

# National Diabetes Insulin Pump Audit, 2015-2016

England and Wales

13 July 2017



# Introduction (1)

- The Insulin Pump Audit is part of the National Diabetes Audit programme (NDA), and is commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit programme (NCA). The NDA is managed by NHS Digital (formerly the Health and Social Care Information Centre (HSCIC)) in collaboration with Diabetes UK and supported by Public Health England (PHE).
- The Insulin Pump Audit collects information on the number and characteristics of people with diabetes using an insulin pump, the reason for going on an insulin pump and the outcomes achieved since starting the pump.

Prepared in collaboration with:



Supported by:



Public Health  
England

## Introduction (2)

The guidance states that Continuous Subcutaneous Insulin Infusion (CSII) or 'insulin pump' therapy is recommended as a treatment option for adults and children 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 using 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.

# Key Findings

- Improved participation and data quality means that the report this year is more comprehensive and clinically useful.
- The rate at which people with Type 1 diabetes are starting pump treatment has stabilised.
- The proportion of people with Type 1 diabetes treated with pumps varies between centres from >50% to <5%.
- More people are recorded as starting pump treatment to lower glucose levels than to reduce hypoglycaemia.
- Between two thirds and three quarters of pump users are recorded as achieving their pump treatment goals.
- Type 1 diabetes pump users are more likely to achieve all their treatment targets and on average have a lower HbA1c than their non-pump using peers, despite being a younger cohort.

# Recommendations

- Given the evidence for effectiveness, more people with Type 1 diabetes should be considered for pump treatment.
  - **Who:** all specialist diabetes services
  - **What:** offer pump therapy to all people with Type 1 diabetes who meet NICE criteria
  - **Where/when:** during annual care planning
- The reasons for the ten fold variation in pump use by people with Type 1 diabetes between specialist centres 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 NDA review and action planning

# National Diabetes Insulin Pump Audit, 2015-16

## 1. Participation and Data Quality

# Participation

This is the first year that insulin pump data has been submitted for Wales. Table 1 shows the number of hospitals that submitted to the NDA only, to the Insulin Pump Audit only and to both. Improvement in participation and data quality mean that the findings are more comprehensive and clinically useful.

**Table 1: Participation in the pump audit, England and Wales 2013-2016**

	Number of units participating			
	2013-2014	2014-2015	2015-2016	
	England	England	England	Wales <sup>1</sup>
<b>Insulin pump and NDA</b>	29	64	69	N/A
<b>Insulin pump only</b>	2	2	0	14
<b>NDA only</b>	46	30	29	N/A

1. Wales specialist services were permitted to submit only pump patients due to 100% GP practice participation in Wales. The records were matched to the primary care submissions from Wales; the rest of this report will report by Local Health Board (LHB) for Wales instead of by specialist organisation.

# Data Quality

Table 2 shows the number and per cent complete fields for each data item submitted. The completeness of the 'Reason' field in the Welsh records suggests that further improvement in the English records is possible. Similarly, the completeness of the 'Treatment Goal' fields in the English records suggest that further improvement in the Welsh records is possible.

**Table 2: Completeness of the pump data submitted, 2014-2016**

	England						Wales		
	2014-2015			2015-2016			2015-2016		
	Number of Responses	Number of People	Percentage Completed	Number of Responses	Number of People	Percentage Completed	Number of Responses	Number of People	Percentage Completed
<b>Reason for starting pump</b>									
Hypoglycaemia Reduction	1,813	6,744	26.9	5,615	9,183	61.1	904	904	100.0
Glucose Control	1,809	6,744	26.8	5,668	9,183	61.7	903	904	99.9
Other	400	6,744	5.9	5,211	9,183	56.7	904	904	100.0
<b>Treatment Goals<sup>1</sup></b>									
Hypoglycaemia Reduction	3,062	6,744	45.4	4,636	9,183	50.5	55	904	6.1
Glucose Control	3,331	6,744	49.4	4,636	9,183	50.5	55	904	6.1
<b>Year started using pump</b>	5,685	6,744	84.3	8,575	9,183	93.4	872	904	96.5

<sup>1</sup>The treatment goal field within the insulin pump collection is optional



