

# National Diabetes Insulin Pump Audit, 2017-18

England and Wales

8<sup>th</sup> August 2019

Prepared in collaboration with:



**The Healthcare Quality Improvement Partnership (HQIP).** The National Diabetes Audit (NDA) is part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP) which is commissioned by the Healthcare Quality Improvement Partnership (HQIP) and funded by NHS England. HQIP is led by a consortium of the Academy of Medical Royal Colleges, the Royal College of Nursing and National Voices. Its aim is to promote quality improvement, and in particular to increase the impact that clinical audit has on healthcare quality in England and Wales. HQIP holds the contract to manage and develop the NCAPOP Programme, comprising more than 30 clinical audits that cover care provided to people with a wide range of medical, surgical and mental health conditions. The programme is funded by NHS England, the Welsh Government and, with some individual audits, also funded by the Health Department of the Scottish Government, DHSSPS Northern Ireland and the Channel Islands.



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**Diabetes UK** is the charity leading the fight against the most devastating and fastest growing health crisis of our time, creating a world where diabetes can do no harm. They provide patient engagement and quality improvement services to the audit programme.

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**The National Cardiovascular Intelligence Network (NCVIN)** is a partnership of leading national cardiovascular organisations which analyses information and data and turns it into meaningful timely health intelligence for commissioners, policy makers, clinicians and health professionals to improve services and outcomes. Public Health England provide analytical and policy context expertise to the audit programme.

# Introduction

The National Diabetes Insulin Pump Audit collects information on the number and characteristics of people with diabetes using an insulin pump, the reasons for going on an insulin pump and the outcomes achieved since starting on the pump.

The National Institute for Care and Health Excellence (NICE) guidance states that Continuous Subcutaneous Insulin Infusion (CSII) or 'insulin pump' therapy is recommended as a treatment option for adults, and children aged 12 years and over, with Type 1 diabetes mellitus if:

- Attempts to reach target haemoglobin A1c (HbA1c) levels with multiple daily injections result in the person having 'disabling hypoglycaemia', or
- HbA1c levels have remained high (69mmol, 8.5%, or above) with multiple daily injections (including use of long-acting insulin analogues if appropriate) despite the person and/or their carer carefully trying to manage their diabetes.

CSII therapy is not recommended as treatment for people with Type 2 diabetes mellitus. Although a small number of patients had a recorded diagnosis of Type 2 (slide 11), the analysis in this report is restricted to people recorded as having Type 1 diabetes in specialist diabetes service data submissions.

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# Key Findings

## Participation and Data Quality

- In England, whilst the number of responses increased for 2017-18, key insulin pump data field completion declined.
- In Wales, completion improved for treatment goal fields.

## Pump starts

- The rate at which people with Type 1 diabetes are starting pump treatment has stabilised.

## Prevalence of pump users

- The proportion of people with Type 1 diabetes who are on an insulin pump varies from less than five per cent in some specialist services to over 40 per cent in others.

## Pump treatment goals

- Between two thirds and three quarters of pump users are recorded as achieving their pump treatment goals.
- Over 90 per cent of people reached their target goal for hypoglycaemia. Around 80 per cent of people (83.9% for England and 71.6% for Wales) reached their target goal for glucose control.



# Key Recommendations

The variation in provision and the associations with treatment target benefit suggests that more people with Type 1 diabetes should be considered for pump treatment in line with NICE guidance.

- **Who:** All services delivering Type 1 diabetes care.
- **What:** Offer pump therapy to all people with Type 1 diabetes who meet NICE criteria.
- **Where/when:** During annual, or more frequent, review with named doctor or nurse.

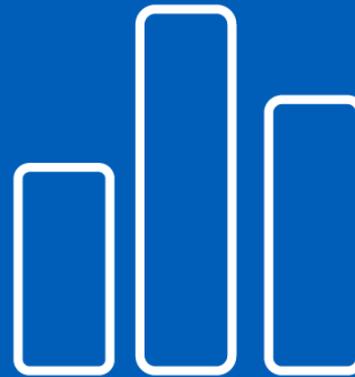
The ten-fold variation between specialist centres in pump use by people with Type 1 diabetes is unexplained; its causes and consequences should be investigated.

- **Who:** All specialist services and commissioners.
- **What:** Consider whether there is adequate understanding, capacity and capability to explain and provide pump treatment.
- **Where/when:** During National Diabetes Audit review and action planning.



# National Diabetes Insulin Pump Audit 2017-18

**Participation  
and Data  
Quality**



# Audit Participation

- Almost two-thirds of the specialist diabetes services in England that participated in the Core National Diabetes Audit (NDA) 2017-18 also submitted insulin pump data (63 services).
- There were 13 services that submitted pump data but did not contribute Core NDA data.
- Specialist services in Wales all submit data only on pump patients.

**Table 1: Number of specialist diabetes services that participated in the insulin pump audit, England and Wales, 2015-16 to 2017-18**

	2015-16		2016-17		2017-18	
	England	Wales <sup>1</sup>	England	Wales <sup>1</sup>	England	Wales <sup>1</sup>
<b>Insulin pump and NDA</b>	69	N/A	55	N/A	63	N/A
<b>Insulin pump only</b>	0	14	18	15	13	13
<b>NDA only</b>	29	N/A	26	N/A	25	N/A



# Data Quality

- In England, the number of patients included increased substantially for 2017-18, but completion rates for several key data fields declined.
- In Wales, the number of patients declined slightly but completion rates for treatment goal fields improved.

**Table 2: Completeness of the pump data submitted, England and Wales, 2016-17 to 2017-18**

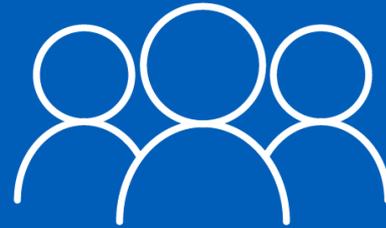
		England			Wales			England			Wales		
		2016-17			2016-17			2017-18			2017-18		
		Number of responses	Number of people	Percentage completed	Number of responses	Number of people	Percentage completed	Number of responses	Number of people	Percentage completed	Number of responses	Number of people	Percentage completed
Reason for starting pump	Hypoglycaemia reduction	7,020	9,770	71.9	1,055	1,065	99.1	8,725	14,070	62.0	920	940	97.9
	Glucose Control	7,000	9,770	71.6	1,055	1,065	99.1	9,165	14,070	65.1	925	940	98.4
	Other	6,155	9,770	63.0	1,055	1,065	99.1	8,195	14,070	58.2	915	940	97.3
Treatment goals <sup>1</sup>	Hypoglycaemia reduction	4,435	9,770	45.4	460	1,065	43.2	6,615	14,070	47.0	555	940	59.0
	Glucose Control	4,510	9,770	46.2	540	1,065	50.7	6,615	14,070	47.0	555	940	59.0
Year started using pump	Year Started Using Pump	9,030	9,770	92.4	1,035	1,065	97.2	10,545	14,070	74.9	905	940	96.3



