The Information Centre
knowledge for care

National Diabetes Audit

Key findings about the quality of care for 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

FOR HEALTH AND SOCIAL CARE

NHS

National Diabetes Audit

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

Report for the audit period 2004/05

Version 1.0

Report for the Audit Period 2004/05

This report presents the main findings from the second year of the audit. 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

This is only available as a PDF file download.

For further information about this report, contact:

National Clinical Audit Support Programme
The Information Centre for health and social care
1 Trevelyan Square
Boar Lane
Leeds
LS1 6AE

Contents

Foreword

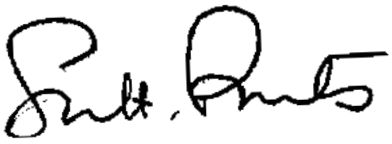
It is a key part of my philosophy that unless you can measure something accurately then the impact of any changes you make to improve it will never be established. Indeed you will not know whether it has been improved or made worse. By default then any system that captures accurate data about diabetes care and transforms it, through intelligent analysis, into useful information makes a key contribution to achieving the NSF standards. This is what the National Diabetes Audit does.

This second Annual Report of the NDA displays the increasing confidence that the diabetes community has both in signing up to the audit and to the outcomes it produces. There has been a significant uplift in the number of PCTs subscribing to the NDA whilst the analysis produced from the data submitted is of increasing use to the diabetes community. A virtuous circle of more sign ups leading to more data leading to more accurate information is being created that will produce significant benefits for the diabetes community including people with diabetes. Tribute goes to the hard work of the NDA team at the Information Centre, with the support of the National Diabetes Support Team, who have done so much to encourage organisations to engage.

The information produced will be increasingly valuable within the new NHS landscape where commissioning effective quality services will be the touchstone of diabetes care. With establishing the essential needs of the local diabetes user base as the starting point for commissioning services the information the NDA can supply about what standard of care is, and what is not, delivered in the locality is vital.

This can be integrated with information from a range of other sources such as DiabetesE and the Quality and Outcomes Framework indicators to build up a very precise picture of the needs of people with diabetes in the area. The ability to stratify needs by age, gender, ethnicity and deprivation will also be a valuable contribution by ensuring commissioned services are bespoke solutions. Ones that address specific needs not a one size fits all approach that views the needs of people with diabetes as identical with each other.

Although I am encouraged by the increased membership of the NDA I recognise that there is still a long way to go until we have the ideal 100% engagement with it. The views of those who see it as time consuming, irrelevant and boring must be overcome through demonstrating its practical application to frontline staff and commissioners.



Dr Sue Roberts
National Clinical Director for Diabetes

Introduction

The National Diabetes Audit (NDA), funded by the Healthcare Commission, has now completed its second year. The main findings from the first year of the audit, covering the period from January 2003 to March 2004 were reported in September 2005 and participating organisations have access to local and comparative analysis through the NDA toolkit throughout the audit years. This report presents the main findings from the second year of the audit for children and adults, covering the period from January 2004 to March 2005. It also provides recommendations that arise from the results for national and local organisations. An abridged version of this report is available (reference number 13090603). A separate report focusing on findings from the information submitted by paediatric units is also available (reference number 13090602). Both the paediatric and abridged report can be ordered by quoting the appropriate reference on 0845 300 6016 or by email at diabetes@ic.nhs.uk

Quality information is vital to the success of organisations implementing the Diabetes National Service Framework (NSF) and achieving improvements in services for people with diabetes. The NDA provides one of the key means of collating, analysing, benchmarking and feeding back information about the effectiveness of diabetes services and their impact on children and adults with diabetes based on the standards laid out in the Diabetes NSF.

Participation in the NDA allows organisations to check their progress in meeting national standards. It allows measurement of achievements towards implementing NICE guidelines for diabetes and provides analysis of key areas related to the National Service Framework for Diabetes. In particular, primary care has the lead role in registration, recall and regular review of adults with diabetes (NSF standard 4) and are responsible for the provision of diabetes care to all people with diabetes registered with their practices.

NDA participation also allows comparison of delivery of care in your locality and in England. This is based on robust benchmarks and taking into account influences such as age profile, type of diabetes and social class. Furthermore it will allow sharing of best practice through identification of similar organisations that are performing well in diabetes care and complication outcomes. Year-on-year comparisons are available for organisations that submit data over a number of audit years.

NDA will allow organisations to review their patient pathways, if secondary care organisations in an area are participating in the audit, it will help to identify where patients are not included on GP registers. In addition the Hospital Episode Statistics are linked to NDA data to provide a rich picture of diabetes care and complications in England and at a local level.

The NDA data can also be used to prepare reports for and inform discussions with commissioners. Local data from NDA can be used to support recommendations for service changes and improvements.

The NDA is designed to complement DiabetesE, a standardised web-based, self-assessment quality improvement tool. Taken together the NDA and DiabetesE provide a comprehensive and integrated view of the quality of diabetes services. In addition, the Quality and Outcomes Framework (QOF) provides information relevant to payment for primary care diabetes services that achieve quality targets. Further information about the different information initiatives to support diabetes is available from the National Diabetes Support Team http://www.diabetes.nhs.uk/downloads/Factsheet info_to_improve_care.pdf

Participation

Information about more than 500,000 patients with diabetes has been collected from primary and secondary care organisations participating in the second year of the audit. This represents a two-fold increase in participation over the 2003/04 audit and creates a valuable source of information to enable organisations to compare the quality performance of their services with peer services across England. It also provides a baseline upon which trends over time can be identified. This data represents information on 28 percent of the 1.8 million people who make up the registered diabetic population of England.

A large number of organisations have now submitted data to the audit and it is hoped that the significant increase in participation will encourage other organisations who have not yet taken part to see the value of being involved in the 2005/06 audit. Use of MIQUEST queries for extracting the data from GP systems has been proven to be straightforward with 106 PCTs submitting data from 1,868 GP practices, an average of 18 practices per PCT.

Paediatric units in Wales have for the first time submitted registration information to the audit. It is hoped that primary care and adult specialist services caring for people with diabetes in Wales will also participate in future audits. Again, the participation of both primary and secondary care organisations will provide a complete view of diabetes care throughout the local health economy.

Extending participation has been the major focus for the audit in order to increase the benefits for all those involved. The Healthcare Commission, which commissions the NDA, has committed to a further two years funding of the audit covering the 2005/06 and 2006/07 periods. Increasing participation in NDA will allow more effective time-trend analysis for diabetes care and outcomes. It will also provide a valuable resource to support commissioning and audit of diabetes services.

Summary of Key Findings

A number of important findings including significant variations in services have been identified in this audit:

- Of the data submitted to the NDA, on average only four out of five (81 percent) of the number of people predicted (utilising the PBS phase 2 diabetes population prevalence model) to have diabetes are actually recorded as having diabetes at GP practices. This is a 4% increase on the 2003/04 audit, which estimated that 77 percent of the number of people with diabetes (PBS Phase 1 model) were recorded on practice based registers. There is also considerable variation between practices with predicted registrations varying from less than two out of five (40 percent), whilst others have a far higher rate of registration. People who have diabetes but do not have their diagnosis recorded on practice registers will be unlikely to receive the routine care and monitoring required for optimising wellbeing and minimising long term complications. This report will identify some of the issues raised by NDA data for diabetes registrations in more detail.
- Significant differences in complications rates for MI, cardiac failure, stroke, renal failure and major amputations were seen for some PCTs, even accounting for differences in deprivation. There is a tendency to see a sharp rise in complication rates at 25 years of age which continues throughout the age bands. The highest prevalence rates for renal failure are found in the middle age bands, starting with a sharp rise at age 25-39 years, which also shows a higher complication rate in Males (0.34%) compared to females (0.23%). Known preventative care interventions for people with diabetes from a young age could result in a reduction in these rates.
- The introduction of the QOF in primary care may have led to the increase in recording of all care processes in primary care for people with diabetes this year compared with 2003/4. Three out of five (61 percent) of people with diabetes were recorded as having received an eye exam in the audit year, this compares with less than half (47 percent) in 2003/04.
- Just over half (58 percent) of people with diabetes achieved an HbA1c of less than 7.5%, the primary target level of glucose control recommended in NICE clinical guidelines. Of those one in five (21 percent) achieved the secondary target of less than 6.5%. However, 42 percent of people with diabetes have recorded HbA1c readings of over 7.5%. This shows a high percentage of people with diabetes having poor glucose control. However, this is 1% lower than the 43 percent achieved in the 2003/04 audit. Maintaining controlled blood glucose levels reduces the risk of long term complications such as blindness, renal failure and nerve damage, which may in extreme cases lead to the need for amputations.
- In the audit of specialist paediatric units less than one in five (16 percent) of children with diabetes under 16 years achieved the HbA1c target of less than 7.5%. 28 percent of children and young people have HbA1c recordings of over 9.5%, children with HbA1c levels consistently above 9.5% are at greater risk of developing diabetic ketoacidosis and long-term complications such as blindness, renal failure and nerve damage.
- On average, around one in ten (8.2%) of children and young adults with diabetes experienced at least one episode of ketoacidosis in the audit period. NDA analysis shows that ketoacidosis occurs more in girls than boys.

Discussion of Key Findings

The National Diabetes Audit was designed to provide quality performance information about the four key Diabetes NSF objectives:

- Is everyone with diabetes diagnosed and recorded on a practice diabetes register?
- For people with diabetes what is the annual rate of specific complications?
- What proportions of people with diabetes receive key processes of diabetes care?
- What proportions of people with diabetes achieve treatment targets?

The following sections provide details of the audit findings relating to these questions.

Identification and Registration of People with Diabetes

Ensuring people with diabetes are correctly diagnosed and on a register is the starting point for establishing an effective programme of systematic care. The primary emphasis of the audit has been to ask whether complete registers have been established. To do this the audit has compared the numbers of people diagnosed and registered with diabetes with the PBS phase 2 diabetes population prevalence model developed by the Yorkshire and Humber Public Health Observatory (YHPHO), Brent PCT and University of Sheffield School of Health and Related Research (ScHARR).
http://www.yhpho.org.uk/viewResource.aspx?id=7

The PBS phase 2 model provides the expected total numbers of cases of both diagnosed and undiagnosed diabetes at Strategic Health Authority, Local Authority and PCT level. It takes into account the age, sex and ethnic group profile of each population, with an adjustment for geographical variations in socio-economic deprivation.

The PBS phase 2 model predicts that for those areas that submitted data to the audit 4.30% of the population will have diabetes. The percentage of people actually registered with diabetes by the organisations participating in the audit was 3.48%. Based on the data submitted to the NDA this represents an average registration rate of 81 percent of the numbers of people predicted to have diabetes. This suggests that on average 19 percent, which represents 97,848 people, of the population with diabetes are either undiagnosed or not recorded on practice registers. Registrations for the 2004/05 audit have shown an increase from the 2003/04 registration rate of 77 percent. However, care should be taken when interpreting these figures due to several factors, including limitations of the PBS Phase 2 methodology and the NDA data itself, which may be a skewed sample as organisations that are performing well may be more likely to participate in the NDA.

Figure 1 shows the percentage of the PBS phase 2 predictions[1] for the PCTs that contributed data from more than 50 percent of their practices - ordered by highest percentage of registrations first. As was observed in the 2003/04 audit, there is a pattern for a greater number of male diabetic registrations than female registrations; however, the PBS phase 2 model predicts that there should be a greater number of women with diabetes than men. The impact of this is an under diagnosis of women with diabetes, a finding that was also identified in the 2003/04 audit. When looked at by age band the under identification of women becomes marked in the 40 years and older age groups. This effect could be due to a number of reasons including the PBS phase 2 model itself or the greater number of men receiving coronary heart disease screening and subsequent diagnosis of diabetes.

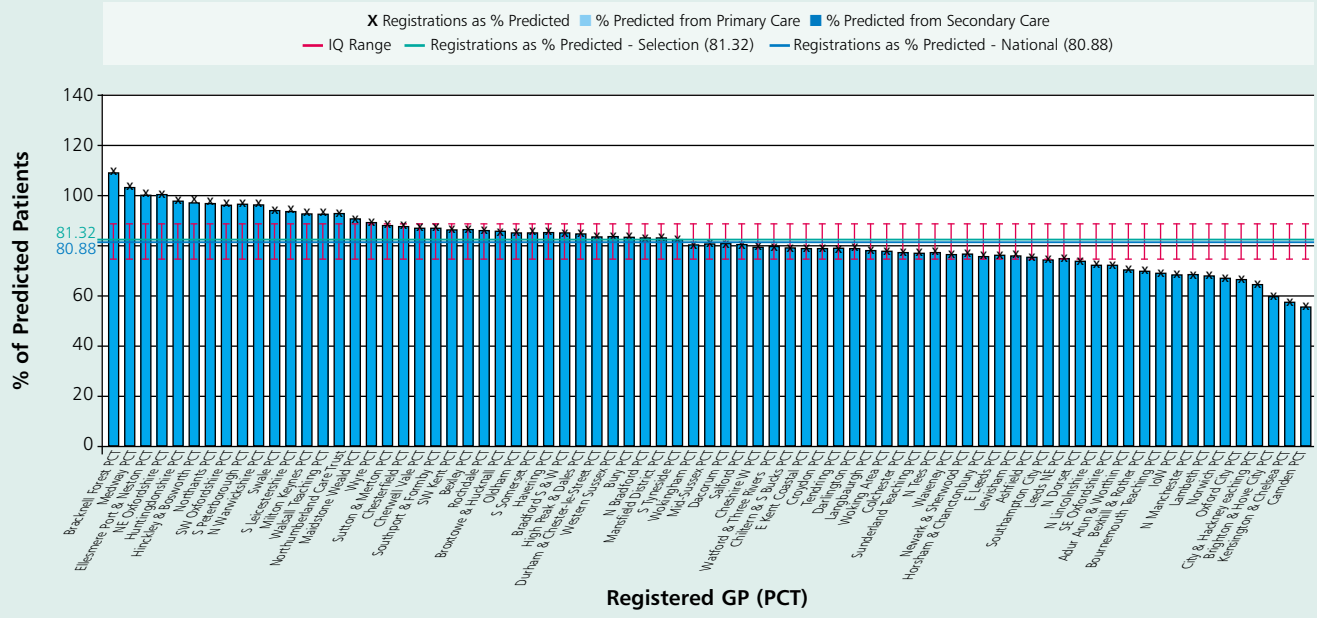


Figure 1: Registrations as % of PBS phase 2 (mean=81%, lower quartile=75%, upper quartile=88%)

1 The predictions using the PBS Phase 2 model for this analysis are only included from those practices that have submitted data to the audit

Further work is required nationally to determine whether there is systematic under-identification of women aged 40 and above and to develop appropriate recommendations. This issue has been referred to the National Diabetes Public Health Intelligence Group for further exploration.

There is a difference of almost 1% in the observed prevalence of diabetes between areas which are least (Quintile 1) and most deprived (Quintile 5) having the highest prevalence of diabetes. There are higher numbers of registrations of people with diabetes in Quintile 5 in the data submitted to NDA. This represents an increase of just over 10,000 registrations in the NDA compared to Quintile 1. This is indicative of the potential impact on the burden of treating diabetes in deprived areas.

It is important that the diabetes type and ethnicity of patients are recorded on diabetes registers. Currently the recording of these items is generally poor although there are some practices that have submitted information with high levels of completeness. Overall, 43 percent of records did not have diabetes type recorded, which is a 17 percent improvement on the 60 percent unrecorded in the previous audit. In addition 83 percent did not have an ethnic code recorded, which is comparable with the previous audit. Until an improvement in the completeness of recording is achieved effective analysis by diabetes type and by ethnicity cannot be developed. The recording of ethnicity and diabetes type are now partial requirements for QOF. This should lead to improved recording and data completeness.

Complications Associated with Diabetes

Understanding the continuing burden of complications associated with diabetes that are susceptible to preventative care is the second most important objective of the audit.

Complications rates calculated using one year of Hospital Episode Statistics (HES) data for those patients included in the audit are shown in Figure 2. These rates are comparable to those seen in the first year of the audit providing confidence in their validity.

The three most common complications for people with diabetes are all related to coronary heart disease; for example angina in 2.37% of patients, though this rate is thought to be overstated due to the known over-use of angina codes (e.g. for chest pain), cardiac failure and myocardial infarction.

Having diabetes greatly increases the risk of suffering from all the complications listed, affecting the quality of life for people with the condition. For example, a person with diabetes is about three times more likely to have a stroke and 11 times more likely to have a minor amputation.

These findings accord with other published results, summarised in the Yorkshire and Humber Public Health Observatory Diabetes Key Facts document, published in March 2006.

Complication type	Prevalence in people with Diabetes (%) (Source NDA)	National prevalence (%) (Source HES)	Difference (%)	Relative increase in risk
Angina	2.37	0.50	1.87	474%
Cardiac Failure	1.18	0.33	0.85	358%
Myocardial Infarction	0.55	0.17	0.38	324%
Ketoacidosis	0.49	N/A	N/A	N/A
Stroke	0.48	0.17	0.31	282%
Diabetic Retinopathy	0.33	N/A	N/A	N/A
Renal Failure	0.21	0.05	0.16	420%
Amputation (minor)	0.11	0.01	0.10	1100%
Amputation (major)	0.07	0.01	0.06	700%

Figure 2: Complication rates

Complications and Age

An increase in the prevalence of Myocardial Infarction, Angina, Cardiac Failure and Stroke is observed with increasing age as is the case for all people nationally. There is a tendency to see a sharp rise in complication rates at 25 years which continues throughout the age bands. The highest prevalence rates for renal failure are found in the middle age bands, starting with a sharp rise at age 25-39 years, which also shows a higher complication rate in Males (0.34%) compared to females (0.23%) Prevalence rates for ketoacidosis were highest in the younger age bands particularly under 24 years of age.

Variations in Complication Rates

Use of statistical process control (SPC) methodology revealed a number of SHAs and PCTs with statistically significantly increased rates for MI, cardiac failure, stroke, renal failure and major amputations. As noted in the detailed analysis, this will be discussed in further detail with the National Clinical Director for Diabetes in order to consider how best to support local services in seeking to achieve improvements.

The pattern for MI cardiac failure and stroke is consistent with the findings from the first year of the audit. Even taking into account factors such as deprivation, significantly high prevalence rates for these complications are still apparent.

It has not been possible to consider ethnicity in assessing complication rates due to the current poor recording of this. Improved recording of ethnicity is one of the key recommendations of this report.

When considering trends it will also take time for improvements in care to impact on improvements in some of the diabetic complications. There are also different time intervals for improvements in complications such as amputations, renal disease and myocardial infarction.

Structured Care for People with Diabetes

This audit question seeks to analyse whether the most basic components of care as outlined in the Diabetes NSF Delivery Strategy (section 3.25) have been delivered and recorded.

As predicted last year, an increase in the recording of all the care processes in primary care has been seen in 2004/05 compared with 2003/04. This may be related to the introduction in primary care of the new General Medical Services (GMS) contract in 2004/05.

With the exception of eye and foot examination both of which were recorded in around 60 percent of patients and urinary albumin which was recorded in 42 percent of patients, all other care processes were recorded in at least 80 percent of patients with diabetes in 2004/05.

A 14 percent improvement in the recording of eye examinations was seen and 61 percent of people with diabetes had an eye exam carried out during the 2004/05 audit period. A further increase of 19 percent is needed to achieve the NSF standard of 80 percent for 2006 followed by an additional 20 percent for 2007 to achieve the target of all people having this care process.

A quarter (24.4 percent) of people with diabetes had all care processes recorded during 2004/05, which was equivalent to a full annual surveillance review. Although this proportion is still small it represents an improvement of over 17 percent compared with the baseline year.

The rates of carrying out and recording care processes increases with the age of the patients. People in the 55 to 84 year age band are more likely to have care processes recorded than other age bands.

Variation in carrying out care processes was seen across PCTs, with the greatest degree of variation seen in the care processes which had the lowest rates of being carried out, namely eye exam, foot exam and urinary albumin.

Achievement of Treatment Targets

The final aim for the audit was to understand what proportions of people with diabetes achieved treatment targets. This checks whether care processes achieved their objective. Targets for HbA1c, cholesterol and blood pressure for people with diabetes have been published in NICE guidelines, with other targets set within the General Medical Services (GMS) Quality and Outcomes Framework (QOF) for primary care. It must be remembered that there are differences between the NICE and QOF targets. The results below and NDA toolkit analysis are based on NICE guidelines.

