

National Diabetes Inpatient Audit England and Wales, 2017

England and Wales

14 March 2018

Full report

Foreword

NaDIA 2017 shows that, since the audit began in 2010, there have been very impressive improvements in many aspects of inpatient diabetes care, including reductions in **medication errors**, severe **hypoglycaemia** and hospital-acquired diabetic **foot lesions**.

However, the rate of two important and life-threatening harms remain unchanged:

- Hospital-acquired diabetic ketoacidosis (**DKA**); and
- Hospital-acquired hyperosmolar hyperglycaemic state (**HHS**)

DKA and HHS are preventable and should not occur during a hospital admission.

Were it not for the hard work of diabetes teams and the almost one hundred per cent participation in this annual audit we may not have realised these improvements nor identified where we need to redouble our efforts. No other healthcare service in the world has such comprehensive national data to evidence and direct change in inpatient care; a unique achievement for which we should be proud.

Gerry Rayman, National Clinical Lead for Inpatient Diabetes

Introduction: Overview

- The National Diabetes Inpatient Audit (NaDIA) measures the quality of diabetes care provided to people with diabetes while they are admitted to hospital whatever the cause, and aims to support quality improvement.
- Data is collected and submitted by hospital staff in England and Wales.
- The NaDIA audit is part of the National Diabetes Audit (NDA) portfolio within the National Clinical Audit and Patient Outcomes Programme (NCAPOP), commissioned by the Healthcare Quality Improvement Partnership (HQIP).

This is the **full report**. Short reports are available for individual chapters.

Buttons – *available on some slides*

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Introduction: Audit questions

The audit sets out to measure the quality of diabetes care provided to people with diabetes while they are admitted to hospital, by answering the following questions:

- Did diabetes management minimise the risk of avoidable complications?
- Did harm result from the inpatient stay?
- Was patient experience of the inpatient stay favourable?
- Has the quality of care and patient feedback changed since NaDIA 2010, 2011, 2012, 2013, 2015 and 2016¹?



The report will be of interest to the public, especially to people with diabetes. Health planners and policy makers, as well as acute NHS Trusts, Clinical Commissioning Groups (CCGs), Local Health Boards (LHBs), Sustainability and Transformation Partnerships (STPs), Clinical Networks (CNs; formerly Strategic Clinical Networks or SCNs) and other providers and commissioners of specialist diabetes services will also make use of the information in this report.

Notes:

1. Wales did not participate in NaDIA 2010, so comparisons with later audit years covering both England and Wales are not made in this report. To help ensure that outputs remain uncluttered as the audit duration increases, NaDIA 2012 has not been included in most tables and charts. Years on either side (NaDIA 2011 and 2013) are included. There was no audit collection or report in 2014, so 2014 data is not available.

Introduction: Terminology

Main abbreviations

DISN	diabetes inpatient specialist nurse
DKA	diabetic ketoacidosis
DSN	diabetes specialist nurse
HHS	hyperosmolar hyperglycaemic state
MDFT	multi-disciplinary foot team
NICE	National Institute for Health and Care Excellence
OA-DA	oral anti-diabetic agent

The above acronyms will not always be footnoted in the report. For an extended list of abbreviations, see [Glossary: Acronyms](#).

Patient harms and medication errors

The audit looks at the proportion of inpatients that experience one or more patient harm and/or medication error during the last seven days of their hospital stay.

Patient harms cover:

- Severe hypoglycaemic episodes
- Hypoglycaemic episodes requiring injectable rescue treatment
- Hospital-acquired DKA and HHS
- Hospital-acquired diabetic foot lesions

Cohorts used in the report

Outputs are often split by **audit year** (see right) and/or **diabetes type**.

Inpatients with **Type 1** diabetes are reported as a single group.

Inpatients with **Type 2** diabetes are grouped into three sub-categories based on their treatment type:

- **Type 2 (insulin)**
- **Type 2 (non insulin)**
- **Type 2 (diet only)**

For further information, see [Glossary: Diabetes type](#) and [Diabetes treatments](#).

Audit year	Notes
2010	First NaDIA collection, England only. Not covered in this report.
2011	First England and Wales collection.
2012	Not included in most time series outputs due to space restrictions.
2013	There was no NaDIA in 2014.
2015	
2016	Previous NaDIA
2017	Latest NaDIA

Medication errors are broken down into two main sub-types:

- Prescription errors
- Glucose management errors

A further sub-category of **insulin errors** covers prescription and glucose management errors relating to insulin.

A single patient may experience multiple patient harms and/or medication errors

For further information, see [Glossary: Patient harms](#) and [Medication errors: Definitions](#).

Introduction: Contents

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National Diabetes Inpatient Audit 2017

Key messages



Key messages: Summary

Improvements in diabetes inpatient care



208 out of 213 sites known to be eligible for NaDIA took part in the 2017 audit¹. The **commitment** and **hard work** by hospital teams to collect data and their dedication to using the analysed results to alter their practice has delivered some very encouraging **improvements**. This has been achieved with the help of a small but appreciable increase in staffing levels² since NaDIA 2016, treating a consistently high proportion of people in hospital who have diabetes - 18 per cent in NaDIA 2017.

NaDIA team

In the face of this heavy workload teams have:

- ✓ Reduced **medication errors** by 7 percentage points since 2016 (from 38 to 31 per cent).
- ✓ Reduced all **hypoglycaemia** episodes from 26 per cent in 2011 to 18 per cent.
- ✓ Reduced the need for **injectable rescue treatment** of severe hypoglycaemia – from 2.1 per cent in 2011 to 1.3 per cent.
- ✓ Reduced patients developing **foot ulcers** during hospital stay – from 1.6 per cent in 2011 to 1.0 per cent.
- ✓ Delivered more personal care to inpatients with diabetes – 72 per cent overall being **seen by the diabetes team** where appropriate compared to only 58 per cent in 2011.
- ✓ Reduced use of **intravenous insulin infusions (IVII)**, such that only 8 per cent of inpatients with diabetes were on an IVII in 2017 compared with 11 per cent in 2011.

Key messages: Summary

Areas where further improvement is needed



Despite the significant and important improvements documented in the previous [slide](#), NaDIA also demonstrates that there is still **considerable scope for further improvements**.

Since 2011, NaDIA findings have shown high levels of:

- **Medication errors** – almost 1 in 3 inpatients (31 per cent in 2017).
- **Insulin errors** – two fifths of those treated with insulin (40 per cent with Type 1 diabetes¹ and 37 per cent with Type 2 diabetes in 2017¹).
- **Insulin infusions** – almost 1 in 15 infusions is inappropriate (6 per cent in 2017²) and 1 in 14 infusions lasted for at least a week (7 per cent in 2017²).
- Hospital-acquired **diabetic ketoacidosis** (DKA); in 2017 around 1 in 25 people with Type 1 diabetes developed in-hospital DKA due to under-treatment with insulin (4 per cent in 2017²).

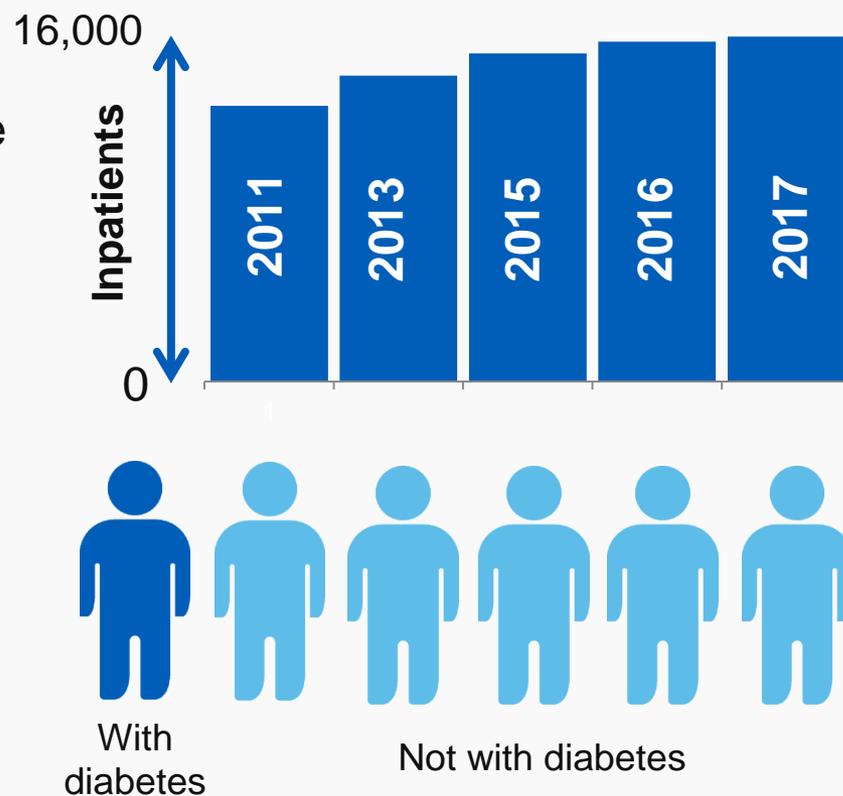
All of these findings clearly demonstrate the benefit of NaDIA in identifying areas on which to focus service improvements, and in driving and tracking change.

NaDIA team

Key messages: Participation and prevalence

Key findings

- 208 out of 213 sites known to be eligible for NaDIA took part in the 2017 audit¹.
- Bedside data on 16,010 inpatients was submitted, 200 more than NaDIA 2016.
- Over half of inpatients returned a Patient Experience questionnaire (54 per cent).
- Around **1 in 6** hospital beds are occupied by a person with diabetes (18 per cent). 1 in 15 of the total population have diabetes (7 per cent).
- In a few hospital sites over **one quarter** of inpatients have diabetes.



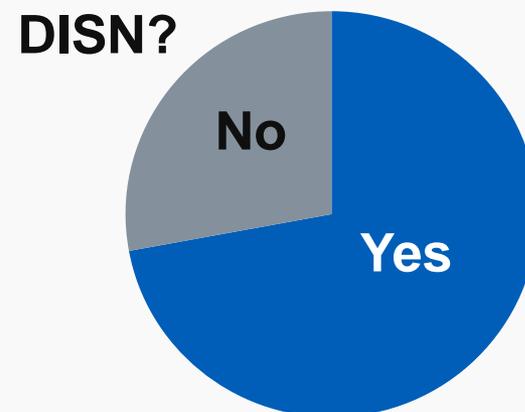
Recommendations:

Healthcare professionals: Continue to contribute to this unique and valuable insight into the inpatient care of people with diabetes.

Key messages: Staffing levels

Key findings

- Staffing hours per inpatient may have increased in comparison to 2016, though changes to data collection means that cautious interpretation is advised.
- More than a **quarter** of hospital sites report no dedicated diabetes inpatient specialist nurses (DISNs) (28 per cent)¹.



Recommendations:

Provider organisations: In the face of increasing numbers of inpatients with diabetes, ensure that diabetes teams are adequately staffed to support other healthcare professionals and patients in the delivery of safe diabetes care¹.

Key messages: Care improvement initiatives

Key findings¹

- An **increasing** proportion of hospital sites are now fully-utilising an EPR, EP and RBGM.
- However, just **17 per cent** of sites fully utilise both an EPR and EP, the same as in 2016. Only **12 per cent** utilise all three care technologies (EPR, EP and RBGM).
- **Half** of sites hold diabetes Mortality and Morbidity meetings (50 per cent).



Recommendations:

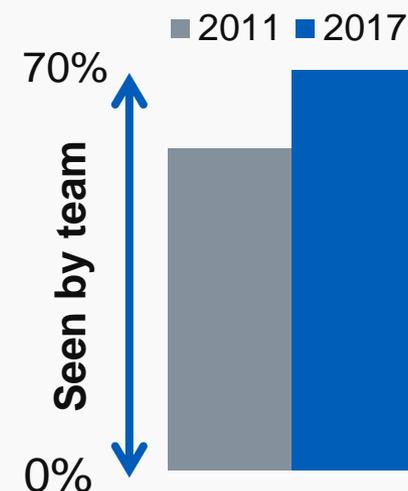
Healthcare professionals:

- Learn from NHS Trusts and Local Health Boards where Electronic Prescribing and Electronic Patient Records work well and encourage others to adopt similar systems.
- Continue to highlight diabetes at Morbidity and Mortality meetings.

Key messages: Seen by the diabetes team

Key findings

- The proportion of people with diabetes seen by the diabetes team where appropriate¹ has **increased** since 2011 (from 58 to 72 per cent).
- However, over **one quarter** of people are not seen by the diabetes team where appropriate¹ (28 per cent).
- A **higher** proportion are seen by the diabetes team where appropriate¹ when 7-day DISN² cover is provided (80 per cent compared to 70 per cent).



Notes: 1. Based on the 'Think Glucose Criteria'. See [NHS Institute for Innovation Think Glucose](#)
2. DISN = Diabetes inpatient specialist nurse.

Recommendations:

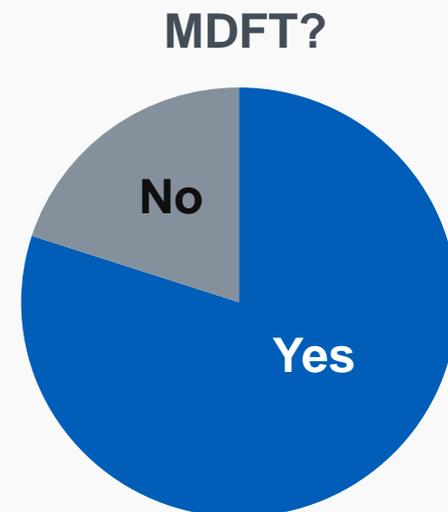
Provider organisations:

- The impressive work undertaken by diabetes teams should be recognised and acknowledged by NHS Trusts and Local Health Boards.
- Ward referral systems should be in place to ensure that all appropriate patients¹ are promptly referred and promptly seen by the diabetes team.
- Every NHS Trust and Local Health Board should have 7 Day DISN provision².

Key messages: Foot disease management

Key findings

- **One fifth** of hospital sites do not have a MDFT¹ (20 per cent), though this proportion has reduced from 42 per cent in 2011.
- Less than **two thirds** of inpatients with active diabetic foot disease have a specific diabetic foot risk examination within 24 hours (64 per cent).
- Inpatients with diabetes that attend a hospital with one or more foot care initiatives in place are **more likely** to have a diabetic foot risk examination and to be seen by the MDFT².



Recommendations:

Provider organisations: Implementation of initiatives to improve foot examination on admissions and NICE guidance¹ are associated with better processes and should be implemented in all NHS Trusts and Local Health Boards.

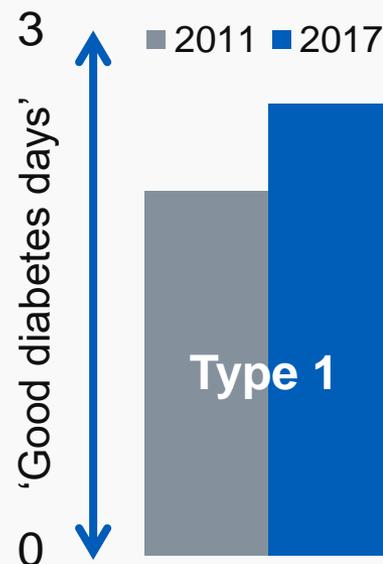
Notes: 1. Diabetes UK: [Putting Feet First](#); NICE: NG19: [Diabetic foot problems: prevention and management](#).

2. MDFT = Multi-disciplinary Foot Care Team.

Key messages: Blood glucose monitoring

Blood glucose monitoring

- Since 2011 the average number of 'good diabetes days' per week has **improved** by one half of a day for inpatients with Type 1 diabetes (from 2.1 to 2.6 days)¹.
- **Less than half** of the days of a typical hospital stay for inpatients with insulin-treated diabetes meet the definition of a 'good diabetes day'.



Recommendations:

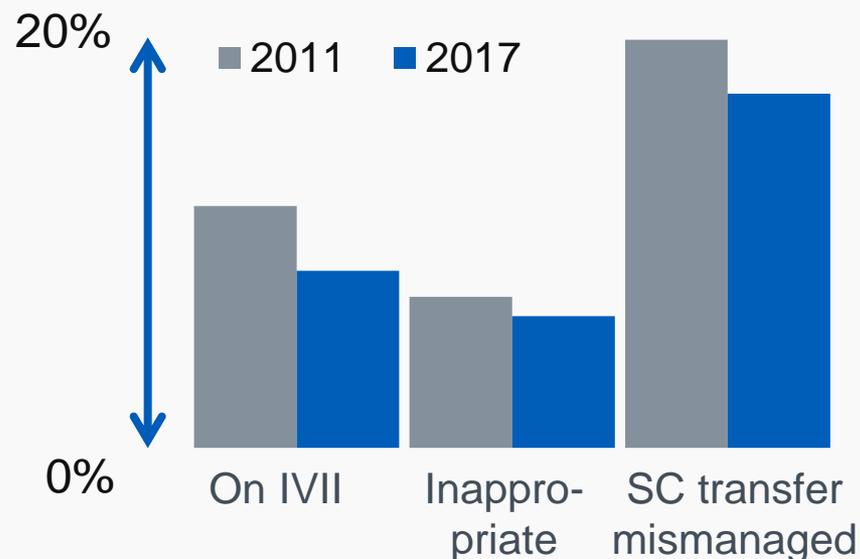
Healthcare professionals:

Continue to innovate and improve systems of blood glucose monitoring, including consideration of remote blood glucose monitoring where practical and appropriate. Higher rates of 'good diabetes days' will translate into fewer harms and quicker recovery¹.

Key messages: Use of insulin infusions

Use of insulin infusions

- The proportion of patients on insulin infusions (IVII) has **decreased** since 2011 (from 11 to 8 per cent).
- The proportion of transfers to subcutaneous (SC) insulin that were mismanaged has not **decreased** significantly since 2011.



Recommendations:

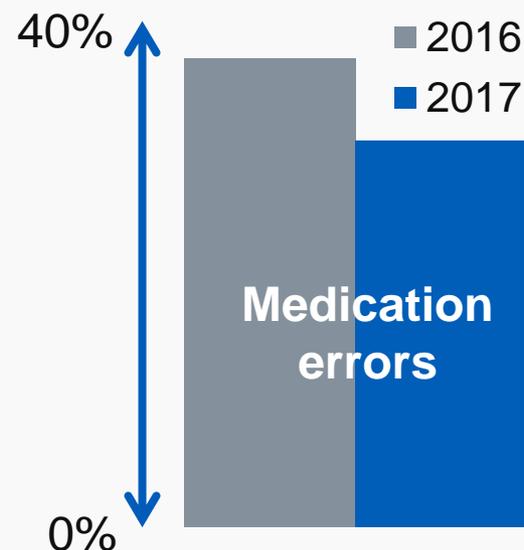
Diabetes teams:

- Continue to focus on surveillance of inappropriate use and duration of use of insulin infusions.
- Consider how to improve safe transfer back to SC insulin, with processes to ensure prompt intervention if hypoglycaemic emergencies develop.

Key messages: Medication errors

Key findings

- 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.
- 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 Electronic Patient Records or Electronic Prescribing are used.



Recommendations:

Provider organisations: Learn from NHS Trusts and Local Health Boards that have most effectively utilised Electronic Prescribing and implemented other new technologies and systems that help reduce errors.

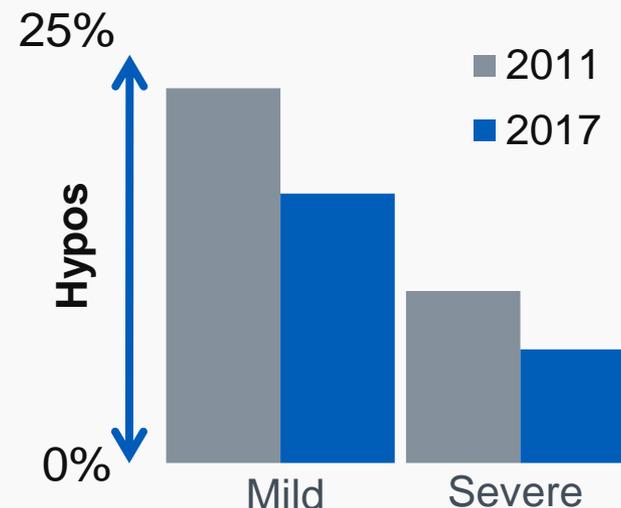
Diabetes teams:

- Continue to educate and support junior doctors and nursing staff, while also developing and testing new systems to reduce prescribing and glucose management errors. Junior doctors and nursing staff should be made aware that hyperglycaemia should not be left untreated, especially in people with Type 1 diabetes.
- Work with surgical colleagues to ensure diabetes safety levels are at least equivalent to those on medical units.

Key messages: Hypoglycaemic episodes

Key findings

- The prevalence of hypoglycaemic episodes has **decreased** since 2016, though almost **1 in 5** inpatients with diabetes still have a hypo during their hospital stay (18 per cent).
- The highest proportion of severe hypoglycaemic episodes took place between 05:00am and 08:59am (28 per cent).
- The incidence of hypoglycaemic episode requiring injectable rescue treatment has **decreased** since 2011 (from 2.1 to 1.3 per cent).



Recommendations:

Provider organisations:

- Benchmark their outcomes against the national reduction in hypoglycaemia.

Healthcare professionals:

- Measures should be taken to prevent hypoglycaemia in the early morning (05:00am to 08:59am), including the introduction of bed time snacks.

Key messages: DKA, HHS and foot lesions

Key findings

- There has been **no significant change** in the incidence of hospital-acquired DKA or HHS since data collection began.
- The proportion of inpatients developing a foot lesion has **decreased** since 2012 from 1.6 to 1.0 per cent or **1 in 100**.
- Around **1 in 25** inpatients with Type 1 diabetes develop DKA¹ during their hospital stay (4.3 per cent).
- Around **1 in 800** inpatients with Type 2 diabetes develop HHS¹ during their hospital stay (0.12 per cent).

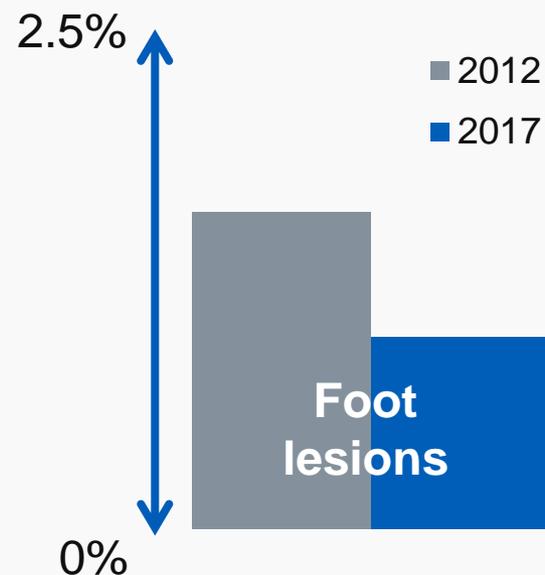
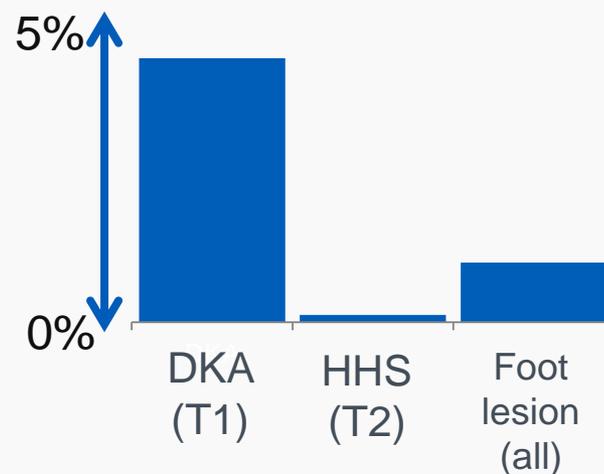
Recommendations:

Diabetes teams:

- Record all hospital-acquired DKA¹ and HHS¹ as Serious Incidents and undertake Root Cause Analysis.
- Continue to promote screening of diabetes admissions for risk of hospital-acquired diabetic foot lesions and introduce preventative measures in those found to be at risk, using NICE guidance [\[NG19\]](#) as a framework.

Provider organisations:

- Hospitals should report all hospital-acquired DKA, HHS and diabetic foot ulceration as part of the upcoming NaDIA continuous harms collection to provide a focus for these urgent Patient harms.
- Hospitals should include these reports in regular diabetes Mortality and Morbidity meetings and annual audits.