1. The treatment goal field within the insulin pump collection is optional.

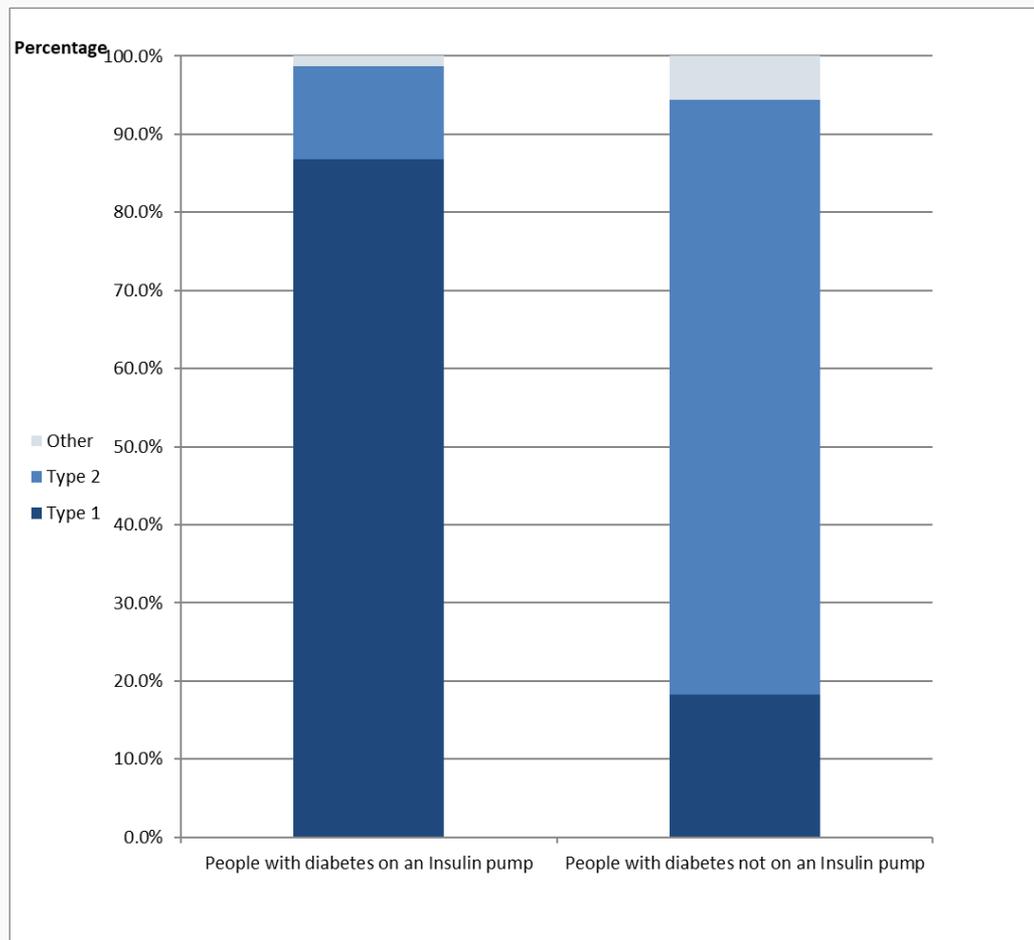
# National Diabetes Insulin Pump Audit 2017-18

## Demographics of People on Insulin Pump



# Diabetes Type - People on Pump

**Figure 1: The distribution of diabetes type for people with diabetes attending specialist services, by pump status\*, England and Wales, 2017-18**



- The percentage of pump users recorded as having Type 2 diabetes increased to 12 per cent in 2017-18 (from less than 3 per cent in 2016-17), due to one service submitting a significant amount of records where people with Type 2 diabetes were on a pump.

Number of people with diabetes attending specialist services		
Diabetes type	On pump	Not on pump
Type 1	12,900	70,190
Type 2	1,760	292,105
Other	200	21,275

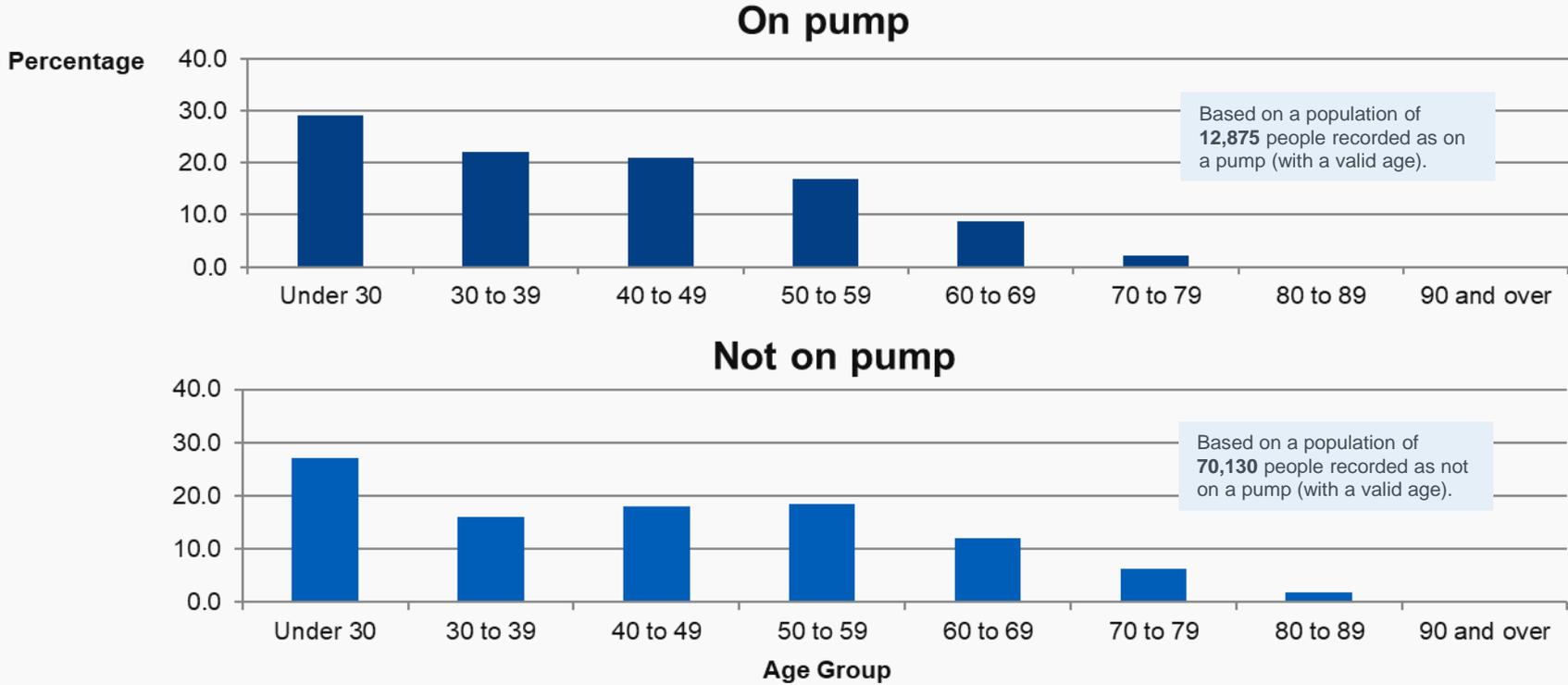
\*CSII (pump) therapy is not recommended as treatment for people with Type 2 diabetes mellitus.