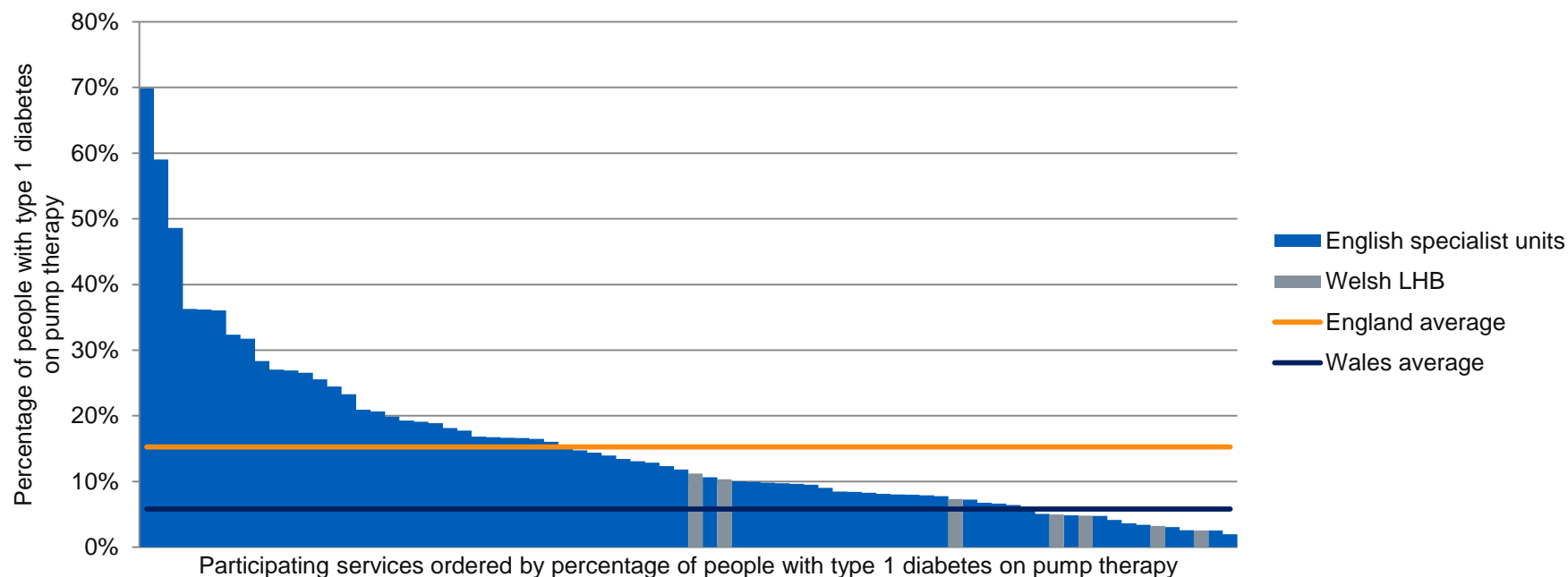
# National Diabetes Insulin Pump Audit, 2015-16

## 2. Prevalence of insulin pump use for people with Type 1 diabetes

# Proportion of people on insulin pump

The apparent difference between England and Wales in the proportion of people with Type 1 diabetes on insulin pumps is likely due to differences in submission. For England, the denominator is the number of people with Type 1 diabetes attending the participating centres. For Wales, it is the total number of people with Type 1 diabetes in the LHB.

**Figure 1: Percentage of people with Type 1 diabetes on pump therapy by participating specialist service<sup>1</sup>, 2015-2016**

