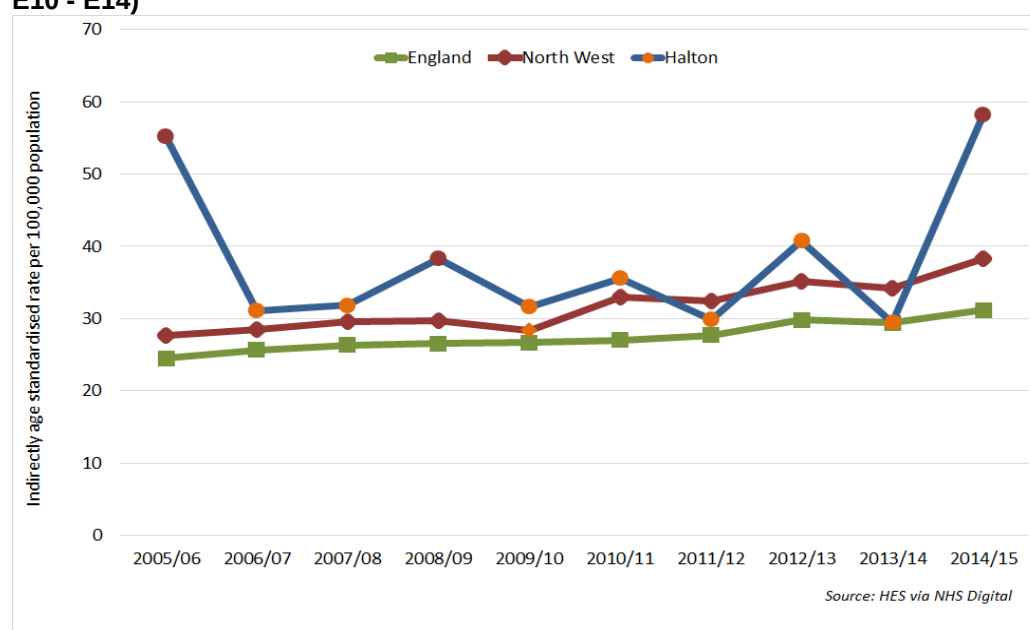
DKA is sometimes the first sign of type 1 diabetes in people who have not yet been diagnosed. It can also occur in someone who has already been diagnosed with type 1 diabetes. Infection, injury, a serious illness, missing doses of insulin shots, or surgery can lead to DKA in people with type 1 diabetes.

People with type 2 diabetes can also develop DKA, but it is less common and less severe. It is usually triggered by prolonged uncontrolled blood sugar, missing doses of medicines, or a severe illness or infection.

In 2014, NHS England set a target to reduce total emergency admissions by 3.5%, 'as a clear indicator of the effectiveness of local health and care services in working better together to support people's health and independence in the community'.⁸ This coincides with a wider government agenda to better manage the demand of emergency admissions in hospitals. Emergency admissions to hospital can be avoided if local systems are put in place firstly to identify those at risk prior to attendance and target primary care services, encourage better diet and exercise, improve self-monitoring and diabetes control and offer better support for patients and carers in the management of diabetes in the home.

Data from 2005/06 ending 2014/15 shows that overall, although Halton had a higher level of hospital admissions due to DKA, it was not statistically significantly different (denoted by amber data points in the chart) apart from 2005/06, 2008/09 and 2014/15 when it was statistically higher (denoted by red data points).

Figure 15: Emergency hospital admissions: diabetic ketoacidosis and coma (ICD 10 codes: E10 - E14)

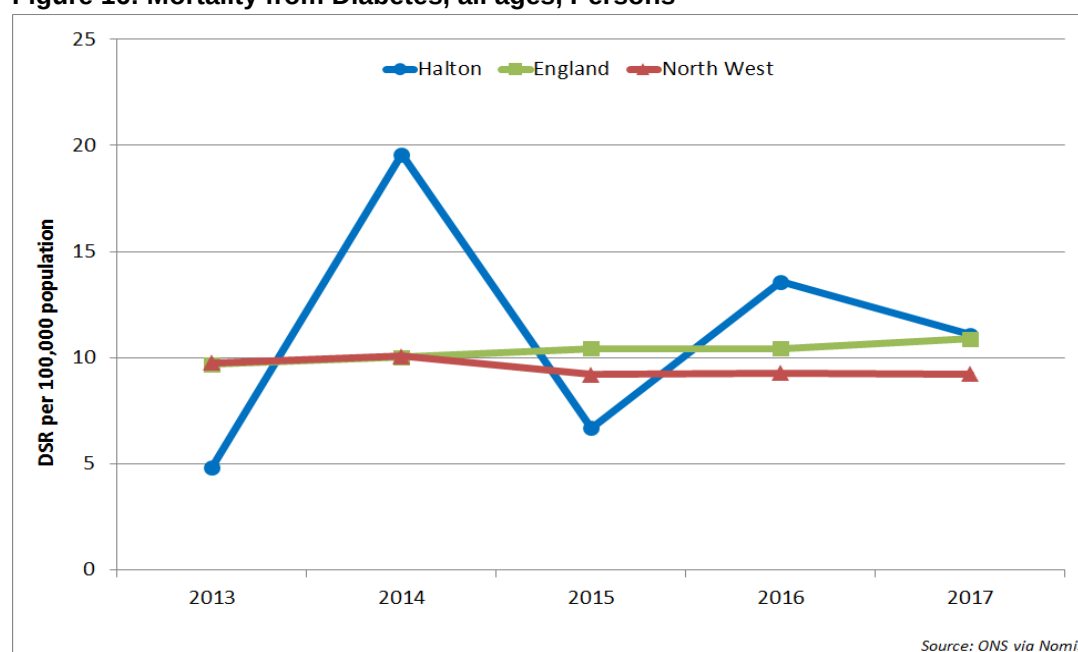


g NHS England, *Better Care Fund – Revised Planning Guidance*, 2014, <http://www.england.nhs.uk/wp-content/uploads/2014/07/bcf-rev-plan-guid.pdf>

2.10. Mortality

Diabetes is a risk factor for cardiovascular disease, the second biggest killer locally. However, as a primary cause of death, rates are low. Small numbers locally result in a fluctuating rate over time but generally Halton's rates have been higher than its comparators over the last decade.

Figure 16: Mortality from Diabetes, all ages, Persons



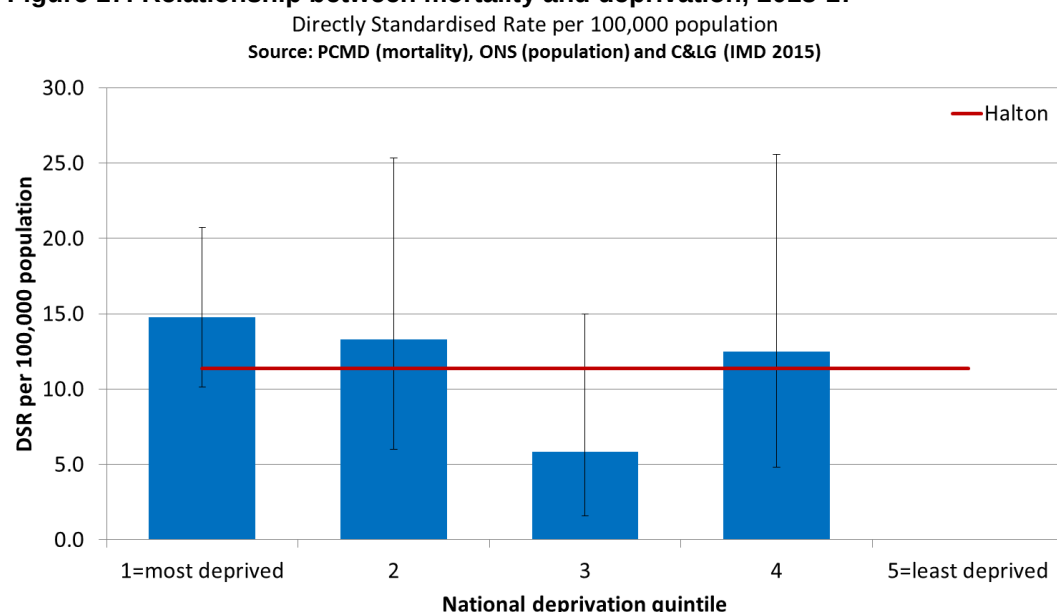
All age mortality from diabetes is higher in Halton than in both the North West and England; more substantially so when compared to the North West. However, the picture is different in 2017 when looking at males and females separately. Due to the small numbers of such deaths in Halton, there can be year-on-year variations in the numbers and therefore rates, of deaths from diabetes. Notwithstanding, the female rate of diabetes deaths is much higher than that of the North West and England, whereas the male rate in Halton is much lower than seen regionally and nationally.

Table 9: Mortality from diabetes (all ages), 2017; age-sex standardised mortality rate per 100,000 population

Area	Males		Females		Persons	
	Number	DSR	Number	DSR	Number	DSR
Halton	5	7.3	8	13.1	12	11.1
North West	328	11.1	302	7.6	630	9.5
England	2812	12.8	2861	9.4	5673	10.9

Source: ONS via NOMIS

For 2013-17, no Halton residents living in the least deprived quintile died from diabetes, whereas residents in the most deprived quintile accounted for the highest rate of deaths (15 deaths per 100,000). With that said, due to the small number of deaths with diabetes as the underlying cause, no significant difference was found across the five deprivation quintiles and the rates themselves for the most (15 per 100,000), second most (13 per 100,000) and second least deprived (12 per 100,000) quintiles were very similar.

Figure 17: Relationship between mortality and deprivation, 2013-17

For 2013-17, Halton residents living in the most deprived quintile were nearly three-times more likely to die with diabetes as a contributory factor, as residents in the least deprived quintile (138 deaths per 100,000 compared with 51 deaths per 100,000). The most deprived quintile had the highest rate of deaths with diabetes as a contributory factor (primary or secondary diagnosis code) of any of the deprivation quintiles.

Diabetes can also be a factor in someone's death, but may not have directly caused the death e.g the underlying cause of death may be coded as cardiovascular disease, with diabetes coded as a secondary diagnosis. Between 2013 and 2017, there were 530 deaths in Halton where diabetes was coded in one of the eight secondary diagnosis fields, which was considerably higher than the 55 deaths where diabetes was the underlying (primary) cause of death.

3. Service provision

3.1. Primary Prevention: Weight Management Services

The Halton Healthy Weight Strategy^[39] outlines a coordinated approach to tackling overweight and obesity in a way that recognises the barriers local people face when trying to practice a healthy diet or undertake regular physical activity, within a wider context of action to tackle health inequalities. The focus on healthy weight rather than obesity reflects intentions to encourage people from an early age to maintain a healthy weight, to minimise the stigma attached to the term obese and encourage people to see their weight in a positive way.

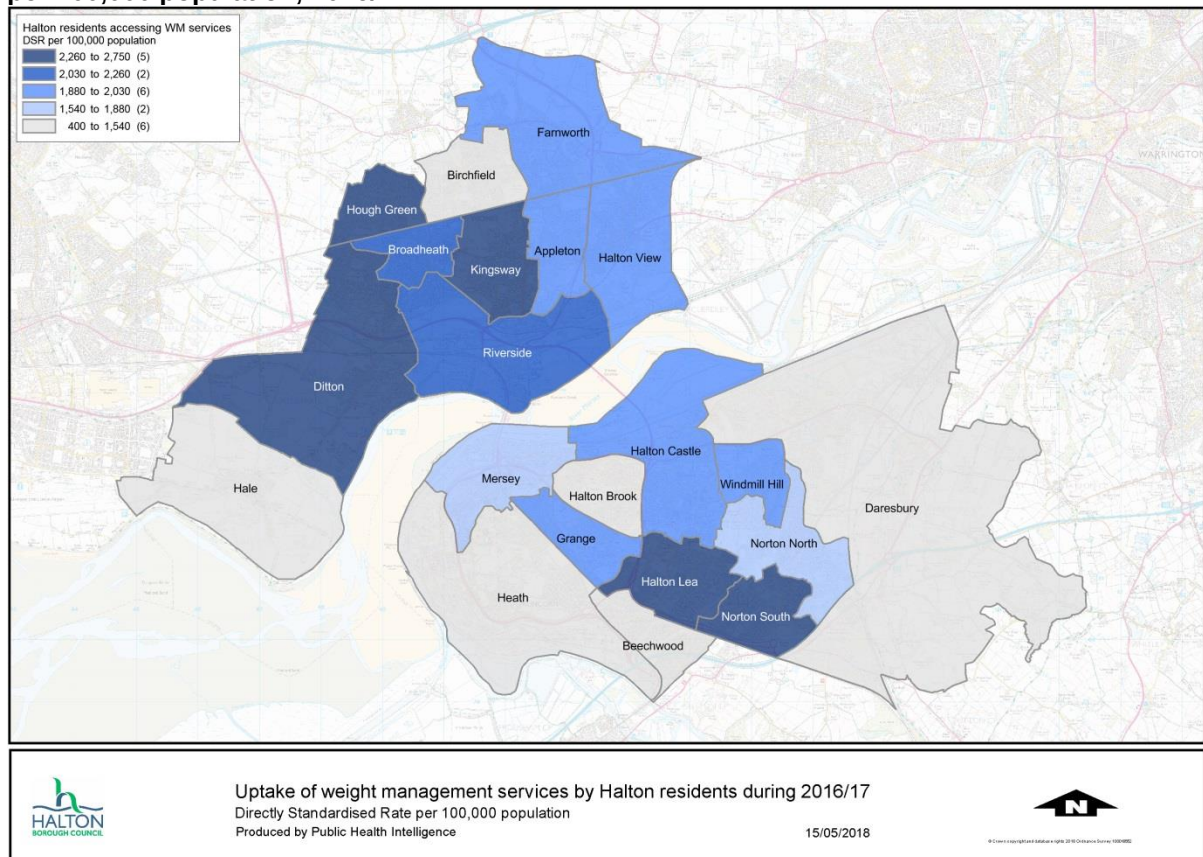
The 2018-2025 Strategy builds on the previous one, using a whole systems approach to tackling obesity.

A whole systems approach has the following characteristics:

- Recognises that obesity is the product of a complex web of interacting and changing causes and influences and as such requires a cross sector approach, not just a public health response
- Combines bringing together all the partners that can have a bearing on obesity with using “systems thinking” to identify the most important factors and make sense of changing dynamics – passage of time, multiple levels, complex influence
- For significant improvements to be made, we need to look at not just the individual contributions of each organisations but also how the whole system works together and can be “more than the sum of its parts”
- Creates a map of moving and interacting drivers and recognises that tackling a single driver in isolation cannot work
- Acknowledges the need for both individual and organisational action
- By moving the interventions upstream, it creates the environment for more effective societal change

For 2016/17 the rate of people accessing the specialist weight management services is higher in the more deprived areas. This has been the case for some time reflecting successful targetting. The areas with higher obesity levels are also those with higher rates of people accessing the NHS weight management services ie Windmill Hill and Norton South. Other areas with high obesity prevalence, Halton Castle, Grange and Halton Lea, also have fairly higher access rates. This demonstrates that the specialist weight management services are reaching the right people.