# Age – People on Pump

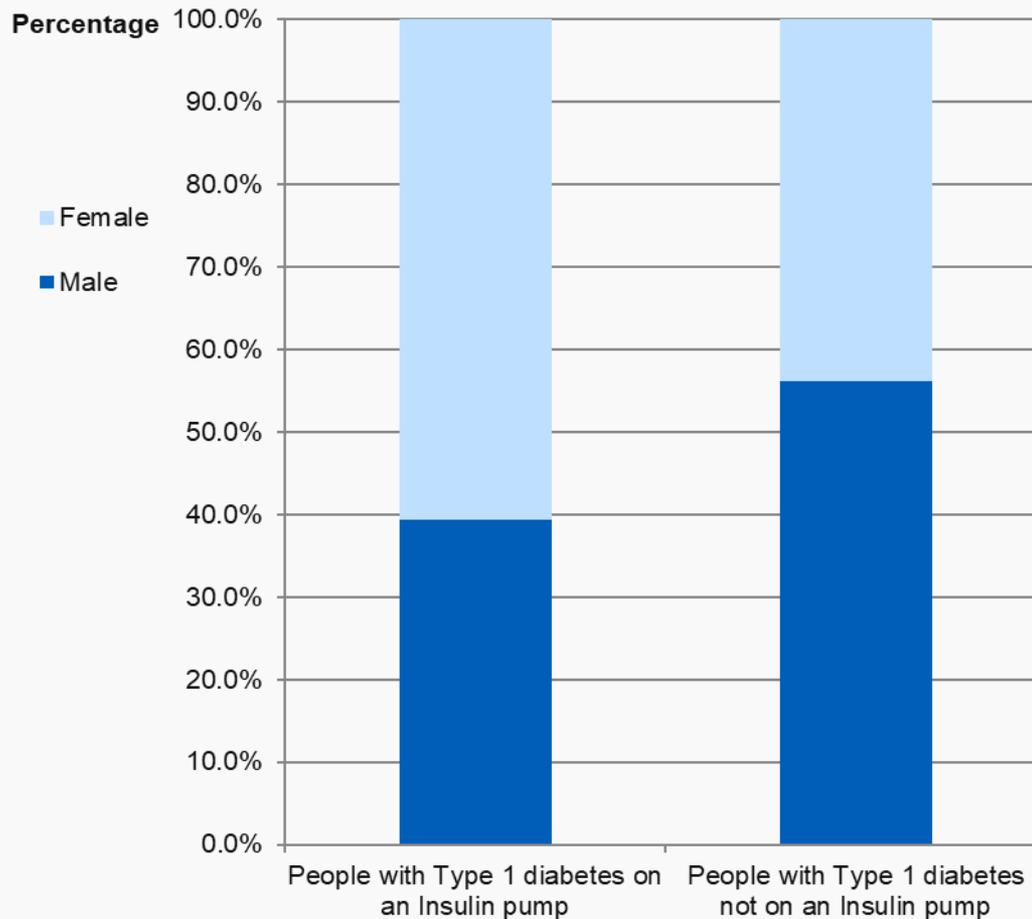
- Pump treatment is more often seen among younger people with Type 1 diabetes.

**Figure 2: The age distribution of people with Type 1 diabetes attending specialist services, by pump status, England and Wales, 2017-18**



# Sex – People on Pump

**Figure 3: The sex distribution of adults with Type 1 diabetes attending specialist services, by pump status, England and Wales, 2017-18**



- Women outnumber men nearly 2:1 among pump users.
- However, overall there are more men than women attending specialist services with Type 1 diabetes.

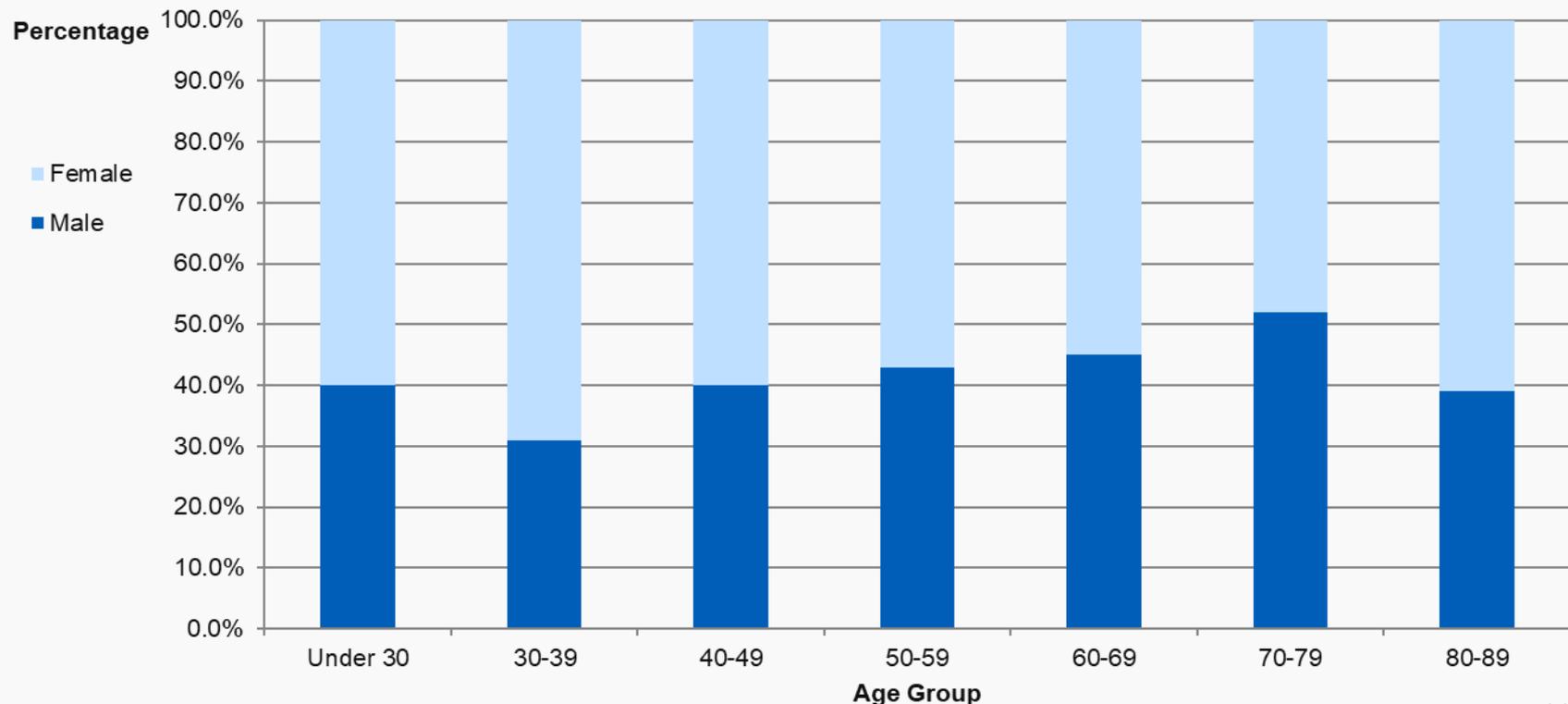
Number of people with diabetes attending specialist services		
Sex	On pump	Not on pump
Male	5,060	39,355
Female	7,815	30,775



# Sex and Age – People on Pump

- In all age groups, except 70 to 79 years, female pump users outnumber males.

