

# National Diabetes Inpatient Audit (NaDIA) Harms, 2020

England

8 Jul 2021

## Annual report

# Foreword

The National Diabetes Inpatient Audit (NaDIA) – Harms started in May 2018. It is designed to help reduce the serious inpatient harms identified by the [NaDIA snapshot](#) audits. Although there has been some reduction in the prevalence of both hypoglycaemic rescue and inpatient-onset foot ulcers, they remain common; inpatient-onset diabetic ketoacidosis (DKA) and hyperosmolar hyperglycaemic state (HHS) rates have shown no improvement. Yet all these serious, potentially life-threatening events are largely preventable.

The NaDIA harms audit will enable NHS trusts to identify and analyse local occurrences of these key inpatient harms, supporting local quality improvement (QI) work. By linking to the information in the core National Diabetes Audit (NDA), case-mix adjusted benchmarking will also be reported and risk-adjusted long term outcomes identified. Additionally, national characterisation of which patients are at highest risk will inform the development of better preventive care.

The hard work of all participants is hugely appreciated. Tracking these inpatient harms closely will allow a better understanding of how they occur, and to whom. Alongside the recommendations from the [GIRFT Diabetes report](#), this will help to improve safety significantly for people with diabetes within the NHS.

**Alistair Lumb**, Clinical Lead, NaDIA harms audit

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The NaDIA harms audit publishes supporting data in addition to this report:

## Local reports

Trust participation report	Submission details for all eligible and/or participating NHS trusts
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## Supporting documents

Appendices	Detailed tables and charts to support this report
Tables and charts	In Excel format
Open data	Report data in CSV format
Data quality statement	Details about the data collection

All documents are available on the publication landing page:  
<http://digital.nhs.uk/pubs/nadia-harms2020>

# 1. Executive summary: Recommendations

**Finding:** NaDIA harms audit participation is around 81 per cent.

**Recommendation 1:** NHS trusts should participate in the NaDIA harms audit to review the safety and quality of inpatient diabetes services. This is consistent with the Getting It Right First Time<sup>1</sup> (GIRFT) recommendation that NHS trusts should participate in local and national audits of patient harms.



**Finding:** The NaDIA harms audit has identified characteristics that are consistently associated with higher rates of inpatient harms.

**Recommendation 2:** NHS trusts should implement robust systems to identify all people with diabetes on admission to hospital, in line with GIRFT recommendations. Systems should involve triage to identify those at risk and rapidly refer them to the diabetes team, including for all emergency admissions and elective surgical admissions.



**Finding:** The NaDIA harms audit identified a higher risk of hyperosmolar hyperglycaemic state (HHS) in people that have a stroke on or during admission.

**Recommendation 3:** Healthcare professionals should reassess plans for diabetes management in patients with stroke on or during admission including nutrition, hydration and medication, to avoid episodes of HHS.



**Finding:** NaDIA has identified a higher rate of hospital-acquired diabetes ketoacidosis (DKA) in people admitted under surgical specialties.

**Recommendation 4:** NHS trusts should incorporate reduction of DKA arising in people admitted under surgical specialties within Quality Improvement programmes, focusing on the establishment of processes to ensure that insulin is not stopped in people with type 1 diabetes.



# National Diabetes Inpatient Audit: Harms 2020

## 2. Introduction



## 2. Introduction: Overview

- National Diabetes Inpatient Audit (NaDIA) – Harms is a continuous data collection to record serious inpatient events referred to as ‘harms’ that occur due to errors of inpatient diabetes management. The data collection started on 1 May 2018.
- The objective of the NaDIA harms audit is to help reduce the rates of serious inpatient harms by providing hospitals with a system of case-mix adjusted benchmarked measurements.
- All acute hospitals in England should participate. The Welsh government chose not to participate in the NaDIA harms audit collection.
- The NaDIA harms audit is part of the National Diabetes Audit (NDA) programme within the National Clinical Audit and Patient Outcomes Programme (NCAPOP), commissioned by the Healthcare Quality Improvement Partnership (HQIP) on behalf of NHS England.
- This report covers NaDIA harms audit data collected between May 2018 and October 2020.
- NaDIA also undertakes a snapshot audit, which is discussed on slide 10.

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# 2. Introduction: Key details

## Key details

This report covers four inpatient harms occurring in English hospitals in the 30 month period May 2018 to October 2020:

- Severe hypoglycaemia requiring rescue treatment – Hypoglycaemic rescue
- Diabetic ketoacidosis – DKA
- Hyperosmolar hyperglycaemic state – HHS
- Diabetic foot ulcer – DFU

The Welsh government chose not to participate in the NaDIA harms audit collection.

## Acronyms and abbreviations

The following acronyms and abbreviations are used throughout the report and are not always defined on the slide where they appear:

**BG** = Blood glucose

**BMI** = Body mass index

**DFU** = Diabetic foot ulcer

**DKA** = Diabetic ketoacidosis

**HES** = Hospital Episode Statistics

**HHS** = Hyperosmolar hyperglycaemic state

**LOS** = Length of stay

**NaDIA** = National Diabetes Inpatient Audit

**RRT** = Renal replacement therapy

**NDA** = National Diabetes Audit

**vs.** = Versus

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## 2. Introduction: Why is this audit important?

The NaDIA harms audit aims to monitor, and in time help reduce, instances of four **life-threatening** diabetes specific inpatient harms originally characterised in the NaDIA snapshot audits:

**Hypoglycaemic rescue:** A hypoglycaemic episode is a potentially dangerous drop in a patient's blood glucose (BG) to below 4.0 mmol/L. Severe hypoglycaemia requires **rescue treatment** because the patient is either unconscious, too confused to follow instruction or unable to swallow safely. Rescue treatment is applied using an injection of glucose or glucagon.

*A hospital inpatient whose BG levels are optimally managed should only very rarely experience a severe hypoglycaemic episode requiring rescue treatment.*

**Diabetic Ketoacidosis (DKA):** DKA occurs (mainly 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 life threatening ketoacidosis if the levels are too high.

*The development of DKA after admission suggests that the person'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):** HHS mainly occurs in people with type 2 diabetes who experience very high BG levels (often over 40mmol/L). It can develop over a course of days or weeks through a combination of illness (e.g. infection) and dehydration, and following high dose steroid therapy.

*HHS is a potentially life-threatening emergency which should not develop in hospital.*

**Diabetic foot ulcer (DFU):** Patients with diabetes are at a higher risk of developing foot lesions (ulcers) if they have diabetes associated blood flow (ischaemia) and nerve problems (neuropathy).

*Preventive care should stop new foot lesions developing in hospital.*

**These events are distressing, slow-down recovery, may be life-threatening and are entirely preventable.**





## 2. Introduction: Why is this report important?

Submission to the NaDIA harms audit will contribute to efforts to reduce the rates of serious and avoidable inpatient harms. Data collected by the NaDIA harms audit will facilitate local quality improvement work through the production of risk-adjusted outcomes and the identification of patients at risk.

### What's in the report?

- audit participation
- the number of submissions of each inpatient harm
- the impact of the COVID-19 pandemic on inpatient harms
- the patient profiles of people that experience each inpatient harm.



The patient profiles include demographics, diabetes characteristics, treatment targets, care processes, admission characteristics and comorbidities.

**The audit team appreciate the hard work of all submitters and recognise that it can initially be difficult to set up systems that record all inpatient harms.**



## 2. Introduction: NaDIA snapshot audit

Since 2010 information about the four inpatient harms has been collected in the **NaDIA snapshot audit**, which takes place on a given day in late September.

On the audit day, the [2019 NaDIA snapshot](#) found that:

- 1.4 per cent of inpatients with diabetes required hypoglycaemic rescue in the last 7 days.
- 3.6 per cent with type 1 diabetes had developed DKA during their hospital stay.
- 0.2 per cent with type 2 diabetes had developed HHS during their hospital stay.
- 1.1 per cent had developed a DFU during their hospital stay.

**Changes over time:** Whilst hypoglycaemic rescue and DFU both have reduced since the [NaDIA snapshot](#) began in 2010, similar reductions are not evident for DKA and HHS.

**Requirements:** The snapshot nature of the NaDIA collection, coupled with the relatively low incidence of the four inpatient harms, means that continuous collection via the NaDIA harms audit is needed to allow robust monitoring at local level, and contribute to the drive to lower the incidence of these serious inpatient harms.



# National Diabetes Inpatient Audit: Harms 2020

## 3. Participation



# 3. Participation:

## Overview

**Audit questions:** How many NHS trusts participated in the 2020 NaDIA harms audit?

**Background:** The NaDIA harms audit collection opened in May 2018. NHS trusts in England are encouraged to report instances (NHS number, date, hospital site) of four serious inpatient harms (hypoglycaemic rescue, DKA, HHS, DFU) that had developed during the inpatient's stay. NHS trusts must also record confirmation that no inpatient harms have occurred during a calendar month. These inpatient harms are preventable. The NaDIA harms audit will provide case-mix adjusted, benchmarked measurements and risk scores to facilitate local quality improvement work.