Maintaining controlled blood glucose levels reduces the risk of long-term complications of diabetes such as blindness, renal failure and nerve damage, which may in extreme cases lead to the need for amputations. HbA1c provides a measure of overall levels of blood glucose and is an indicator of glycaemic control. NICE clinical guidelines recommend that the HbA1c level should be less than 7.5%.

Maintaining controlled blood pressure and cholesterol levels reduces the risk of long-term vascular disease. When compared to the 2003/04 audit results improved rates have been found in all areas except the target of lower than 6.5% for HbA1c for those at higher risk of arterial disease.

When compared to the NICE guidelines the results of the audit show:

HbA1c:

- 22 percent of people with diabetes achieved the lower HbA1c target of less than 6.5%, recommended, where appropriate, for those at higher risk of arterial disease
- 58 percent achieved the target of less than or equal to 7.5%.

Blood pressure:

- 24 percent of people with diabetes achieved the blood pressure target of less than or equal to 135/75 mm Hg;
- 88 percent of people achieved the target of less than 160/100 mm Hg.

Cholesterol:

- 68 percent of people achieved the target of less than 5mmol/litre;
- 10% more men achieved the cholesterol target than women. A possible explanation for this may be the greater screening for and prevalence of coronary heart disease amongst men and a resulting use of statins.

Children with Diabetes

The NDA includes the audit of paediatric services that was previously carried out by Diabetes UK. A separate report detailing the findings specifically for paediatric units is available.

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).

Key Recommendations

The results of the two years of National Diabetes Audit provide a useful evidence base on which to make recommendations for local service improvements and commissioning.

It is recommended that Diabetes networks, clinicians and PCTs should:

1. Continue the improvements in diagnosing and recording people with diabetes and aim to ensure that at least 90 percent of the PBS phase 2 predicted numbers are identified and registered.

2. Strive to improve the accuracy and completeness of recording diabetes type in order to better understand the population of people with diabetes and their needs.

3. Also improve the accuracy and recording of ethnicity in order to better understand the population of people with diabetes and evaluate their needs.

4. Use detailed local knowledge to:

   - Identify and investigate reasons for significantly high complications rates where they occur (outliers above the control limits in the statistical process control charts).

   - share understanding of the factors contributing to the achievement of significantly low complications rates (outliers below the control limits in the statistical process control charts).

5. Review rates of carrying out and recording key processes of care and aim to make further improvements to aspire to achieve the benchmarks as set by the upper quartiles seen in the audit (figure 3):

   Local services should aim to complete the gaps in undertaking the key care processes, particularly where they are poorly filled. The upper quartiles in the audit should be considered as a minimum to achieve and continued improvement should be based on this. Where services are clearly lagging local organisations should examine the specific reasons for this.

Care Process	Minimum rate to aim to achieve:
Blood Pressure	93%
Smoking status	87%
Creatinine	88%
Cholesterol	87%
HbA1c	85%
BMI	85%
Eye exam	66%
Foot exam	68%
Urinary Albumin	58%
All care processes	34%

Figure 3: Care Process Rates

6. Consider the provision of services for people in the younger age bands (under 16 years) and aim to maximise the rates of carrying out the key processes of diabetic care in order to minimise complications. Consideration must also be given to provision of services for the 16 to 24 years agebands in order to ensure ease of transition of care into adulthood.

7. Aspire to achieve the upper quartile rates for each of the treatment targets. Again, the upper quartiles in the audit should be considered as a minimum to achieve and continued improvement should be based on this. Where local services are achieving the upper quartile targets they should show year-on-year improvement in order to meet NICE guidelines and implementation of the Diabetes NSF.

Treatment Targets		Minimum rate to aim to achieve:
HbA1c	<6.5%	26%
	≤ 7.5%	62%
Cholesterol	< 5 mmol/litre	72%
Blood Pressure	≤ 135/75 mmHg	26%
	<160/100 mmHg	90%

Figure 4: Treatment Targets

Considerations for bodies involved in providing advice and guidance to PCTs and Commissioners including the Department of Health (DH) and the National Diabetes Support Team (NDST):

1. Support continued participation in the NDA and aim to improve participation, particularly in areas where organisations are not currently registered for the audit.
2. Support initiatives that seek to improve data quality and standardise diabetic coding.
3. Consider inclusion of NDA as a data source that can be used for commissioning purposes in any relevant documentation.

Paediatric specialist units

It is recommended that paediatric units should:

1. Strive to continue improving rates of recording HbA1c results.
2. Use detailed local knowledge to:
   - Identify and investigate reasons for significantly high ketoacidosis rates where they occur (outliers above the control limit in Statistical Process Control charts).
   - share understanding of the factors contributing to the achievement of significantly low rates for ketoacidosis (outliers below the control limit in Statistical Process Control charts).
3. Aim to achieve the NICE guidelines for HbA1c ie. Less than 7.5%, without frequent disabling hypoglycaemia.

National organisations

This includes The Information Centre for health and social care, the National Diabetes Public Health Intelligence Group and Yorkshire and Humber Public Health Observatory.

It is recommended that national organisations:

1. Carry out work to understand the reasons for the apparent under-identification of women aged 40 and above and develop any recommendations if required (Yorkshire and Humber Public Health Observatory, National Diabetes Public Health Intelligence Group).
2. Develop a User Group for the National Diabetes Audit to facilitate the sharing of good practice identified through the audit findings and to develop the audit to support local action planning and the commissioning of diabetes services.

Organisations involved in the care of people with diabetes, including diabetes networks, PCTs, GP practices and hospital trusts, should:

- Participate in the National Diabetes Audit in 2005/06. The service and queries to support the collection and submission of data are all fully available. The deadline for submissions is the end of November 2006. Further information about the audit and how to submit data is available at www.icservices.nhs.uk/ncasp/pages/audit_topics/diabetes
- Identify relevant local issues to improve services both in light of the recommendations identified in this report and information provided direct to all the NDA users through the NDA analysis toolkit (PIANO).
- PCTs should analyse the data in the National Diabetes Audit in order to identify the complication rates for their diabetic population and ensure that the appropriate interventions are undertaken.

Introduction

The National Diabetes Audit (NDA) is a national service developed and managed by The Information Centre for health and social care's National Clinical Audit Support Programme (NCASP). It provides an infrastructure for the collation, analysis and feedback of local clinical data to support effective clinical audit across the NHS.

The aim of the National Diabetes Audit is to support implementation of the Diabetes NSF and so improve quality of patient care for people with diabetes. This ongoing national audit of diabetes care will help to raise standards by enabling NHS organisations to:

- ensure that clinical standards are met;
- compare the processes and outcomes of diabetes care with similar NHS organisations;
- identify and share good practice in the care of people with diabetes;
- identify any gaps or shortfalls in commissioning services for people with diabetes. The NDA will facilitate identification of gaps in bio-medical aspects of care;
- support identification of progress in meeting the Diabetes NSF and NICE guidelines;
- where primary and secondary care organisations participate, it will provide a local health economy view of diabetic care and outcomes.

The NDA began collecting diabetes related data from PCTs, GP practices, hospital trusts and paediatric units in July 2004 and the main findings from the first year of the audit, covering the period from January 2003 to March 2004 were reported in September 2005. This report presents the main findings from the second year of the audit, covering the period from January 2004 to March 2005. Participating organisations have access to the audit analysis via the NDA toolkit throughout the year, enabling local and comparative analysis to be done before the annual report is published.

The audit was commissioned by the Healthcare Commission and developed in partnership with Diabetes UK. Throughout the development we have worked with representatives from the following organisations: the Department of Health, National Diabetes Support Team, Yorkshire and Humber Public Health Observatory, PRIMIS, NHS Connecting for Health and the Royal College of Nursing, Royal College of Physicians, Royal College of Paediatrics and Child Health, and Royal College of General Practitioners. The membership of the NDA Management Board is shown in Appendix A

The report that follows is divided into the following sections:

- Section 1: Background and Participation in the Audit
- Section 2: Detailed Analysis
- Section 3: Paediatrics
- Appendices.

Background

Accurate, timely and relevant information is a key contributor to service improvement and implementation of the Diabetes National Service Framework (NSF). Such information allows organisations to understand service quality and enables effort to be targeted appropriately, and the effect of service changes to be measured. The National Diabetes Audit (NDA) is one of a number of diabetes related information initiatives that aim to provide organisations with relevant information about local services. DiabetesE, a standardised web-based, self-assessment quality improvement tool, also provides important information and can be used in combination with the NDA to provide an integrated view of diabetes services in an area. Further information about the different information initiatives to support diabetes services is available from the National Diabetes Support Team.

The NDA provides a national system for routine data collection, analysis and feedback of diabetes related data that can be collated at different levels for population-based analysis. The audit covers all people, including children and adults with diabetes in England. In addition, registration data for Welsh paediatric units has been submitted for the 2004/05 audit. The audit began collecting data in July 2004 and has now completed its second year, collecting information about care that was provided to patients during the 15 month period from January 2004 to March 2005. Data for this period was submitted to the central audit database until the end of March 2006. This report presents the main findings identified in this second year of the audit and provides recommendations for both national and local organisations based on the analysis of the audit data.

Participation

For the second year of the audit data has been collected about more than 500,000 patients with diabetes, a two fold increase in participation for the first audit year. The numbers of different organisations that participated in the 2004/05 audit were as follows:

	Registered for the audit		Submitted data to the audit	
	Number	% eligible[2]	Number	% eligible
PCTs	182	60%	106	35%
GP practices	3,833	45%	1,868	22%
Hospital Trusts	75	37%	34	17%
Paediatric Units	100	45%	70	32%

Figure 5: Participation for 2004/05

A map (figure 6) illustrating participation of PCTs in England is shown below.

SHA, PCT, hospital trust and paediatric unit participation information is included in Appendices B, C and D.

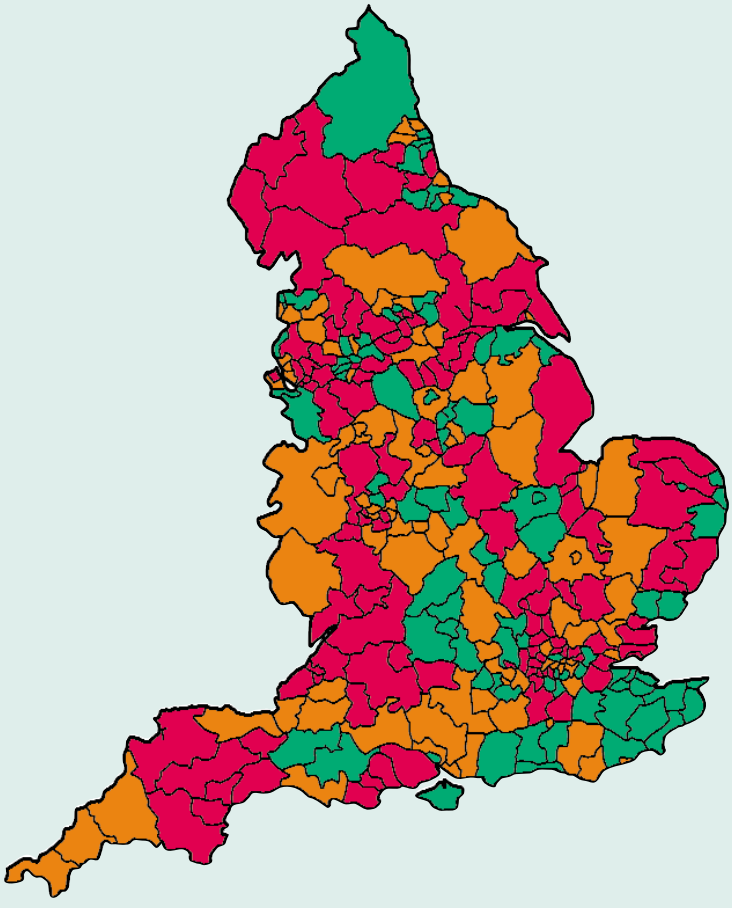
For the first time, paediatric units in Wales submitted information on registrations to the audit for 2004/05. Discussions have been held with representatives from Wales to encourage participation from primary care and adult secondary care units treating people with diabetes.

The number of organisations participating in the 2004/05 audit is a significant improvement on participation in the first year and it is anticipated that these numbers will continue to grow significantly as organisations become aware of the information available through the audit and the benefits for NSF implementation. Participation in national clinical audit is included in the core standards assessment of the Annual Health Check carried out by the Healthcare Commission.

Whilst there is still work to be done to ensure participation continues to rise, the first two years of the audit indicate a number of important issues and developing patterns.

The majority of the PCTs that submitted data for the 2003/04 audit also submitted data for the 2004/05 audit. Twelve PCTs that took part in the first year did not take part in the second year. Five of those PCTs had only previously submitted data for fewer than 5 GPs practices, suggesting that they had been trialling their participation. The NDA project team contacted most of the PCTs involved and in almost all cases the drop-off in submitting data to the audit over the two years was due to lack of resource, particularly PRIMIS facilitators for collecting the audit data.

Figure 6: Map of participation by PCT



No registrations (121)

Registered but less than 60% submitted (87)

Registered but more than 50% submitted (86)

2 Figures based on 303 PCTs, 8,542 GP Practices, 200 hospital trusts and 220 paediatric units

How Does the National Diabetes Audit Work?

The National Diabetes Audit provides a technical infrastructure for PCTs, hospitals, GP practices and other organisations to submit data about care for people with diabetes. The audit system is based on a browser-based application that uses NHSnet (or N3). The audit collects key clinical data from primary care systems using MIQUEST queries. Data from hospital trusts and paediatric units can be collected from electronic patient records or gathered from patient notes. Many paediatric units collect data manually due to the lack of IT infrastructure. Appendix E includes a more detailed explanation of the audit infrastructure.

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

Access to analyse the information is available through the NDA analysis toolkit, accessible to all organisations which register with the audit. The NDA toolkit provides a highly flexible and intuitive analysis capability, allowing detailed comparisons across and within organisations. The top priority recommendation from DiabetesE, published in February 2006, was that PCTs should assess the needs of all sections of the population. Information available in the NDA analysis toolkit can support this recommendation. A further finding from DiabetesE was that only 57 percent of PCTs compare audit results regionally and nationally. The NDA analysis toolkit provides standardised comparative analysis to enable identification of good practice.

What are the Audit Questions that are Answered by the National Diabetes Audit?

The National Diabetes Audit provides answers to the following audit questions:

- Is everyone with diabetes diagnosed and recorded on a practice diabetes register?
- For people with diabetes what is the annual rate of specific complications?
- What proportions of people with diabetes receive the key processes of diabetes care?
- What proportions of people with diabetes achieve treatment targets?

In the sections that follow each of the audit questions are discussed, and the key findings from the 2004/05 audit period are presented, along with comparisons with the 2003/04 findings. The analysis is generally provided at PCT and Paediatric Unit level, detailed analysis for individual organisations is not included in this report. Users should access the NDA analysis toolkit directly to investigate issues relevant to their network or organisation. Within this report the findings are presented such that individual paediatric units are not identifiable. Registered users of the NDA toolkit will see their own unit identified and others anonymised. The majority of charts in this report have been produced using the NDA analysis toolkit and further analysis is available to all registered users. Details of how to register for the NDA are available at http://www.icservices.nhs.uk/ncasp/pages/audit_topics/diabetes/register-new.asp

Registrations

Is everyone with diabetes diagnosed and recorded on a practice diabetes register?

Ensuring people with diabetes are correctly diagnosed and on a register is the starting point for establishing an effective programme of systematic care. This audit question measures the standards set out in the diabetes NSF.

"Delivering support relies upon the establishment of effective registers. Without an effective register it will not be possible to identify those with poor diabetes control (an indicator of those who have the highest risk of complications) nor those with newly diagnosed diabetes."

NSF for Diabetes: Delivery Strategy 3.12

"By 2006 all people with diagnosed diabetes should be identified in an up to date practice-based register. This should be a collaborative effort involving primary care and specialist services. A comprehensive and up to date register will provide the cornerstone of care and the basis for call and recall, clinical care, prevention, continuous quality improvement, monitoring and clinical audit."

NSF for Diabetes: Delivery Strategy 3.13

"Registers will enable the PCTs to gauge the extent of undiagnosed diabetes in their population..."

NSF for Diabetes: Delivery Strategy 3.14

The primary emphasis of the audit has been to ask whether complete registers have been established as without this as the starting point, effective programmes of systematic care cannot be established. To do this, the audit has compared the numbers of people diagnosed and registered with diabetes with the PBS phase 2 diabetes population prevalence model developed by the Yorkshire and Humber Public Health Observatory (YHPHO), Brent PCT and University of Sheffield School of Health and Related Research (ScHARR).

The PBS phase 2 model provides the expected total numbers of cases of both diagnosed and undiagnosed diabetes at Strategic Health Authority, Local Authority and PCT level, taking into account the age, sex and ethnic group profile of each population, with an adjustment for geographical variations in socio-economic deprivation.

	2003/04 audit	2004/05 audit	Difference over the 2 audit periods
PBS phase 2 predicted prevalence	4.19[3]%	4.30%	0.11%
NDA registered prevalence	3.25%	3.48%	0.23%
Difference between NDA and PBS phase 2 rate	0.94%	0.82%	
Average registration rate	77%	81%	

Figure 7: Diabetes prevalence rates compared with the prediction model

The above table is based on the predictions using the PBS phase 2 model for only those practices which have submitted data to the audit. This indicates that there remained in 2004/05 on average 19 percent of people with diabetes undiagnosed or not recorded on practice registers.

Given the small size of this increase and the methodological difficulties in obtaining a like-for-like comparison of NDA registration data and PBS model estimates, these data should not necessarily be interpreted that diabetes diagnosis increased between audit years. The increase in NDA registered prevalence may be due to a combination of increasing case detection, increasing diabetes prevalence, improved data quality and changes in the sample of practices participating in the NDA. In addition, estimates of total diabetes prevalence from the PBS Phase 2 model are unlikely to be sufficiently accurate to detect small year-on-year changes.

The overall diabetes prevalence rate of 3.48% seen for primary care organisations which submitted data to the NDA is slightly higher than the rate that was calculated by QOF for 2004/05, at 3.3%. This difference is likely to be due to the different sizes of populations covered by NDA compared with QOF and that NDA includes children with diabetes. Further comparisons with the QOF figures are discussed in the section relating to care processes for people with diabetes.

3 Note that this differs slightly from the figure reported in the first annual report which used prevalence estimates based on PBS PHASE release 1.

Variation in the proportion of numbers registered with diabetes as a percentage of those predicted, to have diabetes (using the PBS phase 2 prediction model) ranges from 103 percent to 57 percent. However, there are methodological difficulties in comparing diabetes prevalence at the PCT level using the sample of practices participating in the NDA and PBS model estimates of total diabetes. In particular, basing this calculation on a sample of participating practices within only those PCTs which contributed information from more than half of their GP practices may tend to artificially inflate the diagnosis rate.

An increasing prevalence of people registered with diabetes was seen over the two audit years and although participation in the first year was less than half that of the second year, the tendency to show an increased prevalence in the second year compared with the first is seen for most organisations. An illustration at PCT level is given in figure 9.

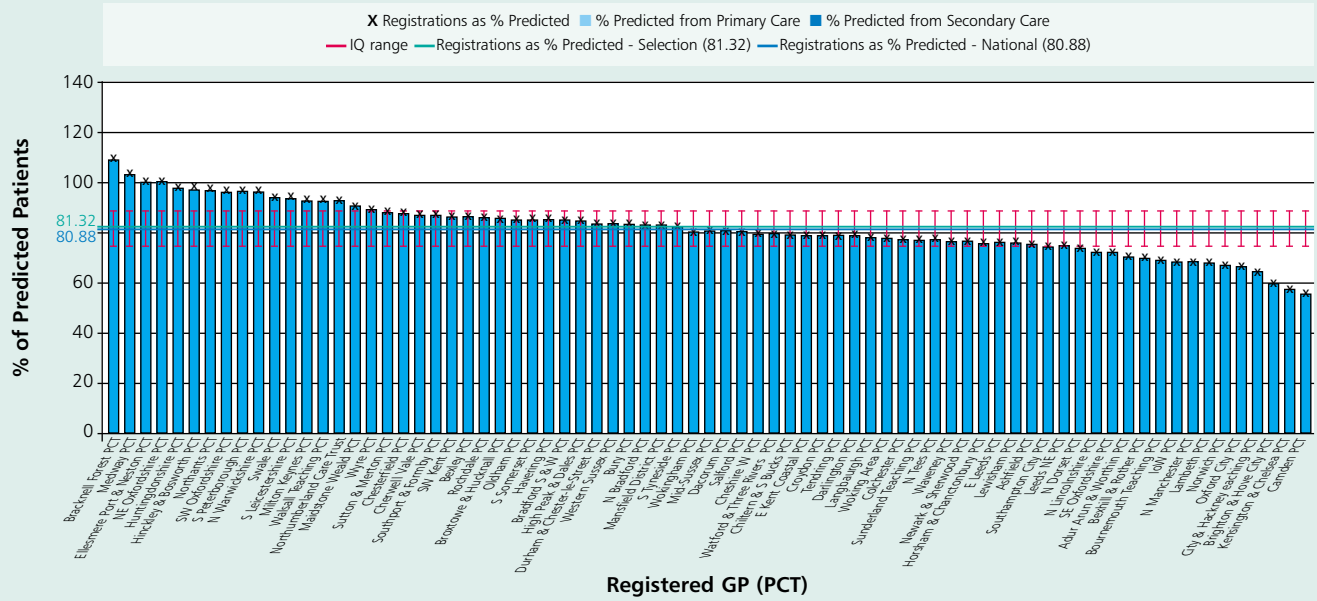


Figure 8: Registrations as % of PBS phase 2 (mean=81%, lower quartile=75%, upper quartile=88%)

The data in this section must be treated with caution due to several factors:

The Yorkshire and Humber Public Health Observatory PBS Phase 2 prediction model has to be applied to a registered patient population within NDA (based on numbers of patients registered with GPs) for each area. Linear interpolation has been used for developing the 'in-year' forecasts of prevalence based on projected trends in obesity. This is not a particularly precise method of calculation.