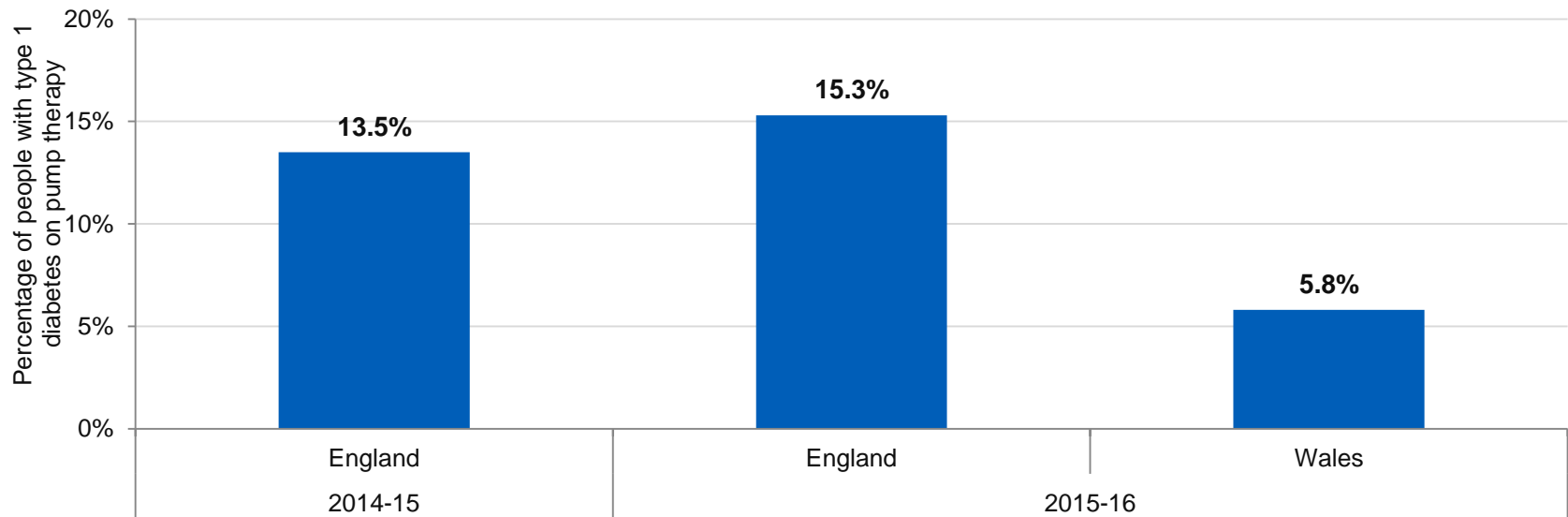


\*1 See Data Quality Report

# Proportion of people on insulin pump

The apparent difference between England and Wales is likely to be due to submission arrangements (in England by specialist centre, in Wales by LHB). The proportion of people with Type 1 diabetes attending specialist centres in England treated with pumps has increased between 2014-15 and 2015-16.