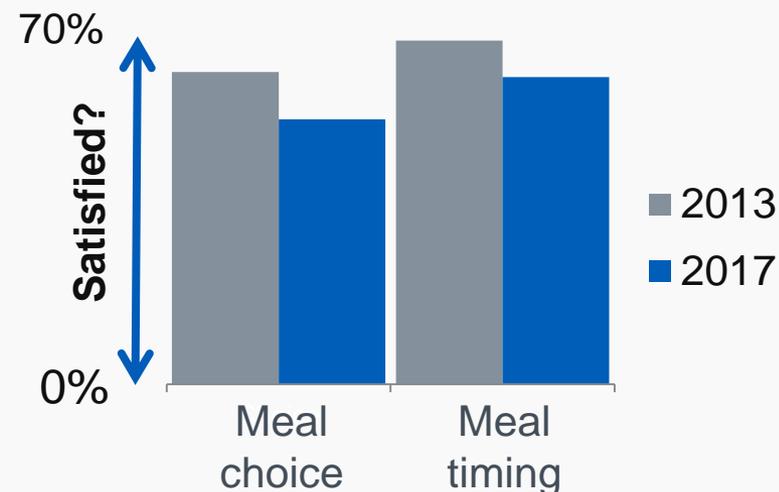


Notes: 1. DKA = diabetic ketoacidosis.
HHS = hyperosmolar hyperglycaemic state.

Key messages: Patient Experience

Key findings

- Inpatient perception of meal choice and timing **dropped** in 2015 and has not recovered.
- **5 out of 6** patients were satisfied or very satisfied with their diabetes care during their hospital stay (84 per cent).
- There is a **wide variation** in patient satisfaction across hospital sites, with some hospitals having consistently lower levels of satisfaction across the measures.



Recommendations:

Provider organisations:

- Patient surveys may be needed to address the issue of hospital food.
- Variation in the apparent need for better staff knowledge requires further exploration.

Healthcare professionals: Encourage diabetes teams to involve patients in their care planning.



National Diabetes Inpatient Audit 2017

1. Participation and prevalence



Participation: Overview



Audit question:

How many hospital sites participated in the audit?

Why is this important?

Participation in the NaDIA enables organisations to measure progress towards implementing national standards established in the NICE published quality standards for diabetes care for adults and measures for inpatient care¹ which states:

“People with diabetes admitted to hospital are cared for by appropriately trained staff, provided with access to a specialist diabetes team, and given the choice of self-monitoring and managing their own insulin.”

How is data collected?

On a nominated day between 25 and 29 September 2017 participating hospital teams identified all inpatients with diabetes. Where the patient was able and willing a **Patient Experience** form was completed, as well as a **Bedside Audit** form which provided information on the patient’s medical treatment taken from the patient’s notes. The hospital team also completed a **Hospital Characteristics** questionnaire providing information on the hospital’s resources and staffing structure.

Key findings

- 208 out of 213 hospital sites known to be eligible for NaDIA took part in the 2017 audit².
- Bedside data on 16,010 inpatients was submitted, 200 more than NaDIA 2016.
- Over half of inpatients returned a Patient Experience questionnaire (54 per cent).

“We again thank all the teams who have worked hard to contribute to this unique and valuable insight into the care of inpatients with diabetes. Including the pilot, this is the eighth year of NaDIA and it is impressive that despite the enormous amount of work involved, participation remains high, demonstrating the value diabetes teams place in the data and their determination to improve inpatient diabetes care.”

Gerry Rayman

National Clinical Lead for Inpatient Diabetes



Participation: Submissions

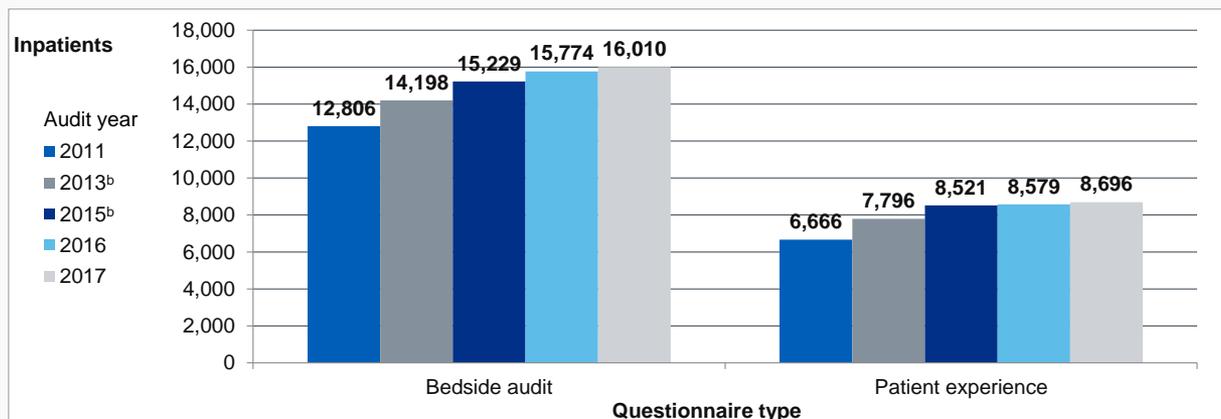
Table 1.1: NaDIA organisational participation, England and Wales, 2011-17

Audit year	Number of sites ¹	NHS Trusts/ LHBs
2017 England	190	134
2017 Wales	18	6
2017 total	208	140
2016	209	
2015 ^b	206	
2013 ^b	211	
2011	206	

Findings

- 208 out of 213 hospital sites known to be eligible for NaDIA (representing 134 NHS Trusts in England and 6 Local Health Boards in Wales) took part in the 2017 audit².
- Bedside data on 16,010 inpatients with diabetes was submitted to the 2017 audit, an **increase** of over 200 patients compared to 2016.
- Over **half** of inpatients returned a Patient Experience questionnaire (54 per cent).

Figure 1.1: Number of NaDIA questionnaires returned, England and Wales, 2011-17



- Notes:** b = break in time series.
1. A NaDIA 'site' may represent a single hospital, multiple hospitals or an entire NHS Trust /Local Health Board. Because NaDIA site aggregations vary over time, year-on-year changes in number may not represent real changes in participation.
 2. Eligibility inferred from past NaDIA participation.



Prevalence of diabetes: Overview

Audit question:

What proportion of people admitted to hospital have diabetes?

Why is this important?

Hospitals need to know how many patients need additional care for issues related to their diabetes. This includes people admitted for their diabetes and those admitted for unrelated conditions.

How is this measured?

As part of the NaDIA Hospital Characteristics form, hospital staff submit the total number of hospital beds in applicable wards. The prevalence of diabetes is then calculated using the number of returned Bedside Audit forms for inpatients with diabetes.

Key findings

- Around **1 in 6** hospital beds are occupied by a person with diabetes (18 per cent). 1 in 15 of the total population have diabetes¹ (7 per cent).
- In 5 hospital sites more than **one quarter** of inpatients have diabetes.

Notes:

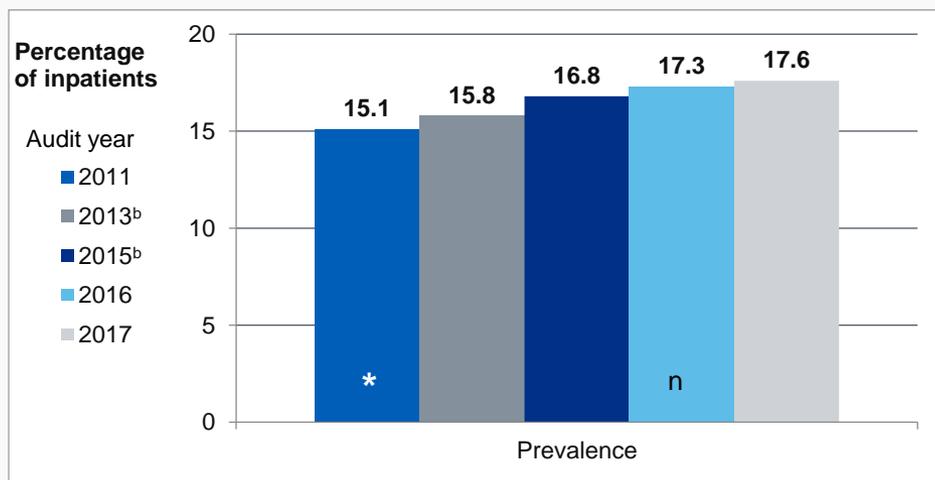
1. NHS Digital: Quality and Outcomes Framework (QOF) – [2016-17](#). Welsh Government: General medical services contract: Quality and outcomes framework, [2016-17](#). Estimated list size (aged 17+) for Wales provided on request from Stats.healthinfo@gov.wales.



Prevalence of diabetes: Findings



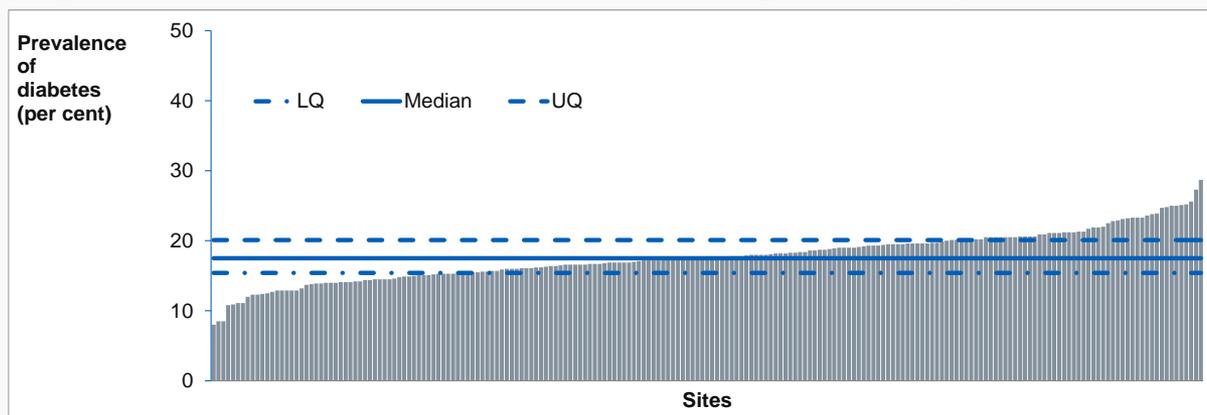
Figure 1.2: National prevalence of diabetes in inpatients, England and Wales, 2011-17



Findings

- People with diabetes occupied 18 per cent of acute hospital beds, an **increase** since the first audit in 2011. 1 in 15 of the total population have diabetes¹ (7 per cent)
- Prevalence ranges from **8 to 29 per cent** across hospital sites
- **8 per cent** of inpatients with diabetes were admitted for diabetes

Figure 1.3: Prevalence of diabetes: by site, England and Wales, 2017



Measure	Per cent
Minimum	8.0
Lower quartile (LQ)	15.4
Median	17.5
Upper quartile (UQ)	20.1
Max	28.7
Mean	17.8

Notes: b = break in time series. * = statistically significant at the 0.05 level (vs. current audit year). n = not statistically significant (vs. current audit year). 1. NHS Digital: Quality and Outcomes Framework (QOF) – [2016-17](#). Welsh Government: General medical services contract: Quality and outcomes framework, [2016-17](#). Estimated list size (aged 17+) for Wales provided on request from stats.healthinfo@gov.wales.



Participation and prevalence:

Clinical comment and recommendations



Despite the hard work involved, with each diabetes team giving a whole day to audit activity, participation remains remarkably high. This reflects the importance given to the audit by diabetes teams.

The proportion of inpatients who have diabetes remains consistently high and continues to increase annually.

NaDIA team

Recommendations:

Provider organisations: In the face of high and increasing numbers of inpatients with diabetes, ensure that inpatient diabetes teams are adequately staffed to support other healthcare professionals and patients in the delivery of safe diabetes care.



National Diabetes Inpatient Audit 2017

2. Staffing levels



Staffing levels: Overview

Audit question:

What specialist staff are available to look after people with diabetes when they are admitted to hospital?

Why is this important?

Caring for people with diabetes in hospital requires specialist knowledge about treatments and medication, and an understanding of how a patient's care may be affected by their diabetes.

It is important that hospitals have enough specialist staff with this knowledge to help to look after patients with diabetes and to support other ward staff in delivering good diabetes care.

How is this measured?

Hospitals were asked to estimate the amount of staffing time spent each week on inpatient diabetes care. Stated hours, derived from whole time equivalents, was compared to the numbers of admitted people with diabetes by each hospital.

The NaDIA team acknowledge the difficulty of estimating staff hours. Caution is therefore advised when interpreting staffing levels, particularly at site level.

Key findings

- Staffing hours per inpatient may have **increased** since 2016, though changes to data collection could have affected the results.
- More than a **quarter** of hospital sites report no dedicated diabetes inpatient specialist nurses (28 per cent).

"I was surprised to see that over a quarter of hospitals still have no diabetes inpatient specialist nurses. I'd feel more confident going into hospital if I knew that both I and the team caring for me would have the support of a nurse with that specialist knowledge. I'd feel safer in a hospital where if I'm struggling to manage my condition, there's someone on hand who can help."

Sarah, aged 32, who has Type 1 diabetes



Staffing levels: Results

Table 2.1: Average staffing for care of inpatients with diabetes¹, England and Wales, 2015-17

Profession	Hours per week of inpatient care per inpatient with diabetes		
	2015 ²	2016 ²	2017 ³
• Diabetes inpatient specialist nurse (DISN)	0.50	0.49	0.61
• Diabetes specialist nurse (DSN)	0.17	0.17	0.23
• Any diabetes specialist nurse (DISN and DSN)	0.67	0.66	0.84
• Diabetes consultant	0.19	0.19	0.29
• Podiatrist	0.11	0.11	0.16
• Specialist diabetes dietitian	0.03	0.03	0.04
• Non-specialist dietitian	0.06	0.05	0.05
• Any dietitian	0.09	0.08	0.09
• Diabetes specialist pharmacist	0.03	0.04	0.07

NaDIA 2017 staffing levels were collected as whole time equivalents (WTE) for the first time. Previously NaDIA collected staffing in hours, which was often difficult for submitters to calculate.

It is hoped that the NaDIA 2017 staffing figures are more accurate. However, be aware that the apparent uplift seen between 2016 and 2017 may stem from the above change in collection methodology, rather than increases to real staffing levels.

Finding

- At national level staffing levels may have **increased** for inpatients with diabetes between 2016 and 2017, though data collection changes could have affected the results.

Notes:

1. The stated figures are derived from the total number of Bedside Audit forms divided by the total number of hours of inpatient care per week. The NaDIA team acknowledge the difficulty of estimating staff hours. Caution is therefore advised when interpreting staffing levels, particularly at site level. Please see the explanatory note (top right) about data collection changes in 2017.

2. Staffing originally collected in hours.

3. Staffing originally collected as whole time equivalents.



Staffing levels: Delivery of diabetes care



Table 2.2: Percentage of sites with staff deficiencies, England and Wales, 2011-17

Percentage of sites with:	2011	2013 ^b	2015 ^b	2016 ^{r, 2}	2017 ²
• no inpatient DISNs ^{1, 2}	31.9	31.7	31.1	27.9	27.9
• no specialist inpatient dietetic provision for people with diabetes	70.8	71.2	71.4	73.6	73.2
• no inpatient podiatry service for people with diabetes	33.6	34.1	26.2	28.0	31.7

Table 2.3: Percentage of inpatients under a diabetes consultant, England and Wales, 2011-17

Percentage of patients:	2011	2013 ^b	2015 ^b	2016	2017
• under a diabetes consultant	9.2 n	8.9	8.9	8.7 n	8.9

Findings

- More than a **quarter** of hospital sites have no diabetes inpatient specialist nurses (28 per cent). 70 per cent of these sites also had no DISNs in 2016².
- Less than **1 in 10** inpatients with diabetes are under the care of a diabetes consultant. This has remained **constant** since 2011 (9 per cent).

Notes:

b = break in time series. **r** = revised. Error affecting one 2016 record corrected for NaDIA 2017 analysis.

***** = statistically significant at the 0.05 level (vs. current audit year).

n = not statistically significant (vs. current audit year).

1. DISN = Diabetes inpatient specialist nurse. [Data not available](#)

2. 57 hospital sites had no DISNs in 2017. 40 of the 57 also had no DISNs in the 2016 audit, along with a further 18 sites.



Staffing levels:

Clinical comment and recommendations



Staffing issues continue to be a concern over the last seven years. Although NaDIA is now able to highlight some increases in the hours that inpatient diabetes staff deliver to inpatient diabetes care, there has been no change in the percentage of sites with deficiencies in inpatient dietitians, podiatrists and diabetes inpatient specialist nurses (DISNs)¹. More than 1 in 4 hospitals report they have no diabetes inpatient specialist nurses (DISNs)¹ who are key to supporting inpatient diabetes care.

The new [diabetes transformation fund](#) aims to increase DISN capacity in England, though any additional DISN resource would not have been appointed at the time the audit was undertaken (September 2017).

NaDIA team

Recommendations:

Provider organisations: In the face of increasing numbers of inpatients with diabetes, who are found in every department, ensure that inpatient diabetes teams are adequately staffed to support other healthcare professionals and patients in the delivery of safe diabetes care¹.

Notes:

1. DISNs are an important component of most diabetes teams. The centrality of DISNs to good patient care and outcomes is affirmed in the [2014 Diabetes UK Position Statement](#)



National Diabetes Inpatient Audit 2017

3. Care improvement initiatives



Care improvement initiatives:

Overview

Audit question: Which initiatives have hospitals introduced in order to improve the care of people with diabetes?

Why is this important?

The introduction of initiatives to improve the care received by inpatients with diabetes may help improve the overall patient experience and reduce the harms experienced during admission.

For example, NaDIA has found ([slide 73](#)) that inpatients with diabetes are less likely to have prescription errors if an Electronic Patient Record is used (although causation cannot be confirmed).

How is this measured?

Hospital staff were asked to provide information on:

- Whether particular initiatives in diabetes care had been introduced;
- Their use of technologies such as Electronic Patient Record, Electronic Prescribing and remote blood glucose monitoring;
- Whether diabetes Mortality and Morbidity meetings are undertaken.

Key findings

- An **increasing** proportion of hospital sites are now fully-utilising an Electronic Patient Record (EPR), Electronic Prescribing (EP) and remote blood glucose monitoring (RBGM).
- However, just **17 per cent** of sites fully utilise both an EPR and EP, the same as in 2016. Only **12 per cent** utilise all three care technologies (EPR, EP and RBGM).
- **Half** of sites hold diabetes Mortality and Morbidity meetings (50 per cent).

Care improvement initiatives: EPR and EP



Figure 3.1: Percentage of sites using an Electronic Patient Record (EPR)¹, England and Wales, 2013-17

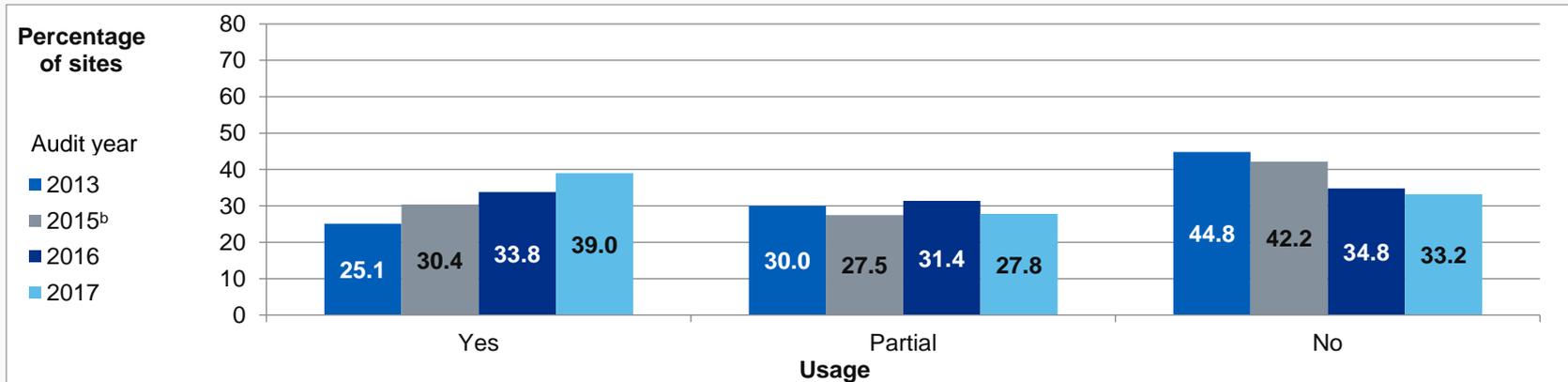
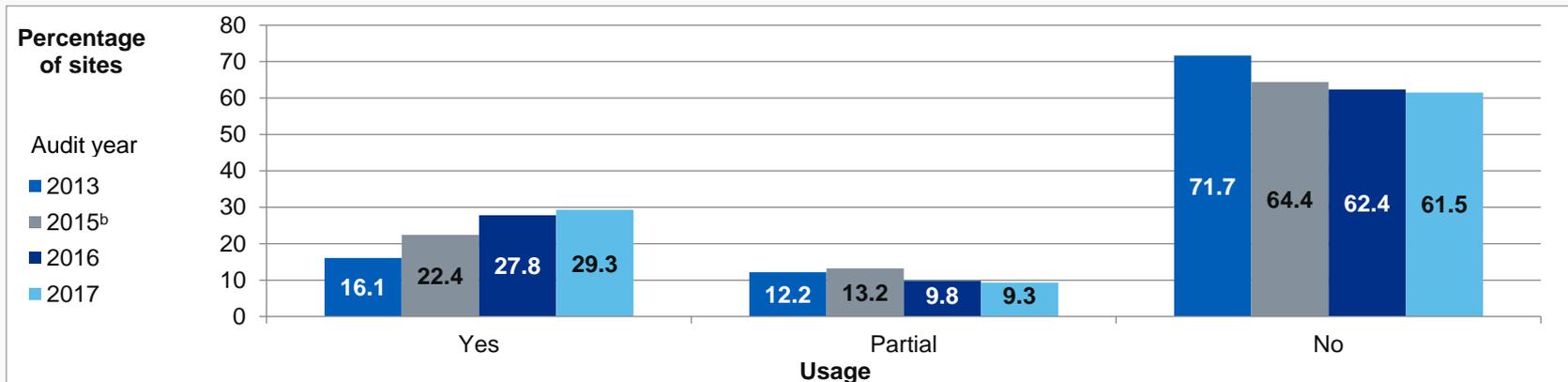


Figure 3.2: Percentage of sites using Electronic Prescribing (EP)¹, England and Wales, 2013-17



Notes:

b = break in time series.

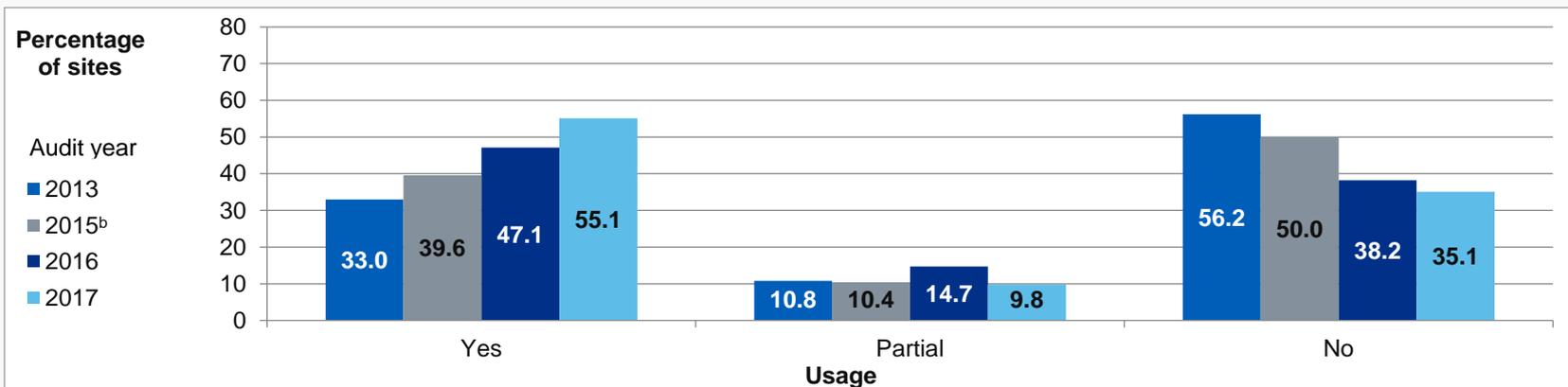
1. Data for all comparable years is shown.