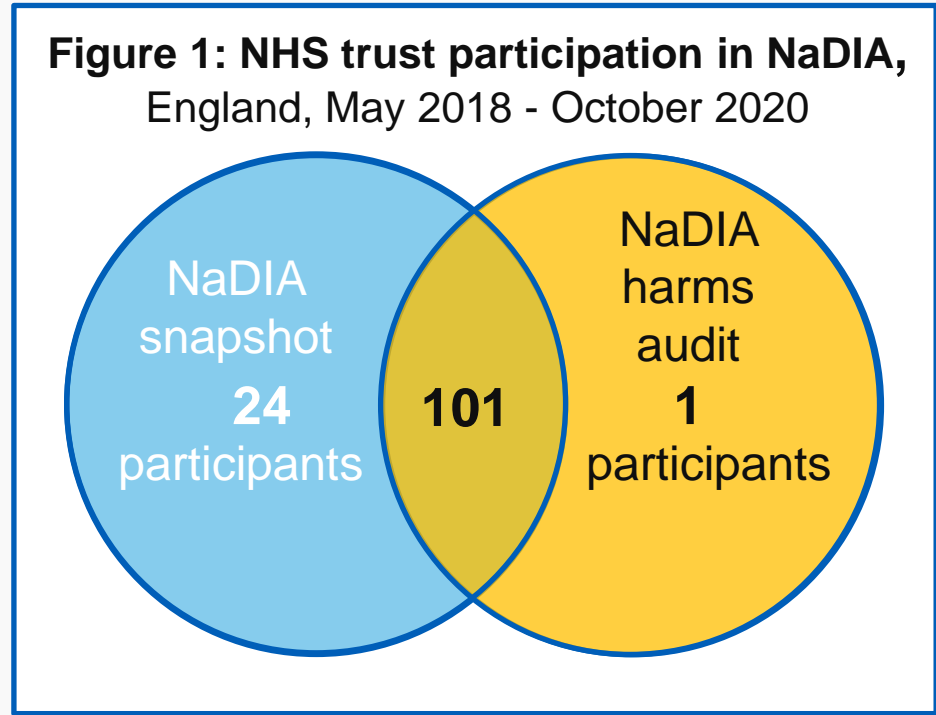
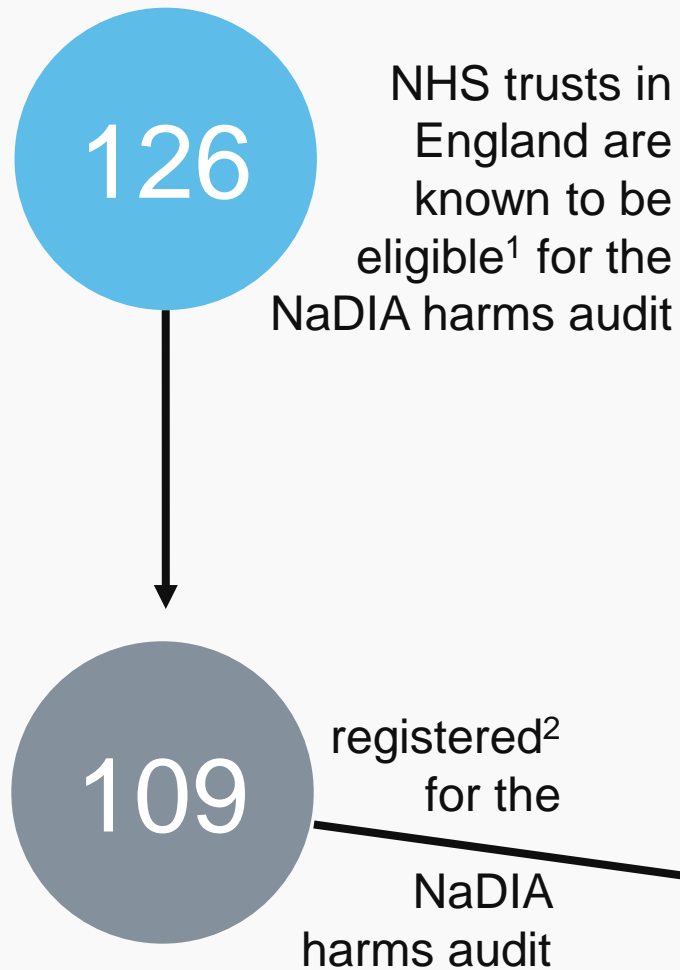
### Key findings

- By December 2020, 109 NHS trusts in England had registered for the NaDIA harms audit.
- 102 NHS trusts in England have participated in the audit<sup>1</sup> and 43 submitted in every quarter since inception<sup>2</sup> (May 2018 to Oct 2020).
- 126 NHS trusts are known to be eligible for NaDIA snapshot<sup>3</sup>, meaning that NaDIA harms audit participation is around 81 per cent.
- 4,605 inpatient harms were submitted to the NaDIA harms audit between May 2018 and October 2020 (30 months). The majority were hypoglycaemic rescue (3,200, 69.5 per cent).
- Case ascertainment has previously been estimated at 20 per cent (DKA) and 6 to 8 per cent (others)<sup>4</sup>. Whilst this is likely to be an underestimate, true case ascertainment is nonetheless expected to be relatively low.

**Notes:** 1. One or more inpatient harm submission or any verified monthly nil submission.  
2. One or more inpatient harm submission or any verified monthly nil submission in all ten quarters.  
3. Eligibility inferred from NaDIA snapshot participation (2015-19) and/or NaDIA harms audit participation.  
4. Case ascertainment is discussed in the glossary (slide 40).



# 3. Participation: Summary charts



There have been two new participants<sup>3</sup> in the preceding year (November 2019 to October 2020):

- Liverpool Heart and Chest Hospital NHS Foundation Trust<sup>5</sup> (RBQ)
- Norfolk and Norwich University Hospitals NHS Foundation Trust (RM1)



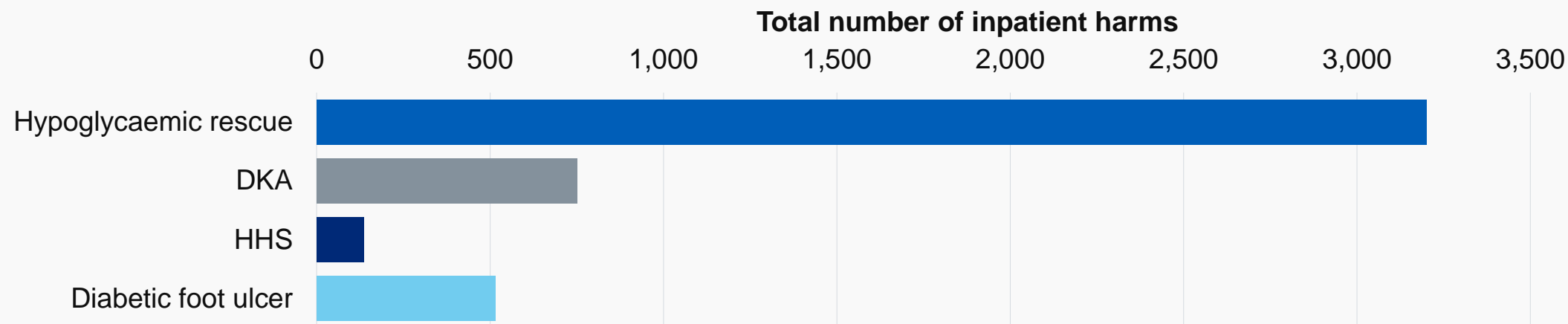
**Notes:** 1. Eligibility inferred from NaDIA snapshot participation (2015-19) and/or NaDIA harms audit participation (see note 3). 2. 2 of the 109 registered NHS trusts do not meet the eligibility criteria (see note 1), so are not included in the 126 eligible NHS trusts. 3. One or more inpatient harm submission or any verified monthly nil submission. 4. As for note 2, in all ten quarters. 5. RBQ is not eligible for the NaDIA snapshot.



# 3. Participation:

## Frequency of inpatient harms by type

**Figure 2: Number of inpatient harms, by harm type, England, May 2018 - October 2020 (rounded<sup>1</sup>)**



**Table 1: Number of inpatient harms, by harm type and quarter when inpatient harm occurred, England, (rounded<sup>1</sup>), May 2018 - October 2020 (rounded<sup>1</sup>)**

Inpatient harm	May – Jul 2018	Aug – Oct 2018	Nov 2018 – Jan 2019	Feb – Apr 2019	May – Jul 2019	Aug – Oct 2019	Nov 2019 – Jan 2020	Feb – Apr 2020	May – Jul 2020	Aug – Oct 2020	Total
Hypoglycaemic rescue	210	335	455	440	360	305	325	295	235	245	<b>3,200</b>
DKA	50	85	80	80	70	80	90	75	65	65	<b>750</b>
HHS	5	15	25	15	15	10	10	15	10	15	<b>135</b>
DFU	60	50	65	75	55	65	45	40	40	25	<b>515</b>
<b>Total</b>	<b>325</b>	<b>485</b>	<b>625</b>	<b>615</b>	<b>500</b>	<b>460</b>	<b>470</b>	<b>420</b>	<b>350</b>	<b>355</b>	<b>4,605</b>

**Notes:** 1. Counts have been rounded. Counts between 1 and 7 are represented as a 5. All counts greater than 7 have been rounded to the nearest five. Consequently the total will not usually match the sum of the four constituent inpatient harms.



# National Diabetes Inpatient Audit: Harms 2020

## 4. Impact of COVID-19



# 4. Impact of COVID-19: Participation

## Audit questions:

How has NaDIA harms audit participation been affected by the COVID-19 pandemic?

## Background:

Given the burden on NHS trusts caused by the high numbers of COVID-19 cases and deaths by the close of NaDIA's data collection (01/12/2020), it is likely that data completeness is lower than normal.

In order to interpret the 2020 NaDIA harms audit data, it is essential to understand how participation was affected by COVID-19.

## Key findings: 2020 vs. 2019

- The number of participating NHS trusts was 9.5 per cent lower between January and October 2020 when compared with 2019 (86 vs. 95 NHS trusts respectively). The total number of reported inpatient harms was 27.7 per cent lower during this period (1,290 vs. 1,785 harms respectively).
- The drop in the number of inpatient harms was mainly driven by the reduction in reported hypoglycaemic rescue during 2020 compared to 2019, particularly between March and June 2020 when wave one of the pandemic peaked (317 vs. 548 hypoglycaemic rescues respectively).
- However, further analysis suggests a small spike in the rate of hypoglycaemic rescue in April 2020, once the reduction in number of occupied bed days was factored-in.