**Figure 2: Percentage of people with Type 1 diabetes on an insulin pump, by audit year, 2014-2016**

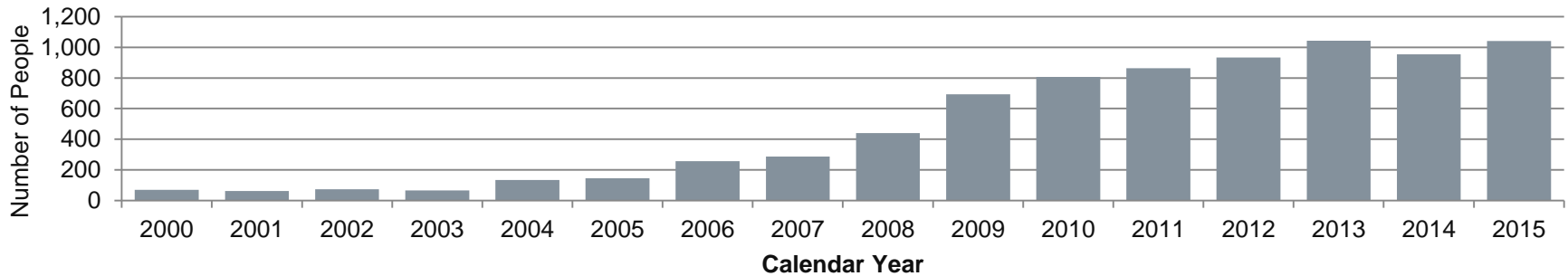


# Year Started on Pump

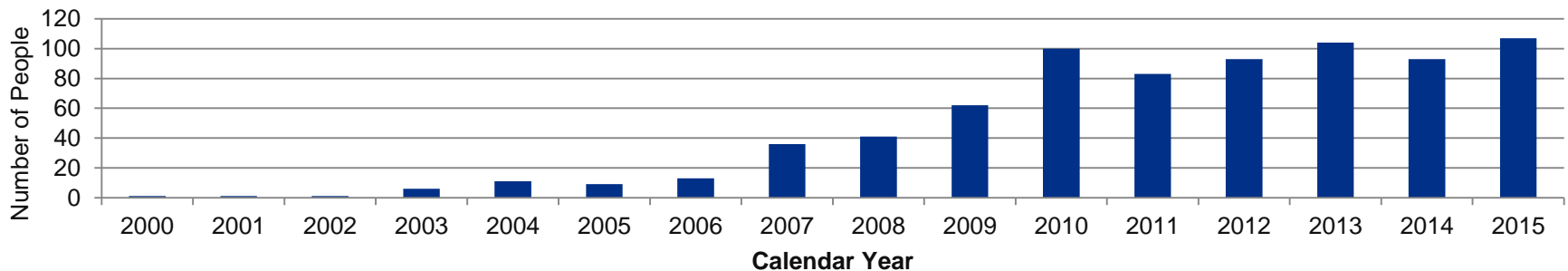
Figure 3 shows the year in which people included in the 2015-16 audit started on a pump. For both England and Wales, the number of people starting on a pump has stabilised over the past 5 years.

**Figure 3: Number of people with Type 1 diabetes by year started on pump, by country, 2015-16.**

## England



## Wales



# National Diabetes Insulin Pump Audit, 2015-16

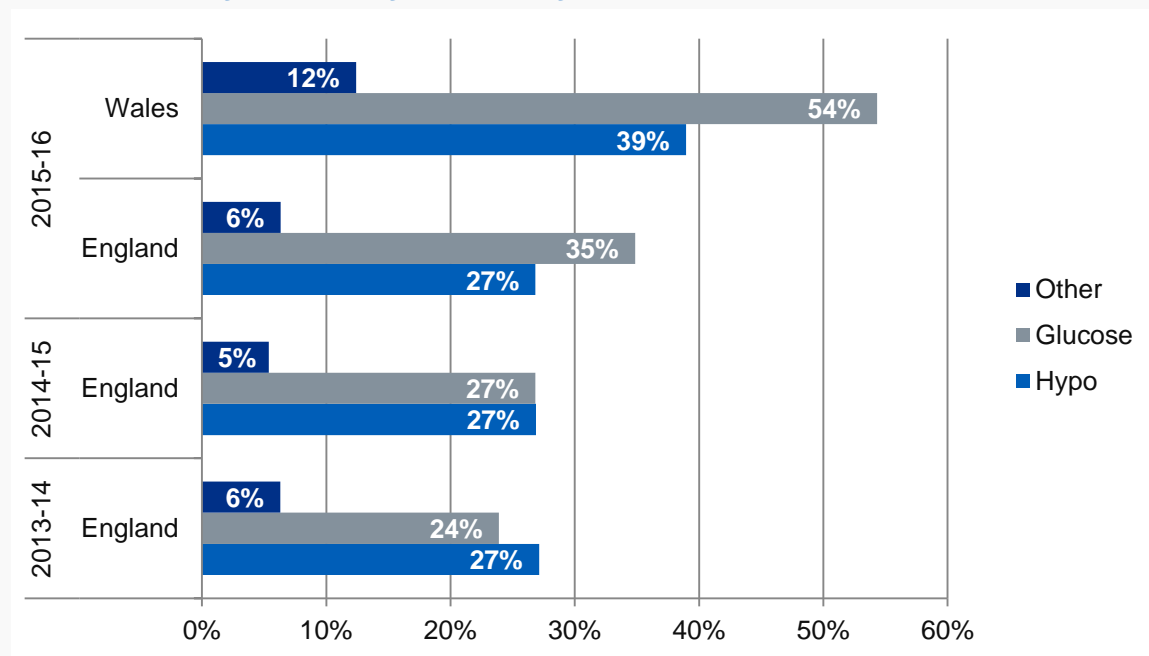
## 3. Reason for starting on insulin pump therapy