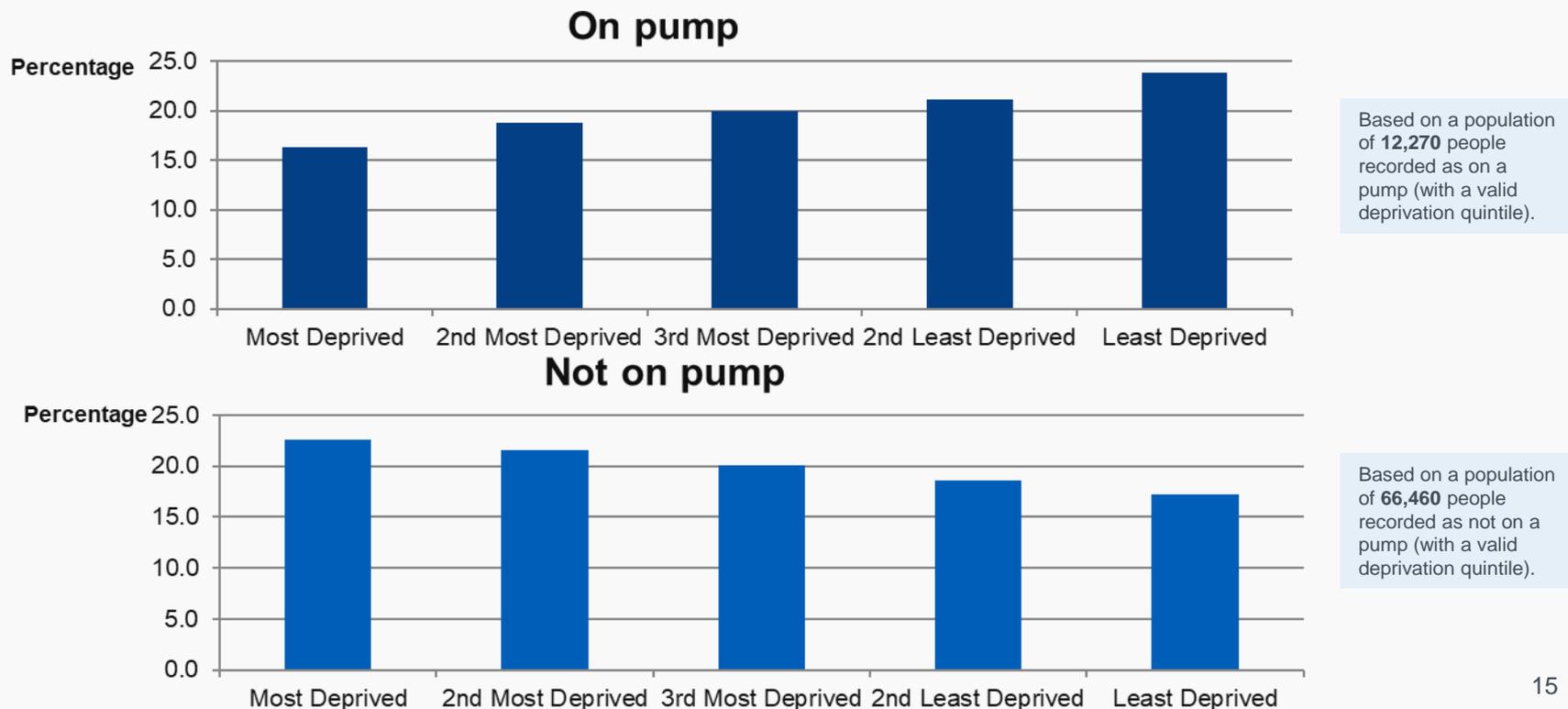
**Figure 4: The age and sex distribution of adults with Type 1 diabetes attending specialist services who are on an insulin pump, England and Wales, 2017-18**



# Deprivation - People on Pump

- The proportion of people with Type 1 diabetes is greatest in the most deprived quintile, however the highest proportion of people with Type 1 diabetes who are pump users is in the least deprived quintile.

**Figure 5: The distribution of people with Type 1 diabetes attending specialist services, by deprivation quintile and pump status, England and Wales, 2017-18**



# National Diabetes Insulin Pump Audit 2017-18

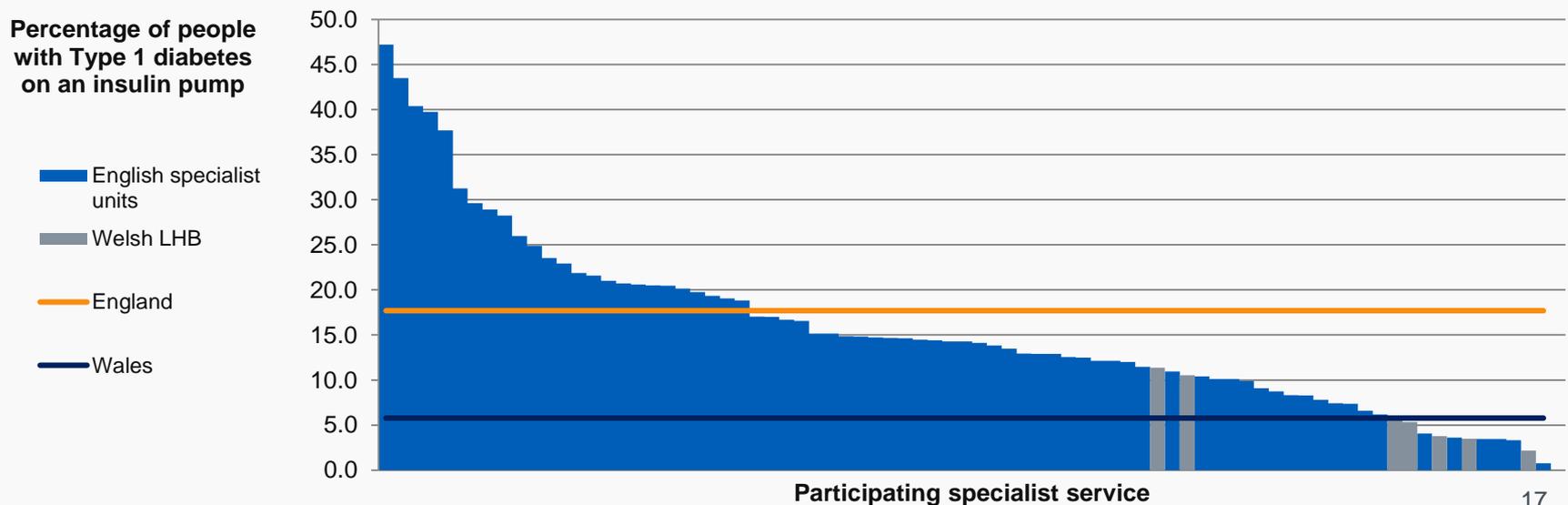
## Prevalence of Insulin Pump Use



# Prevalence - People on Pump, by Service

- In England, 83,005 patients with Type 1 diabetes attend specialist services that participate in this audit. Among these services, the percentage who use insulin pumps varies ten-fold. Overall, there are 242,910 people in England with a recorded diagnosis of Type 1 diabetes.
- In Wales, data submission is by Local Health Board (LHB). So, in Wales, the denominator is the number of all people with Type 1 diabetes in an LHB (geographical area).

**Figure 6: The percentage of people with Type 1 diabetes who are on an insulin pump, by participating specialist service<sup>1</sup>, England and Wales, 2017-18**