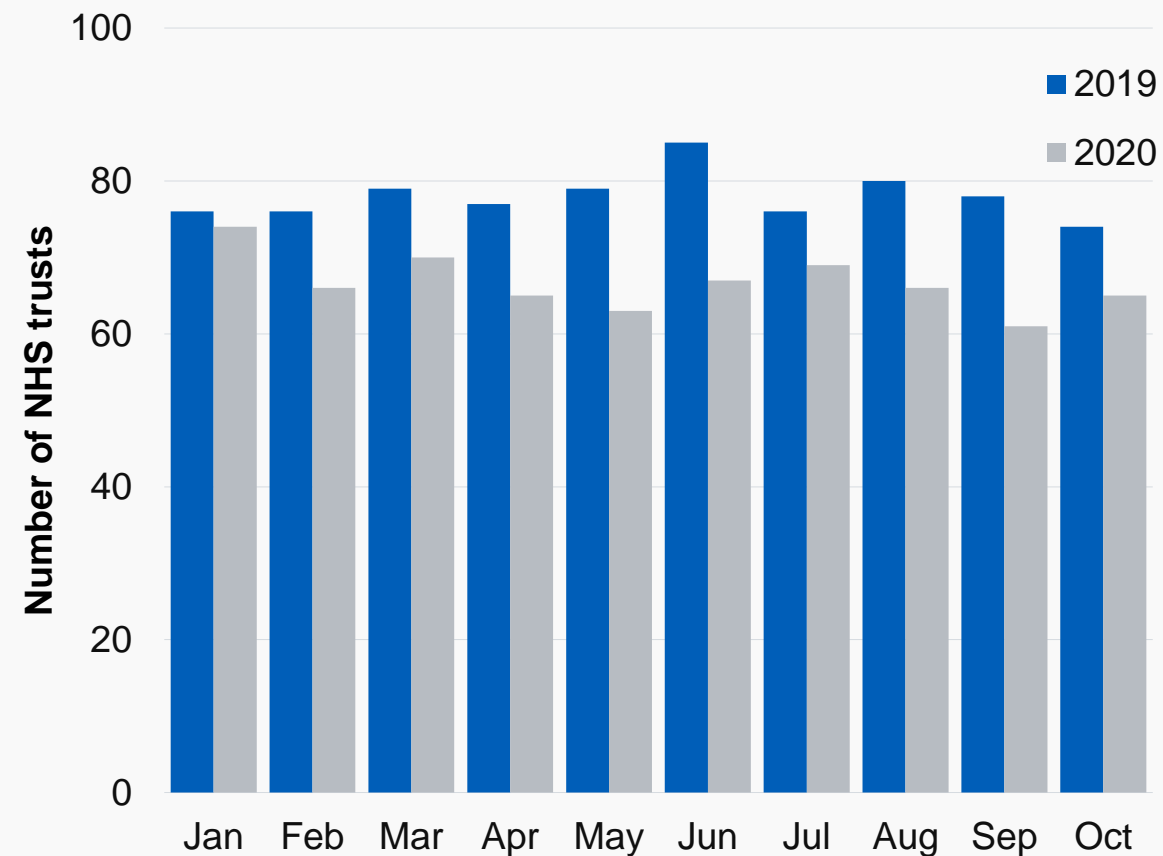


# 4. Impact of COVID-19:

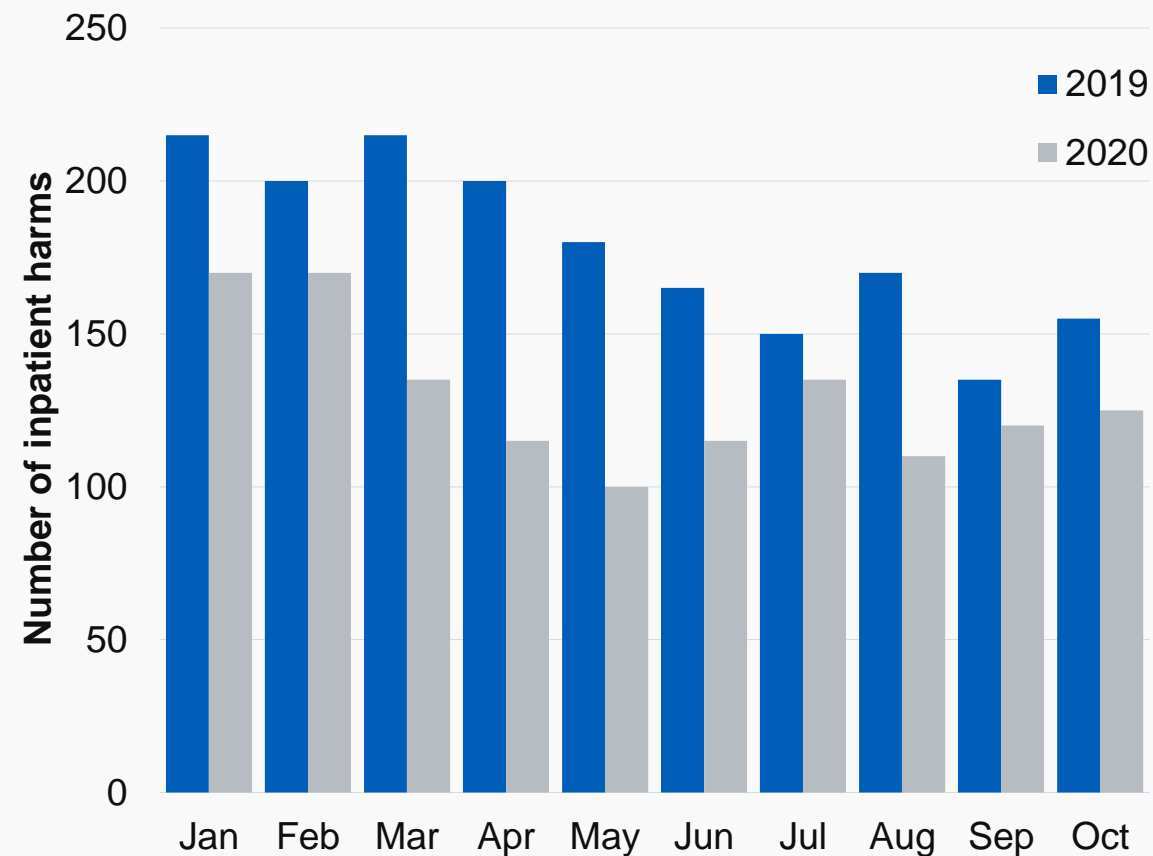
## Participation and submissions by month

Figure 3: NaDIA harms audit participation, by month when inpatient harm occurred, England

a. Participating NHS trusts



b. Inpatient harms submitted (rounded<sup>1</sup>)

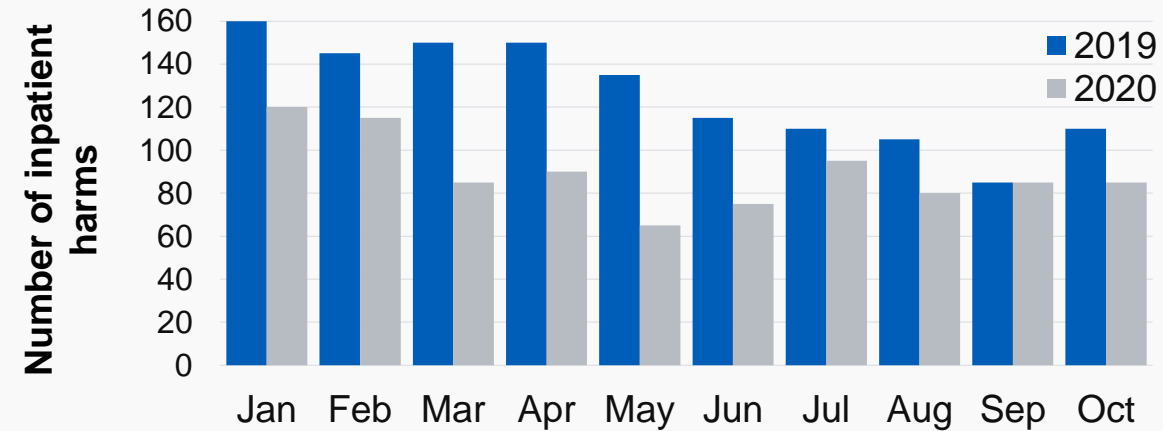


Notes: 1. Counts have been rounded. Counts between 1 and 7 are represented as a 5. All counts greater than 7 have been rounded to the nearest five.

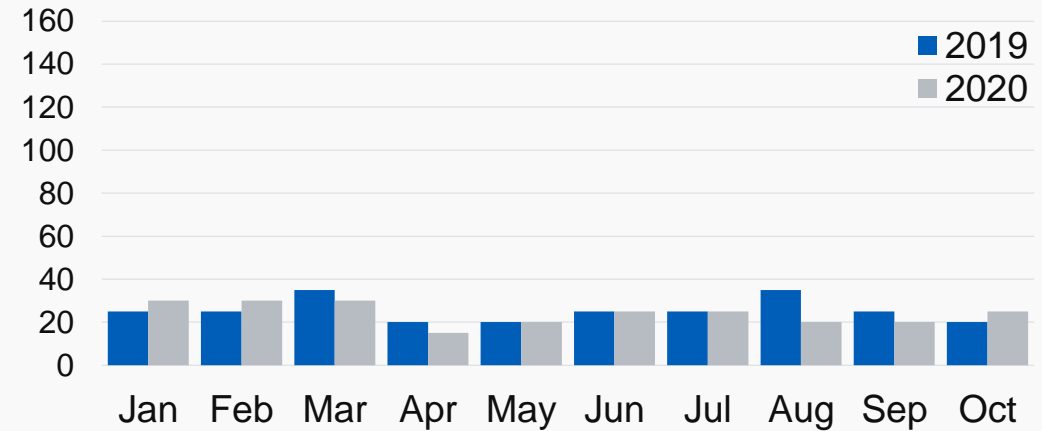
# 4. Impact of COVID-19: Harms by month

Figure 4: Number of inpatient harms, by month when inpatient harm occurred, England (rounded<sup>1</sup>)

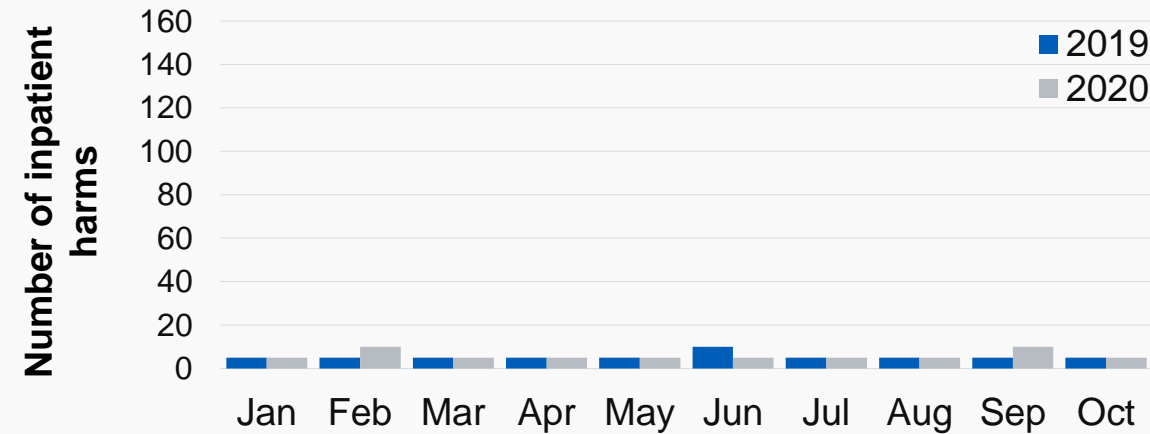
a. Hypoglycaemic rescue



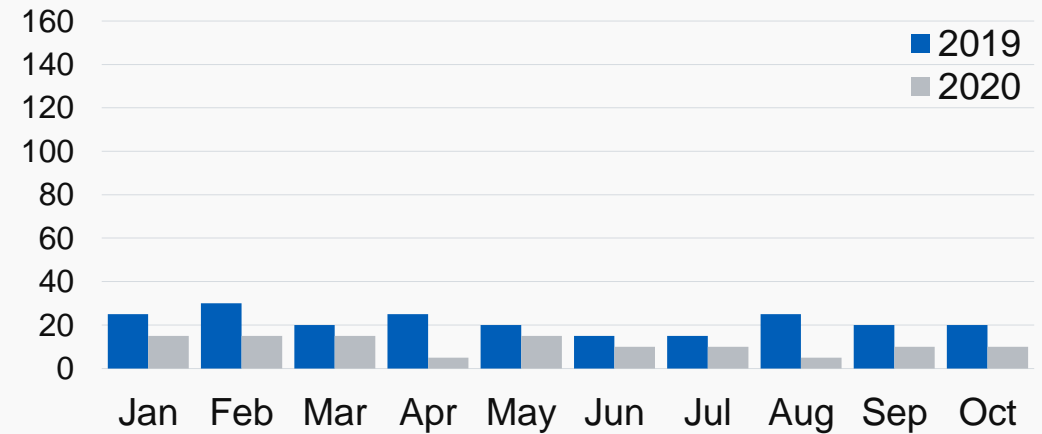
b. DKA



c. HHS



d. DFU



Notes: 1. Counts have been rounded. Counts between 1 and 7 are represented as a 5. All counts greater than 7 have been rounded to the nearest five. Consequently the total will not usually match the sum of the four constituent inpatient harms.



