

National Diabetes Audit

Key findings about the quality of care for children and young people with diabetes in England, incorporating registrations from Wales

Report for the audit period 2004/05



Prepared in association with:

The Healthcare Commission • Diabetes UK • National Diabetes Support Team • Yorkshire and Humber Public Health Observatory

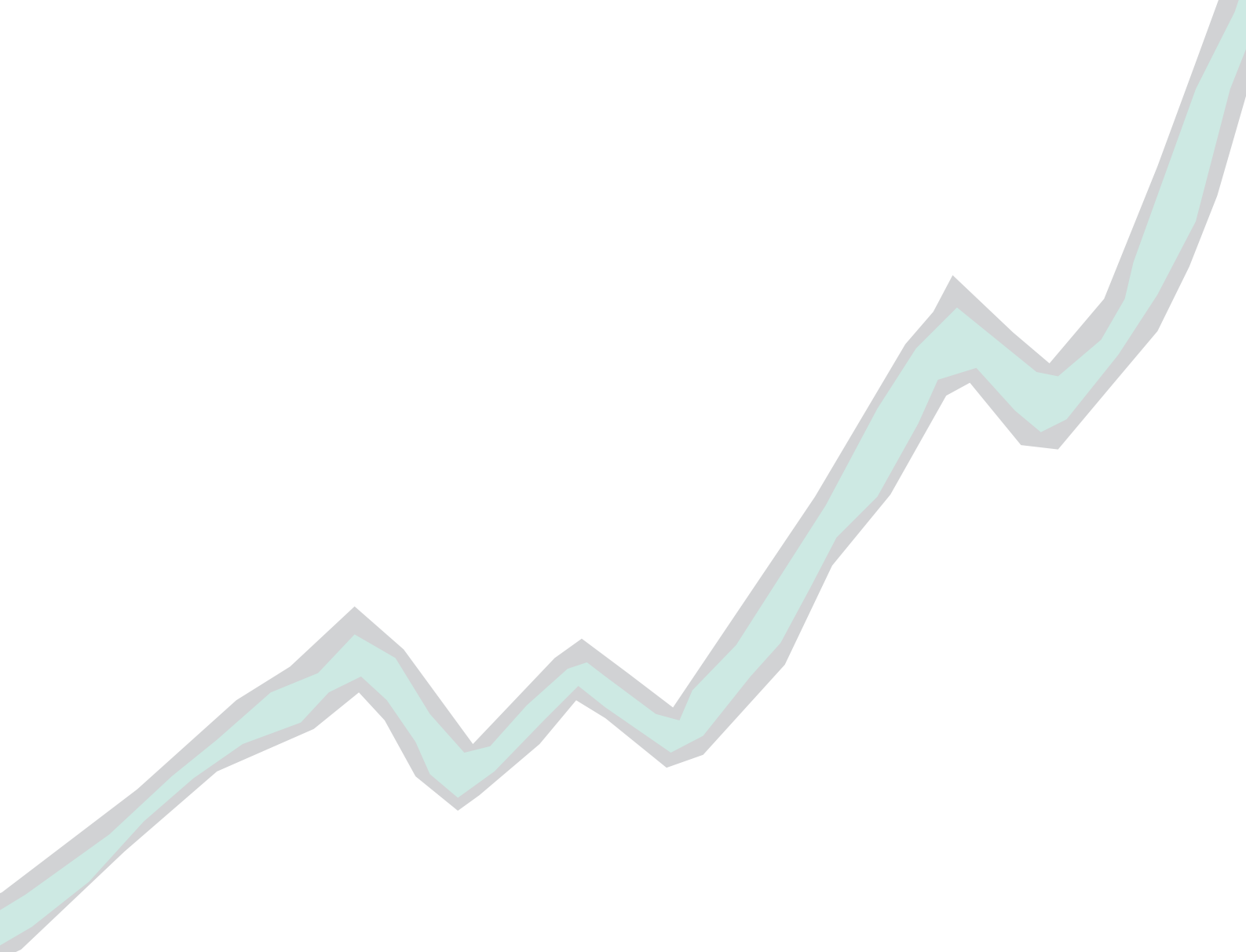
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Report for the audit period 2004/05

Version 1.0





Paediatric Report for the Audit Period 2004/05

This report presents the main findings from the second year of the National Diabetes Audit of paediatric specialist units. It also provides recommendations for both national and local organisations based on the analysis of the audit data. The full report containing the detailed analysis and further explanation of the approach used can be found at www.icservices.nhs.uk/ncasp/pages/audit_topics/diabetes

Printed copies can be ordered by quoting reference number (13090602), on **0845 300 6016** or email diabetes@ic.nhs.uk

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Foreword

It is with great pleasure that I write this foreword to the second annual National Diabetes Audit report especially as I can comment on the singular advances that have been made in the past year in terms of the numbers of units submitting data. It is very encouraging to note that there has been an increase of more than 100%, not only in the number of units submitting data but also in the total number of children whose data have been submitted. I also wish to welcome wholeheartedly the participation of our colleagues in Wales who have participated in this year's audit.



However, we still have a long way to go if we are to achieve anywhere near the level of participation achieved in the latter days of the Diabetes UK audit, let alone full participation of all units. This would allow us to have a much fuller picture of the situation as whole in England and Wales - something that has already been achieved in many other countries for some years now. If we are to be able to improve the care of our patients to allow them to arrive at adulthood as well educated and informed about their diabetes as possible, we need to be able to know how well (or badly) we are doing at present. This will enable us to get some idea of what needs to be done to achieve those objectives.

On the face of it, it seems that there has already been some slight improvement in the outcomes achieved even in such a short period of time, but some caution has to be exercised in interpreting these results because of the relatively small numbers and because of the different populations reflected by the changing numbers. We will only really be able to know if sustained improvements are being achieved if we gather data from as many units as possible.

It is clear also that one of the major hurdles that needs to be overcome is the difficulty that many units find in being able to submit data. Electronic recording systems are still unavailable in many units who are to

be commended for the time and effort that they have spent in ensuring they have been able to submit data. There is a need to provide suitable information systems that will avoid the time-consuming effort of collecting data by hand. Let us hope that those who have had difficulties in providing data and those who have been unable to do so will be able to use this report to provide evidence of the need for IT systems to their relevant organisations. In other words **"Give us the tools and we will finish the job"**.

My thanks to all of you who have found the time to put in so much effort and to my colleagues on the Steering Committee of the BSPED and the Paediatric Advisory Group of the NDA. Let us hope that by the time the next report is produced, we can reverse the situation and provide more data from paediatric units than comes from Primary Care sources.

A handwritten signature in black ink, appearing to read 'Jeremy Allgrove'.

Jeremy Allgrove

Chair of Steering Group of BSPED and Paediatric Advisory Group of the NDA, Royal London Hospital, Whitechapel, London E1 1BB

Introduction

Quality information is key to the successful implementation of the Diabetes National Service Framework (NSF) and achieving service improvement. The National Diabetes Audit (NDA) provides a means to collate, analyse, benchmark and feedback about the effectiveness of diabetes services and their impact on children and adults with diabetes.

This is the second paediatric report for the National Diabetes Audit and presents the main findings from the paediatric analysis for the 15 month period from January 2004 to March 2005. The full report for the National Diabetes Audit, comprising the detailed analysis for the whole audit including adults, and an abridged version are available in the full and abridged NDA report.

The audit is commissioned by the Healthcare Commission and was developed in partnership with Diabetes UK. Clinical and professional guidance is provided by the NDA Paediatric Advisory Group, which has a vital role directing the paediatric audit. The membership of the Paediatric Advisory Group, and the NDA Service Management Board can be found in Appendix A.

Participation

For the first time the NDA includes registration details for children and young people cared for by specialist paediatric diabetes units in Wales. In total information on 7,841 children and young people (0-24 years old) was submitted directly from paediatric units; 7,073 in England (5,770 under 16 year olds) and 768 (500 under 16 year olds) in Wales. This audit year has seen more than double the number of registrations from paediatric units compared with last year (3,484). The audit includes information on a further 10,265 children and young people with diabetes submitted from primary care registers in England. A further 846 records have been submitted from sources other than specialist paediatric units. Together this totals 18,952 children and young people with diabetes.

The major priority for the second year of the audit was to increase participation and a range of tools for collecting and submitting data has been developed in response to issues raised by units during the 2003/04 audit period. These have been welcomed and have contributed to the increase in participation. The tools available can be found on the NDA website at http://www.icservices.nhs.uk/ncasp/pages/audit_topics/diabetes/submitdata-new.asp#paediatric

Appendix B identifies the paediatric units that have taken part in the audit.

Summary of Key Findings

A number of important findings have been identified from the 2004/05 data based on the paediatric units that participated in the audit:

- Participation in the audit has more than doubled this year with information received for 7,841 children and young people in England and Wales.
- On average, around 8.2% of children and young adults with diabetes experienced at least one episode of ketoacidosis in the audit period. There is a tendency for ketoacidosis to occur more in girls than boys.
- 81 percent of children and young people had their HbA1c recorded at least once in the audit period. This is an increase of 15 percent compared with last year.
- Not all care processes are recommended for all ages. However, only 17 percent of 12-15 year olds received eye and foot exams, or had their cholesterol checked in the audit year.
- There is a tendency for more males to achieve the treatment targets for both HbA1c and cholesterol. 16 percent of Children and young people under 16 years achieved the HbA1c target of <7.5% which represents a higher percentage of males (17 percent) achieving the target than females (15 percent). Alongside this, 72 percent of children and young people under 16 years achieved the HbA1c target of less than or equal to 9.5% which also shows a higher achievement in males (74 percent) than females (71 percent).

How Does the National Diabetes Audit Work?

The National Diabetes Audit provides a technical infrastructure for PCTs, GP practices, Hospitals and Paediatric Units to submit data about care for people with diabetes. The audit uses NHSnet (N3) and is a browser based system. Wherever possible the data is collected using predefined queries from clinical systems, such as TWINKLE, though in many cases where units rely on paper-based records data has to be prepared manually.

In addition to the data submitted directly to the audit, supplementary data relating to specific complications and procedures are obtained from Hospital Episode Statistics (HES) database.

The audit enables access to the analysis through the NDA toolkit. There are two versions of the toolkit each audit year; one which contains all the information on adults and children submitted by primary and secondary care organisations (including paediatric units) and one which includes only the information submitted by paediatric units.

Paediatric units predominantly care for children with diabetes up to 16 or 18 years and then the transition to adult services begins. The analysis in this report focuses mainly on children aged less than 16 years, though also includes information for young people up to 24 years who are still being cared for by paediatric units.

A more detailed explanation of the audit infrastructure is included in Appendix C.

What Does the Audit Measure?

The Paediatric National Diabetes Audit aims to provide answers to the following questions:

- How many children and young adults with diabetes are cared for in paediatric units?
- What is the annual rate of ketoacidosis for children registered with diabetes?
- What proportions of children with diabetes are getting the key processes of diabetes care?
- What proportions of children with diabetes achieve treatment targets?

Each of the audit questions are discussed in this report and the key findings from the 2004/05 audit period are presented. Where appropriate, comparisons have been made with the 2003/04 audit period.

To undertake more detailed and locally based analyses users should access the NDA toolkit directly. Within this report the findings are presented so that individual paediatric units are not identifiable. Registered users of the NDA toolkit will see their own unit identified and others anonymised when they access it. This level of anonymity was initially considered important to avoid a 'league table' approach but the Paediatric Advisory Group continues to review whether this is still necessary.

Detailed Analysis

Many units are working predominantly with paper-based methods of record-keeping and to collect and submit data electronically in these circumstances has not been straightforward. Ideally, information on the complete dataset should be submitted to the audit (see Appendix D). This is not always possible, especially for units that do not have supporting IT systems. A number of units have submitted partial data and have provided information about registrations with limited information on care processes and treatment targets. This must be borne in mind when considering data analysis. The predefined queries from TWINKLE were used by 11 units to submit data, the remainder (53) have submitted via either regional registers or by other mechanisms.

Prior to the National Diabetes Audit, Diabetes UK conducted a national audit of children (0-16 years) with diabetes for 2000, 2001 and 2002. With the introduction of the Data Protection Act it was no longer feasible for Diabetes UK to continue with their data collection methodology. There are a number of findings from the Diabetes UK National Paediatric Diabetes Audit (2000 and 2002) that provide useful benchmarks and are included for comparison.