Map 3: People accessing specialist weight management services, directly standardised rate per 100,000 population, 2016/17



Weight management service outcomes data is based on NICE^[40] and Department of Health^[41] guidance that an effective programme should aim to elicit a 3% to 5% weight reduction in obese adults during a 3 month period. Performance data is not currently available at postcode level so it has not been possible to map local outcomes. There is a rolling programme of people completing the programmes, with data collection at 12 weeks and follow up at 6 months. Clients with complex needs are followed up for 2 years. An audit of client outcomes during August 2014 showed that over half of clients completing the programme had lost 3% of more weight and had made substantial improvements to their health scores including self esteem scores. Due to changes in service and IT issues more recent outcomes data was not available to time of writing this JSNA chapter.

3.2. Early identification: Health Checks Programme

The NHS Health Check Programme is a public health programme for people aged 40-74 which aims to keep people well for longer. It is a risk assessment and management programme which aims to prevent or delay the onset of diabetes, heart and kidney disease and stroke. Together these conditions account for a third of the difference in life expectancy between the most deprived areas and the rest of the country.

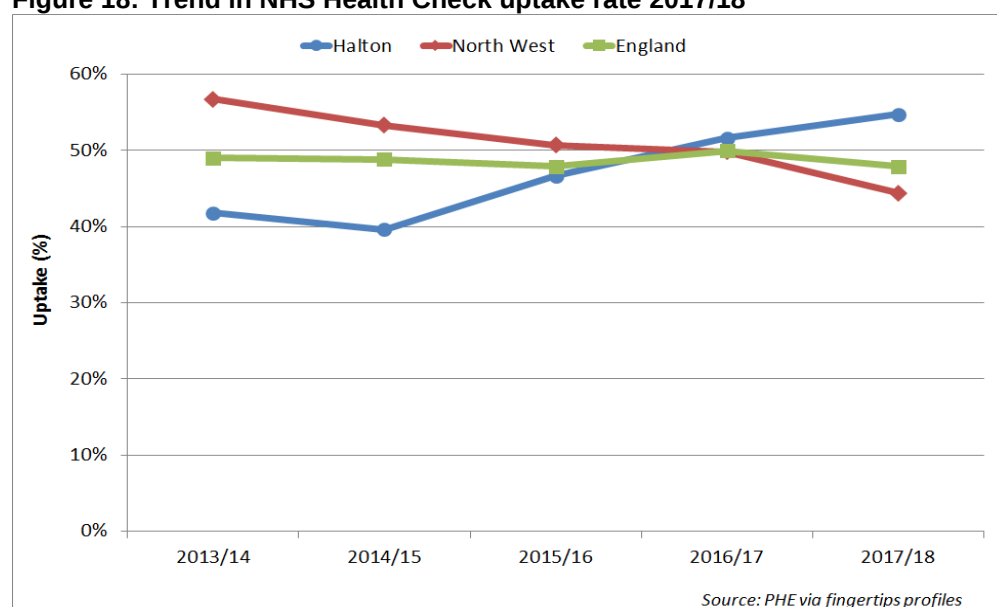
The programme now also aims to reduce levels of alcohol related harm and raise awareness of the signs of dementia and where people can go for help. Everyone attending a NHS Health Check will have their alcohol consumption risk assessed. In addition, people aged 65-74 will be informed of the signs and symptoms of dementia and sign posted to memory clinics if needed.

As the NHS Health Checks Programme is a public health programme aimed at preventing disease, people who have been previously diagnosed with a long term condition are excluded as they should already be being managed and monitored through existing care pathways.

Since 1st April 2013 the provision of NHS Health Checks has been a mandatory requirement for local authority Public Health teams. The Department of Health requires that every person who is eligible for a NHS Health Check be invited every five years.

Since 2014/15 there has been a steady increase in uptake rates in Halton to the point that by 2016/17 local rates were higher than England and the North West; they remained so, increasing further in 2017/18, against falling rates regionally and nationally.

Figure 18: Trend in NHS Health Check uptake rate 2017/18



During 2017/18 there were 3,327 Halton CCG eligible patients had a health check. Of these 3,327 patients, 589 (17.6%) had a CVD risk score of 10% or greater (169; 5.1% had a CVD risk score 20% or greater). 356 (10.7%) had Impaired Glucose Tolerance (IGT) and 353 (10.6%) were hypertensive. Of the 3,327, only 19 (0.6%) had diabetes. Given the success in case finding, it is not surprising that this

figure is low as the estimated versus diagnosed prevalence suggests nearly all people with diabetes have already been found.

Table 10: Outcomes from Health Checks completed for eligible Halton CCG patients, 2017/18^h

Outcome	Number	% of eligible receiving health
Eligible patients receiving a health check	3327	
Diabetes	19	0.6%
CKD 3, 4 or 5	5	0.2%
IGT	356	10.7%
CVD @Risk Score =>20%	169	5.1%
CVD @Risk Score =>10%	586	17.6%
Hypertension	353	10.6%

Source: Health Checks Performance Monitoring, PHE

3.3. Management of Diabetes in Primary Care

Most diabetes care in Halton is delivered by general practices, with secondary care providing specialist services for people with complex Type 1 and Type 2 diabetes, pregnant women with diabetes, complications of diabetes and children and young people with diabetes. This approach supports care planning consultations in which each patient has a session to jointly plan their care for the following year and tailor it to their individual needs and circumstance.

Management of people with diabetes in primary care is carried out as part of the Quality Outcomes framework (QOF). There are 10 indicators, or care processes, within QOF.

Table 11: List of care processes for Diabetes Mellitus, 2017/18 QOF

Indicator	Description
DM002	The percentage of patients with diabetes, on the register, in whom the last blood pressure reading (measured in the preceding 12 months) is 150/90 mmHg or less
DM003	The percentage of patients with diabetes, on the register, in whom the last blood pressure reading (measured in the preceding 12 months) is 140/80 mmHg or less
DM004	The percentage of patients with diabetes, on the register, whose last measured total cholesterol (measured within the preceding 12 months) is 5 mmol/l or less
DM006	The percentage of patients with diabetes, on the register, with a diagnosis of nephropathy (clinical proteinuria) or micro-albuminuria who are currently treated with an ACE-I (or ARBs)
DM007	The percentage of patients with diabetes, on the register, in whom the last IFCC-HbA1c is 59 mmol/mol or less in the preceding 12 months
DM008	The percentage of patients with diabetes, on the register, in whom the last IFCC-HbA1c is 64 mmol/mol or less in the preceding 12 months
DM009	The percentage of patients with diabetes, on the register, in whom the last IFCC-HbA1c is 75 mmol/mol or less in the preceding 12 months
DM0012	The percentage of patients with diabetes, on the register, with a record of a foot examination and risk classification: 1) low risk (normal sensation, palpable pulses), 2) increased risk (neuropathy or absent pulses), 3) high risk (neuropathy or absent pulses plus deformity or skin changes in previous ulcer) or 4) ulcerated foot within the preceding 12 months
DM0014	The percentage of patients newly diagnosed with diabetes, on the register, in the preceding 1 April to 31 March who have a record of being referred to a structured education programme within 9 months after entry on to the diabetes register
DM0018	The percentage of patients with diabetes, on the register, who have had influenza immunisation in the preceding 1 August to 31 March

^h There may be some overlap with some people having multiple outcomes, so caution is advised in interpretation of these figures

Table 12: Percentage of patients receiving intervention, 2017/18 QOF

Practice code	Practice name	DM002: BP 150/90mmHg or less	DM003: BP 140/80 mmHg or less	DM004: cholesterol 5mmol/l or less	DM006: ACE-I (or ARBs)	DM007: HbA1c 59 mmol/mol or less	DM008: HbA1c 64 mmol/mol or less	DM009: HbA1c 75 mmol/mol or less	DM012: foot exam	DM014: structured education	DM018: flu imms
N81011	BEVAN GROUP PRACTICE	94.81	86.66	67.41	81.40	60.45	69.66	82.41	86.07	82.22	73.55
N81019	CASTLEFIELDS HEALTH CENTRE	89.31	79.16	70.30	80.77	56.59	66.74	79.59	84.56	93.62	76.13
N81035	APPLETON VILLAGE SURGERY	86.08	66.62	70.96	60.87	59.58	68.71	80.39	89.52	95.24	78.29
N81037	THE BEECHES MEDICAL CTR	78.37	48.21	63.49	91.67	57.74	65.28	76.59	82.34	90.32	65.87
N81045	PEELHOUSE MEDICAL PLAZA	90.77	81.14	64.05	65.85	55.50	63.75	74.36	87.13	51.43	76.42
N81054	WEAVER VALE PRACTICE	84.52	73.04	69.57	74.47	59.30	66.26	77.74	77.39	95.45	72.52
N81057	TOWER HOUSE PRACTICE	85.71	69.63	65.61	75.00	60.21	68.15	78.62	79.15	94.44	73.65
N81064	NEWTOWN SURGERY	85.86	74.30	76.29	77.42	68.73	76.29	84.46	83.47	64.71	70.72
N81066	GROVE HOUSE PRACTICE	85.61	70.02	69.81	70.27	61.15	69.59	79.00	82.90	86.54	76.84
N81072	MURDISHAW	90.35	71.99	65.86	68.97	60.11	67.35	77.55	91.28	90.91	75.32
N81096	BROOKVALE PRACTICE	90.43	79.74	74.86	81.03	60.23	68.67	79.36	85.18	96.30	78.42
N81119	HOUGH GREEN HEALTH PARK	85.23	65.15	63.64	66.67	47.73	53.41	66.29	55.68	87.50	76.52
N81619	OAKS PLACE SURGERY	93.46	83.01	67.97	100.00	59.48	67.32	78.43	91.50	90.00	72.55
N81651	UPTON ROCKS PRIMARY CARE	89.17	83.44	68.79	85.71	64.33	70.70	82.80	89.81	100.00	74.52
	HALTON CCG	87.89	73.90	68.38	76.78	59.30	67.56	78.61	83.74	85.51	74.73
	CHESHIRE & MERSEYSIDE	86.45	72.28	69.17	78.54	62.24	69.63	79.79	78.63	74.08	77.19
	NORTH OF ENGLAND	86.69	71.41	69.33	79.63	61.23	69.20	80.23	80.16	67.72	76.82
	ENGLAND	86.10	70.07	69.25	79.60	60.28	68.37	79.44	81.20	70.92	75.45

Source: QOF via NHS Digital

Table 13: Exception rates, 2017/18 QOF

Practice code	Practice name	DM002: BP 150/90mmHg or less	DM003: BP 140/80 mmHg or less	DM004: cholesterol 5mmol/l or less	DM006: ACE-I (or ARBs)	DM007: HbA1c 59 mmol/mol or less	DM008: HbA1c 64 mmol/mol or less	DM009: HbA1c 75 mmol/mol or less	DM012: foot exam	DM014: structured education	DM018: flu imms
N81011	BEVAN GROUP PRACTICE	1.30	2.83	16.06	16.28	26.21	19.83	11.10	6.02	15.56	24.91
N81019	CASTLEFIELDS HEALTH CENTRE	4.97	6.80	11.23	19.23	14.04	12.85	8.96	7.45	2.13	23.43
N81035	APPLETON VILLAGE SURGERY	8.08	15.42	22.60	39.13	23.80	20.36	14.97	7.78	0.00	19.46
N81037	THE BEECHES MEDICAL CTR	6.55	9.92	15.28	8.33	16.27	14.29	11.90	7.34	6.45	23.81
N81045	PEELHOUSE MEDICAL PLAZA	2.95	4.13	21.02	34.15	34.77	28.00	19.35	4.13	48.57	19.94
N81054	WEAVER VALE PRACTICE	6.09	7.13	10.96	23.40	14.09	13.22	10.43	8.87	4.55	24.87
N81057	TOWER HOUSE PRACTICE	7.30	16.51	16.51	22.22	20.74	18.31	14.18	8.36	2.78	24.23
N81064	NEWTOWN SURGERY	1.00	2.59	5.18	16.13	2.79	1.99	1.39	3.59	32.35	17.53
N81066	GROVE HOUSE PRACTICE	7.90	12.34	16.88	29.73	21.54	18.29	13.96	11.90	11.54	20.24
N81072	MURDISHAW	0.56	2.23	7.05	10.34	13.17	11.32	9.46	1.67	9.09	23.93
N81096	BROOKVALE PRACTICE	3.94	5.82	9.94	17.24	20.45	17.82	13.88	7.50	0.00	21.39
N81119	HOUGH GREEN HEALTH PARK	4.92	9.09	13.64	16.67	15.15	14.02	9.85	28.79	12.50	22.73
N81619	OAKS PLACE SURGERY	3.92	10.46	15.69	0.00	26.80	23.53	15.69	3.27	10.00	24.18
N81651	UPTON ROCKS PRIMARY CARE	5.10	6.37	17.20	14.29	27.39	22.93	14.65	5.73	0.00	23.57
	HALTON CCG	4.76	8.17	14.74	20.29	20.35	17.22	12.41	7.57	12.32	22.27
	CHESHIRE & MERSEYSIDE	5.97	9.44	14.57	16.94	16.23	14.04	10.66	11.23	21.57	19.65
	NORTH OF ENGLAND	5.64	9.39	14.19	14.78	15.43	13.23	9.69	9.53	28.10	20.02
	ENGLAND	5.84	9.78	13.51	14.26	15.33	13.19	9.77	8.73	24.04	20.86

Source: QOF via NHS Digital

Blood glucose (HbA1c) is a marker of long-term control of diabetes. Better control leads to fewer complications in patients with both insulin dependent and non-insulin dependent diabetes. There are three target levels for HbA1c that are designed to provide an incentive to improve glycaemic control across the distribution of HbA1c values. Compared to Cheshire & Merseyside, North of England and England overall, Halton CCG had a slightly lower proportion of patients with diabetes who achieved at all three levels meaning that blood glucose of Halton patients with diabetes is slightly less well managed across the borough than comparators.

Vascular disease is a common complication of diabetes. Control of risk factors including serum cholesterol is associated with a reduction in vascular risk. The proportion of patients with diabetes whose last measured total cholesterol level (measured in the previous 15 months) was five mmol/l or less is recorded as part of QOF. Of the comparators Halton had a lower proportion of patients

with diabetes (72.55%) whose last measured total cholesterol level was 5 mmol/l in the last 15 months than comparators.