There are methodological difficulties in the way that the data is analysed. For example, the graph shows data based on information from participating practices only. This is due to the fact that not all practices in all PCTs have submitted data to the NDA. As a result an adjustment has to be made to exclude the predicted prevalence from those practices in a PCT that have not submitted data to the NDA. However, this calculation is not particularly robust and may artificially inflate the results of 'registrations as a percentage of predicted diabetes' for that area.

The recorded prevalence of diabetes in the NDA may be affected by data quality issues; this may result in the registered prevalence of diabetes being higher than the actual prevalence in an area and therefore higher than the PBS phase 2 predictions.

A single practice may well have a higher than predicted recorded prevalence because:

- It may be a specialist diabetes practice.
- Its population profile may be very different from the PCT population profile (which the expected figures are based on). So a particular practice may have a much higher elderly population than the PCT as a whole, which will cause its actual prevalence of diabetes to be higher than predicted.
- Data quality issues may lead to an over-recording of diabetes in which case the recorded prevalence may well be higher than the actual prevalence.

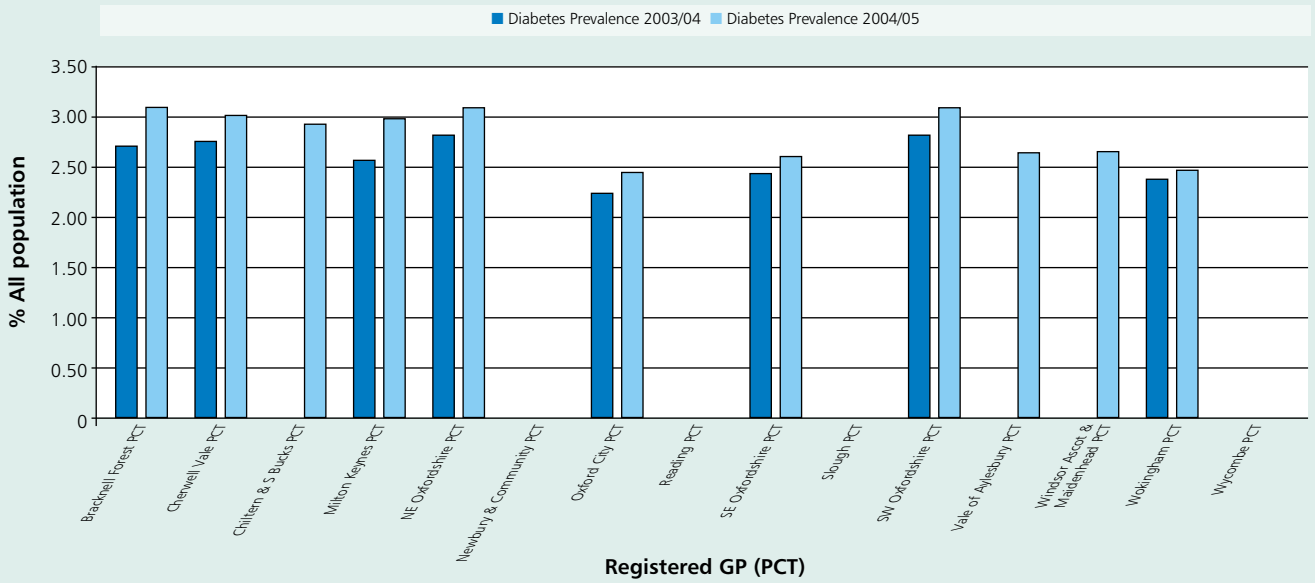


Figure 9: Prevalence rates for PCTs across the two audit years

Recommendation:

PCTs and GPs should continue the improvements in diagnosing and recording people with diabetes and aim to ensure that at least 90 percent of the PBS phase 2 predicted numbers are identified and registered.

Recommendation:

PCTs and GPs should improve the accuracy and recording of ethnicity in order to better understand the population of people with diabetes and evaluate their needs.

Age and Gender

As was observed in the 2003/04 audit, the pattern observed amongst the people registered with diabetes was for there to be a greater number of men than women. The PBS phase 2 model predicts a greater number of women with diabetes than men.

Viewed by age band it can be seen that the registrations of men with diabetes are largely in line with the predicted rates whereas the PBS phase 2 model indicates that there are a large proportion of women with diabetes who remain un-recorded on GP practice registers, assumed undiagnosed.

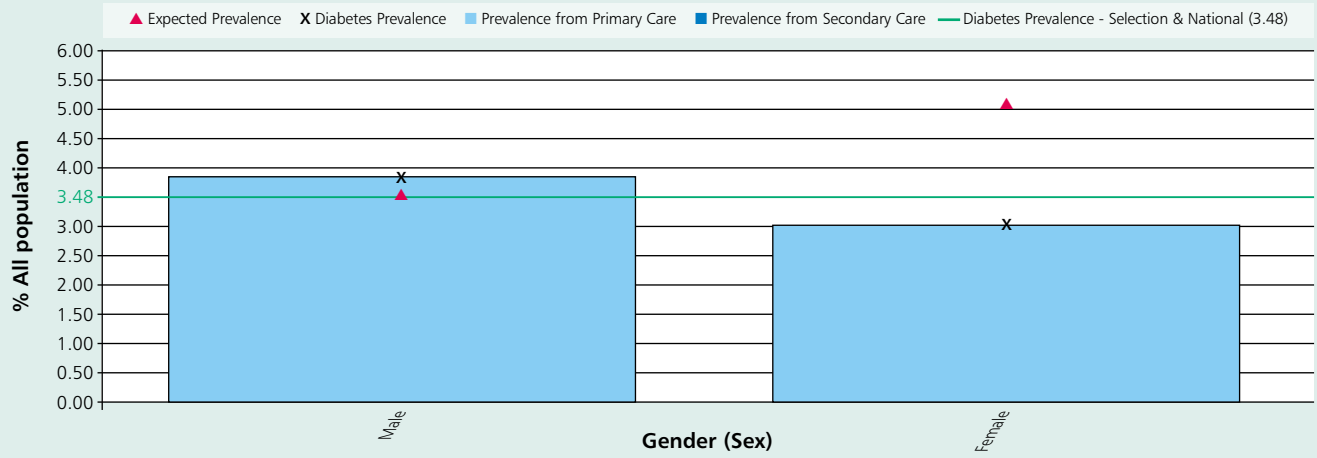


Figure 10: Registrations and PBS phase 2 predictions by gender

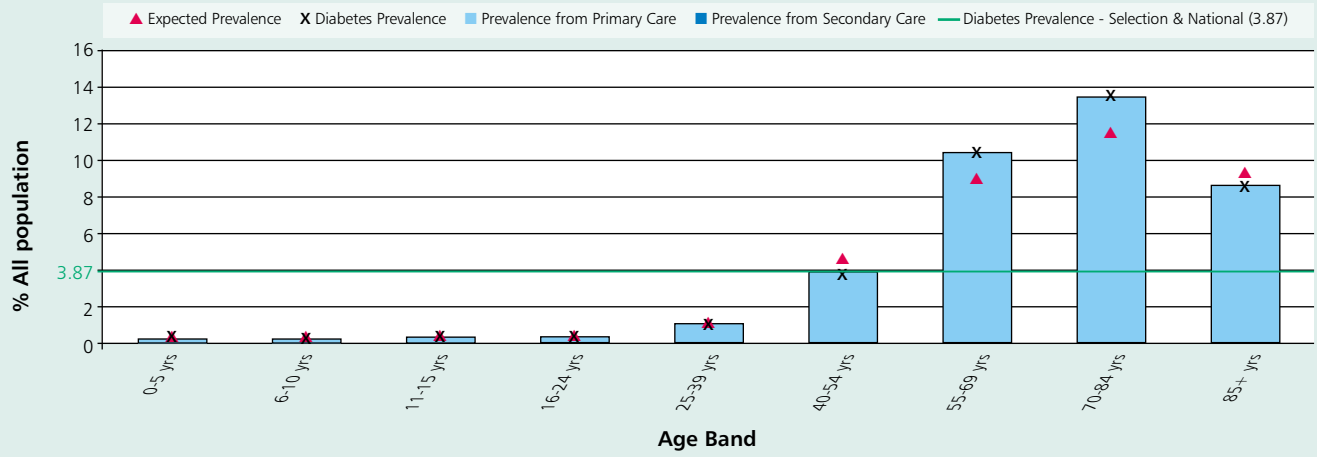


Figure 11: Registrations Compared with Predicted Prevalence for Men

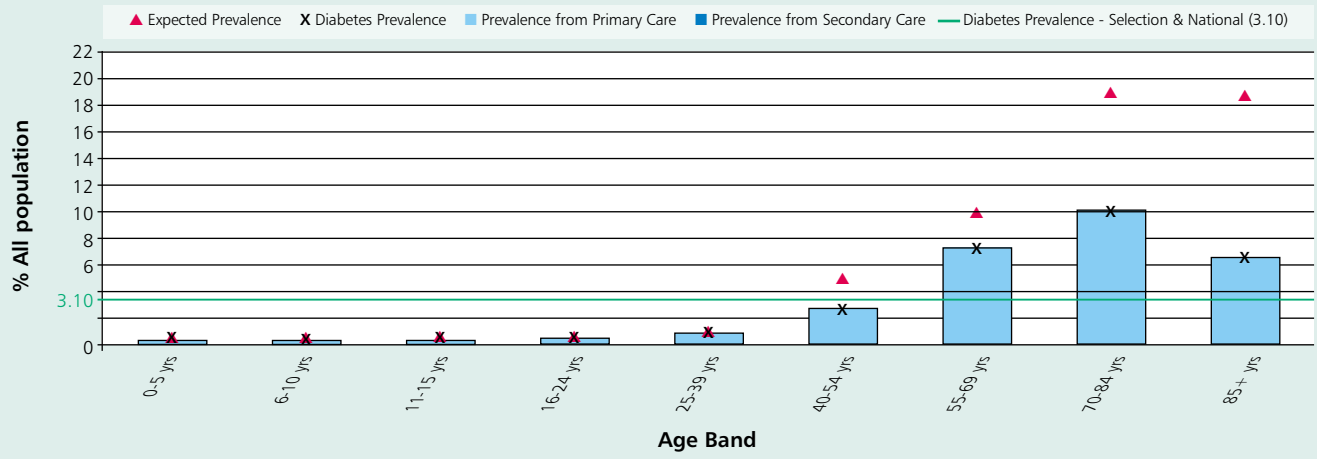


Figure 12: Registrations Compared with Predicted Prevalence for Women

The under-identification of women aged 40 and above with diabetes could be as a result of the following factors:

- The prediction model (PBS phase 2) used as its basis an epidemiological study which found a higher prevalence of diabetes in women than in men.
- Currently the only systematic screening for diabetes across the UK is among the population with known CHD which includes a much greater proportion of men than women. This could result in greater diagnosis of diabetes in men.

As noted, this issue has been referred to the National Diabetes Public Health Intelligence Group for further exploration.

Further work is required nationally to determine whether there is indeed a systematic under-identification of women aged 40 and above and to develop any appropriate recommendations.

Type of Diabetes

Overall, 43 percent of records submitted to the audit did not include coding for diabetes type. Of the remainder, 10% of people were recorded with type 1 diabetes and 46 percent of people with type 2 diabetes.

For those records missing diabetes type coding, a diabetes type was assumed by looking at the age at diagnosis. Patients diagnosed with diabetes under the age of 30 years were assumed to be type 1 and those diagnosed with diabetes aged 30 years and over were assumed to be type 2. This is referred to in the NDA toolkit as 'derived diabetes type' and is used as a proxy in records received without diabetes type recorded. This showed 9% with type 1, 82 percent with type 2, and a further 9% with unspecified type (no valid age at diagnosis information available). In other words, there is 9 times more type 2 diabetes than type 1.

Data on Maturity-Onset Diabetes of the Young (MODY) is now being received by the audit. Although this is a small percentage of records, in light of the increasing prevalence of MODY and type 2 diabetes in younger people derived diabetes type will become less useful over time and at present is only used as an indicative measure.

Recommendation:

In order to better understand their population of people with diabetes PCTs should strive to improve the accuracy and completeness of recording diabetes type. The Diabetes Information Strategy Group is establishing a sub-group to support this.

Diabetes and Deprivation

Diabetes is known to be correlated with deprivation, and this is borne out by the observed prevalence rates across deprivation quintiles. This can be supported by the findings in the Yorkshire and Humber Public Health Observatory *Diabetes Key Facts document published in March 2006.*

Deprivation Quintile	Prevalence rate
Quintile 1 (least deprived)	2.78%
Quintile 2	2.90%
Quintile 3	3.46%
Quintile 4	3.45%
Quintile 5 (most deprived)	3.70%

Figure 13: Prevalence rates by deprivation quintile

There is a difference of almost 1% in the observed prevalence of diabetes between areas which are least (Quintile 1) and most deprived (Quintile 5) having the highest prevalence of diabetes. There are higher numbers of registrations of people with diabetes in Quintile 5 in the data submitted to NDA. However, this represents only a small increase of just over 10,000 registrations in the NDA data compared to Quintile 1. This is indicative of the potential impact on the burden of treating diabetes in deprived areas.

Complications Associated with Diabetes

What is the rate of adverse outcomes for people registered with diabetes?

The purpose of this audit question is to identify whether there are variations in the adverse outcomes of diabetes and, ultimately, whether causal factors can be determined. 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 the HES data required from both the audit year and the preceding four years. This information is removed before the data is loaded into the analysis toolkit.

There are some known limitations with this approach:

- Complications for patients who have diabetes but who have not been included on the GP practice or acute trust data submitted to the audit will not be included;
- Only admitted patients will be identified. The HES extract incorporated into the audit does not include outpatient information due to the poor coding inherent within this data.

Rates of the main complications and outcomes associated with diabetes have remained at comparable levels across the two audit years (figure 14). This stable pattern over large numbers of patients is likely to reflect an accurate picture of complications rates (with the exception of angina and diabetic retinopathy where there are known issues with coding these complications).

Complications rates calculated from one year of Hospital Episode Statistics (HES) data for those patients included in the audit are shown in figure 15. The three most common complications seen for people with diabetes are all related to coronary heart disease: for example angina (in 2.37% of patients, although this rate is thought to be overstated due to the known over-use of angina coding, e.g. for chest pain), cardiac failure and myocardial infarction.

Having diabetes greatly increases the risk of suffering from all the complication types listed, contributing to the reduced quality and quantity of life for people with the condition.

These findings accord with other published results, summarised in the Yorkshire and Humber Public Health Observatory Diabetes Key Facts document, published in March 2006:

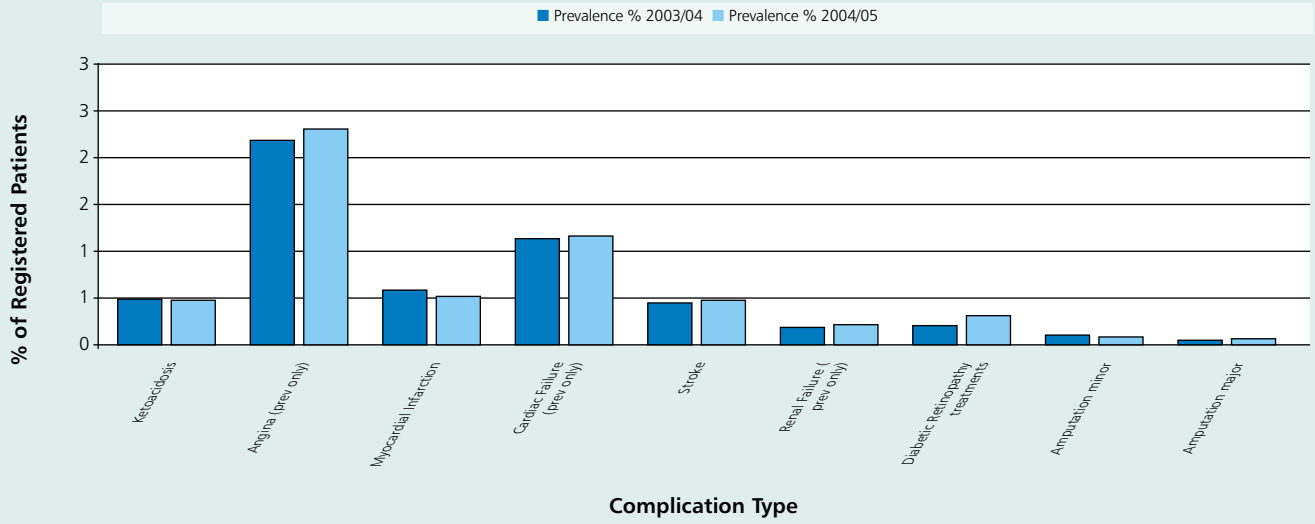


Figure 14: Complications prevalence rates across the two audit years

Complication type	Prevalence in people with Diabetes (%) (Source NDA)	National prevalence (%) (Source HES)	Difference (%)	Relative increase in risk
Angina	2.37	0.50	1.87	474%
Cardiac Failure	1.18	0.33	0.85	358%
Myocardial Infarction	0.55	0.17	0.38	324%
Ketoacidosis	0.49	N/A	N/A	N/A
Stroke	0.48	0.17	0.31	282%
Diabetic Retinopathy	0.33	N/A	N/A	N/A
Renal Failure	0.21	0.05	0.16	420%
Amputation (minor)	0.11	0.01	0.10	1100%
Amputation (major)	0.07	0.01	0.06	700%

Figure 15: Complication rates

- Adults with diabetes have heart disease death rates about two to four times higher than adults without diabetes;
- The risk of stroke is two to four times higher among people with diabetes;
- Diabetes is the most common cause of non-traumatic lower limb amputation;
- Diabetes has become the single most common cause of end stage renal failure;
- Diabetes is the most common cause of blindness in people of working age.

These findings are a useful tool in identifying people with diabetes who are at increased risk of developing further complications. This information can be used to develop diabetes services and improve clinical outcomes.

Analysis of complication rates by SHA and PCT using statistical process control (SPC) methodology has revealed SHAs and PCTs which have statistically significantly increased rates for MI, cardiac failure, stroke, renal failure and major amputations. The pattern for MI, cardiac failure and stroke is consistent with the findings from the first year of the audit.

Complication rates calculated using 5 years of HES data (based on the people registered with diabetes during the audit year) show patterns for MI and Stroke with significantly high rates associated with PCTs based in northern regions and significantly low rates associated with PCTs in southern regions. Even adjusting for factors such as deprivation in many cases the same organisations still appear as outliers. This pattern is similar, though with fewer outliers when only one year of HES data is used.

In contrast, three south London PCTs show significantly high rates of renal failure based on one year of HES data (and two of these are outliers when 5 years of HES data is used). All organisations participating in the audit have access to this analysis and should ensure that they review their results.The National Diabetes Audit will work with the National Clinical Director for Diabetes to review these results in more detail and consider how best to support local services in seeking to achieve improvements.