In total 64 paediatric units successfully submitted data to the audit, 57 in England and 7 in Wales. When compared to the 28 units which took part in the 2003/04 audit it is clear that an enormous effort has gone into participating for 2004/05.

A further 6 paediatric units submitted data very close to the submission deadline and for a variety of reasons their data could not be included in the audit. These are being individually followed up to make sure that lessons can be learned and data included in the audit for the next audit year. Eleven paediatric units are registered for the audit, but have not submitted data this audit period. This compares to 29 registering but not submitting in the last audit year.

Registrations

How many children and young adults with diabetes are treated at paediatric units?

Children with diabetes receive the majority of their care in specialist paediatric units. This was also found by the 2006 Diabetes report which stated;

Only 54 percent of PCTs have guidelines for the management of children and young people with diabetes. Despite this, 80 percent refer all children and young people on the day of diagnosis to a paediatrician with a special interest in diabetes and 98 percent of children and young people have their long-term condition managed by such a paediatrician.

Age Band	England	Wales	Total	
Up to 16 years	Male	2,944	255	3,199
	Female	2,825	244	3,069
	Subtotal	5,769	499	6,268
16 to 24 years	Male	677	128	805
	Female	624	138	762
	Subtotal	1,301	266	1,567
All ages	7,070	765	7,835	
Unknown age or gender	3	3	6	
Total	7,073	768	7,841	

Figure 1: Numbers of children and young adults submitted to the audit

The 64 paediatric units submitted data to the audit on a total of 6,270 children under the age of 16; 5,770 in England and 500 in Wales. In total, participating paediatric units submitted information for 7,841 children and young adults (up to the age of 24); 7,073 in England and 768 in Wales.

A complete list of paediatric units has been compiled by the NDA Paediatric Advisory Group. There are 220 paediatric units in England and 17 in Wales. Therefore the information submitted to the audit represents 26 percent of the units in England and 41 percent of those in Wales.

The size of the paediatric units as measured by the numbers of children with diabetes in their care varies from 10 to 376 in England, and from 3 to 242 in Wales.

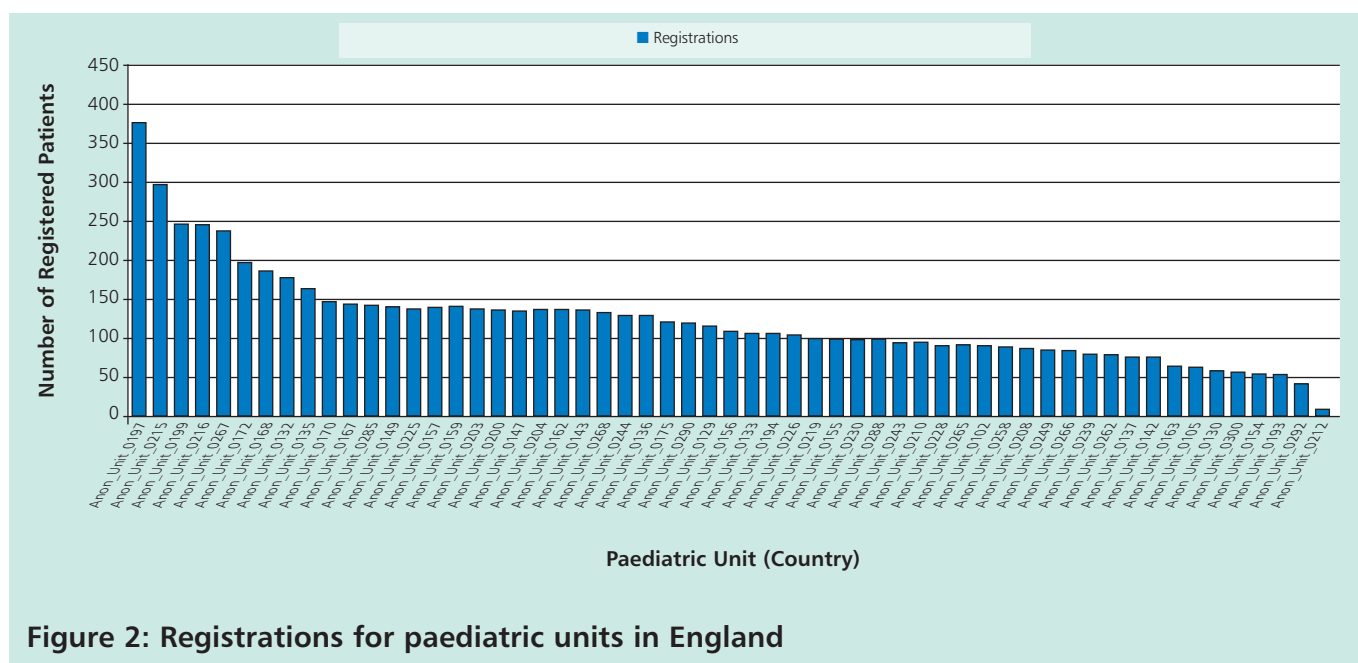


Figure 2: Registrations for paediatric units in England

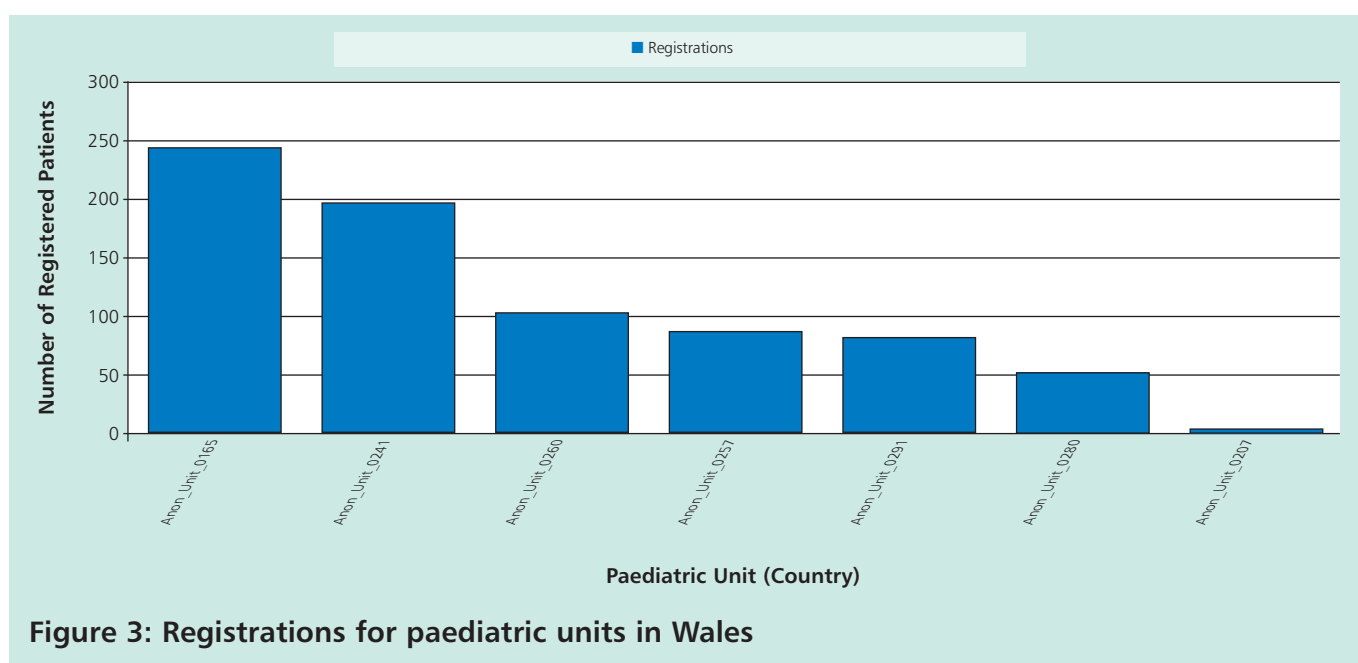


Figure 3: Registrations for paediatric units in Wales

Country	Mean	Median
England	124	112
Wales	110	88
Total	123	106

Figure 4: Average size of paediatric units

The Diabetes UK audit in 2002 found that 33 percent of the units submitting data to their audit cared for fewer than 70 children; the equivalent figure based on this audit for 2004/05 now stands at 16 percent. This may be due to more of the larger units being involved in the audit; whether this is the case will become clearer over time as participation increases.

Diabetes and Gender

The gender balance has not changed over the five years in which national audits have been undertaken (including the Diabetes UK audits from 2000 to 2002) and remains at 51 percent males and 49 percent females.

Age of Children Registered with Diabetes

In both England and Wales the largest proportions of children registered with diabetes are between 12-15 years old.

Age band	England		Wales		Total	
0 to 4 years	363	(5%)	42	(6%)	405	(5%)
5 to 11 years	2,587	(37%)	221	(28%)	2,808	(36%)
12 to 15 years	2,820	(40%)	237	(31%)	3,057	(39%)
Under 16s subtotal	5,770	(82%)	500	(65%)	6,270	(80%)
16 to 24 years	1,301	(18%)	266	(35%)	1,567	(20%)
Unknown age	2		2		4	
Total	7,073		768		7,841	

Figure 5: Age distribution of children in the care of paediatric units

In response to feedback, it is now also possible to analyse the paediatric unit data using five-year age bands (0-4, 5-9, 10-14 years) which link to denominator populations for geographical areas provided by the Office of National Statistics. This can facilitate epidemiological studies. This offers a choice to those conducting their own analysis using the NDA toolkit.

Ethnicity of Children with Diabetes

Recording of ethnic origin is much better in paediatric units than in primary care. In England ethnic origin was recorded for 70 percent of registrations, in Wales it was recorded in all registrations. This means that for England there are data for 1,838 children (under 16 years old) without any ethnicity recorded. Although data was collected using the census categories for ethnicity, they have been aggregated into 5 groups for ease of reporting. In England the ethnic groups of the population of children with diabetes is similar to that of last year. However, there are considerable differences between the audit populations in England and Wales; with 61 percent identifying as White in England, and 7% from Black/Minority Ethnic (BME) groups compared to 96 percent identifying as White and 4% from BME groups in Wales (figure 6). This audit population is not representative of the national population if compared to the 2001 census figures which indicate that in England 92 percent identify as White and 8% BME and in Wales, 98 percent White and 2% BME.

Ethnicity	England				Wales	
	Registrations 2003/4		Registrations 2004/5		Registrations 2004/5	
White	1,684	(58%)	3,524	(61%)	478	(96%)
Asian	135	(5%)	170	(3%)	3	(<1%)
Black	61	(2%)	90	(2%)	5	(1%)
Other	57	(2%)	148	(3%)	13	(3%)
Not stated	953	(33%)	1,838	(32%)	1	(<1%)
Total	2,890		5,770		500	

Figure 6: Ethnic group distribution of children <16 years in the care of paediatric units. The effects of rounding may skew the percentages

Type of Diabetes in Children (<16 years)

Age Band	Type 1		Type 2		MODY		Other specified		Not specified	
0 to 4 years	397	(5%)	1	(<1%)	0		6	(5%)	1	(3%)
5 to 11 years	2,756	(36%)	10	(9%)	2	(22%)	36	(28%)	4	(13%)
12 to 15 years	2,925	(39%)	62	(54%)	5	(56%)	58	(45%)	7	(23%)
Under 16s subtotal	6,078	(80%)	73	(64%)	7	(78%)	100	(78%)	12	(39%)
16 to 24 years	1,476	(20%)	41	(36%)	2	(22%)	29	(22%)	19	(61%)
Unknown age	4	(<1%)								
Total	7,558		114		9		129		31	

Figure 7: Type of diabetes by age band for England and Wales

Diabetes Type	Females		Males		Total	
Type 1	2,953	(96%)	3,123	(98%)	6,078*	(97%)
Type 2	52	(2%)	21	(<1%)	73	(1%)
MODY	3	(<1%)	4	(<1%)	7	(<1%)
Other Specified	56	(2%)	44	(1%)	100	(2%)
Not Specified	5	(<1%)	7	(<1%)	12	(<1%)
Total	3,069		3,199		6,270	

Figure 8: Type of diabetes by gender for children <16 years

* includes 2 records with an unspecified gender category which slightly skews the percentage figures

Paediatric units are very good at recording diabetes type with 95.5% of registrations having a diabetes type recorded. It is not however possible to verify the accuracy of the recording. The type of diabetes most commonly found in children is Type 1 (96 percent).