# 4. Impact of COVID-19:

## Patient profile and inpatient harms

**Audit questions:** How has the inpatient population with diabetes changed during the COVID-19 pandemic? Has the rate of inpatient harms changed during this period?

**Background:** Changes to the inpatient population with diabetes caused by the COVID-19 pandemic may affect the rate of inpatient harms.

Analysis covering April-Oct 2020 uses provisional data from HES and core NDA. Further analysis will be required to get a complete picture of hospital activity during this period.

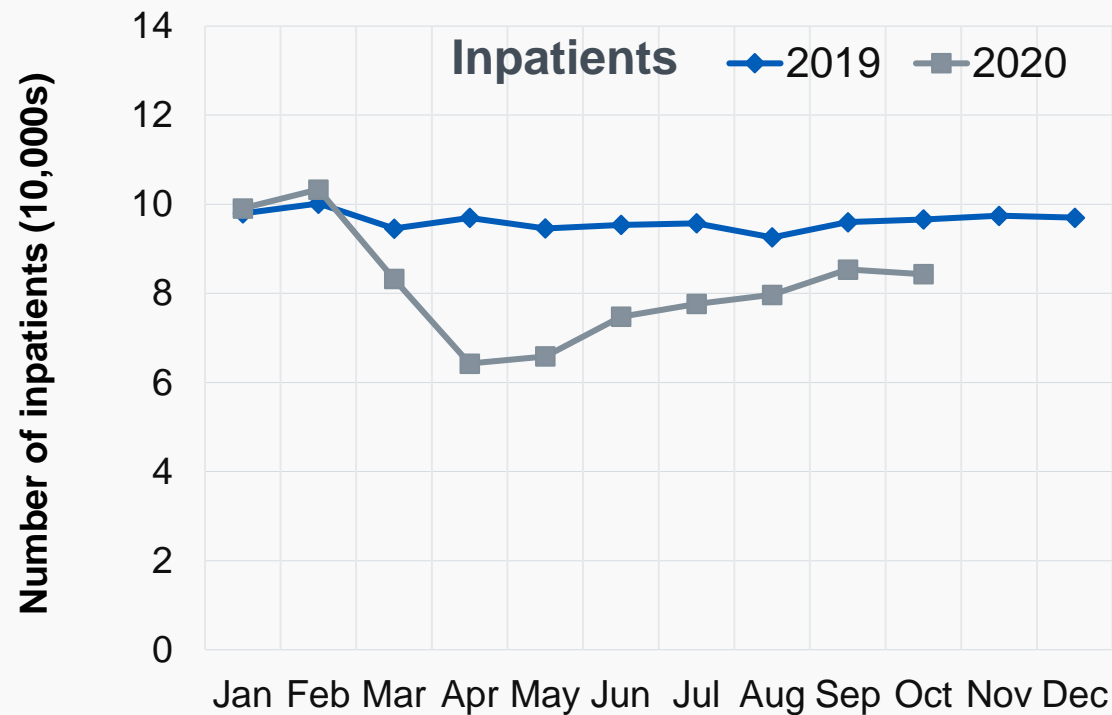
### Key findings<sup>1</sup>: April 2020 vs. April 2019

- The number of inpatients with diabetes dropped by 33.7 per cent in April 2020 compared to April 2019 as available beds were used to accommodate COVID-19 patients. The proportion of elective (6.4 vs. 10.5 per cent) and surgical admissions was also lower (15.6 vs. 23.4 per cent).
- As a proportion, there were more men (56.9 vs. 52.6 per cent), more people with type 1 diabetes (7.6 vs. 7.0 per cent) and more people from ethnic minorities (19.1 vs. 15.3 per cent) in April 2020.
- There were also dips in the proportion of inpatients that were current smokers (11.5 vs. 14.3 per cent), who had angina (6.4 vs. 7.9 per cent) or heart disease (19.3 vs. 22.0 per cent) on or during admission.
- By contrast, there was a spike in inpatients requiring RRT during their admission in April 2020 (7.2 vs. 4.6 per cent).
- The proportion of inpatients admitted for diabetic foot disease was lower in April 2020 (3.6 vs. 5.0 per cent) and has remained lower than 2019. The rate of foot ulceration (mainly heel ulcers) occurring in hospital was also lower in most months.

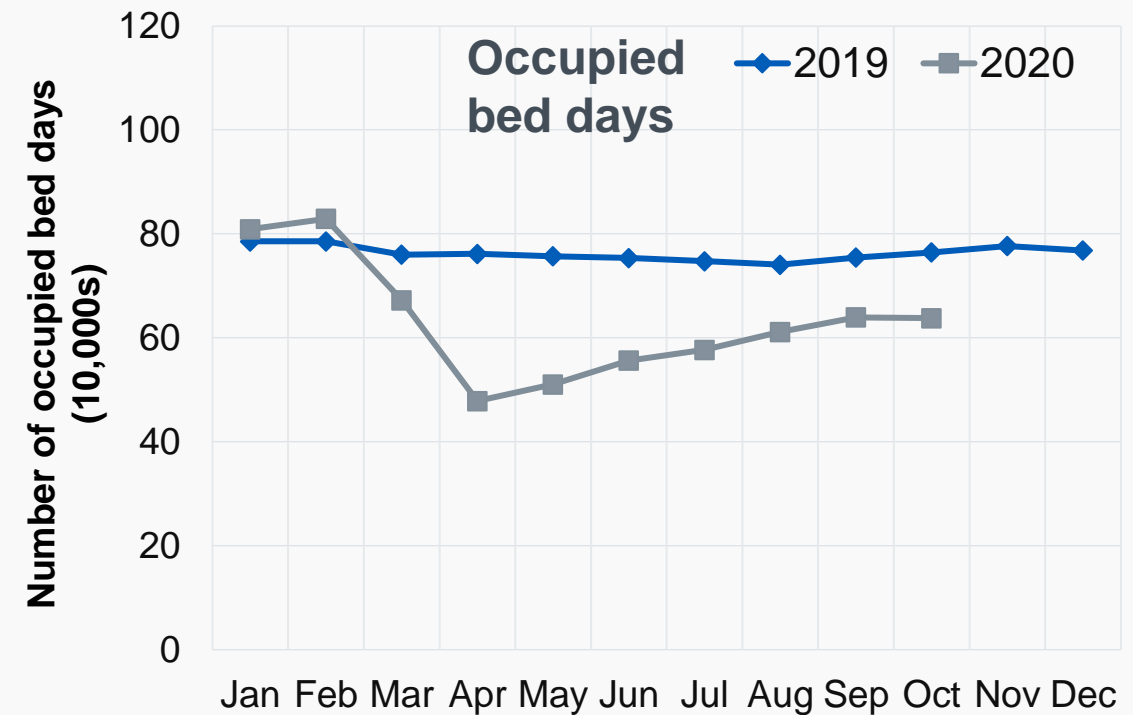


# 4. Impact of COVID-19: Patients and occupied bed days

**Figure 5: Inpatients with diabetes, by month<sup>2</sup>:  
unique inpatients<sup>3,4</sup>, England (rounded<sup>1</sup>)**



**Figure 6: Inpatients with diabetes, by month<sup>2</sup>:  
occupied bed days<sup>3,5</sup>, England (rounded<sup>1</sup>)**



**Findings:** Patient numbers were similar in January and February 2020 compared to 2019, as were occupied bed days. However, there was a steep fall starting in March 2020 to below the comparable 2019 figures. This is because available beds were used to accommodate COVID-19 patients. Since April 2020 patient numbers and occupied bed days have steadily increased, but have remained below the 2019 figures.

**Notes:** 1. Counts between 1 and 7 are set to 5. All counts greater than 7 are rounded to the nearest five. 2. Adjusted for month length. 3. Analysis covering April-Oct 2020 uses provisional data from HES and core NDA. 4. The number of inpatients in hospital during the period stated for people in the core NDA, where diabetes was diagnosed on or before admission. 5. Occupied bed days are calculated from the sum of nights in hospital during the period stated for people in the core NDA, where diabetes was diagnosed on or before admission. Day cases and same-day discharges are counted as zero days and are therefore excluded. For further information, see: Methodology: Inpatient population.



