National Diabetes Insulin Pump Audit, 2016-2017

England and Wales

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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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Supported by:

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

Introduction

The 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 the pump.

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 attending specialist services that are treated with pumps varies from >40% to <5%.
- Between two thirds and three quarters of pump users are recorded as achieving their pump treatment goals.
- Nine out of ten people reached their target goal for hypoglycaemia.
- Seven out of ten people reached their target goal for glucose control.
- Despite being a younger cohort, Type 1 diabetes pump users more often achieve all their treatment targets, and on average have a lower HbA1c, than their non-pump using peers.

Recommendations

- The variation in provision and apparent 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 suggests a lack of access for patients attending some services and 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.

1. Participation and data quality

Participation

More centres have participated in the insulin pump component of the NDA for 2016-17.

Table 1: Participation in the pump audit, England and Wales, 2013-2017

	Number of units participating					
	2013-2014	2014-2015	2015-2016		2016-17	
	England	England	England	Wales[1]	England	Wales[1]
Insulin pump and NDA	29	64	69	N/A	55	N/A
Insulin pump only	2	2	0	14	18	15
NDA only	46	30	29	N/A	26	N/A

1. Wales specialist services were permitted to submit only pump patients due to near 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

Data for 2016-17 was more comprehensive, and overall the data quality has improved.

Table 2: Completeness of the pump data submitted, England and Wales, 2015-2017

	England			Wales			England			Wales		
	2015-2016			2015-2016			2016-2017			2016-2017		
Data Field	No. of Responses	No. of People	% Complete	No. of Responses	No. of People	% Complete	No. of Responses	No. of People	% Complete	No. of Responses	No. of People	% Complete
Reason for starting pump												
Hypoglycaemia Reduction	5,615	9,183	61.1	904	904	100.0	7,020	9,770	71.9	1,055	1,065	99.1
Glucose Control	5,668	9,183	61.7	903	904	99.9	7,000	9,770	71.6	1,055	1,065	99.1
Other	5,211	9,183	56.7	904	904	100.0	6,155	9,770	63.0	1,055	1,065	99.1
Treatment Goals[1]												
Hypoglycaemia Reduction	4,636	9,183	50.5	55	904	6.1	4,435	9,770	45.4	460	1,065	43.2
Glucose Control	4,636	9,183	50.5	55	904	6.1	4,510	9,770	46.2	540	1,065	50.7
Year started using pump	8,575	9,183	93.4	872	904	96.5	9,030	9,770	92.4	1,035	1,065	97.2

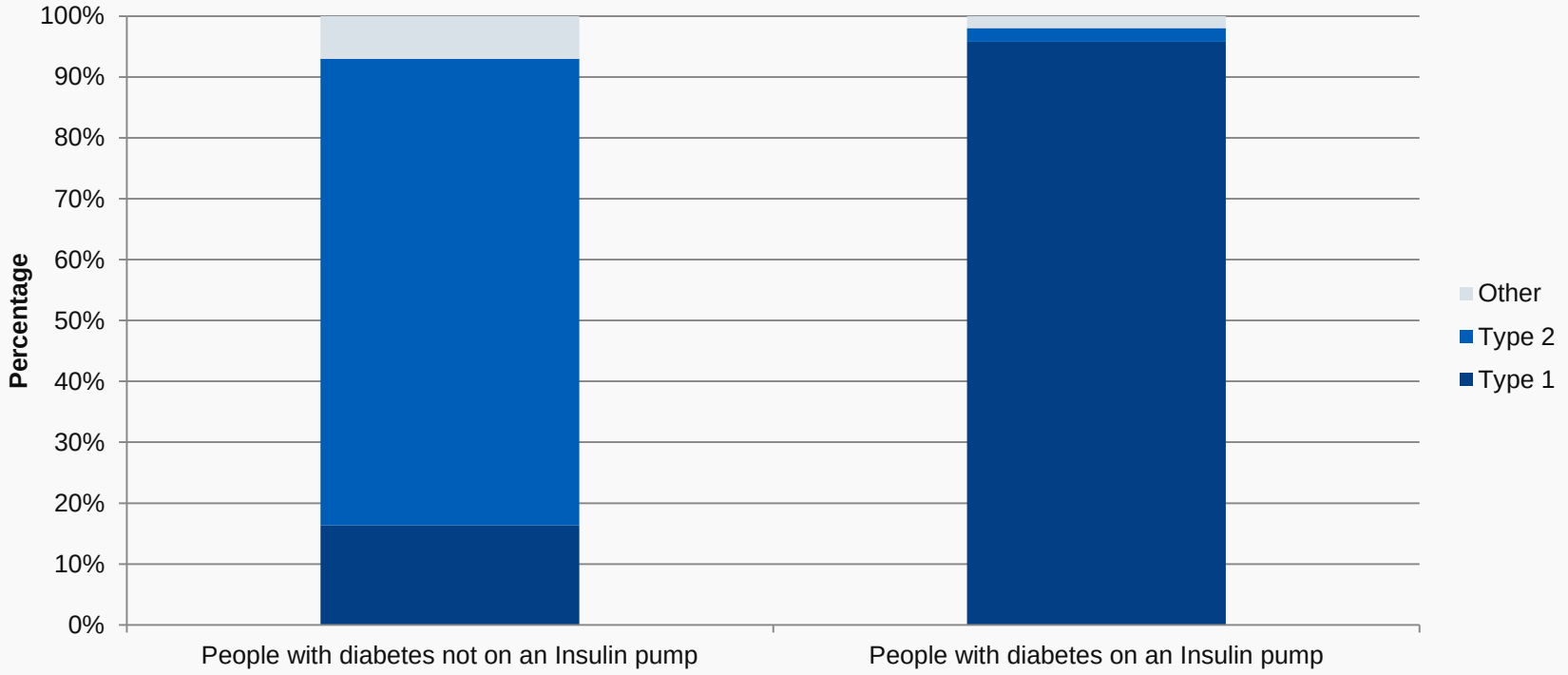
[1]The treatment goal field within the insulin pump collection is optional

2. Demographics of people on Pump

Diabetes Type of People on Pump

A small number of people using insulin pumps are still recorded as having Type 2 diabetes.