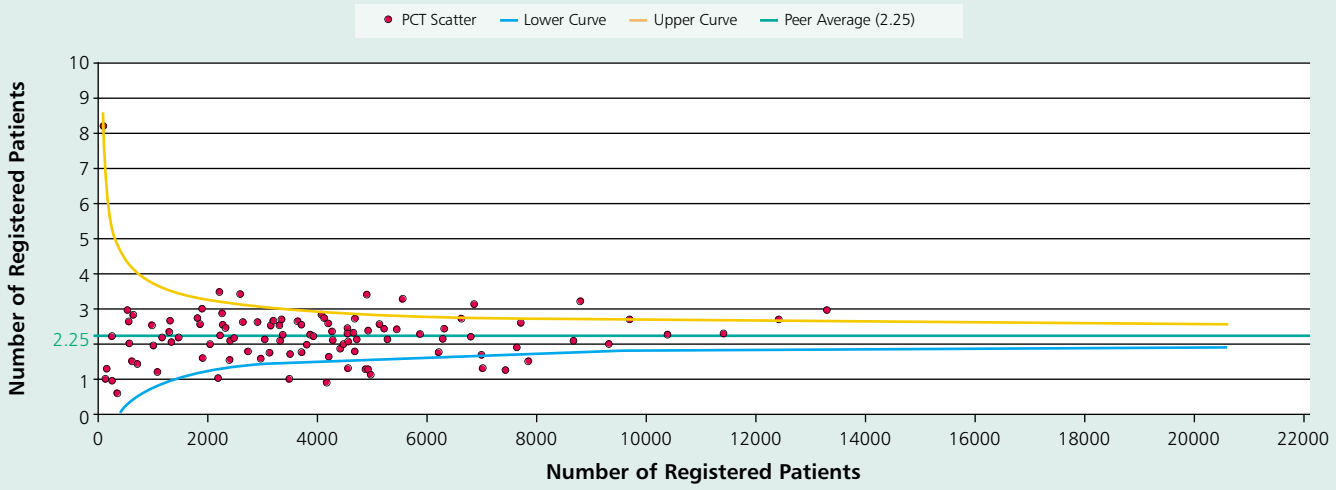


Figure 16: SPC chart for MI rates by PCT

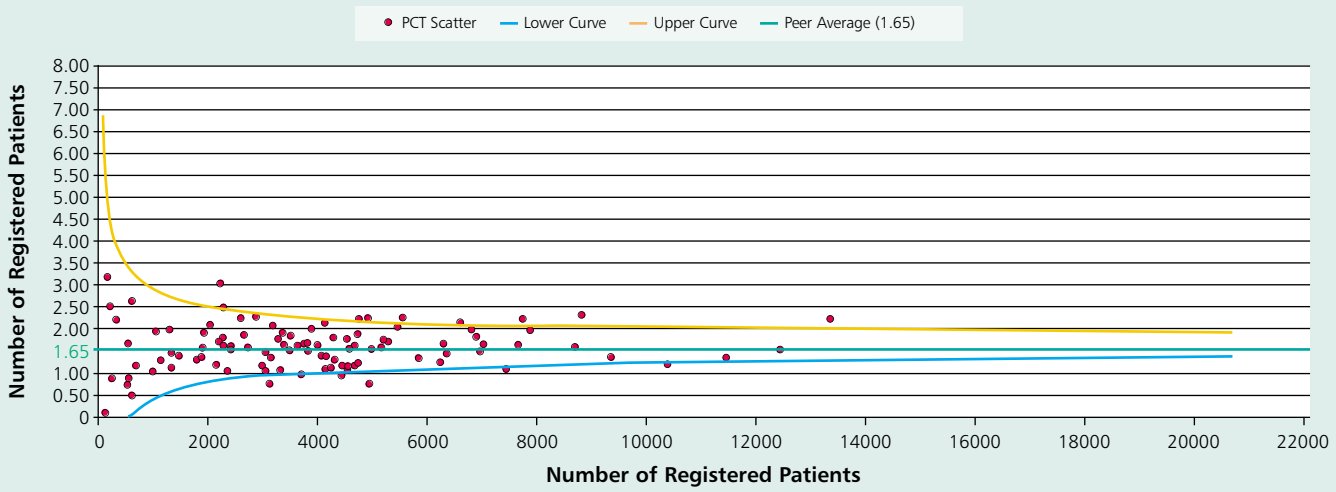


Figure 17: SPC chart for stroke rates by PCT

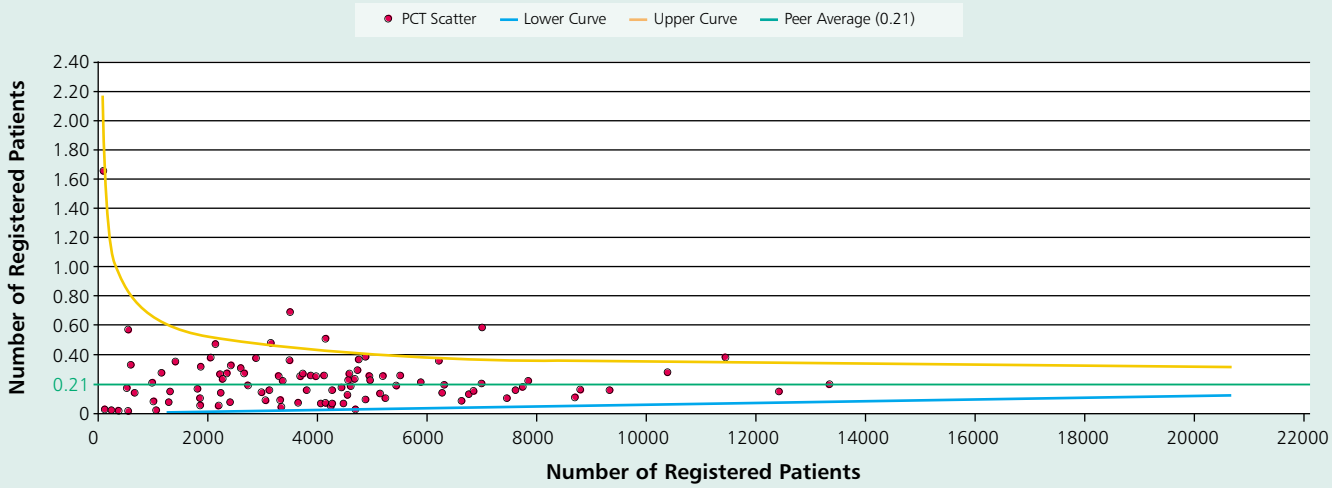


Figure 18: SPC chart for Renal Failure rates by PCT (One year of HES data)

Recommendation:

The audit provides the information on which PCTs can review their complications rates for people with diabetes and compare them with other PCTs across England. Using detailed local knowledge it is recommended that PCTs:

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

Complications and Age

An increase in the prevalence of Myocardial Infarction, Angina, Cardiac Failure and Stroke is observed with increasing age. There is a tendency to see a sharp rise in complication rates at 25 years which continues throughout the age bands.

Compared with national rates of these conditions, the prevalence rates in the older age bands for people with diabetes tend to be lower. This suggests that people with longer duration of diabetes tend not to survive to the older age ranges; those who do survive to the older ages have either recently diagnosed diabetes and/or strong vascular function.

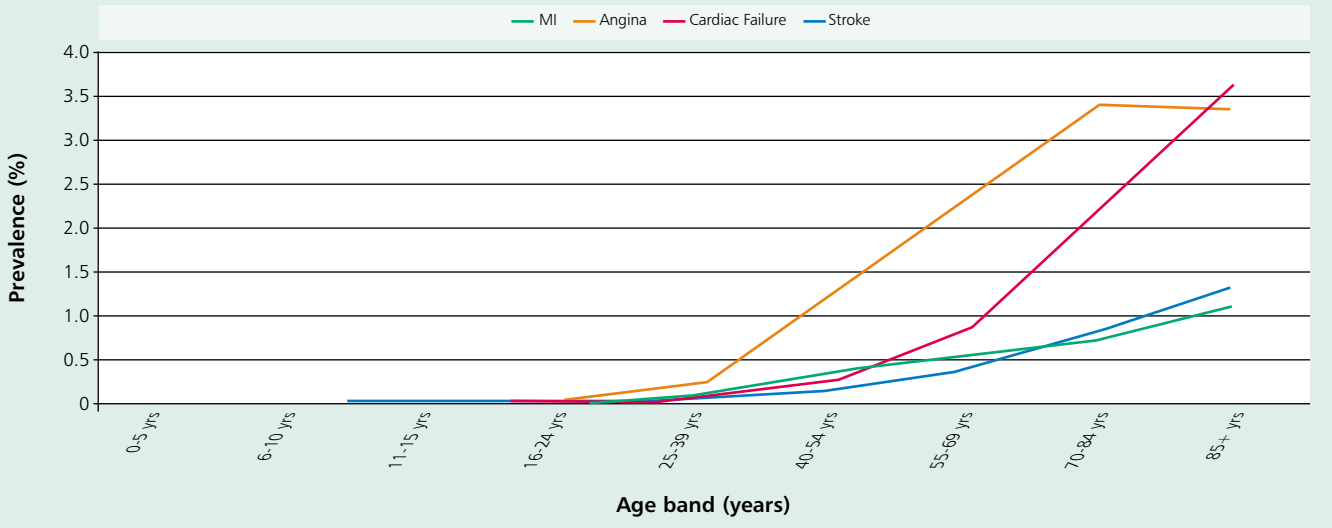


Figure 19: Prevalence of MI, Angina, Cardiac Failure and Stroke by age band

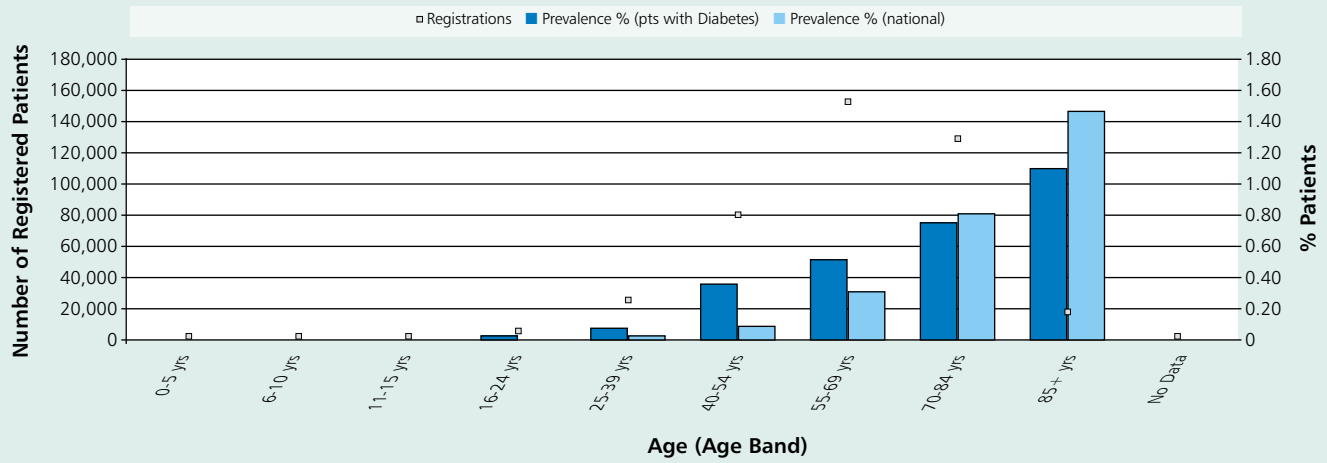


Figure 20: MI rates by age band

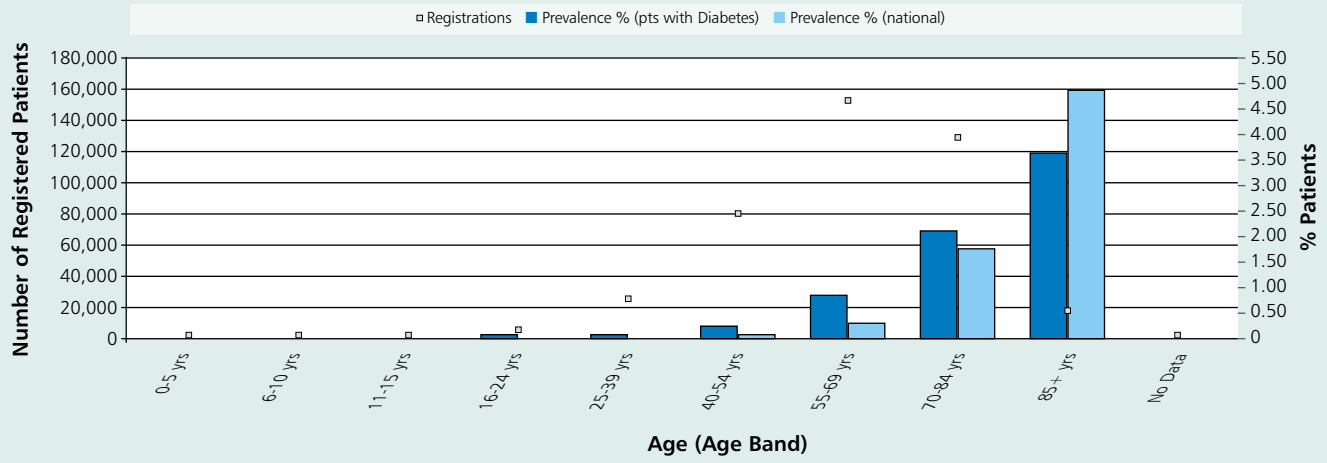


Figure 21: Cardiac Failure rates by age band

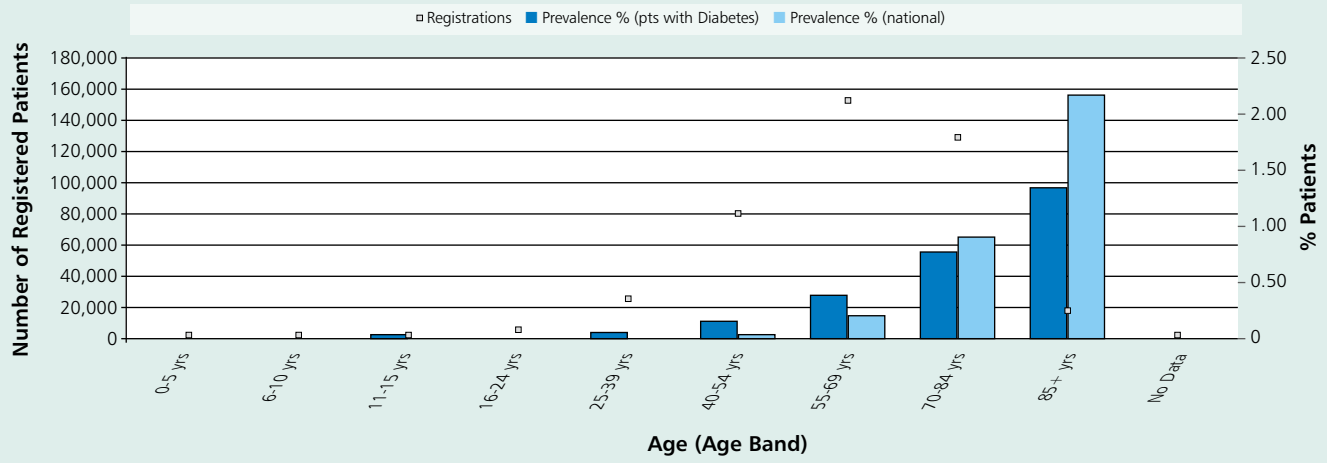


Figure 22: Stroke rates by age band

The highest prevalence rates for renal failure are found in the middle age bands, starting with a sharp rise at age 25-39 years, which also shows a higher complication rate in Males (0.34%) compared to females (0.23%). There is little variation in prevalence rates of renal failure across the country and only a small number of PCTs with statistically high rates. Known preventative care interventions in people with diabetes from a young age ought to result in a reduction in these rates.

Recommendation:

PCTs should analyse the data in the National Diabetes Audit in order to identify the complication rates for their diabetic population and ensure that the appropriate interventions are undertaken.

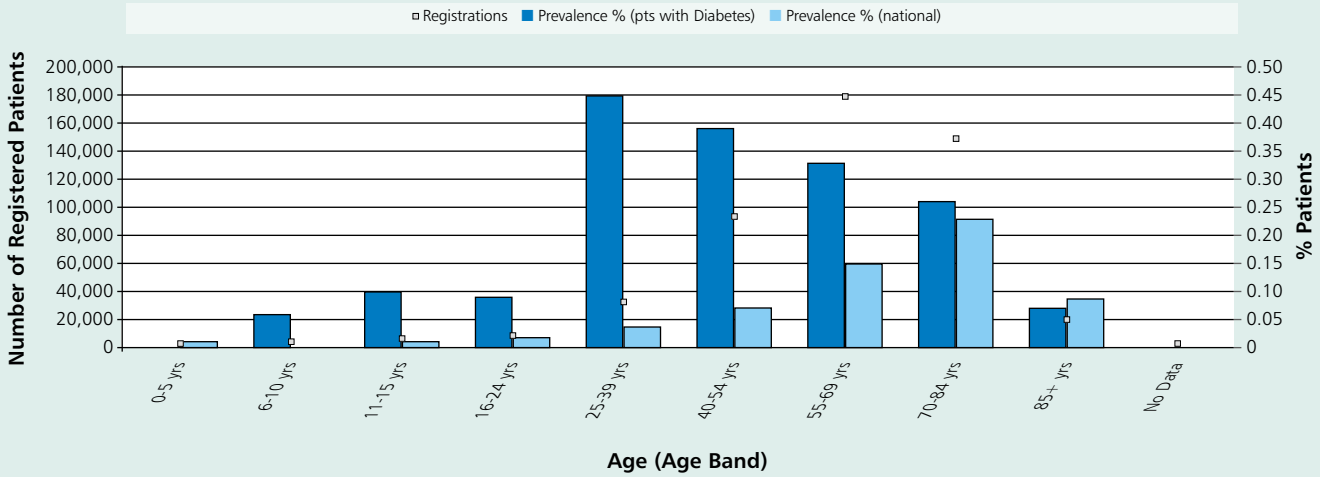


Figure 23: Prevalence of Renal Failure by age band

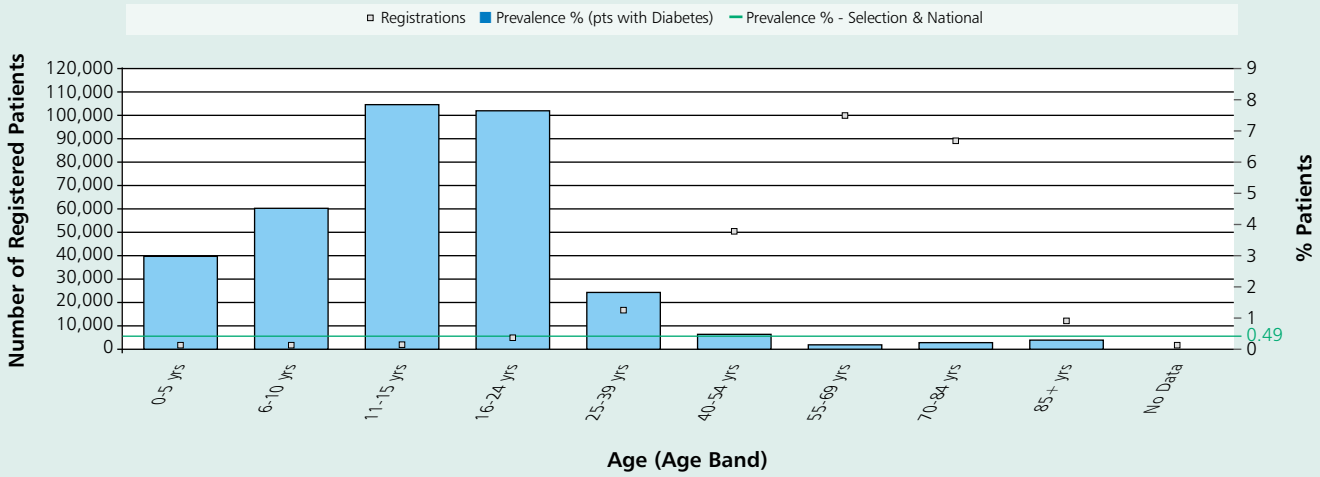


Figure 24: Prevalence of ketoacidosis by age band (excluding DKA at diagnosis)

Rates of diabetic retinopathy treatments are also highest in the middle age bands 25 to 39 years of age decreasing as people get older (40 years and above). However, care should be taken in interpreting this outcome as there is some question over the consistency of coding outpatient episodes of diabetic retinopathy and there is variability in the use of laser treatment codes. The introduction of Payment by Results is likely to result in improvements in the standardisation of diabetic retinopathy treatment codes.