# 4. Impact of COVID-19: Inpatient harms

Figure 7: Inpatients with diabetes, by month: rate of hypoglycaemic rescue<sup>2,3</sup>, England (rounded<sup>1</sup>)

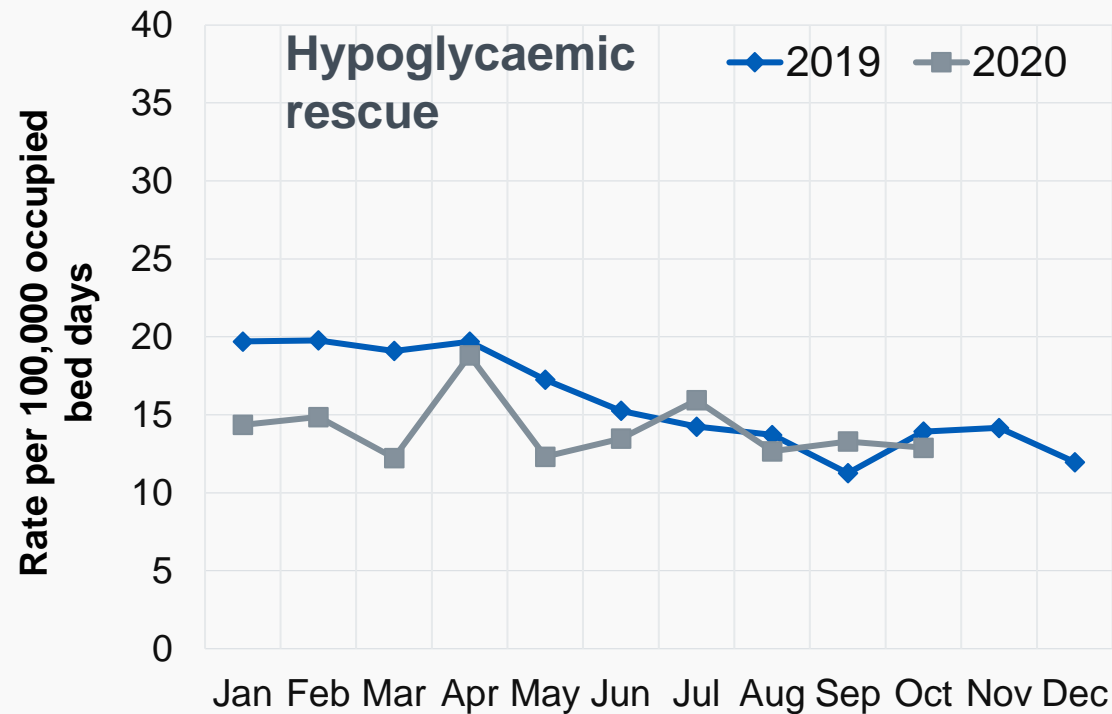
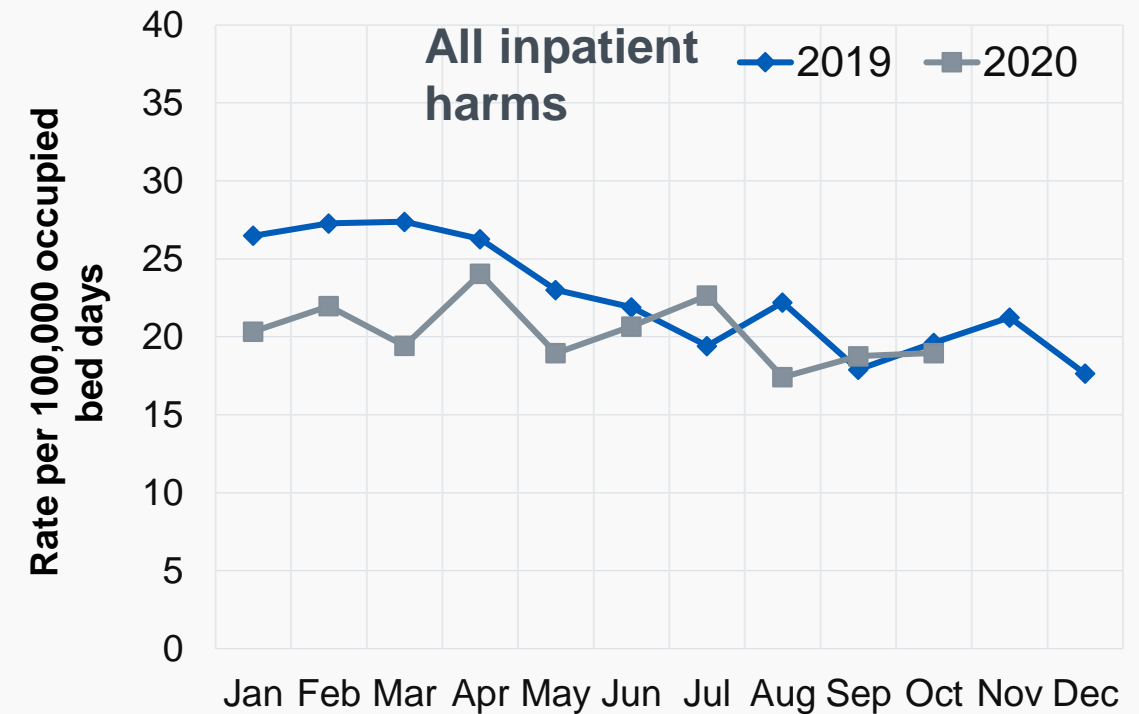


Figure 8: Inpatients with diabetes, by month: rate of inpatient harms<sup>2,3</sup>, England (rounded<sup>1</sup>)



## Findings:

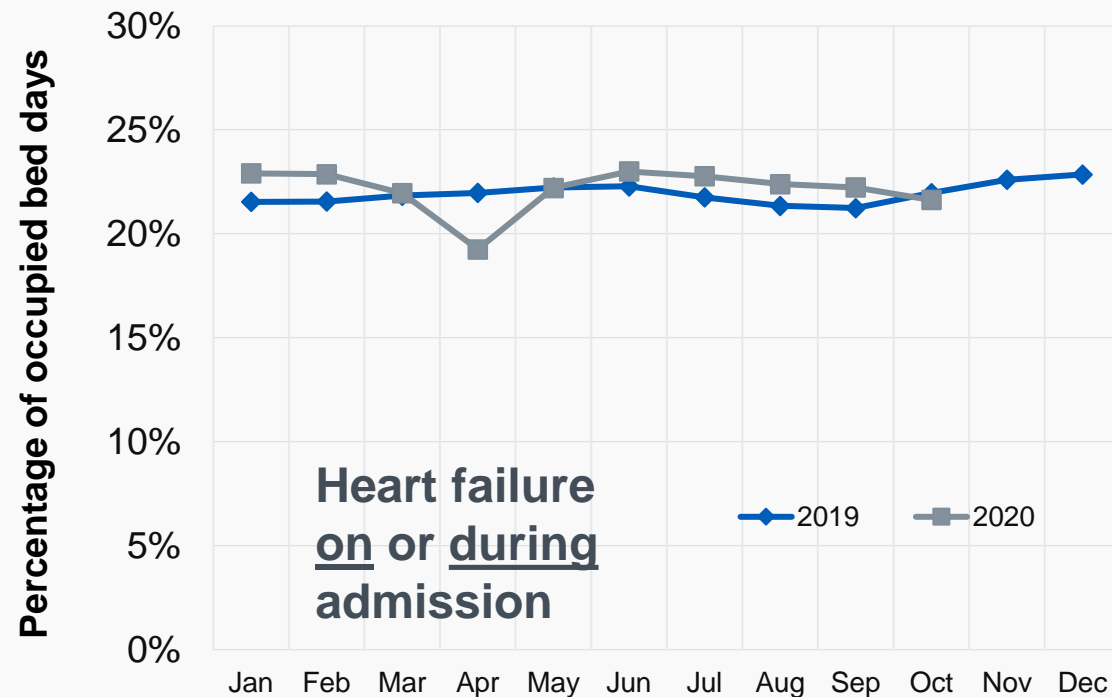
There was a downward trend in the rate of hypoglycaemic rescue during 2019. Lower levels were maintained during 2020, though there was a spike in April 2020 at the peak of wave one of the COVID-19 pandemic. A similar trend is evident for all inpatient harms, without such a pronounced peak in April 2020. Some of the apparent reduction in 2020 may be a result of lower participation during the COVID-19 pandemic.

**Notes:** 1. Proportions and rates are derived from rounded values. Underlying counts between 1 and 7 are set to 5. All counts greater than 7 are rounded to the nearest five. 2. Analysis covering April-Oct 2020 uses provisional data from HES and core NDA. 3. Proportions and rates are calculated from the sum of nights in hospital during the period stated for people in the core NDA, where diabetes was diagnosed on or before admission. Day cases and same-day discharges are counted as zero days and are therefore excluded. For further information, see: Methodology: Inpatient population.

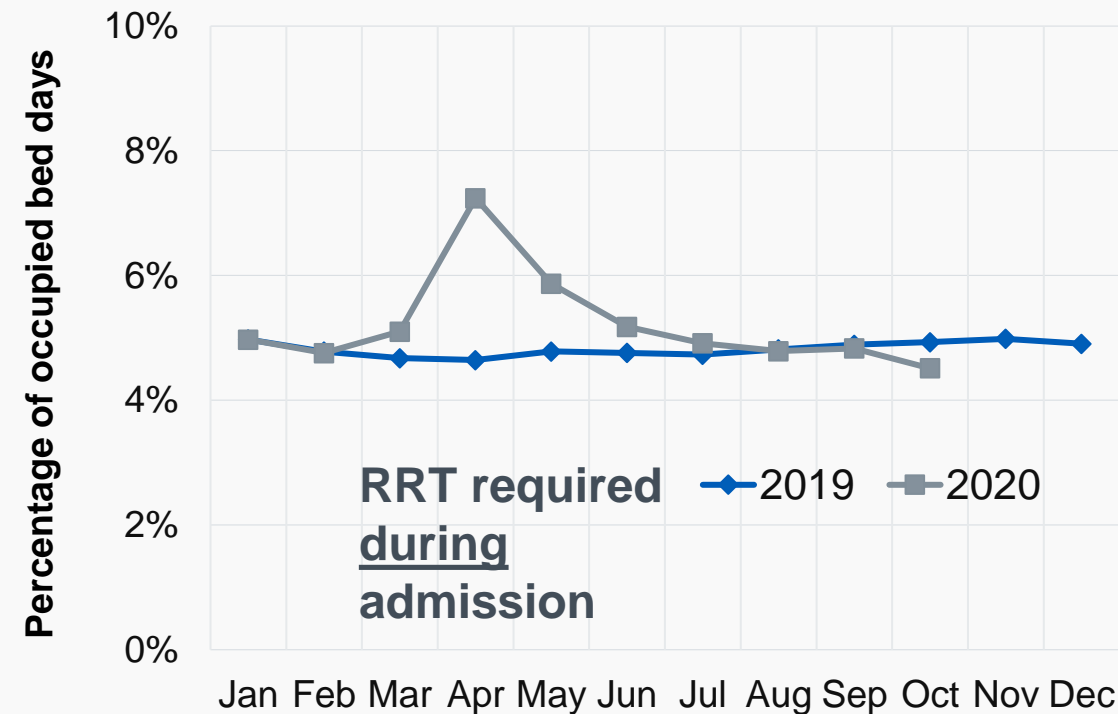


# 4. Impact of COVID-19: Heart failure and RRT

**Figure 9: Inpatients with diabetes, by month: % heart failure<sup>2,3</sup>, England (rounded<sup>1</sup>)**



**Figure 10: Inpatients with diabetes, by month: % RRT required<sup>2,3</sup>, England (rounded<sup>1</sup>)**



**Findings:** There was a drop in the proportion of inpatients experiencing heart failure on or during admission in April 2020 compared to April 2019 (19.3 vs. 22.0 per cent). Concurrently there was a spike in the proportion of inpatients requiring RRT during admission (7.2 vs. 4.6 per cent).