Hypertension (high blood pressure) is associated with an increased risk of many complications of diabetes including coronary heart disease. Reducing hypertension in people with diabetes reduces the risk of macro vascular and micro vascular disease. QOF records the proportion of patients with diabetes mellitus whose last blood pressure reading measured in the previous 15 months was:

- 1) 150/90 mmHg or less and
- 2) 140/80 mmHg or less.

Halton had higher percentages achieving both these levels than comparators. This is no doubt, at least in part, due to the local and Cheshire & Merseyside public health network programme to address hypertension.

People with diabetes are at high risk of foot complications. Inspection for vasculopathy is needed to detect problems. People with diabetes who have foot problems are likely to benefit from referral to specialist diabetic chiropody services. Nearly 84% of Halton people with diabetes have a record of foot examination and risk classification which was higher than all comparators.

All people with diabetes aged 12 years and over should receive all of the NICE recommended care processes and attend a structured education programme shortly after diagnosis. Diabetes UK's 2013^[42] report found that people who live in the best performing Clinical Commissioning Group (CCG) area are four times more likely to be given eight of the vital health checks recommended by NICE as compared to people living in the worst performing area. This geographical variation has a direct effect on clinical outcomes for people with diabetes. The National Diabetes Audit (NDA) presents key findings on care processes and treatment target achievement rates from 2017/18 in all age groups in England and Wales.

Table 14: 8 NICE recommended diabetes care processes,ⁱ NDA

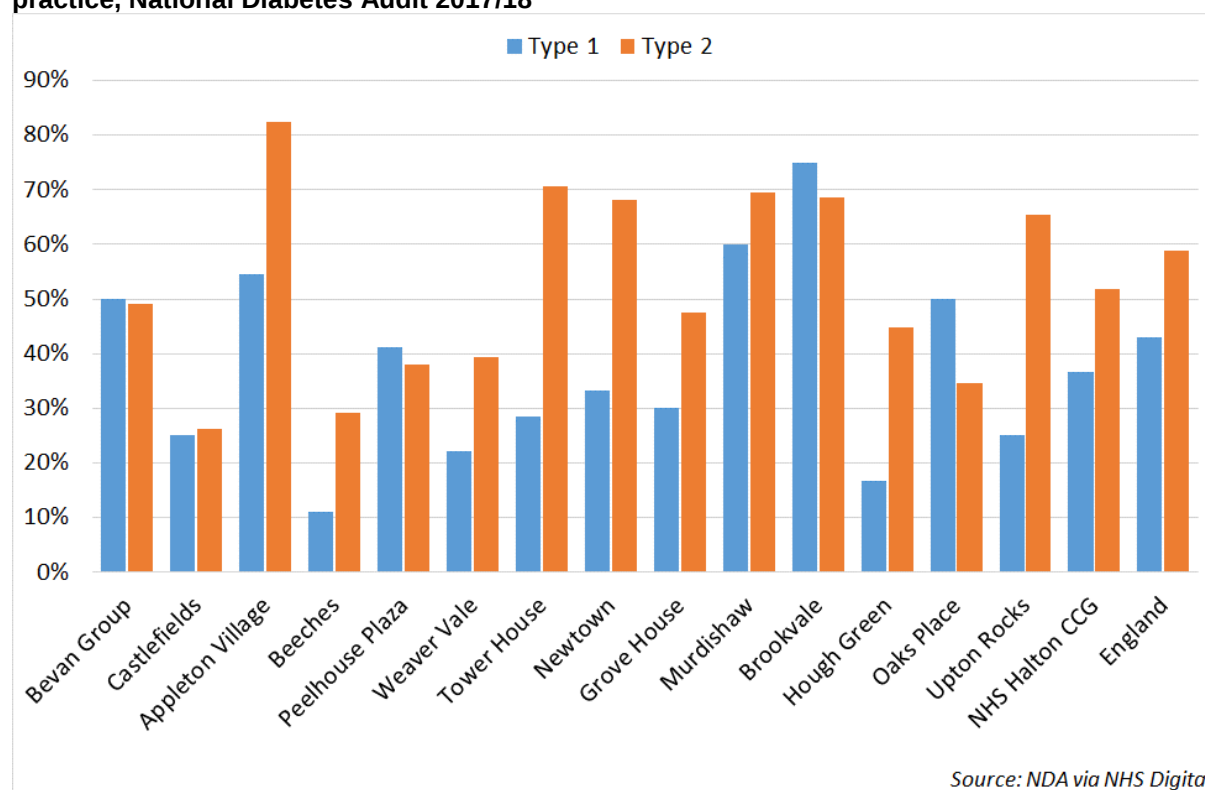
No:	8 care checks
1	HbA1c (mmol/mol)
2	Blood Pressure (mmHg)
3	Cholesterol (mmol/L)
4	Smoking status
5	Weight
6	Urinary Albumin
7	Serum Creatinine
8	Foot Screening

Source: NHS Digital

ⁱ note Eye Screening is also a NICE recommended care process but is not included in the NDA as the data management system on which screening outcome is recorded cannot currently be exported to the NDA

There was substantial variation at a GP practice level receiving all 8 care processes. For Type 1 patients it ranged from 11.1% to 75% and for Type 2 patients the range was 26.3% to 82.4%.

Figure 19: Percentage of patients receiving all 8 care processes, by diabetes type, by GP practice, National Diabetes Audit 2017/18



There are also 3 NICE treatment targets for HbA1c, blood pressure and cholesterol levels.

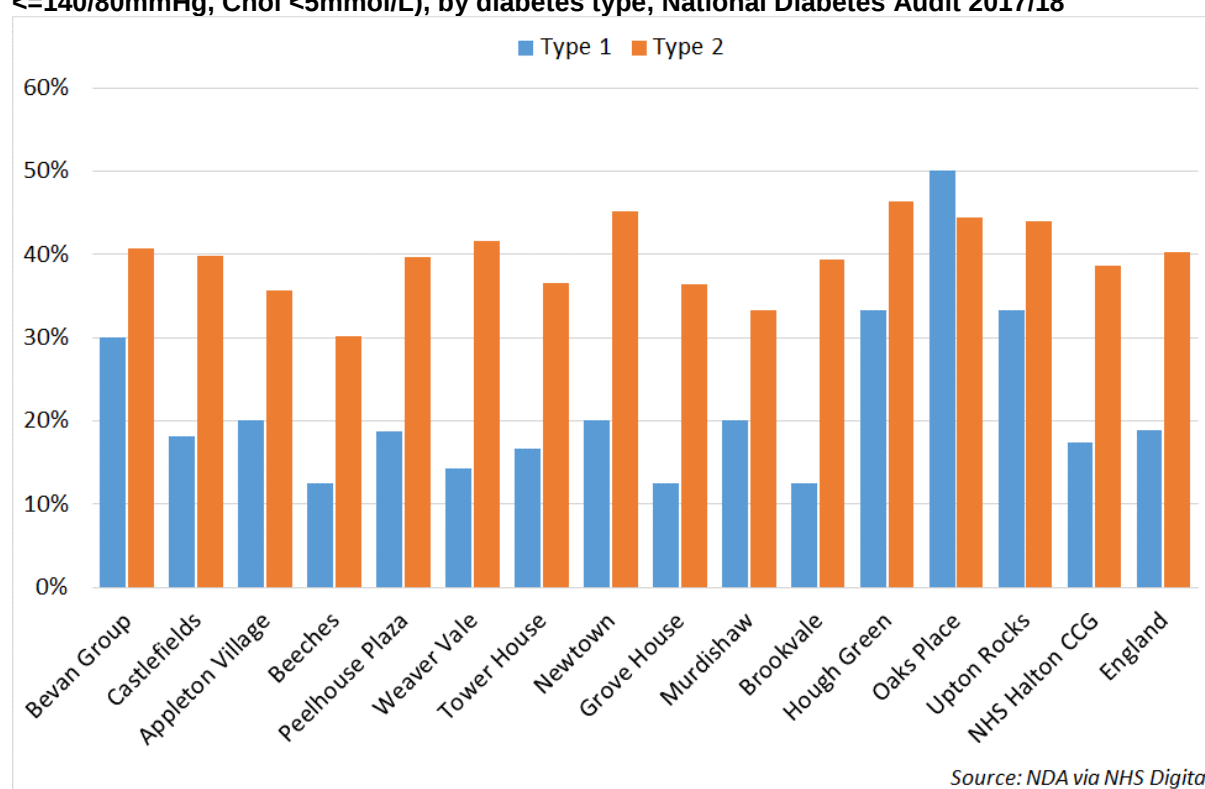
Table 15: 3 diabetes treatment targets

	3 NICE recommended Treatment Targets	NDA	QOF
HbA1c	<=58mmol/mol	HbA1c 48, 58, 86 <=mmol/mol	HbA1c 59, 64, 75 <=mmol/mol (DM007, DM008, DM009).
Blood Pressure	<=140/80mmHg	<=140/80mmHg	<=140/80mmHg (DM003) <=150/90mmHg (DM002)
Cholesterol	<=5mmol/L	<=4mmol/L <=5mmol/L	<=5mmol/L (DM004)

Source: NHS Digital

Again, there is substantial GP practice level variation, although the CCG as a whole performs at a similar level to England. For Type 1 patients this varied from 12.5% to 50% and for Type 2 patients from 30.1% to 46.3%.

Figure 20: Percentage of patients receiving all 3 treatment targets (HbA1c $\leq$ 58mmol/mol, BP $\leq$ 140/80mmHg, Chol $<$ 5mmol/L), by diabetes type, National Diabetes Audit 2017/18



3.4. Foot care

Good podiatry and footcare services are essential to for people with diabetes. They are at risk of damage to the nerves including the lower limbs and this can lead to loss of sensation in the feet predisposing them to the development of foot ulcers and lower limb amputation. For this reason:

- All patients with diabetes are offered an annual foot examination by a trained health care professional (part of annual review within QOF)
- Patients classed as 'at risk' should be seen at least every 6 months by a Podiatrist (NICE)
- Patients classed as 'high risk' should be seen at least every 3 months by a Podiatrist (NICE)
- Patients developing a new acute problem should have access to the Diabetes foot team within 24hours (NICE)

As seen in section 2.9.1. Halton has a lower level of major and minor lower limb amputations compared to England. QOF data showed Halton has a higher percentage of patients with diabetes receiving a foot examination annually, with all but three practices achieving levels above England. However, exception rates for the examination did vary considerably. Data from the National Diabetes Audit (NDA) is broken down in to those receiving care processes who have Type 1 diabetes and those who have Type 2 diabetes. 2017/18 data shows that amongst those with Type 1 diabetes, those receiving a foot examination and risk assessment varied from 50% to 100%. Amongst those with Type 2 diabetes the levels varied from 71.4% to 94.1%. Whilst the variation appears much more marked for those with Type 1 diabetes, small numbers at some practices may be skewing this

apparent variation. For Type 1 diabetes, levels receiving a foot examination were slightly lower than England but they were higher than national level for Type 2 diabetes.

Table 16: Foot examination by type of diabetes, GP practice level, 2017/18

Code	Name	Type 1				Type 2			
		Percentage Receiving	Ratio to expected			Percentage Receiving	Ratio to expected		
			Observed	Expected	Standardised rate		Observed	Expected	Standardised rate
N81011	Bevan Group	88.9	40	34	1.18	91.4	690	659	1.05
N81019	Castlefields	81.8	45	43	1.04	91.0	760	747	1.02
N81035	Appleton Village	90.9	50	40	1.26	94.1	560	514	1.09
N81037	Beeches	87.5	35	31	1.14	87.6	390	382	1.02
N81045	Peelhouse Plaza	81.3	65	59	1.11	91.6	820	754	1.09
N81054	Weaver Vale	44.4	20	27	0.74	83.2	445	462	0.96
N81057	Tower House	50.0	35	44	0.79	88.2	750	714	1.05
N81064	Newtown	66.7	20	21	0.96	87.5	385	378	1.02
N81066	Grove House	66.7	30	34	0.88	86.3	690	696	0.99
N81072	Murdishaw	100.0	25	17	1.47	94.1	480	431	1.11
N81096	Brookvale	85.7	30	30	1.01	89.2	455	454	1.00
N81119	Hough Green	60.0	15	19	0.79	71.4	175	207	0.85
N81619	Oaks Place	100.0	10	8	1.31	93.1	135	131	1.03
N81651	Upton Rocks	75.0	15	15	0.98	92.3	120	120	1.00
NHS Halton	NHS Halton CCG	74.1	430	421	1.02	89.1	6,855	6,648	1.03
England	England	75.1				86.8			

Source: NDA 2017/18 via NHS Digital

3.5. Eye screening

Diabetic eye screening is a key part of diabetes care. People with diabetes are at risk of damage from diabetic retinopathy, a condition that can lead to sight loss if it's not treated. Indeed it is one of the most common causes of sight loss among people of working age.

It occurs when diabetes affects small blood vessels, damaging the part of the eye called the retina. People with diabetes should also see their optician every two years for a regular eye test. The regular eyesight test is available free to those with diabetes for this reason.

Why eye screening is needed

Screening is a way of detecting the condition early before the person notices any changes to their vision. This is important as diabetic retinopathy doesn't usually cause any noticeable symptoms in the early stages.

If retinopathy is detected early enough, treatment can stop it getting worse. Otherwise, by the time symptoms become noticeable, it can be much more difficult to treat. This is why the NHS Diabetic Eye Screening Programme was introduced. Everyone aged 12 and over with diabetes is offered screening once a year. Diabetic retinopathy is extremely unusual in children with diabetes who are under the age of 12.