Recommendation

Paediatric Units are encouraged to aim to improve the data quality of recording diabetes type to ensure the correct analysis of diabetes data.

There is an increase in the numbers of children with Type 2 diabetes as they get older, numbers are small and caution should be taken in making inferences.

There does not seem to be a gender difference between diabetes types for England or Wales.

There are proportionately more children with Type 2 diabetes in the BME groups than White children, 9% of the Asian population and 5% Black, compared to less than 1% of the White children in the audit.

Data on Maturity-Onset Diabetes of the Young (MODY)

Is now being received by the audit. It should be noted that this is a small percentage of records, but in the light of increasing prevalence of MODY and type 2 diabetes in younger people derived diabetes type, used in the analysis toolkit, will become less useful over time and at present is only used as an indicative measure.

One of the main key audit recommendations, which should address this issue, is that efforts should be made to improve the accuracy and recording of diabetes type.

Diabetes Type	White		Asian		Black		Other		Not stated	
Type 1	3,905	(98%)	143	(83%)	88	(93%)	149	(93%)	1,793	(97%)
Type 2	31	(<1%)	15	(9%)	5	(5%)	5	(3%)	17	(<1%)
MODY	5	(<1%)	0		0		0		2	(<1%)
Other specified	52	(1%)	14	(10%)	2	(2%)	6	(4%)	26	(1%)
Not specified	9	(<1%)	1	(<1%)	0		1	(<1%)	1	(<1%)
Total	4,002		173		95		161		1,839	

Figure 9: Type of diabetes by Ethnic Group for children <16 years

Deprivation for Children with Diabetes

Using the postcode of the patient, ward areas are mapped and these are then used to assign an IMD 2004 Deprivation Score. Quintile 1 represents the least deprived areas and Quintile 5 the most deprived. Where it has not been possible to map from postcode to ward code it is recorded as 'no data'. The analysis of deprivation is not available for the children treated in paediatric units in Wales.

When compared to last year's audit population where more than 50 percent of the children were from the most deprived areas, this year's population is more evenly spread across the quintiles. The 2003/04 paediatric NDA audit population included only 2,890 children under 16 from 28 units, this compares to 5,770 children under 16 from 57 units in England. Care should be taken when making year-on-year comparisons and it is important to recognise the differences in the audit populations.

Deprivation Quintile	Percentage of 2003/04 registrations	Percentage of 2004/05 registrations
No data	7%	8%
Quintile 1 (least deprived)	15%	16%
Quintile 2	18%	20%
Quintile 3	16%	17%
Quintile 4	18%	17%
Quintile 5 (most deprived)	26%	22%

Figure 10: Registrations by deprivation quintile

Age at Diagnosis of Diabetes

The average age at diagnosis is 7.69 years old, the youngest children were diagnosed in their first year and the oldest at 19 years old. The following chart (figure 11) illustrates the average age at diagnosis by unit, a table of this data can be found in Appendix E.

Predicted Prevalence of Diabetes

In the full analysis covering both adults and children with diabetes, the PBS Phase 2 Diabetes Population Prevalence model, which provides the expected total numbers of people with both undiagnosed and diagnosed diabetes at PCT level, is used to look at the differences between the registered population and the predicted numbers of people with diabetes. However, there is no equivalent prevalence model for paediatric units due to the more geographically dispersed nature of the population of children being treated at each paediatric unit. Using the registered GP for all the children included in the audit from paediatric units and primary care registers (the use of NHS number allows unique registrations to be identified) enables comparisons with the PBS prevalence model to be drawn.

The requirement under the GMS contract is for GPs to register people over the age of 17 on their practice based diabetes registers although good practice suggests all people with diabetes should be registered. Information on a further 10,265 children and young people (0-24 years) was submitted to the audit from primary care systems (A further 846 records have been submitted from sources other than specialist paediatric units), giving a total of 18,952 children and young people with diabetes.

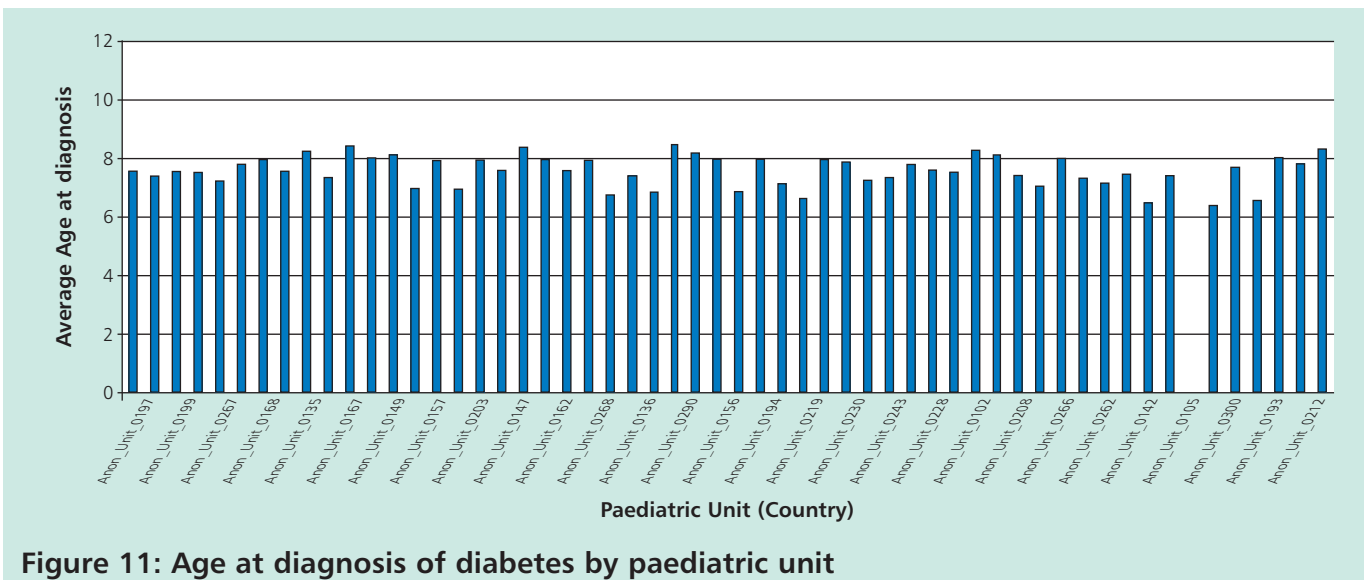


Figure 11: Age at diagnosis of diabetes by paediatric unit

The PBS Phase 2 model predicts that 24,191 children aged 0-19 years had Type 1 diabetes in England in 2001. The PBS model is based on studies that found no Type 2 diabetes in children aged 0-19 years, although the authors accept that this may no longer be true.

The following chart shows the numbers of children registered with diabetes from both primary and secondary care (paediatric units) compared with the numbers predicted to have diabetes using the PBS model. Note that this chart has been drawn from the NDA toolkit covering both adults and children and that the age bands used are slightly different to those in the paediatric toolkit analysis. Adjustments to the PBS Phase 2 model prediction for children have had to be made in order to calculate prevalence for the age bands used.

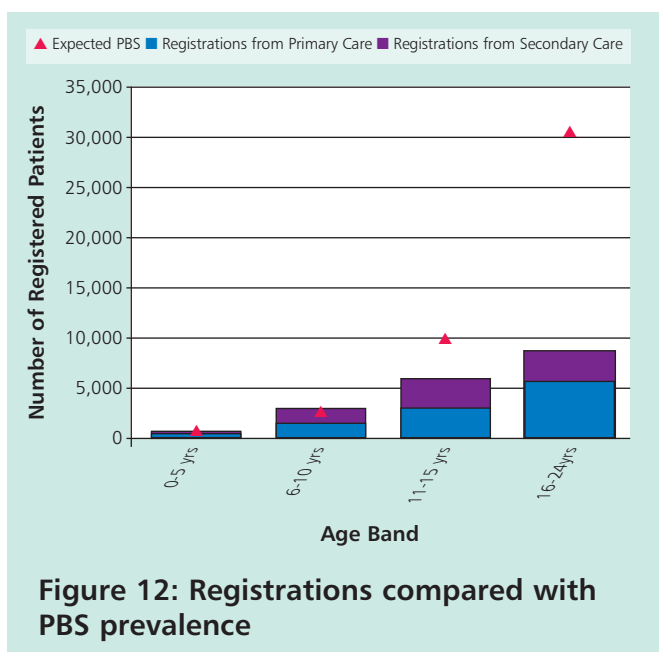


Figure 12: Registrations compared with PBS prevalence

The audit received information from primary and secondary care for 10,057 children under 16 years old.

The Diabetes UK audit (2002) included a calculation of national prevalence of children actually treated for diabetes (not including undiagnosed) which identified 16,950 children under 16 years old in England and 1,121 in Wales. The 2004/05 National Diabetes Audit identifies 10,057 children under 16 years old with diabetes, representing 59 percent of the Diabetes UK diabetic population and 501 children in Wales representing 45 percent of the Diabetes UK diabetic population.

Ketoacidosis in Children with Diabetes

The audit question is:

What is the rate of ketoacidosis for children registered with diabetes?

The purpose of this audit question is to analyse the rate of ketoacidosis for children registered with diabetes and assess the services provided to ensure smooth transition in to adult care. This is reflected in the standards set out in the Diabetes NSF:

All children and young people with diabetes will receive consistently high-quality care and they, with their families and others involved in their day-to-day care, will be supported to optimise the control of their blood glucose and their physical, psychological, intellectual, educational and social development.

NSF for diabetes: Standard 5

Unfortunately, for the first year of their participation in NDA, the Welsh units were not able to submit data on complications, care processes or treatment targets. All analysis from this section onwards covers children cared for by paediatric units in England only.

Complications rates for episodes of ketoacidosis are obtained from the Hospital Episode Statistics (HES), and can be analysed for complications occurring just in the audit year, or the previous five years. Data from patients diagnosed with diabetes within the audit year have been excluded throughout this section of the report to ensure that ketoacidosis (DKA) at diagnosis is not included. This means that the rates might be slightly under-reported as some children may have had more than one episode in the year of diagnosis.

7.9% of children aged under 16 years of age and 8.2% of children and young adults under 24 years experienced at least one episode of ketoacidosis in the audit year, a slight increase on last year's figure of 6.4%.

Age Band	Registrations	Prevalence in audit year (%)	Prevalence in previous 5 years (%)
0-4 yrs	363	13.77	31.40
5-11 yrs	2,587	6.57	18.90
12-15yrs	2,820	8.33	23.16
Under 16s subtotal	5,770	7.89	21.77
16-24 yrs	1,301	9.15	22.37
Unknown Age	2	0.00	0.00
Total	7,073	8.12	21.87

Figure 13: Prevalence of ketoacidosis by age band

As with last year the prevalence of ketoacidosis is slightly greater for females than males, the gap between the rates in males and females has increased this year.

Age band	Female	Male	Total
Under 16	8.71%	7.10%	7.89%
16-24	9.78%	8.57%	9.15%

Figure 14: Prevalence of ketoacidosis by gender

Prevalence of ketoacidosis in the audit year increases with age and is highest in the young adult population (16 to 24 years).

Audit year	Males		Females	
	under 16 yrs	16-24 yrs	under 16 yrs	16-24 yrs
2003/04	6.46%	8.36%	7.83%	8.81%
2004/05	7.10%	8.57%	8.71%	9.78%

Figure 15: Prevalence of Ketoacidosis by age and gender

Statistical Process Control Analysis

Statistical Process Control (SPC) charts are used within the NDA to display performance without using any ranking. It also helps to differentiate between random variation and that which is due to special causes, meriting further investigation. A fuller explanation of the interpretation of control charts is given in the full audit report. The following analysis of the ketoacidosis prevalence rates using SPC methodology and removing patients diagnosed with diabetes within the audit year indicates that one unit has a particularly high rate of ketoacidosis prompting the need for further investigation by the paediatric unit to identify the reasons behind this and to ensure the rate is reduced by identifying any problem areas within their diabetes service. This will also be referred to the NDA Paediatric Advisory Group to explore and to identify whether any support can be offered.