# Reason for starting insulin Pump therapy

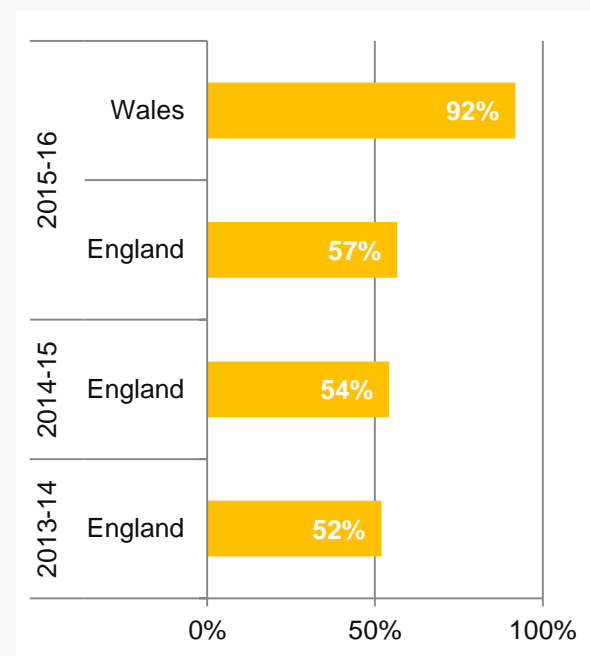
It is important to note poorer data completeness for England than for Wales.

Nonetheless, similar patterns are seen in England and Wales, with glucose lowering more often given as the recorded reason for moving to pump rather than hypoglycaemia.

**Figure 4: The reason<sup>1</sup> for starting pump, all diabetes types, by audit year**



**Figure 5: Percentage with at least one known reason**



1. A person may have more than one reason for starting insulin pump therapy.

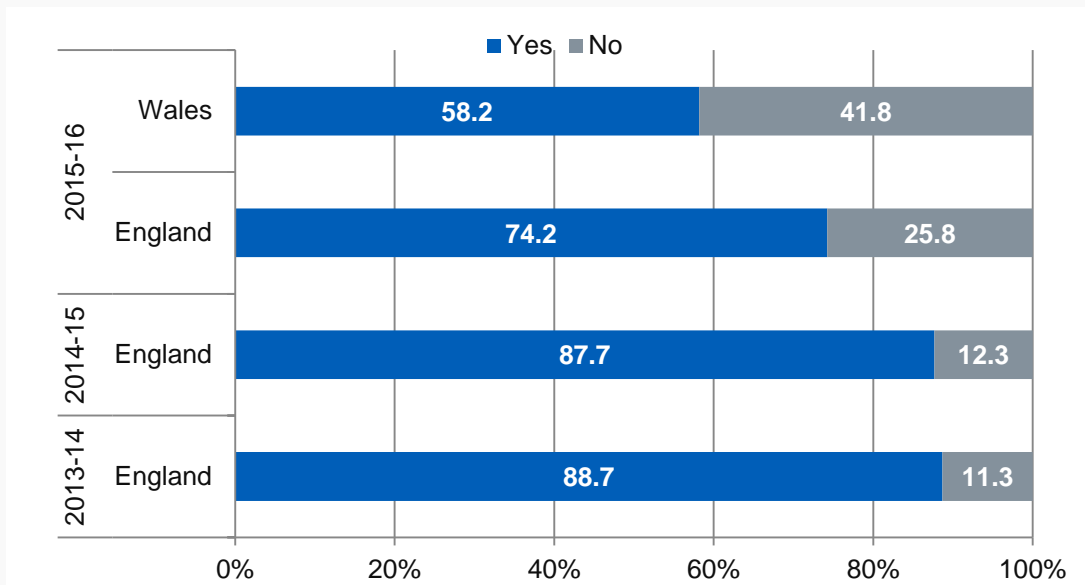
# National Diabetes Insulin Pump Audit, 2015-16

## 4. Achievement of Treatment Goals

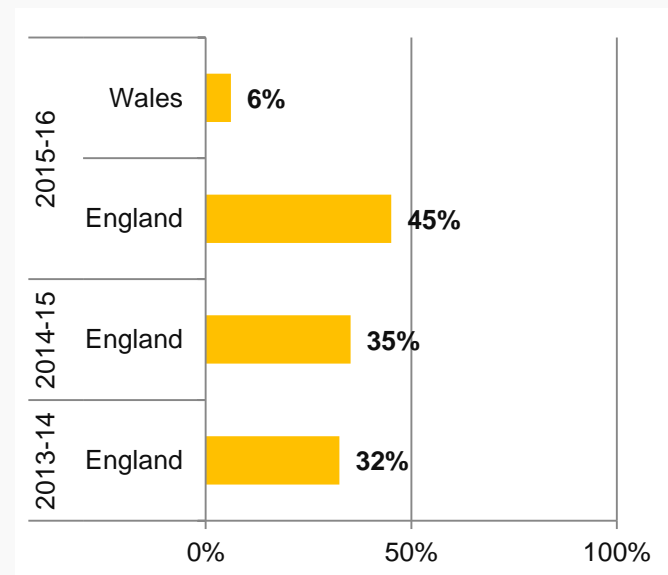
# Treatment Goal – Hypoglycaemia

It is important to consider data completeness when considering goal achievement, although this is much improved for England this year. Within the limitations of the data, between two thirds and three quarters of people on insulin pump reach their target goal for hypoglycaemia.