Prevalence of ketoacidosis is greatest amongst the younger age bands; further analysis on this condition is included in the paediatric section of the report.

For those people who experience at least one ketoacidosis event there is a wide variation in the number of their subsequent events; a small group of people experience a large number of events. Examination of the average number of events for this group of people highlights that children in their teenage years and young adults experience a higher number of ketoacidosis events compared with younger children and people in the older age groups.

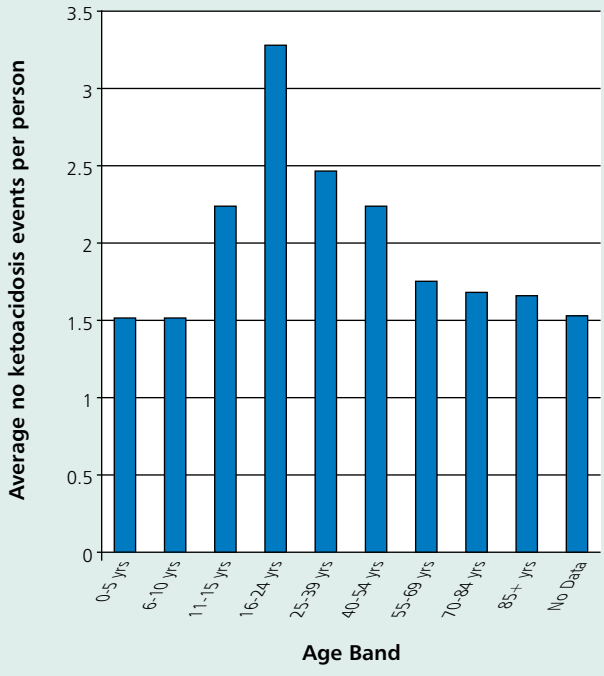


Figure 25: Ketoacidosis events by age band

Care Processes

What proportion of people registered with diabetes receive the key processes of diabetes care?

The purpose behind this audit question is to analyse whether the most basic components of care have been delivered and recorded. These care components are as defined by the Diabetes NSF Delivery Strategy (section 3.25):

> *"The key elements of diabetes care including glycaemia, blood pressure and cardiovascular risk reduction;*
> *The results and implications of the surveillance programme for eyes, feet and kidney damage..."*

The basis of this audit question is that if key care processes are carried out diabetes can be better managed, enabling treatment targets to be reached and the risk of associated complications reduced.

As predicted last year, an increase in the recording of all care processes in primary care for people with diabetes has been seen in 2004/05 compared with 2003/04. This is likely to be related to the introduction of the new General Medical Services (GMS) contract in 2004/05 for primary care. The new GMS contract incorporated the Quality and Outcomes Framework (QOF), a voluntary system of financial incentives covering a range of clinical indicators, including diabetes.

With the exception of eye and foot exam both of which were recorded in around 60 percent of patients and urinary albumin which was recorded in 42 percent of patients, all other care processes were recorded in at least 80 percent of patients with diabetes in 2004/05.

Care Process	Care process % 2003/4	Care process % 2004/5	% Increase
Blood Pressure	85.9	89.2	3.3
Smoking status	70.3	83.1	12.8
Creatinine	74.9	82.9	8.0
Cholesterol	74.8	82.4	7.6
HbA1c	75.8	80.5	4.7
BMI	71.9	80.5	8.6
Eye Exam	46.8	60.7	13.9
Foot Exam	30.4	58.0	27.5
Urinary Albumin	20.7	41.9	21.2
All Care Processes	7.0	24.4	17.5

Figure 27: Care Process % across 2 audit years

The Diabetes NSF Delivery Strategy establishes a specific target for eye screening:

> *"By 2006, a minimum of 80 percent of people with diabetes to be offered screening for the early detection (and treatment if needed) of diabetic retinopathy as part of a systematic programme that meets national standards, rising to 100 % coverage of those at risk of retinopathy by end 2007."*

An improvement in the recording of eye examinations was seen and 61 percent of people with diabetes had an eye exam carried out during the 2004/05 audit period. A further increase of 19 percent is needed to achieve the NSF standard of 80 percent for 2006 followed by an additional 20 percent for 2007. It is known that there are issues with the provision of digital screening across the country and that there are difficulties in accurately recording the information required to measure the NSF target.

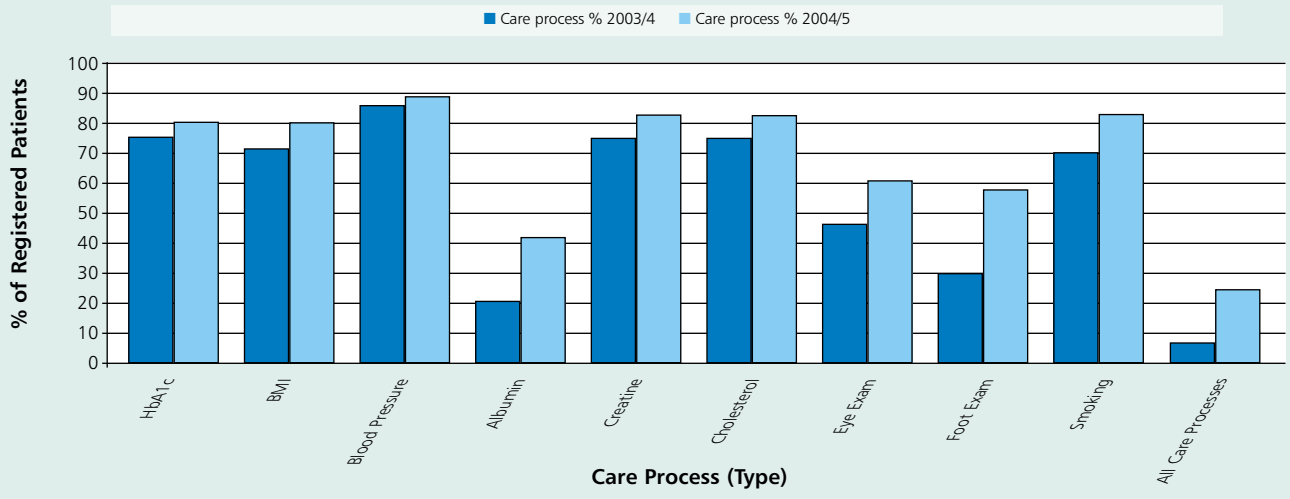


Figure 26: Care process rates across the 2 audit years

Improvements of more than 20 percent in the recording of foot exam and urinary albumin were seen in 2004/05, compared with the 2003/04 baseline. 24.4% of people with diabetes had all care processes recorded during 2004/05, which was equivalent to a full annual surveillance review and although this proportion is still small it represents an improvement of over 17 percent compared with the baseline year.

The DiabetesE study, published in February 2006, found that 63 percent of PCTs have not developed a structured programme of care. Analysis using the NDA toolkit enables PCTs to identify gaps in the key processes of care and commission diabetes services to ensure these gaps are filled. Information on structured education for people with diabetes will be included in the audit from 2005/06 onwards. Combined use of the NDA toolkit and DiabetesE will provide a whole system view of local services.

Variation in the carrying out and recording of care processes is seen across PCTs:

Care Process	Care process as % of registered patients		
	Average (mean)	Lower quartile	Upper Quartile
Blood Pressure	89.2	88.8	92.7
Smoking status	83.1	82.9	87.4
Creatinine	82.9	82.3	87.9
Cholesterol	82.4	81.8	86.6
HbA1c	80.5	78.9	85.0
BMI	80.5	79.5	84.9
Eye exam	60.8	56.4	66.5
Foot exam	58.0	51.4	67.5
Urinary Albumin	41.9	30.4	58.0
All care processes	24.5	16.3	34.1

Figure 28: Variation in care process rates across PCTs

Most variation, as measured by the interquartile range, is seen in the care processes which had the lowest rates of being carried out, namely eye exam, foot exam and urinary albumin. This also results in a large degree of variation in the measure of all care processes, or full annual review. Figure 29 is illustrative of the variation across PCTs in carrying out all care processes.

One of the benefits of audit lies in being able to identify organisations that are performing well, from which a detailed understanding of the factors contributing to their good performance may be possible. Of the 106 PCTs which took part in the audit in 2004/05, 11 PCTs came in the top three rankings for rates of carrying out each of the care processes.

Recommendation:

PCTs should review their rates of carrying out and recording key processes of care and aim to make further improvements to aspire to achieve the benchmarks as set by the upper quartiles seen in the audit:

Care Process	Minimum rate to aim to achieve:
Blood Pressure	93%
Smoking status	87%
Creatinine	88%
Cholesterol	87%
HbA1c	85%
BMI	85%
Eye exam	66%
Foot exam	68%
Urinary Albumin	58%
All care processes	34%

Local services should aspire to completing the gaps in undertaking the key care processes, particularly where they are poorly filled. The upper quartiles in the audit (figure 28) should be considered as a minimum to achieve and continued improvement should be based on this. Where services are clearly lagging local organisations should examine the specific reasons for this.

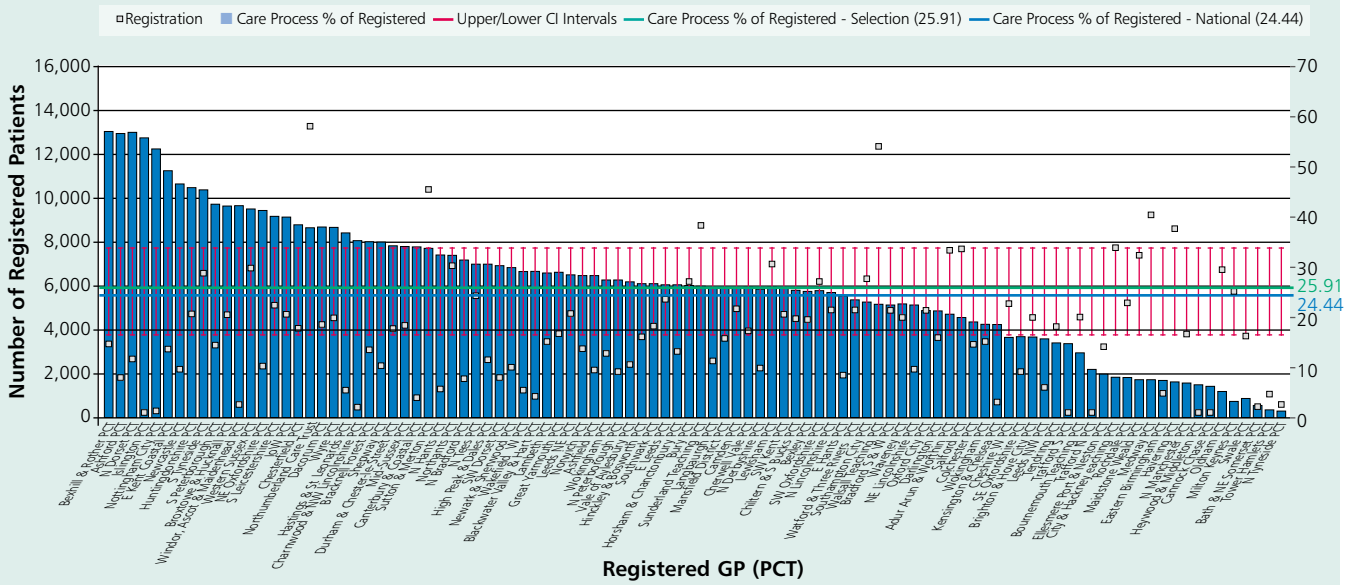


Figure 29: Variation on recording of all care processes across PCTs
NB: PCT names are very difficult to read due to the large number of them included in the chart - this chart is intended to illustrate the range of variation only

Delivery of Care Processes Across all Ages

The rates of carrying out and recording of care processes increase with the age of the patients, a pattern that was also seen in the first year of the audit. People in the 55 to 84 year age band are more likely to have care processes recorded than other age bands. This pattern is seen across all of the care processes.

The rates of carrying out care processes are lowest in the younger age bands, which may be reflective of younger people being less willing or able to attend for regular checks in the absence of other medical conditions or through not perceiving the condition to be serious. The risk of complications increases with the duration of diabetes. Routine processes of care and monitoring should be carried out for all age ranges particularly the younger age bands to optimise wellbeing and minimise the risk of long-term complications.

Recommendation:

PCTs should consider the provision of services for people in the younger age bands and aim to maximise the rates of carrying out the key processes of diabetic care in order to minimise complications.

There is no difference in the rates of carrying out care processes across deprivation quintiles.

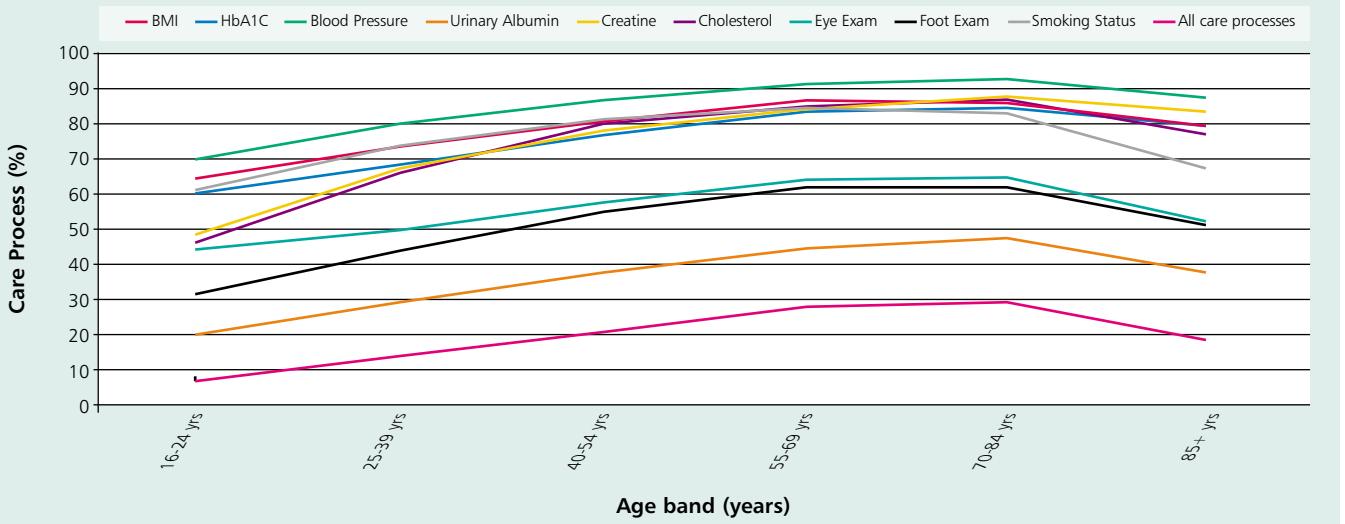


Figure 30: Rates of carrying out care processes by age band

Comparison with QOF Rates

The Quality and Outcomes Framework results for 2004/05 were published nationally in August 2005. Many of the QOF clinical indicators for diabetes coincide with the care processes which are examined as part of the NDA. The Read Codes[4], which are used in QOF and NDA are the same with the exception of eye exam where the NDA uses a reduced set of read codes, which are considered to measure actual eye exam conducted, rather than eye exam requested.

The following table, based on information from primary care only in the case of the NDA, illustrates that rates of care processes recorded using NDA were lower than those recorded in QOF. The differences in results are likely to be indicative of the effect of exception reporting, and 3-month grace (or 'holiday') period allowed for newly diagnosed cases, which are both features of QOF but not the audit. A proportion of the differences will also be accounted for by the fact that QOF is only applicable for people aged 17 years and over whereas the NDA covers all people. This would have the effect of increasing the total number of people in the calculations for recording of care processes. However, not all care processes are applicable to young children eg smoking status recorded. This would have the effect of lowering the percentage recorded in the NDA results. As numbers of children with diabetes are relatively low, they will account for only very small proportions.

Care Process		QOF Outcome	NDA Outcome	Difference
BMI recorded	(QOF 2)	90.6%	80.5%	10.1%
Smoking Status recorded	(QOF3)	95.9%	83.1%	12.8%
HbA1c recorded	(QOF 5)	94.4%	80.5%	13.9%
Eye exam	(QOF 8)	83.4%	60.7%	22.7%
Blood Pressure	(QOF 11)	97.0%	89.2%	7.8%
Urinary Albumin	(QOF 13)	70.9%	41.9%	29.0%
Creatinine	(QOF 14)	93.0%	82.9%	10.1%
Cholesterol	(QOF 16)	92.7%	82.4%	10.3%

Figure 31: Comparison between QOF and NDA

The NDA analysis across the two audit years has already demonstrated an improvement in recording of care processes, which may be a result of the introduction of QOF and in turn an improvement in care for people with diabetes. However, QOF data has been collected primarily as a means of determining payments to GPs and should not be interpreted in the same way as audit information.

The NDA allows organisations to further examine the rates of care processes recorded and identify gaps in recording to ensure the QOF clinical indicators are met. The NDA also allows for the analysis of care processes recorded in children and young people (under 17 years old) which will enable organisations to encourage the younger age bands to have regular checks to minimise the risk of long-term complications later in life.

Treatment Targets

What Proportions of People with Diabetes Achieve Treatment Targets?

The purpose of this audit question is to check whether the care processes are achieving their objective, that treatment targets are consistently being achieved.

Targets for HbA1c, cholesterol and blood pressure (BP) for people with diabetes have been published in NICE guidelines, and the table below shows the overall percentage of people registered with diabetes achieving each of the targets. It should be noted that these figures exclude the patients for whom the process and treatment target has not been recorded.

Gender	% achieving HbA1c target		% achieving cholesterol target	% achieving blood pressure target	
	<6.5%	≤ 7.5%	<5mmol/litre	≤ 135/75 mmHg	<160/100 mmHg
Males	22.0	57.6	72.7	24.1	89.2
Females	22.0	58.6	62.8	24.2	87.1
Total	22.0	58.0	68.2	24.1	88.2

Figure 32: Treatment target achievement rates

Rates of treatment target achievement remain comparable to the findings from the first year of the audit. It must be noted that the NICE targets used in the NDA analysis differ from those for QOF. The NDA allows organisations to analyse the targets for HbA1c, Choleterol and blood pressure (BP) by the NICE targets and by age and gender. This enables the identification of key developments in diabetes services required to ensure these targets are met, which aim to reduce the risk of long-term complications.

Only 22 percent of people with diabetes achieve the lower (secondary) HbA1c target range (<6.5%). This is recommended, where appropriate, for those at higher risk of arterial disease.

4 Each Clinical term has a unique Read Code. This allows recorded material to be stored as data which can be retrieved and analysed to provide information across a number of disciplines such as audit and statistics, in addition to the clinical application.

The percentage of people achieving the HbA1c treatment target increases to 58 percent as the target range increases to ≤7.5%. However, 42 percent of people with diabetes have an HbA1c of >7.5% recorded, showing a high percentage of people with diabetes having poor glucose control which is only 1% lower than the 43 percent achieved in the 2003/04 audit.

Only 24 percent of people with diabetes achieve the best blood pressure target (≤ 135/75 mm Hg). Again this increases to 88 percent as the target range increases to <160/100 mm Hg.

A higher proportion of people with diabetes (68 percent) achieve the cholesterol target (<5mmol/litre). There is a notable difference between males and females with 10% more males achieving the cholesterol target than females. A possible explanation for this may be due to the increase in screening for coronary heart disease amongst males and increased use of statins.

Rates of achieving the treatment targets have remained fairly stable across the two audit years, though achievement of the cholesterol target and, to a lesser extent, the blood pressure targets have increased slightly.

There is variation in the attainment of treatment targets by PCT; summarised in figure 33.

	Treatment target	Mean %	Lower quartile %	Upper quartile %
HbA1c	<6.5%	22.0	17.6	26.0
	≤ 7.5%	58.0	54.7	61.9
Cholesterol	<5 mmol/litre	68.2	65.0	71.8
Blood Pressure	≤ 135/75 mmHg	24.1	22.4	26.0
	<160/100 mmHg	88.2	87.1	89.5

Figure 33: Variation in the achievement of treatment target rates

As with the care processes, of the 106 PCTs which took part in the audit in 2004/05, 11 PCTs came in the top three rankings for rates of achieving each of the treatment targets. Four of these PCTs (36 percent) appeared in the top 3 ranking for both of the care processes and some of the treatment targets. This could indicate a causal link between carrying out the processes of care and achievement of treatment target objectives or it could be a result of other factors, such as the demographics of that area. The NDA will examine these results in more detail with the National Clinical Director for Diabetes.