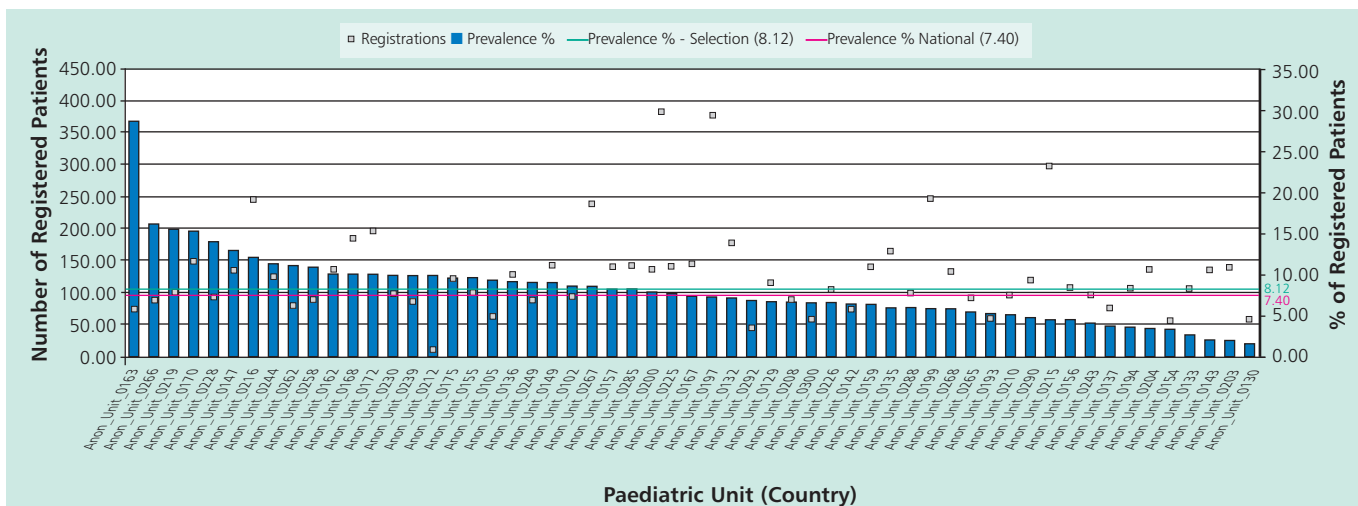


Figure 16: Prevalence of ketoacidosis by paediatric unit

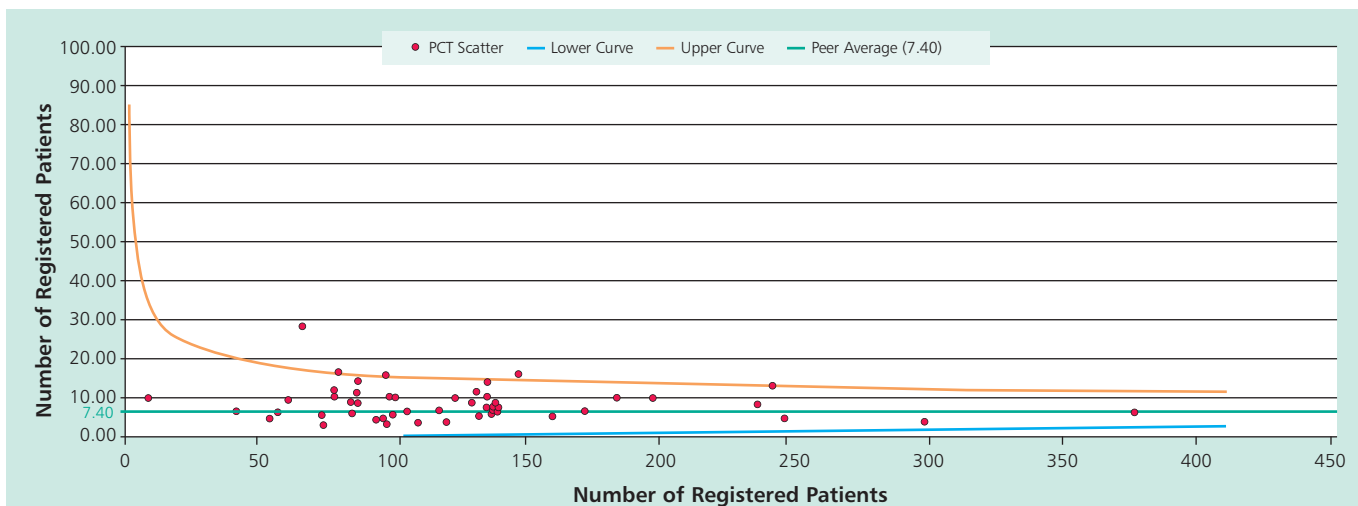


Figure 17: Statistical Process Control for ketoacidosis prevalence by paediatric unit

Recommendation

The audit provides the information on which paediatric units can review their ketoacidosis rates for people with diabetes and compare them with results from across England. Using detailed local knowledge and analysis of relevant SPC charts it is recommended that paediatric units should:

- Identify and investigate reasons for significantly high rates where they occur (outliers above the control limits)
- share understanding of the factors contributing to the achievement of superior performance (outliers below the control limits)

Ethnicity	% Prevalence 2003/04 (n=3,484)	% Prevalence 2004/05 (n=7,073)
White	6.98	8.13
Asian	5.85	7.14
Black	8.99	6.90
Other	6.85	10.10
Not Stated	8.29	8.09
Total	7.38	8.12

n= total numbers within the data category

Figure 19: Prevalence of ketoacidosis by ethnic group 2003/04 and 2004/05

Deprivation and Ethnicity

It appears that managing diabetes is more difficult for those in the more deprived areas where both the prevalence and incidence of ketoacidosis is higher.

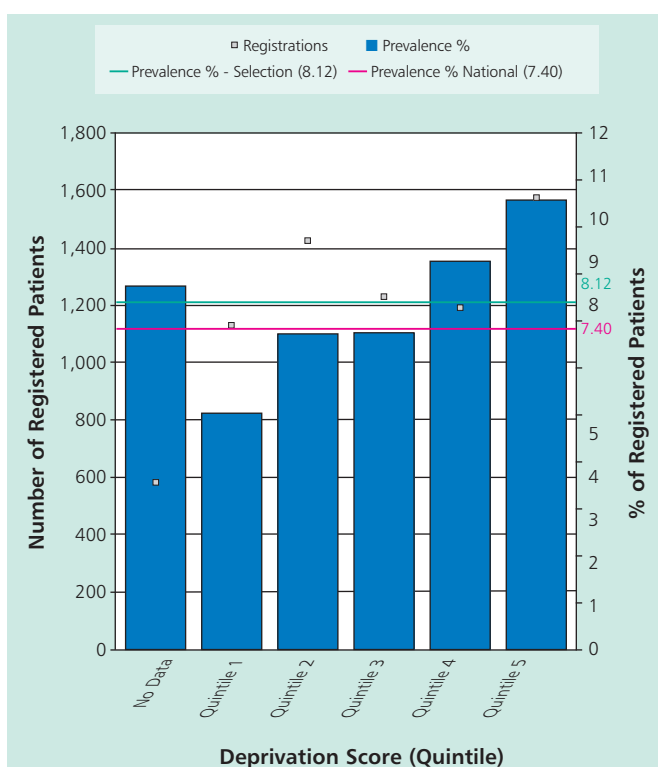


Figure 18: Prevalence of ketoacidosis by deprivation quintile

There does not appear to be a link between ethnic group and prevalence of ketoacidosis, this is in contrast to last years findings which indicated that episodes of ketoacidosis occurred more frequently in BME groups.

Care Processes for Children with Diabetes

The audit question is:

What proportion of children with diabetes receiving care from specialist paediatric units are getting the key processes of care?²

The Diabetes National Service Framework Standard 5 Clinical care of children and young people with diabetes, states:

All children and young people with diabetes will receive consistently high quality care and they, with their families and others involved in their day to day care, will be supported to optimise the control of their blood glucose and their physical, psychological, intellectual, educational and social development.

The rates of carrying out care processes vary considerably between specialist units. Many units do not record care process information electronically, and complete information was not always submitted to the audit. Not all of the care processes outlined in the Diabetes NSF Delivery Strategy and measured through the National Diabetes Audit are recommended for children of all ages. Guidelines specify aged 12 for commencement of most care processes.

The HbA1c results have been analysed for all children. All other care processes have been analysed for children aged 12-15 years.

² Care process information was not available for the paediatric units in Wales, therefore the following analysis includes just the data from units in England (7,073)

Care Process Rates Per Unit

The most important biomedical care process is HbA1c, and units were asked to submit this information if at all possible, even if they could not submit information on any other care processes. Only 6 units were unable to submit any care process information, 8 units were only able to submit HbA1c care process information. There were only 12 units that submitted data on 'all care processes' for any of their patients (see Appendix F).

For both years of the NDA, HbA1c has been the care process most commonly undertaken and recorded. An increase from 66 percent of children receiving this care process in 2003/04 to 81 percent in 2004/05 has been seen, although this is likely to be more reflective of greater participation and more complete data being submitted to the audit than a change in clinical practice. This care process is recommended for all ages and should be carried out at least 3 times a year in children, although frequency of recording is not part of this audit. It appears that as children get older there is more likelihood of them having their HbA1c recorded at least once in the audit period.

Age band	Registrations	Care Process recorded
0-4 yrs	363	71%
5-11 yrs	2,587	80%
12-15 yrs	2,820	81%
16-24 yrs	1,301	85%
Age unknown	2	50%
Total	7,073	81%

Figure 20: HbA1c by age band

Recommendation

Paediatric Units should strive to continue the improving rates of recording HbA1c results.

The calculation of BMI is not routinely undertaken in paediatric units, many units use centiles as a measure of height/weight. Where paediatric units entered a date for recording height/weight but did not enter an actual BMI the care process would still have been calculated as having been undertaken.

Although numbers and differences are small and therefore caution should be taken, it appears that for most of the care processes females are slightly more likely to have had them carried out.

Care Process Type (12-15 yrs)	Males (n=1,436)	Females (n=1,383)
HbA1c	80%	81%
BMI	53%	56%
Blood Pressure	46%	48%
Urinary Albumin	20%	21%
Creatine	21%	23%
Cholesterol	19%	18%
Eye Exam	19%	19%
Foot Exam	17%	20%
All care processes	2%	2%

Figure 21: Proportion of Care processes by gender for 12-15 year olds

Ethnicity and Care Process

Given that the information on care processes is not complete caution should be taken when making inferences from the data. Proportionately there are fewer HbA1c recordings carried out for Black children than the other ethnic groups. This pattern is not replicated for the other care processes where ethnicity does not appear to impact on the care processes recorded.

Ethnicity	Registrations % recorded	Care Process
White	4,369	80%
Asian	238	84%
Black	116	66%
Other	198	84%
Not stated	2,152	82%
Total	7,073	81%

Figure 22: HbA1c by ethnic group

HbA1c test

This shows the average amount of glucose in a persons blood over the last three months.

Treatment Targets for Children with Diabetes

The audit question is:

What proportions of children with diabetes achieve treatment targets?³

Targets for HbA1c and cholesterol have been published in NICE guidelines, although these guidelines do not require cholesterol to be measured for children under 18 years old. The tables below show the overall percentage of children with diabetes achieving each of these targets. Males are more likely to achieve the upper treatment target for both HbA1c and Cholesterol (figures 23 and 28).

Age band	Gender	% Achieving HbA1c targets	
		<7.5%	≤ 9.5%
Under 16 years	Male	17.1%	74.4
	Female	14.8%	70.5
	Total	15.9%	72.4
16 to 24 years	Male	14.7%	62.8
	Female	13.0%	54.1
	Total	13.9%	58.7
All ages	Male	16.6%	72.0
	Female	14.4%	67.4
	Total	15.5%	69.8

Figure 23: HbA1c treatment target achievement rates

With increasing age the rates for achieving the HbA1c targets decrease (refer to figure 23).