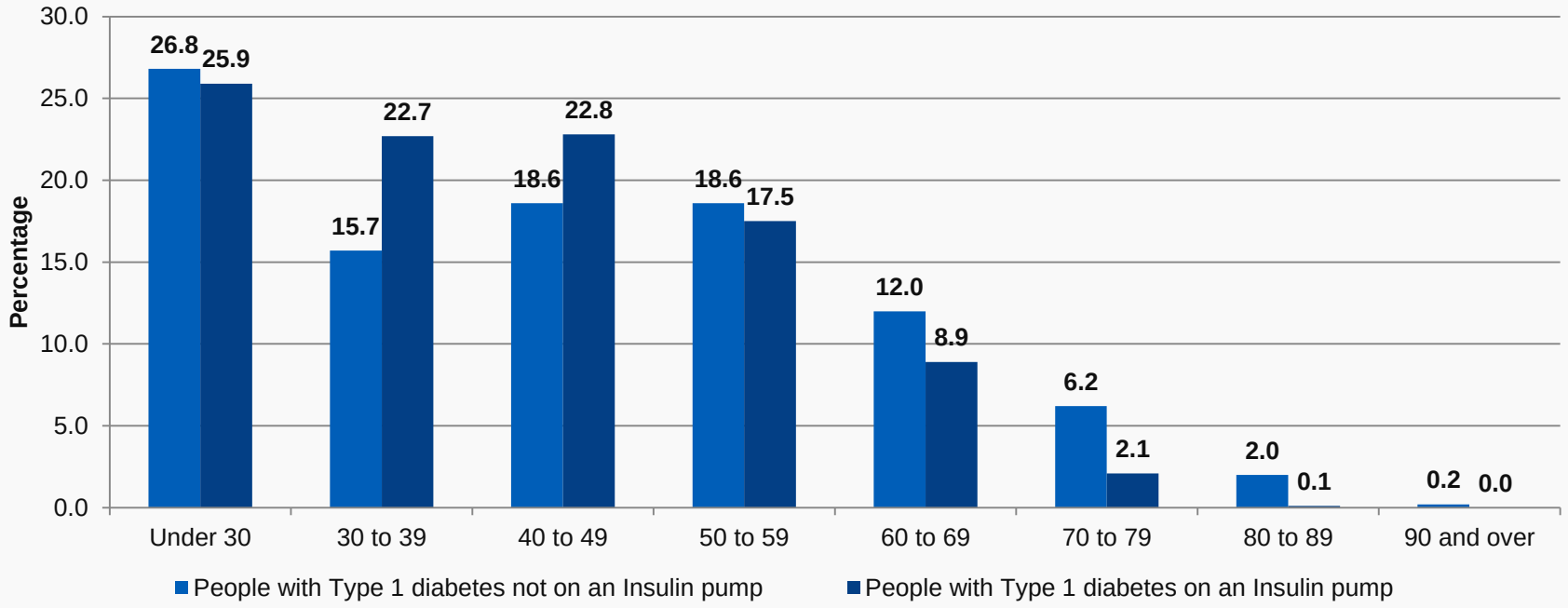
Figure 1: The distribution of diabetes type for those on pump and people not on pump with diabetes attending specialist services, England and Wales, 2016-17



Age of Adults on Pump

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

Figure 2: The percentage of all pump users in each age group compared to percentage of those not on pump in each age group, Type 1 diabetes, England and Wales, 2016-17

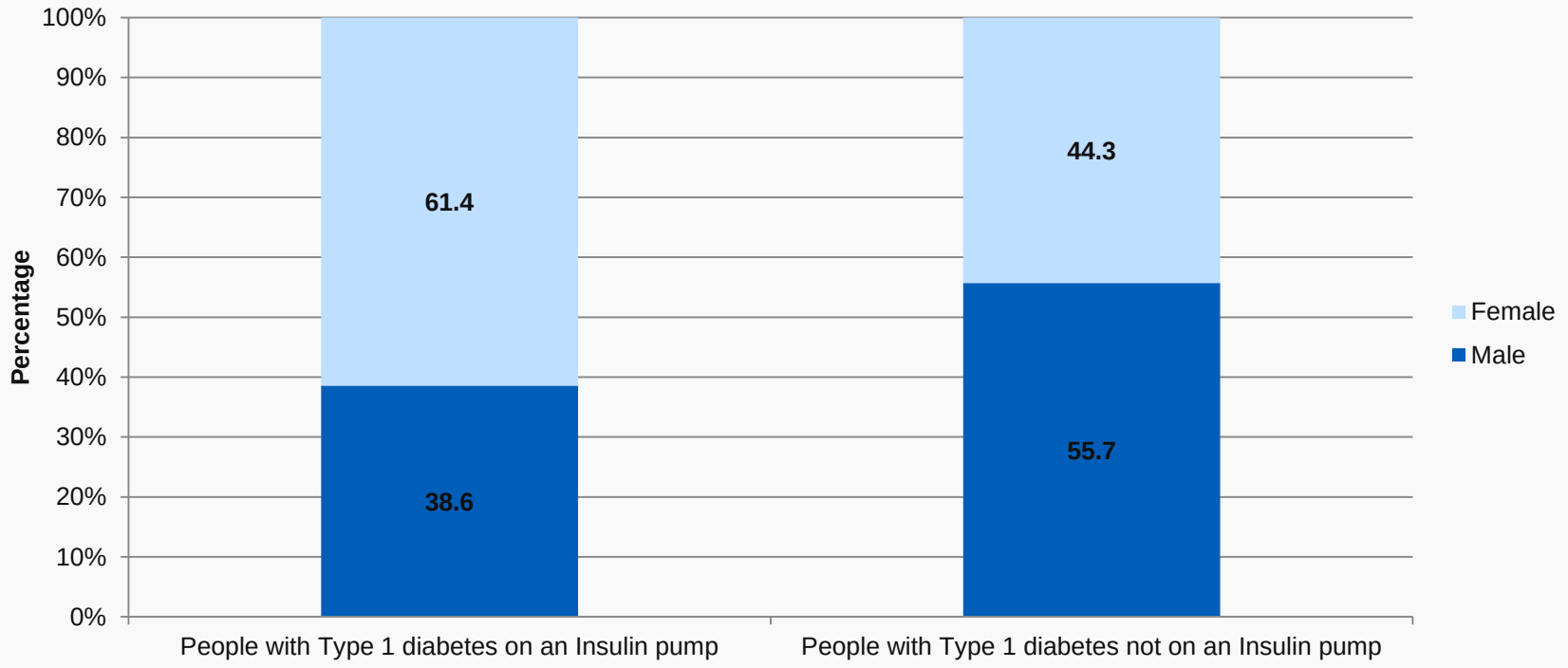


This report is for people attending adult clinics. The National Paediatric Diabetes Audit is the source for information on people attending paediatric clinics. https://www.rcpch.ac.uk/national-paediatric-diabetes-audit-npda

Sex of People on Pump

Nearly twice as many women with Type 1 diabetes use an insulin pump compared to men, though overall there are more males with Type 1 diabetes in the population.