**Notes:** 1. Percentages are derived from rounded values. Underlying counts between 1 and 7 are set to 5. All counts greater than 7 are rounded to the nearest five. 2. Analysis covering April-Oct 2020 uses provisional data from HES and core NDA. 3. Proportions and rates are calculated from the sum of nights in hospital during the period stated for people in the core NDA, where diabetes was diagnosed on or before admission. Day cases and same-day discharges are counted as zero days and are therefore excluded. For further information, see: Methodology: Inpatient population.



# 4. Impact of COVID-19: Diabetic foot disease

Figure 11: Inpatients with diabetes, by month: % admitted with diabetic foot disease<sup>2,3</sup>, England (rounded<sup>1</sup>)

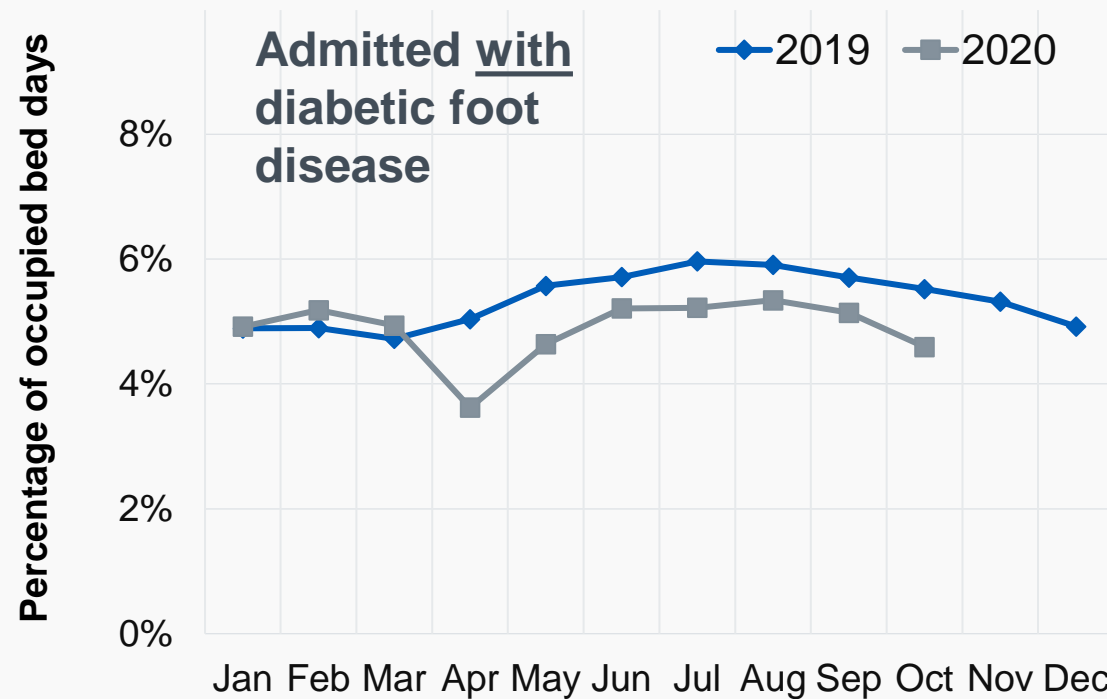
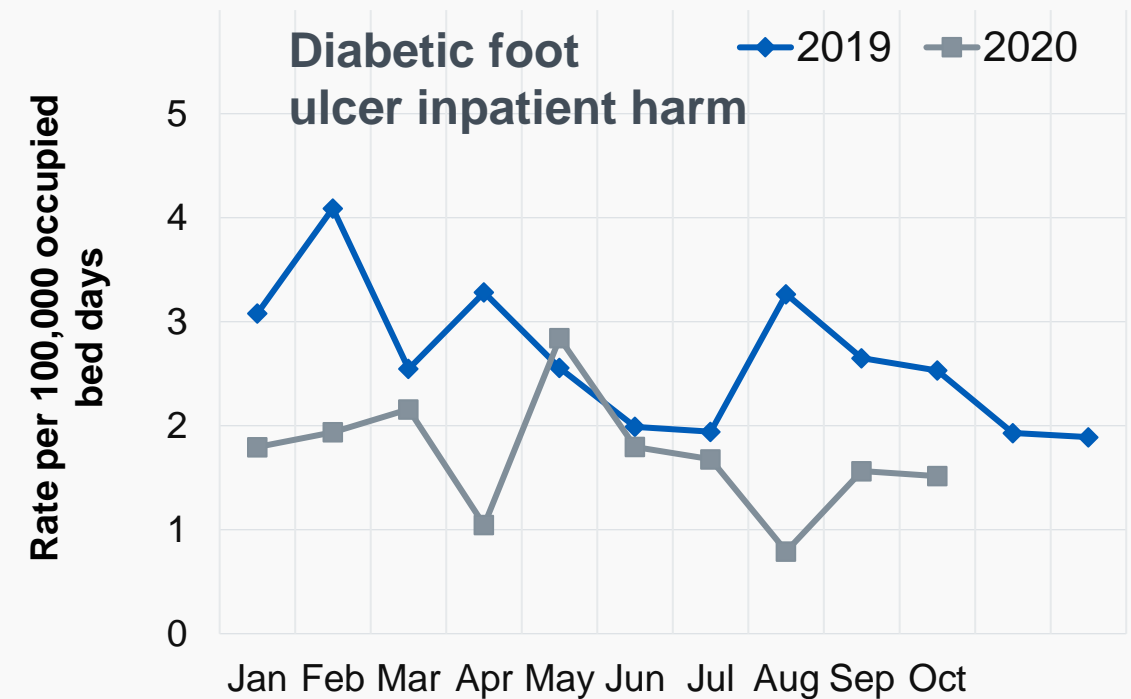


Figure 12: Inpatients with diabetes, by month: rate of diabetic foot ulcer inpatient harm<sup>2,3</sup>, England (rounded<sup>1</sup>)



**Findings:** The proportion of inpatients admitted with diabetic foot disease dropped markedly in April 2020 (3.6 vs. 5.0 per cent) and has remained below the 2019 level during the rest of 2020. The observed rate of inpatients developing a diabetic foot ulcer during their hospital stay has also been substantially lower for much of 2020 compared to 2019 (January, February, April, August and September).

**Notes:** 1. Proportions and rates are derived from rounded values. Underlying counts between 1 and 7 are set to 5. All counts greater than 7 are rounded to the nearest five. 2. Analysis covering April-Oct 2020 uses provisional data from HES and core NDA. 3. Proportions and rates are calculated from the sum of nights in hospital during the period stated for people in the core NDA, where diabetes was diagnosed on or before admission. Day cases and same-day discharges are counted as zero days and are therefore excluded. For further information, see: Methodology: Inpatient population.



# 4. Impact of COVID-19: Commentary

- Between January and December 2019 the incidence of reported harms decreased from a rate of 26.5 to 17.6 per 100,000 occupied bed days. This allows us to tentatively suggest that the hard work of diabetes teams is being reflected in improvements in the safety of inpatient diabetes care. However, the current voluntary reporting system means that the exact rate is uncertain. Automated ascertainment is under development, which should provide robust, comprehensive data in the future.
- This trend has continued in 2020, where the total number of reported inpatient harms was 27.7 per cent lower than in the same period in 2019. As above, this may have been influenced by the effect of preventive care measures, but there are other factors likely also to have had an influence such as lower participation, and reduced elective activity during the peak of the pandemic. Informal feedback suggests that another influence may have been improved understanding of exactly which hypoglycaemic episodes should be reported.
- The overall fall in reported inpatient harms was mainly driven by the reduction in reported hypoglycaemic rescue events during 2020, particularly between March and June 2020 as wave one of the pandemic peaked.





# National Diabetes Inpatient Audit: Harms 2020

## 5. Patient profiles



# 5. Patient profiles: All inpatients with diabetes

## Overview

### Audit questions:

Are particular characteristics associated with a greater risk of inpatient harm?

### How were data collected?

Inpatient harms are identified and notified by hospital teams. Patient demographics, diabetes characteristics, treatment targets and care processes are linked from the core National Diabetes Audit (NDA, 94 per cent matched). Hospital admission characteristics and comorbidities are linked from Hospital Episode Statistics (HES, 90 per cent matched).

### Why is this important?

A better understanding of high risk features might help target preventive care. In the future such understanding will also permit calculation of case-mix adjusted rates.

### Key findings

Overall, those experiencing inpatient harms are more likely to:

- Have been admitted as an emergency
- Be of white ethnicity
- Have type 1 diabetes
- Have not received 8 care processes in the last 12 months
- Have not met the combined treatment target for HbA1c, cholesterol and blood pressure.
- Experience cardiovascular or diabetes-specific complications on admission or during their hospital stay. In particular, inpatients having strokes on or during admission are more likely to experience HHS during their hospital stay.

See recommendations 2, 3 and 4 in the Executive summary.



# 5. Patient profiles: All inpatients with diabetes

## Summary

**Table 2: Summary of characteristics associated with each inpatient harm<sup>1</sup>,**  
England, May 2018 - October 2020

Characteristic		Inpatient harm			
		Hypoglycaemic rescue	DKA	HHS	Diabetic foot ulcer
Demographics	Age	Younger	Younger	None	None
	Sex	None	Female	None	Male
	Ethnicity	White	White	None	White
	Smoking status <sup>2</sup>	Current	Current	None	None
	Deprivation quintile	Least	Least	None	None
	BMI	Lower	Lower	Lower	None
Diabetes characteristics	Diabetes type	Type 1	Type 1	None	Type 1
	Diabetes duration	Longer	Longer	Longer	Longer
	Renal function	Worse	Better	None	Worse
Treatment targets and care processes <sup>3</sup>	Blood pressure ( $\leq 140/80$ )	None	None	None	Not met
	Cholesterol ( $< 5$ mmol/L)	Not met	Not met	None	None
	HbA1c ( $\leq 58$ mmol/mol)	Not met	Not met	Not met	Not met
	Met 3 treatment targets?	No	No	No	No
	Had all 8 care processes?	No	No	None	No
Hospital admissions	Admission method <sup>4</sup>	Emergency	Emergency	Emergency	Emergency
	Admission type	Medical	Surgical	Medical	Surgical
Complications during admission <sup>5</sup>		Myocardial infarction, Heart failure, Admitted for DKA, Admitted with diabetic foot disease, RRT required during admission	Angina, Myocardial infarction, Heart failure, Admitted for DKA, RRT required during admission	Stroke, Admitted for DKA	Heart failure, Admitted for DKA, Admitted with diabetic foot disease, RRT required during admission

See recommendation 2 in the Executive summary.