The rates of achieving the HbA1c targets have improved this year, however they fall short of benchmarks set in the audit last year (refer to figure 24).

Targets	2003/04 Benchmark	2003/04	2004/05
HbA1c < 7.5%	20%	15%	16%
HbA1c ≥ 7.5% and ≤ 9.5%	76%	68%	72%

Figure 24: Comparison of achievement of HbA1c targets across the audit years (0-16 years)

Recommendation

Aim to achieve the NICE guidelines for HbA1c ie. Less than 7.5%, without frequent disabling hypoglycaemia.

It appears that within the BME group slightly more children (12-15 years old) achieve the lower target for HbA1c recording. This is not the case with the higher target, however the numbers are small and caution should therefore be taken with these results.

Ethnicity	Registrations 12-15 yrs)	% Achieving <7.5% target	% Achieving ≤ 7.5% and ≥ 9.5%
White	1,744	12%	53%
Asian	82	20%	50%
Black	32	16%	53%
Other	78	15%	47%
Not stated	884	12%	56%
Total	2,820	12%	53%

Figure 26: HbA1c target achievement by ethnic group

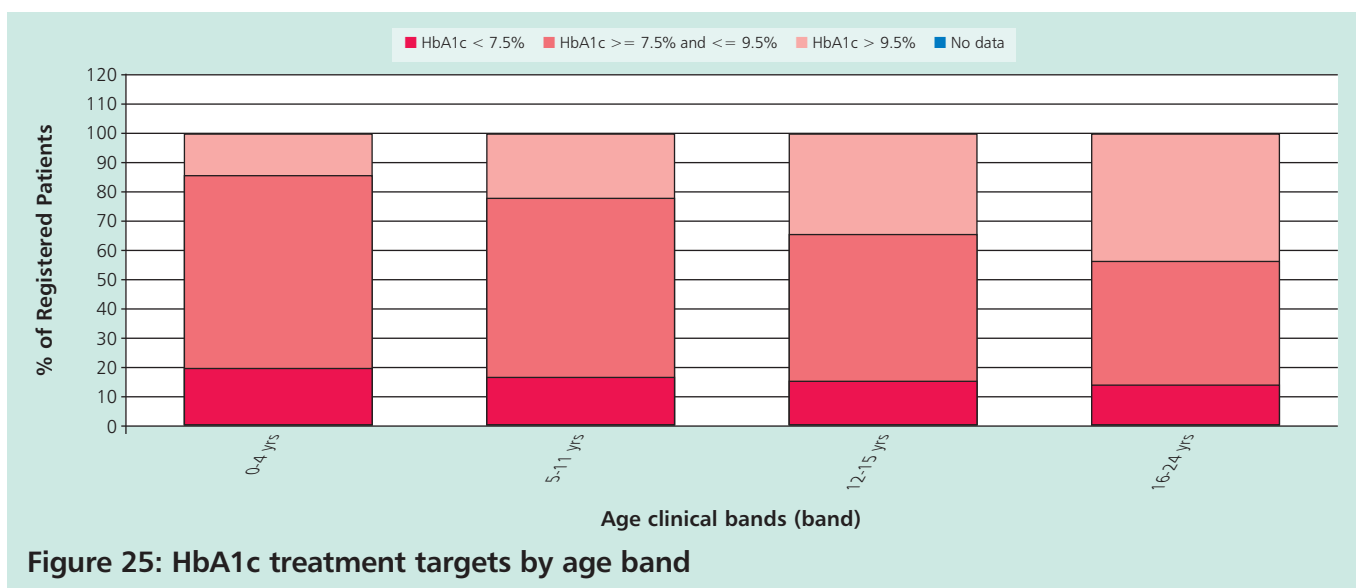


Figure 25: HbA1c treatment targets by age band

³ Treatment target information was not available for the paediatric units in Wales, therefore the following analysis includes just the data from units in England (7073)

There does not appear to be any effect of deprivation on achieving the HbA1c treatment targets.

HbA1c Rates by Unit

There is some variation in mean HbA1c rates across the units (overall mean is 8.9%, lower quartile 7.9%; upper quartile 9.8%), though comparing interquartile ranges calculated for individual

paediatric units, the ranges overlap indicating no significant differences between units. This data is available in table format see Appendix G.

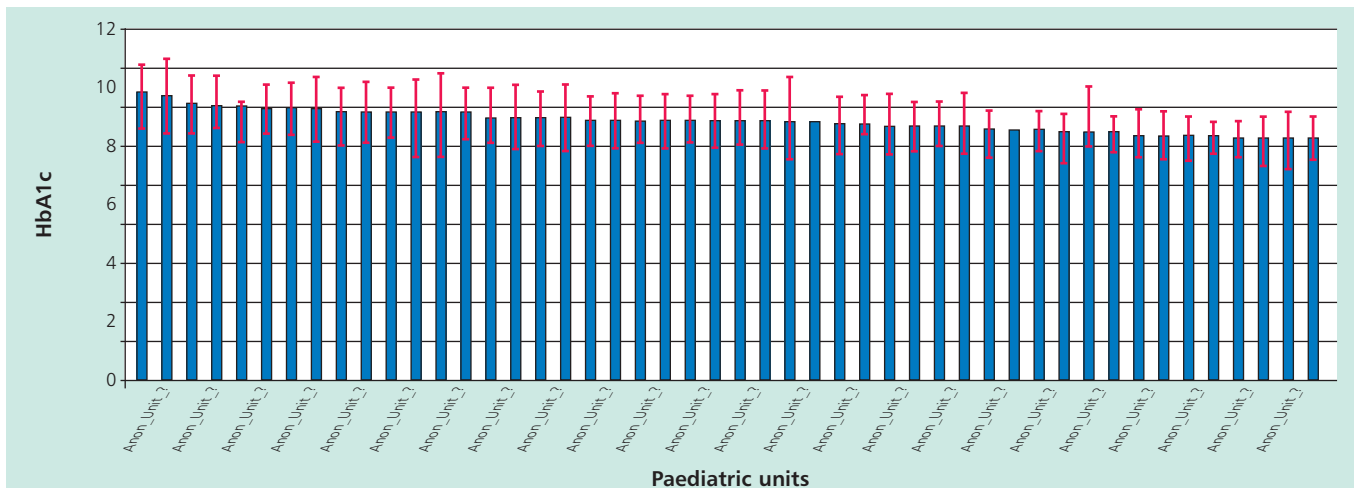


Figure 27: Median HbA1c and IQ range by paediatric unit

Cholesterol Treatment Target

Although NICE guidelines do not state that cholesterol should be tested for all ages, results are shown here for interest. It appears that as age increases a greater proportion of patients are found to have cholesterol levels in excess of the 5mmol/litre standard (figure 28).

Age band	Gender	% Achieving Cholesterol Target <5mmol/litre
12-15 years	Male	87.1
	Female	71.9
	Total	79.8
16 to 24 years	Male	78.9
	Female	54.9
	Total	66.7
12 to 24 years	Male	84.1
	Female	65.2
	Total	74.8

Figure 28: Cholesterol treatment target rates

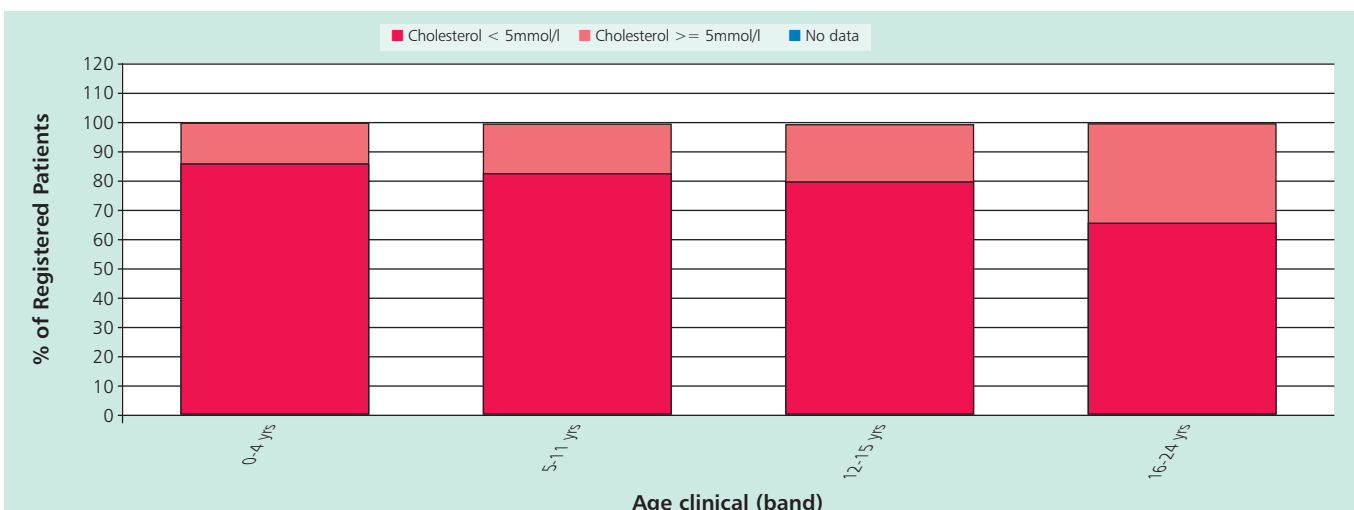


Figure 29: Achievement of cholesterol treatment target by age band

Future Work Programme

The National Diabetes Audit has seen a considerable rise in participation from the 2003/04 audit to the 2004/05 audit periods. The NDA aims to continue this increase and expand year-on-year to provide organisations with a rich source of local and national information to benchmark diabetes services, use as evidence to improve local services and support the commissioning of those services for children and young adults with Diabetes.

The NDA is currently working with Dr Sue Roberts (National Clinical Director for Diabetes) and the Department of Health (DH) to develop guidance on how the NDA can be used to support the commissioning of Diabetes services.

Alongside this the NDA are working to identify any developments which may be required in the dataset and assess how these developments will improve the information gathered by the audit and how they can be used more effectively to deliver clinical improvements and support monitoring of delivery of the Diabetes NSF and NICE guidelines.

To facilitate future audit developments and audit participation the NDA would welcome the introduction of IT support systems for Paediatric Units. This would allow effective participation in the NDA and create wider benefits for clinical care.

An NDA user group is being established. This will support development of the NDA and provide valuable end-user perspectives.

The NDA will be consulting the Paediatric Advisory Group and relevant stakeholders regarding paediatric unit de-anonymisation with the analysis toolkit.

References

1. National Service Framework for Diabetes: Standards. London, Department of Health 2001.
2. National Service Framework for Diabetes: Delivery Strategy. Department of Health 2003.
3. How PCTs are Implementing the Diabetes NSF: Findings from DiabetesE; First National Report, 2006.
4. Key Facts: Diabetes. Yorkshire and Humber Public Health Observatory 2006.

