National Diabetes Audit 2010-2011

Report 2: Complications and Mortality

Summary for Nottinghamshire County Teaching PCT (5N8)

Key findings about the outcomes for people with diabetes in Nottinghamshire County Teaching PCT
Complication Ratios in Nottinghamshire County Teaching PCT

This report contains the complications and mortality data from the National Diabetes Audit (NDA) report for 2010-11 for Nottinghamshire County Teaching PCT. It is important to act upon this information.

No health economy can afford to be complacent about diabetes and diabetic complications because even in the best performing health economies the health burden of diabetes is enormous. It is recommended that every Primary Care Trust (PCT) and Local Health Board (LHB) uses these reports to prioritise local improvement efforts across all General Practice and Specialist care providers. Action plans should aim to better achieve the NICE guidance found at: www.nice.org.uk/cg87; www.nice.org.uk/cg15; www.nice.org.uk/cg108.

Data from people with diabetes submitted to the 2009-2010 NDA and still alive on 31st March 2010 were matched to Hospital Episode Statistics (HES), a record of every hospital admission in England, and Patient Episode Data for Wales (PEDW), a record of every hospital admission in Wales, for the period 1st April 2010 to 31st March 2011. The prevalence of each complication was calculated as the number of people alive of the 31st March who had one or more hospital admissions with a relevant complication between 1st April 2010 and 31st March 2011.

Many of the complications of diabetes are more common in males and older people. As a result, the age and sex structure of the population with diabetes will influence the number of people with complications. The impact of the age and sex structure of the population can be removed by standardisation, allowing robust comparisons between different PCTs and LHBs. Apart from diabetic ketoacidosis, which is unique to diabetes, the standardised ratios presented here report the excess risk of complications and death due to diabetes. The calculations compare the complication prevalence for people with diabetes with the prevalence in the general population in the same PCT or LHB after adjustment for age and sex.

All results in this report have been tested for statistical significance at the 95% confidence interval; i.e. there is a 1 in 20 chance that the statements made in this report are untrue. Therefore in this report:

Lower than expected: the result for people with diabetes is statistically significantly lower (p<0.05) than in England and Wales.

As expected: the result for people with diabetes is not statistically significantly different than in England and Wales.

Higher than expected: the result for people with diabetes is statistically significantly higher (p<0.05) than in England and Wales.

The standardised diabetic complications ratios for Nottinghamshire County Teaching PCT and for England and Wales are shown in Table 1.
<table>
<thead>
<tr>
<th></th>
<th>Total Expected</th>
<th>Observed</th>
<th>Standardised Ratio*</th>
<th>95% Confidence Interval*</th>
<th>Additional risk</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Angina</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nottinghamshire County Teaching PCT</td>
<td>685</td>
<td>1206</td>
<td>176</td>
<td>166 186</td>
<td>76%</td>
</tr>
<tr>
<td>England and Wales</td>
<td>40840</td>
<td>69957</td>
<td>171</td>
<td>170 173</td>
<td>71.3%</td>
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<tr>
<td><strong>Myocardial Infarction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nottinghamshire County Teaching PCT</td>
<td>174</td>
<td>277</td>
<td>159</td>
<td>141 179</td>
<td>59%</td>
</tr>
<tr>
<td>England and Wales</td>
<td>9782</td>
<td>14476</td>
<td>148</td>
<td>146 150</td>
<td>48.0%</td>
</tr>
<tr>
<td><strong>Heart Failure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nottinghamshire County Teaching PCT</td>
<td>361</td>
<td>599</td>
<td>166</td>
<td>153 180</td>
<td>66%</td>
</tr>
<tr>
<td>England and Wales</td>
<td>27291</td>
<td>45001</td>
<td>165</td>
<td>163 166</td>
<td>64.9%</td>
</tr>
<tr>
<td><strong>Stroke</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nottinghamshire County Teaching PCT</td>
<td>184</td>
<td>228</td>
<td>124</td>
<td>108 141</td>
<td>24%</td>
</tr>
<tr>
<td>England and Wales</td>
<td>14327</td>
<td>17892</td>
<td>125</td>
<td>123 127</td>
<td>24.9%</td>
</tr>
<tr>
<td><strong>Renal Replacement Therapy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nottinghamshire County Teaching PCT</td>
<td>52</td>
<td>130</td>
<td>252</td>
<td>211 299</td>
<td>152%</td>
</tr>
<tr>
<td>England and Wales</td>
<td>3993</td>
<td>9753</td>
<td>244</td>
<td>239 249</td>
<td>144%</td>
</tr>
<tr>
<td><strong>Minor Amputation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nottinghamshire County Teaching PCT</td>
<td>11</td>
<td>53</td>
<td>482</td>
<td>361 630</td>
<td>382%</td>
</tr>
<tr>
<td>England and Wales</td>
<td>706</td>
<td>3042</td>
<td>431</td>
<td>415 446</td>
<td>331%</td>
</tr>
<tr>
<td><strong>Major Amputation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nottinghamshire County Teaching PCT</td>
<td>7</td>
<td>28</td>
<td>405</td>
<td>269 586</td>
<td>305%</td>
</tr>
<tr>
<td>England and Wales</td>
<td>559</td>
<td>1731</td>
<td>310</td>
<td>295 325</td>
<td>210%</td>
</tr>
</tbody>
</table>