Care improvement initiatives: RBGM



Figure 3.3: Percentage of sites using remote blood glucose monitoring¹, England and Wales, 2013-17



Findings

- The proportion of sites fully-utilising the Electronic Patient Record (EPR), Electronic Prescribing (EP) and remote blood glucose monitoring is **increasing**.
- However, just **17 per cent** of sites fully utilise both an EPR and EP, the same as in 2016. Only **12 per cent** utilise all three care technologies (EPR, EP and remote blood glucose monitoring).

Initiative	2013 to 2017	2016 to 2017
• Electronic patient record	Up	Up
• Electronic prescribing	Up	Up
• Remote blood glucose monitoring	Up	Up

Notes: b = break in time series.

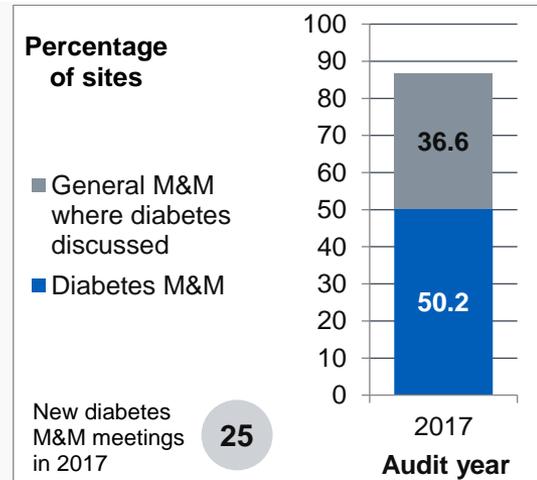
1. Data for all comparable years is shown.



Care improvement initiatives: M&M and e-learning



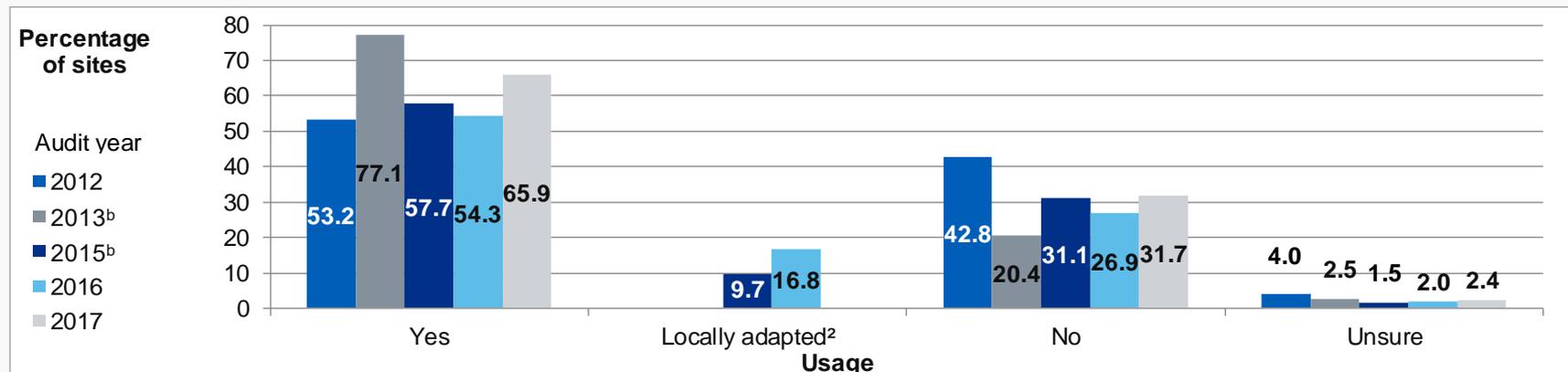
Figure 3.4:
Percentage of sites holding diabetes Mortality and Morbidity meetings¹, England and Wales, 2017



Findings

- **Half** of sites hold diabetes Mortality and Morbidity meetings.
- At least 25 sites convened diabetes Mortality and Morbidity meetings for the first time in 2017.
- 13 per cent of sites have no Mortality and Morbidity meeting at which diabetes is discussed.

Figure 3.5: Percentage of sites using NHS Diabetes e-learning on safe insulin use¹, England and Wales, 2012-17



Notes: **b** = break in time series. **1.** Data for all comparable years is shown. **2.** The option 'Locally adapted' was removed for NaDIA 2017. Consequently 2017 results are not directly comparable to those in 2015 and 2016, where the 'Locally adapted' option was available.



Care improvement initiatives: Healthcare initiatives

Table 3.1: Percentage of sites using diabetes healthcare initiatives, England and Wales, 2017

Initiative type	Initiative name	Percentage of sites
JBDS ¹ guidelines	• DKA and hypoglycaemia guidance (2013)	99.0
	• Hypoglycaemia management in hospital (2013)	98.0
	• Management of adults with diabetes undergoing surgery (2011)	85.4
	• Self-management of diabetes in hospital (2012)	47.3
	• Hyperosmolar Hyperglycaemia State (2012)	82.0
	• Glycaemic management of enteral-fed stroke patients (2012)	60.0
	• Admission Avoidance (front door/AMU protocols) (2013)	30.7
	• Steroid use for inpatients with diabetes (2014)	51.2
	• Discharge planning (2014)	30.2
	• Variable rate insulin infusion (VRIII) for medical inpatients (2014)	85.9
Staff education	• Regular ward nurse diabetes training	85.9
	• NHS Diabetes e-learning on safe insulin use	65.9
	• NHS Diabetes e-learning on other diabetes topics	40.0
National initiatives	• NHS Institute for Innovation Think Glucose	66.3
	• End of Life Care Clinical Care Recommendations	64.9
	• NICE inpatient foot guidance	72.7
	• ‘Putting Feet First’	62.9
	• Best Practice Tariff for DKA	48.3
Safety initiatives	• Hypoglycaemia boxes	87.8
	• Insulin passport	77.1
	• Combined glucose monitoring/diabetes drug charts	48.3
	• Combined glucose monitoring/insulin infusion chart	81.5



Care improvement initiatives:

Clinical comment and recommendations

- Although there has been a year-on-year increase in Electronic Prescribing and the use of an Electronic Patient Record, just 1 in 6 hospital sites fully utilises both technologies (17 per cent).
- At least 25 hospital sites held diabetes Morbidity and Mortality meeting for the first time this year, but 13 per cent of sites have no Morbidity and Mortality meeting where they can discuss diabetes.
- Two-thirds of hospital sites use NHS Diabetes' safe insulin use e-learning module.
- The Admission Avoidance and Discharge Planning initiatives have the lowest percentage take-up at around 30 per cent. These initiatives potentially have the most relevance to managing a hospital's front door and back door.

NaDIA team

Recommendations:

Healthcare professionals:

- Learn from NHS Trusts and Local Health Boards where Electronic Prescribing and Electronic Patient Records work well and encourage others to adopt similar systems.
- Continue to highlight diabetes at Morbidity and Mortality meetings.



National Diabetes Inpatient Audit 2017

4. Seen by the diabetes team



Seen by the diabetes team: Overview



Audit question:

Were inpatients seen by the diabetes team where it was deemed appropriate¹?

Why is this important?

The diabetes team support people with diabetes during their hospital stay. Members of the diabetes team have been specially trained in the problems that may affect people with diabetes while they are in hospital.

They may be able to identify and alleviate potential concerns before these result in harm to the patient, improve the patient's experience of their care and can offer more specialised advice and support to the patient and the general ward staff caring for them.

How is this measured?

For each patient with a Bedside Audit completed it was recorded whether or not they were seen by the diabetes team, and whether or not they should have been seen by the diabetes team.

Results were compared by different diabetes types and by whether specialist diabetes nursing was available in the hospital each day.

Key Finding

- The proportion of people with diabetes seen by the diabetes team where appropriate¹ has **increased** since 2011 (from 58 to 72 per cent).
- However over **one quarter of** people who should be seen are not seen by the diabetes team where appropriate¹ (28 per cent).
- A higher proportion are seen by the diabetes team where appropriate¹ when 7-day DISN² cover is provided (80 per cent compared to 70 per cent).

'Outcomes for people with diabetes following admission to hospital can be improved by better liaison between the diabetes team and ward staff.'

National Service Framework for Diabetes, December 2001

Notes:

1. Based on the 'Think Glucose Criteria'. See [NHS Institute for Innovation Think Glucose](#)

2. DISN = Diabetes inpatient specialist nurse.

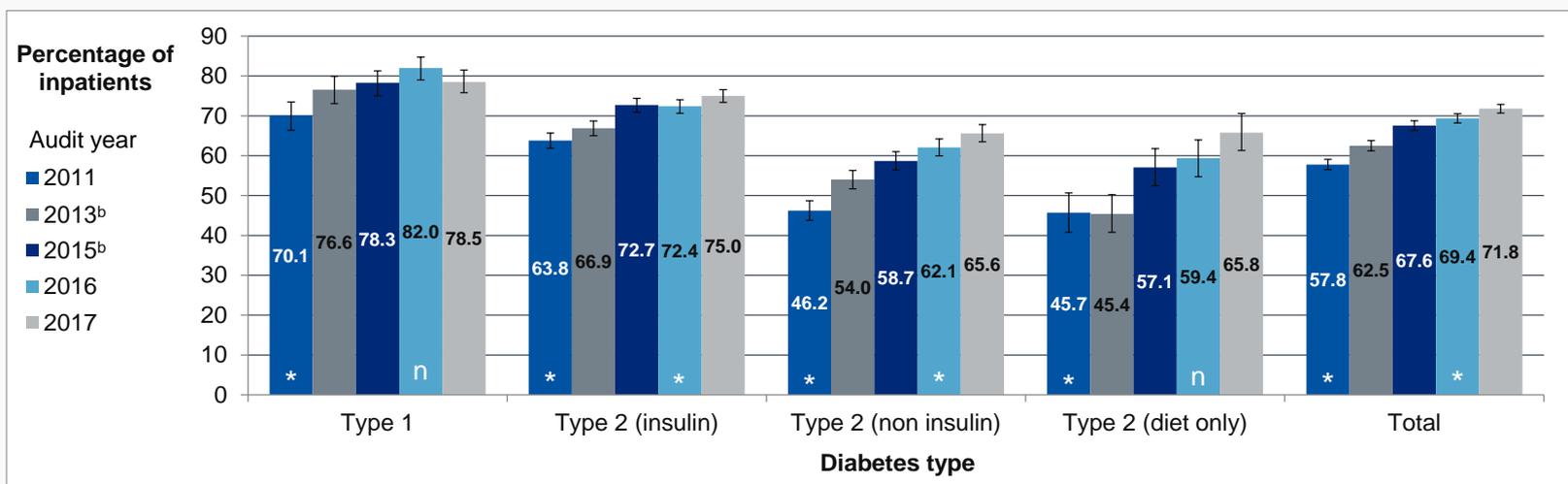


Seen by the diabetes team: Results



Based on the 'Think Glucose Criteria'¹, it was appropriate for 41 per cent of inpatients with diabetes to be referred to the diabetes team, a decrease of two percentage points since 2011.

Figure 4.1: Percentage of inpatients seen by the diabetes team where it was deemed appropriate¹: by diabetes type, England and Wales, 2011-17



Comparison	Significant Difference ($p < 0.05$)				
	Type 1	Type 2 (insulin)	Type 2 (non insulin)	Type 2 (diet only)	Total
2011 to 2017	Up	Up	Up	Up	Up
2016 to 2017	No change	Up	Up	No change	Up

Notes: b = break in time series.

* = statistically significant at the 0.05 level (vs. current audit year).

ⁿ = not statistically significant (vs. current audit year).

1. Based on the 'Think Glucose Criteria'. See [NHS Institute for Innovation Think Glucose](#).



Seen by the diabetes team

7 day DISN provision

Table 4.1: Percentage of sites with 7 day DISN provision¹, England and Wales, 2015-17

Percentage of sites with:	2015	2016	2017
• 7 day DISN provision	6.4	7.7	8.8

Table 4.2: Percentage of inpatients seen by the diabetes team where it was deemed appropriate²: by 7 day DISN provision¹, England and Wales, 2017

Percentage of patients:	7 day DISN provision?			
	Yes		No	
• seen by the diabetes team where appropriate	79.5	*	70.4	*

Percentage of patients:	Significant Difference (p < 0.05)	
	7-day DISN	No 7-day DISN
• seen by diabetes team where appropriate	Higher	Lower

Findings

- Since 2015 there has been a small **increase** in the proportion of hospital sites providing 7 day DISN provision¹ (from 6 to 9 per cent).
- A **higher** proportion of inpatients are seen by the diabetes team where appropriate when 7-day DISN cover is provided¹ (80 per cent compared to 70 per cent).

Notes:

* = statistically significant at the 0.05 level ('Yes' vs. 'No' in audit year). n = not statistically significant ('Yes' vs. 'No' in audit year).

1. DISN = Diabetes inpatient specialist nurse. 2. Based on the 'Think Glucose Criteria'. See [NHS Institute for Innovation Think Glucose](#).



Seen by the diabetes team:

Clinical comment and recommendations

- Diabetes teams continue to see an increasing proportion of patients with diabetes, despite a consistent lack of increase in staffing levels. This is to be commended as an example of their continual commitment to improvements in efficiency and effectiveness.
- Diabetes teams at hospitals with 7 Day DISN provision are able to see a higher proportion of inpatients – four fifths – than those at sites without that support.

NaDIA team

Recommendations:

Provider organisations:

- The impressive work undertaken by diabetes teams should be recognised and acknowledged by NHS Trusts and Local Health Boards.
- Ward referral systems should be in place to ensure that all appropriate patients¹ are promptly referred and promptly seen by the diabetes team.
- Every NHS Trust and Local Health Board should have 7 Day DISN provision².

Notes:

1. Based on the 'Think Glucose Criteria'. See [NHS Institute for Innovation Think Glucose](#).

2. DISN = Diabetes inpatient specialist nurse.



National Diabetes Inpatient Audit 2017

5. Foot disease management



Foot disease management: Overview



Audit questions: Does the hospital have a Multi-disciplinary Foot Care Team (MDFT)? Do people with diabetes receive timely foot risk examinations?

Why is this important? 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.

How is this measured? Hospitals reported whether they had an 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.

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. Previously all inpatients were assessed. Historic results have been updated using the same methodology.

Key findings

- **One fifth** of hospital sites do not have a Multi-disciplinary Foot Care Team (20 per cent).
- 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 'Putting Feet First' or NICE¹ inpatient foot guidance are **more likely** to have a diabetic foot risk examination and to be seen by the MDFT within 24 hours of admission.

'Each hospital should have a care pathway for people with diabetic foot problems who need inpatient care ... [and] ... refer the person to the multidisciplinary foot care service within 24 hours of the initial examination of the person's feet' **NICE guidelines, NG19**



Foot disease management:

Admissions for and with foot disease

Table 5.1: Proportion of inpatients with diabetic foot disease, England and Wales, 2011-17

Percentage of patients who:	2011	2013 ^b	2015 ^b	2016	2017
• Had a history of foot disease on admission	12.2 n	12.6	12.8	12.1 n	12.3
• Had active foot disease on admission	9.1 n	9.2	8.9	9.0 n	9.2
• Were admitted for active foot disease	4.3 n	3.8	4.5	4.3 n	4.3

Foot disease	Significant Difference ($p < 0.05$)	
	2011 to 2017	2016 to 2017
History of	No change	No change
<u>With</u> active	No change	No change
<u>For</u> active	No change	No change

Findings

- There has been **no change** in the proportion of inpatients affected by diabetic foot disease since audit inception.
- Almost **1 in 10** inpatients with diabetes had active foot disease on admission
- Almost **1 in 20** were admitted for active foot disease.

Notes:

b = break in time series.

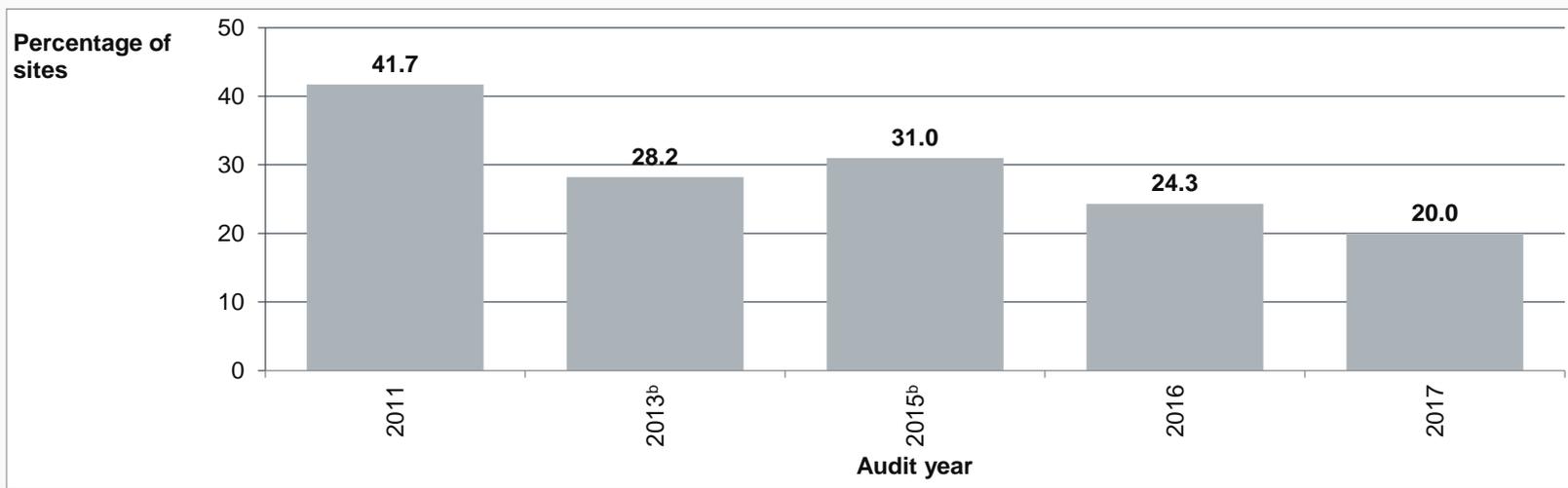
* = statistically significant at the 0.05 level (vs. current audit year).

n = not statistically significant (vs. current audit year).



Foot disease management: Multi-disciplinary Foot Care Team

Figure 5.1: Percentage of sites not having a Multi-disciplinary Foot Care Team, England and Wales, 2011-17



Findings

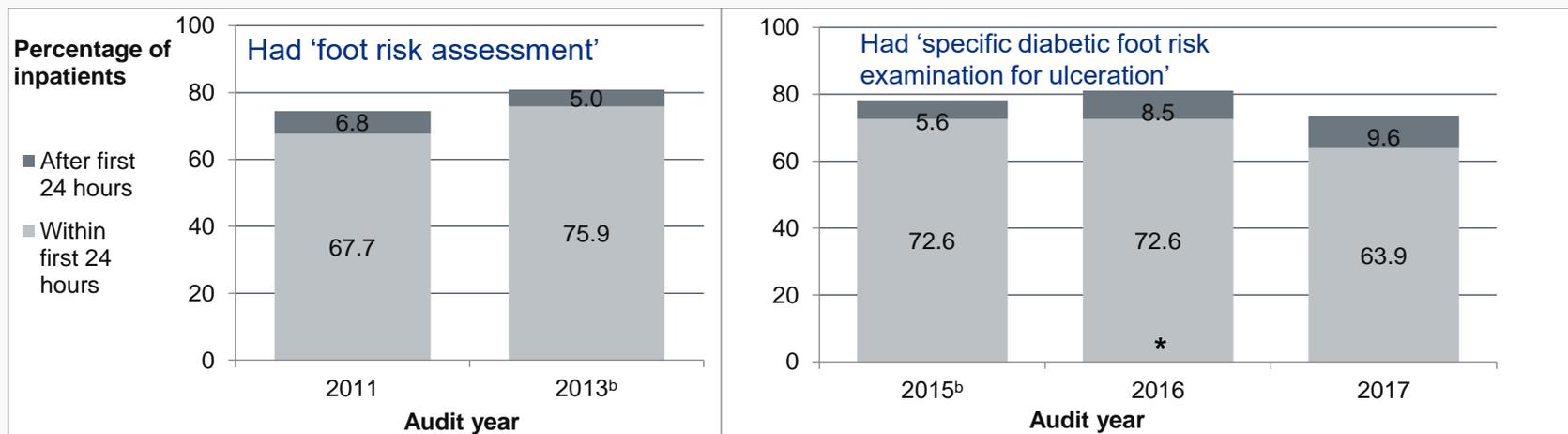
- **One fifth** of hospital sites do not have a Multi-disciplinary Foot Care Team.
- The proportion of hospital sites not having a Multi-disciplinary Foot Care Team has **halved** since 2011.



Foot disease management: Diabetic foot risk assessment



Figure 5.2: Percentage of inpatients admitted with active foot disease¹ having a specific diabetic foot risk examination for ulceration² during their hospital stay, England and Wales, 2011-17



Significant Difference ($p < 0.05$)	
2011 to 2017	2016 to 2017
Not comparable	Down

Findings

- Less than **two thirds** of inpatients admitted with active foot disease have a specific diabetic foot risk examination within 24 hours.
- The proportion of inpatients having an assessment within 24 hours has **decreased** by nine percentage points since NaDIA 2016.

Notes: b = break in time series.

* = 'Within first 24 hours' statistically significant at the 0.05 level (vs. current audit year).

n = 'Within first 24 hours' not statistically significant (vs. current audit year).

1. 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. Previously all inpatients were assessed.

2. The definition of "foot risk assessment" used in NaDIA 2011 and 2013 may include Waterlow score, Norton score and similar general pressure sore checks. The definition of "specific diabetic foot risk assessment for ulceration" used from NaDIA 2015 onwards specifically excludes these tests.



Foot disease management: Impact of foot care initiatives



Table 5.2: Diabetic foot assessment and foot lesion development during admission: by foot care initiatives in use³, England and Wales, 2017

Percentage of inpatients admitted <u>with</u> diabetic foot disease that:	With foot care initiatives in use	Without foot care initiatives in use
• Had diabetic foot risk examination <24hr after admission ¹	65.4 *	53.7 *
• Had diabetic foot risk examination at any time after admission (including <24hr) ¹	74.8 *	65.2 *
• Seen by a member of the MDFT <24hr after admission ²	59.9 *	47.8 *
• Seen by member of MDFT in the last 7 days ²	66.6 n	59.2 n
Percentage of inpatients that:		
• Developed new foot lesion during admission	1.0 n	0.9 n

Event	Significant Difference (p <0.05)	
	Foot care initiatives used	Foot care initiatives not used
• Foot risk exam <24hr	More likely	Less likely
• Foot risk exam (any time)	More likely	Less likely
• Seen by MDFT <24hr ²	More likely	Less likely
• Seen by MDFT 7 days ²	No difference	No difference
• Foot lesion developed	No difference	No difference

Findings

- Inpatients with diabetes who attend a hospital that has one or more foot care initiative in place are **more likely** to have a diabetic foot risk examination.
- There is **no difference** in the proportion of inpatients that develop a foot lesion during their hospital stay.

Notes: * = statistically significant at the 0.05 level (Using vs. not using...). n = not statistically significant (Using vs. not using...).

1. 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. Previously all inpatients were assessed.

2. MDFT = Multi-disciplinary Foot Care Team.

3. NICE inpatient foot guidance / 'Putting Feet First' / Tools or systems to increase the numbers that have a foot risk examination.



Foot disease management:

Clinical comment and recommendations



- Since 2011 there has been an increase in the proportion of sites with a Multi-disciplinary Foot Care Team (MDFT). But still 20 per cent do not comply with this basic NICE guidance.
- The percentage of patients admitted with active foot disease that received a specific diabetic foot risk examination for ulceration has reduced since 2016 to less than 80 per cent.
- Hospital-acquired foot ulceration does not seem to be lower in sites that use 'Putting Feet First'/NICE guidance¹ and/or systems that increase foot examinations, though this could be the result of better foot surveillance and identification at these sites or insufficient statistical power to detect a difference.