Appendix A

NDA Service Management Board Membership - 2004/05 Audit Period

Helen Laing [Clinical Audit Commissioning Manager, Healthcare Commission](#)

Phil Moores [Service Delivery Manager, NHS Connecting for Health](#)

Claire Morris [NCASP Project Manager \(from November 2005\), The Information Centre](#)

Martin Old [NCASP Services Manager, The Information Centre for health and social care](#)

Dr Sue Roberts [National Clinical Director for Diabetes, Department of Health](#)

David Stones [NCASP Project Manager \(to end October 2005\), The Information Centre for health and social care](#)

Bridget Turner [Head of Policy, Diabetes UK](#)

Dr Bob Young [Consultant Physician, Diabetes and Endocrinology, Salford Royal Hospitals](#)

NDA Paediatric Advisory group - 2004/05 Audit Period

Dr Jeremy Allgrove [Consultant in Paediatric Endocrinology and Diabetes, East London Centre for Paediatric and Adolescent Diabetes, Royal London Hospital; Representative of Royal College of Paediatrics and Child Health](#)

Dr Julie Edge [Consultant in Paediatric Diabetes and Endocrinology, John Radcliffe Hospital, Oxford](#)

Dr Fiona Campbell [Consultant Paediatrician and Clinical Director of Paediatric Medicine, St. James' University Hospital, Leeds](#)

Trish McKinney [Paediatric Epidemiologist, University of Leeds](#)

Pauline Proud [Health Information Manager, Diabetes UK](#)

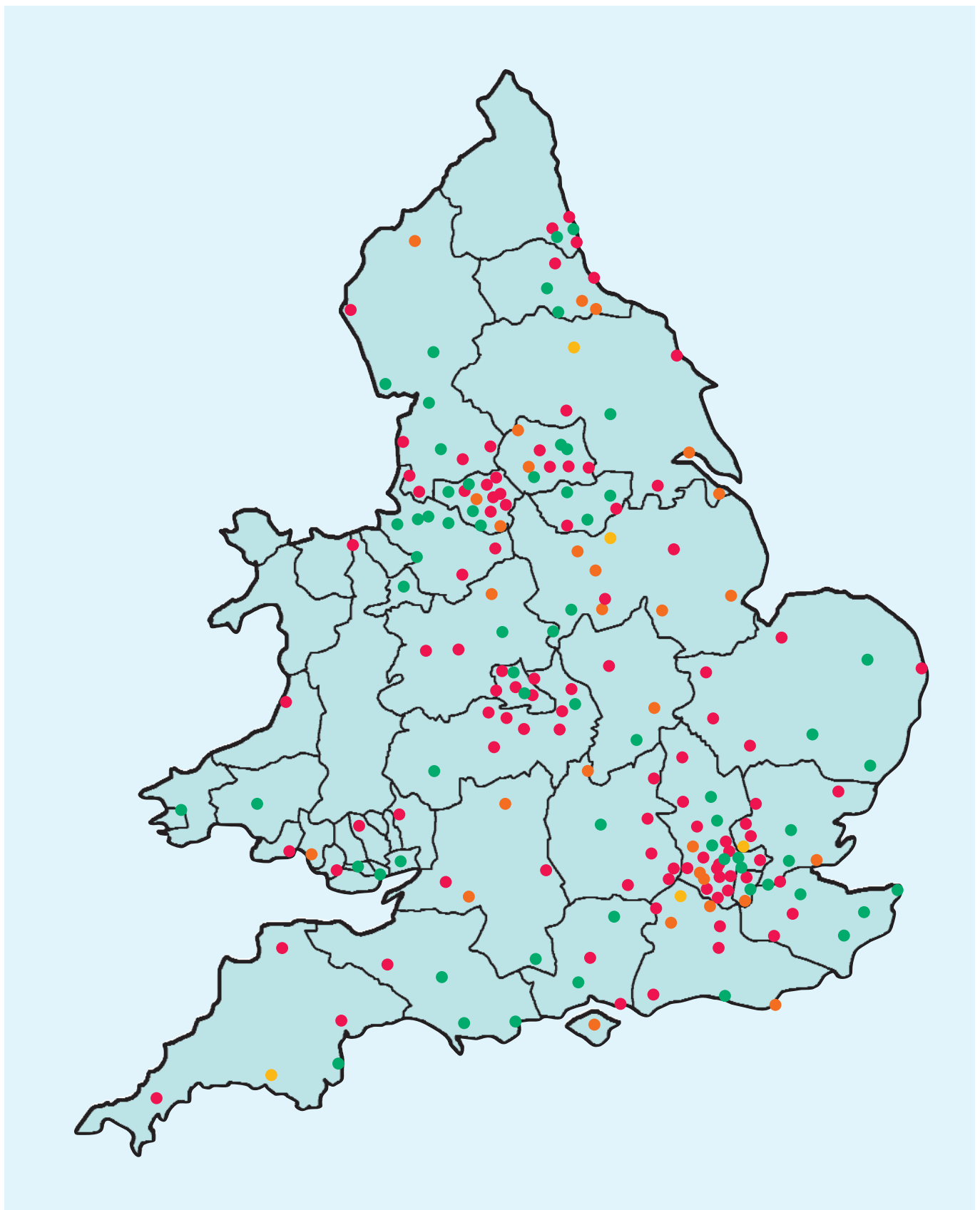
Chris Lambourne [Regional Programme Manager, National Diabetes Support Team](#)

Claire Morris [NCASP Project Manager, Medical Mosaic, on behalf of The Information Centre for health and social care](#)

Jilly Alexander [NDA Project Analyst, Medical Mosaic on behalf of The Information Centre for health and social care](#)

Appendix B

Paediatric Unit Registrations 2004/05



Status of Registrations

Registered & Submitted

Submitted But Unsuccessful

Registered Not Submitted

Not Registered

Participating Paediatric Units 2004-05

Audit by Region

Northern

Bishop Auckland General Hospital
Cumberland Infirmary
Darlington Memorial Hospital
Diana, Princess of Wales Hospital, Grimsby
Dryburn Hospital
James Cook University Hospital, Middlesbrough
North Tees General Hospital, Stockton-on-Tees
North Tyneside General Hospital, North Shields
Queen Elizabeth Hospital, Gateshead
Royal Victoria Infirmary, Newcastle Upon Tyne
South Tyneside District Hospital, South Shields
St Mary's Hospital for Women and Children, Manchester
Sunderland Children's Centre
Sunderland Royal Hospital
University Hospital of Hartlepool
University Hospital of North Durham
West Cumberland Hospital, Whitehaven

North West

Arrowe Park Hospital, Upton
Booth Hall Childrens Hospital, Manchester
Burnley General Hospital
Countess of Chester Hospital NHS Trust
Fairfield General Hospital, Bury
Furness General Hospital, Barrow-in-Furness
Halliwell Childrens Centre, Bolton
Leighton Hospital, Crewe
Macclesfield District General Hospital
Morecambe Bay Trust
Ormskirk & District General Hospital, Ormskirk
Queen's Park Hospital, Blackburn
Rochdale Infirmary
Royal Albert Edward Infirmary, Wigan
Royal Bolton Hospital
Royal Lancaster Infirmary
Royal Liverpool Children's NHS Trust
Royal Manchester Children's Hospital
Royal Oldham Hospital

Royal Preston Hospital
Southport District General Hospital
Stepping Hill Hospital, Stockport
Tameside General Hospital, Ashton under Lyne
Trafford General Hospital, Manchester
Victoria Hospital, Blackpool
Warrington General Hospital, Warrington
Westmorland General Hospital, Kendal
Whiston Hospital, Prescott
Wythenshawe Hospital

Oxford

Horton General Hospital, Banbury
John Radcliffe Hospital, Oxford
Kettering General Hospital
Milton Keynes Hospital
Northampton General Hospital
Royal Berkshire Hospital, Reading
Stoke Mandeville Hospital, Aylesbury
Wycombe General Hospital, High Wycombe

North Thames

Barnet General Hospital
Barts and the London NHS Trust, London
Basildon & Thurrock Hospital
Central Middlesex Hospital
Chase Farm Hospital, Enfield
Ealing Hospital
Great Ormond Street Hospital, London
Hammersmith Hospital
Herts & Essex Hospital, Hertfordshire
Hillingdon Hospital
King Edward VII Hospital, Windsor
King George Hospital, Ilford
Newham General Hospital, London
North Middlesex University Hospital
Northwick Park Hospital
Oldchurch Hospital, Romford
Princess Alexandra Hospital, Harlow
Royal Free & University College Hospital, London

Status of Registrations

Registered & Submitted Submitted But Unsuccessful Registered Not Submitted Not Registered

Southend Hospital
St John's Hospital, Chelmsford
St John's Hospital, Essex
St Margaret's Hospital, Essex
St Mary's Hospital, London
University College Hospital, London
West Middlesex University Hospital, London
Whipps Cross University Hospital, London
Whittington Hospital, London

Yorkshire

Airedale General Hospital, Keighley
Calderdale Royal Hospital, Halifax
Dewsbury & District Hospital
Friarage Hospital, Northallerton
Grimsby District General Hospital
Harrogate General Hospital
Huddersfield Royal Infirmary
Hull Royal Infirmary
Leeds General Infirmary
Pinderfields General Hospital, Wakefield
Pontefract General Infirmary
Scarborough General Hospital
Scunthorpe General Hospital
St James's University Hospital, Leeds
St Luke's Hospital, Bradford
York District Hospital

West Midlands

Birmingham Children's Hospital
Birmingham Heartlands Hospital
City General Hospital, Stoke-on-Trent
City Hospital, Birmingham
George Elliot Hospital, Nuneaton
Good Hope Hospital, Sutton Coldfield
Grantham and District Hospital
Kidderminster General Hospital
Leicester Royal Infirmary
Manor Hospital, Walsall
New Cross Hospital, Wolverhampton
Princess of Wales Community Hospital, Worcestershire
Queen's Hospital, Burton on Trent

Sandwell General Hospital, West Bromwich
Staffordshire General Hospital, Stafford
The Alexandra Hospital, Redditch
Walsgrave Hospital, Coventry
Warwick Hospital
Warwick Medical School
Worcestershire Royal Hospital
Wordsley Hospital, Stourbridge

South Thames (East)

Darent Valley Hospital, Dartford
East Surrey Hospital, Redhill
Eastbourne District General Hospital
Gravesend & North Kent Hospital
Guy's Hospital, London
Kent & Canterbury Hospital, Canterbury
King's College Hospital, London
Maidstone Hospital
Medway Maritime Hospital, Gillingham
Pembury Hospital, Tunbridge Wells
Princess Royal University Hospital, Bromley
Queen Elizabeth the Queen Mother Hospital, Kent
Queen Mary's Hospital, Sidcup
Royal Alexandra Hospital, Brighton
University Hospital Lewisham
Wexham Park Hospital
William Harvey Hospital, Ashford

South Thames (West)

Chelsea & Westminster Hospital, London
Crawley Hospital
Epsom General Hospital
Frimley Park Hospital, Camberley
Kingston Hospital, Kingston Upon Thames
Mayday University Hospital, Croydon
Queen Mary's Hospital for Children, Epsom & St Helier Trust
Royal Surrey County Hospital
St George's Hospital, London
St Peter's Hospital, Chertsey
St Richard's Hospital, Chichester
Worthing Hospital

Status of Registrations

Registered & Submitted Submitted But Unsuccessful Registered Not Submitted Not Registered

Wessex

Dorset County Hospital
North Hampshire Hospital, Basingstoke
Poole Hospital NHS Trust
Royal Hampshire County Hospital, Winchester
Salisbury District Hospital
Southampton General Hospital
St Mary's Hospital, Isle of Wight
The Great Western Hospital, Swindon

Trent

Barnsley District General Hospital
Bassetlaw District General Hospital
Chesterfield Royal Hospital, Derbyshire
Derbyshire Children's Hospital
Doncaster Royal Infirmary
Kings Mill Hospital, Sutton-in-Ashfield
Lincoln County Hospital, Lincolnshire
Nottingham University Hospital
Pilgrim Hospital, Nottingham
Queen's Medical Centre, Nottingham
Rotherham General Hospital
Ryegate Children's Centre
Sheffield Children's Hospital

Anglia

Addenbrooke's Hospital, Cambridge
Bedford Hospital
Colchester General Hospital
Hinchingsbrooke Hospital
Ipswich Hospital
James Paget Hospital, Great Yarmouth
Lister Hospital, Stevenage
Luton and Dunstable Hospital
Norfolk and Norwich University Hospital
Peterborough General Hospital
QEII Hospital, Welwyn Garden City
Queen Elizabeth Hospital, Kings Lynn
Queen Elizabeth Hospital, London
St Albans City Hospital
Watford General Hospital
West Suffolk Hospital, Bury St Edmunds

South & West

Bristol Royal Hospital for Children
Cheltenham General Hospital
Derriford Hospital
Musgrove Park Hospital, Taunton
North Devon District Hospital
Royal Cornwall Hospital, Truro
Royal Devon and Exeter Hospital, Exeter
Royal Naval Hospital, Gosport
Royal United Hospital, Bath
St Mary's Hospital, Portsmouth
Tauton & Somerset Hospital, Taunton
The General Hospital, St Helier
Torbay Hospital, Torquay
Yeovil District Hospital

Wales

Bronglais General Hospital, Wales
Glan Clwyd District General Hospital, Rhyl
Hereford County Hospital
Neath Port Talbot Hospital
Nevill Hall Hospital, Abergavenny
Prince Charles Hospital, Merthyr Tydfil
Princess of Wales Hospital, Bridgend
Princess Royal Hospital, Telford
Royal Glamorgan Hospital
Royal Gwent Hospital
Royal Shrewsbury Hospital
Singleton Hospital, Swansea
University Hospital of Wales, Cardiff
West Wales General Hospital, Carmarthen
Withybush General Hospital
Wrexham Maelor Hospital
Ysbyty Gwynedd Hospital, Wales

Status of Registrations

Registered & Submitted Submitted But Unsuccessful Registered Not Submitted Not Registered

Appendix C

How does the National Diabetes Audit Work?