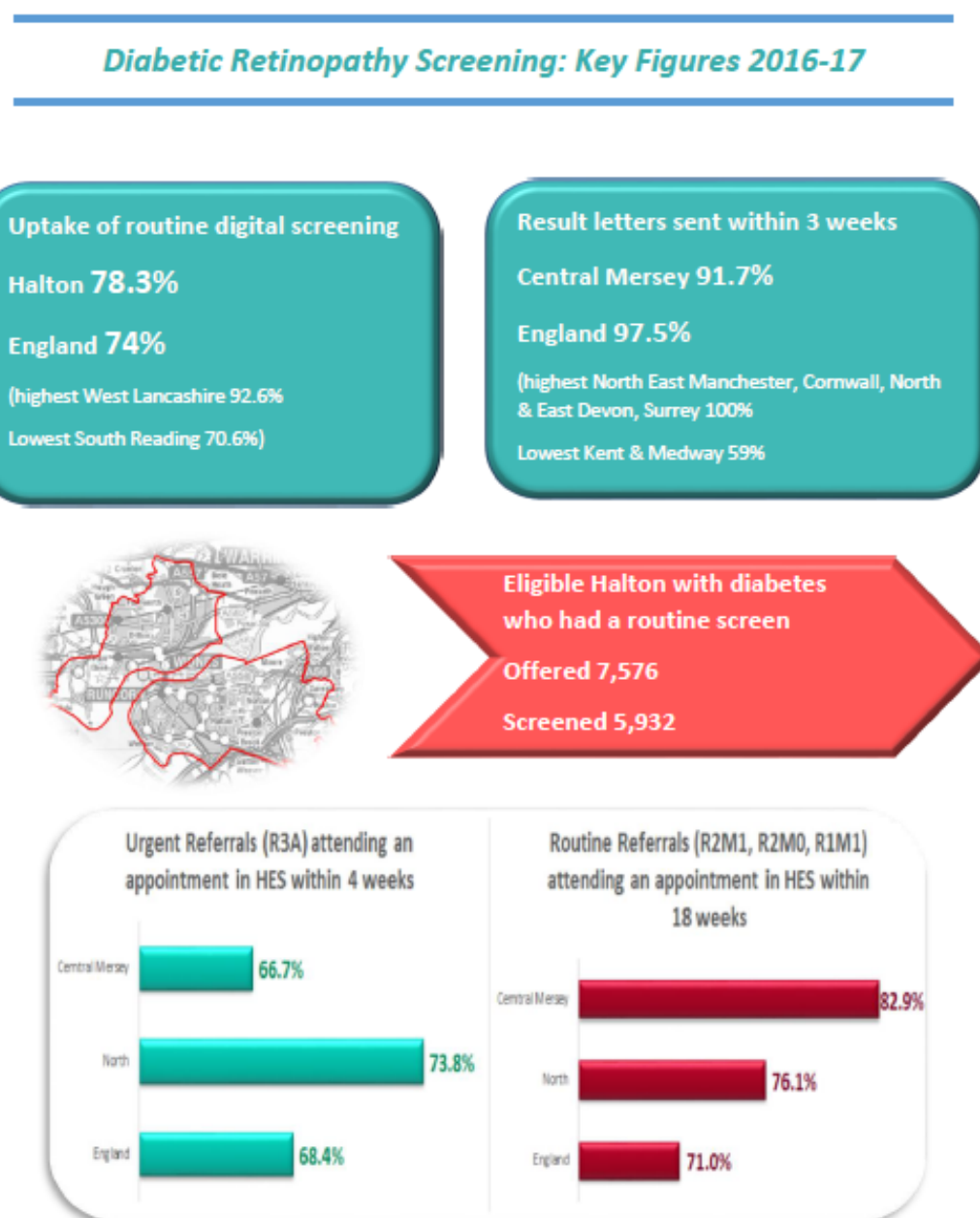
Diabetic eye screening in pregnancy

If a woman with diabetes becomes pregnant, she will be offered additional tests for diabetic retinopathy at or soon after the first antenatal clinic visit, and after 28 weeks of pregnancy. If the early stages of retinopathy are found at the first screening, another test is offered between 16 and

20 weeks of pregnancy. Pregnant women who develop gestational diabetes are not offered screening for diabetic retinopathy.

The Central Mersey diabetic eye screening programme covers populations registered with GPs of Knowsley, Halton, St Helens and Warrington CCGs. Screening appointments are offered in both Widnes and Runcorn using a mix of NHS clinic venues and local high street optometrists.

Figure 21: Eye screening 2016/17



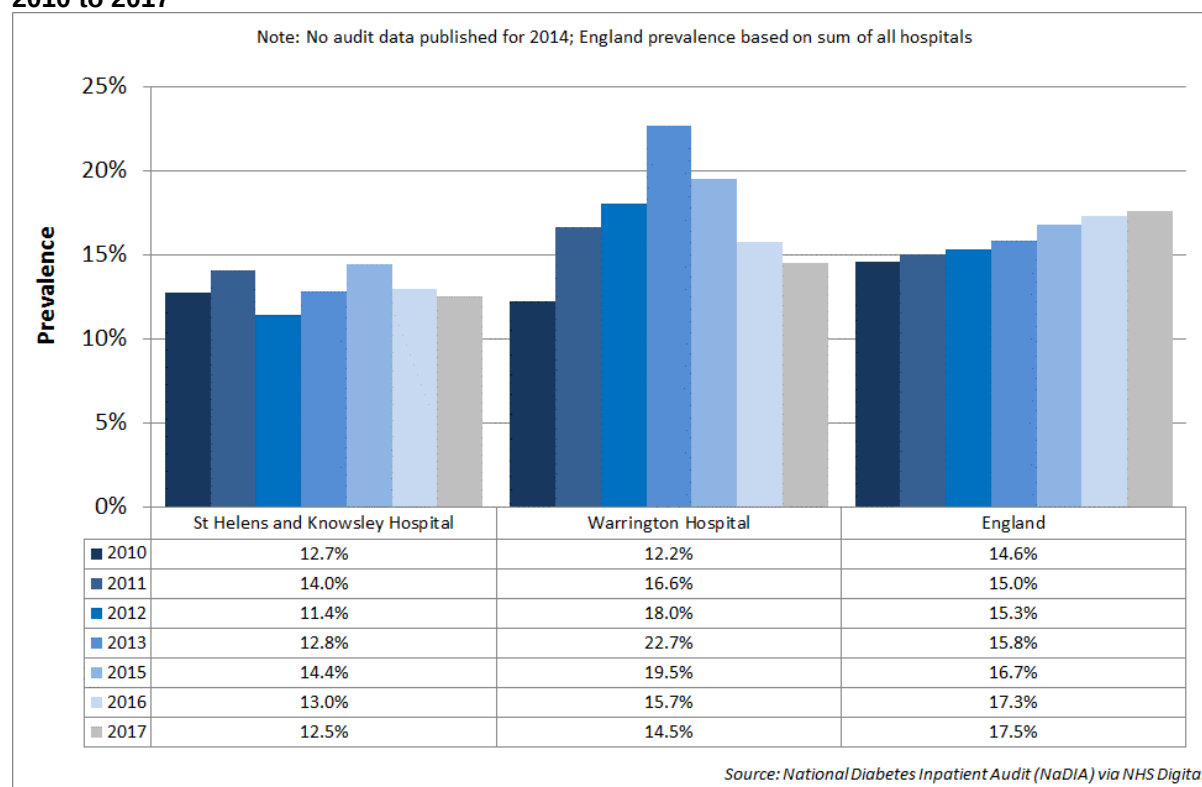
Source: Public Health England

3.6 Secondary care

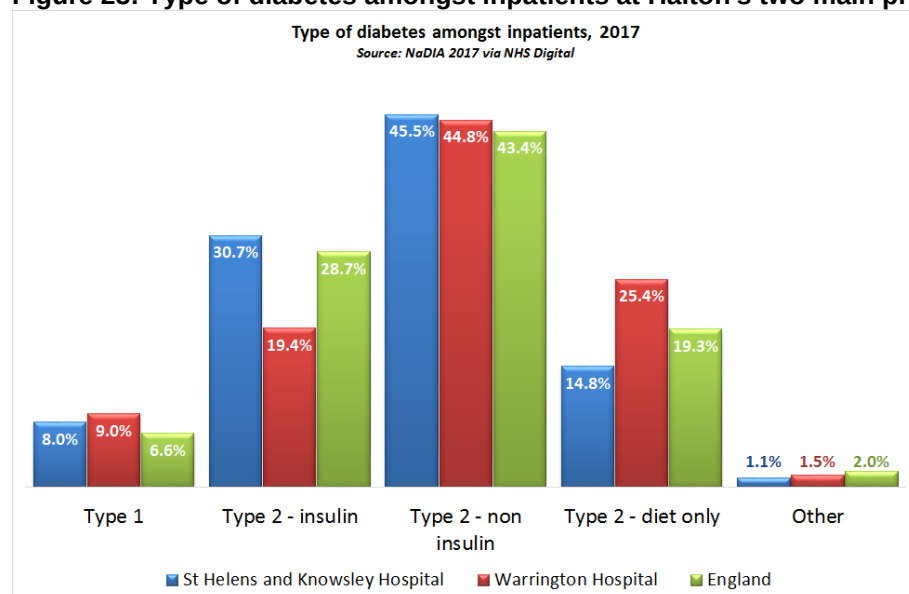
3.6.1. Prevalence of diabetes amongst inpatients

The National Diabetes Inpatient Audit (NaDIA) indicates that 12.5% of patients in St Helens and Knowsley Hospital Trust and 14.5% in Warrington Hospital Trust have diabetes. This is based on an audit of bed occupancy.

Figure 22: Prevalence of inpatients with diabetes in the two main hospital providers for Halton, 2010 to 2017

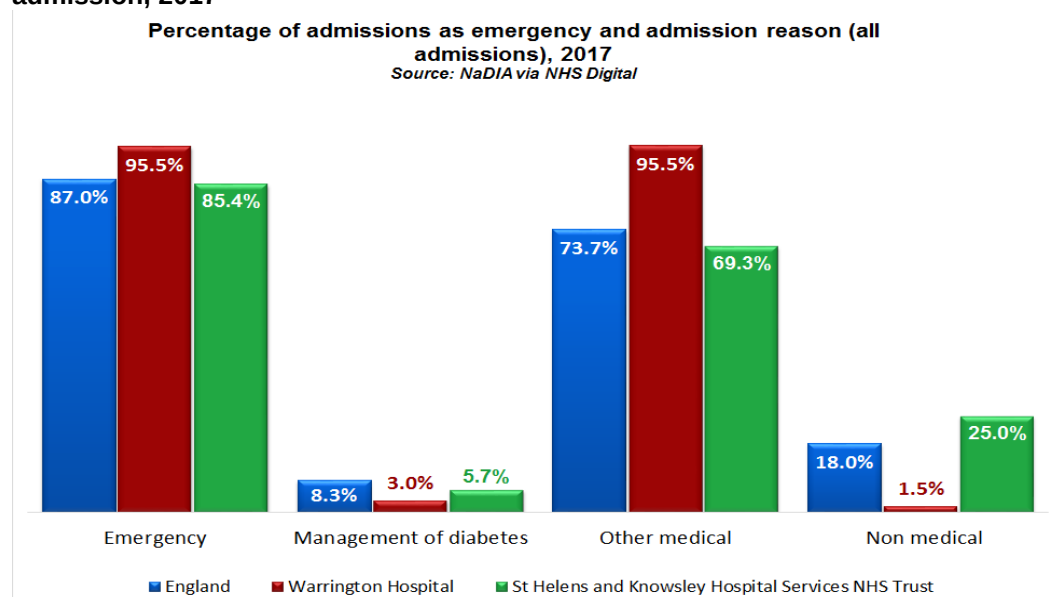


Most patients in both hospital trusts have Type 2 diabetes. Warrington Hospital has a lower percentage of patients who are Type 2 insulin dependent and a higher proportion controlled by diet only compared to England. Proportions at St Helens & Knowsley Hospital are broadly similar to England.

Figure 23: Type of diabetes amongst inpatients at Halton's two main providers, 2017

3.6.2. Admission method and reason

In the 2017 National Diabetes Inpatient Audit both hospital trusts had higher percentages of admissions through the emergency route than England. Of all admissions a lower percentage were for the management of diabetes, the majority for other medical issues. This was especially so at Warrington hospital.

Figure 24: Admissions of people with diabetes, by type of admission and reason for admission, 2017

3.6.3. Blood glucose monitoring and hypoglycaemic episodes

Regular monitoring of a patient's blood glucose whilst in hospital is essential to avoid the onset of hypoglycaemic episodes, hyperglycaemia and other potential harms to the patient. Monitoring is

particularly important in hospital because a patient's blood glucose level may vary more than usual due to illness, treatment or changes to diet and diabetes care routines. It may also be more difficult for the person with diabetes to recognise changes to their blood glucose level.

Data in the audit is collected on inpatients blood glucose monitoring in the previous 7 days, adjusted for length of stay e.g. a patient in hospital for 2 days and monitored on 1 day is counted as having been monitored on 3.5 out of 7 days. It takes into account the appropriate monitoring guidelines for different patient groups.

A 'good diabetes day' was defined as a day on which the frequency of blood glucose monitoring was appropriate, using the guidelines in the table below (taken from the NaDIA full report^[43]), and there was no more than one blood glucose measurement greater than 11 mmol/L and no blood glucose measurements less than 4 mmol/L.

Table 17: Appropriate blood glucose monitoring

Patient status	Blood glucose testing frequency
Metformin or diet alone	1 or more/day
Long stay patient on diet and metformin with stable control	Once weekly or more
Insulin, Exenatide, SU or >1 oral agent including DPP-4 inhibitors and glitazones	2 or more/day
Unwell, unstable diabetes or basal bolus	4 or more/day

Source: NaDIA 2017 via NHS Digital

A hypoglycaemic episode (a hypo) is a potentially dangerous drop in a patient's blood glucose to below 4.0 mmol/L. To prevent hypos, a patient's blood glucose level should remain under control as much as is possible during their hospital stay.

By identifying the extent of the problem of hypoglycaemia and associated patient and hospital characteristics, hospitals can focus their efforts on reducing the harmful occurrences of this complication.

Table 18: Appropriate levels of blood glucose monitoring and hyperglycaemic episodes amongst inpatients at Halton's two main providers, 2017

	England	Warrington Hospital		St Helens and Knowsley Hospital Services NHS Trust	
	Percentage	Percentage	Quadrant	Percentage	Quadrant
Blood glucose monitoring days	6.8	6.8	2	6.2	1
Good diabetes days	4.6	5.2	4	3.3	1
severe hypoglycaemic episode (<3.0mmol/L)	7.1%	6.8%	3	7.7%	3
minor hypoglycaemic episode (3.0-3.9mmol/L)	16.7%	13.6%	4	10.3%	1

Source: NaDIA 2017 via NHS Digital

3.6.4. Foot disease management in hospital

Foot disease is common in people with diabetes. It is important that hospitals have the expertise to treat severe diabetic foot problems requiring admission. It is important also to prevent the serious harm of a new foot ulcer developing whilst a patient is in hospital.

Hospitals reported whether they had an Multi Disciplinary Foot Team (MDFT) on site, and whether they had initiatives to promote diabetic foot examinations. Details of the patients admission, including whether and when they had a foot risk assessment, were recorded in the Bedside Audit.

Note: Changes to the routing in the NaDIA 2017 Bedside Audit form means that only inpatients admitted with active foot disease can be assessed for this measure.