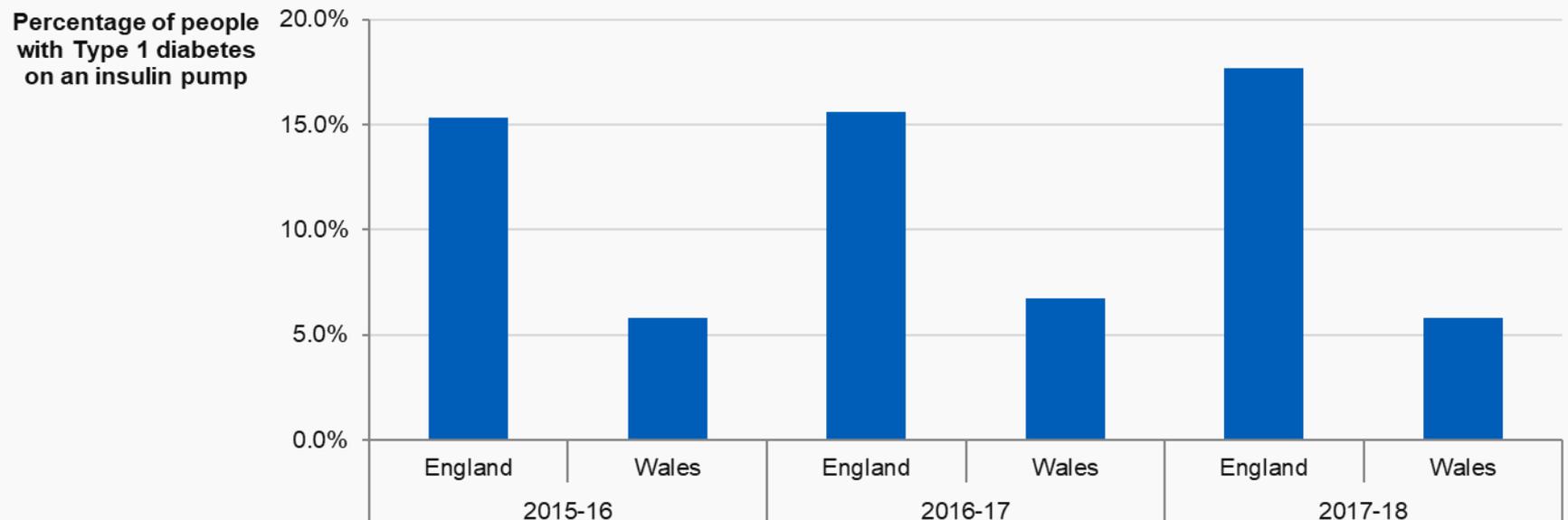
1. The three trusts reporting 100% of patients using insulin pumps have been excluded from this graph because it is not clear whether they only submitted pump patients or whether all the patients in their Type 1 service use a pump.



# Prevalence - People on Pump, by Audit Period

- The apparent difference in the proportion of Type 1 pump users between England and Wales is likely to be due to the different submission arrangements and denominators (see slide 17).
- There has been a small increase in the proportion of pump users among Type 1 patients attending English specialist services. The geographical pattern of use in Wales has been stable.

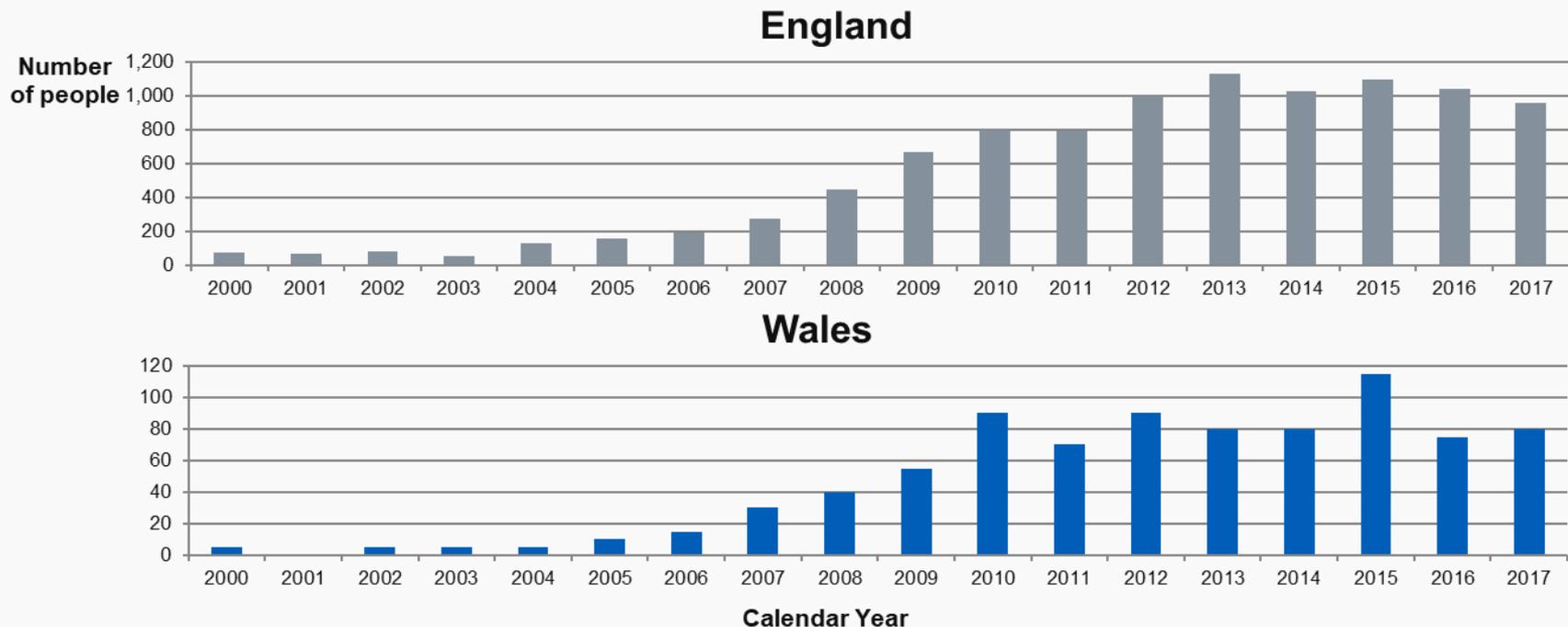
**Figure 7: The percentage of people with Type 1 diabetes who are on an insulin pump, by audit period, England and Wales, 2015-16 to 2017-18**



# Year Started on Pump

- The rate of pump starts increased steadily until 2012 and has stabilised since.
- Please note the difference in scale between the England and Wales graphics below.

**Figure 8: The number of people with Type 1 diabetes by country and year started on pump, England and Wales, 2000 to 2017**



# National Diabetes Insulin Pump Audit 2017-18

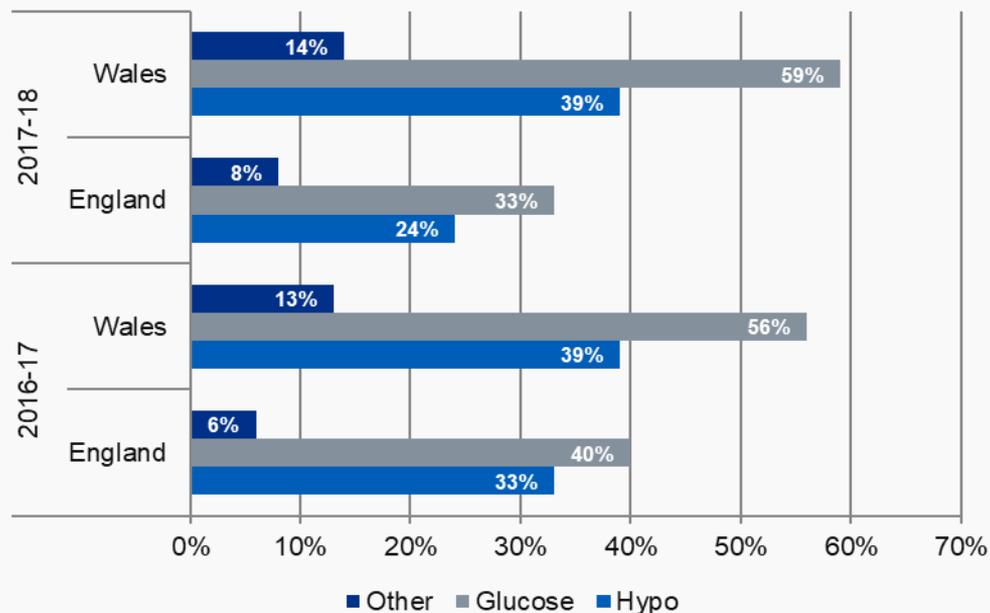
**Reason for  
Starting on an  
Insulin Pump**