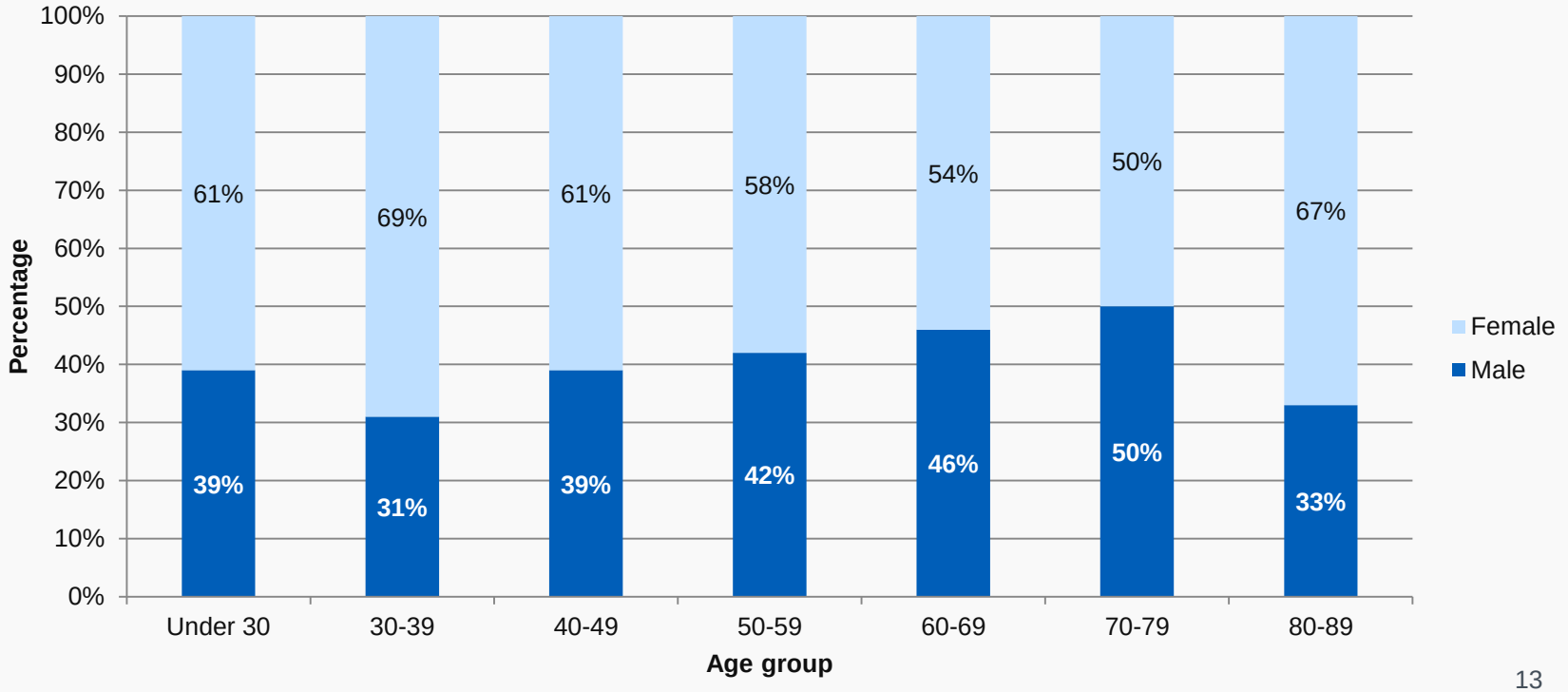
Figure 3: The percentage by sex of pump users and non-users, Type 1 diabetes, England and Wales, 2016-17



Sex and Age of People on Pump

Female pump users outnumber males in all age groups, except 70 to 79 years where the split is equal. The difference is most marked in the 30 to 39 years age group.

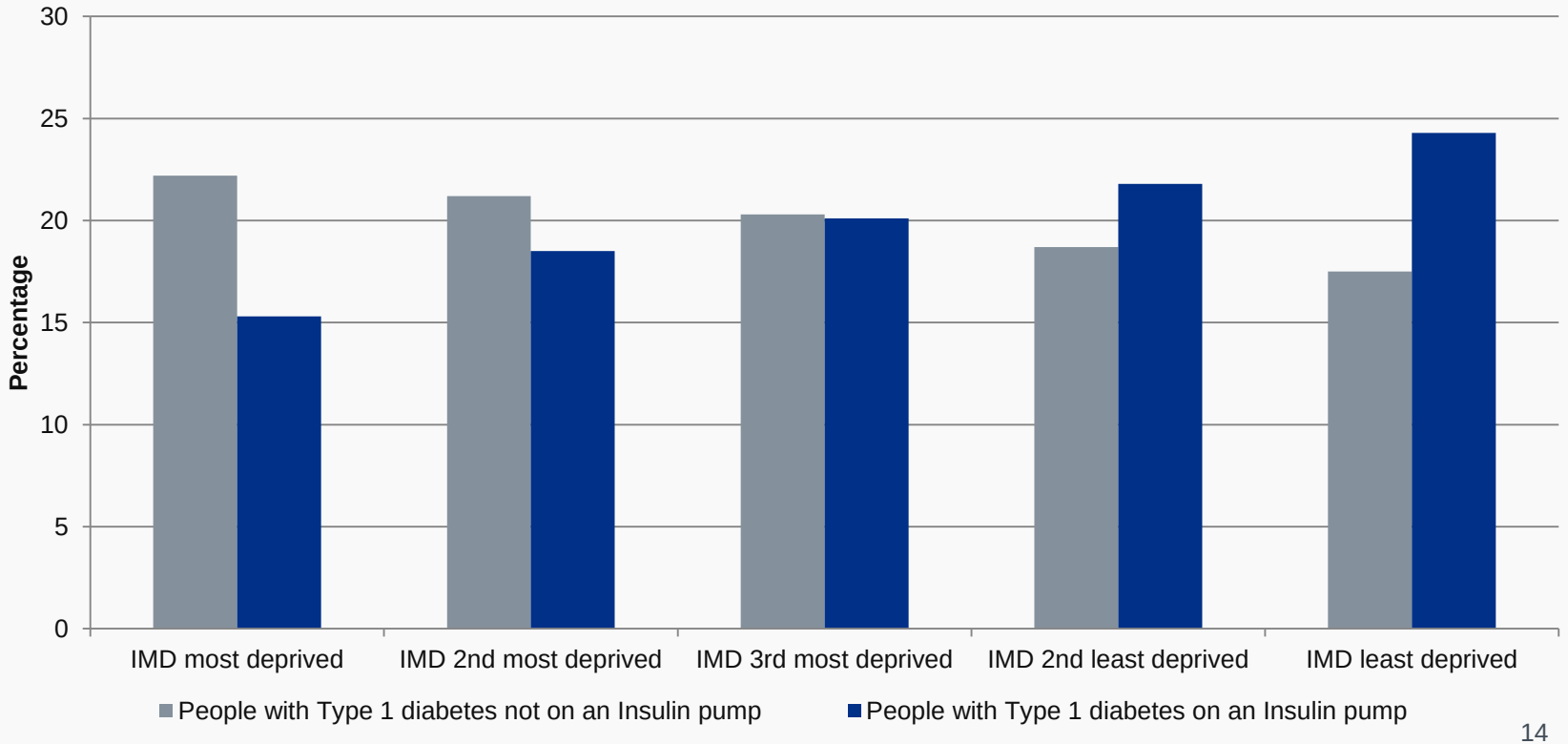
Figure 4: The percentage by sex in age groups for people on pump, Type 1 diabetes, England and Wales, 2016-17