The National Diabetes Audit provides a technical infrastructure to allow PCTs, hospitals, GP practices and other organisations to submit data about care that is being delivered in their organisations. Figure 30 provides an overview of the infrastructure that is available nationally to collect, analyse and feedback data.

The audit system is based on a browser-based application that uses NHSnet or N3. Key biomedical data is collected from existing systems either in primary or secondary care using extract queries. In primary care this is done using standard and approved MIQUEST queries that ensure equivalent and comparable information is collected from GP practices across the country. For secondary care detailed specifications for use by system suppliers or local IT departments are provided to ensure data is provided in a consistent way. Further details about the technical infrastructure and how data is collected, including details about how to register for the audit are available at:

<http://www.icservices.nhs.uk/ncasp/pages/auditpics/diabetes>

In addition to the data which is submitted directly to the audit, supplementary information relating to specific complications and procedures is sourced from the Hospital Episode Statistics (HES) database. An extract of all the NHS numbers of patients submitted to the audit, and therefore registered as having diabetes, is used as the basis for identifying which HES data is added - in other words, and in line with the approach used in the QUIDS audit - the diabetic

population is first identified in order to extract the HES data and any diabetes diagnosis information which may be contained within HES is ignored. This approach is known to have some limitations:

- Complications for patients who have diabetes but whose details have not been submitted to the audit will not be included;
- Complications for patients with diabetes whose details have been submitted to the audit are all counted regardless of whether there was a causal link between the diabetic condition and the complication (indeed it is possible that the complication could have occurred before diabetes was diagnosed and recorded).

The analysis for the audit is provided through the NDA toolkit which uses technology powered by PIANO (initially developed by the NHS Information Authority and at the time of this audit maintained by the Health and Social Care Information Centre). The NDA toolkit is available to all users who have registered for the audit and enables organisations to understand and interpret their performance.

Users of the NDA toolkit can access analyses for the audit questions. The analyses include inter-quartile ranges and allow the data to be stratified according to dimensions such as age, sex, deprivation, type of diabetes and duration of diabetes. This helps to identify where problems may be occurring. The analysis of the data can be based solely on data provided GP practices or upon combined data from GP practices and hospitals, providing a whole system view of care provided throughout a local health economy. In the case of analysing complications, data from Hospital Episode Statistics (HES) is integrated into the analysis.

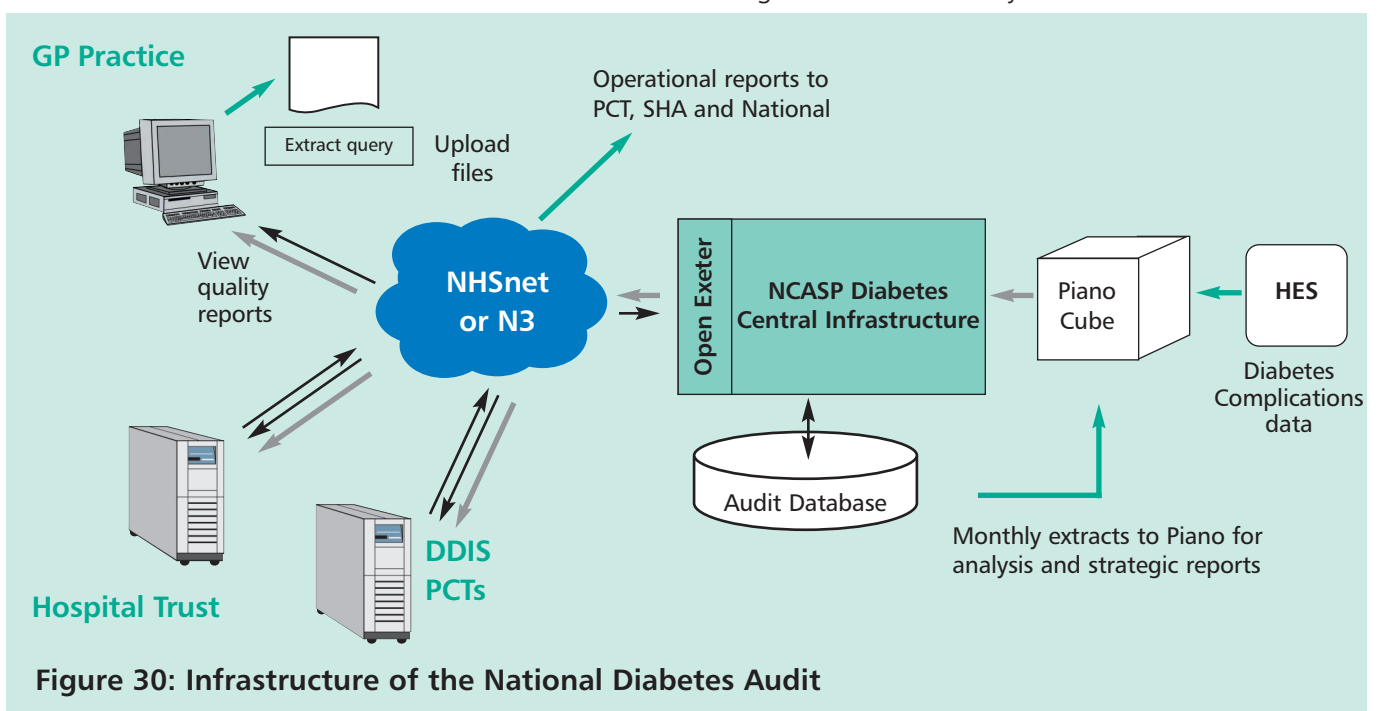


Figure 30: Infrastructure of the National Diabetes Audit

Appendix D

The National Diabetes Audit Dataset

Field No.	Data item name	M/O	Permitted values	Notes
1.	NHS number	M	Format (10N). 10 digit numeric	Once the demographic data has been linked with the complications data the NHS number is removed from the system
2.	Type of data	M	1 Demographic/observation data	
3.	Year of Birth	M	Year: (format YYYY)	
4.	Postcode of usual address	M	The patient's postcode	The post code will be translated to ward code and only the ward code will be stored centrally.
5.	Sex	M	National Codes are used: 0 Unknown 1 Male 2 Female 9 Not specified	
6.	Ethnic category	O	National Codes are used: A British B Irish C Any other White background D White and Black Caribbean E White and Black African F White and Asian G Any other mixed background H Indian J Pakistani K Bangladeshi L Any other Asian background M Caribbean N African P Any other Black background R Chinese S Any other ethnic group Z Not stated	Leave this blank if the ethnic category is unknown.
7.	Death Date	O	Date: (format YYYY-MM-DD)	
8.	GP Practice Code	O	Format X99999, where X can be A-H, J-N, P	Leave this blank if the GP practice is not known.
9.	NHS organisation code (provider code)	M	This is your organisation code. Format PZXXX- Paediatric unit code	This is the number used on your registration form and should match the organisation you log in as. If you do not know your organisation code please contact the helpdesk.
10.	Source Unit	M	P	Should be set to "P" for all patients being treated in paediatric units. Should be null for patients being treated in all other units.

Field No.	Data item name	M/O	Permitted values	Notes
11.	Year of Diagnosis (Diabetes)	O	Year: (format YYYY)	
12.	Diabetes Type	M	01 Type 1 02 Type 2 06 MODY 08 Other specified 99 Not Specified	Organisations should determine the type of diabetes from local coding systems. Where Type 1 or Type 2 cannot be derived e.g. a coding of NIDDM or IDDM is used the Type should be coded as 08 Other specified
13.	Person observation (BMI)	O	Format 99.9	Only required for children aged 12 years and above
14.	Observation Date (BMI)	O	Date: (format YYYY-MM-DD)	Add date if height/weight measurement is taken - even if BMI calculation is not done and has been left blank
15.	Systolic Blood Pressure	O	Format (3N). 3 digit numeric	Only required for children aged 12 years and above
16.	Observation Date (Blood pressure)	O	Date: (format YYYY-MM-DD)	Mandatory if observation value provided
17.	Diastolic Blood Pressure	O	Format (3N). 3 digit numeric	Only required for children aged 12 years and above
18.	Observation Date (Blood pressure)	O	Date: (format YYYY-MM-DD)	Mandatory if observation value provided
19.	Person observation (HbA1c Level)	O	Format 99.9	Whilst not mandatory this is the most important care process data item for the audit
20.	Observation Date (HbA1c level)	O	Date: (format YYYY-MM-DD)	Mandatory if observation value provided
21.	Person observation (Serum Creatine Level)	O	Format (4N). 4 digit numeric	Only required for children aged 12 years and above. This is a straight lift from lab results usually 2 to 3 digits
22.	Observation Date (Serum creatine level)	O	Date: (format YYYY-MM-DD)	Mandatory if observation value provided
23.	Person observation (Urinary Albumin Level)	O	Format 9999.99	Only required for children aged 12 years and above
24.	Urinary Albumin Level Testing Method	O	01 Albumin concentration (mg/L) 02 Albumin creatine ratio (mg/mmol) 03 Timed overnight albumin (ug/min) 04 24hr albumin excretion (mg/24hr)	
25.	Albuminuria Stage	O	01 Normoalbuminuria 02 Microalbuminuria 03 Macroalbuminuria	
26.	Observation Date (Urinary Albumin level)	O	Date: (format YYYY-MM-DD)	Mandatory if observation value provided

Field No.	Data item name	M/O	Permitted values	Notes
27.	Person observation (Total Serum Cholesterol Level)	O	Format 99.9	Only required for children aged 12 years and above
28.	Observation Date (Cholesterol level)	O	Date: (format YYYY-MM-DD)	Mandatory if observation value provided
29.	Diabetes routine review (eye)	O	01 Carried out 02 Not done 03 Not necessary	Only required for children aged 12 years and above
30.	Observation Date (Eye examination)	O	Date: (format YYYY-MM-DD)	Mandatory if observation value provided
31.	Diabetes routine review (foot)	O	01 Carried out 02 Not done 03 Not necessary	Only required for children aged 12 years and above
32.	Observation Date (Foot examination)	O	Date: (format YYYY-MM-DD)	Mandatory if observation value provided
33.	Smoking Status	O	National codes: 1 Current smoker 2 Ex-smoker 3 Non-smoker history unknown 4 Never smoked 9 Unknown	Not required for paediatric data - included for adults only
34.	Observation Date (Smoking status)	O	Date: (format YYYY-MM-DD)	Not required for paediatric data - included for adults only
35.	Patient education review	O	01 Carried out 02 Not done	
36.	Observation Date (patient education review)	O	Date: (format YYYY-MM-DD)	Mandatory if observation value provided
37.	Diabetes Structured Education programme offered	O	01 Carried out 02 Not done	
38.	Observation date (Diabetes Structured Education programme offered)	O	Date: (format YYYY-MM-DD)	Mandatory if observation value provided
39.	Diabetes Structured Education programme attended	O	01 Carried out 02 Not done	
40.	Observation date (Diabetes Structured Education programme attended)	O	Date: (format YYYY-MM-DD)	Mandatory if observation value provided

For each episode of ketoacidosis the following records were submitted:

Field No.	Data item name	Permitted values
1	NHS Number	n10
2	Type of data	2 Conditions/complications/procedure data
3	Diagnosis/procedure scheme in use	Format n3 872 - ICD-10 (This will always be 872)
4	Diagnostic coding (Diabetes relevant ICD-10)	E10.1 Insulin-dependent diabetes mellitus with ketoacidosis E11.1 Non-insulin-dependent diabetes mellitus with ketoacidosis E13.1 Other specified diabetes mellitus with ketoacidosis E14.1 Unspecified diabetes mellitus with ketoacidosis E10.0 Insulin-dependent diabetes mellitus with ketoacidosis and coma E11.0 Non-insulin-dependent diabetes mellitus with ketoacidosis and coma E13.0 Other specified diabetes mellitus with coma E14.0 Unspecified diabetes mellitus with coma
5	Observation Date (Diabetes relevant diagnosis)	Date: (format YYYY-MM-DD)