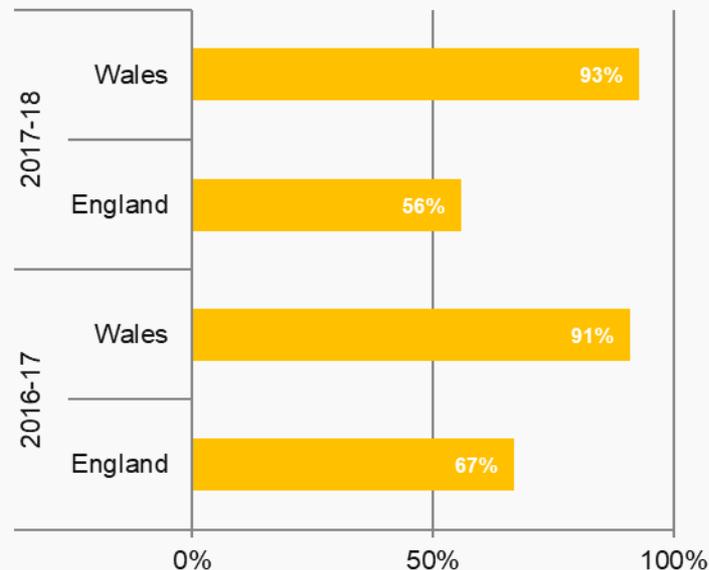
# Reason for Starting on an Insulin Pump

- Treatment goal achievement is not a mandatory field in the collection. Data completeness was only two-thirds in England but close to 100% in Wales.
- Where recorded, improving glucose control has been the most common pump start treatment goal in all time periods in both England and Wales.

**Figure 9: The percentage of people with a reason<sup>1</sup> for starting on an insulin pump, all diabetes types, by country and audit period, England and Wales, 2016-17 to 2017-18**



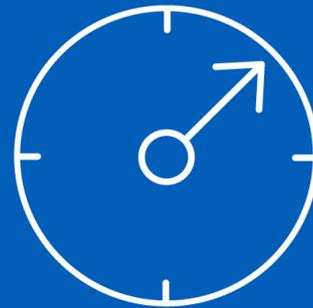
**Figure 10: The percentage of people on a pump with at least one known reason, all diabetes types, by country and audit period**



1. A person may have more than one reason for starting insulin pump therapy. For this reason, some people are counted more than once and the sum of the percentages by country in some years is greater than 100%. For those years where no reason is given for most people, the percentages sum to less than 100%.

# National Diabetes Insulin Pump Audit 2017-18

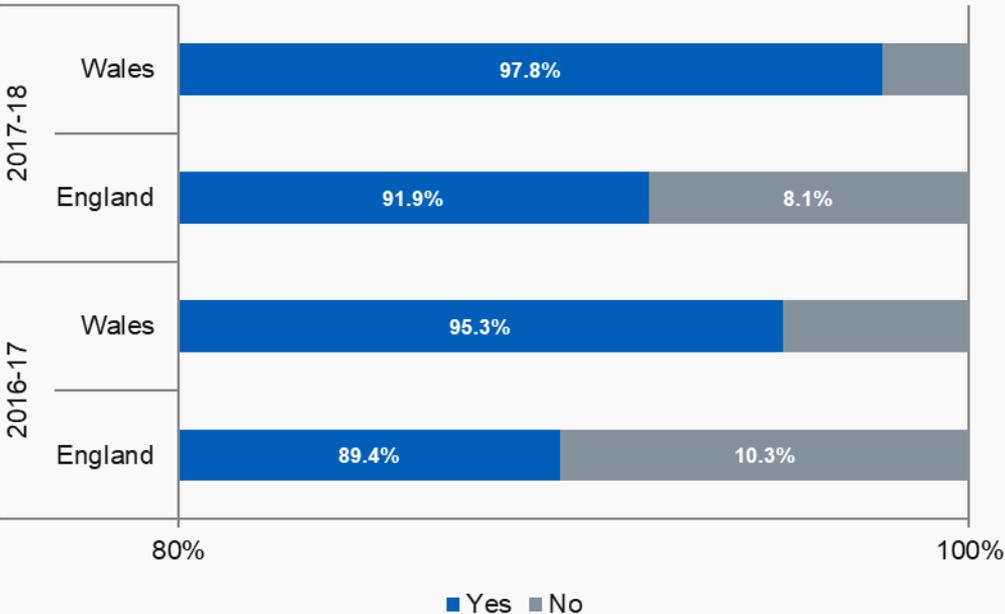
## Achievement of Treatment Goals



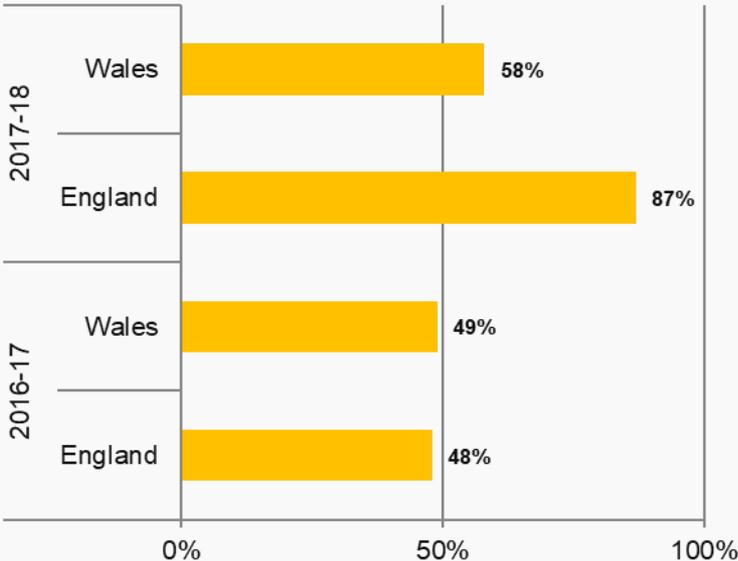
# Treatment Goal - Hypoglycaemia

- Treatment goal achievement is not a mandatory field in the collection, therefore it is important to note the partial data completeness (see slide 9).
- Where hypoglycaemia reduction is recorded as a treatment goal, around nine out of ten people on insulin pumps reach their target.

**Figure 11: The percentage of people that reached their hypoglycaemia reduction treatment goal after starting on an insulin pump, by country and audit period, England and Wales, 2016-17 to 2017-18**