Deprivation and People on Pumps

The number of people using pumps decreases with increasing levels of deprivation.

Figure 5: The percentage in each IMD quintile for people on pump, compared to those not on pump, Type 1 diabetes, England and Wales, 2016-17

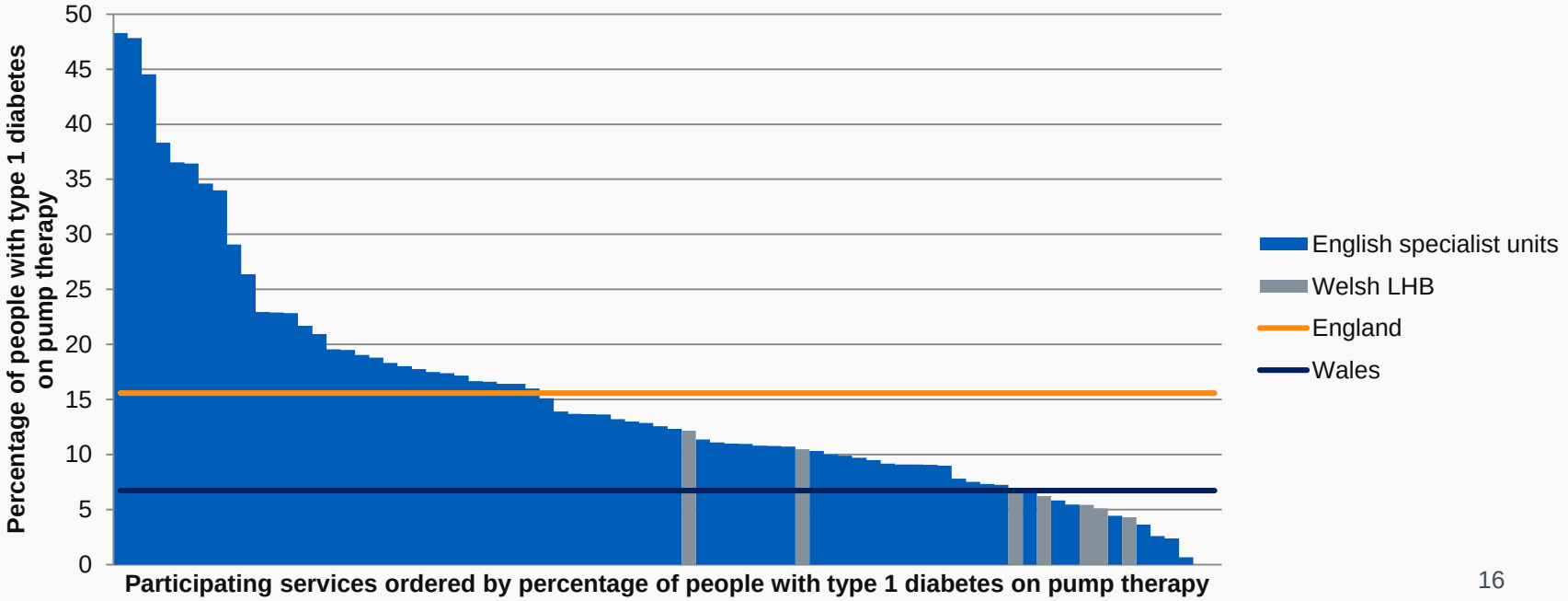


3. Prevalence of insulin pump use in people with Type 1 diabetes

Proportion of People on Pump

The proportions of patients attending specialist Type 1 diabetes services that use pumps varies tenfold. The apparent difference between England and Wales 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 6: Percentage of people with Type 1 diabetes on pump therapy by participating specialist service[1], England and Wales, 2016-2017