**Figure 6: The percentage of people that reached their hypoglycaemia reduction treatment goal after starting pump therapy, by audit year**



**Figure 7: Percentage with hypoglycaemia reduction goal recorded**

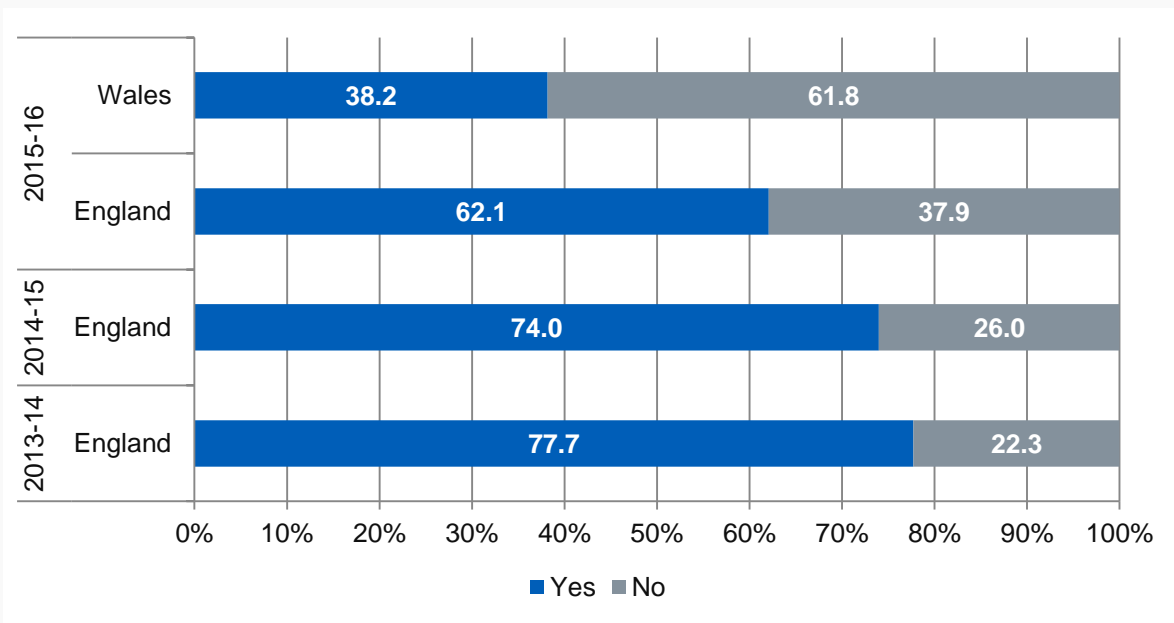




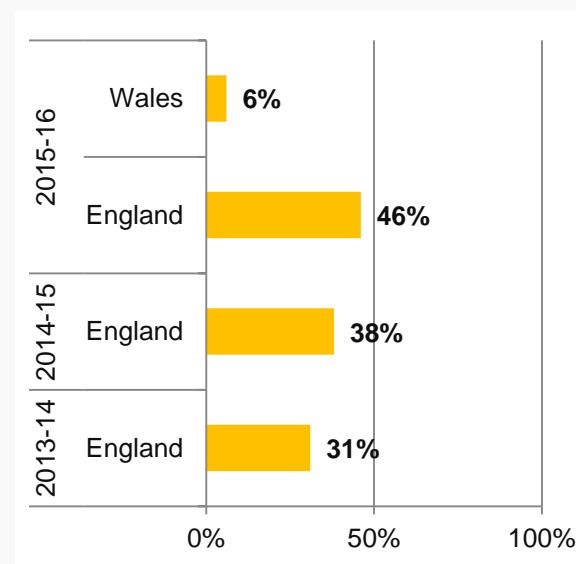
# Treatment Goal – Glucose Control

It is important to consider data completeness when considering goal achievement, although this is much improved for England this year. Within the limitations of the data, between a third and two thirds of people on insulin pump reach their target goal for glucose control.