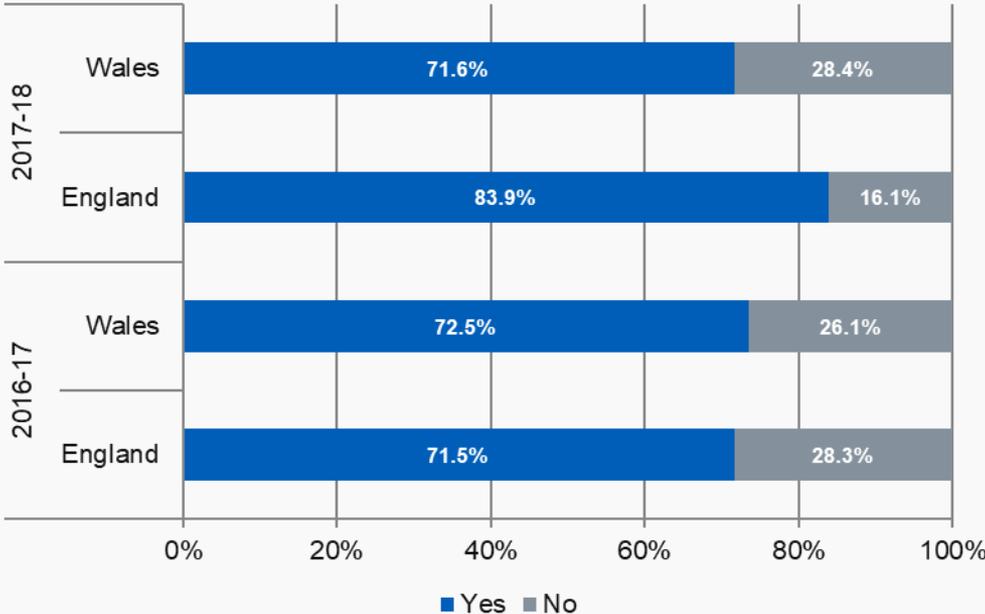
**Figure 12: The percentage of people with hypoglycaemia reduction goal recorded, all diabetes types, by country and audit period**



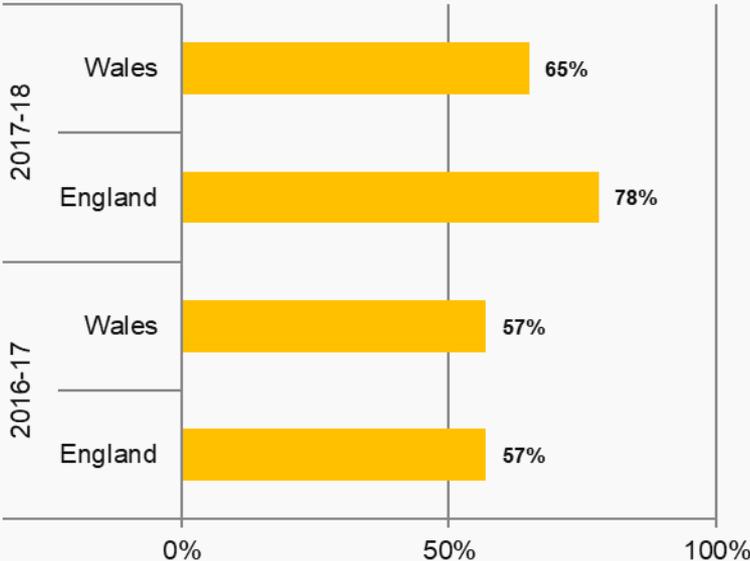
# Treatment Goal – Glucose Control

- Treatment goal achievement is not a mandatory field in the collection, therefore it is important to note the partial data completeness (see slide 9).
- Where improved glucose control is recorded as a treatment goal, around seven out of ten people on insulin pumps reach their target.

**Figure 13: The percentage of people that reached their glucose control treatment goal after starting on an insulin pump, by country and audit period, England and Wales, 2016-17 to 2017-18**



**Figure 14: The percentage of people with glucose control goal recorded, all diabetes types, by country and audit period**



# National Diabetes Insulin Pump Audit 2017-18

**Care Process  
Completion**



# Care Processes

All people with diabetes aged 12 years and over should receive all of the nine NICE recommended care processes<sup>1,2</sup> and attend a structured education programme shortly after diagnosis.

## Nine Annual Care Processes for all people with diabetes aged 12 and over

Responsibility of Diabetes Care providers (comprising the NDA 8 Care Processes)

<b>1. HbA1c</b> (blood test for glucose control)	<b>5. Urine Albumin/Creatinine Ratio</b> (urine test for risk of kidney disease)
<b>2. Blood Pressure</b> (measurement for cardiovascular risk)	<b>6. Foot Risk Surveillance</b> (examination for foot ulcer risk)
<b>3. Serum Cholesterol</b> (blood test for cardiovascular risk)	<b>7. Body Mass Index</b> (measurement for cardiovascular risk)
<b>4. Serum Creatinine</b> (blood test for kidney function)	<b>8. Smoking History</b> (question for cardiovascular risk)

**Responsibility of NHS Diabetes Eye Screening (NHS England, Public Health England)  
(the screening registers are drawn from practice registers but the outcomes are recorded in screening management systems that presently cannot export data to the NDA)**

**9. Digital Retinal Screening**  
(photographic eye test for early detection of eye disease)

1. NICE recommended care processes <http://www.nice.org.uk/guidance/conditions-and-diseases/diabetes-and-other-endocrinal--nutritional-and-metabolic-conditions/diabetes>  
2. National Service Framework (NSF) for Diabetes <https://www.gov.uk/government/publications/national-service-framework-diabetes>  
NICE Clinical Guidelines – NG17: Type 1 diabetes in adults: diagnosis and management <http://www.nice.org.uk/guidance/ng17>  
NICE Clinical Guidelines – NG28: Type 2 diabetes in adults: management <http://www.nice.org.uk/guidance/ng28>  
NICE – Diabetes in Adults Quality Standard <http://guidance.nice.org.uk/QS6>



# Care Processes, by pump status

- Care process completion in England is similar between people with Type 1 diabetes using, and people with Type 1 diabetes not using, an insulin pump.
- The English services participating in the pump audit performed better as a cohort than the entire NDA.
- In Wales, care process completion is generally worse in pump users.

**Table 3: The percentage of people with Type 1 diabetes receiving NICE recommended care processes by country and insulin pump status, England and Wales, 2017-18**

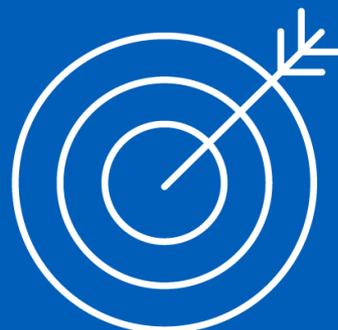
	England - Participating Pump Services		England - all NDA	Wales	
	People on an insulin pump	People NOT on an insulin pump	All People	People on an insulin pump	People NOT on an insulin pump
<b>HbA1c</b>	94.9	91.7	85.4	73.9	74.7
<b>Blood pressure</b>	94.4	93.2	91.1	87.3	83.3
<b>Cholesterol</b>	88.0	86.0	81.1	59.5	65.6
<b>Serum creatinine</b>	90.8	89.1	83.5	70.5	74.1
<b>Urine albumin</b>	67.5	63.2	52.3	32.4	35.3
<b>Foot surveillance</b>	78.0	78.2	75.1	56.1	56.9
<b>BMI</b>	89.0	88.2	82.7	74.6	66.2
<b>Smoking</b>	94.4	92.2	90.4	88.4	82.4
<b>All eight care processes<sup>1</sup></b>	<b>52.6</b>	<b>51.8</b>	<b>42.9</b>	<b>21.0</b>	<b>24.9</b>



1. The eye screening care process is not included; therefore 'eight care processes' comprises of eight care processes excluding eye screening.

# National Diabetes Insulin Pump Audit 2017-18

**Treatment  
Target  
Achievement**



# Treatment Targets

NICE recommends treatment targets for HbA1c (glucose control), blood pressure and Cardiovascular Disease (CVD) risk reduction:

- Target HbA1c reduces the risk of all diabetic complications (eyes, kidney, nerves) and CVD risk.
- Target blood pressure reduces CVD risk and reduces the progression of diabetic eye and kidney disease.
- Statins reduce serum cholesterol and CVD risk.
- NICE treatment target specifications were updated in 2015-16 and now differ between Type 1 and Type 2 diabetes (<https://www.nice.org.uk/guidance/ng17>; <https://www.nice.org.uk/guidance/ng28>).