Overall the audit found:

- **One fifth** of hospital sites do not have a Multi-disciplinary Foot Care Team (20%).
- The proportion of inpatients admitted for active foot disease having an assessment within 24 hours has decreased by nine percentage points since NaDIA 2016, though changes to data collection means that cautious interpretation is advised.
- Inpatients admitted with diabetic foot disease that attend a hospital that uses Diabetes UK 'Putting Feet First'^[44] or NICE inpatient foot guidance^[45] are **more likely** to have a diabetic foot risk examination and to be seen by the MDFT within 24 hours of admission.

Locally whilst Warrington Hospital patients were not seen by the MDFT within 24-hours they did have much greater access to podiatrist hours than St Helens and Knowsley Hospital Trust or the England average. However only half of Warrington Hospital eligible patients with diabetes had a foot risk assessment compared to 75% at St Helens and Knowsley Hospital Trust or England.

Table 19: Management of foot disease amongst inpatients at Halton's two main providers, 2017

	England	Warrington Hospital		St Helens and Knowsley Hospital Services NHS Trust	
	Percentage	Percentage	Quadrant	Percentage	Quadrant
Podiatrist hours	0.16	2.24		0.02	
Admitted with foot disease	9.1%	1.6%	1	4.5%	1
Seen by the MDFT within 24 hours	59.3%	0.0%	1	50.0%	2
Foot risk assessment within 24 hours	64.9%	50.0%	2	75.0%	3
Foot risk assessment during stay	74.5%	50.0%	1	75.0%	2

Source: NaDIA 2017 via NHS Digital

3.6.5. Medication errors amongst those with diabetes in hospital

A patient with diabetes that receives medication inappropriately can experience harm, such as a hypoglycaemic episode or even more serious complications.

Control of a person's diabetes is often dependent on precisely managing the medication that they receive. This is particularly important where they are in hospital, and their usual routine may be disrupted.

The healthcare professionals collect the information for the audit by reviewing each inpatient's drug chart and recording whether specified medication errors (prescription errors and/or glucose management errors) had occurred in the previous 7 days. The audit does not collect how many of each error type occurred to each patient during their stay.

Overall the audit found:

- Almost **one third** of inpatients with diabetes have a medication error during their hospital stay (31 per cent).
- The proportion of patients having medication errors has **decreased** by seven percentage points since 2016 (from 38 to 31 per cent).
- Inpatients with diabetes are **more likely** to have medication errors if treated on a surgical ward.
- Inpatients with diabetes are **less likely** to have medication errors if an Electronic Patient Record or Electronic Prescribing are used.

Locally, St Helens and Knowsley hospital was in the top quadrant for medication errors across all categories. Warrington was in the bottom 2, with much fewer errors

Table 20: Medication errors amongst inpatients at Halton's two main providers, 2017

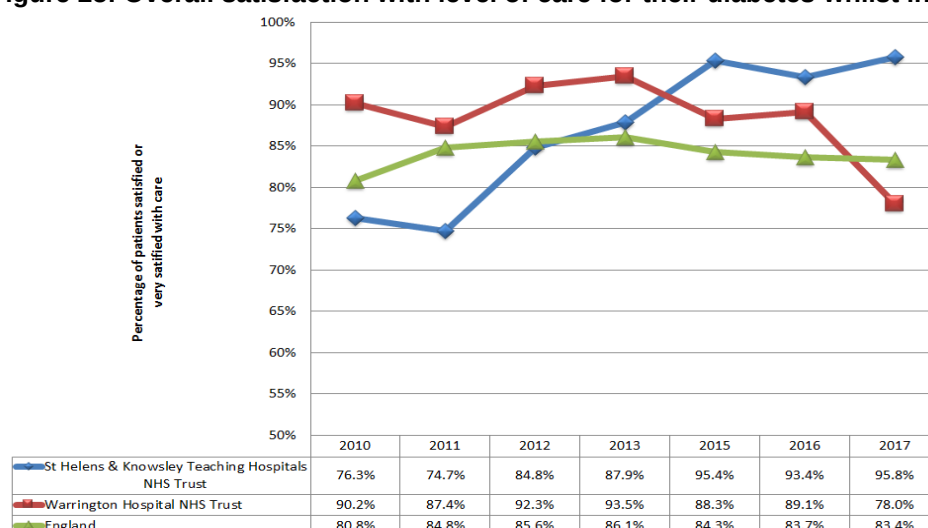
	England	Warrington Hospital		St Helens and Knowsley Hospital Services NHS Trust	
	Percentage	Percentage	Quadrant	Percentage	Quadrant
medication errors	31.3%	19.6%	1	53.3%	4
prescription errors	19.0%	13.0%	2	26.7%	4
glucose management errors	18.5%	13.0%	2	31.7%	4
insulin errors	18.6%	6.5%	1	26.7%	4

Source: NaDIA 2017 via NHS Digital

3.6.6. Patient satisfaction

Clinical staff should work with the patient to ensure their hospital stay is as satisfactory as possible, empowering them to take control and become involve in their care planning wherever possible. The patient's expertise related to the effective management of their condition should be considered wherever possible and integrated into their care plan. The timely provision of suitable food is integral to good diabetes management.

Overall satisfaction with the level of care was higher at both trusts for 2013 than the England average. However, whilst the percentage of patients who were either satisfied or very satisfied with how staff cared for their diabetes whilst they were an inpatient rose for St Helens & Knowsley Hospitals Trust it has fallen for Warrington Hospital; for 2017 it was lower than England average for the first time.

Figure 25: Overall satisfaction with level of care for their diabetes whilst in hospital

Source: NDA 2016/17 via NHS Digital

Table 21: Satisfaction with meals and staff knowledge

	England	Warrington Hospital		St Helens and Knowsley Hospital Services NHS Trust	
	Percentage	Percentage	Quadrant	Percentage	Quadrant
Meals timing	62.6%	40.3%	1	67.8%	3
Meal choice	53.8%	66.8%	4	55.6%	3
Staff aware of diabetes	81.9%	73.4%	1	86.2%	3
All or most staff know enough about diabetes	64.6%	61.4%	1	73.4%	3
Staff knowledge - Answers Q	79.3%	81.2%	3	77.3%	2
Overall satisfaction	83.4%	78.0%	1	95.8%	4

Source: NaDIA 2017 via NHS Digital

Indeed, when asked for areas that could be improved, it was better staff knowledge of diabetes that came highest for both trusts, despite high levels of satisfaction with staff knowledge in both hospital trusts; amongst 47.6% of those asked in St Helens and Knowsley Hospital and 39.4% in Warrington Hospital, compared to 26.8% across England as a whole. Only 20.8% of St Helens and Knowsley Hospital patients and 18.7% in Warrington Hospital said there were no areas for improvement needed, compared to 43.1% England average.

3.7. Pregnancy and diabetes

The National Pregnancy in Diabetes audit (NPID) uses NICE guidance NG3^[46] as its benchmark against which to assesses trusts. It was carried out annually between 2013 and 2016.^[47]

Prior to pregnancy

- Use of folic acid supplement
- Keeping HbA1c below 48 mmol/mol where achievable without causing problematic hypoglycaemia
- Stopping / substituting of oral glucose-lowering medications apart from metformin
- Suspending statins and ACE inhibitors/ARBs

During pregnancy

- Early first contact with joint diabetes and antenatal clinic, before 10 weeks of pregnancy
- Monitoring HbA1c to assess level of risk to pregnancy
- More frequent retinal screening

Birth and neonatal care

- Elective birth and timing of birth
- Transfer of infants to intensive, high dependency or special care only if there are clear clinical indications

The NPID audit demonstrates that there is a concerning lack of progress with delivering the NICE recommendations over the last 3 years. There is now therefore an urgent need for these outcomes to be owned across Local Maternity Systems, Public Health, primary care, diabetes and maternity networks and specialist antenatal services, with the authority and resources to join up an intentional and effective programme to improve outcomes.^[48]

Work is needed within each service area to identify the models, local pathways, roles, actions, and responsibilities needed to deliver this. Initially this can be informed by local quality improvement initiatives using NPID data against which to measure progress.

Nationally the audit found that as the proportion of women with Type 2 diabetes continues to rise, for the first time, almost exactly half of women whose diabetes type was identified in the audit had Type 2 diabetes. Women with Type 2 diabetes are older, have a much shorter duration of diabetes and higher BMI than women with Type 1 diabetes. Over 40% of women with Type 2 diabetes were from the most deprived socio-economic group.

NICE guideline – HbA1c

NICE recommendation (NG3): Explain to women with diabetes who are planning to become pregnant that establishing good glucose control before conception and continuing this throughout pregnancy will reduce the risk of miscarriage, congenital malformation, stillbirth and neonatal death. It is important to explain that risks can be reduced but not eliminated.

The guideline recommends:

- Advising women with diabetes who are planning to become pregnant to aim to keep their HbA1c level below 48 mmol/mol if this is achievable without causing problematic hypoglycaemia
- Strongly advising women with diabetes whose HbA1c level is above 86 mmol/mol not to get pregnant because of the associated risks

The NPID audit records the first HbA1c measurement in pregnancy and uses the readings that are in the first trimester as an indication of HbA1c prior to pregnancy.

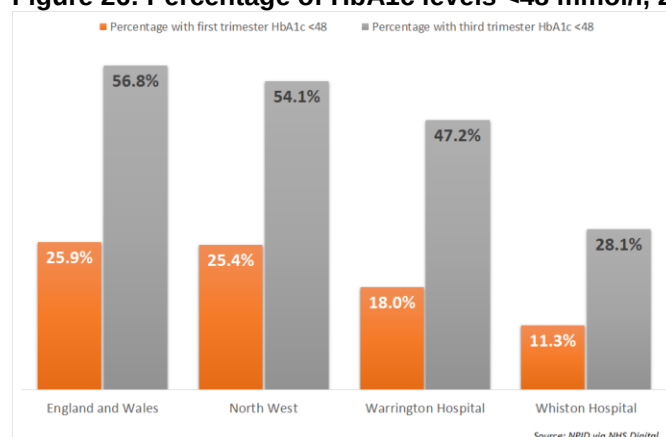
Additionally the guidelines recommend healthcare professionals should consider measuring HbA1c levels in the second and third trimesters of pregnancy to assess the level of risk to the pregnancy. Also, to be aware that level of risk to the pregnancy increases with a HbA1c level above 48mmol/mol.

Nationally:

- During the three years 2014 to 2016 there has been no significant change in the percentages of pregnancies where the current NICE guideline targets were achieved
- Women with Type 2 diabetes were much more likely than women with Type 1 diabetes to have HbA1c < 48 mmol/mol and less likely to have HbA1c > 86 mmol/mol
- Around 40% of women with Type 1 diabetes and 75% of women with Type 2 diabetes had HbA1c < 48 mmol/mol in late pregnancy
- The median (most frequently recorded) HbA1c for women with Type 1 diabetes in late pregnancy was 50 mmol/mol, and for women with Type 2 diabetes was 41 mmol/mol
- Neither the proportion of women with HbA1c < 48 mmol/mol nor the median HbA1c in the last trimester changed significantly between 2014 and 2016

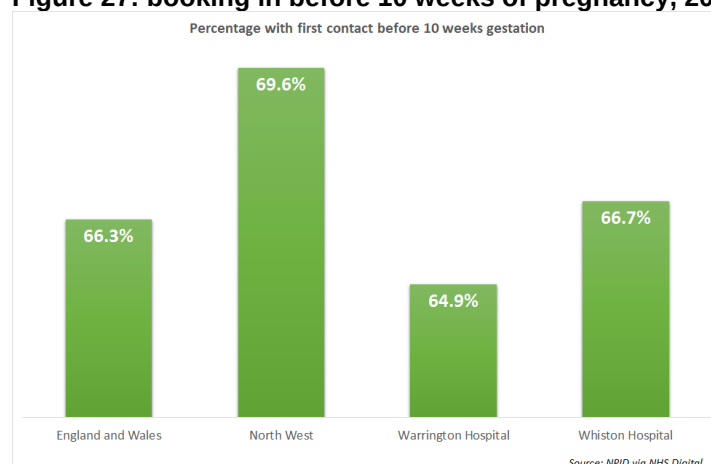
Considering women with all types of diabetes, the two main maternity units used by Halton women show lower percentages achieving the recommended HbA1c target at the beginning or during pregnancy. Levels were especially low at Whiston hospital. This probably reflects, in part at least, the high levels of deprivation, drawing as it does women from Halton, Knowsley and St Helens; areas that all have high levels of deprivation.

Figure 26: Percentage of HbA1c levels <48 mmol/l, 2014-2016



Locally, a lower percentage of women booking in at both hospital trusts are in contact with antenatal services before 10 weeks of pregnancy compared to the North West, although the percentage for Whiston is similar to England and Wales.

Figure 27: booking in before 10 weeks of pregnancy, 2014-2016



NICE guideline – folic acid

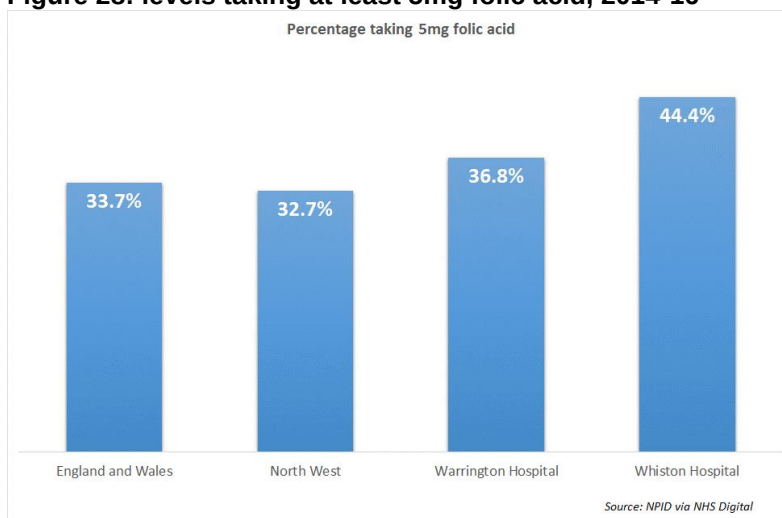
- Women with diabetes have an increased risk of having a pregnancy affected by a neural tube defect
- NICE recommendation (NG31): Advise women with diabetes who are planning to become pregnant to take 5mg/day folic acid until 12 weeks of gestation to reduce this risk
- The 5mg dose is available on prescription

Nationally:

- Almost twice as many women with Type 1 diabetes were taking 5mg of folic acid prior to pregnancy as women with Type 2 diabetes
- There has been no significant increase in the percentage of women taking folic acid at the recommended dose in the years since 2014.