Recommendation:

PCTs should aspire to achieve the upper quartile rates for each of the treatment targets:

Treatment Target		Minimum rate to aim to achieve:
HbA1c	<6.5%	26%
	≤ 7.5%	62%
Cholesterol	<5 mmol/litre	72%
Blood Pressure	≤ 135/75 mmHg	26%
	<160/100 mmHg	90%

Again, the upper quartiles in the audit should be considered as a minimum to achieve and continued improvement should be based on this. Where local services are achieving the upper quartile targets they should show year-on-year improvement in order to meet NICE guidelines and implementation of the Diabetes NSF to reduce the risk of long-term complications.

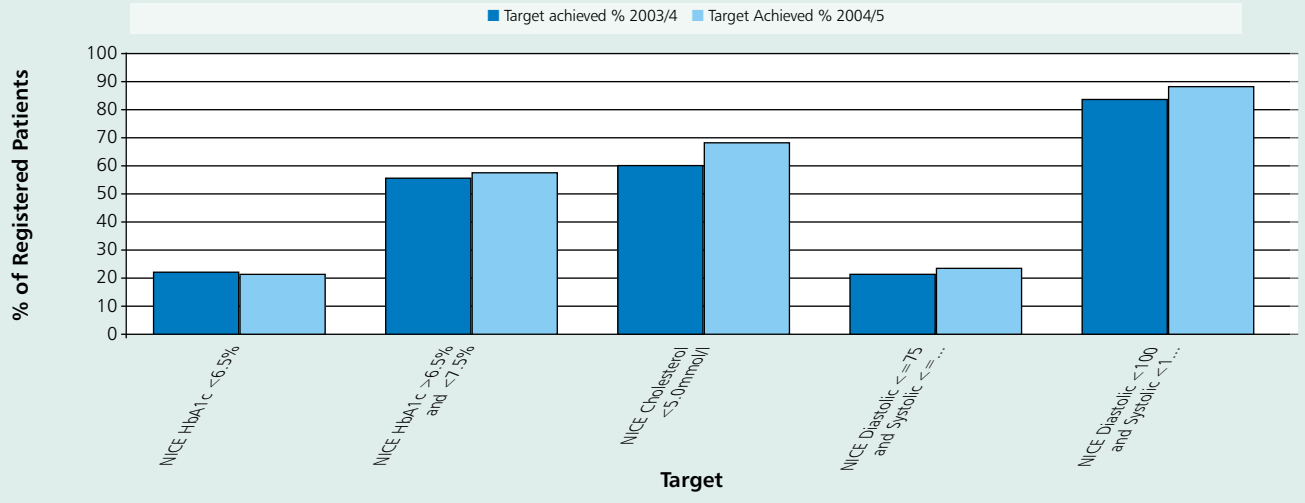


Figure 34: Rates of achieving treatment targets across two years

As was seen for the care processes, findings from the NDA relating to the same period in QOF show consistently lower rates for each of the treatment targets. As well as including the NICE treatment targets, the NDA toolkit contains treatment target information using GMS targets as used in QOF. The following table, based on information from primary care only in the case of the NDA, illustrates that rates of achievement of treatment targets recorded using NDA were lower than those recorded in QOF. It is assumed that the differences in results are indicative of the effect of exception reporting which is available in QOF but not in NDA, reinforcing the need to understand the different purposes for these two data sources.

Treatment Target	QOF Finding (2004/05)	NDA Finding (2004/05)	Difference
HbA1c < 7.5 (QOF 6)	58.8%	42.4%	16.4%
BP < 145/85 (QOF 12)	70.3%	58.6%	11.7%
Cholesterol < 5 (QOF 17)	71.8%	58.1%	13.7%

Figure 35: Comparison between NDA and QOF rates

Treatment Targets by Age Band

Rates of achievement of the HbA1c target shows an increase with age which can be analysed using the NDA toolkit. A similar, though less steep increase, is seen for rates of achievement of cholesterol targets. A higher proportion of people in the younger age bands will have type 1 diabetes. Type 1 diabetes is recorded in 96 percent of paediatric unit data submitted to the audit. In the older age bands there is a much greater proportion of people with type 2 diabetes who may have had diabetes for a shorter duration.

Rates of achieving blood pressure targets are fairly consistent across the age bands, with greater proportions of people in the younger age bands achieving the targets.

The NDA allows organisations to analyse the achievement of treatment targets using a number of dimensions such as age, sex and deprivation. This analysis provides valuable information regarding the key areas in which organisations must focus on improving diabetes services to ensure treatment targets are met to reduce the risk of long-term complications.

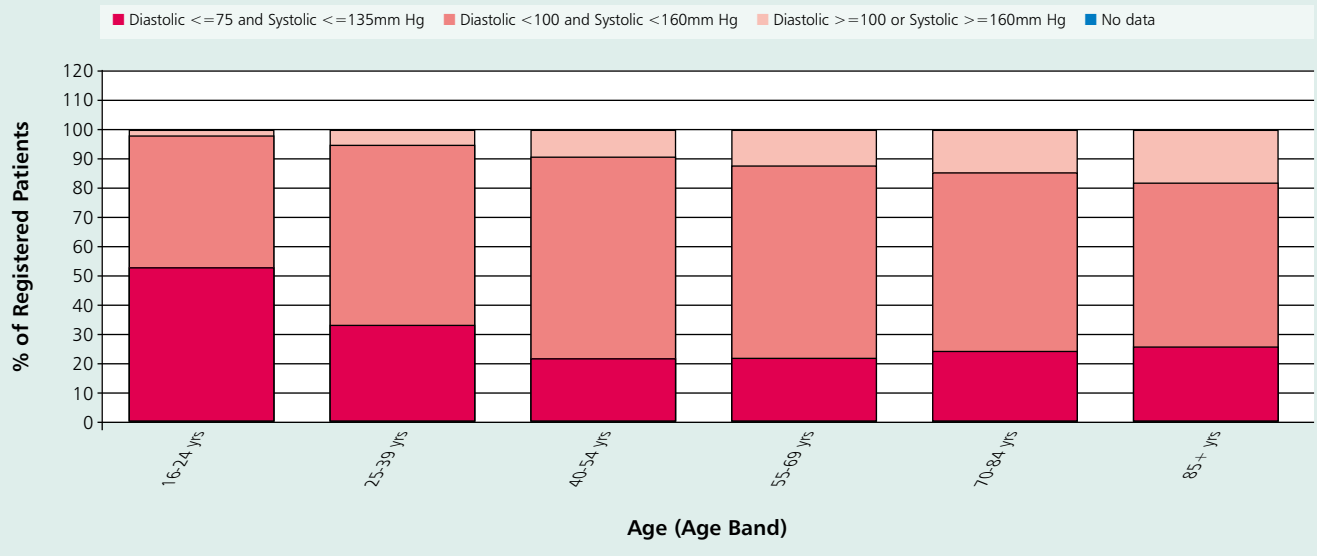


Figure 36: Achievement of blood pressure target by age band

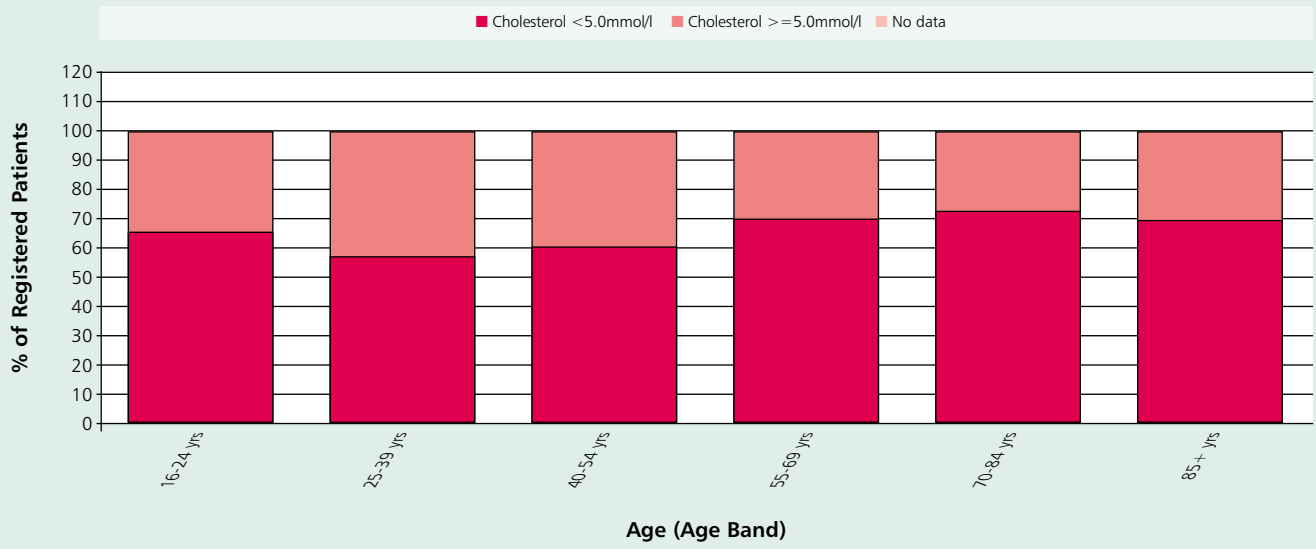


Figure 37: Achievement of cholesterol target by age band

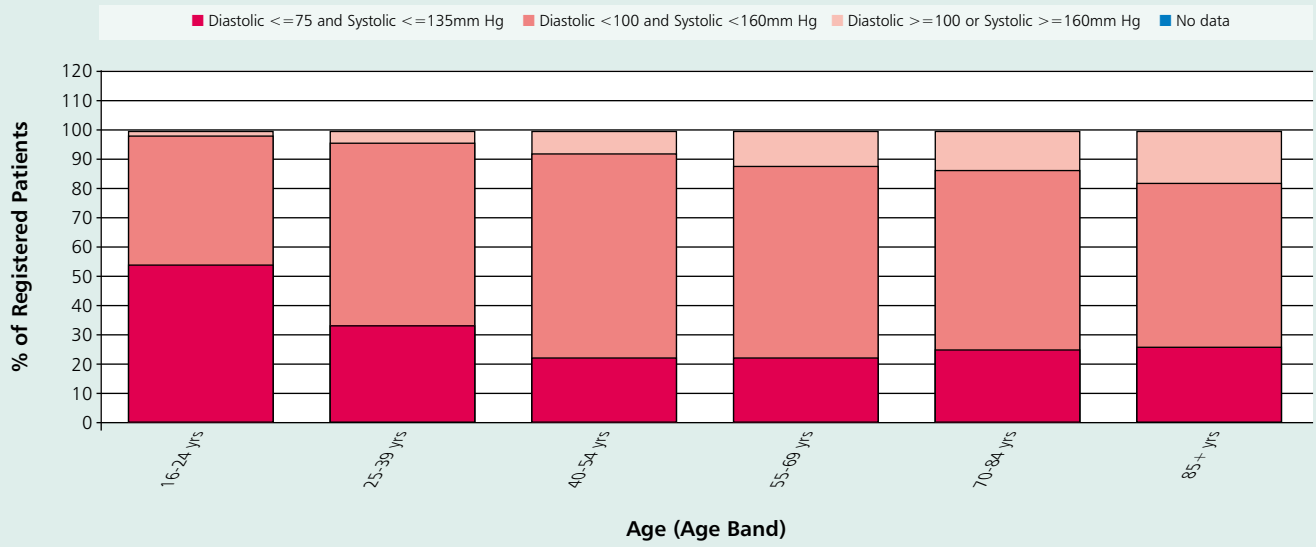


Figure 38: Achievement of blood pressure target by age band

Section 3: Paediatrics

For the first time the NDA includes registration details for children and young people cared for by specialist paediatric diabetes units in Wales. Information on 7,841 children and young people (0-24 years old) was submitted directly from the 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.

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 F). This is not always possible, especially for units which 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. The predefined queries from the TWINKLE clinical system were used by 11 units to submit data, the remainder (53) have submitted via either district 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 became unfeasible 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 that 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.

There are slight differences in the information that the NDA gathers from paediatric units. This is reflected in the audit questions asked.

- 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?

In terms of complications information the paediatric NDA focuses on ketoacidosis. In addition, care process information is gathered and analysed in a manner that is relevant for paediatric diabetes services. This is discussed in more detail within the relevant sections of the paediatric analysis.

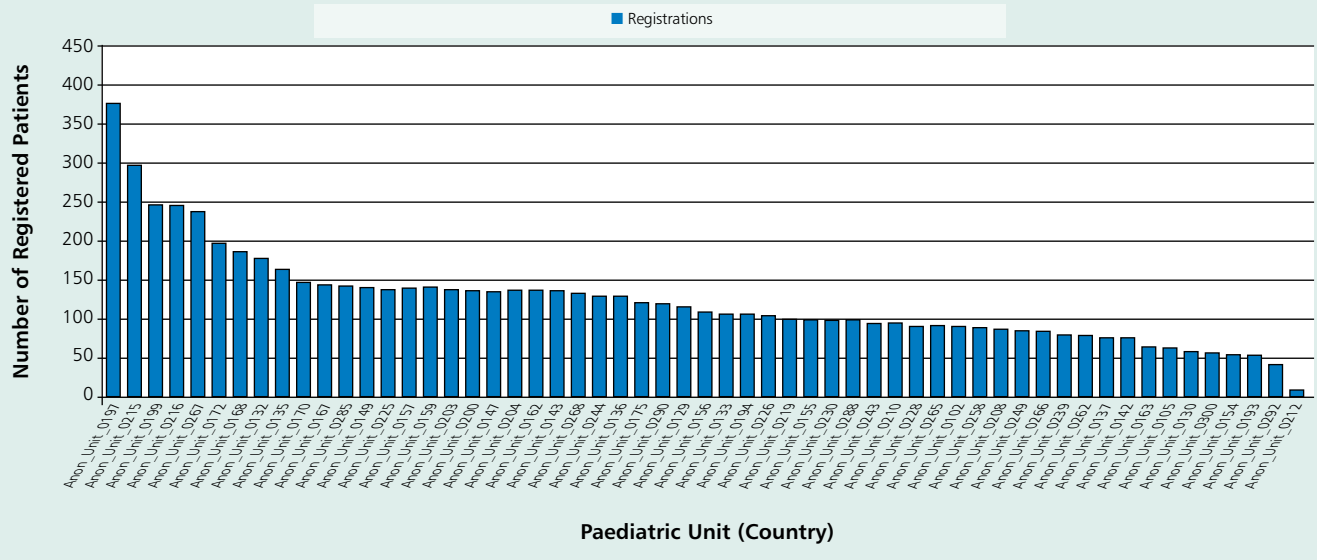


Figure 39: Registrations for paediatric units in England

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 DiabetesE 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."*

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.

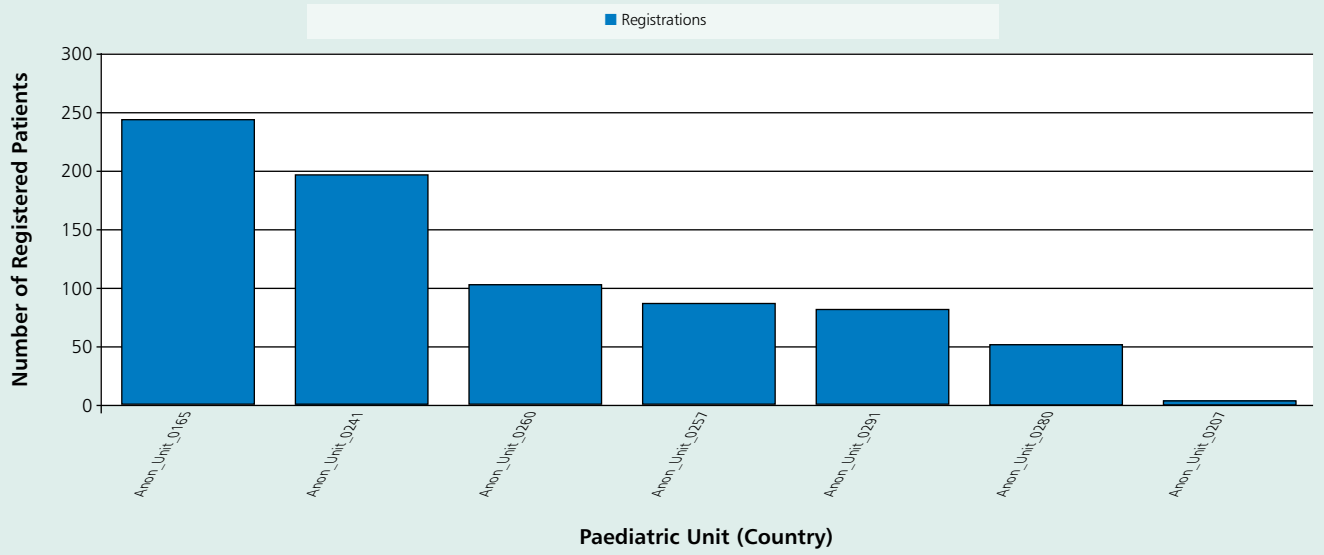


Figure 40: Registrations for paediatric units in Wales

Age Bands		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 41: Numbers of children and young adults submitted to the audit

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.

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

Figure 42: 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 to15 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 43: 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. Records with a known age are not included.

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 44).

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.

	England				Wales	
Ethnicity	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 44: 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)

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.

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 11years	2,756	(36%)	10	(9%)	2	(22%)	36	(28%)	4	(13%)
12 to15 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 45: Type of diabetes by age band for England and Wales

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

There does not seem to be a gender difference between diabetes types for England or 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 47: Type of diabetes by gender for children <16 years

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

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 light of the 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 and 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.

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 48: 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 49) illustrates the average age at diagnosis by unit, a table of this data can be found in Appendix G.

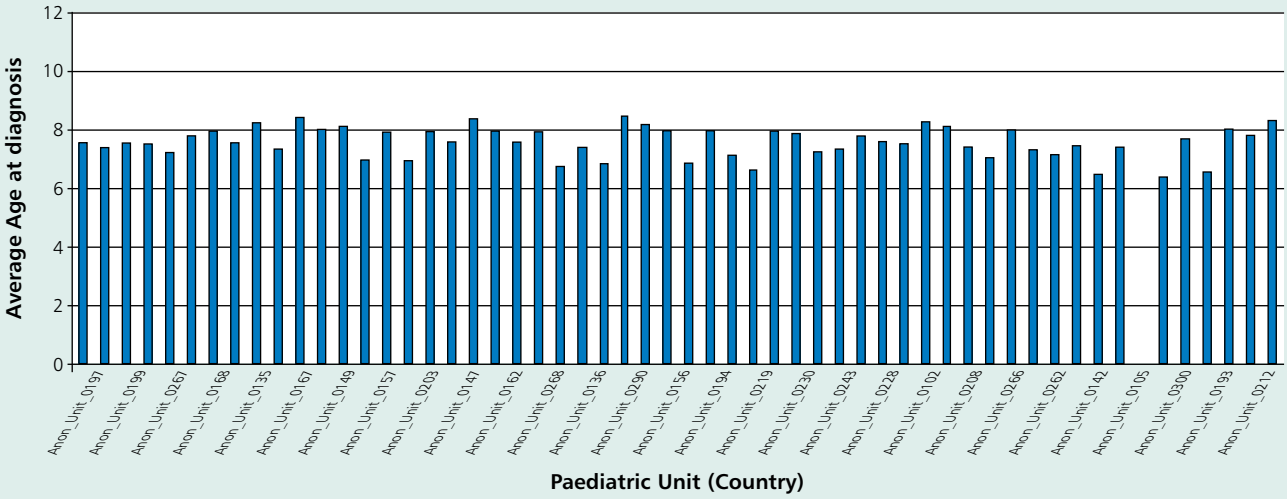


Figure 49: Age at diagnosis of diabetes by paediatric unit

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.

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 (figure 50) 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, that the age bands used are slightly different to those in the paediatric toolkit analysis and 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.

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 with diabetes, representing 59 percent of the Diabetes UK diabetic population[5] and the 501 children in Wales representing 45 percent of the Diabetes UK diabetic population.