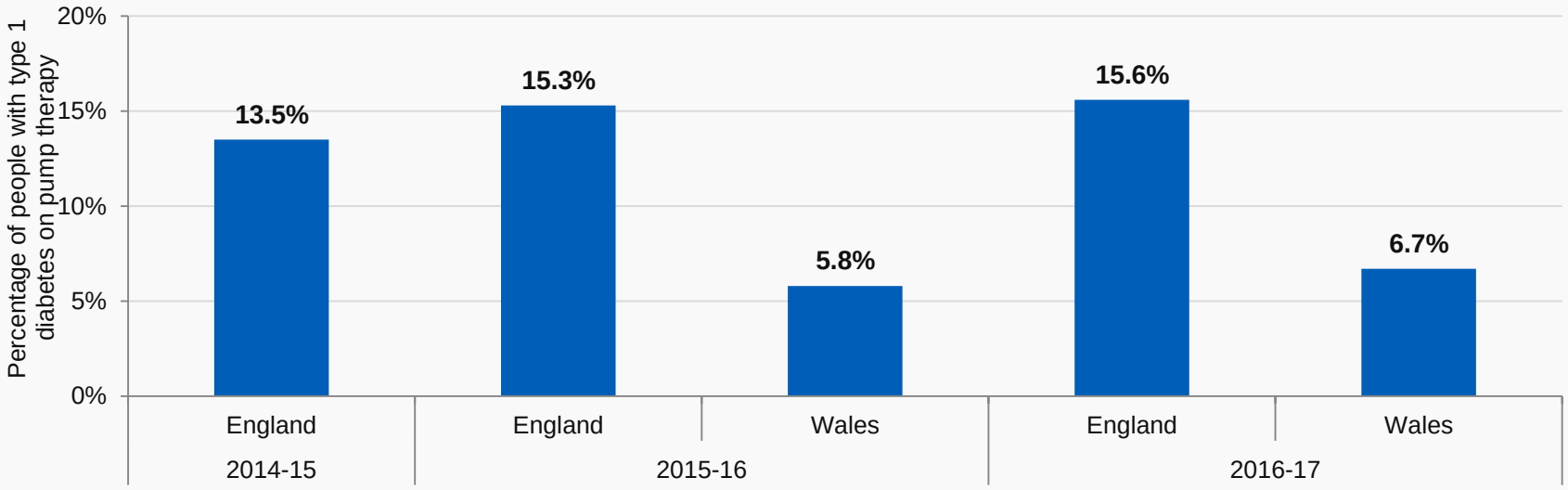


[1] The two trusts reporting 100% of patients using insulin pumps have been excluded from this graph.

Proportion of People on Pump

The apparent difference between England and Wales is likely to be due to submission arrangements. For England, the percentage is of those people with Type 1 diabetes being treated in a specialist service that participated in the pump audit. For Wales, the percentage is of all people with Type 1 diabetes in the local population, as pump information is submitted by Local Health Boards.

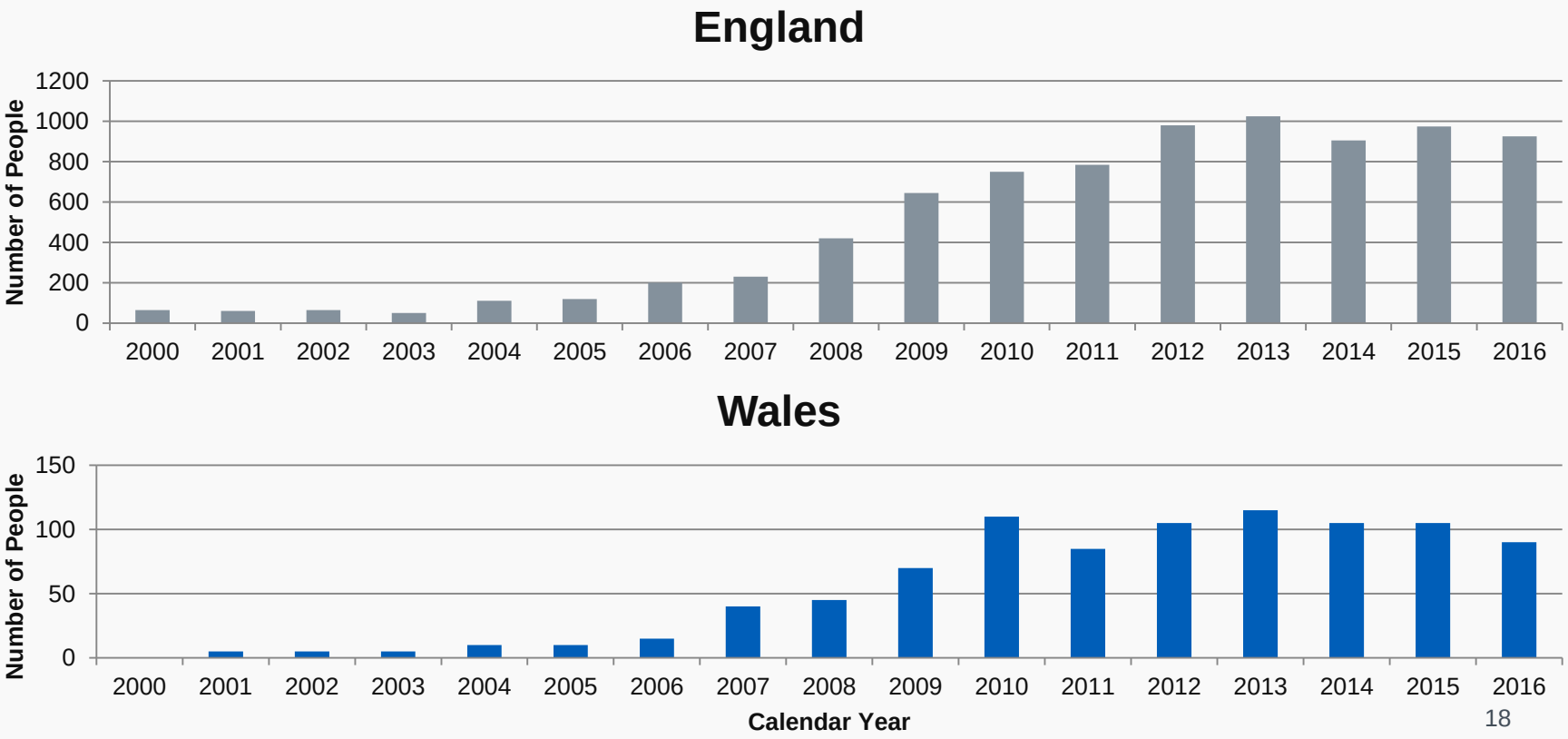
Figure 7: Percentage of people with Type 1 diabetes on an insulin pump, by audit year, England and Wales, 2014-2017



Year Started on Pump

The rate of pump uptake increased steadily until 2012 and has stabilised since.

Figure 8: Number of people with Type 1 diabetes by year started on pump, by country, England and Wales, 2016-17.



4. Reason for starting on insulin pump therapy

Reason for Starting Pump Therapy

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

A similar proportion of people in both England and Wales are recorded with hypoglycaemia as a reason for moving to pump treatment. In Wales a greater proportion are recorded with glucose lowering as a reason.