NaDIA team

Recommendation:

- Implementation initiatives to improve foot examination on admissions and NICE guidance¹ are associated with better processes and should be implemented in all NHS Trusts and Local Health Boards.



National Diabetes Inpatient Audit 2017

6. Blood glucose monitoring



Blood glucose monitoring: Overview



Audit question:

Was inpatient blood glucose monitoring appropriate?

Why is this important?

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.

How is this measured?

Data was collected on inpatients' blood glucose monitoring in the previous 7 days of their hospital stay.

What about patients who have been in hospital for less than 7 days? Results are adjusted for length of stay. For example, a patient who has been admitted for 2 days and been monitored on 1 day would be counted as having been monitored on 3.5 days out of 7.

Key findings

- The average number of days per week that blood glucose monitoring occurred has remained **consistent** since 2011.
- Since 2011, the average number of 'good diabetes days' per week has **improved** by half a day (from 4.1 to 4.6 days).
- **Less than half** of the days of a typical hospital stay for inpatients with insulin-treated diabetes meet the definition of a 'good diabetes day'¹.



Blood glucose monitoring: Definitions

Appropriate blood glucose monitoring

Information was collected on inpatients' blood glucose control, looking at the previous 7 days of their hospital stay, excluding inpatients in diabetic ketoacidosis (DKA) or hyperglycaemic hyperosmolar state (HHS) at the time of the audit. The following guidelines were used to establish the appropriateness of blood glucose testing:

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

'Good diabetes days'

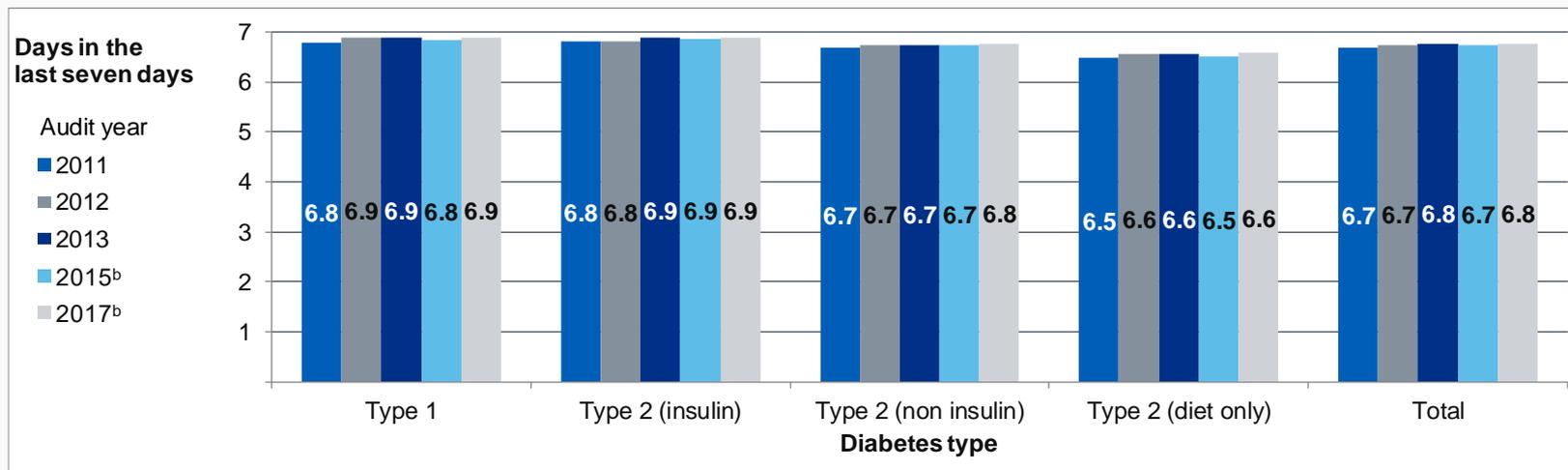
A 'good diabetes day' was defined as a day on which the frequency of blood glucose monitoring was appropriate, using the guidelines in the table above, and there was no more than one blood glucose measurement greater than 11 mmol/L and no blood glucose measurements less than 4 mmol/L.

Further information on blood glucose monitoring is provided in the [Glossary: Blood glucose control](#).



Blood glucose monitoring: Results

Figure 6.1: Blood glucose monitoring in last 7 days: by diabetes type, England and Wales, 2011-17



Methodology

Data was collected on inpatients' **blood glucose monitoring** in the previous 7 days of their hospital stay. Results were adjusted for length of stay. For example, a patient who has been admitted for 2 days and been monitored on 1 day would be counted as having been monitored on 3.5 days out of 7.

Findings

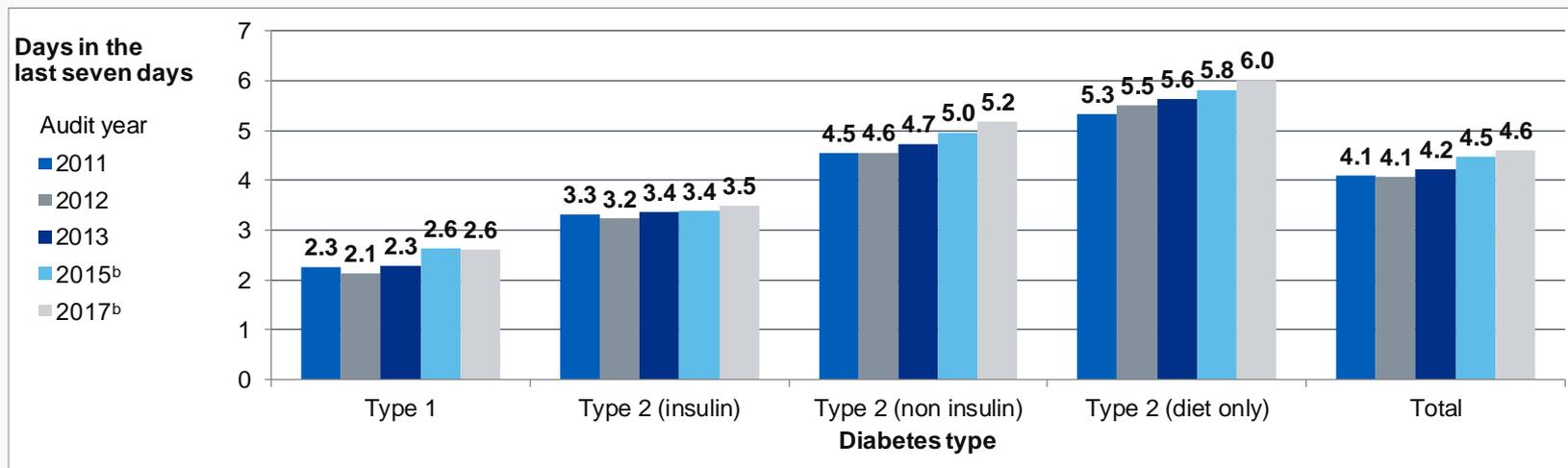
- The average number of days per week that monitoring occurred has remained **consistent** since 2011.
- **93 per cent** of total monitoring was considered appropriate.



Blood glucose monitoring: 'Good diabetes days'



Figure 6.2: 'Good diabetes days' in last 7 days: by diabetes type, England and Wales, 2011-17



Methodology

Data was collected on inpatients' **'good diabetes days'** in the previous 7 days of their hospital stay. Results were adjusted for length of stay. For example, a patient who has been admitted for 2 days and been monitored on 1 day would be counted as having been monitored on 3.5 days out of 7. **Definitions** are provided in [Blood glucose monitoring: Definitions](#).

Findings

- Since 2011, the average number of 'good diabetes days' per week has **improved** by half a day.
- **Less than half** of the typical hospital stay for inpatients with insulin-treated diabetes meets the definition of a 'good diabetes day'.



Blood glucose monitoring:

Clinical comment and recommendations

The frequency of blood glucose monitoring has always been appropriate for each treatment group and remains so. Despite that, fewer than half the days of a hospital stay of an insulin-treated patient are made up of 'good diabetes days'.

NaDIA team

"This is so disappointing as it seems patients are putting up with the blood glucose monitoring but appropriate action is not always being taken on the results of those checks, putting us at risk."

Maureen, who has Type 1 diabetes

Recommendation:

Healthcare professionals:

Continue to innovate and improve systems of blood glucose monitoring, including consideration of remote blood glucose monitoring where practical and appropriate. Higher rates of 'good diabetes days'¹ will translate into fewer harms and quicker recovery.



National Diabetes Inpatient Audit 2017

7. Use of insulin infusions



Use of insulin infusions: Overview

Audit question:

Were intravenous insulin infusions (IVII) used appropriately and safely?

Why is this important?

Insulin infusions should be used in hospital for short time periods only, e.g. around the time of an operative procedure when the patient isn't eating.

If a patient is on an insulin infusion when they don't need to be, or for too long, this increases the risk of them undergoing a hypoglycaemic episode or experiencing a medication error.

It is important patients are only on an infusion when necessary and that they are appropriately monitored throughout, including while the patient is transferred between infusions and other insulin delivery methods.

'Capillary blood glucose (CBG) levels should be monitored and recorded at least hourly during the procedure and in the immediate postoperative period.'

Management of adults with diabetes undergoing surgery and elective procedures: Improving standards, Joint British Diabetes Societies for Inpatient Care, March 2016

Key findings

- The proportion of patients on insulin infusions has **decreased** since 2011 (from 11 per cent to 8 per cent).
- The proportion of patients on insulin infusions having 12 or more blood glucose measurements within 24 hours has **increased** since 2011.

How is this measured?

The Bedside Audit recorded whether the inpatient had been on an insulin infusion in the last 7 days, along with information on the duration and appropriateness of the infusion, the transfer to subcutaneous insulin and the frequency of blood glucose monitoring.



Use of insulin infusions: Results

Table 7.1: Use of insulin infusions, England and Wales, 2011-17

Percentage of patients:	2011	2013 ^b	2015 ^b	2016	2017	Trend
• Been on an infusion in the last 7 days	11.2 *	9.8	9.0	8.1 n	8.2	
• Infusions considered inappropriate	7.0 n	6.5	6.3	7.1 n	6.1	
• Infusions that were 7 days or longer	8.0 n	9.7	8.3	8.1 n	7.1	
• Transfer to s.c. insulin not managed appropriately	18.9 n	16.3	14.2	14.0 n	16.4	

Percentage of patients:	Significant Difference (p < 0.05)	
	2011 to 2017	2016 to 2017
• Been on an infusion in the last 7 days	Down	No change
• Infusions considered inappropriate	No change	No change
• Infusions that were 7 days or longer	No change	No change
• Transfer to s.c. insulin not managed appropriately	No change	No change

Findings

- The proportion of patients on insulin infusions has **decreased** since 2011 (from 11 to 8 per cent).
- The proportion of insulin infusions that were considered inappropriate, lasted 7 or more days or where transfers to subcutaneous insulin were mismanaged have not changed significantly since 2011.

Notes: **b** = break in time series.

s.c. = subcutaneous.

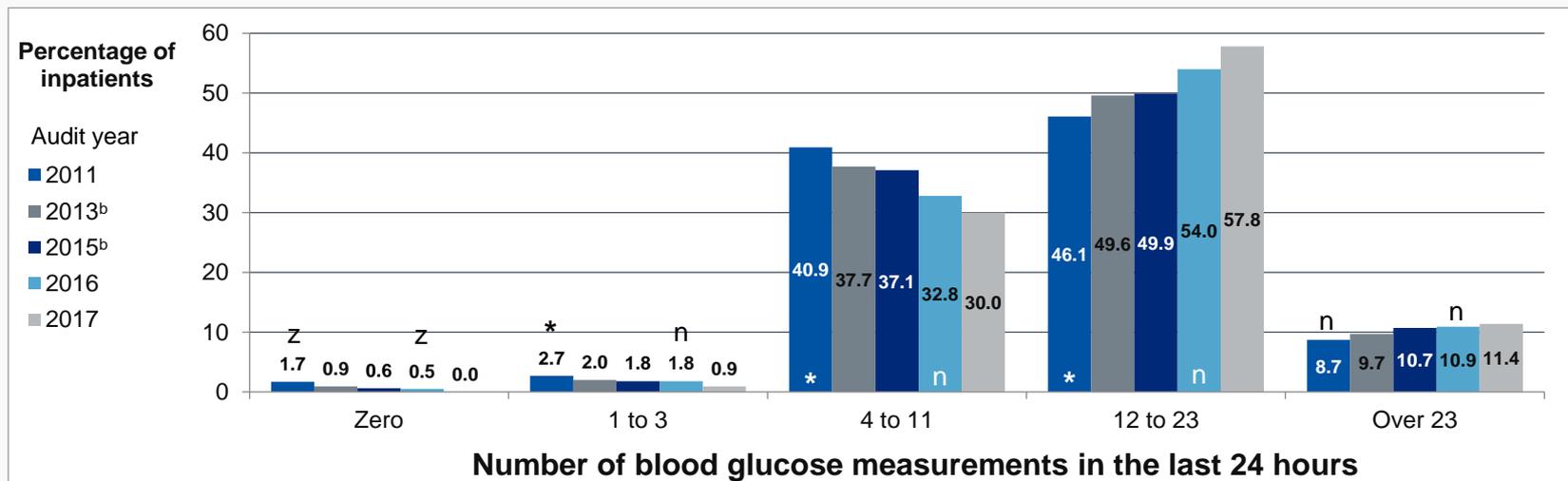
* = statistically significant at the 0.05 level (vs. current audit year).

n = not statistically significant (vs. current audit year).



Use of insulin infusions: Monitoring

Figure 7.1: Number of blood glucose measurements in the last 24 hours on infusion¹, England and Wales, 2011-17



Blood glucose measurements	Significant Difference ($p < 0.05$)	
	2011 to 2017	2016 to 2017
• Zero	N/A	N/A
• 1 to 3	Down	No change
• 4 to 11	Down	No change
• 12 to 23	Up	No change
• Over 23	No change	No change

Finding

- The proportion of patients on insulin infusions having 12 to 23 blood glucose measurements within 24 hours has **increased** by 12 percentage points since 2011.

Notes:

b = break in time series.

***** = statistically significant at the 0.05 level (vs. current audit year).

n = not statistically significant (vs. current audit year).

z = not applicable. Too few events to assess.

1. For insulin infusions that lasted longer than 24 hours.



Use of insulin infusions:

Clinical comment and recommendations

- The important finding is that the percentage of patients on an insulin infusion continues to decline year-on-year. However, it is concerning that other insulin infusion measures are unable to maintain a similar decline.
 - The frequency of glucose monitoring whilst on an infusion has increased since 2011, but there remains a percentage of patients in whom the monitoring is dangerously infrequent.
 - Last year's improvements in the safe transfer back to subcutaneous insulin were not maintained, and further attention is required to halt a dangerous upward trend in inappropriate transfers.
- NaDIA team**

Recommendations:

Diabetes teams:

- Continue to focus on surveillance of inappropriate use and duration of use of insulin infusions.
- Consider how to improve safe transfer back to subcutaneous insulin, with processes to ensure that there is no deterioration in glucose control¹.



National Diabetes Inpatient Audit 2017

8. Medication errors



Medication errors: Overview

Audit questions: What were the rates of medication errors in the last seven days?

Why is this important?

A patient 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.

How is this measured?

The healthcare professionals collecting the information for the audit reviewed each inpatient's drug chart and recorded whether specified medication errors (prescription errors and/or glucose management errors, see [Medication errors: Definitions](#)) 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.

Comparisons in error rates have been made to earlier audits.

Key findings

- 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.



Medication errors: Definitions

Hospital inpatients have **drug charts** to record their prescribed medication. Some entries contain **medication errors**, which have the potential to cause or contribute towards Patient harms (see [Glossary: Patient harms](#)). Medication errors can be categorised by incident type (**prescription** or **glucose management**) and medication type (**insulin** or **OA-DA**¹). A summary is shown in the table below:

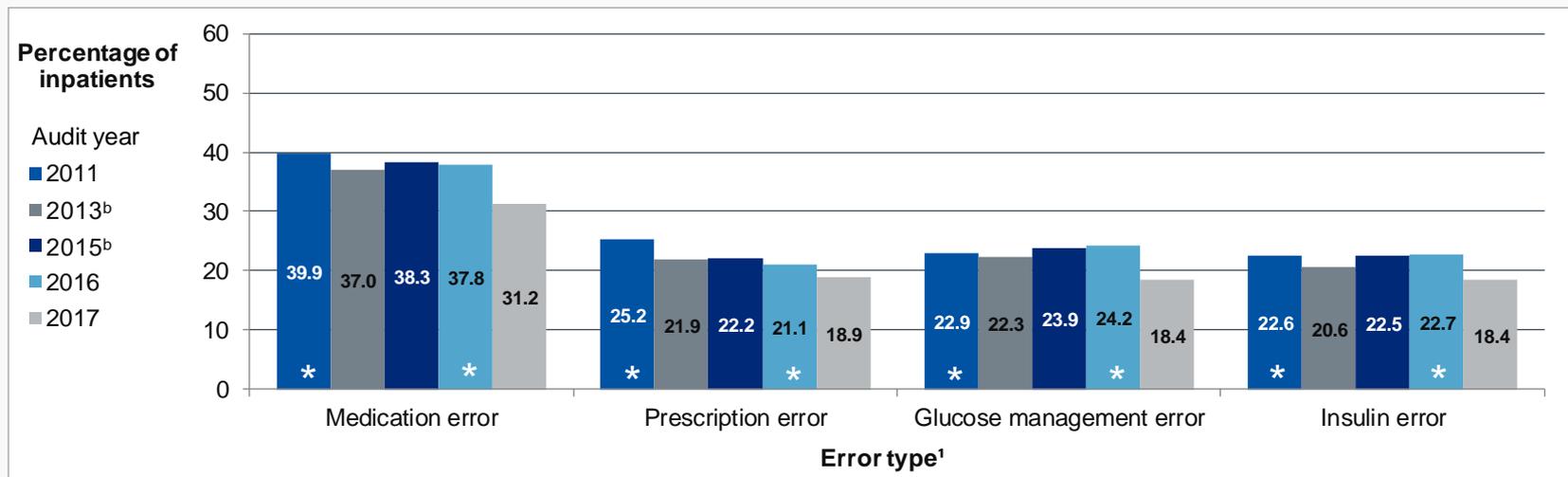
Error description ¹	Error type				
<ul style="list-style-type: none"> • Insulin not written up • Name of insulin incorrect • Number (dose) unclear • Unit abbreviated to 'u' or written unclearly • Insulin or prescription chart not signed by prescriber • Insulin not signed as given • Insulin given/prescribed at the wrong time 	Insulin prescription error	Insulin error	Prescription error	Medication error	
<ul style="list-style-type: none"> • OA-DA not signed as given • OA-DA given/prescribed at the wrong time 					OA-DA prescription error
<ul style="list-style-type: none"> • Wrong dose • OA-DA not written up 	Insulin management error	Insulin error			Glucose management error
<ul style="list-style-type: none"> • Insulin not increased when persistent BG >11 mmol/L and better glycaemic control appropriate for this patient • Insulin not reduced if unexplained BG <4 mmol/L • Inappropriate omission of insulin after episode of hypoglycaemia 					
<ul style="list-style-type: none"> • No action taken when persistent BG >11 mmol/L and better glycaemic control appropriate • OA-DA not reduced if unexplained BG <4 mmol/L • Inappropriate omission of OA-DA after episode of hypoglycaemia 					



Medication errors: Error type



Figure 8.1: Inpatient drug charts having one or more medication error¹ in last 7 days, England and Wales, 2011-17



Error type ¹	Significant Difference (p <0.05)	
	2011 to 2017	2016 to 2017
• Medication error	Down	Down
• Prescription error	Down	Down
• Glucose management error	Down	Down
• Insulin error	Down	Down

Findings

- Almost **one third** of inpatients with diabetes have a medication error during their hospital stay.
- The proportion of patients having medication errors had **decreased** by seven percentage points since 2016.

Notes:
b = break in time series.
 * = statistically significant at the 0.05 level (vs. current audit year).
 n = not statistically significant (vs. current audit year).
 1. See [Medication errors: Definitions](#) for explanation of error types.



Medication errors: Individual errors

Table 8.1: Percentage of Inpatient drug charts having one or more medication error in last 7 days: by individual error, England and Wales, 2011-17

Error type ¹	Error description ¹	2011	2013 ^b	2015 ^b	2016	2017	Significant difference ²	
							2011 to 2017	2016 to 2017
Insulin prescription error	• Insulin not written up	2.1 n	1.7	2.2	1.9 n	2.0	No change	No change
	• Name of insulin incorrect	2.9 *	2.1	1.8	1.8 n	1.8	Down	No change
	• Number (dose) unclear	2.3 *	1.9	1.7	1.6 n	1.5	Down	No change
	• Unit abbreviated to 'u' or written unclearly	3.4 *	1.9	1.5	1.2 n	1.0	Down	No change
	• Insulin or prescription chart not signed	2.4 *	1.9	2.1	2.0 n	1.9	Down	No change
	• Insulin not signed as given	5.1 *	4.8	4.9	4.7 n	4.3	Down	No change
	• Insulin given/prescribed at the wrong time	3.1 *	3.1	3.7	4.2 *	3.7	Up	Down
OA-DA prescription error	• OA-DA not signed as given	5.1 *	4.6	5.2	4.8 *	4.2	Down	Down
	• OA-DA given/prescribed at the wrong time	5.3 *	4.8	4.6	4.2 n	3.8	Down	No change
	• Wrong dose	1.1 *	1.0	1.0	0.9 n	0.7	Down	No change
	• OA-DA not written up	2.3 *	2.0	1.8	1.8 n	1.7	Down	No change
Insulin management error	• Insulin not increased when persistent BG >11 mmol/L and better glycaemic control appropriate	9.5 n	9.8	11.5	12.1 *	8.9	No change	Down
	• Insulin not reduced if unexplained BG <4 mmol/L	4.0 *	3.3	4.0	3.8 *	3.0	Down	Down
	• Inappropriate omission of insulin after episode of hypoglycaemia	2.1 *	1.8	1.8	1.4 n	1.3	Down	No change
OA-DA management error	• No action taken when persistent BG >11 mmol/L and better glycaemic control appropriate	9.0 *	9.5	8.8	9.2 *	6.9	Down	Down
	• OA-DA not reduced if unexplained BG <4 mmol/L	2.9 *	2.6	2.3	2.2 *	1.6	Down	Down
	• Inappropriate omission of OA-DA after episode of hypoglycaemia	1.0 *	0.8	0.6	0.6 n	0.5	Down	No change

Notes: b = break in time series. * = statistically significant at the 0.05 level (vs. current audit year).

n = not statistically significant (vs. current audit year). 1. OA-DA = Oral anti-diabetic agents are drugs used for the treatment of people with Type 2 diabetes. BG = blood glucose. 2. p <0.05.



Medication errors: Summary

Insulin errors

OA-DA errors¹

Prescription errors

Insulin prescription errors

- 5 of the 7 insulin prescription errors have **decreased** in frequency since 2011.
- The frequency of 'Insulin given/prescribed at wrong time' errors has **increased** since 2011 (from 3.1 to 3.7 per cent).

OA-DA prescription errors¹

- All 4 OA-DA prescription errors have **decreased** in frequency since 2011¹.

Glucose management errors

Insulin management errors

- 2 of the 3 insulin management errors have **decreased** in frequency since 2011. The remaining error has **decreased** since 2016.