**Figure 8: The percentage of people that reached their glucose control treatment goal after starting pump, by audit year**



**Figure 9: Percentage with glucose control treatment goal recorded**



# National Diabetes Insulin Pump Audit, 2015-16

## 5. 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 when diagnosed.

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

Responsibility of diabetes care providers (including in the NDA 8 Care Processes)

<b>1 - HbA1c</b> (blood test for glucose control)	<b>5 - Urine Albumin/Creatinine Ratio</b> (urine test for kidney function)
<b>2 - Blood Pressure</b> (measurement for cardiovascular risk)	<b>6 - Foot Risk Surveillance</b> (foot 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 (screening register drawn from practices)

**9 - Digital Retinal Screening**  
Photographic eye test for eye risk

# Care Processes

Care process completion in England is similar between people with Type 1 using and people with Type 1 not using an insulin pump with the exception of foot surveillance. In Wales, care process completion is generally worse in pump users.

**Table 3: Percentage of people with Type 1 diabetes receiving NICE recommended care processes by care process, for those on insulin pump and those not on an insulin pump, 2015-2016**

	England		Wales	
	People on an insulin pump	People <b>not</b> on an insulin pump	People on an insulin pump	People <b>not</b> on an insulin pump
<b>HbA1c</b>	92.4	91.1	68.1	73.6
<b>Blood pressure</b>	92.5	90.8	89.3	85.0
<b>Cholesterol</b>	83.6	84.3	59.8	67.5
<b>Serum creatinine</b>	86.8	87.5	66.5	73.9
<b>Urine albumin</b>	59.6	59.5	33.0	39.9
<b>Foot surveillance</b>	67.3	71.9	57.7	62.6
<b>BMI</b>	85.0	83.1	69.4	67.4
<b>Smoking</b>	79.9	81.9	68.9	71.9
<b>Eight care processes<sup>3</sup></b>	38.9	42.2	19.4	27.1

3. Please see full list of footnotes in the definitions and footnote section.

# National Diabetes Insulin Pump Audit, 2015-16

## 6. Treatment Target Achievement

# Treatment Targets

NICE recommends treatment targets for HbA1c (glucose control), blood pressure and serum cholesterol

- Target HbA1c reduces the risk of all diabetic complications.
- Target blood pressure reduces the risk of vascular complications and reduces the progression of eye disease and kidney failure.
- Target cholesterol reduces the risk of vascular complications.

# Treatment Targets

All three treatment targets are more often achieved in people with Type 1 diabetes using an insulin pump. Figures have not been adjusted for age, although the age profile of people on insulin pumps is lower than for those not on a pump<sup>1</sup>, and overall younger people are less likely to achieve the treatment targets<sup>2</sup>.

**Table 4: Percentage of people with diabetes achieving their NICE recommended treatment targets for those on insulin pump and those not on an insulin pump, 2015-2016**

	England		Wales	
	People on an insulin pump	People <b>not</b> on an insulin pump	People on an insulin pump	People <b>not</b> on an insulin pump
<b>HbA<sub>1c</sub> ≤ 58 mmol/mol</b>	32.0	27.8	33.5	23.3
<b>Blood Pressure ≤ 140/80</b>	71.9	70.3	75.8	74.6
<b>Cholesterol &lt; 5mmol/L</b>	72.7	70.6	71.4	69.6
<b>Meeting all three treatment targets</b>	19.0	15.8	19.9	13.9