- Notes:**
1. Statistical significance of harms population vs. inpatient population with diabetes at the 95% level. Proportions are tested using the Chi-squared test. Medians are tested using the Mann-Whitney U test.
  2. Group comprises of non-smokers whose history is unknown and patients who have never smoked.
  3. Treatment target and care process information is taken from the NDA audit year prior to the hospital admission (e.g. from 2017-18 where the hospital admission is in 2018-19).
  4. Admission method = The method of admission to hospital e.g. emergency or elective. An elective admission is one that has been arranged in advance. Admission type is defined by the speciality under which consultant is contracted e.g. surgical or medical. The category 'Other' covers: Admission methods 'Maternity' and 'Other'; Admission types 'Other', 'Pathology', 'Psychiatry' and 'Radiology'.
  5. Complication recorded at any point during the admission, except: 'Admitted for DKA' and 'Admitted with diabetic foot disease'.



# 5. Patient profiles: All inpatients with diabetes

## Hospital admissions

**Table 3: Hospital admission method and main speciality, by inpatient harm<sup>2</sup>, England, May 2018 - October 2020 (rounded<sup>1</sup>)**

Group	Admission method <sup>4</sup>			Admission type <sup>4</sup>			
	Emergency	Elective	Other	Medical	Surgical	Other	
	%	%	%	%	%	%	
<b>Inpatient population with diabetes</b>	<b>83.6</b>	<b>10.2</b>	<b>6.2</b>	<b>70.9</b>	<b>23.0</b>	<b>6.2</b>	
• Hypoglycaemic rescue	93.7	3.2	3.1	80.0	19.5	0.5	*
• DKA	91.0	6.7	3.0	67.9	31.3	0.7	*
• HHS	91.3	4.3	4.3	87.0	13.0	4.3	*
<b>Inpatient population with diabetes<sup>3</sup> (LOS≥3)</b>	<b>83.9</b>	<b>9.3</b>	<b>6.8</b>	<b>71.0</b>	<b>21.8</b>	<b>7.3</b>	
• Diabetic foot ulcer (LOS≥3)	90.0	4.4	5.6	70.0	28.9	1.1	*

See recommendation 4 in the Executive summary.

**Notes:** \* = statistically significant at the 0.05 level vs. inpatient population. n = not statistically significant. Proportions are tested using the Chi-squared test. Cases with missing or unknown values are excluded from the calculations. The proportions of the inpatient population (data row 1, all diabetes) with missing or unknown values are: Admission method 0.0%; Admission type 0.2%.

1. Percentages are derived from rounded values. Underlying counts between 1 and 7 are set to 5. All counts greater than 7 are rounded to the nearest five. Consequently some percentages may not sum up to exactly 100 per cent.

2. Proportions and rates are calculated from the sum of nights in hospital during the period stated for people in the core NDA, where diabetes was diagnosed on or before admission. Day cases and same-day discharges are counted as zero days and are therefore excluded. For further information, see: Methodology: Inpatient population.

3. See note 2 above, with additional exclusion for admissions that are less than 3 nights due to the audit requirement that new onset foot ulcers must occur more than 72 hours after admission.

4. Admission method = The method of admission to hospital e.g. emergency or elective. An elective admission is one that has been arranged in advance. Admission type is defined by the speciality under which consultant is contracted e.g. surgical or medical. The category 'Other' covers: Admission methods 'Maternity' and 'Other'; Admission types 'Other', 'Pathology', 'Psychiatry' and 'Radiology'.



# 5. Patient profiles: All inpatients with diabetes

## Complications

**Table 4: Complications during hospital admission, by inpatient harm<sup>2</sup>,**  
England, May 2018 - October 2020 (rounded<sup>1</sup>)

Group	Cardiovascular complications <sup>4</sup> (on or during admission)				Diabetes-specific complications <sup>4</sup> (at specified point during admission)		
	Angina	Myocardial infarction	Heart failure	Stroke	Admitted for DKA	Admitted with diabetic foot disease	RRT required during admission
	%	%	%	%	%	%	%
<b>Inpatient population with diabetes</b>	<b>7.9</b>	<b>3.6</b>	<b>21.6</b>	<b>7.4</b>	<b>1.0</b>	<b>5.2</b>	<b>4.9</b>
• Hypoglycaemic rescue	7.2 n	4.3 *	26.3 *	6.7 n	9.6 *	7.9 *	7.7 *
• DKA	6.0 *	5.2 *	13.4 *	6.7 n	56.0 *	6.7 n	7.5 *
• HHS	8.7 n	4.3 n	21.7 n	30.4 *	4.3 *	4.3 n	4.3 n
<b>Inpatient population with diabetes<sup>3</sup> (LOS≥3)</b>	<b>7.6</b>	<b>3.6</b>	<b>22.4</b>	<b>8.1</b>	<b>0.8</b>	<b>5.6</b>	<b>5.2</b>
• Diabetic foot ulcer (LOS≥3)	6.7 n	5.6 n	34.4 *	7.8 n	3.3 *	13.3 *	8.9 *

See recommendation 3 in the Executive summary.

**Notes:** \* = statistically significant at the 0.05 level (vs. inpatient population with diabetes). n = not statistically significant (vs. Inpatient population with diabetes). Proportions are tested using the Chi-squared test.

1. Percentages are derived from rounded values. Underlying counts between 1 and 7 are set to 5. All counts greater than 7 are rounded to the nearest five. Consequently some percentages may not sum up to exactly 100 per cent.
2. Proportions and rates are calculated from the sum of nights in hospital during the period stated for people in the core NDA, where diabetes was diagnosed on or before admission. Day cases and same-day discharges are counted as zero days and are therefore excluded. For further information, see: Methodology: Inpatient population.
3. See note 2 above, with additional exclusion for admissions that are less than 3 nights due to the audit requirement that new onset foot ulcers must occur more than 72 hours after admission.
4. Complication recorded at any point during the admission, except: 'Admitted for DKA' and 'Admitted with diabetic foot disease'.



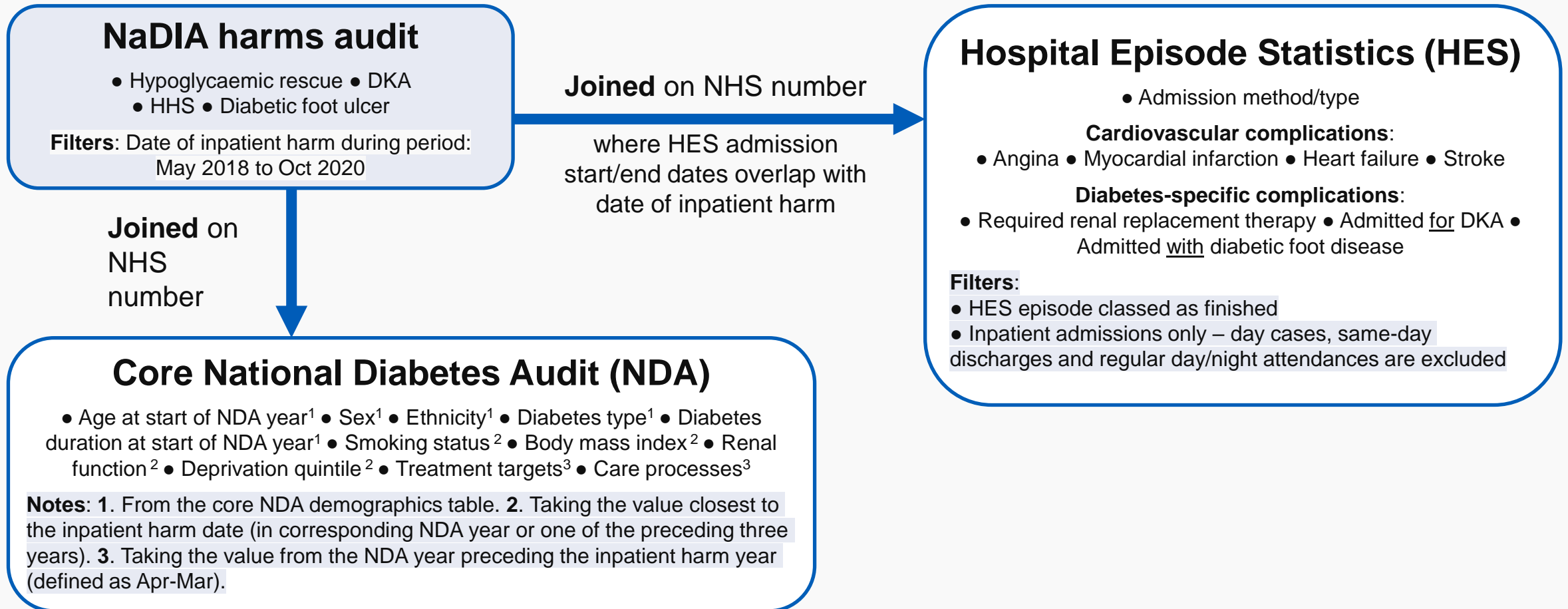
# National Diabetes Inpatient Audit: Harms 2020

## 6. Methodology



# 6. Methodology: NaDIA harms audit linkage

To produce the patient profiles, NaDIA harms audit data was enriched by linkage:



# 6. Methodology: Inpatient population

Linkage was also used to produce a comparison population of inpatients with diabetes to compare with the profile of inpatients with inpatient harms recorded:

## Core National Diabetes Audit (NDA) All years

- Sex<sup>1</sup> • Ethnicity<sup>1</sup> • Diabetes type<sup>1</sup> • Diabetes duration at start of NDA year<sup>1</sup> • Smoking status<sup>2</sup> • Body mass index<sup>2</sup> • Renal function<sup>2</sup> • Deprivation quintile<sup>2</sup> • Treatment targets<sup>3</sup> • Care processes<sup>3</sup>

**Notes:** 1. From the cumulative core NDA demographics table, supplemented by the ongoing NDA 2020-21 collection. 2. Taking the value from the NDA year corresponding to the admission year. 3. Taking the value from the NDA year preceding the admission year.

## Comparison: Inpatient population with diabetes

Characteristics of the inpatient population, adjusted for nights in hospital e.g. 1 night is counted once, 7 nights are counted 7 times etc.

Joined on NHS number

Filters: Patient in both NDA and HES cohorts

## Hospital Episode Statistics (HES) 2015-16 to 2019-20 & 2020-21 (provisional)

- Occupied bed days • Admission method/type

### Cardiovascular complications:

- Angina • Myocardial infarction • Heart failure • Stroke

**Diabetes-specific complications:** • Required renal replacement therapy • Admitted for DKA • Admitted with diabetic foot disease

**Filters:** • HES episode classed as finished

- Inpatient admissions only – day cases, same-day discharges and regular day/night attendances are excluded.
- Aged 17+ on admission.
- Diagnosed with diabetes on or before admission.
- Where compared with inpatient harm characteristics, hospital days where any inpatient harms occurred are excluded.
- Cross-HES year admissions are merged where admission dates and provider spell ID match.
- Admissions deleted if fully enveloped by another admission.