# Treatment Targets, by pump status

- All three treatment targets (particularly HbA1c) are more often achieved in people with Type 1 diabetes if they are using an insulin pump.
- As seen earlier in this report, there are age, sex and socio demographic differences between people on pump therapy and those not. The figures below have not been adjusted for these and other factors that may affect rates beyond whether a person is on a pump or not. We do know that people on insulin pumps have a younger age profile than those not on a pump (see slide 12) and, among all people with Type 1 diabetes, younger people (aged under 50) are only about two-thirds as likely to achieve treatment targets (as those over 60)<sup>1</sup>.

**Table 4: The percentage of people with Type 1 diabetes achieving their NICE recommended treatment targets, by country and insulin pump status, England and Wales, 2017-18**

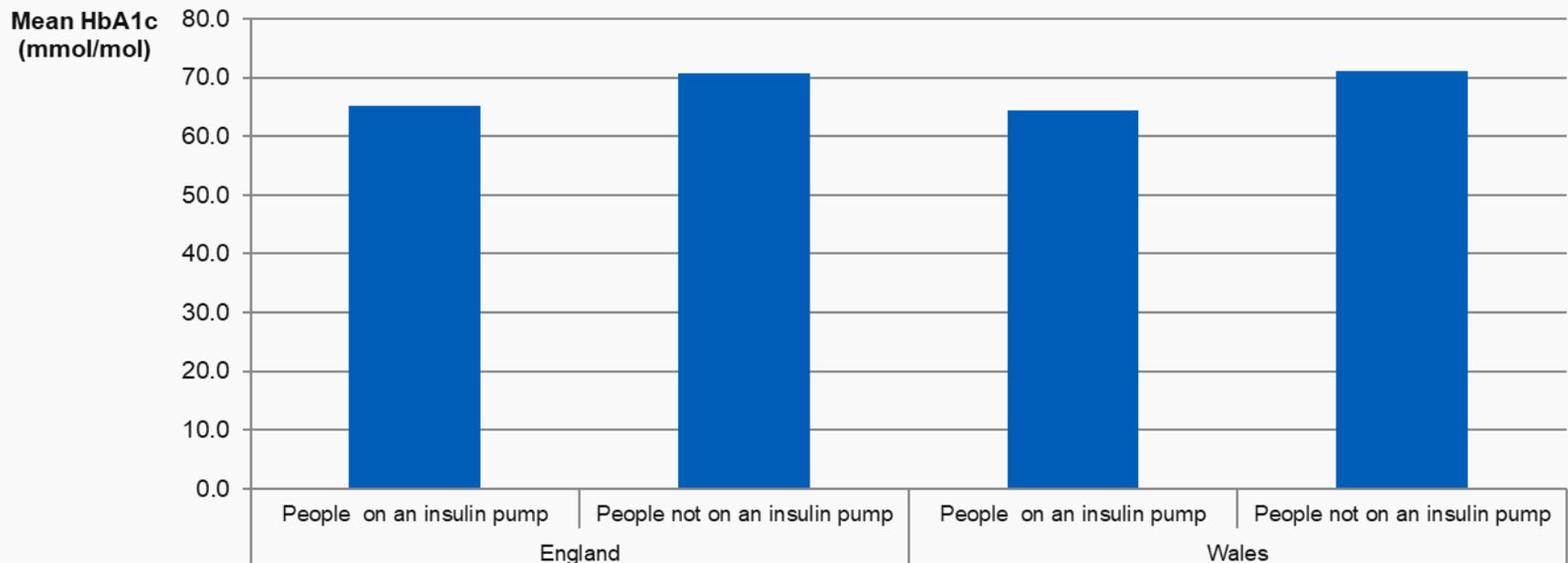
	England - Participating Pump Services		England - all NDA	Wales	
	People on an insulin pump	People NOT on an insulin pump	All People	People on an insulin pump	People NOT on an insulin pump
HbA1 <sub>c</sub> ≤ 58 mmol/mol	34.4	27.0	29.9	35.7	25.4
Blood pressure ≤ 140/80*	72.6	69.9	74.8	71.5	71.7
Cholesterol < 5mmol/L	73.0	70.2	70.3	72.8	69.0
Meeting all three treatment targets OLD	20.8	15.3	18.6	20.0	15.0
Statins for Primary Prevention of CVD	61.9	63.7	65.4	62.0	63.9
Statins for Secondary Prevention of CVD	83.9	75.3	85.3	75.0	83.9
Statins for Combined Prevention of CVD	64.6	65.8	68.9	64.6	67.4
Meeting all three treatment targets NEW*	21.5	15.6	18.9	22.1	14.8



# Treatment Targets – Mean HbA1c

- Mean HbA1c is lower for people with Type 1 diabetes who are on an insulin pump.
- Analysis for the first Insulin Pump Audit looked at the change in HbA1c after starting on an insulin pump: <https://digital.nhs.uk/catalogue/PUB20436>.

**Figure 15: Mean HbA1c (mmol/mol) for people with Type 1 diabetes, by country and insulin pump status, England and Wales, 2017-18**



# National Diabetes Insulin Pump Audit 2017-18

## Methodology



# Methodology

- The National Diabetes Insulin Pump Audit data are collected via the Core NDA data extraction. For further methodological and data quality details, please see the latest annual report: [www.digital.nhs.uk/pubs/ndauditcorerep1718](http://www.digital.nhs.uk/pubs/ndauditcorerep1718)
- During the NDA collection window, the insulin pump data were collected alongside the NDA care processes and treatment target data. The local insulin pump teams were required to liaise with their wider diabetes teams and clinical audit/information departments to ensure that the correct information was submitted for all of their diabetes patients, not just insulin pump patients.
- Welsh specialist services were allowed to submit only pump data, as 100% GP practice participation in Wales should ensure that all other data for the patients were collected. However, this meant that for Wales comparisons are at Local Health Board level, whereas for England comparisons are at specialist service level.
- Within the proforma, the reason the person is on pump and the year pump was started, were mandatory fields. Achievement of treatment goals was optional.
- Pump data was linked to the Core NDA data for all patients.



# National Diabetes Insulin Pump Audit 2017-18

**Definitions,  
Data Sources  
and Further  
Reading**



# Definitions

## Diabetes

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

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

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

**BMI measurement** – Body Mass Index calculated from weight and height to classify under, normal, overweight and obese.

**Serum creatinine** – this blood test is used as measure kidney function.

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

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

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

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

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



# Definitions

## Insulin Pump Therapy

Insulin pumps are portable devices attached to the body that continuously deliver amounts of rapid or short acting insulin via a catheter placed under the skin. Insulin pump therapy is also referred to as continuous subcutaneous insulin infusion therapy.

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

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

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

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

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

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

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

## Specialist Service

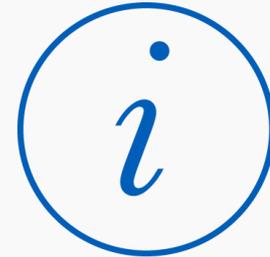
This is a service (often hospital based but sometimes delivered in a community setting) which includes diabetes specialists working in multidisciplinary teams. These teams usually comprise physicians (diabetologists), diabetes specialist nurses and dieticians; it may also include clinical psychologists.



# Additional Information

The following documents are available from <http://www.digital.nhs.uk/pubs/ndapump1718>

- Supporting data in Excel
  - Supporting Information – National tables and charts
  - Interactive report, Wales - LHB level
  - Interactive report - Specialist Service (England)
- PowerPoint version of this report



# National Diabetes Insulin Pump Audit 2017-18

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For further information

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