Despite the lower numbers in contact early in pregnancy and lower percentages achieving HbA1c targets, a higher proportion of women locally were taking the recommended levels of folic acid

Figure 28: levels taking at least 5mg folic acid, 2014-16



3.8. Paediatric diabetes

The National Paediatric Diabetes Audit, managed by the Royal College of Paediatrics and Child Health (RCPCH), provides an analysis of data submitted by healthcare professionals caring for infants, children and young people with diabetes in England and Wales over 2016/17. It includes details of the prevalence of diabetes, compliance with health care checks and clinical outcomes recommended by the NICE and recommendations for improvements in care for the growing number of children with Type 1 or 2 diabetes.

It shows a continuing national improvement in overall diabetes management, and details of new national initiatives which should catalyse further progress. However, the audit continues to show variation, with inequalities in treatment widening between children and young people at both ends of the deprivation scale, and poorer outcomes associated with non-white ethnicity, adolescence, female sex and living in a deprived area. It is also apparent from the audit that the growing numbers

of young people with Type 2 diabetes receiving care in paediatric diabetes units are at higher risk of poorer care and disease related complications than those with Type 1 diabetes.

The health checks (care processes) audited were those recommended by NICE in their guidance for the diagnosis and management of children and young people with Type 1 and Type 2 diabetes (NG18, NICE, 2015).^[49]

The guidelines specify a starting age of 12 years for commencing all checks except for HbA1c and measurement of height and weight, which should be recorded in all ages of children and young people with Type 1 diabetes, and thyroid screening, which should be performed at diagnosis and annually thereafter.

The healthcare checks for children and young people with Type 2 diabetes recommended in NG18 and NG19 (NICE, 2015) differ slightly from those for Type 1 diabetes. The NPDA includes cholesterol screening as being one of the seven essential annual checks rather than thyroid screening. All should be performed annually from diagnosis, except for foot examination and eye screening, which are indicated from age 12.

Data is not available at a CCG or local authority level but instead at a provider trust level. In addition to the two main general hospital trusts, children in Halton may be treated at Alder Hey Children's Hospital in Liverpool. Data for that hospital is therefore included below although the majority of children treated at Alder Hey Hospital are not from Halton.

Characteristics

The age breakdown at local provider trusts is broadly similar for the older age groups, with Warrington Hospital having a higher percentage in the 0-4 age group and lower in the 5-9 age group. There were a higher proportion coming from the most deprived areas compared to England and this was especially so for Alder Hey hospital. This is likely to reflect that the hospital draws a high proportion of its patients from Liverpool and Knowsley.

Table 22: Key characteristics of paediatric diabetes, 2016/17

	Received structured education for Type 1	Use of CAMHS for Type 1			
		No referral required	Referred and seen	Referred but no evidence of being seen	Unknown
Warrington Hospital	35.10%	85.00%	15.00%	0.00%	0.00%
Alder Hey Hospital	70.10%	84.70% *		8.50%	0.00%
Whiston Hospital	98.60%	87.70% *		7.40%	0.00%
North West	79.30%	58.50%	39.20%	2.30%	0.00%
England	73.90%	65.60%	29.40%	5.10%	0.00%

Source: NPDA via RCPCH

The vast majority, nearly 100%, have Type 1 diabetes and this reflects the national position, with only Alder Hey Hospital also reflecting the regional and national pattern for people with Type 2 non-insulin dependent diabetes. At both Warrington Hospital and Whiston Hospital the number of people with Type 2 diabetes was too small to show for confidentiality reasons.

Table 23: Type of paediatric diabetes, 2016/17

	Type of diabetes					
	Type 1 Insulin-Dependent	Type 2 Non-Insulin-Dependent	Cystic Fibrosis Related	Monogenic forms	Other specified	Not Specified
Warrington Hospital	98.70%	*	0.00%	0.00%	0.00%	0.00%
Alder Hey Hospital	96.40%	2.40%	0.00%	*	*	*
Whiston Hospital	96.00%	*	*	*	0.00%	*
North West	94.90%	2.10%	1.00%	0.50%	0.60%	0.80%
England	95.10%	2.50%	0.60%	0.60%	0.60%	0.60%

Source: NPDA via RCPCH

Health checks completed

There are several healthcare checks recommended by NICE for children and young people with Type 1 diabetes (NG18, NICE 2015; NG19, 2015) that should be performed at least once annually.

The NPDA has considered seven of these to be essential annual checks:

1. Glycated Haemoglobin A1c (HbA1c) (blood test for diabetes control)
2. Body Mass Index (BMI) (measure of cardiovascular risk)
3. Blood pressure (measure of cardiovascular risk)
4. Urinary albumin (urine test for kidney function)
5. Thyroid screen (blood test for hyper/hypothyroidism)
6. Eye screening (photographic test for eye risk)
7. Foot examination (foot examination for ulcer risk)

The provider trust level analysis is not available broken down by type of diabetes.

Table 24: Paediatric diabetes health checks carried out, 2016/17

	Care processes for young people All ages			Care processes for young people aged 12+ years					Screening for auto-immune conditions Type 1 diabetes	
	HbA1c	Thyroid	Body mass index	Blood pressure	Albuminuria	Eye screening	Foot examination	All seven	Thyroid	Coeliac
Warrington Hospital	100.00%	97.30%	100.00%	91.50%	96.60%	69.50%	88.10%	62.70%	75.00%	83.30%
Alder Hey Hospital	99.70%	72.10%	99.10%	98.00%	35.30%	63.20%	56.90%	17.60%	80.00%	77.10%
Whiston Hospital	98.30%	81.90%	98.30%	95.40%	76.90%	81.50%	81.50%	55.40%	100.00%	87.50%
North West	99.70%	86.80%	99.40%	92.90%	69.70%	75.40%	78.90%	46.60%	73.80%	64.90%
England	99.50%	81.40%	98.70%	92.90%	68.00%	72.20%	74.00%	42.50%	78.70%	72.20%

Source: NPDA via RCPCH

Outcomes of care

HbA1c

HbA1c is a marker of overall diabetes blood glucose management over the preceding six to eight weeks and provides a measure of long term risk of microvascular complications. Good diabetes management in childhood tracks into adulthood with a lower risk of developing vascular complications and early mortality in the future.

In 2015, NICE published new guidance (NG18, 2015) which introduced stricter HbA1c targets to indicate excellent diabetes management for both Type 1 and 2 diabetes with a 'cut-off' of 48mmol/mol or below. It also requested providers to report those achieving a level of 53 mmol/mol or below. Given the low numbers of children and young people achieving this new target and to

allow historical benchmarking, the NPDA will continue to include the numbers achieving the previous NICE (2004) target of 58 mmol/mol or below. An HbA1c level above 80mmol/mol carries considerable increased risk of both microvascular diabetic

complications (eye disease and kidney disease) and cardiovascular disease, and so the numbers of children and young people exceeding this upper limit is also reported.

Average HbA1c and the proportion of children and young people meeting specific HbA1c targets vary depending on the type of diabetes. Children and young people with non-Type 1 diabetes tend to have a lower HbA1c than those with Type 1 diabetes. The data below is for those with Type 1 diabetes only.

Table 25: Average (mean), most frequent (median) and Percentage of children and young people with Type 1 diabetes achieving HbA1c targets, 2016/17

people with Type 1 diabetes achieving HbA1c targets, 2010/11								
	Unadjusted HbA1c figures (Type 1 diabetes only)							
	Mean	Median	<=48 mmol/mol	<=53 mmol/mol	<58 mmol/mol	>=69mmol/mol	>75mmol/mol	>80mmol/mol
Warrington Hospital	64.1	61	4.00%	13.40%	26.80%	30.20%	16.10%	7.40%
Alder Hey Hospital	68.2	65	9.00%	16.00%	27.90%	37.70%	23.80%	17.30%
Whiston Hospital	65	61	7.50%	25.60%	39.80%	30.10%	21.10%	13.50%
North West	68.9	65	6.50%	14.00%	24.60%	40.50%	25.60%	18.60%
England	67.3	64	7.60%	16.20%	28.90%	36.80%	23.10%	16.40%

Source: NPOA via RCPD

Source: NPDA via RCPCH

Small vessel (microvascular) disease

People with diabetes are at increased risk of microvascular disease including chronic kidney disease (nephropathy) and eye disease (retinopathy). However, maintaining optimal blood glucose levels can minimise diabetes-related complications.

Increased risk of kidney disease is indicated by the presence of either micro- or macro-albuminuria. Nationally:

- 10,214 young people with Type 1 diabetes aged 12 years and above were recorded as having an albuminuria screen, which equates to 63.5% of the total potential cohort of 16,085
- The percentage of young people with Type 1 diabetes in England and Wales aged 12 years and above with micro- or macro-albuminuria was 9.7%, the same result as was found in 2015/16. However, the percentage varied according to country and region
- In 2016/17, the occurrence of albuminuria was similar across all age groups and differed only slightly compared to 2015/16
- When broken down by gender, females tend to be at greater risk of having albuminuria than males
- Albuminuria prevalence was higher amongst those living in more deprived areas and has increased in the most and second most deprived areas since 2015/16
- 11,336 children and young people with Type 1 diabetes aged 12 years or older underwent retinopathy screening during the audit period.
- In England and Wales, 13.6% had an abnormal screen result in 2016/17 compared to 13.8% in 2015/16; the percentage varies by county and by region
- The risk of retinopathy increased with age and it was highest amongst adolescent females. The risk also tends to increase as duration of diabetes increases; this may well reflect increasing age
- The audit showed little or no variation in the risk of retinopathy by deprivation quintile

Table 26: Eye screening and kidney disease, 2016/17

	Eye screening (aged 12+ years and Type 1)			Albuminuria (aged 12+ years and Type 1)		
	Normal	Abnormal	Unknown	Normoalbuminuria	Albuminuria (micro or macro)	Unknown
Warrington Hospital	88.10%	10.20%	*	98.80%	0.00%	*
Alder Hey Hospital	76.30%	16.80%	6.90%	78.90%	21.10%	*
Whiston Hospital	81.10%	16.20%	*	93.00%	*	*
North West	68.90%	15.00%	16.10%	90.20%	8.80%	0.90%
England	77.70%	14.00%	8.30%	88.00%	9.20%	2.70%

Source: NPDA via RCPCH

Large vessel disease - Cardio Vascular Disease (CVD) risk factors

People with diabetes are at an increased risk of cardiovascular disease secondary to macrovascular risk factors including high blood pressure, abnormal lipid levels, high body mass index and smoking.

Blood pressure, cholesterol and Body Mass Index (BMI)

High blood pressure and/or raised blood cholesterol increases lifetime risk of cardiovascular disease including stroke and heart disease. In adults with Type 1 diabetes, maintaining normal blood pressure and cholesterol within target (less than 5 mmol/L) reduces this risk. Although total cholesterol levels are no longer a mandatory requirement for children and young people with Type 1 diabetes following NICE guidance NG18 (2015), results are still presented where data has been submitted. Diastolic and systolic blood pressure measurements were converted to age and sex adjusted centiles using survey data between 1995 and 1998 from the general population aged between 4 and 24 years old.

Higher Body Mass Index (BMI, weight/height²) is associated with increased cardiovascular risk. To allow direct comparisons across different ages and genders BMI requires standardisation using centile charts.

The BMI categories shown based on the UK 1990 standards. For 2016/17, in England 33.4% of children aged 4 to 5 years old with Type 1 diabetes are overweight or obese (a decrease from 33.7% in 2015/16) compared to 22.6% in the National Child Measurement Programme for England. So, despite the secular trends in body mass index since 1990, comparisons with the National Child Measurement Programmes clearly demonstrate a higher prevalence of obesity among young children with Type 1 diabetes. National level analysis also shows that children and young people with Type 1 diabetes who are recorded as being obese are more likely to live in more deprived areas than in least deprived areas.

Table 27: levels of high blood pressure, cholesterol and BMI amongst children and young people with Type 1, 2016/17

	Blood pressure (aged 12+ years) Type 1 only		Cholesterol (aged 12+ years) Type 1 only		Body mass index (Type 1 diabetes only)			
	High normal	High	>=4mmol/l	>=5mmol/l	Underweight	Healthy weight	Overweight	Obese
Warrington Hospital	14.80%	9.90%	28.20%	*	*	55.60%	19.00%	24.20%
Alder Hey Hospital	39.10%	38.20%	70.50%	25.50%	1.50%	51.30%	22.60%	24.60%
Whiston Hospital	37.30%	34.90%	63.90%	21.30%	0.00%	55.40%	17.30%	27.30%
North West	35.60%	24.80%	65.40%	23.60%	1.60%	58.30%	19.40%	20.40%
England	34.10%	25.90%	65.80%	23.10%	2.00%	60.00%	18.00%	19.60%

Source: NPDA via RCPCH

Given the national findings between macro-vascular health issues including BMI and deprivation, it is not surprising that the levels are highest amongst children locally compared to England. The levels with high blood pressure and cholesterol at Warrington Hospital is an anomaly to this pattern, even compared to England and may be due to characteristics of this particular cohort, small numbers or data collection issues.

Structured patient education

Structured education is important to support children and young people with diabetes and their families to understand the optimal management of their treatment regimen, blood glucose monitoring, the effects of diet, physical activity and illness, and how to detect and manage hypoglycaemia, hyperglycaemia and ketosis.

NICE (NG18, 2015) recommends that children and young people with Type 1 diabetes and their family members or carers (as appropriate) should be offered a continuing programme of education from diagnosis.

The programme should include the following core topics:

- HbA1c monitoring and targets
- the effects of diet, physical activity, body weight and intercurrent illness on blood glucose control
- the aims of metformin therapy and possible adverse effects
- the complications of type 2 diabetes and how to prevent them

For the purposes of audit, the NPDA has defined a structured patient education programme for paediatric diabetes as:

‘A programme of self-management education, tailored to the needs of the child or young person and their family, both at the time of initial diagnosis and on an ongoing basis throughout the child or young person’s attendance at the paediatric diabetes service. This is a programme offered in addition to the education provided at routine outpatient consultations.’

Nationally, there has been an improvement in the percentage of children and young people with Type 1 diabetes receiving structured patient education between 2014/15 and 2016/17 but a decline in provision to those with Type 2 diabetes between 2015/16 and 2016/17.