# National Diabetes Inpatient Audit: Harms 2020

## 7. Glossary



# 7. Glossary:

## Definitions: Hypoglycaemic rescue

Guidance on harm specification questions within the NaDIA harms audit data collection: **Hypoglycaemic rescue**

**Question:** 'Did the patient require injectable rescue treatment for an episode of hypoglycaemia starting more than 6 hours after admission?'

For the purpose of this audit an episode should be recorded only if subcutaneous and/or intravenous injected rescue treatment (glucagon, glucose) for severe hypoglycaemia was used.

For consistency and compatibility this harm is defined not by the measured blood glucose level but by the need to urgently counteract severe hypoglycaemic symptoms such as loss of consciousness, acute confusion or seizures with injected treatment.

Rescue treatment would usually be intravenous glucose or subcutaneous/ /intramuscular/intravenous glucagon.

For example, these treatments may be required if pre-meal insulin had been given but the meal had not been delivered resulting in severe hypoglycaemia (loss of consciousness, acute confusion, seizures etc due to a low blood glucose) requiring rescue treatment.

Low blood glucose arising in patients receiving intravenous insulin infusions as well as intravenous glucose has led to some misunderstanding of 'rescue treatment'. Intravenous glucose infusions should always run alongside continuous intravenous insulin and their use in this situation should not be considered 'rescue treatment' even when the CBG falls below 4.0 mmol/L provided that the patient has no severe hypoglycaemic symptoms. If, however, the person develops severe hypoglycaemic symptoms such as loss of consciousness, acute confusion or seizures during the infusion and require additional glucose or glucagon this would be considered 'rescue treatment'.



# 7. Glossary:

## Definition: DKA and HHS

Guidance on harm specification questions within the NaDIA harms audit data collection: **DKA**

**Question:** 'Was the patient diagnosed with new onset DKA more than 24 hours after admission?'

DKA requires three key features for diagnosis:

- Known diabetes or blood glucose over 11.0 mmol/l.
- Ketonaemia (blood ketones 3.0 mmol/l or more) or urine ketones 2+ or more.
- Acidosis with venous pH less than 7.3 or bicarbonate less than 15 mmol/l.

For more on the definition of DKA please refer to the JBDS guidelines on the [ABCD web site](#).

Guidance on harm specification questions within the NaDIA harms audit data collection: **HHS**

**Question:** 'Was the patient diagnosed with new onset HHS more than 24 hours after admission?'

HHS has characteristic features used in its diagnosis:

- Hypovolaemia.
- Marked hyperglycaemia (blood glucose 30 mmol/l or more) without significant ketonaemia (blood ketones less than 3 mmol/l) or acidosis (venous pH 7.3 or more/bicarbonate 15 mmol/l or more).
- Osmolality usually 320 mosmol/kg or more.

For more on the definition of HHS please refer to the JBDS guidelines on the [ABCD web site](#).



# 7. Glossary:

## Definition: Diabetic foot ulcer

Guidance on harm specification questions within the NaDIA harms audit data collection: **Diabetic foot ulcer**

**Question:** ‘Was the patient diagnosed with a new onset foot ulcer more than 72 hours after admission?’

The audit is not intended to collect reports of foot ulcers that are present on admission, or which develop within 3 days of admission. Grade 2+ Pressure sores on the foot that develop more than 72 hours after admission should be included. Deep tissue injury which has not progressed to skin ulceration is not included. Traumatic skin foot lesions and foot infections which arise during the admission are included.



The definition of ‘Admitted with diabetic foot disease’ used in this report is discussed on the following slide.

For further information on the audit, visit the NaDIA harms audit homepage:

<https://digital.nhs.uk/data-and-information/clinical-audits-and-registries/national-diabetes-in-patient-audit-harms>



# 7. Glossary:

## Definition: Admitted with diabetic foot disease

**Diabetic foot disease** is defined as a foot affected by ulceration that is associated with neuropathy and/or peripheral arterial disease of the lower limb in a patient with diabetes<sup>1</sup>.

People with diabetic foot ulcers sometimes require admission to hospital to treat their foot disease. This occurs when the condition of the foot threatens survival of either the foot or the patient. Such deterioration is often a result of infection (requiring intravenous antibiotics, with or without local surgery) or poor arterial blood flow. Resultant hospital stays and rehabilitation may be lengthy. In extreme cases amputation is required.

To identify people admitted to hospital with diabetic foot disease, the first episode of each admission has been searched for the following **clinical procedures** or **diagnoses** predominantly associated with inpatient management of diabetes related foot disease<sup>2</sup>:

### Foot disease clinical diagnoses

- Diabetes mellitus with peripheral circulatory complications
- Ulcer of the lower limb
- Decubitus ulcer
- Cellulitis
- Osteomyelitis
- Gangrene
- Atherosclerosis

### Foot disease clinical procedures

- Debridement of a foot/leg wound
- Minor and major amputation of lower limb

**For reporting purposes, the foot disease must be identified in the first episode of the hospital admission. Outputs are called: 'Admitted with diabetic foot disease' or similar.**



**Notes:** 1. Alexiadou K., Doupis J. [Management of diabetic foot ulcers](#). Diabetes Therapy. 2012;3:1–15. doi: 10.1007/s13300-012-0004-9.

2. [Public Health England](#). Diabetic Foot Profiles. Technical Document. Note that patients may have other conditions which are contributing factors towards their hospital stay.



# 7. Glossary:

## Definition: Care Processes

Care processes are reported on in the core [National Diabetes Audit](#) (NDA). The latest full [NDA report](#) into Care Processes and Treatment Targets covered the period 1 January 2019 to 31 March 2020.

[NICE](#) recommends that people with diabetes have all 8 of the following care processes at least once a year):

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

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

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

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

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

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

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

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



# 7. Glossary:

## Definition: Treatment targets

Treatment targets are reported on in the core [National Diabetes Audit](#) (NDA). The latest full [NDA report](#) into Care Processes and Treatment Targets covered the period 1 January 2019 to 31 March 2020.

[NICE](#)<sup>1</sup> defines the following target levels to reduce risks of complications for people with diabetes. Note that only the first three (highlighted in blue) are covered in this report:

**HbA1c** – the closer this is to normal (less than 42 mmol/mol) the lower is the risk of all long term complications of diabetes. **NDA treatment target: ≤ 58 mmol/mol.**

**Cholesterol** – reducing cholesterol levels lowers the risk of heart attacks and strokes. **NDA treatment target: < 5 mmol/L.**

**Blood Pressure** – high levels are a risk for heart attacks and strokes; they also drive progression of eye and kidney disease. **NDA treatment target: ≤ 140/80.**

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

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

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



# 7. Glossary:

## Discussion: Case ascertainment



What is the case ascertainment (completeness) for hypoglycaemic rescue, DKA, HHS and DFU in the NaDIA harms audit?

Case ascertainment for each type of inpatient harm has previously been calculated using estimates derived from the [2019 NaDIA snapshot](#). Results were published in the [2019 NaDIA harms audit report](#) (p. 32).

**Case ascertainment for DKA was estimated at 20 per cent (DKA), with the other harms estimated at 6 to 8 per cent (others).** Re-running the same methodology on the latest NaDIA harms audit data produces similar figures (21 per cent for DKA and 6 to 8 per cent for the other harms).

However, the true case ascertainment is likely to be higher than the above estimates for two reasons:

- 1) The expected number of harms may be inflated by the increased likelihood of longer stay patients both experiencing a harm and being present on the NaDIA snapshot audit day; and
- 2) Because the latest NaDIA snapshot was undertaken in September 2019, the likely reduction in the number of inpatient harms during the COVID-19 pandemic (see slide 16) will not be reflected in the baseline figures.

Both of the factors above will increase the expected number of harms, consequently reducing the case ascertainment. It was therefore decided not to publish detailed case ascertainment results in this year's NaDIA harms audit report, though it is acknowledged the true case ascertainment is likely to be relatively low.





# National Diabetes Inpatient Audit: Harms 2020

## 8. Further information



# 8. Further information: Acknowledgements

The NaDIA harms audit team would like to thank all the people and teams who have worked hard to contribute to this unique and valuable insight into the inpatient care of people with diabetes.

Development and delivery of NaDIA harms audit is guided by a multi-professional advisory group of clinicians and patient representatives, chaired by Alistair Lumb (NaDIA harms audit) and Gerry Rayman (NaDIA). The NaDIA Advisory Group members include:

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<b>Gerry Rayman</b>	Consultant Diabetologist & National Clinical Lead for Inpatient Diabetes (Chair: NaDIA)	<b>Michael Mason</b>	Information Analyst, NHS Digital
<b>Bob Young</b>	NDA Specialist Clinical Lead	<b>Maureen McGinn</b>	Patient Representative, Diabetes UK
<b>Neera Agarwal</b>	Consultant Diabetologist, Wales	<b>Julie Michalowski</b>	Audit Manager, NHS Digital
<b>Belinda Allan</b>	Consultant Diabetologist, Michael White Centre for Diabetes and Endocrinology (Hull)	<b>Shivani Misra</b>	Consultant in Metabolic Medicine & Diabetes, Imperial College Healthcare NHS Trust
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<b>Kath Higgins</b>	Diabetes Consultant, University Hospitals of Leicester NHS Acute Trust	<b>Garry Tan</b>	Consultant Diabetologist, Oxford Centre for Diabetes, Endocrinology and Metabolism
<b>Annu Joy</b>	Apprentice Analyst, NHS Digital	<b>Dave Ward</b>	Patient Representative, Diabetes UK
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<b>Anne Kilvert</b>	Consultant Diabetologist, Northampton General Hospital NHS Trust	<b>Emilia Woch</b>	Higher Information Analyst, NHS Digital
		<b>Arthur Yelland</b>	Senior Information Analyst, NHS Digital



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**The Healthcare Quality Improvement Partnership (HQIP).** The National Diabetes Inpatient Audit (NaDIA) – Harms is commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP). HQIP is led by a consortium of the Academy of Medical Royal Colleges, the Royal College of Nursing, and National Voices. Its aim is to promote quality improvement in patient outcomes, and in particular, to increase the impact that clinical audit, outcome review programmes and registries have on healthcare quality in England and Wales. HQIP holds the contract to commission, manage, and develop the National Clinical Audit and Patient Outcomes Programme (NCAPOP), comprising around 40 projects covering care provided to people with a wide range of medical, surgical and mental health conditions. The programme is funded by NHS England, the Welsh Government and, with some individual projects, other devolved administrations and crown dependencies [www.hqip.org.uk/national-programmes](http://www.hqip.org.uk/national-programmes).

**NHS Digital** is the new name for the Health and Social Care Information Centre. NHS Digital managed the publication of the 2020 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.

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.



# National Diabetes Inpatient Audit: Harms 2020

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