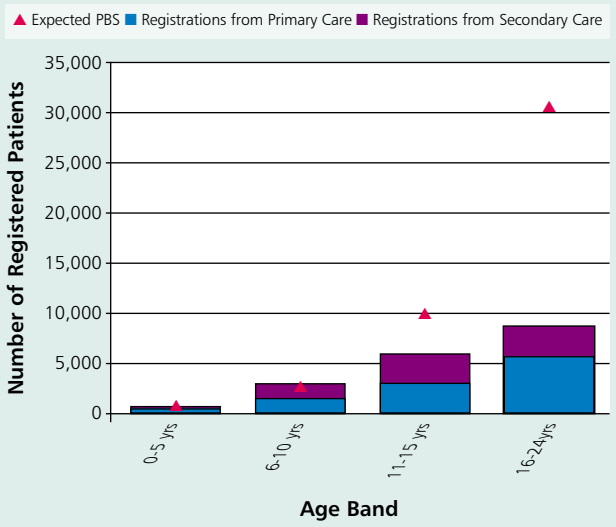


Figure 50: Registrations compared with PBS prevalence

5 As calculated in the National Paediatric Diabetes Audit: Results from Audit year 2002: Diabetes UK

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 51: 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 52: 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	Females %		Males %	
	under 16 yrs	16-24 yrs	under 16 yrs	16-24 yrs
2003/04	7.83	8.81	6.46	8.36
2004/05	8.71	9.78	7.10	8.57

Figure 53: Prevalence of Ketoacidosis by age and gender

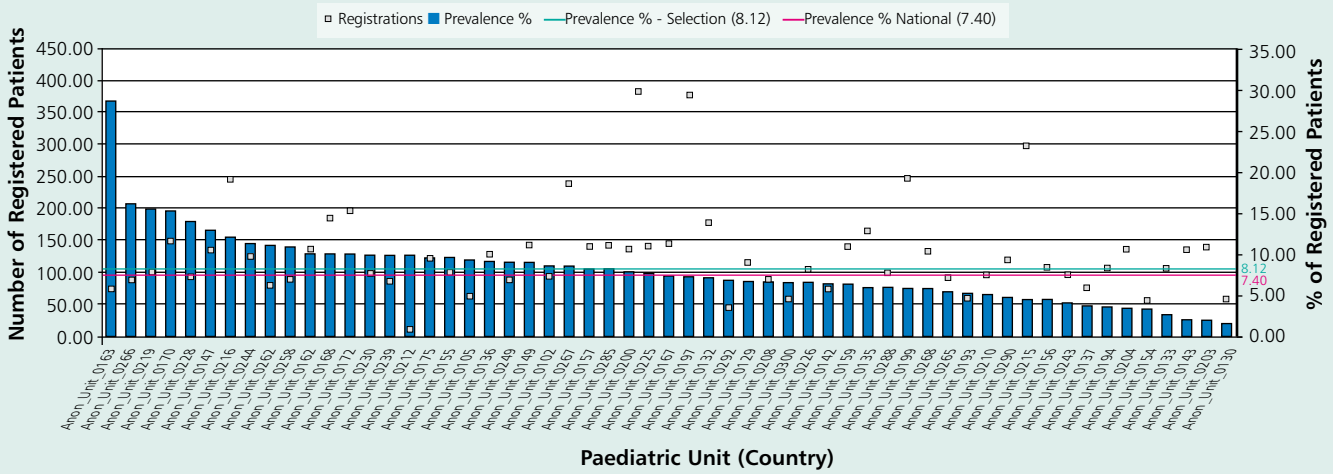


Figure 54: Prevalence of ketoacidosis by paediatric unit

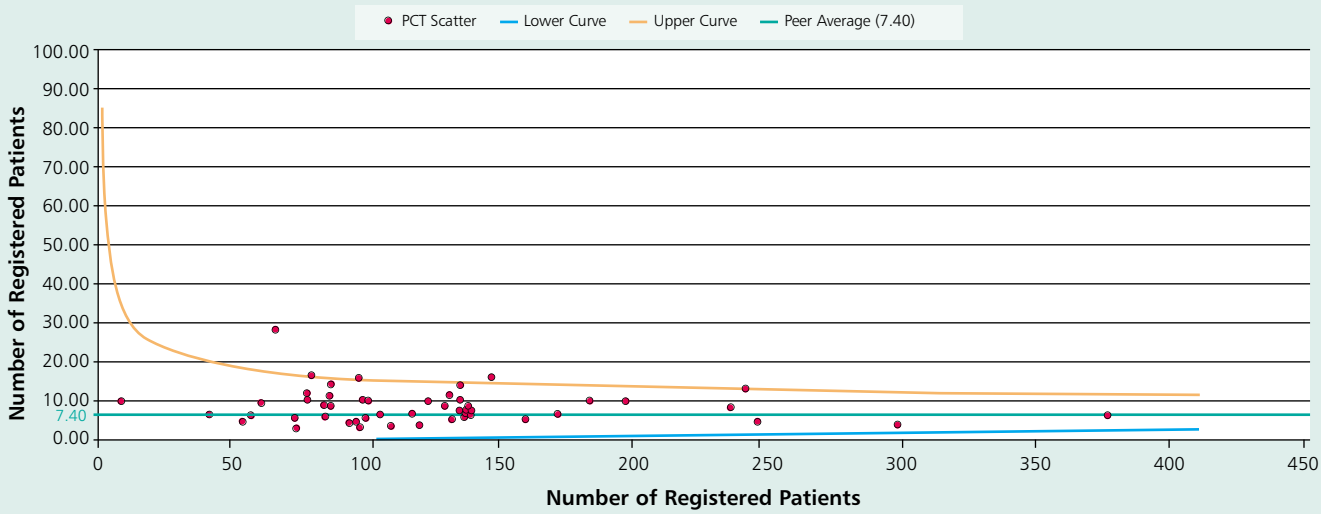


Figure 55: Statistical Process Control for ketoacidosis prevalence by paediatric unit

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. 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.

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 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)

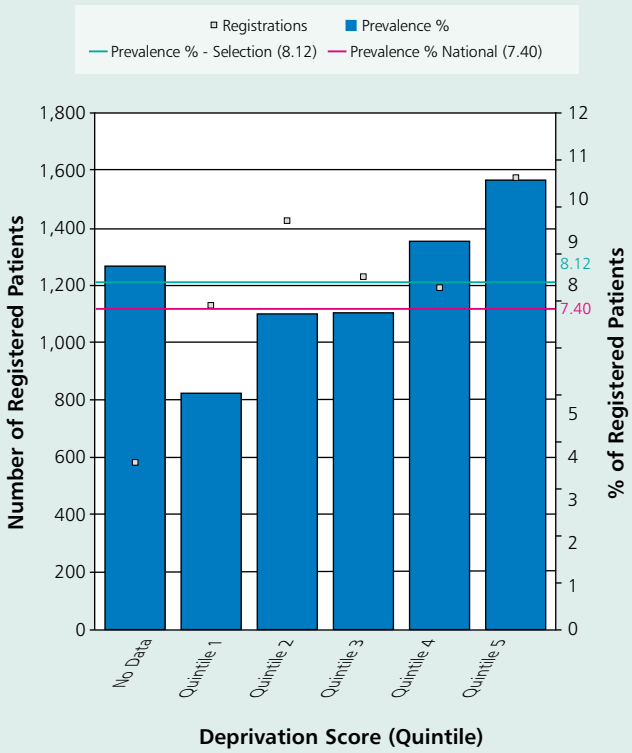


Figure 56: Prevalence of ketoacidosis by deprivation quintile

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.

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.

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

Figure 57: Prevalence of ketoacidosis by ethnic group 2003/04 and 2004/05
n=total number within the ethnicity category

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?[6]

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 age 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 age 12-15 years.

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 H). 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 Bands	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 58: HbA1c by age band

Recommendation

Paediatric units should strive to continue 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%
Creatinine	21%	23%
Cholesterol	19%	18%
Eye Exam	19%	19%
Foot Exam	17%	20%
All care processes	2%	2%

Figure 59: Proportion of Care processes by gender for 12-15 year olds
n= Total number within the gender category

6 Care process information was not available for the paediatric units in Wales, therefore the following analysis includes just the data from units in England (7073).

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 60: HbA1c by Ethnic group

HbA1c Test

This shows the average amount of glucose in a person's 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?[7]

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 61 and 66).

Age Bands (Clinical)	Gender	% Achieving HbA1c targets <7.5%	% Achieving HbA1c targets ≤ 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 62: HbA1c treatment target achievement rates

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

Figure 63: Comparison of achievement of HbA1c targets across the audit years (0-16 years)

With increasing age the rates for achieving the HbA1c targets decrease (figures 61 and 62).

The rates of achieving the HbA1c targets have improved this year, however, they are still not reaching the benchmarks set in the audit last year (figure 63).

Recommendation

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

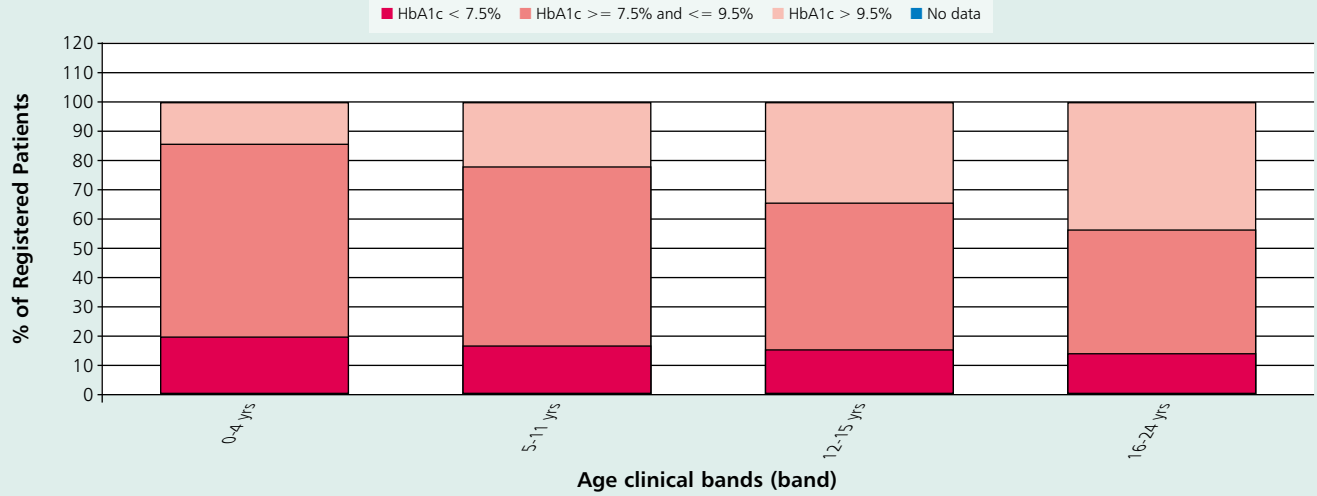


Figure 61: HbA1c treatment targets by age band

7 Treatment target information was not available for the paediatric units in Wales; therefore the following analysis includes only the data from units in England (7,073).

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 64: HbA1c target achievement by ethnic group

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 I.

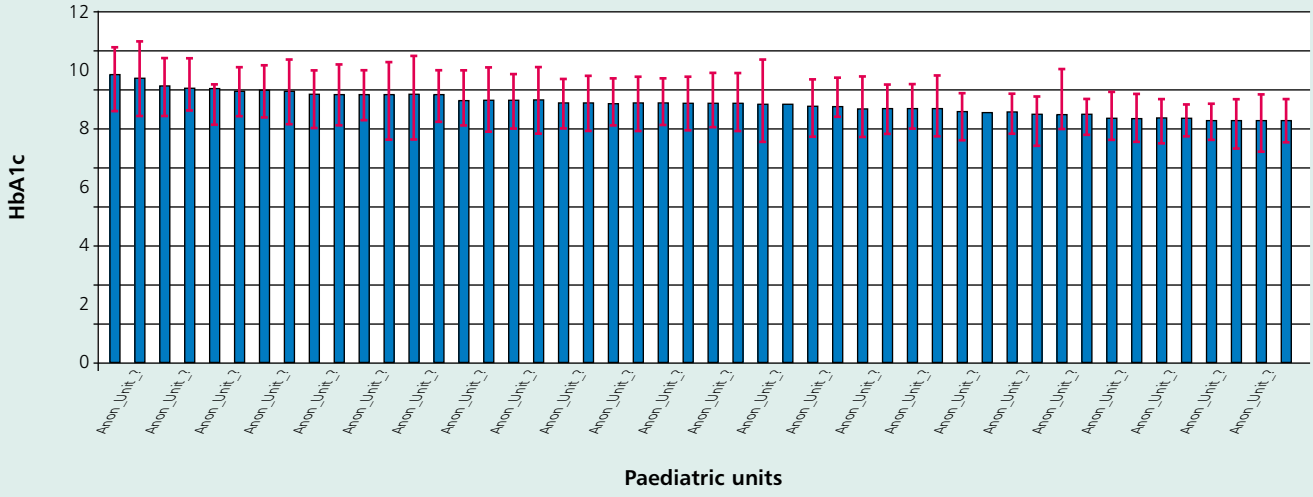


Figure 65: Median HbA1c and IQ range by paediatric unit

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 67).

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 66: Cholesterol treatment target rates

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 asses 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 faciliate 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 within the NDA Analysis Toolkit.

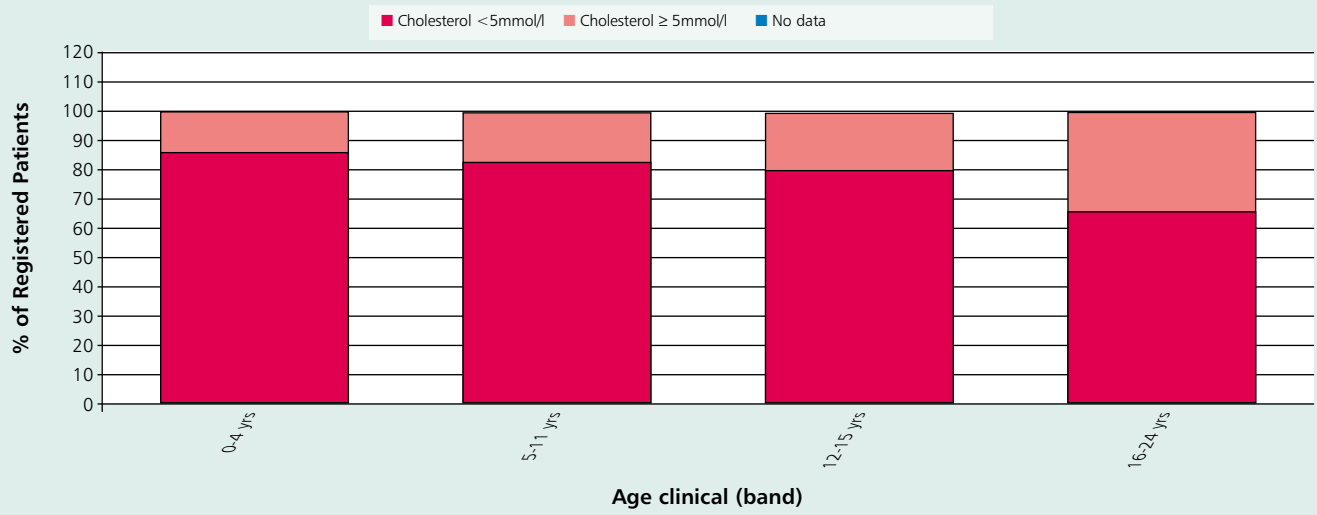


Figure 67: Achievement of cholesterol treatment target by age band

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 data collection 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.

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.
5. The National Paediatric Diabetes Audit: Results from the audit year 2002.Diabetes UK 2002.

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 for health and social care

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, Barts and the 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

Appendix B

Participation in the NDA for 2004/05 Audit Data by PCTs

Norfolk, Suffolk and Cambridgeshire

Norwich
North Peterborough
South Peterborough
West Norfolk
Southern Norfolk
Huntingdonshire
Great Yarmouth
Cambridge City
South Cambridgeshire
East Cambridgeshire and Fenland
Broadland
North Norfolk
Ipswich
Suffolk Coastal
Central Suffolk
Waveney
Suffolk West

Bedfordshire and Hertfordshire

Hertsmere
Luton
Bedford
Bedfordshire Heartlands
Welwyn Hatfield
North Hertfordshire and Stevenage
South East Hertfordshire
Royston, Buntingford and Bishop's Stortford
Watford and Three Rivers
Dacorum
St Albans and Harpenden

Essex

Tendring
Epping Forest
Southend on Sea
Harlow
Maldon and South Chelmsford

Not registered, Not Submitted Registered, <50% Submitted data Registered, >50% Submitted data

Colchester
Uttlesford
Billericay, Brentwood and Wickford
Thurrock
Basildon
Chelmsford
Castle Point and Rochford
Witham, Braintree & Halstead Care Trust

Cheshire & Merseyside
Bebington and West Wirral
Southport and Formby
North Liverpool
Birkenhead and Wallasey
Cheshire West
Central Cheshire
Eastern Cheshire
Ellesmere Port and Neston
Central Liverpool
South Liverpool
Halton
Warrington
St Helens
Knowsley
South Sefton

Thames Valley
Milton Keynes
Newbury and Community
Reading
Slough
Wokingham
Vale of Aylesbury
North East Oxfordshire
Cherwell Vale
Oxford City
South East Oxfordshire
South West Oxfordshire
Bracknell Forest
Windsor, Ascot and Maidenhead
Chiltern and South Bucks
Wycombe

Hampshire and Isle of Wight
New Forest
North Hampshire
Isle of Wight
Mid-Hampshire
East Hampshire
Portsmouth City Teaching
Blackwater Valley and Hart
Southampton City
Fareham and Gosport
Eastleigh and Test Valley South

North West London
Hillingdon
Hammersmith and Fulham
Ealing
Hounslow
Brent Teaching
Harrow
Kensington and Chelsea
Westminster

North Central London
Barnet
Enfield
Haringey Teaching
Camden
Islington

North East London
Havering
Barking and Dagenham
City and Hackney Teaching
Tower Hamlets
Newham
Redbridge
Waltham Forest

South East London
Bromley
Greenwich
Lambeth
Southwark
Lewisham
Bexley Care Trust

South West London
Kingston
Croydon
Wandsworth
Richmond and Twickenham
Sutton and Merton

Not registered, Not Submitted Registered, <50% Submitted data Registered, >50% Submitted data

Northumberland, Tyne & Wear

Newcastle
North Tyneside
Gateshead
South Tyneside
Sunderland Teaching
Northumberland Care Trust

Kent and Medway

Dartford, Gravesham and Swanley
South West Kent
Maidstone Weald
Medway
Swale
Ashford
Canterbury and Coastal
East Kent Coastal
Shepway

Surrey and Sussex

Bexhill and Rother
Hastings and St Leonards
Mid-Sussex
East Elmbridge and Mid Surrey
East Surrey
Guildford and Waverley
North Surrey
Woking Area
Adur, Arun and Worthing
Western Sussex
Brighton and Hove City
Eastbourne Downs
Sussex Downs and Weald
Crawley
Horsham and Chanctonbury

Avon, Gloucestershire and Wiltshire

South Gloucestershire
West Wiltshire
South Wiltshire
Bath and North East Somerset
Bristol North
Bristol South and West
Swindon
Kennet and North Wiltshire
Cheltenham and Tewkesbury
West Gloucestershire
Cotswold and Vale
North Somerset

County Durham and Tees Valley

Hartlepool
North Tees
Durham Dales
Darlington
Derwentside
Durham and Chester-Le-Street
Easington
Sedgefield
Middlesbrough
Langbaurgh

North and East Yorkshire and Northern Lincolnshire

North East Lincolnshire
Selby and York
East Yorkshire
Yorkshire Wolds and Coast
Eastern Hull
West Hull
North Lincolnshire
Hambleton and Richmondshire
Craven, Harrogate and Rural District
Scarborough, Whitby and Ryedale

West Yorkshire

Airedale
Bradford City
Bradford South and West
North Bradford
Eastern Wakefield
Wakefield West
Leeds West
Leeds North East
East Leeds
South Leeds
Leeds North West
Calderdale
North Kirklees
Huddersfield Central
South Huddersfield

Not registered, Not Submitted	Registered, <50% Submitted data	Registered, >50% Submitted data

South Yorkshire
Doncaster Central
North Sheffield
Doncaster East
Doncaster West
Sheffield West
Sheffield South West
South East Sheffield
Rotherham
Barnsley

South West Peninsula
South Hams and West Devon
Torbay
Plymouth
West of Cornwall
North Devon
Exeter
East Devon
Mid Devon
Teignbridge
North and East Cornwall
Central Cornwall

Dorset and Somerset
North Dorset
Bournemouth Teaching
South and East Dorset
South West Dorset
Somerset Coast
Mendip
South Somerset
Taunton Deane
Poole