OA-DA management errors¹

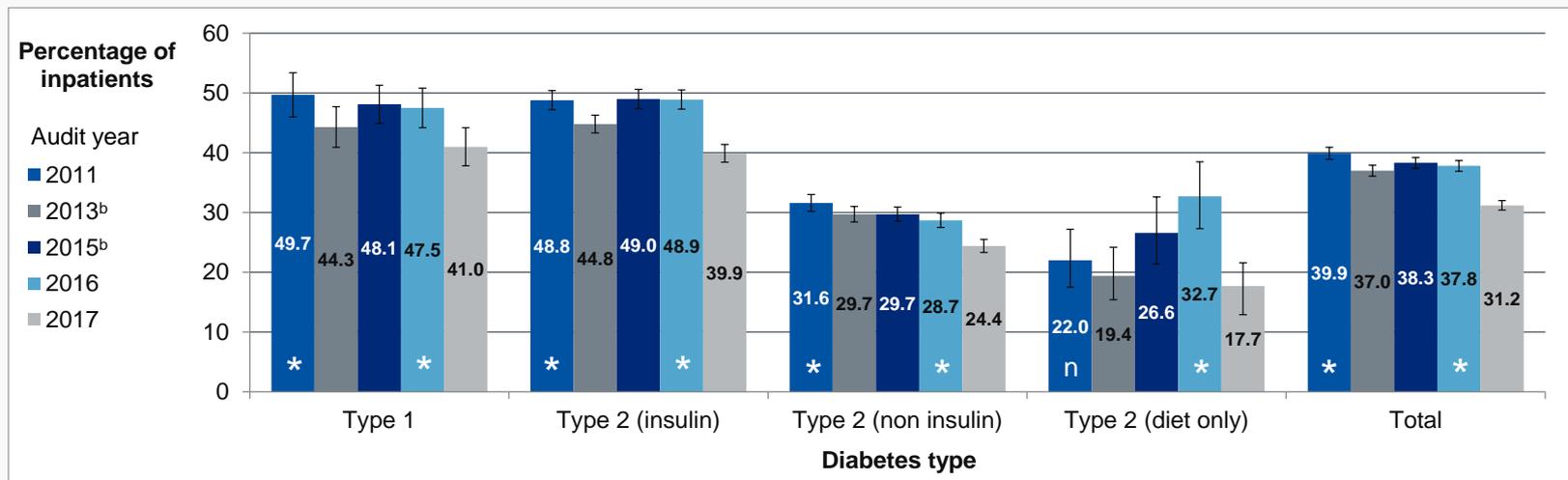
- All 3 OA-DA prescription errors have **decreased** in frequency since 2011¹.



Medication errors: by diabetes type



Figure 8.2: Inpatient drug charts having one or more medication error¹ in last 7 days: by diabetes type, England and Wales, 2011-17



Diabetes type	Significant Difference (p <0.05)	
	2011 to 2017	2016 to 2017
• Type 1	Down	Down
• Type 2 (insulin)	Down	Down
• Type 2 (non insulin)	Down	Down
• Type 2 (diet only)	No change	Down
• Total	Down	Down

Findings

- **4 out of 10** insulin-treated inpatients have a medication error during their hospital stay.
- The frequency of medication errors for inpatients with all diabetes types has **reduced** since 2016.

Notes: **b** = break in time series.

* = statistically significant at the 0.05 level (vs. current audit year). **n** = not statistically significant (vs. current audit year).

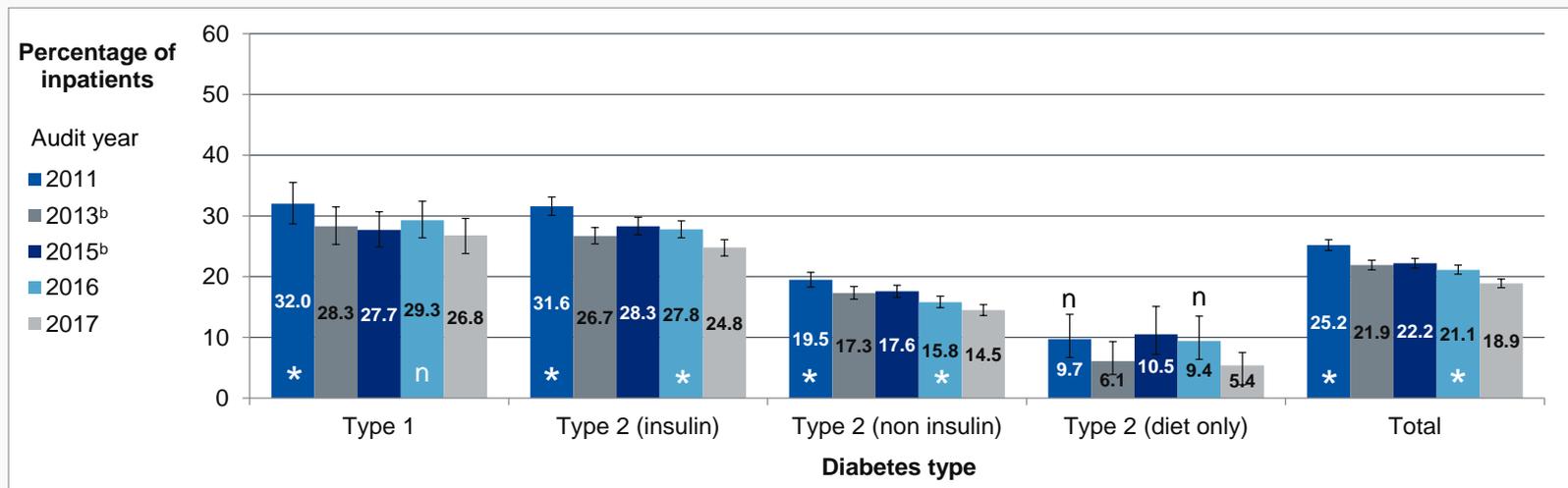
1. Medication error = any prescription or glucose management error. See [Medication errors: Definitions](#) for explanation of error types.



Medication errors: Prescription errors



Figure 8.3: Inpatient drug charts having one or more prescription error¹ in last 7 days: by diabetes type, England and Wales, 2011-17



Diabetes type	Significant Difference (p < 0.05)	
	2011 to 2017	2016 to 2017
• Type 1	Down	No change
• Type 2 (insulin)	Down	Down
• Type 2 (non insulin)	Down	Down
• Type 2 (diet only)	No change	No change
• Total	Down	Down

Findings

- Around **one quarter** of insulin-treated inpatients have a prescription error during their hospital stay.
- The frequency of prescription errors for inpatients with insulin or non-insulin treated diabetes types has **reduced** since 2011.

Notes:

b = break in time series.

***** = statistically significant at the 0.05 level (vs. current audit year).

n = not statistically significant (vs. current audit year).

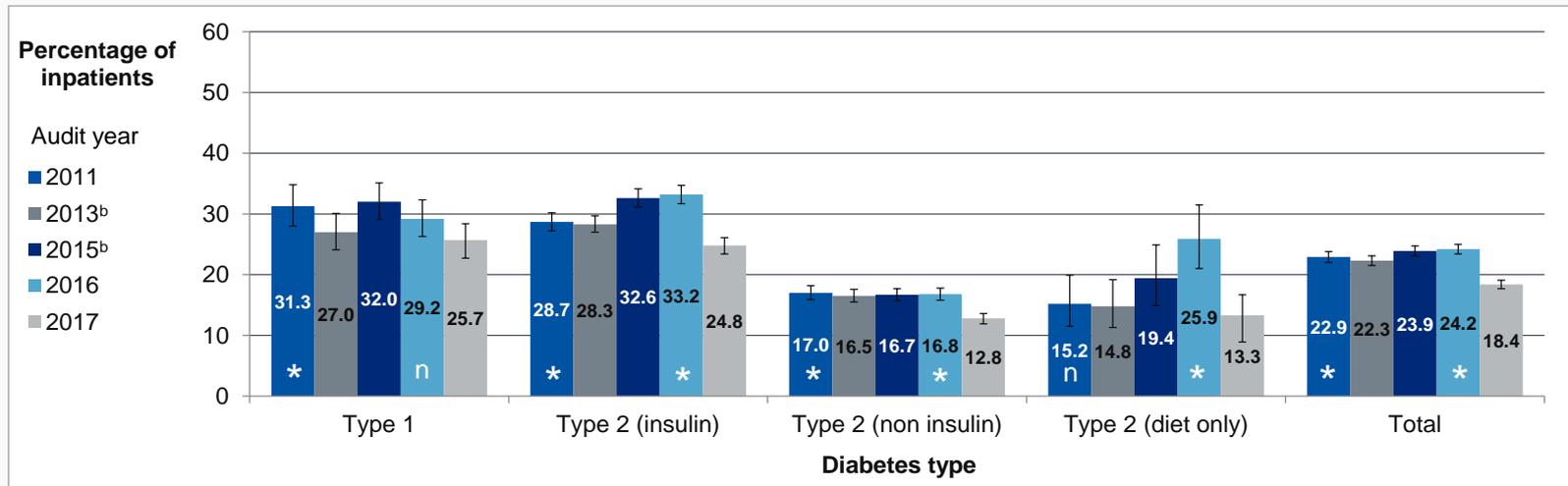
1. See [Medication errors: Definitions](#) for explanation of error types.



Medication errors: Glucose management errors



Figure 8.4: Inpatient drug charts having one or more glucose management error¹ in last 7 days: by diabetes type, England and Wales, 2011-17



Diabetes type	Significant Difference (p < 0.05)	
	2011 to 2017	2016 to 2017
• Type 1	Down	No change
• Type 2 (insulin)	Down	Down
• Type 2 (non insulin)	Down	Down
• Type 2 (diet only)	No change	Down
• Total	Down	Down

Findings

- Around **one quarter** of insulin-treated inpatients have a glucose management error during their hospital stay.
- The frequency of glucose management errors for inpatients with all diabetes types has **reduced** since 2011 and/or 2016.

Notes:

b = break in time series.

***** = statistically significant at the 0.05 level (vs. current audit year).

n = not statistically significant (vs. current audit year).

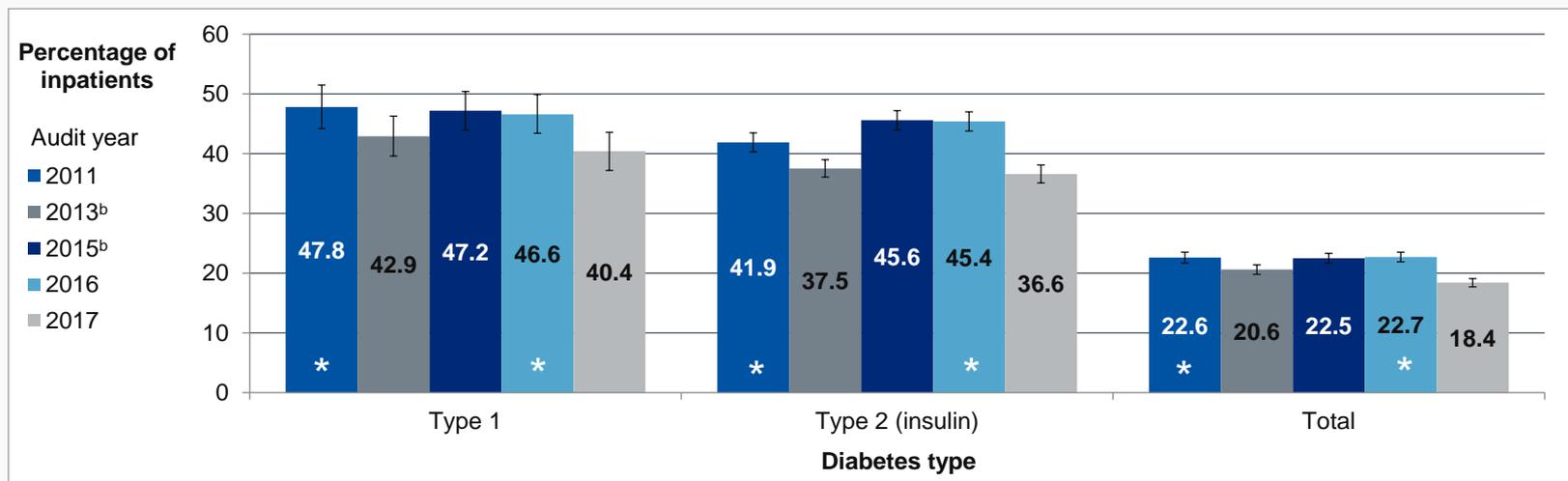
1. See [Medication errors: Definitions](#) for explanation of error types.



Medication errors: Insulin errors



Figure 8.5: Inpatient drug charts having one or more insulin error¹ in last 7 days: by diabetes type, England and Wales, 2011-17



Diabetes type	Significant Difference (p <0.05)	
	2011 to 2017	2016 to 2017
• Type 1	Down	Down
• Type 2 (insulin)	Down	Down
• Total	Down	Down

Findings

- Around **4 out of 10** insulin-treated inpatients have an insulin error during their hospital stay.
- The frequency of insulin errors has **decreased** since 2016.

Notes:

b = break in time series.

***** = statistically significant at the 0.05 level (vs. current audit year).

n = not statistically significant (vs. current audit year).

1. See [Medication errors: Definitions](#) for explanation of error types.



Medication errors: by ward type

Table 8.2: Frequency of medication errors¹ in last 7 days: by ward type, England and Wales, 2017

Inpatient drug charts that had one or more:	Medical	Surgical
• Medication error	30.6 *	33.4 *
• Prescription error	18.4 *	21.3 *
• Glucose management error	18.3 n	19.0 n
• Insulin error	18.2 n	19.2 n

Error type ¹	Significant Difference (p < 0.05)	
	Medical	Surgical
• Medication error	Less likely	More likely
• Prescription error	Less likely	More likely
• Glucose management error	No difference	No difference
• Insulin error	No difference	No difference

Findings

- Inpatients with diabetes are **more likely** to have prescription errors if treated on a surgical ward.
- There is **no difference** in the occurrence of glucose management and insulin errors between the two ward types.

Notes:

* = statistically significant at the 0.05 level (vs. current audit year). n = not statistically significant (vs. current audit year).

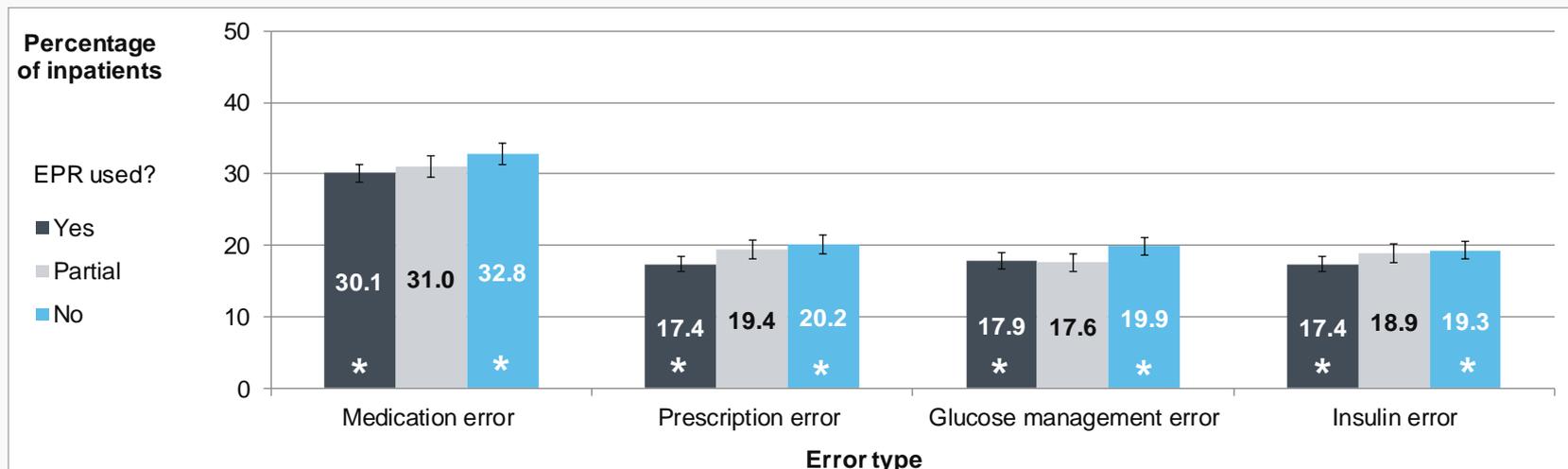
1. Medication error = any prescription or glucose management error. See [Medication errors: Definitions](#) for explanation of error types.



Medication errors: Use of an Electronic Patient Record



Figure 8.6: Inpatient drug charts having one or more medication error¹ in last 7 days: by Electronic Patient Record (EPR) usage², England and Wales, 2017



Error type ¹	Significant Difference (p < 0.05)	
	EPR used	EPR not used
• Medication error	Less likely	More likely
• Prescription error	Less likely	More likely
• Glucose management error	Less likely	More likely
• Insulin error	Less likely	More likely

Finding

- Inpatients with diabetes are **less likely** to have medication errors if EPR is used.

Notes: * = statistically significant at the 0.05 level (EPR used vs. EPR not used).

n = not statistically significant (EPR used vs. EPR not used).

1. Medication error = any prescription or glucose management error.

See [Medication errors: Definitions](#) for explanation of error types.

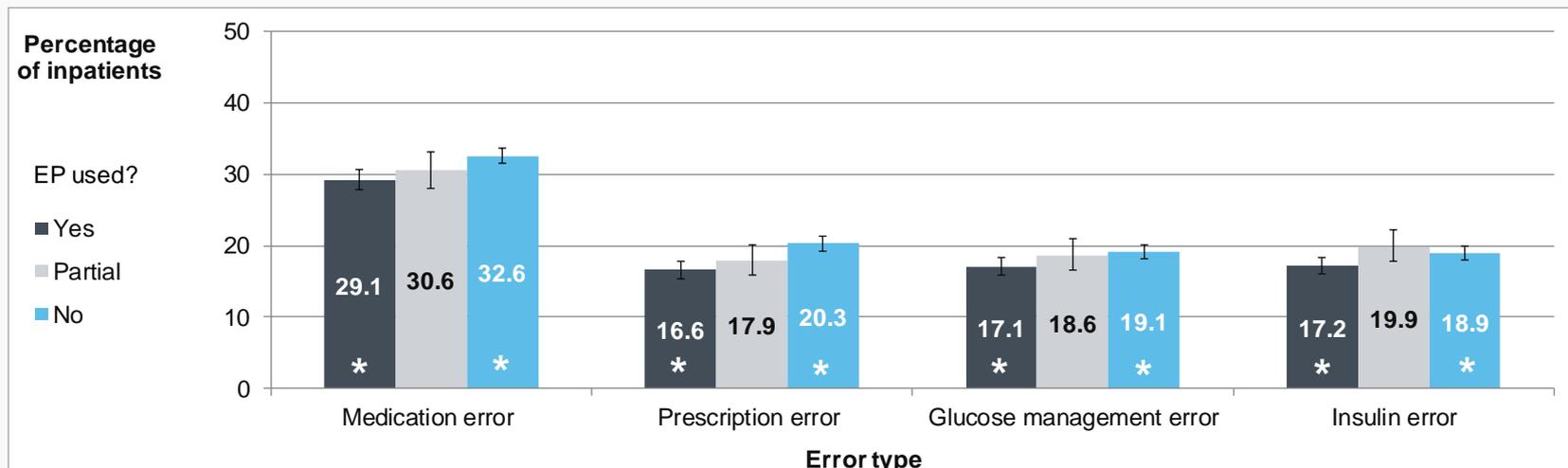
2. See [Glossary: Healthcare technologies](#) for information on EPR



Medication errors: Use of Electronic Prescribing



Figure 8.7: Inpatient drug charts having one or more medication error¹ in last 7 days: by Electronic Prescribing (EP) usage², England and Wales, 2017



Error type ¹	Significant Difference (p < 0.05)	
	EP used	EP not used
• Medication error	Less likely	More likely
• Prescription error	Less likely	More likely
• Glucose management error	Less likely	More likely
• Insulin error	Less likely	More likely

Finding

- Inpatients with diabetes are **less likely** to have medication errors if EP is used.

Notes: * = statistically significant at the 0.05 level (EP used vs. EP not used).

n = not statistically significant (EP used vs. EP not used).

1. *Medication error* = any prescription or glucose management error.

See [Medication errors: Definitions](#) for explanation of error types.

2. See [Glossary: Healthcare technologies](#) for information on EP.



Medication errors: Hospital site results

Overview

Audit questions:

To what extent does the rate of medication errors vary between hospital sites?

How is this measured?

The proportion of inpatients experiencing one or more medication errors in the last seven days was broken-down by hospital site¹, then charted on a box and whisker plot. Attention has been drawn to hospital sites with very high or very low error proportions. This section focuses on prescription and glucose management errors.

Why is this important?

All hospital sites should continue to work to reduce the incidence of medication errors. Hospital sites with particularly high rates should investigate the underlying causes and make changes to practice where appropriate.

Key findings

- Rates of medication error vary by over **60 percentage points** across hospital sites.
- One hospital site has **very high** rates of prescription and glucose management errors (70 and 65 per cent).

Results for these and other measures are published in the NaDIA 2017 **Hospital Level Analysis** at hospital site level.

Caveats: Because NaDIA is a snapshot audit, an atypical inpatient population at the point of assessment may affect a hospital's results, both positively and negatively. Other uncontrollable factors, such as staff sickness, may also have an impact. It is therefore possible that a hospital's results would have been significantly different if audited on a different day.

Nonetheless, hospital sites should review practice where high rates have been identified, particularly if similar issues have been found in previous audit years.



Medication errors: Hospital site results

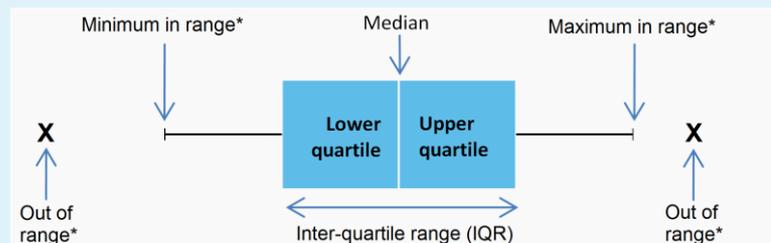
Findings



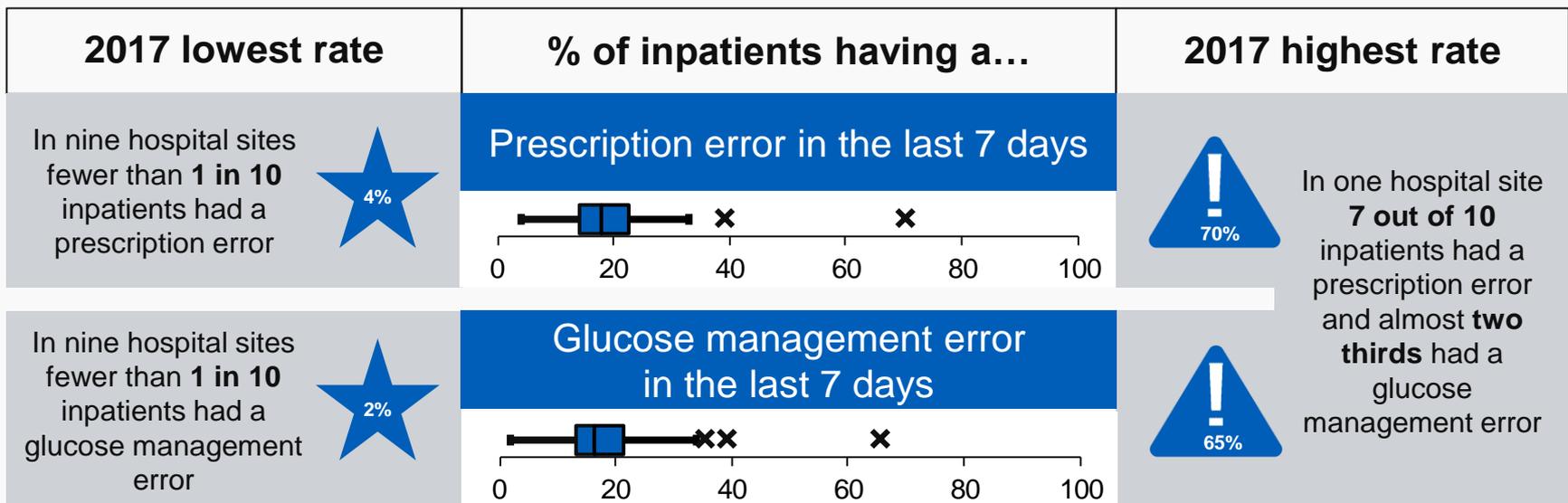
Findings

- Rates of medication error vary by over **60 percentage points** across hospital sites.
- One hospital site has **very high** rates of prescription and glucose management errors (70 and 65 per cent).

Box and whisker plots show the range of proportions found across NaDIA hospital sites for each measure.



* Range = Between 1.5 x IQR below the lower quartile and 1.5 x IQR above the upper quartile.