Figure 9: The reason[1] for starting pump, all diabetes types, by audit year, by country, E&W, 2013-2017

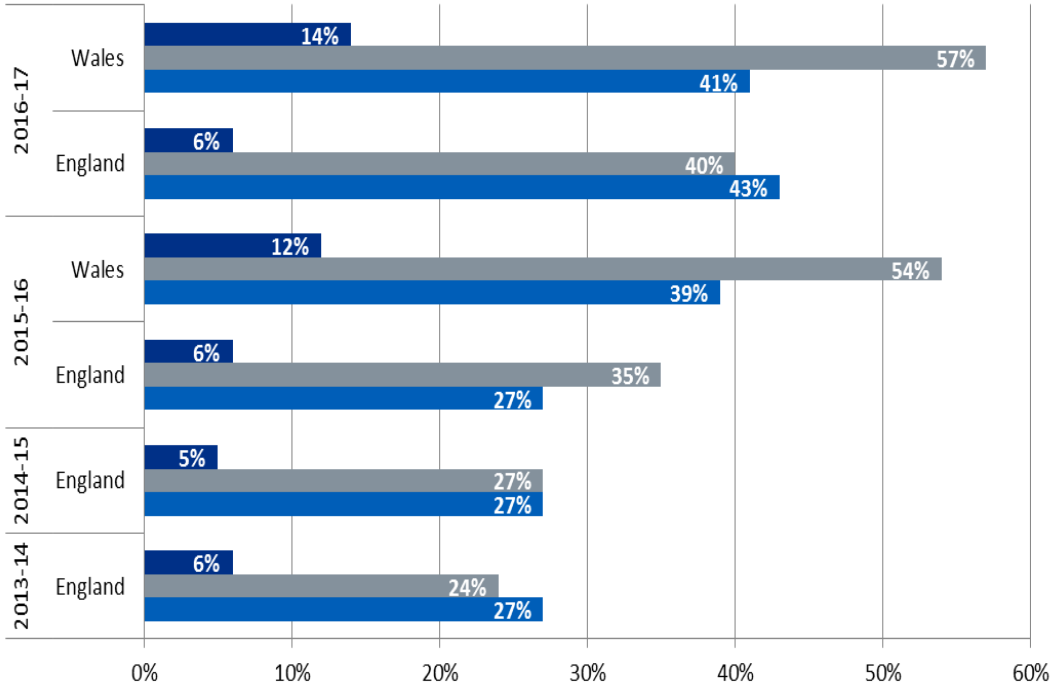
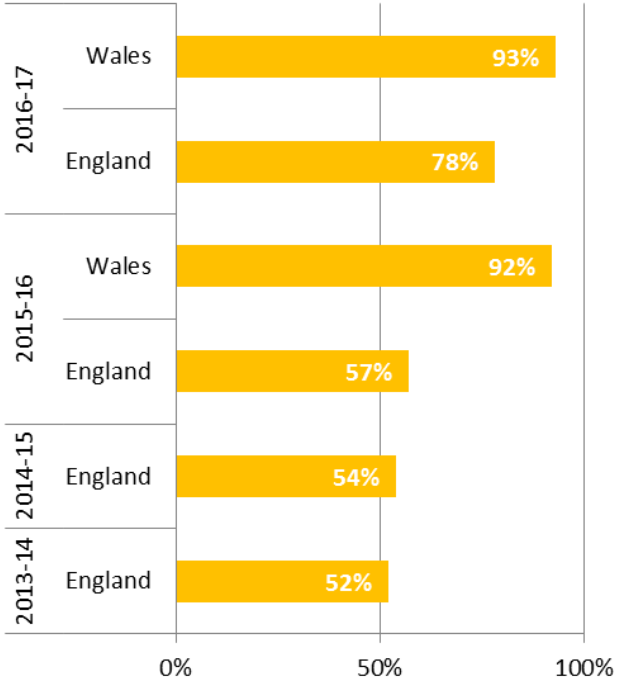


Figure 10: Percentage with at least one known reason



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%.

5. Achievement of treatment goals

Treatment Goal – Hypoglycaemia

Treatment goal achievement is not a mandatory field in the collection. It is important to consider data completeness for this, even though it has considerably improved for Wales this year. Within the limitations of the data, around nine out of ten people on insulin pump reach their target goal for hypoglycaemia.

Figure 11: The percentage of people that reached their hypoglycaemia reduction treatment goal after starting pump therapy, by audit year, E&W, 2013-17

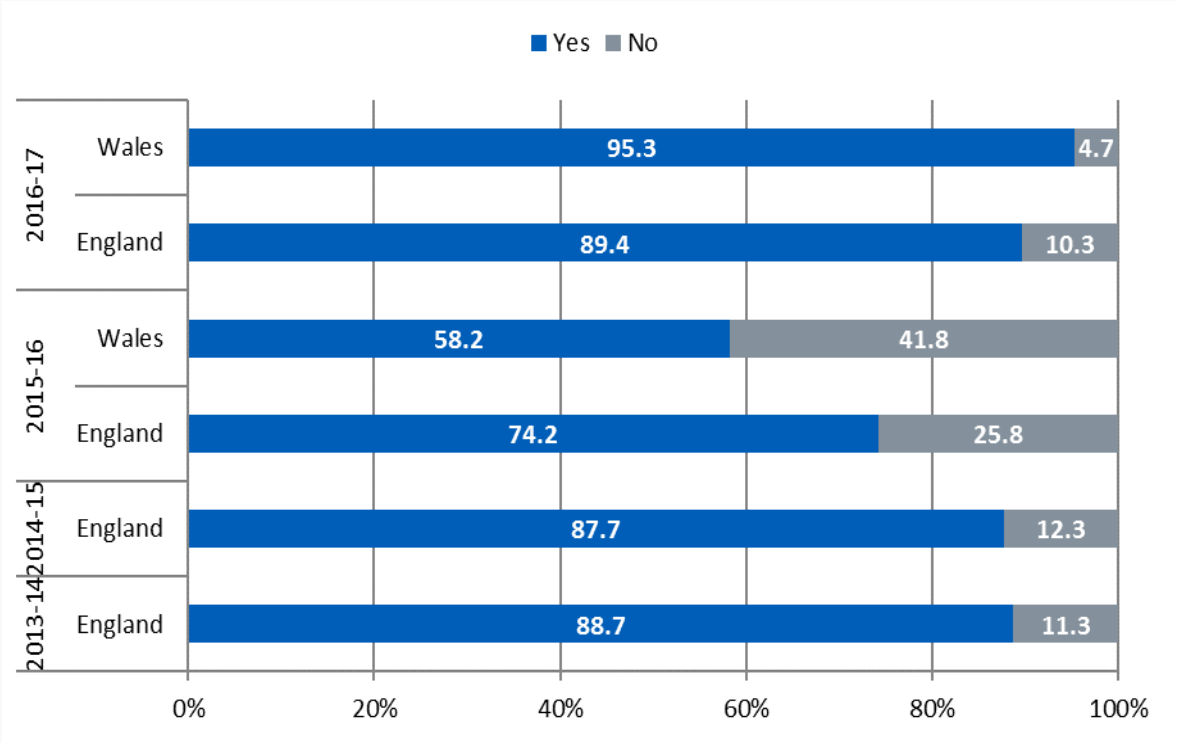
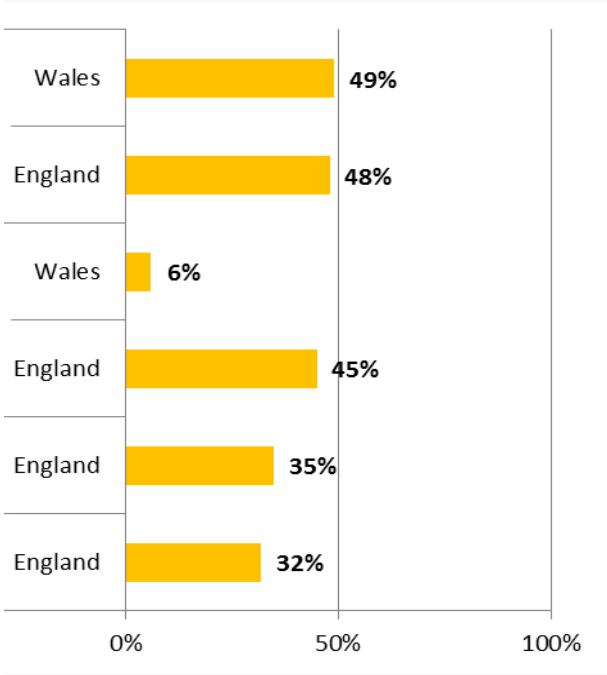