Trent
Central Derby
Mansfield District
Newark and Sherwood
West Lincolnshire
Lincolnshire South West Teaching
Chesterfield
Gedling
Amber Valley
North Eastern Derbyshire
Nottingham City
Erewash
Bassetlaw
Broxtowe and Hucknall
Greater Derby
Ashfield
Rushcliffe
Derbyshire Dales and South Derbyshire
East Lincolnshire
High Peak and Dales

Cumbria and Lancashire
Blackburn with Darwen
Carlisle and District
Eden Valley
West Cumbria
Morecambe Bay
Chorley and South Ribble
West Lancashire
Hyndburn and Ribble Valley
Burnley, Pendle and Rossendale
Preston
Fylde
Wyre
Blackpool

Greater Manchester
South Manchester
Central Manchester
North Manchester
Trafford South
Heywood and Middleton
Salford
Trafford North
Stockport
Ashton, Leigh and Wigan
Bolton
Oldham
Bury
Rochdale
Tameside and Glossop

Leicestershire, Northamptonshire and Rutland
Daventry and South Northamptonshire
Melton, Rutland and Harborough
Leicester City West
Eastern Leicester

Not registered, Not Submitted Registered, <50% Submitted data Registered, >50% Submitted data

Hinckley and Bosworth

Charnwood and North West Leicestershire
South Leicestershire
Northamptonshire Heartlands
Northampton

Shropshire and Staffordshire
Burntwood, Lichfield and Tamworth
Staffordshire Moorlands
Newcastle-Under Lyme
Shropshire County
North Stoke
South Stoke
Telford and Wrekin
East Staffordshire
Cannock Chase
South Western Staffordshire

Birmingham and The Black Country
Solihull
Dudley South
Dudley Beacon and Castle
South Birmingham
Walsall Teaching
Oldbury and Smethwick
Rowley Regis and Tipton
Wednesbury and West Bromwich
Wolverhampton City
North Birmingham
Heart of Birmingham Teaching
Eastern Birmingham

Coventry, Warwickshire, Herefordshire & Worcestershire
Herefordshire
Wyre Forest
Rugby
Coventry
North Warwickshire
South Warwickshire
Redditch and Bromsgrove
South Worcestershire

Appendix C

Participating Secondary Care Organisations 2004-05 Audit by SHA

Northumberland, Tyne & Wear Strategic HA
City Hospitals Sunderland NHS Foundation Trust
Newcastle Upon Tyne Hospitals NHS Trust
Northumbria Healthcare NHS Trust
South Tyneside NHS Foundation Trust

County Durham and Tees Valley Strategic HA
Bishop Auckland General Hospital
County Durham and Darlington Acute Hospitals NHS Trust
North Tees and Hartlepool NHS Trust
South Tees Hospital NHS Trust - Friarage Hospital
South Tees Hospital NHS Trust - James Cook University Hospital

North and East Yorkshire and Northern Lincolnshire Strategic HA
Harrogate Health Care NHS Trust
Hull & East Yorkshire NHS Trust
Northern Lincolnshire and Goole Hospital NHS Trust
Scarborough & North East Yorkshire Health Care NHS Trust
York Hospital Services NHS Trust

West Yorkshire Strategic HA
Airdeale NHS Trust
Calderdale Royal Hospital
Dewsbury & District Hospitals
Pinderfields General Hospital
Pontefract General Hospital

South Yorkshire Strategic HA
Barnsley Hospital NHS Foundation Trust
Doncaster & Bassetlaw Hospital NHS Trust
Northern General Hospital
Rotherham NHS Foundation Trust
Royal Hallamshire Hospital

Cumbria and Lancashire Strategic HA
Blackpool Fylde & Wyre Hospital NHS Trust
East Lancashire Hospitals NHS Trust
Lancashire Teaching Hospital NHS Foundation
Morecambe Bay Hospitals NHS Trust
North Cumbria Acute Hospitals NHS Trust

Not registered, Not Submitted	Registered, <50% Submitted data	Registered, >50% Submitted data

Cheshire and Merseyside Strategic HA

Aintree Hospitals NHS Trust
Countess of Chester Hospital
East Cheshire NHS Trust
Liverpool Women's Hospital NHS Foundation Trust
Mid Cheshire Hospitals NHS Trust
North Cheshire Hospitals NHS Trust
Royal Liverpool and Broadgreen University Hospitals NHS Trust
Southport & Ormskirk Hospital NHS Trust
St Helens & Knowsley Hospital Trust
Wirral Hospital NHS Trust

Trent Strategic HA

Chesterfield Royal Hospital NHS Foundation Trust
Derby Hospital NHS Foundation Trust
Nottingham City Hospital
Queens Medical Centre in Nottingham
Sherwood Forest Hospitals NHS Trust
United Lincolnshire NHS Trust - County Hospital
United Lincolnshire NHS Trust - Pilgrim Hospital

Birmingham and The Black Country Strategic HA

Birmingham Women's Healthcare NHS Trust
Dudley Group of Hospitals NHS Trust
Good Hope Hospital NHS Trust
Heart of England NHS Foundation Trust
Manor Hospital
Royal Wolverhampton Hospitals NHS Trust
Sandwell & West Birmingham Hospitals NHS Trust
University Hospital Birmingham NHS Foundation Trust

West Midlands South Strategic HA

County Hospital Hereford
George Eliot Hospital
South Warwickshire General Hospital NHS Trust
University Hospital Coventry and Warwickshire NHS Trust
Worcestershire Acute Hospitals NHS Trust

Greater Manchester Strategic HA

Bolton Hospitals NHS Trust
Central Manchester and Manchester Children's University Hospitals NHS Trust
Christie Hospital NHS Trust
Manchester Royal Infirmary
Pennine Acute Hospitals NHS Trust
Salford Royal Hospital NHS Trust
South Manchester University Hospitals NHS Trust
Stockport NHS Foundation Trust
Tameside & Glossop Acute Services NHS Trust
Trafford Healthcare NHS Trust
Wrighington, Wigan, Leigh NHS Trust
Wythenshawe Hospital

Bedfordshire and Hertfordshire Strategic HA

Bedford Hospitals NHS Trust
East & North Hertfordshire NHS Trust
Hemel Hempstead & St Albans Hospital
Hertfordshire Partnership Trust
Luton & Dunstable Hospital NHS Trust

Norfolk, Suffolk and Cambridgeshire Strategic HA

Cambridge University Hospitals NHS Foundation Trust
Hinchingbrooke Healthcare Trust
Ipswich Hospital NHS Trust
James Paget Healthcare NHS Trust
Kings Lynn & Wisbech Hospitals NHS Trust
Norfolk and Norwich University Hospital NHS Trust
Papworth Hospital NHS Foundation Trust
Peterborough & Stamford Hospitals NHS Foundation Trust
West Suffolk Hospital Diabetes Centre

Essex Strategic HA

Basildon & Thurrock University Hospitals
Essex Rivers Healthcare NHS Trust
Mid Essex Hospitals
Princess Alexandra Hospital NHS Trust
Southend Hospital NHS Trust

North West London Strategic HA

Chelsea & Westminster Healthcare NHS Trust
Ealing Hospital NHS Trust
Hammersmith Hospital NHS Trust
Hillingdon Hospital NHS Trust
North West London Hospital NHS Trust
St Mary's NHS Trust
West Middlesex University Hospital NHS Trust

Leicestershire, Northamptonshire and Rutland Strategic HA

Kettering General Hospitals NHS Trust
Leicester Royal Infirmary
Northampton General Hospital
University Hospitals of Leicester

Not registered, Not Submitted Registered, <50% Submitted data Registered, >50% Submitted data

Shropshire and Staffordshire Strategic HA
Burton Hospitals NHS Trust
Mid Staffordshire General Hospital NHS Trust
Shrewsbury & Telford Hospital NHS Trust
University Hospitals of North Staffordshire

Thames Valley Strategic HA
Amersham Hospital
Buckinghamshire Hospitals NHS Trust
Churchill Hospital
Heatherwood & Wexham Park Hospitals NHS Trust
Milton Keynes General Hospital
Oxford Radcliffe Hospitals NHS Trust
Royal Berkshire & Battle Hospitals NHS
Stoke Mandeville Hospital Trust

Hampshire and Isle of Wight Strategic HA
North Hampshire Hospital
Portsmouth Hospitals NHS Trust
Southampton General Hospital
Southampton University Hospitals NHS Trust
Winchester & Eastleigh Healthcare Trust

Kent and Medway Strategic HA
Darent Valley Hospital
Dartford, Gravesham NHS Trust
East Kent Hospitals NHS Trust
Maidstone & Tumbridge Wells
Medway NHS Trust

Surrey and Sussex Strategic HA
Ashford and St Peter's Hospital NHS Trust
Brighton & Sussex University Hospitals NHS Trust
East Sussex Hospitals NHS Trust
Frimley Park Hospital NHS Foundation Trust
Queen Victoria Hospital NHS Foundation Trust
Royal Surrey County Hospital NHS Trust
Royal West Sussex NHS Trust
Surrey & Sussex Healthcare NHS Trust
Worthing & Southlands Hospitals NHS Trust

North Central London Strategic HA
Barnet & Chase Farm Hospitals NHS Trust
North Middlesex Hospital
Royal Free Hampstead NHS Trust
University College London Hospitals NHS Foundation Trust
Whittington Hospital NHS Trust

North East London Strategic HA
Barking, Havering & Redbridge Hospitals
Barts and London NHS Trust
Homerton Hospital NHS Trust
Newham University Hospital NHS Trust
Royal London Hospital
Whipps Cross University Hospital NHS Trust

South East London Strategic HA
Bromley Hospitals NHS Trust
Guy's & St Thomas NHS Foundation Trust
Princess Royal University Hospital
Queen Elizabeth Hospital NHS Trust
Queen Mary's Sidcup NHS Trust
University Hospital Lewisham

South West London Strategic HA
Epsom & St Helier NHS Trust
Kingston Hospital NHS Trust
Mayday Healthcare NHS Trust
Royal Marsden NHS Foundation Trust
St George's Healthcare NHS Trust

Avon, Gloucestershire and Wiltshire Strategic HA
Gloucestershire Hospital NHS Foundation Trust
North Bristol NHS Trust
Royal United Hospital Bath NHS Trust
Salisbury Healthcare NHS Trust
Swindon & Marlborough NHS Trust
United Bristol Healthcare NHS Trust
Weston General Hospital

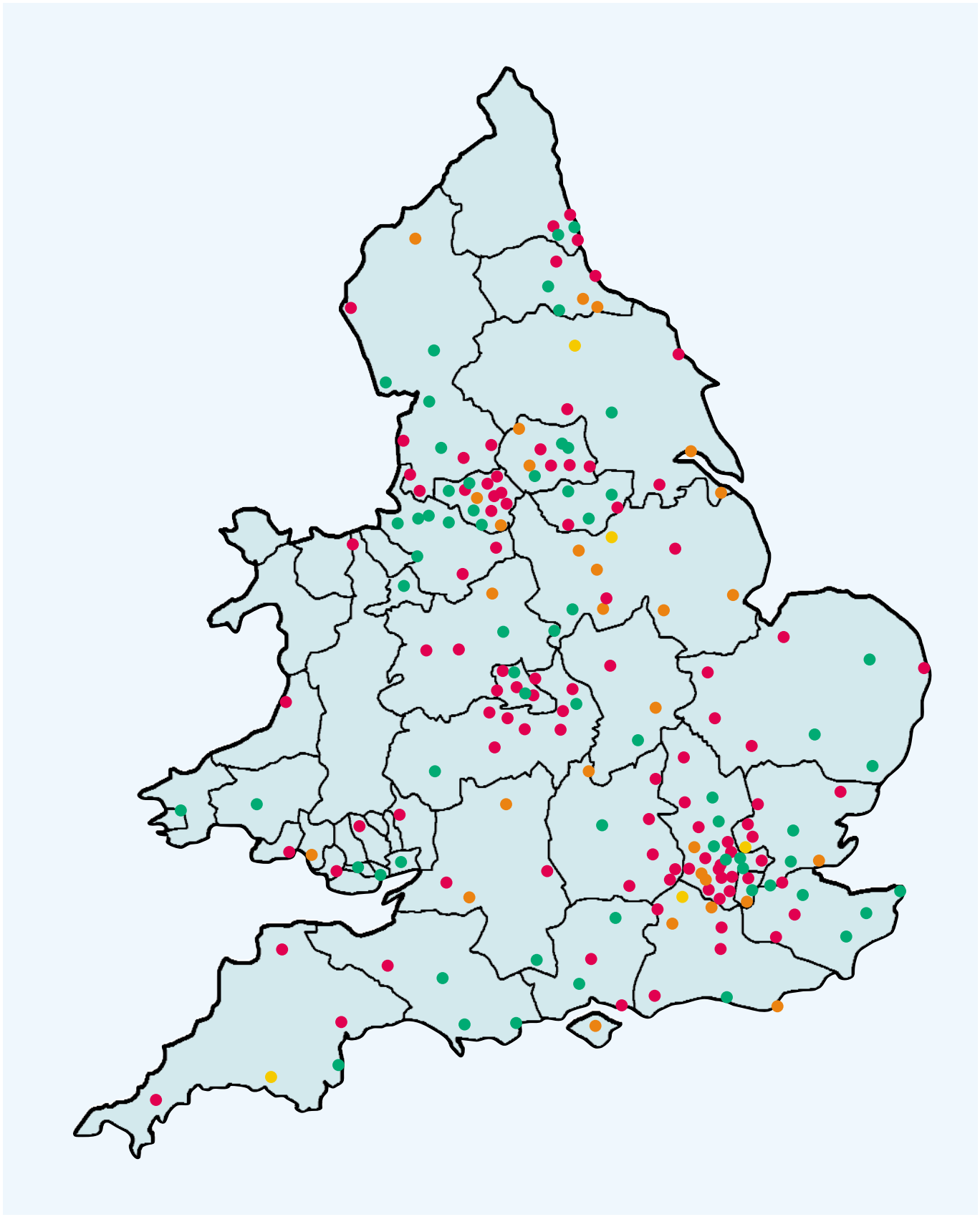
South West Peninsula Strategic HA
Northern Devon Healthcare NHS Trust
Plymouth Hospitals NHS Trust
Royal Cornwall Hospitals NHS Trust
Royal Devon & Exeter NHS Foundation Trust
South Devon Healthcare NHS Trust

Dorset and Somerset Strategic HA
East Somerset NHS Trust
Poole Hospital
Royal Bournemouth & Christchurch Hospitals NHS Foundation Trust
Taunton and Somerset NHS Trust
West Dorset General Hospitals Trust
Yeovil District Hospital

Not registered, Not Submitted Registered, <50% Submitted data Registered, >50% Submitted data

Appendix D

Map of Paediatric Unit Registrations 2004/05



Status of Registrations

Registered & Submitted | Submitted But Unsuccesful | 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 Children's 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 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
Southend Hospital

Status of Registrations
Registered & Submitted Submitted But Unsuccesful Registered Not Submitted Not Registered

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, Tumbridge 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 Unsuccesful | 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
Hinchingbrooke 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 Unsuccesful | Registered Not Submitted | Not Registered

Appendix E

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 68 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 of 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/audittopics/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.

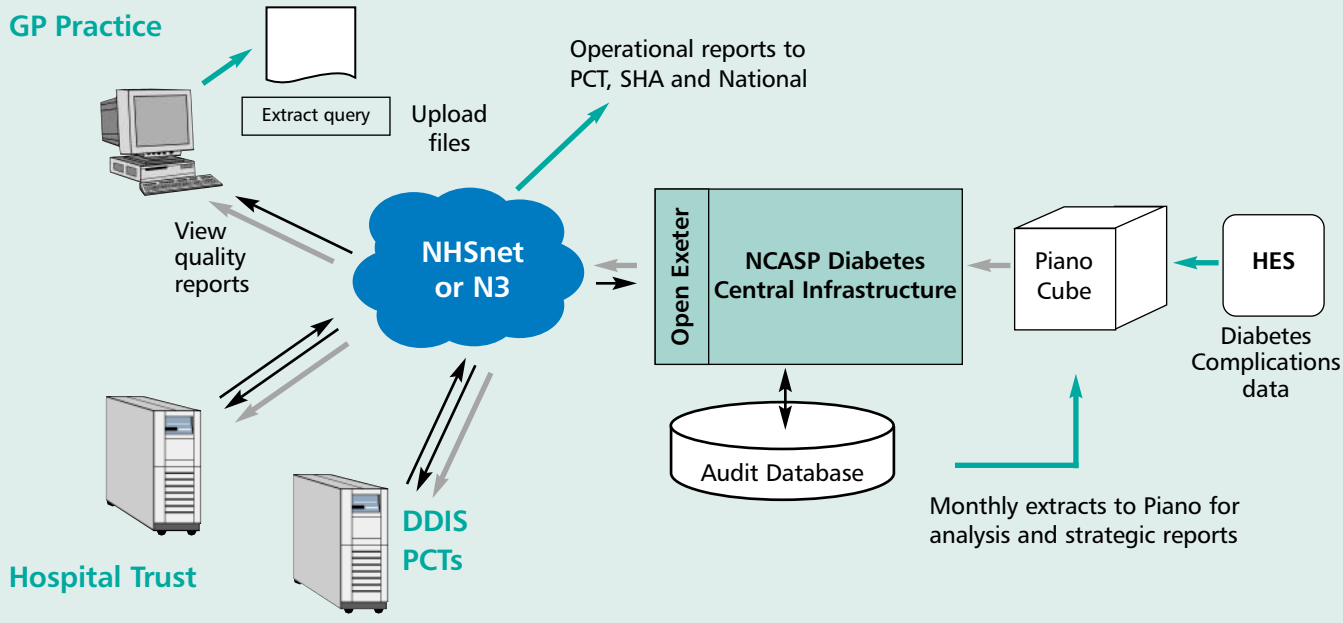


Figure 68: Infrastructure of the National Diabetes Audit

Appendix F

The National Diabetes Audit Dataset - Annotated for Paediatric Units

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 G

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 H

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 I

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		

Acknowledgements

The audit was commissioned by the Healthcare Commission and developed in partnership with Diabetes UK. Throughout the development we have worked with representatives from the following organisations: the Department of Health, the National Diabetes Support Team, Yorkshire and Humber Public Health Observatory, PRIMIS, NHS Connecting for Health and the Royal College of Nursing, Royal College of Physicians, The Royal College of Paediatrics and Child Health and The Royal College of General Practitioners. The membership of the NDA Management Board is shown in Appendix A.

The National Diabetes Support Team (NDST) and the National Clinical Director for Diabetes have provided considerable support for the NDA audit and actively involved networks and PCTs in the audit. Throughout the project we have worked closely with the Yorkshire and Humber PHO and the various individuals responsible for the PBS phase 2 diabetes prevalence model.

We would also like to acknowledge the work done by PRIMIS in writing and supporting the queries that have been used by PCTs and GP practices to provide data for the audit and the contribution from Pat Potts of Dacorum PCT in providing invaluable feedback and testing of the MIQUEST queries.

NHS Connecting for Health have supported the technical infrastructure for collecting the audit data. The team based in Exeter have provided an infrastructure that has been easy to use and which is well supported. We would particularly like to acknowledge Simon Netley, Darren Reddick and the helpdesk team who have provided support to users of the audit.

The analysis for the Audit is provided by the NDA toolkit, powered by PIANO. The NDA toolkit provides a powerful analysis capability that has greatly facilitated the findings included in this report. We would particularly like to acknowledge the work of James Barrett in providing the ongoing support and development of the toolkit. Much of the work in preparing the analysis and identifying the findings has been done by consultants from Medical Mosaic. In particular we would like to acknowledge all the work and support provided by Claire Morris and Jilly Alexander. We would also like to acknowledge the input given by the NDA team particularly Julie Henderson and Emma Hirst.

We would also like to acknowledge the work done by The Information Centre for health and social care's Geographic Demography and Population Statistics team. We would particularly like to thank Bill Hageman and Nick Armitage for their work in designing and developing the Registration map information.

Above all we would like to acknowledge all the PCTs, GP practices, hospital trusts and paediatric units who have contributed to the audit and provided the data that has been used in this report.

The Information Centre™
knowledge for care

The IC is working to make information more relevant and accessible to the public, regulators, health and social care professionals and policy makers, leading to improvements in knowledge and efficiency. The IC is a special NHS health authority that collects, analyses and distributes data to reduce the burden on frontline staff, releasing more time for direct care.

Ref 13090601.

Further information:

The Information Centre for health and social care
1 Trevelyan Square
Boar Lane
Leeds
LS1 6AE

www.ic.nhs.uk

0845 300 6016