Medication errors: Clinical comment



- Medication errors continue to reduce – from 38 per cent in 2016 to 31 per cent in 2017. This most recent reduction comes from improvements in both prescribing and glucose management, but is largely due to better management of patients with particularly high and low blood glucose levels.
- Incorrect timing of insulin administration have worsened since 2011; these errors increase the risk of diabetic ketoacidosis (DKA) and hyperosmolar hyperglycaemic state (HHS).
- Two in five insulin-treated patients have at least one insulin error during their hospital stay. This is an improvement since 2016, but the rate of insulin errors among Type 1 and Type 2 (insulin-treated) patients is still too high.
- It is notable that the proportion of prescription errors and overall medication errors are significantly worse on surgical wards, while there is no difference between glucose management errors on medical and surgical wards.
- The use of Electronic Prescribing and Electronic Patient Records are associated with lower levels of all medication errors.

NaDIA team



Recommendations:

Provider organisations: Learn from NHS Trusts and Local Health Boards that have most effectively utilised Electronic Prescribing and implemented other new technologies and systems that help reduce errors.

Diabetes teams:

- Continue to educate and support junior doctors and nursing staff, while also developing and testing new systems to reduce prescribing and glucose management errors. Junior doctors and nursing staff should be made more aware that untreated hyperglycaemia is high risk, especially in people with Type 1 diabetes.
- Work with surgical colleagues to ensure diabetes safety levels are at least equivalent to those on medical units.



National Diabetes Inpatient Audit 2017

9. Hypoglycaemic episodes



Hypoglycaemic episodes: Overview

Audit questions:

What were the rates of hypoglycaemic episodes during the patient's admission? What factors were associated with increased rates of hypoglycaemia?

Why is this important?

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.

How is this measured?

For each patient with a Bedside Audit, it was recorded whether the patient experienced any mild or severe hypoglycaemic episodes over the last 7 days. The audit collects how many of each episode occurred and at what time of day.

Key findings

- The prevalence of hypoglycaemic episodes has **decreased** since 2016, though almost **1 in 5** inpatients with diabetes still have a hypo during their hospital stay (18 per cent).
- The highest proportion of severe hypoglycaemic episodes took place between 05:00am and 08:59am (28 per cent).
- The incidence of hypoglycaemic episode requiring injectable rescue treatment has **decreased** since 2011 (from 2.1 to 1.3 per cent).

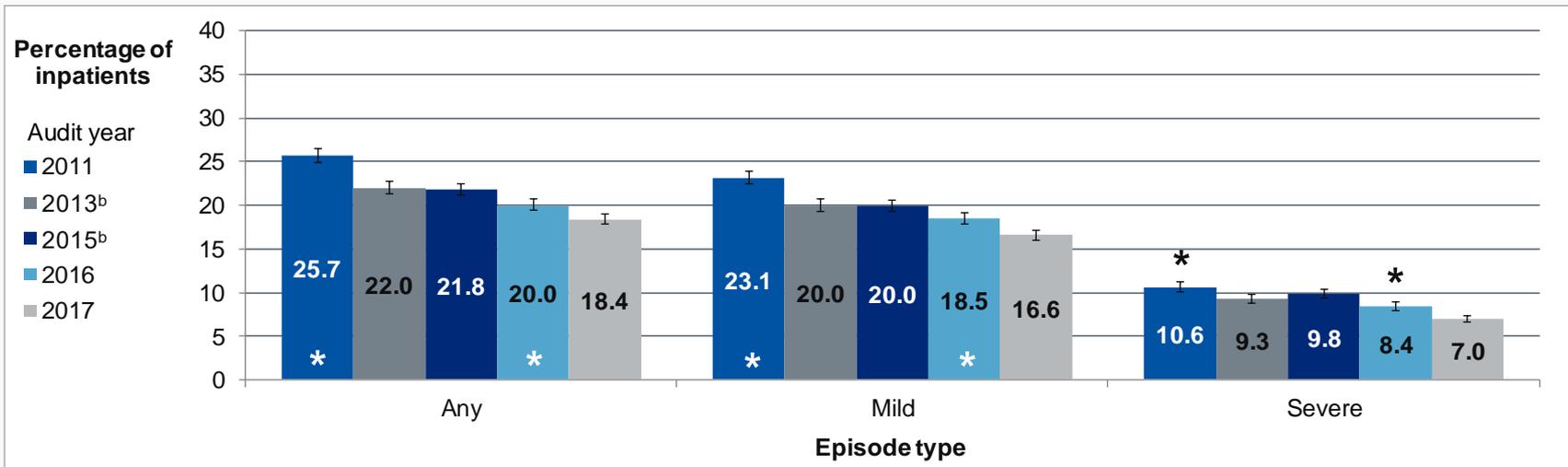
A 'mild' hypoglycaemic episode involves a blood glucose level of between 3.0 and 3.9 mmol/L.

A 'severe' hypoglycaemic episode involves a blood glucose level of less than 3.0 mmol/L.



Hypoglycaemic episodes: Summary

Figure 9.1: Inpatients having one or more hypoglycaemic episode¹ in last 7 days, England and Wales, 2011-17



Comparison	Significant Difference (p < 0.05)		
	Any	Mild	Severe
2011 to 2017	Down	Down	Down
2016 to 2017	Down	Down	Down

Findings

- The prevalence of all hypoglycaemic episode types has **decreased** since 2016.
- However almost **1 in 5** inpatients with diabetes still have a hypoglycaemic episode during their hospital stay. **1 in 14** have a severe episode.

Notes:

b = break in time series.

* = statistically significant at the 0.05 level (vs. current audit year).

n = not statistically significant (vs. current audit year).

1. Any hypoglycaemic episode = blood glucose measurement of ≤ 3.9 mmol/L.

Mild hypoglycaemic episode = 3.0-3.9mmol/L.

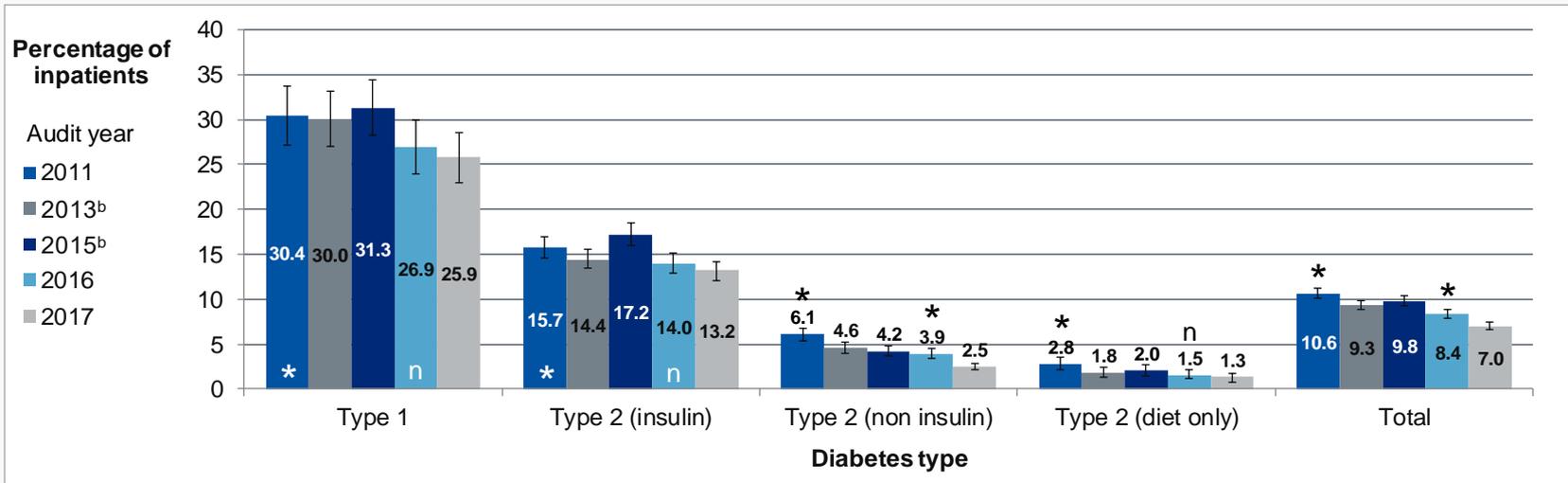
Severe hypoglycaemic episode = < 3.0 mmol/L.



Hypoglycaemic episodes: Severe episodes



Figure 9.2: Inpatients having one or more severe hypoglycaemic episode¹ in last 7 days: by diabetes type, England and Wales, 2011-17



Diabetes type	Significant Difference (p < 0.05)	
	2011 to 2017	2016 to 2017
• Type 1	Down	No change
• Type 2 (insulin)	Down	No change
• Type 2 (non insulin)	Down	Down
• Type 2 (diet only)	Down	No change
• Total	Down	Down

Findings

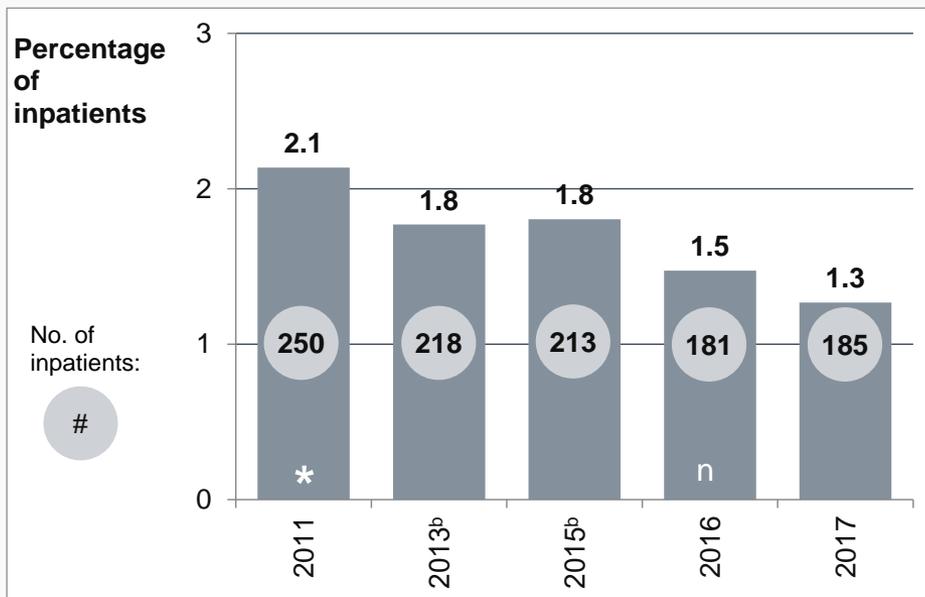
- The prevalence of severe hypoglycaemic episodes has **decreased** for all diabetes types since 2011.
- More than **1 in 4** inpatients with Type 1 diabetes experience at least one severe hypoglycaemic episode during their hospital stay.

Notes:
b = break in time series.
***** = statistically significant at the 0.05 level (vs. current audit year).
n = not statistically significant (vs. current audit year).
1. Severe hypoglycaemic episode = <3.0mmol/L.

Hypoglycaemic episodes: Requiring injectable rescue treatment



Figure 9.3: Inpatients having one or more hypoglycaemic episode that required injectable rescue treatment¹ in the last 7 days, England and Wales, 2017



To account for changes to the NaDIA 2017 Bedside Audit (BA) questionnaire, the methodology has been altered to automatically class inpatients with zero glucose readings under 3 mmol/L as having zero hypoglycaemia episodes requiring injectable rescue treatment. This results in a larger denominator and a smaller percentage (e.g. 0.2 percentage points lower for 2016). For consistency, historic results have been updated using the same logic.

Findings

- Around **1 in 80** inpatients with diabetes have a hypoglycaemic episode requiring injectable rescue treatment during their hospital stay.
- The incidence of injectable rescue treatment has **decreased** since 2011.

Comparison	Significant Difference (p < 0.05)
2011 to 2017	Down
2016 to 2017	No change

Notes:

b = break in time series.

***** = statistically significant at the 0.05 level (vs. current audit year).

n = not statistically significant (vs. current audit year).

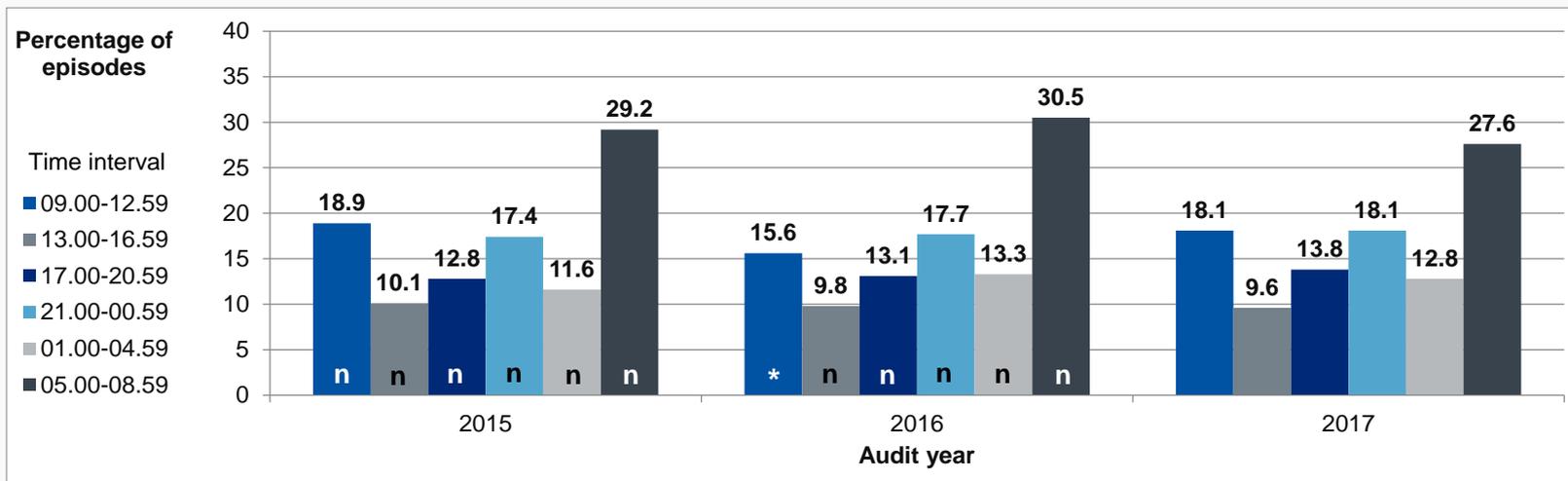
1. See [Glossary: Patient harms](#)



Hypoglycaemic episodes: Time of day



Figure 9.4: Percentage of severe hypoglycaemic episodes¹ during time intervals in the last 7 days, England and Wales, 2015-17



Time interval	Significant Difference (p <0.05)	
	2015 to 2017	2016 to 2017
• 09:00-12:59	No change	Down
• 13:00-16:59	No change	No change
• 17:00-20:59	No change	No change
• 21:00-00:59	No change	No change
• 01:00-04:59	No change	No change
• 05:00-08:59	No change	No change

Findings

- The highest proportion of severe hypoglycaemic episodes consistently takes place between 05:00am and 08:59am.
- There has been **little change** in the spread of timings since 2015.

Notes: **b** = break in time series.

* = statistically significant at the 0.05 level (vs. current audit year).

n = not statistically significant (vs. current audit year).

1. Severe hypoglycaemic episode = <3.0mmol/L.



Hypoglycaemic episodes: Hospital site results – Overview

Audit questions: To what extent does the rate of severe hypoglycaemic episodes vary between hospital sites?

How is this measured?

The proportion of inpatients experiencing one or more hypoglycaemic episode in the last seven days was broken-down by hospital site¹, then charted on a box and whisker plot. Attention has been drawn to hospital sites with very high or very low rates. Results are split into mild and severe hypoglycaemic episodes.

Why is this important?

All hospital sites should continue to work to reduce the incidence of hypoglycaemic episodes. Hospital sites with particularly high rates should investigate the underlying causes and make changes to practice where appropriate.

Key findings

- There is **not much variation** in rates of hypoglycaemia within the middle 50 per cent of hospital sites (5 and 4 per cent for mild and severe hypos respectively).
- In contrast to medication errors and patient satisfaction, there is **no one organisation** that is a long way outside the typical range.

Results for these and other measures are published in the NaDIA 2017 **Hospital Level Analysis** at hospital site level.

Caveats: Because NaDIA is a snapshot audit, an atypical inpatient population at the point of assessment may affect a hospital's results, both positively and negatively. Other uncontrollable factors, such as staff sickness, may also have an impact. It is therefore possible that a hospital's results would have been significantly different if audited on a different day.

Nonetheless, hospital sites should review practice where high rates have been identified, particularly if similar issues have been found in previous audit years.



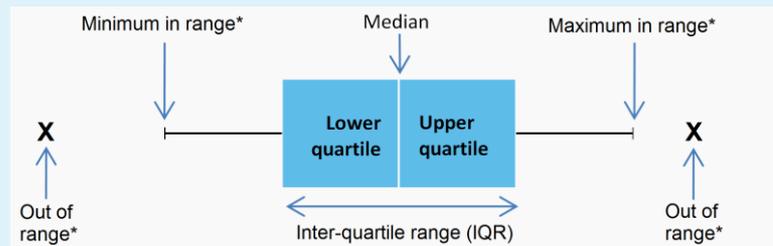
Hypoglycaemic episodes: Hospital site results - Findings



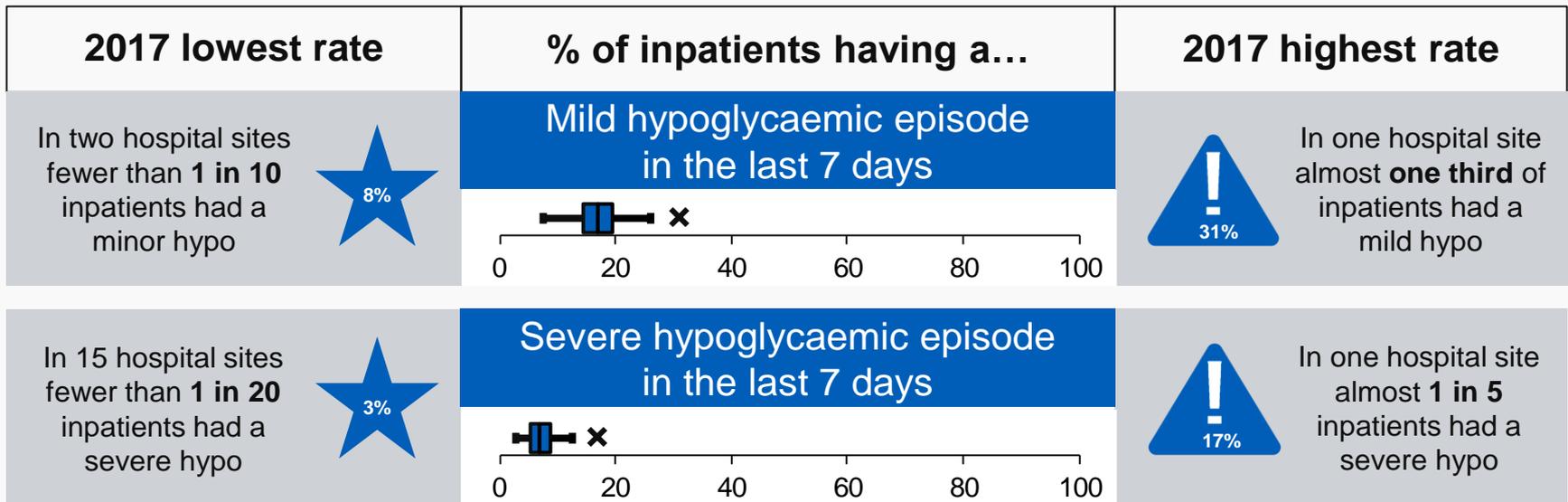
Findings

- There is **not much variation** in rates of hypoglycaemia within the middle 50 per cent of hospital sites (5 and 4 per cent for mild and severe hypos respectively).
- In contrast to medication errors and patient satisfaction, there is **no one organisation** that is a long way outside the typical range.

Box and whisker plots show the range of proportions found across NaDIA hospital sites for each measure.



* Range = Between 1.5 x IQR below the lower quartile and 1.5 x IQR above the upper quartile.



Hypoglycaemic episodes:

Clinical comment and recommendations

- The progressive reduction in total, mild and severe hypoglycaemic episodes overall and for all groups continues.
- It is especially welcome that severe hypoglycaemia is on a downward trend, but 1 in 4 patients with Type 1 still experiences severe hypoglycaemia during their hospital stay (26 per cent).
- The need for injectable rescue treatment for hypoglycaemic episodes has reduced from 2.1 per cent in 2011 to 1.3 per cent in 2017.
- Although the reduction in the numbers of people having hypoglycaemic episodes is welcome, the substantial proportion of people still experiencing severe hypos, particularly in the early hours of the morning, indicates that more work needs to be done.

NaDIA team

Recommendations:

Provider organisations:

- Benchmark their outcomes against the national reduction in hypoglycaemia.

Healthcare professionals:

- Measures should be taken to prevent hypoglycaemia in the early morning (05:00am to 08:59am), including the introduction of bed time snacks.



National Diabetes Inpatient Audit 2017

10. Hospital-acquired hyperglycaemic emergency



Hospital-acquired hyperglycaemic emergency: Overview

Audit question:

What proportion of people with diabetes develop diabetic ketoacidosis (DKA) or hyperosmolar hyperglycaemic state (HHS) after their admission to hospital?

Why is this important?

DKA and HHS are serious conditions which can have very serious consequences for the patient. They are preventable and should not occur during a hospital admission.

DKA mainly occurs in people with Type 1 diabetes when a severe lack of insulin means the body cannot use glucose for energy, and the body starts to break down other body tissue as an alternative energy source¹. The development of DKA after admission suggests that the inpatient's insulin treatment was omitted for an appreciable time.

HHS mainly occurs in people with Type 2 diabetes who experience very high blood glucose levels (often over 40mmol/l). It can develop over a course of weeks through a combination of illness (e.g. infection) and dehydration. HHS is a potentially life-threatening emergency² and should not develop in hospital.

Key findings

- There has been **no significant change** in the incidence of hospital-acquired DKA or HHS since data collection began.
- Around **1 in 25** inpatients with Type 1 diabetes develop DKA during their hospital stay.

Notes:

1. Diabetes UK: [Diabetic Ketoacidosis](#).
2. Diabetes UK: [Hyperosmolar Hyperglycaemic State HHS](#).



Hospital-acquired hyperglycaemic emergency: Results



Figure 10.1: Proportion of inpatients with Type 1 diabetes that develop DKA during their hospital stay¹, England and Wales, 2011-17

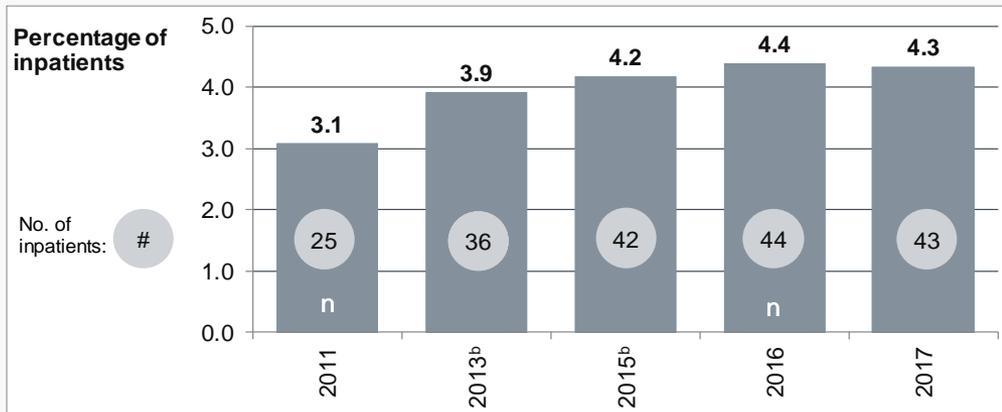
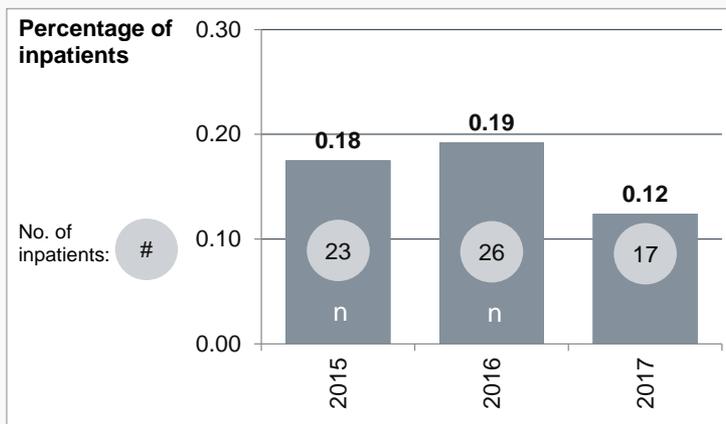


Figure 10.2: Proportion of inpatients with Type 2 diabetes that develop HHS during their hospital stay¹, England and Wales, 2015-17



Findings

- There has been **no significant change** in the incidence of DKA or HHS since data collection began.
- Around **1 in 25** inpatients with Type 1 diabetes develop DKA during their hospital stay.
- Around **1 in 800** inpatients with Type 2 diabetes develop HHS during their hospital stay.