Figure 12: Percentage with hypoglycaemia reduction goal recorded



Treatment Goal – Glucose Control

Treatment goal achievement is not a mandatory field in the collection. It is important to consider data completeness for this, even though it has considerably improved for Wales this year. Within the limitations of the data, around seven out of ten people on insulin pump reach their target goal for glucose control.

Figure 13: The percentage of people that reached their glucose control treatment goal after starting pump, by audit year, by country, England and Wales, 2013-2017

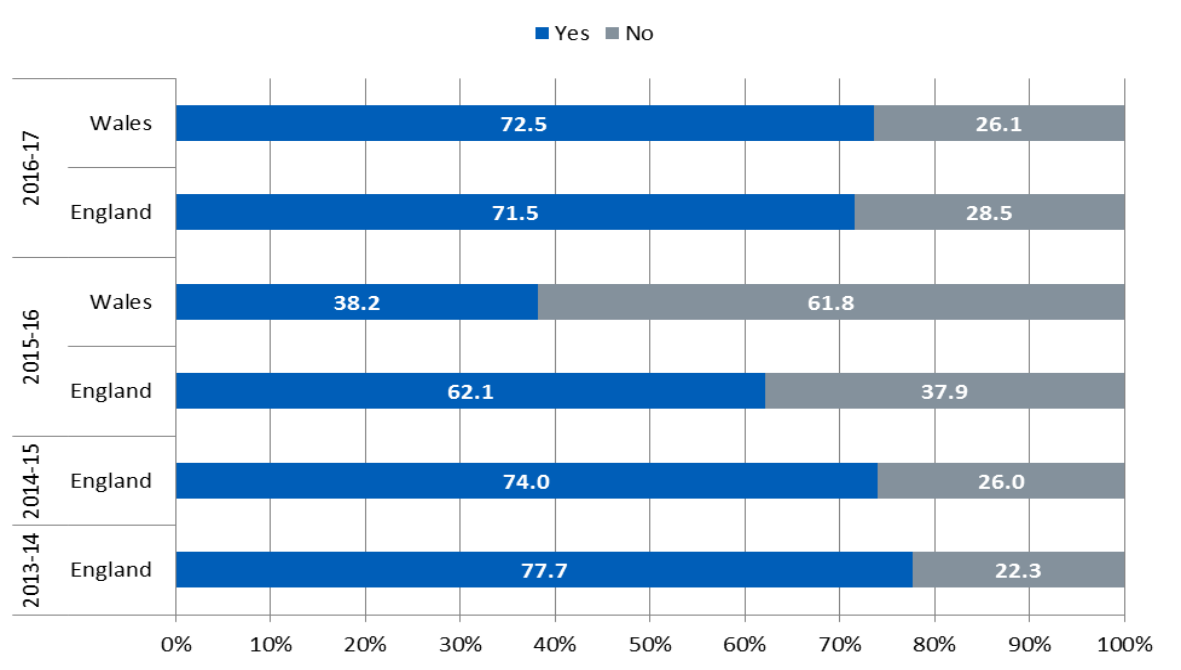
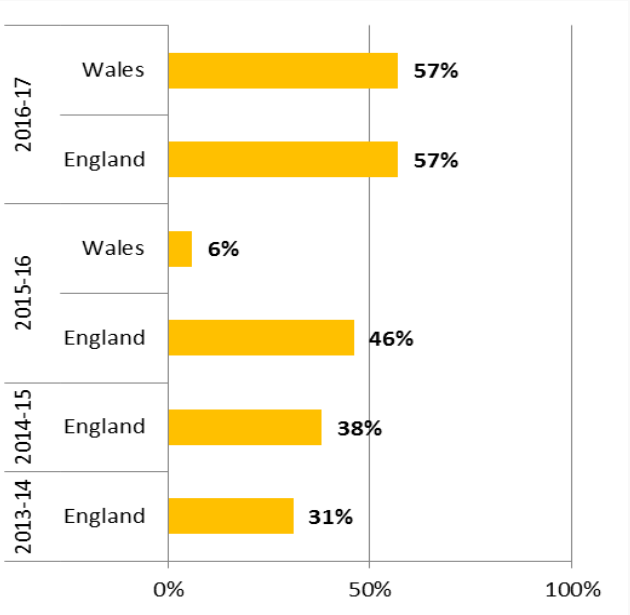


Figure 14: Percentage with glucose control treatment goal recorded



6. Care process completion

Care Processes

All people with diabetes aged 12 years and over should receive all of the nine, NICE recommended care processes[1,2] 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 (included in the NDA 8 Care Processes)	
1 - HbA1c (blood test for glucose control)	**5 - Urine Albumin/Creatinine Ratio** (urine test for kidney function)
2 - Blood Pressure (measurement for cardiovascular risk)	**6 - Foot Risk Surveillance** (foot examination for foot ulcer risk)
3 - Serum Cholesterol (blood test for cardiovascular risk)	**7 - Body Mass Index** (measurement for cardiovascular risk)
4 - Serum Creatinine (blood test for kidney function)	**8 - Smoking History** (question for cardiovascular risk)
Responsibility of NHS Diabetes Eye Screening (NHS England, Public Health England) (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 eye risk	

1,2. Please see full list of footnotes in the definitions and footnote section.