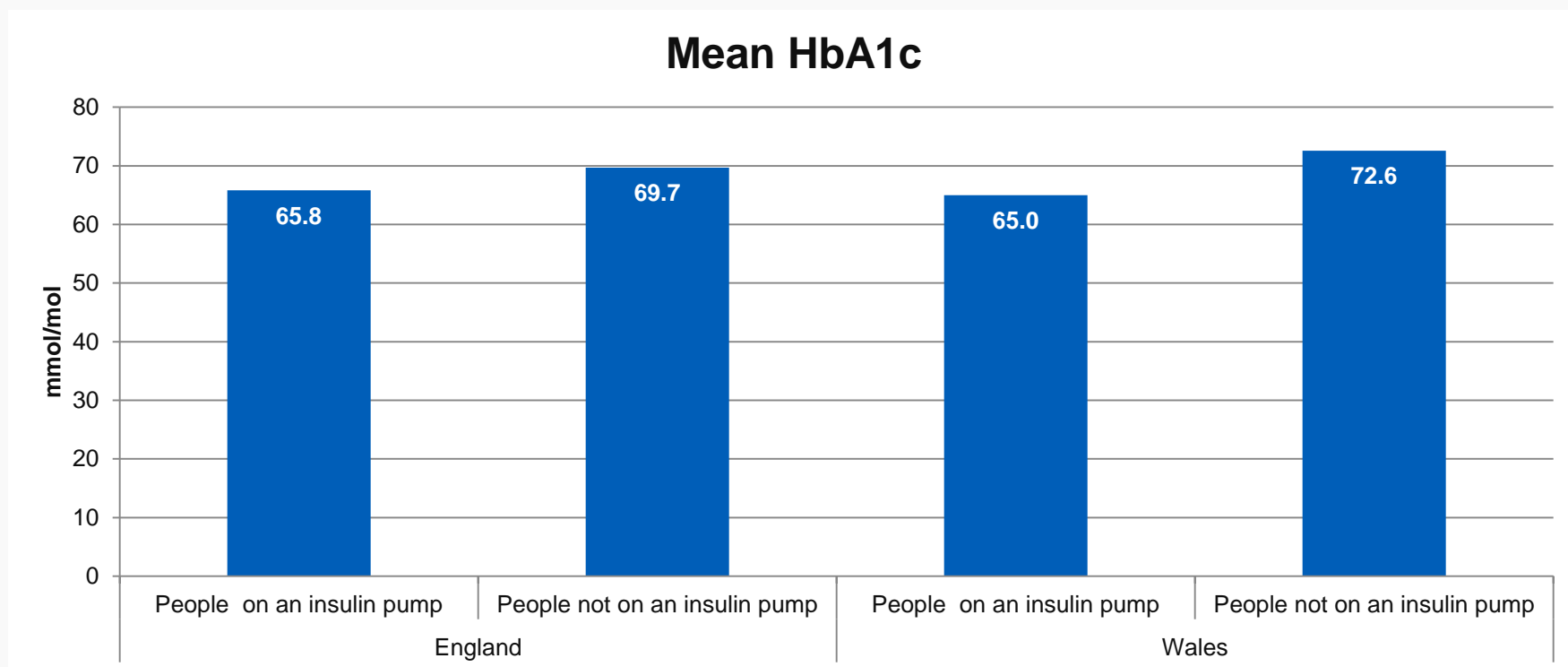
1. National Diabetes Insulin Pump Audit Report, 2013-2015, <http://content.digital.nhs.uk/catalogue/PUB20436>.

2. National Diabetes Audit – 2015-2016: Report 1, Care Processes and Treatment Targets, <http://content.digital.nhs.uk/catalogue/PUB23241>.

# Treatment Targets – Mean HbA1c

Mean HbA1c is lower for Type 1 patients treated with an insulin pump.

**Figure 10: Mean HbA1c (mmol/mol) for those with Type 1 diabetes on an insulin pump compared to those not on a pump, 2015-2016**





# National Diabetes Insulin Pump Audit, 2015-16

## 7. Methodology

# Methodology

- The National Diabetes Insulin Pump Audit supplements the core National Diabetes Audit.
- During the NDA collection window, the insulin pump data was collected alongside the NDA care processes and treatment target data using a single Excel proforma. 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 was 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. For details of the NDA data please see the latest annual report: [www.digital.nhs.uk/pubs/ndauditcorerep1516](http://www.digital.nhs.uk/pubs/ndauditcorerep1516).

## 8. Definitions, footnotes, 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 and over-weight

**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

## 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

## 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.

## 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.

# Footnotes

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 – GN17: 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>
3. The eye screening care process is not included; therefore ‘eight care processes’ comprises of eight care processes excluding eye screening.

# Additional information

The following documents are available from  
<http://www.digital.nhs.uk/pubs/ndapump1516>

- Supporting data in Excel
  - National Summary: Tables and Charts
  - Interactive report for participating Specialist Services in England
  - Interactive report for Local Health Boards in Wales
- PowerPoint version of this report
- Data Quality Report

# National Diabetes Insulin Pump Audit, 2015-2016

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