Comparison	Significant Difference (p < 0.05)	
	DKA	HHS
2011 to 2017	No change	Not collected
2016 to 2017	No change	No change

Notes: **b** = break in time series. * = statistically significant at the 0.05 level (vs. current audit year).

n = not statistically significant (vs. current audit year). **1.** DKA = diabetic ketoacidosis. HHS = hyperosmolar hyperglycaemic state.



Hospital-acquired hyperglycaemic emergency: Comments / recommendations

i

- Since collection began there has been no significant reduction in hospital-acquired DKA and HHS¹, two serious inpatient diabetes harms.
- DKA and HHS are preventable and should not occur during a hospital admission. It is very disappointing that no reduction has been recorded since the beginning of NaDIA six years ago.

NaDIA team



Recommendation:

Diabetes teams:

- Record all hospital-acquired DKA and HHS¹ as Serious Incidents and undertake Root Cause Analysis². Ensure your hospital participates in the upcoming NaDIA continuous harms audit, a collaborative effort to tackle these stubborn problems.

Notes:

1. DKA = diabetic ketoacidosis. HHS = hyperosmolar hyperglycaemic state..

2. NHS Improvement: [Serious Incident Framework](#).



National Diabetes Inpatient Audit 2017

11. Hospital-acquired diabetic foot lesions



Hospital-acquired diabetic foot lesions: Overview

i

Audit question:

What proportion of people with diabetes develop diabetic foot lesions after their admission to hospital?

Why is this important?

Patients with diabetes are at a higher risk of developing foot lesions because of associated blood flow and nerve problems. If a foot lesion develops it can quickly result in severe problems for the patient, particularly when they are already not well and have been admitted to hospital for another reason.

No patient should deteriorate enough, while under a hospital's care, that they develop a new instance of a foot lesion.

How is this measured?

For each patient with a Bedside Audit, it was recorded whether they had developed a foot lesion during their admission.

These proportions were considered by comparing between patients with different types of diabetes.

Key findings

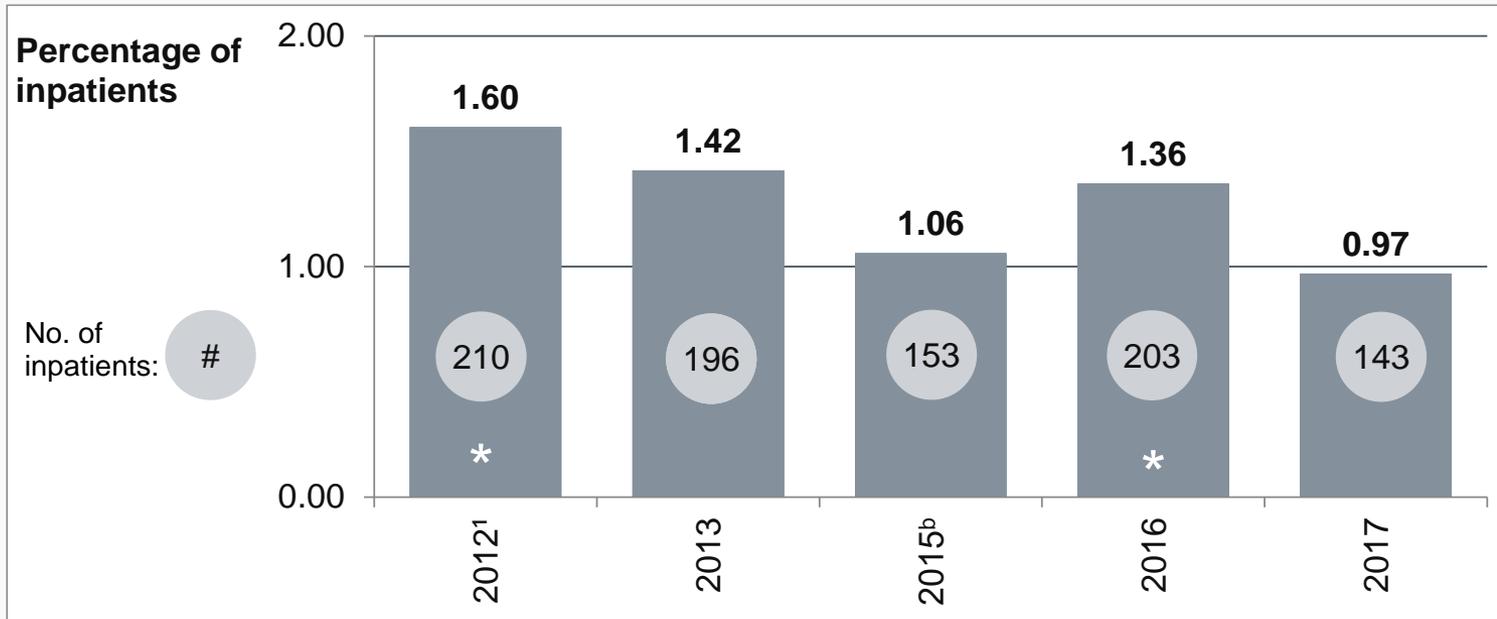
- Around **1 in 100** inpatients with diabetes develop a diabetic foot lesion during their hospital stay (1.0 per cent).
- Following an increase in 2016, the proportion of inpatients developing a diabetic foot lesion has **decreased** in 2017 (from 1.4 to 1.0 per cent).
- Large **drops** in incidence have been seen in inpatients with Type 1 diabetes since 2012 (3.4 to 1.7 per cent) and, more recently, amongst those with insulin-treated Type 2 diabetes (2.0 to 1.1 per cent).



Hospital-acquired diabetic foot lesions: Summary



Figure 11.1: Percentage of inpatients who developed a foot lesion during admission, England and Wales, 2012-17



Findings

- Around **1 in 100** inpatients with diabetes develop a foot lesion during their hospital stay.
- Following an increase in 2016, the proportion of inpatients developing a diabetic foot lesion during their admission has **decreased** in 2017 back to 2015 levels.

Comparison	Significant Difference (p < 0.05)
2012 to 2017	Down
2016 to 2017	Down

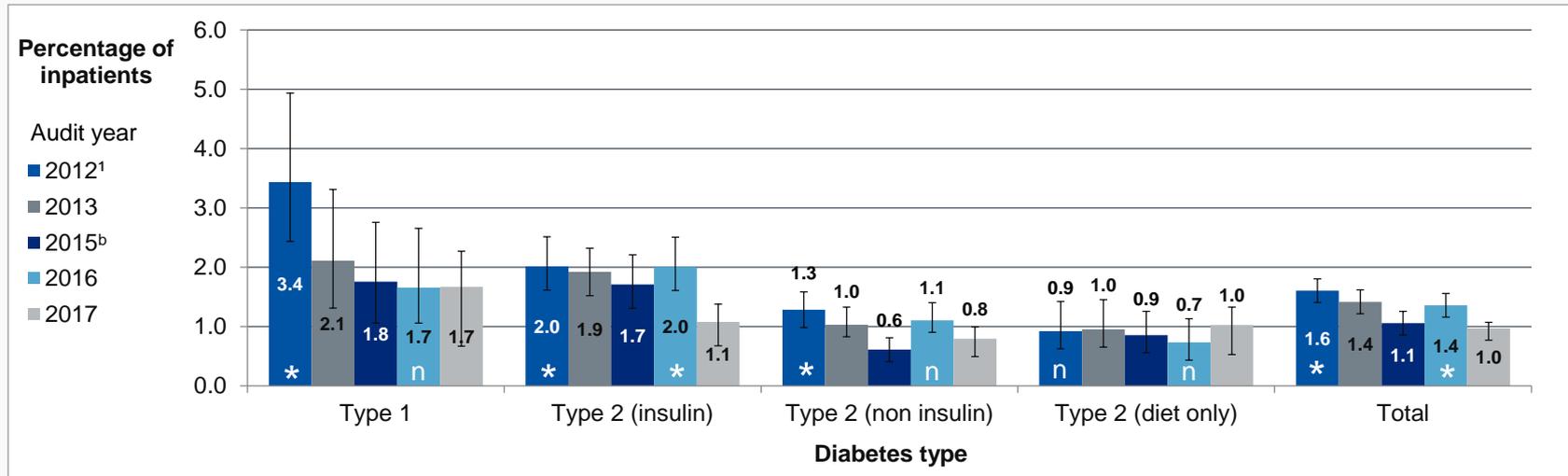
Notes: **b** = break in time series. * = statistically significant at the 0.05 level (vs. current audit year). **n** = not statistically significant (vs. current audit year). **1**. Data not collected in 2011.



Hospital-acquired diabetic foot lesions: By diabetes type



Figure 11.2: Percentage of inpatients who developed a foot lesion during their admission: by diabetes type, England and Wales, 2012-17



Diabetes type	Significant Difference (p <0.05)	
	2012 to 2017	2016 to 2017
• Type 1	Down	No change
• Type 2 (insulin)	Down	Down
• Type 2 (non insulin)	Down	No change
• Type 2 (diet only)	No change	No change
• Total	Down	Down

Findings

- The incidence of hospital-acquired diabetic foot lesions amongst people with Type 1 diabetes has **halved** since 2012.
- The incidence of hospital-acquired diabetic foot lesions amongst people with insulin-treated Type 2 diabetes has **almost halved** since 2016.

Notes:

b = break in time series.

* = statistically significant at the 0.05 level (vs. current audit year).

n = not statistically significant (vs. current audit year).

1. Data not collected in 2011.



Hospital-acquired diabetic foot lesions:

Clinical comment and recommendations

The percentage of hospital-acquired foot ulceration has reduced since 2012 (from 1.6 per cent to 1.0 per cent), halving amongst people with insulin-treated diabetes.

NaDIA team

Recommendations:

Diabetes teams:

- Continue to highlight screening of diabetes admissions for risk of hospital-acquired diabetic foot lesions and introduce preventative measures in those found to be at risk, using NICE guidance [[NG19](#)] as a framework.

Care providers:

- Hospitals should report all hospital-acquired diabetic foot lesions occurring in people with diabetes as part of the upcoming NaDIA continuous harms collection to provide a focus for these urgent Patient harms.
- Hospitals should include these reports in regular diabetes Mortality and Morbidity meetings and annual audits.



National Diabetes Inpatient Audit 2017

12. Patient experience



Patient experience: National results

Overview

Audit questions: Did patients have a favourable experience of their inpatient stay?
Has this changed in comparison to earlier audits?

How is this measured?

Patients were asked to complete a questionnaire on their experience during their hospital stay, with particular reference to their diabetes care. The responses were weighted to account for patients that were more or less likely to complete a questionnaire.

Patients answered questions on care management, their opportunity to participate in their own care, the appropriateness of their meals, the staff who had looked after them, their overall satisfaction and what aspects of their care could be improved.

Why is this important?

Clinical staff should work with the patient to ensure their hospital stay is as satisfactory as possible, empowering them to take control and become involved 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.

Key findings

- Inpatient perception of meal choice and timing **dropped** in 2015 and has not recovered.
- **5 out of 6** inpatients were satisfied or very satisfied with their diabetes care during their hospital stay (84 per cent).

“Given that the timing of meals for anyone on insulin can be a safety issue and having some choice over what we eat is important in helping us manage our diabetes, it is frustrating to see so little change in people's experience of this.”

Maureen, who has Type 1 diabetes



Patient experience: National results

Summary



Table 12.1: Trends in inpatients' views of their hospital stay, England and Wales, 2011-17

Inpatients satisfied with...	2011	2013 ^b	2015 ^b	2016	2017	Significant difference (p < 0.05)	
						2011 to 2017	2016 to 2017
• Involvement in care planning ¹	-	-	-	-	62.5	-	-
• Extent that ward staff respected wishes around diabetes care ¹	-	-	-	-	91.2	-	-
• Control over blood sugar management ¹	-	-	-	-	70.1	-	-
• Ability to self-administer insulin ²	59.2 n	57.2	56.5	55.3 n	57.2	No change	No change
• Meal choice	64.4 *	63.4	54.4	54.4 n	53.8	Down	No change
• Meal timing	70.0 *	69.8	62.6	63.4 n	62.4	Down	No change
• Staff awareness of patient's diabetes	84.6 *	81.7	84.4	83.7 n	82.1	Down	No change
• Staff knowledge of diabetes	66.8 n	67.5	65.7	64.7 n	65.0	No change	No change
• Staff ability to answer questions on diabetes	77.9 n	78.8	81.6	81.0 n	79.4	No change	No change
• Overall care for diabetes	84.8 n	86.0	84.1	83.6 n	83.6	No change	No change

Findings

- Inpatient perception of meal choice, meal timing and staff awareness of their diabetes have **worsened** since 2011.
- There has been **no change** in inpatients' views of their hospital stay since NaDIA 2016.
- **5 out of 6** inpatients are **satisfied** with their inpatient stay

Notes: **b** = break in time series. * = statistically significant at the 0.05 level (vs. current audit year), deft = 2.
n = not statistically significant (vs. current audit year), deft = 2.

1. Changes to the 2017 Patient Experience questionnaire means that historic results are not comparable.

2. Inpatients that responded: 'No – but I do not want to' have not been classed as satisfied.



Patient experience: Hospital site results

Overview



Audit questions: To what extent does patient satisfaction with their diabetes care vary between hospital sites? In which areas is the variation most pronounced?

How is this measured?

The results for selected measures from the 2017 Patient Experience questionnaire were broken-down by hospital site¹, then charted on a box and whisker plot. Attention has been drawn to hospital sites with very high or very low proportions. This section focuses on overall satisfaction and areas where inpatient perception has worsened since 2011 (meal choice/timing and staff awareness of diabetes).

Why is this important?

Whilst it is inevitable that patient satisfaction will vary between hospital sites to some degree, it is essential that sites with particularly low satisfaction levels reflect on the possible reasons for this perception.

Caveats: Because NaDIA is a snapshot audit, an atypical inpatient population at the point of assessment may affect a hospital's results, both positively and negatively. Other uncontrollable factors, such as staff sickness, may also have an impact. It is therefore possible that a hospital's results would have been significantly different if audited on a different day.

Nonetheless, hospital sites should review areas where poor inpatient satisfaction has been identified, particularly if similar issues have been found in previous audit years.

Key findings

- There is a **wide variation** in inpatient satisfaction across hospital sites, with some hospitals having consistently low levels of satisfaction across the measures.

Results for these and other measures are published in the NaDIA 2017 **Hospital Level Analysis** at hospital site level.



Patient experience: Hospital site results

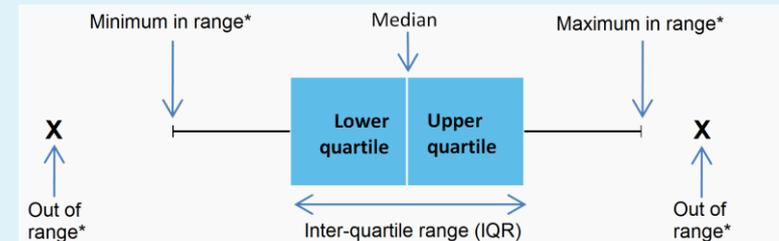
Meal choice and timing



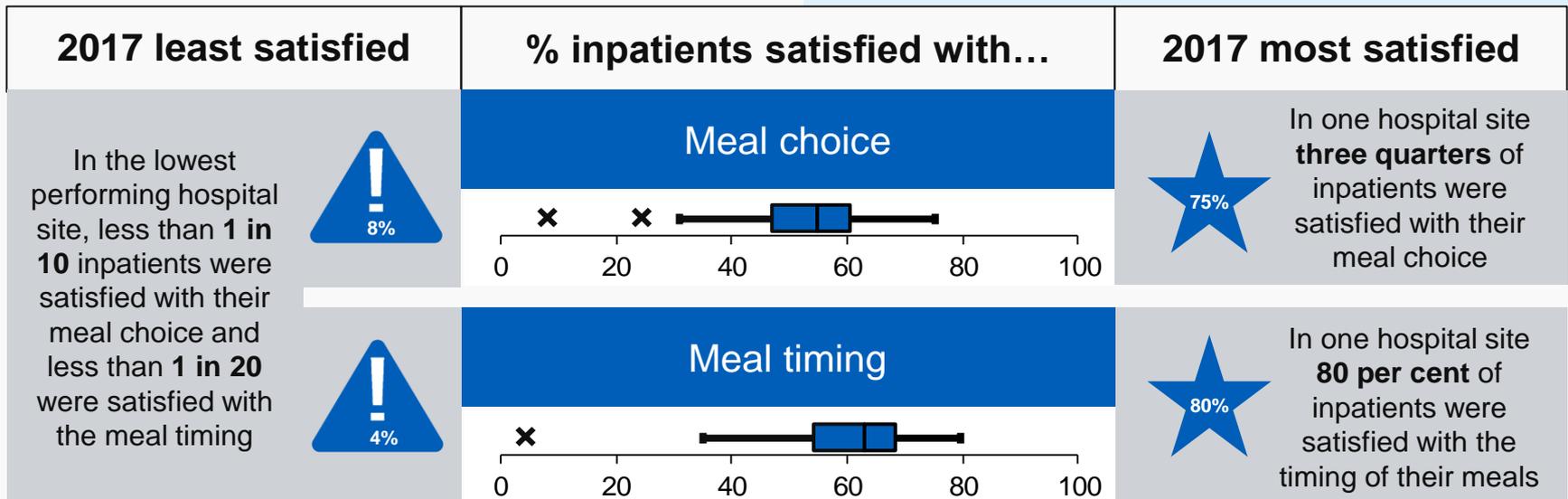
Findings

- Patient satisfaction with hospital meals varies by over **60 percentage points** across hospital sites.
- One hospital site has **very low** levels of patient satisfaction for meal choice and timing (8 per cent and 4 per cent).

Box and whisker plots show the range of proportions found across NaDIA hospital sites for each measure.



* Range = Between 1.5 x IQR below the lower quartile and 1.5 x IQR above the upper quartile.



Patient experience: Hospital site results

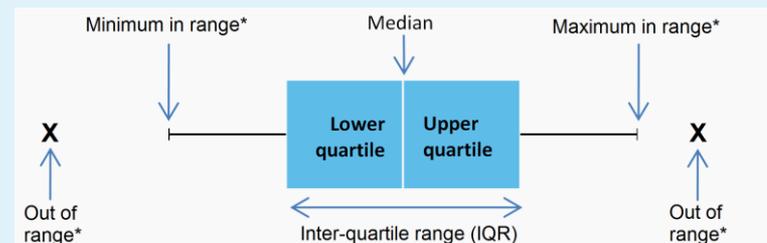
Staff knowledge and awareness



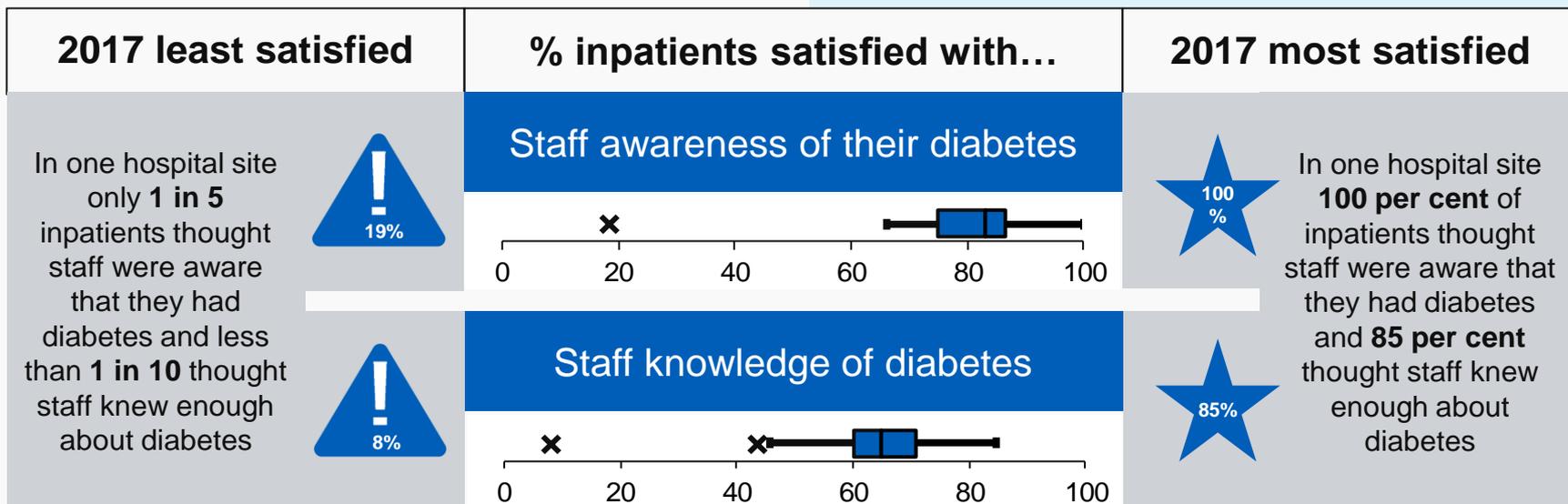
Findings

- Patient satisfaction with the level of staff awareness and knowledge of diabetes varies by over **75 percentage points** across hospital sites.
- One hospital site has **very low levels** of patient satisfaction for staff awareness and knowledge of diabetes.

Box and whisker plots show the range of proportions found across NaDIA hospital sites for each measure.



* Range = Between 1.5 x IQR below the lower quartile and 1.5 x IQR above the upper quartile.



Patient experience: Hospital site results

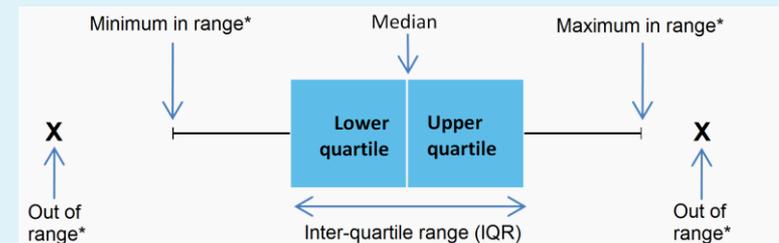
Overall experience



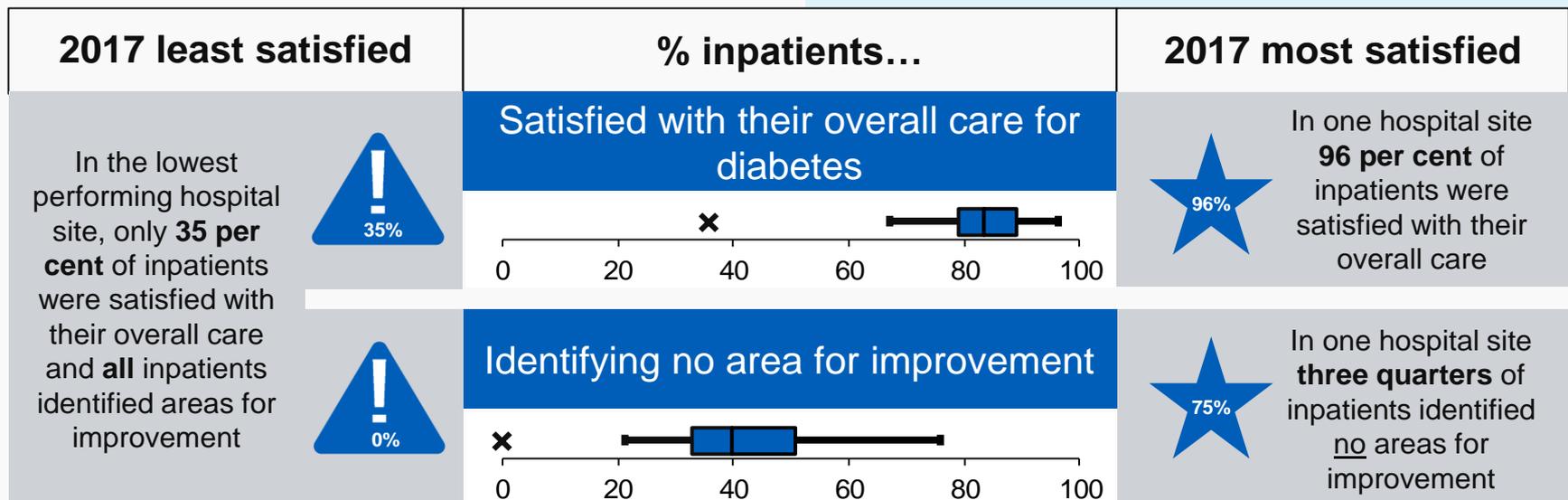
Findings

- Inpatient satisfaction with their overall care for diabetes ranges by **65 percentage points** across hospital sites.
- One hospital site has **very low** levels of overall satisfaction (35 per cent) and areas of improvement were identified by **all** inpatients.