For the 2016/17 only Whiston Hospital saw a higher percentage of children receiving structured education, compared to the regional and England averages. Levels at Warrington Hospital were especially low:

- Warrington Hospital 35.10%
- Alder Hey Hospital 70.10%
- Whiston Hospital 98.60%
- North West 79.30%
- England 73.90%

4. Impacts of diabetes

4.1. On health outcomes

Research from Diabetes UK^[50] shows that:

- Cardiovascular disease, resulting from prolonged exposure to high blood levels of glucose and fats, is a major cause of death and disability in people with diabetes and accounts for 44% of deaths in people with Type 1 diabetes and 52% in those with Type 2 diabetes. The risk of stroke is doubled within the first 5 years after diagnosis of Type 2 diabetes compared with the general population
- Diabetes is the commonest cause of end stage renal disease and about 30% of people with Type 2 diabetes develop kidney disease. Kidney disease accounts for 21% of deaths in people with Type 1 diabetes and 11% in Type 2
- Diabetes is the most frequent cause of blindness in people of working age in the UK. People with diabetes are up to 20 times more likely to become blind than other people. This is mostly because of retinopathy resulting from damage to blood vessels in the retina, but people with diabetes also have double the risk of developing glaucoma and cataracts compared with the general population. Twenty years after diagnosis nearly everyone with Type 1 and 60% of people with Type 2 diabetes have some retinopathy
- Diabetes can adversely affect mental health and the prevalence of depression among people with diabetes is about double that in the general population
- Diabetes can lead to poor circulation and reduced feeling in the feet and legs, which can lead to amputation. People with diabetes are up to 30 times more likely to have an amputation than the general population
- About 50% of people with diabetes suffer from nerve damage (neuropathy) leading to chronic painful neuropathy in about 16% and erectile dysfunction in men

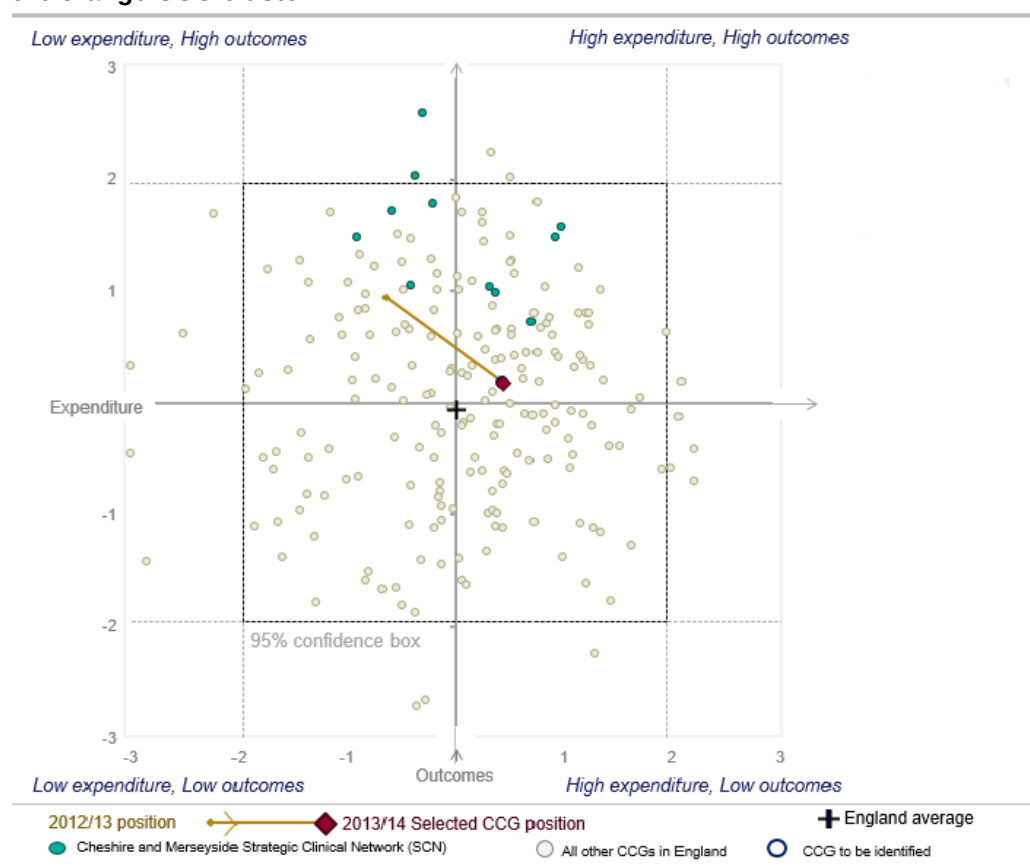
4.2. On the NHS budget

UK NHS spending on diabetes was estimated at nearly £10 billion in 2010/11 – 10% of the NHS budget. £1bn for Type 1 and £8.8bn for Type 2. 80% of NHS spending on diabetes goes into managing avoidable complications. Better management of diabetes has great potential to cut costs and improve the care of people with diabetes^[51].

The National Diabetes Inpatient Audit (NaDIA) indicates that about 1 in 6 hospital beds in England are occupied by someone with diabetes and health economic analysis suggests diabetes admissions in England alone accounted for 607,581 excess bed days (compared to the equivalent population without diabetes), at a total estimated excess tariff expenditure of £573 million in one year. This is due to increased admission (and readmission) rates, a prolonged length of stay once admitted, disease specific admissions, and a bias against day case surgery in those with diabetes.

Public Health England's National Cardiovascular Intelligence Network has developed the Diabetes Outcomes versus Expenditure (DOVE) tool. This shows the relationship between spending on diabetes care and clinical outcomes in GP and clinical commissioning group (CCG) areas.^[52]

Figure 29: Total spend on diabetes prescribing compared to people with diabetes with a HbA1c of 59mmol/mol or less for NHS Halton compared with other CCGs in the Other CCGs in the orange CCG cluster



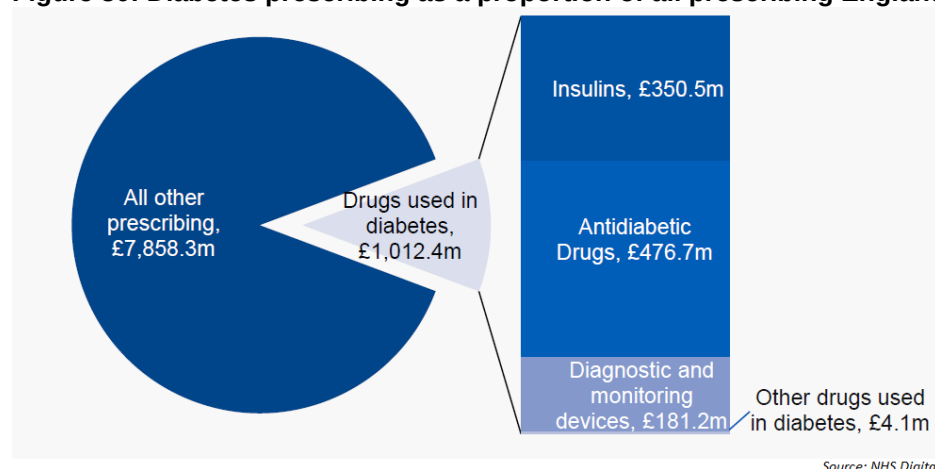
Source: PHE 2014

Whilst Halton remains in the high outcomes half of the chart 2013/14, it has moved from the low expenditure area (2012/13) to the high expenditure area (2013/14). Whilst expenditure was lowest of those CCGs in the Cheshire & Merseyside Strategic Clinical Network, its outcome for the proportion people with diabetes with a HbA1c of 59mmol/mol or less was also lowest.

4.2.1. Prescribing

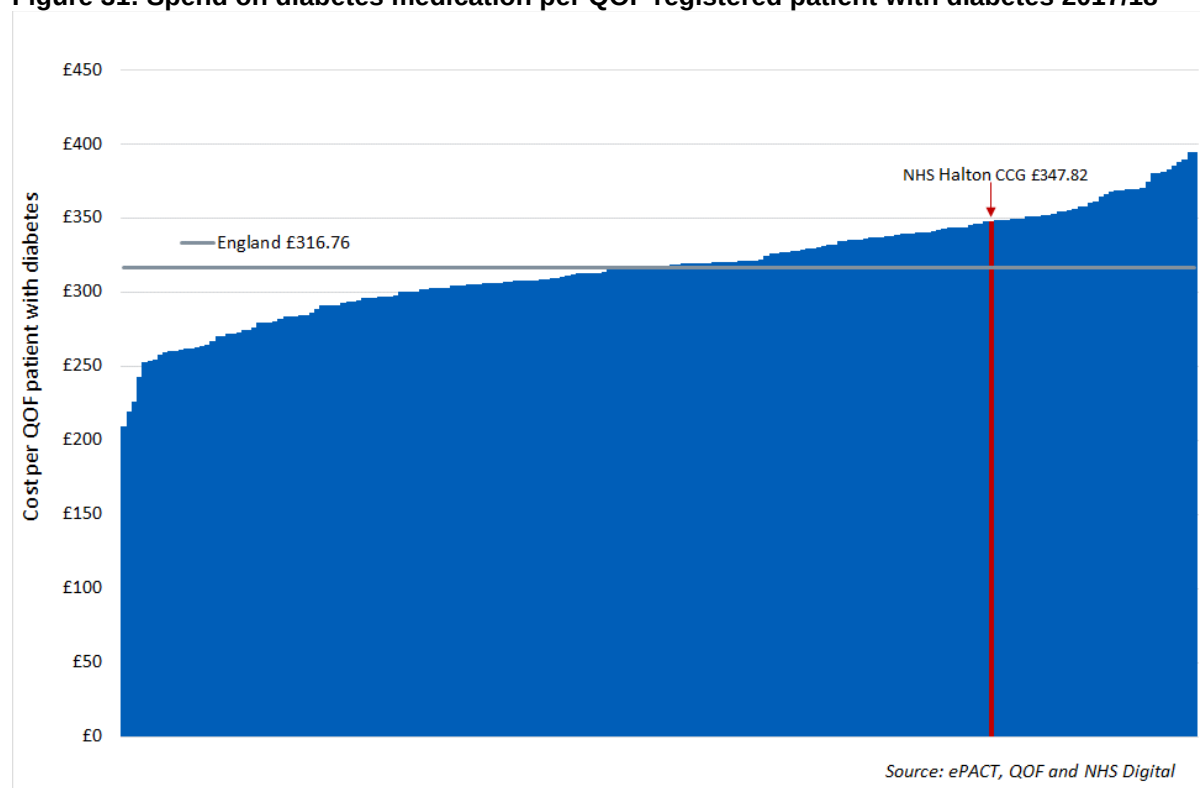
Data analysis from NHS Digital^[53] shows:

- Drugs used in diabetes (British National Formulary (BNF) section 6.1) now make up 11.4% of total primary care net ingredient costs (NIC) and 4.9% of prescription items
- In the financial year 2017/18 there were 53.4 million items prescribed for diabetes at a total net ingredient cost of £1,012.4 million. Up by 22.6 million prescription items and £421.7 million since 2007/08.
- Antidiabetic drugs (BNF section 6.1.2) make up 47.1% of the total net ingredient cost and accounts for 72.6% of prescription items for all diabetes prescribing.

Figure 30: Diabetes prescribing as a proportion of all prescribing England

2017/18 data shows a wide variation in the Net Ingredient Cost per person on the QOF diabetes register; from £09.46 in Northumberland CCG to £394.43 in both Warwickshire North CCG and Surrey Heath CCG. The England average was £316.76 and the Halton CCG value was £347.82.

This places Halton in the highest third of CCGs for its spend per QOF registered patients with diabetes (168th out of 206 with 5 CCGs data not included).

Figure 31: Spend on diabetes medication per QOF registered patient with diabetes 2017/18

The CCG spends more per item as well as more per QOF patient with diabetes compared to England. In terms of its 10 comparator CCGs it spends more per item than all CCGs except Telford & Wrekin CCG and more per QOF patient with diabetes except for Barnsley CCG and Rotherham CCG.

Table 28: Diabetes spend (British National Formulary (BNF) 6.1), Halton compared to England and its 10 comparator CCGs, 2017/18

CCG name	Drugs used for Diabetes (BNF 6.1)			% of all prescribing within the CCG		Diabetes 6.1 Net Ingredient Cost per QOF patient 2017/18
	Prescription Items	Net Ingredient Cost	Cost per item	Prescription items	Net Ingredient Cost	
England Total	53,407,735	£1,012,396,807	£18.96	4.9	11.4	£316.76
Halton CCG	135,624	2,975,569	£21.94	4.7	11.7	£347.82
Barnsley CCG	329,370	5,927,295	£18.00	4.5	12.1	£374.67
Hartlepool and Stockton-On-Tees CCG	270,102	4,996,901	£18.50	4.2	10.0	£309.20
Mansfield & Ashfield CCG	224,857	3,583,194	£15.94	4.7	11.3	£300.45
Rotherham CCG	296,481	5,908,108	£19.93	4.7	12.9	£380.95
South Sefton CCG	146,719	2,993,295	£20.40	4.0	9.9	£338.91
South Tees CCG	315,607	5,396,287	£17.10	4.3	9.8	£314.89
St Helens CCG	197,131	3,786,294	£19.21	4.0	9.6	£312.94
Stoke On Trent CCG	355,191	5,763,629	£16.23	5.4	11.2	£308.08
Tameside and Glossop CCG	255,319	5,046,025	£19.76	4.6	11.4	£331.56
Telford & Wrekin CCG	150,449	3,417,436	£22.71	5.1	11.3	£312.84

Source: ePACT, QOF and NHS Digital

Table 29: Breakdown of Halton spend on diabetes, 2017/18

Category		Prescription Items	Net Ingredient Cost
Total primary care (all BNF)		2,858,539	£25,360,983.54
Drugs used for Diabetes (BNF 6.1)		135,624	£2,975,569.34
Diabetes spend breakdown	Insulins (BNF 6.1.1)	19,064	£995,082.31
	Short-acting insulins (BNF 6.1.1.1)	6,106	£295,649.39
	Intermediate and long-acting insulins (BNF 6.1.1.2)	12,958	£699,432.92
	Antidiabetic drugs (BNF 6.1.2)	96,679	£1,460,494.76
	Sulfonylureas (BNF 6.1.2.1)	18,002	£56,832.38
	Biguanides (BNF 6.1.2.2)	51,311	£202,445.04
	Other antidiabetic drugs (BNF 6.1.2.3)	27,366	£1,201,217.34
	Diagnostic and monitoring devices (BNF 6.1.6)	18,725	£506,267.19
	Human analogue insulins (within BNF 6.1.1.1 and BNF 6.1.1.2)	17,174	£929,275.67
	Other insulins (within BNF 6.1.1.1 and BNF 6.1.1.2)	1,890	£65,806.64

Source: NHS Digital

4.3 On social care

To date much of the analysis of the impact of diabetes has focused on diabetes as a health only problem, in particular as an NHS problem, costing it an estimated £9.8 billion a year nationally. However, there is a growing need to re-appraise the way diabetes as a condition is prioritised, managed and resourced jointly within the health and social care system. The growing ageing population means that the number of people with diabetes in social care is set to grow rapidly, placing real pressures on local authority care budgets which are already strained and face multiple pressures.