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. 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, by country, England and Wales, 2016-2017

	England		Wales	
	People on an insulin pump	People **not** on an insulin pump	People on an insulin pump	People **not** on an insulin pump
HbA1c	93.0	90.9	74.5	74.7
Blood pressure	93.1	91.9	90.3	84.5
Cholesterol	85.6	85.3	64.3	66.5
Serum creatinine	91.2	89.9	71.9	74.2
Urine albumin	64.9	62.6	32.7	36.5
Foot surveillance	72.2	72.7	55.6	60.9
BMI	83.4	83.4	70.4	66.9
Smoking	82.6	83.8	68.4	70.1
Eight care processes [3]	**42.2**	**42.9**	**18.4**	**23.8**

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

7. 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.

* NICE cardiovascular risk reduction guidance (link here) now focuses on the use of statins rather than achieved cholesterol levels ('Offer atorvastatin 20 mg for the primary prevention of CVD to people with Type 2 diabetes who have a 10% or greater 10-year risk of developing CVD and consider for all people with Type 1 diabetes'). The NDA will be able to report against these new standards from 2017-18. Meanwhile, to maintain continuity, attainment of the old Total Cholesterol <5mmol/l target is reported for 2016-17 as before.

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, and overall younger people are less likely to achieve the treatment targets[1].

Table 4: Percentage of people with Type 1 diabetes achieving their NICE recommended treatment targets for those on insulin pump and those not on an insulin pump, by country, England and Wales, 2016-2017

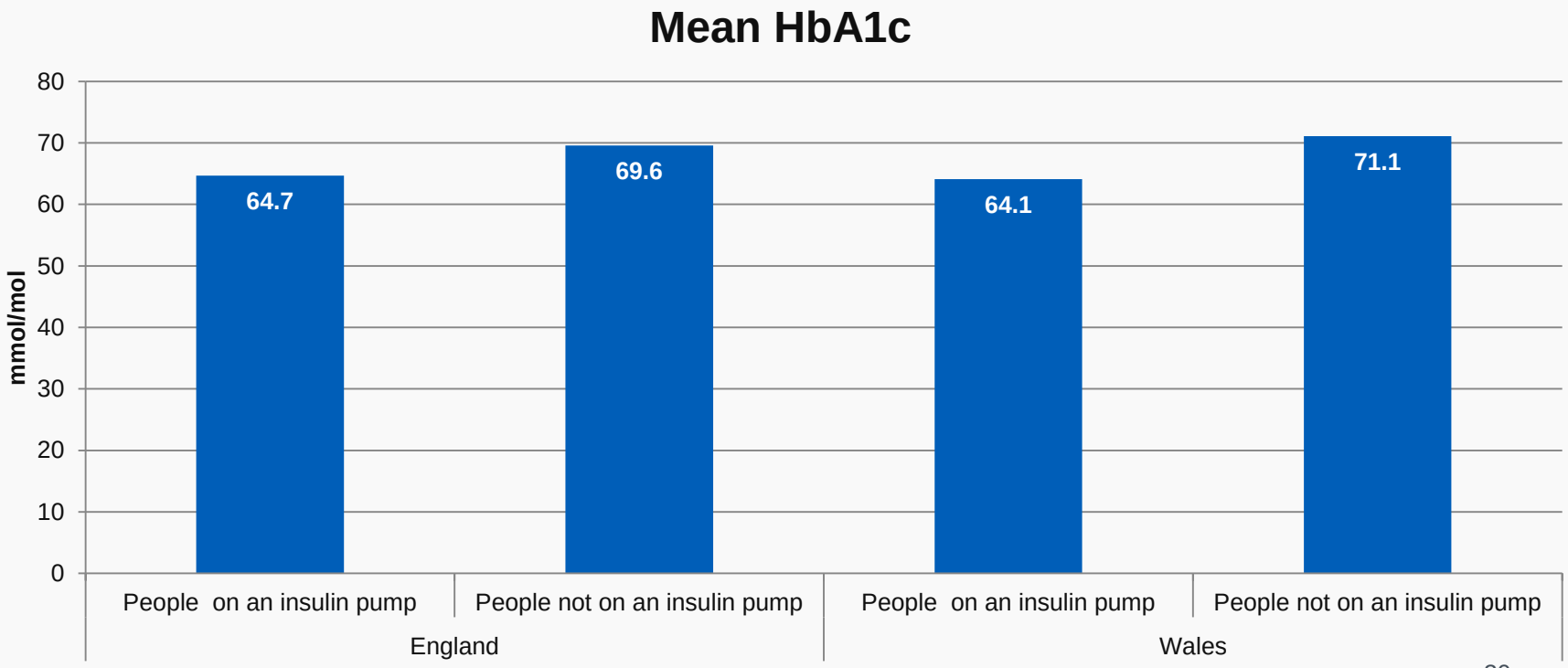
	England		Wales	
	People on an insulin pump	People **not** on an insulin pump	People on an insulin pump	People **not** on an insulin pump
$HbA1_c \leq 58$ mmol/mol	34.7	29.0	35.9	26.0
Blood Pressure ≤ 140/80	73.1	70.7	73.3	73.3
Cholesterol < 5mmol/L	70.5	69.5	69.0	67.9
Meeting all three treatment targets	**20.3**	**16.4**	**19.1**	**15.2**

1. National Diabetes Audit – 2016-2017: Report 1, Care Processes and Treatment Targets

Treatment Targets – Mean HbA1c

Mean HbA1c is lower for Type 1 patients treated with an insulin pump. Analysis for the first Insulin Pump Audit looked at the change in HbA1c after starting pump therapy: https://digital.nhs.uk/catalogue/PUB20436.

Figure 15: Mean HbA1c (mmol/mol) for those with Type 1 diabetes on an insulin pump compared to those not on a pump, by country, England and Wales, 2016-2017



8. Methodology

Methodology

- The National Diabetes Insulin Pump Audit supplements the core National Diabetes Audit.
- 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. For details of the NDA data please see the latest annual report: www.digital.nhs.uk/pubs/ndauditcorerep1617.

9. 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 a measure of 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 – 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

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/ndapump1617

- 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

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