Box and whisker plots show the range of proportions found across NaDIA hospital sites for each measure.



* Range = Between 1.5 x IQR below the lower quartile and 1.5 x IQR above the upper quartile.



Patient experience:

Clinical comment and recommendations



- Patients' views on meal choice and meal timing remains less favourable than in 2011, 2012 and 2013. It is unclear as to why this has changed.
- There has been no change in patients' views on staff knowledge and ability to answer questions on diabetes, but fewer patients in 2017 were satisfied with staff's awareness of their diabetes.

NaDIA team

Recommendations:

Provider organisations:

- Patient surveys may be needed to address the issue of hospital food.
- Variation in the apparent need for better staff knowledge requires further exploration.

Healthcare professionals: Encourage diabetes teams to involve patients in their care planning.



National Diabetes Inpatient Audit 2017

Glossary



Glossary: NaDIA data collection

Data collection

Each participating hospital site identified all inpatients with diabetes and distributed questionnaires accordingly. Where the patient was able and willing a **Patient Experience** (PE) form was completed, as well as a **Bedside Audit** (BA) form which provided information on the patient's medical treatment taken from the patient's notes. The hospital team also completed a **Hospital Characteristics** (HC) questionnaire providing information on the hospital's resources and staffing structure.

Which patients are included in the audit?

A patient was included in the inpatient audit (NaDIA) if they had been admitted to a hospital bed for 24 hours or more. Patients on an Obstetric or Paediatric ward were excluded from this audit. Mental Health wards were also excluded due to the high prevalence of long stay patients. Other exclusions included:

- Patients who were hyperglycaemic but not yet formally diagnosed with diabetes
- Accident and Emergency
- Day case ward
- Day surgery unit patients
- Observation ward (if patients had been admitted for less than 24 hours)
- Surgical short stay unit (if patients had been admitted for less than 24 hours)
- Palliative care centres
- Community hospitals



Glossary: Diabetes type

Diabetes is a serious life-long health condition that causes a person's blood glucose (sugar) level to become too high. This occurs when there is not enough of the hormone insulin to manage blood glucose (BG) levels effectively. If untreated, diabetes leads to serious illness and death.

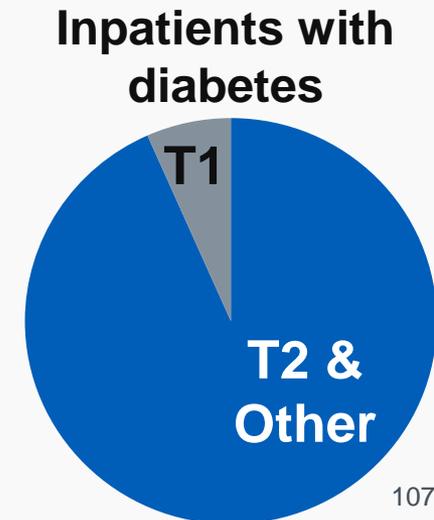
There are two main diabetes types:

- **Type 1 diabetes** develops when the insulin-producing cells in the body have been destroyed and the body is unable to produce any insulin.

Type 1 diabetes accounts for about 10 per cent of all adults with diabetes (7 per cent of inpatients with diabetes) and is treated by daily insulin doses. Type 1 diabetes can develop at any age but usually appears before the age of 40, and especially in childhood¹.

- **Type 2 diabetes** develops when the insulin-producing cells in the body are unable to produce enough insulin, or when the insulin that is produced does not work properly (known as insulin resistance).

Type 2 diabetes usually appears in people over the age of 40, though it may appear at any age. Type 2 diabetes accounts for around 90 per cent of adults with diabetes (around 93 per cent of inpatients with diabetes)².



Glossary: Diabetes treatments

There are a number of treatments available to help manage and control diabetes. All patients are different, so treatment will vary depending on individual needs¹.

- **Insulin:** Everyone with Type 1 diabetes, and some people with Type 2 diabetes, need to take insulin to control blood glucose (BG) levels¹.
- **Tablets:** Some people with Type 2 diabetes (and a minority with Type 1 diabetes) use tablets to help control their BG levels¹. Common tablet treatments include Biguanide (Metformin) and Sulphonylureas.
- **Lifestyle:** Type 2 diabetes can sometimes be controlled through healthy eating and increased exercise. However Type 2 diabetes is a progressive condition, and over time people with Type 2 diabetes may need medication (insulin or tablets) to help manage their BG levels.

For NaDIA analysis, inpatients with Type 2 diabetes are grouped into three sub-categories based on their treatment type:

- **Type 2 (insulin)**
- **Type 2 (non insulin)**
- **Type 2 (diet only)**

Inpatients with Type 1 diabetes are reported as a single group.



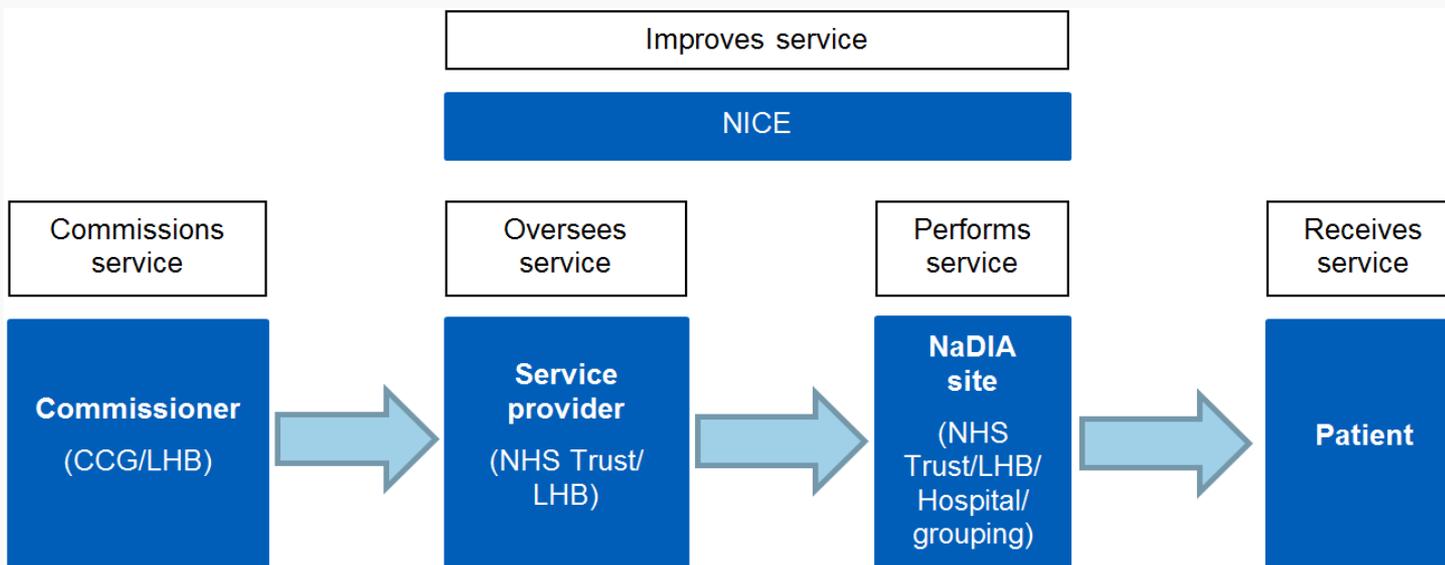
Glossary: Healthcare providers

NaDIA data is collected and submitted by [healthcare professionals](#) that work on applicable hospital wards in England and Wales.

For NaDIA Hospital Level Analysis, data is aggregated by NaDIA **site**, which may be an **NHS Trust**, Welsh **Local Health Board** (LHB), an individual hospital or a grouping of hospitals that have chosen to have their results aggregated together.

Commissioners decide what health services are needed and ensure that they are provided. Clinical Commissioning Groups (CCGs) in England and LHBs in Wales are responsible for commissioning healthcare services.

The National Institute for Health and Care Excellence (**NICE**) produces guidelines for the treatment of diabetes. All diabetes inpatient services should follow these guidelines, so that people with diabetes receive the best possible healthcare.



Glossary: Healthcare professionals

A wide variety of healthcare professionals are involved in the care of inpatients with diabetes, including (but not restricted to) the following professions:

- **Diabetes consultants** are senior hospital physicians who diagnose and treat patients with diabetes. Diabetes consultants are specialists in diabetology and endocrinology (the glands and hormones).
- **Diabetes specialist nurses (DSN)** work to meet the needs of people with diabetes and provide experience and expertise as part of dedicated diabetes teams. DSNs work wholly in diabetes care. A **diabetes specialist inpatient nurse (DISN)** provides hospital inpatient care¹.
- A **dietitian** is a healthcare professional with expertise in diet and nutrition. A **specialist diabetes dietitian** advises people with diabetes on the most suitable diet to control and manage their diabetes.
- **Podiatrists** are healthcare professionals that specialise in conditions of the feet and lower limbs. This includes the prevention, management and treatment of foot complications commonly experienced by people with diabetes (e.g. diabetic foot disease).
- **Diabetes specialist pharmacists** are healthcare professionals that specialise in the safe and effective management of medication for controlling and treating diabetes.



Glossary: Healthcare technologies

Hospitals may use some or all of the following healthcare technologies which support inpatient care:

- An **Electronic Patient Record (EPR)** is a computer system designed to collect and store patients' clinical and health information in one place, replacing paper-based health records and multi-platform data collection. Hospital staff involved in patient care can access and update the EPR system at different points in the patient's care. A variety of EPR systems are used. More than one third of hospitals use an EPR system.
- Hospital **electronic prescribing (EP)** is a computer system designed to allow prescriptions to be sent to pharmacies through IT systems, rather than through paper prescriptions. Almost one third of hospitals use EP.
- **Remote blood glucose monitoring (RBGM)** tools allow remote access to the measurement of patient blood glucose (BG) levels. Results can be transmitted to patients and caregivers in real time, providing an early warning if BG levels are outside the expected levels. More than half of hospitals use RBGM.



Glossary: Healthcare teams

“Specialists involved in the delivery of diabetes care must work in multidisciplinary teams for care to be truly effective. They should have received extensive training accredited at a national level.”

Diabetes UK¹

Healthcare professionals form multi-disciplinary specialist teams in hospitals to co-ordinate diabetes care, including (but not restricted to):

- Inpatient specialist **diabetes teams** co-ordinate diabetes care in hospitals. *diabetes teams usually consist of diabetes consultants, Diabetes Specialist (Inpatient) Nurses (DSN/DISN), podiatrists and dietitians, who will also work with other specialists who might also form part of the team (e.g. pharmacists and clinical psychologists).*
- Inpatient **Multi-disciplinary Foot Care Teams** (MDFT) co-ordinate diabetes footcare in hospitals. *MDFTs meet weekly and consist of a diabetes consultant (diabetologist), a podiatrist with skills in managing the diabetic foot and a surgeon (general, orthopaedic or vascular surgeon). MDFTs will also work with other specialists who might be incorporated into the team (e.g. DSN/DISNs, podiatrists, interventional radiologists, microbiologists, tissue viability nurses). About three quarters of hospitals have MDFTs.*

About half of hospitals host regular diabetes **Mortality and Morbidity meetings** (M&M) for healthcare professionals to discuss patient deaths and adverse incidents relating to diabetes, and another third of hospitals discuss diabetes cases at general M&M meetings. *At M&M meetings staff can discuss incidents in detail, report problems and share lessons to prevent the recurrence of adverse incidents.*



Glossary: Inpatient diabetic foot care

People with diabetes are at much greater risk of developing problems with their feet (**diabetic foot disease**), due to the damage raised blood sugars can cause to sensation (neuropathy) and circulation (ischaemia). If left untreated, these problems can cause foot lesions (ulcers) and infections and, at worst, may lead to amputations¹.

About 9 per cent of inpatients with diabetes are admitted to hospital with active diabetic foot disease, around half of which are admitted for diabetic foot disease.

On admission to hospital, inpatients with diabetes may undergo a **specific diabetic foot risk examination** for ulceration, in addition to general pressure sore checks such as the Waterlow score.

Hospitals may follow foot care examination initiatives such as '**Putting Feet First**'² or **NICE inpatient foot guidance**³ and may also have **tools or systems** in place to increase the number of inpatients with diabetes that have a specific diabetic foot risk examination.

Inpatients with active diabetic foot disease or at a high risk of developing foot problems should be assessed by the **Multi-disciplinary Foot Care Team** (MDFT – see [Glossary: Healthcare Teams](#)) as soon as possible following admission. About three quarters of hospitals have MDFTs.

If inpatient foot care is not effective, hospital-acquired diabetic **foot lesions** can arise. Foot lesions are associated with great patient distress, risk of amputation, increased mortality and high cost. *Whilst under a hospital's care, no patient should deteriorate enough so that they develop a new instance of a foot lesion.*



Glossary: Blood glucose control

Blood glucose control is one of the main challenges faced by people with diabetes.

Blood glucose (BG) is measured in mmol/L or millimoles per litre. BG levels should be as near to 'normal' as possible¹, with individual target levels agreed between the person and their diabetes team. BG levels vary during the day, but a safe level is typically between 4 and 11 mmol/L. Below 4 mmol/L results in **hypoglycaemia** and above 11 mmol/L **hyperglycaemia**, potentially leading to **DKA** (a significant risk in Type 1 diabetes at 15mmol/L and above) or **HHS** (often over 40mmol/L and usually in Type 2 diabetes)².

Blood glucose monitoring is required to ensure that BG levels remain in a safe range, thereby avoiding the onset of hypoglycaemic episodes, hyperglycaemia and other harms. Tools such as blood glucose meters can be used to check BG levels. Monitoring is particularly important in hospital because a patient's BG 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 BG level.

NaDIA collects information on inpatients' BG monitoring, looking at the previous 7 days of their hospital stay, excluding inpatients in diabetic ketoacidosis (DKA) or hyperglycaemic hyperosmolar state (HHS) at the time of the audit. The following guidelines were used to define **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, SU, DPP-4 inhibitors, glitazones, SGLT-2 inhibitors and GLP-1 analogues	2 or more/day
Unwell, unstable diabetes or basal bolus insulin	4 or more/day

A **'good diabetes day'** is defined as a day on which the frequency of BG monitoring was appropriate, using the guidelines in the table above, and there was no more than one BG measurement greater than 11 mmol/L and no BG measurements less than 4 mmol/L.

BG **self-management** is where a person manages their own BG levels. This may involve **self-testing** their BG levels, **self-administering** insulin and/or **self-adjusting** their insulin dosage.



Glossary: Insulin infusion

An intravenous **insulin infusion** (IVII) is where insulin is directly administered into the inpatient's veins using a drip. IVII is used over a short period of time, generally seven days or less, as an alternative or supplement to subcutaneous (SC) injections of insulin or tablets. The purpose of IVII is to achieve safe insulin management during fasting/nil by mouth or to maintain blood glucose (BG) control during severe illness.

The safe and effective use of IVII is dependent on the diligence and expertise of healthcare professionals, who must:

- Take regular BG measurements and adjust the insulin dosage accordingly;
- Correctly manage the difficult transition from IVII back to SC insulin.

Mismanagement of either of these areas is dangerous and can lead to hypoglycaemia, hyperosmolar hyperglycaemic state (HHS) and even diabetic ketoacidosis (DKA).

NaDIA measure	Rationale
• Been on an infusion in the last 7 days	High rates of IVII may suggest that IVII is being used inappropriately
• Infusions considered inappropriate	Inappropriate use of IVII increases the risk of Patient harms occurring.
• Infusions that were 7 days or longer	To reduce the risk of Patient harms, IVII should be used in hospital for short time periods only.
• Transfer to subcutaneous insulin not managed appropriately	The transition from IVII to SC insulin must be carefully managed to avoid the risk of Patient harms occurring.
• Number of blood glucose measurements in the last 24 hours on infusion	BG levels should be monitored hourly to ensure the IVII dosage is appropriate.

Notes:

Joint British Diabetes Societies for Inpatient Care (2014) [The use of variable rate intravenous insulin infusion \(VRIII\) in medical inpatients.](#)



Glossary: Patient harms

There are a variety of Patient harms that people with diabetes may develop in hospital. These potentially life-threatening events are entirely preventable and strenuous efforts must be taken to avoid them.

NaDIA Team

A **hypoglycaemic episode** (a hypo) is a potentially dangerous drop in a patient's blood glucose (BG) to below 4.0 mmol/L. 'Normal' BG (normoglycemia) is typically between 4.0 and 8.0 mmol/L.

- A 'mild' hypo involves a BG level of between 3.0 and 3.9 mmol/L.
- A 'severe' hypo involves a BG level of less than 3.0 mmol/L.

A **hypoglycaemic episode requiring injectable rescue treatment** occurs in severe cases of hypoglycaemia when the patient is unconscious and cannot take sugar by mouth. Rescue treatment is applied using an injection of glucose or Glucagon.

A patient whose BG levels are properly managed should never experience a severe hypoglycaemic episode or require rescue treatment during their hospital stay.

Diabetic ketoacidosis (DKA) mainly occurs in people with Type 1 diabetes when a severe lack of insulin means the body cannot use glucose for energy and the body starts to break down other body tissue, releasing ketones as an alternative energy source. This can lead to ketoacidosis if the levels are too high. *The development of DKA after admission suggests that the inpatient's insulin treatment was omitted, or insufficient levels of insulin were provided, for an appreciable time. DKA is a potentially life-threatening emergency which should not develop in hospital.*

Hyperosmolar hyperglycaemic state (HHS) mainly occurs in people with Type 2 diabetes who experience very high blood glucose levels (often over 40mmol/L). It can develop over a course of weeks through a combination of illness (e.g. infection) and dehydration. *HHS is a potentially life-threatening emergency which should not develop in hospital.*

Patients with diabetes are at a higher risk of developing **foot lesions** (ulcers) because of associated blood flow (ischaemia) and nerve problems (neuropathy). *No patient should deteriorate enough while under a hospital's care that they develop a new foot lesion.*



Glossary: Patient experience

To find out whether the **patient experience** was favourable, the audit collects patient feedback on the following measures:

NaDIA Measure	Rationale
<ul style="list-style-type: none"> Involvement in care planning 	<p>Inpatients should be empowered to become involved in their care planning as much as possible. Patient expertise in their diabetes care should be harnessed.</p>
<ul style="list-style-type: none"> Extent that preferences for diabetes treatment taken into account 	<p>Patient preferences for their diabetes treatment should be accommodated where possible.</p>
<ul style="list-style-type: none"> Ability to take control of their diabetes 	<p>Inpatients should be empowered to take control of their diabetes as much as possible. Patient expertise in their diabetes care should be harnessed.</p>
<ul style="list-style-type: none"> Ability to self-administer insulin 	
<ul style="list-style-type: none"> Meal choice 	<p>The timely provision of suitable food is integral to good diabetes management.</p>
<ul style="list-style-type: none"> Meal timing 	
<ul style="list-style-type: none"> Staff awareness of diabetes 	<p>Staff need to know which patients have diabetes to ensure the appropriate treatment is given.</p>
<ul style="list-style-type: none"> Staff knowledge of diabetes 	<p>Staff expertise in diabetes is essential to ensure the appropriate treatment is given and patient questions can be addressed.</p>
<ul style="list-style-type: none"> Staff ability to answer questions on diabetes 	
<ul style="list-style-type: none"> Overall care for diabetes 	<p>Patients overall perception of their diabetes care during their hospital stay is a useful measure of the patient experience as a whole.</p>



Glossary: Acronyms

BA form = NaDIA Bedside Audit form

BG = Blood glucose

CCG = Clinical Commissioning Group

DISN = Diabetes inpatient specialist nurse

DKA = diabetic ketoacidosis

DSN = Diabetes specialist nurse

EP = Electronic Prescribing

EPR = Electronic Patient Records

HC form = NaDIA Hospital Characteristics form

HHS = hyperosmolar hyperglycaemic state

HQIP = The Healthcare Quality Improvement Partnership

IVII = Intravenous Insulin Infusion

JBDS-IP = Joint British Diabetes Societies for Inpatient Care group

LHB = Welsh Local Health Board

M&M meeting = Mortality and Morbidity meeting

MDFT = Multi-disciplinary foot team

mmol/L = millimole (one thousandth of a mole) per litre

NaDIA = National Diabetes Inpatient Audit

NCAPOP = National Clinical Audit Patient Outcomes Programme

NCVIN = National Cardiovascular Intelligence Network

NDA = National Diabetes Audit

NICE = National Institute for Health and Care Excellence

OA-DA = Oral hypoglycaemic agent

PE form = NaDIA Patient Experience form

QOF = Quality and Outcomes Framework

RBGM = Remote blood glucose monitoring

SC = Subcutaneous



National Diabetes Inpatient Audit 2017

Additional information



Additional information: Summary

The following documents are available from <http://content.digital.nhs.uk/pubs/nadia2017>

- A one page executive summary of this report.
- A PowerPoint version of this report.
- Individual report chapters as standalone publications (pdf and PowerPoint)
- Hospital site level 2010-2017 charts and data
- Supporting data in Excel format
- Data Quality Statement
- Methodology



Additional information: References

Department of Health: National Service Framework for Diabetes:

<https://www.gov.uk/government/publications/national-service-framework-diabetes>

Diabetes UK (2014) Position statement: Diabetes specialist nurses: Improving patient outcomes and reducing costs: <https://www.diabetes.org.uk/Professionals/Position-statements-reports/Healthcare-professional-staffing-competency/Diabetes-Specialist-Nurses-improving-patient-outcomes-and-reducing-costs/>

Diabetes UK: Putting Feet First: <https://www.diabetes.org.uk/putting-feet-first>

Joint British Diabetes Societies for Inpatient Care; Management of adults with diabetes undergoing surgery and elective procedures: Improving standards: http://www.diabetologists-abcd.org.uk/JBDS/Surgical_guidelines_2015_full_FINAL_amended_Mar_2016.pdf

Joint British Diabetes Societies for Inpatient Care: The use of variable rate intravenous insulin infusion (VRIII) in medical inpatients: http://www.diabetologists-abcd.org.uk/JBDS/JBDS_IP_VRIII.pdf

NHS Digital: National Diabetes Inpatient Audit (NaDIA) 2016: <http://content.digital.nhs.uk/pubs/nadia2016>

NHS Digital: Quality and Outcomes Framework (QOF) (2016-17): <http://digital.nhs.uk/catalogue/PUB30124>

NHS England; Serious Incidents Framework: <https://www.england.nhs.uk/patientsafety/serious-incident/>

NICE: Diabetic foot problems: Prevention and management: <https://www.nice.org.uk/Guidance/NG19>

NICE: Diabetes in adults: <https://www.nice.org.uk/Guidance/QS6>

NICE: Type 1 diabetes in adults: diagnosis and management: <https://www.nice.org.uk/Guidance/NG17>

NICE: Type 2 diabetes in adults: management: <https://www.nice.org.uk/Guidance/NG28>

Welsh Government: General medical services contract: Quality and outcomes framework: <http://gov.wales/statistics-and-research/general-medical-services-contract/?lang=en>



Additional information: Acknowledgements

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Digital

NHS Digital is the new name for the Health and Social Care Information Centre. NHS Digital managed the publication of the 2017 annual report.



Diabetes UK is the largest organisation in the UK working for people with diabetes, funding research, campaigning and helping people live with the condition.

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**Public Health
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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.

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