A recent report found that there are over 70,000 people with diabetes incurring local authority social care costs today, and that direct care costs from the condition amount to £1.4 billion. By 2030 it is estimated that the number of people in local authority care affected by diabetes will be 130,000

with an associated cost of £2.5 billion. The impact of diabetes on social care as well as the NHS means that a more integrated approach to managing diabetes would be beneficial to better address the needs of individuals with the condition, providing them with tailored support that improves outcomes and provides care more efficiently.^[54] Cost pressures on both social care and the NHS together with rising levels of diabetes makes this an even greater imperative. It is estimated that the cost to social care is currently £1.9 billion and will rise to over £2.5 billion by 2030.

4.4. On employment chances of individuals

Research indicates that diabetes is a significant predictor of self-rated disability and the chances of a person receiving state disability payments. For those in work it can also result in more time off work due to illness.^[55] Added to this deaths from diabetes amongst the working-age population are estimated to have cost the economy nearly £5 billion.^[56]

As at February 2014 there were only 10 females and no males in receipt of incapacity or severe disablement allowance due to endocrine disorders and 30 due to circulatory disorders (and 50 due to circulatory disorders, mostly aged 60+). However, there were 160 people in receipt of disability living allowance.

Table 30: Numbers in receipt of disability living allowance in Halton due to diabetes, by age and gender, as at May 2018

Age	Total	Male	Female
total (all ages)	100	60	40
Aged under 16	50	30	20
Aged 16-24	~	~	~
Aged 25-49	10	~	~
Aged 50-64	10	10	~
Aged 65 and over	20	20	10

~ These figures are nil or negligible.

DWP via Nomis, 2018

4.5. Impacts on families and wider society

Diabetes and its complications impose significant economic consequences on individuals, families, health systems and countries.

- People living with diabetes and their families feel the impact of diabetes most directly, often through the expenses of diabetes treatment and loss of family income when diabetes interferes with work
- Diabetes can have a pronounced emotional impact upon families and particularly on those with a close relationship with those with diabetes. This can start at the time of diagnosis, causing anxiety about the long term impacts on the health and wellbeing of the partner or family member
- Significant lost productivity and economic consequences due to early retirement, increased sick days, disability, and premature mortality^{[57][58]}

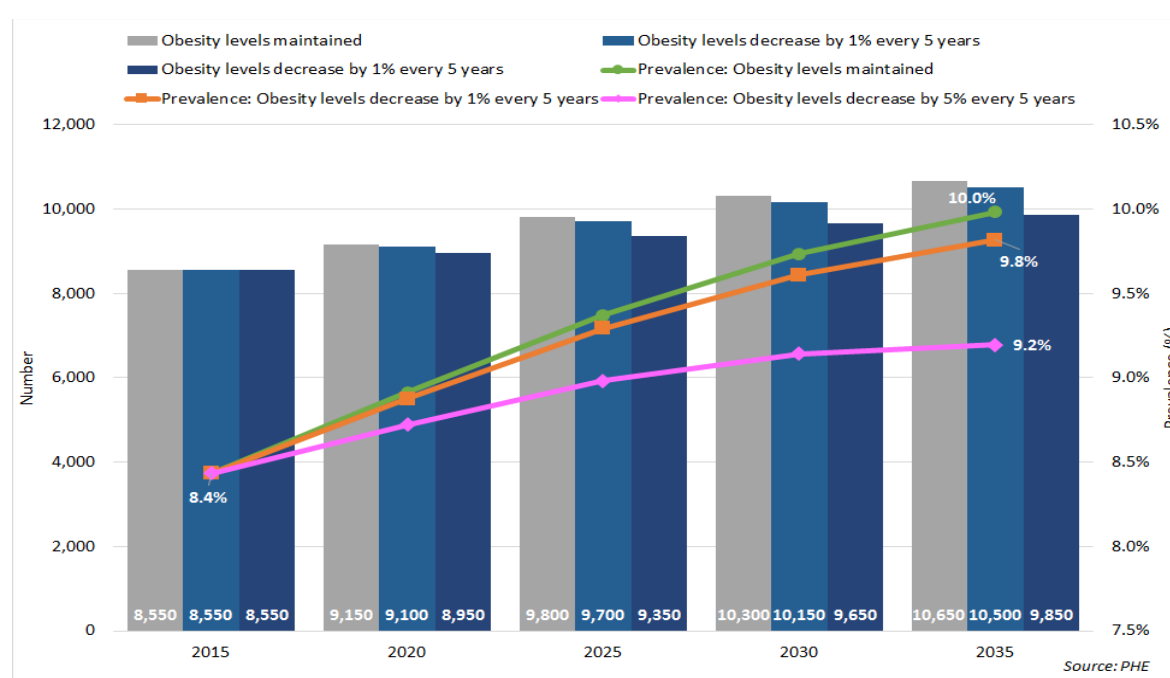
5. Projected levels of need

There are two main driving forces used to predict changes in the levels of diabetes:

- Age
- Obesity

As Figure 32 shows, if the current level of obesity is maintained there will be 2,100 more people with diabetes registered with NHS Halton CCG practices by 2035. However, if obesity levels can be reduced by 5% every 5 years there would be 800 less people with diabetes than the maintenance scenario predicts.

Figure 32: Estimated prevalence of diabetes in Halton 2015 to 2035



Routinely collected local data does not exist for adult overweight or obesity. However, data from the 2016/17 Active Lives Survey from Sport England showed that there was a reduction in the proportion of Halton residents who were classified as overweight or obese, from 70.5% in 2015/16 to 61.1% in 2016/17; so much so that the proportion of adults (18+) who were overweight or obese was lower than that of both the North West and England. It is too early to say with any certainty if this will continue.

Deprivation and income can also play a role in determining levels of obesity (and diabetes) locally. Data from the 2017 Health Survey for England shows that the prevalence of obesity increased with reducing levels of equivalised household income, for both men and women. 24% of men and 18% of women in the highest household income quintile were obese, rising to 30% and 38% respectively in the lowest household income quintile. However, the pattern was reversed for the prevalence of overweight among men, which was highest in the highest household income quintile.

So whilst there are early indications that levels of overweight and obesity in adults has fallen, we need to be aware of the impact deprivation and income are likely to have on this emerging pattern.

6. User views

There has been no specific public consultation or engagement activity in relation to diabetes locally.

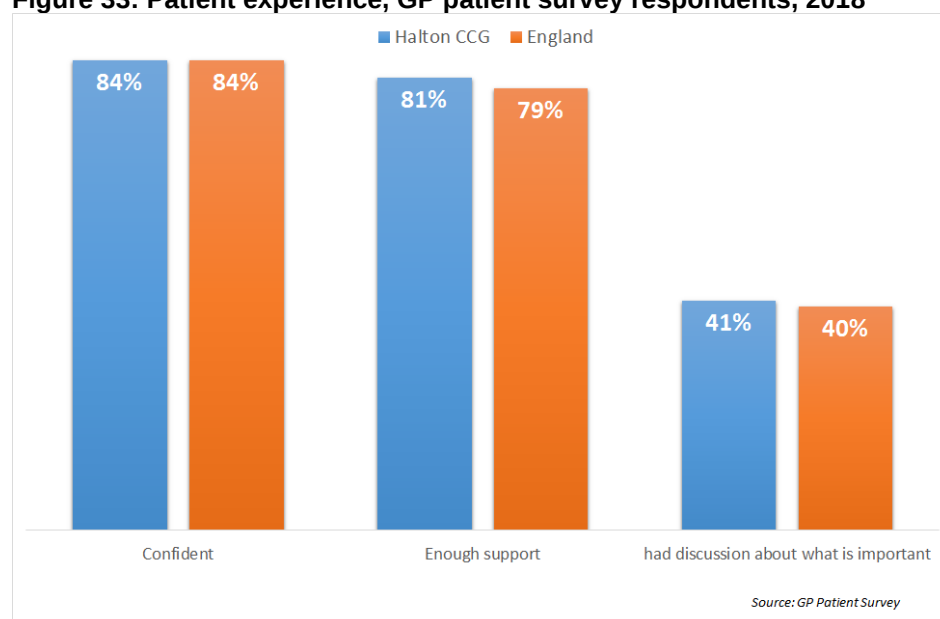
Customer insight was undertaken across Liverpool to better understand the needs of people with diabetes in relation to self-management of their condition with the aim of improving current services in the diabetes pathway, carried out via a series of “listening events” in 2013 with patients with diabetes found that they:

- Were not always ready to do whole X-PERT, exercise, lifestyle change on diagnosis and would like to be offered the support on an annual basis. X-PERT is currently a six week programme, although patients are not ready for this so one session summaries are provided
- Would like subsidised exercise sessions such as free gym membership
- Wanted a better experience of holistic care
- Wanted individual care planning
- Wanted fewer handoffs and care closer to home
- Wanted a greater understanding of their condition and for healthcare professionals to use lay terminology when talking about their condition
- Wanted to practice higher levels of self-care and use technologies for self-care

As seen in section 3.4 Secondary Care, a greater percentage of inpatients with diabetes in both acute providers, were overall satisfied with the level of care they received for their diabetes whilst in hospital than was seen across England as a whole.

Data from the GP Patient Survey shows how confident people in the survey feel about managing their own health and the percentage of people with a long term condition that have received enough support from local organisations. This survey asks all people with a long-term condition not just those with diabetes. Data is not available for individual conditions.

Figure 33: Patient experience, GP patient survey respondents, 2018



7. Unmet need and service gaps

Levels of diabetes are predicted to continue to rise. Increasing adult obesity rates will continue to fuel the increase in Type 2 diabetes, compounding the increase predicted due to the ageing population. We need to be able to monitor adult obesity rates on a routine basis in order to determine if preventative efforts are delivering a halt or even a reduction in the estimated rising rates. It would also be helpful to be able to analyse specialist weight management services at ward or LSOA level so both access and outcomes in relation to the geographical variation in obesity rates can be assessed.

There are types of diabetes that we know little about at a local level. There was no routinely available data on children with diabetes, the number of women of childbearing age with diabetes or the numbers who develop gestational diabetes. Using national rates to estimate local levels is the best available proxy but may not provide an accurate number, especially given the relationship between diabetes and deprivation and Halton's relatively deprived population. For example, using national rates to estimate gestational diabetes and comparing it to a 1-off audit of GP practice records showed nearly twice as many Halton women with gestational diabetes as estimated.

There are inequalities in the diagnosed prevalence and care processes in general practice. The overall QOF performance for Halton CCG was lower than its comparators. As confidence intervals are not calculated for this it is not possible to determine whether the slightly lower percentages are statistically significant or not. The National Diabetes Audit also shows a decrease in the proportion of patients receiving the 8 NICE recommended care processes, from a level higher than the England average to one that is slightly lower for Type 1 diabetes. Levels amongst those with Type 2 diabetes remain just higher than England but this needs to be closely monitored. There is room to reduce the level of practice-by-practice variation. This would both improve the overall performance and reduce inequalities.

8. Best practice interventions

Diabetes

NICE Pathways

- [Diabetes in children and young people](#)
- [Diabetes in pregnancy](#)
- [Foot care for people with diabetes](#)
- [Hyperglycaemia in acute coronary syndromes](#)
- [Preventing type 2 diabetes](#)
- [Type 1 diabetes in adults](#)
- [Type 2 diabetes in adults](#)

NICE guidelines

- [Diabetes \(type 1 and type 2\) in children and young people: diagnosis and management \(NG18\)](#) August 2015
- [Diabetes in pregnancy: management from preconception to the postnatal period \(NG3\)](#) February 2015
- [Diabetic foot problems: prevention and management \(NG19\)](#) August 2015
- [Hyperglycaemia in acute coronary syndromes: management \(CG130\)](#) October 2011
- [Type 1 diabetes in adults: diagnosis and management \(NG17\)](#) August 2015
- [Type 2 diabetes in adults: management \(NG28\)](#) December 2015
- [Type 2 diabetes prevention: population and community-level interventions \(PH35\)](#) May 2011
- [Type 2 diabetes: prevention in people at high risk \(PH38\)](#) July 2012

Quality standards

- [Diabetes in adults \(QS6\)](#) March 2011
- [Diabetes in children and young people \(QS125\)](#) July 2016
- [Diabetes in pregnancy \(QS109\)](#) January 2016
- [Promoting health and preventing premature mortality in black, Asian and other minority ethnic groups \(QS167\)](#) May 2018

Lifestyles

NICE Pathways

- [Diet](#)
- [Lifestyle weight management services for overweight or obese adults](#)
- [Lifestyle weight management services for overweight or obese children and young people](#)
- [Obesity](#)
- [Obesity: working with local communities](#)
- [Physical activity](#)

- [Preventing type 2 diabetes](#)
- [Walking and cycling](#)
- [Maternal and child nutrition](#)
- [Behaviour change](#)

NICE guidelines

- [Cardiovascular disease prevention \(PH25\)](#) June 2010
- [BMI: preventing ill health and premature death in black, Asian and other minority ethnic groups \(PH46\)](#) July 2013
- [Obesity prevention \(CG43\)](#) December 2006
- [Obesity: identification, assessment and management \(CG189\)](#) November 2014
- [Obesity: working with local communities \(PH42\)](#) November 2012
- [Preventing excess weight gain \(NG7\)](#) March 2015
- [Weight management: lifestyle services for overweight or obese adults \(PH53\)](#) May 2014
- [Weight management: lifestyle services for overweight or obese children and young people \(PH47\)](#) October 2013
- [Physical activity and the environment \(NG90\)](#) March 2018
- [Physical activity for children and young people \(PH17\)](#) January 2009
- [Physical activity in the workplace \(PH13\)](#) May 2008
- [Physical activity: brief advice for adults in primary care \(PH44\)](#) May 2013
- [Physical activity: exercise referral schemes \(PH54\)](#) September 2014
- [Physical activity: walking and cycling \(PH41\)](#) November 2012
- [Preventing excess weight gain \(NG7\)](#) March 2015
- [Weight management before, during and after pregnancy \(PH27\)](#) July 2010
- [Behaviour change: general approaches \(PH6\)](#) October 2007
- [Behaviour change: individual approaches \(PH49\)](#) January 2014

Quality standards

- [Obesity in adults: prevention and lifestyle weight management programmes \(QS111\)](#) January 2016
- [Obesity in children and young people: prevention and lifestyle weight management programmes \(QS94\)](#) July 2015
- [Obesity: clinical assessment and management \(QS127\)](#) August 2016
- [Physical activity: for NHS staff, patients and carers \(QS84\)](#) March 2015
- [Promoting health and preventing premature mortality in black, Asian and other minority ethnic groups \(QS167\)](#) May 2018
- [Community engagement: improving health and wellbeing \(QS148\)](#) March 2017

In development

- [Physical activity: encouraging activity within the general population](#) Expected publication date: June 2019
- [Behaviour change: digital and mobile health interventions](#) Expected publication date: August 2020

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