Appendix E

Mean Age at Diagnosis by Unit

Unit code	Mean age at diagnosis	Unit code	Mean age at diagnosis
Anon_Unit_0197	7.61	Anon_Unit_0133	7.93
Anon_Unit_0215	7.45	Anon_Unit_0194	7.21
Anon_Unit_0199	7.62	Anon_Unit_0226	6.72
Anon_Unit_0216	7.55	Anon_Unit_0219	7.98
Anon_Unit_0267	7.28	Anon_Unit_0155	7.90
Anon_Unit_0172	7.84	Anon_Unit_0230	7.33
Anon_Unit_0168	7.99	Anon_Unit_0288	7.40
Anon_Unit_0132	7.62	Anon_Unit_0243	7.84
Anon_Unit_0135	8.05	Anon_Unit_0210	7.64
Anon_Unit_0170	7.42	Anon_Unit_0228	7.63
Anon_Unit_0167	8.49	Anon_Unit_0265	8.35
Anon_Unit_0285	8.12	Anon_Unit_0102	8.19
Anon_Unit_0149	8.21	Anon_Unit_0258	7.48
Anon_Unit_0225	7.04	Anon_Unit_0208	7.11
Anon_Unit_0157	8.00	Anon_Unit_0249	8.02
Anon_Unit_0159	7.03	Anon_Unit_0266	7.35
Anon_Unit_0203	7.96	Anon_Unit_0239	7.23
Anon_Unit_0200	7.65	Anon_Unit_0262	7.54
Anon_Unit_0147	8.43	Anon_Unit_0137	6.52
Anon_Unit_0204	7.97	Anon_Unit_0142	7.50
Anon_Unit_0162	7.67	Anon_Unit_0163	No Data
Anon_Unit_0143	7.98	Anon_Unit_0105	6.40
Anon_Unit_0268	6.80	Anon_Unit_0130	7.78
Anon_Unit_0244	7.48	Anon_Unit_0300	6.61
Anon_Unit_0136	6.89	Anon_Unit_0154	8.13
Anon_Unit_0175	8.58	Anon_Unit_0193	7.85
Anon_Unit_0290	8.23	Anon_Unit_0292	8.42
Anon_Unit_0129	8.03	Anon_Unit_0212	10.60
Anon_Unit_0156	6.93		

Appendix F

Care Process Percentage Recorded by Paediatric Unit*

Paediatric Units	Total Registrations	HbA1c (all ages)	BMI (>=12)	BP (>=12)	Albumin (>=12)	Creatine (>=12)	Cholesterol (>=12)	Eye Exam (>=12)	Foot Exam (>=12)	All Care Processes
Anon_Unit_0197	376	90.96	92.24	52.16	8.19	8.19	3.45	0	33.62	0
Anon_Unit_0215	298	94.97	0	0	0	0	0	0	0	0
Anon_Unit_0199	248	100	0	0	0	0	0	0	0	0
Anon_Unit_0216	245	99.18	95.56	51.11	25.93	45.19	22.96	27.41	2.22	0
Anon_Unit_0267	239	1.67	0	0	5.83	0	0	0	0	0
Anon_Unit_0172	197	90.36	84.13	55.56	3.17	18.25	18.25	3.17	35.71	0
Anon_Unit_0168	186	87.63	95.37	53.7	40.74	4.63	10.19	1.85	0	0
Anon_Unit_0132	178	98.88	98.95	91.58	67.37	0	0	0	0	0
Anon_Unit_0135	165	99.39	0	99.05	0	0	0	43.81	36.19	0
Anon_Unit_0170	149	0	0	0	0	0	0	0	0	0
Anon_Unit_0167	144	96.53	97.09	76.7	54.37	22.33	27.18	0.97	6.8	0.69
Anon_Unit_0285	143	100	87.13	75.25	18.81	18.81	19.8	72.28	29.7	6.29
Anon_Unit_0149	142	94.37	100	98.91	48.91	70.65	48.91	86.96	96.74	29.58
Anon_Unit_0225	141	100	0	0	0	0	0	0	0	0
Anon_Unit_0157	141	92.2	91.57	75.9	49.4	67.47	72.29	48.19	51.81	11.35
Anon_Unit_0159	140	98.57	98.84	74.42	77.91	19.77	36.05	51.16	98.84	2.86
Anon_Unit_0203	139	98.56	0	0	0	0	0	0	0	0
Anon_Unit_0200	137	0.73	2.74	13.7	6.85	10.96	0	13.7	1.37	0
Anon_Unit_0147	137	93.43	95.74	92.55	70.21	78.72	76.6	21.28	32.98	7.3
Anon_Unit_0204	137	0	0	0	0	0	0	0	0	0
Anon_Unit_0162	137	99.27	0	0	0	0	0	0	0	0
Anon_Unit_0143	136	100	0	0	0	0	0	0	0	0
Anon_Unit_0268	133	100	0	0	0	0	0	0	0	0
Anon_Unit_0244	131	98.47	100	100	0	0	0	0	5.26	0
Anon_Unit_0136	129	97.67	96.88	89.06	81.25	26.56	0	60.94	0	0
Anon_Unit_0175	122	0.82	0	0	0	0	0	0	0	0
Anon_Unit_0290	120	98.33	94.87	55.13	69.23	67.95	82.05	33.33	32.05	7.5
Anon_Unit_0129	116	82.76	1.59	68.25	1.59	0	74.6	73.02	0	0
Anon_Unit_0156	108	100	100	100	0	93.06	86.11	0	0	0

Paediatric Units	Total Registrations	HbA1c (all ages)	BMI (>=12)	BP (>=12)	Albumin (>=12)	Creatine (>=12)	Cholesterol (>=12)	Eye Exam (>=12)	Foot Exam (>=12)	All Care Processes
Anon_Unit_0133	106	86.79	74.65	71.83	29.58	0	8.45	16.9	21.13	0
Anon_Unit_0194	106	91.51	82.76	29.31	8.62	29.31	31.03	20.69	22.41	0.94
Anon_Unit_0226	105	89.52	0	0	0	0	0	0	0	0
Anon_Unit_0219	102	97.06	92.31	83.08	30.77	56.92	12.31	46.15	36.92	0
Anon_Unit_0155	102	0	0	0	0	0	0	0	0	0
Anon_Unit_0230	99	98.99	98.21	98.21	50	0	0	80.36	14.29	0
Anon_Unit_0288	99	95.96	23.53	0	0	0	0	0	0	0
Anon_Unit_0243	96	100	98.33	76.67	0	76.67	81.67	73.33	76.67	0
Anon_Unit_0210	95	81.05	66.07	33.93	51.79	39.29	28.57	35.71	58.93	5.26
Anon_Unit_0228	92	80.43	82.69	78.85	11.54	30.77	21.15	0	0	0
Anon_Unit_0265	91	95.6	92.65	88.24	26.47	45.59	44.12	26.47	2.94	0
Anon_Unit_0102	91	95.6	77.59	74.14	34.48	12.07	0	55.17	68.97	0
Anon_Unit_0258	90	94.44	98.04	82.35	17.65	21.57	3.92	72.55	70.59	0
Anon_Unit_0208	88	96.59	0	96	70	72	70	0	0	0
Anon_Unit_0249	87	93.1	91.94	90.32	0	88.71	80.65	14.52	29.03	0
Anon_Unit_0266	86	98.84	100	100	0	0	0	0	0	0
Anon_Unit_0239	80	98.75	70.45	68.18	36.36	68.18	63.64	75	56.82	21.25
Anon_Unit_0262	80	98.75	93.48	60.87	13.04	10.87	8.7	10.87	1	0
Anon_Unit_0137	77	96.1	92.5	77.5	0	0	0	7.5	0	0
Anon_Unit_0142	76	0	0	0	0	0	0	0	0	0
Anon_Unit_0163	66	0	0	0	0	0	0	0	0	0
Anon_Unit_0105	63	93.65	100	100	11.76	47.06	52.94	0	5.88	0
Anon_Unit_0130	59	96.61	89.47	34.21	57.89	84.21	76.32	50	15.79	5.08
Anon_Unit_0300	59	0	10.71	0	0	0	0	0	0	0
Anon_Unit_0154	56	96.43	18.18	12.12	66.67	96.97	72.73	0	90.91	0
Anon_Unit_0193	55	94.55	100	96.97	51.52	33.33	15.15	66.67	63.64	1.82
Anon_Unit_0292	43	90.7	76.92	61.54	34.62	65.38	19.23	38.46	0	0
Anon_Unit_0212	10	0	0	0	0	0	0	0	0	0
Selection Total	7073	80.59	56.64	49.43	20.99	22.52	20.38	19.87	19.49	1.67

* Table contains analysis of data for England Paediatric Units only

Appendix G

HbA1c Results by Unit

Unit Code	Number of Records	Number with Results	% with HbA1c recorded	Median HbA1c
Anon_Unit_0197	376	342	91%	9
Anon_Unit_0215	298	283	95%	8.8
Anon_Unit_0199	248	248	100%	8.4
Anon_Unit_0216	245	243	99%	9.1
Anon_Unit_0267	239	4	2%	8.4
Anon_Unit_0172	197	178	90%	9.1
Anon_Unit_0168	186	163	88%	8.9
Anon_Unit_0132	178	176	99%	8.3
Anon_Unit_0135	165	164	99%	8.9
Anon_Unit_0170	149	0		
Anon_Unit_0167	144	139	97%	9.3
Anon_Unit_0285	143	143	100%	8.8
Anon_Unit_0149	142	134	94%	9
Anon_Unit_0225	141	141	100%	8.9
Anon_Unit_0157	141	130	92%	8.7
Anon_Unit_0159	140	138	99%	8.8
Anon_Unit_0203	139	137	99%	8.1
Anon_Unit_0200	137	1	1%	8.6
Anon_Unit_0147	137	128	93%	8.8
Anon_Unit_0204	137	0		
Anon_Unit_0162	137	136	99%	8.9
Anon_Unit_0143	136	136	100%	8.2
Anon_Unit_0268	133	133	100%	8.2
Anon_Unit_0244	131	129	98%	8.5
Anon_Unit_0136	129	126	98%	8.9
Anon_Unit_0175	122	1		
Anon_Unit_0290	120	118	98%	9.2
Anon_Unit_0129	116	96	82%	8.9
Anon_Unit_0156	108	108	100%	8.7
Anon_Unit_0133	106	92	87%	8.6
Anon_Unit_0194	106	97	92%	9.1
Anon_Unit_0226	105	94	90%	8.5

Unit Code	Number of Records	Number with Results	% with HbA1c recorded	Median HbA1c
Anon_Unit_0219	102	99	97%	9.7
Anon_Unit_0155	102	0		
Anon_Unit_0230	99	98	100%	8.3
Anon_Unit_0288	99	95	97%	9.1
Anon_Unit_0243	96	96	100%	8
Anon_Unit_0210	95	77	81%	9.5
Anon_Unit_0228	92	74	80%	9.6
Anon_Unit_0265	91	87	96%	8.1
Anon_Unit_0102	91	87	96%	8.3
Anon_Unit_0258	90	85	94%	9
Anon_Unit_0208	88	85	97%	9.4
Anon_Unit_0249	87	81	93%	8.8
Anon_Unit_0266	86	85	99%	9.1
Anon_Unit_0239	80	79	99%	8.8
Anon_Unit_0262	80	79	99%	8.7
Anon_Unit_0137	77	74	96%	8.7
Anon_Unit_0142	76	0		
Anon_Unit_0163	66	0		
Anon_Unit_0105	63	59	94%	8.7
Anon_Unit_0130	59	57	97%	9.3
Anon_Unit_0300	59	0		
Anon_Unit_0154	56	54	96%	8.9
Anon_Unit_0193	55	52	95%	9.4
Anon_Unit_0292	43	39	91%	8.7
Anon_Unit_0212	10	0		

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