* For definitions, please refer to the glossary
Where values are shown as * the data have been suppressed for reasons of statistical and information governance.

RAG (Red-Amber-Green) score key: ■ Higher than expected ▲ As expected □ Lower than expected compared to England and Wales □ Data has been suppressed
Angina

Figure 1 shows the spread of standardised ratios for angina for all PCTs/LHBs. The results for Nottinghamshire County Teaching PCT are highlighted in black and are as expected when compared against the national level for people with diabetes.

**Figure 1. Chart showing the spread of standardised ratios for angina in people with diabetes in PCTs and LHBs**

The additional risk of angina for England and Wales is 71% higher for people with diabetes than in the general population so it is an area for health improvement that should be considered by all health economies. The additional risk of angina in people with diabetes in Nottinghamshire County Teaching PCT is 76% higher than in the general population of Nottinghamshire County Teaching PCT. It is recommended that Nottinghamshire County Teaching PCT reviews the approach of its Diabetes Care Providers to angina risk reduction including exercise, diet composition, weight management, smoking, glucose control, blood pressure control and cholesterol control ([www.nice.org.uk/cg87](http://www.nice.org.uk/cg87); [www.nice.org.uk/cg15](http://www.nice.org.uk/cg15)).
Myocardial Infarction

Figure 2 shows the spread of standardised ratios for myocardial infarction for all PCTs/LHBs. The results for Nottinghamshire County Teaching PCT are highlighted in black and are as expected when compared against the national level for people with diabetes.

Figure 2. Chart showing the spread of standardised ratios for myocardial infarction in people with diabetes in PCTs and LHBs

The additional risk of admission to hospital with myocardial infarction is 48% higher for people with diabetes than in the general population so it is an area for health improvement that should be considered by all health economies. The additional risk of myocardial infarction in people with diabetes in Nottinghamshire County Teaching PCT is 59% higher than in the general population of Nottinghamshire County Teaching PCT. It is recommended that Nottinghamshire County Teaching PCT reviews the approach of its Diabetes Care Providers to myocardial infarction risk reduction including exercise, diet composition, weight management, smoking, glucose control, blood pressure control and cholesterol control (www.nice.org.uk/cg87; www.nice.org.uk/cg15).
Heart Failure

Figure 3 shows the spread of standardised ratios for heart failure for all PCTs/LHBs. The results for Nottinghamshire County Teaching PCT are highlighted in black and are as expected when compared against the national level for people with diabetes.

Figure 3. Chart showing the spread of standardised ratios for heart failure in people with diabetes in PCTs and LHBs

The additional risk of admission to hospital with heart failure is 65% higher for people with diabetes than in the general population so it is an area for health improvement that should be considered by all health economies. The additional risk of heart failure in people with diabetes in Nottinghamshire County Teaching PCT is 66% higher than in the general population of Nottinghamshire County Teaching PCT. It is recommended that Nottinghamshire County Teaching PCT reviews the approach of its Diabetes and Cardiology Care Providers to heart failure risk reduction including exercise, diet composition, weight management, smoking, glucose control, blood pressure control and cholesterol control (www.nice.org.uk/cg87; www.nice.org.uk/cg15) and to the management of heart failure according to NICE guidance (www.nice.org.uk/cg108).
Stroke

Due to low numbers of admissions to hospital for stroke, the random play of numbers means that the recorded ‘additional risk’ of stroke in people with diabetes can be zero or less. It is expected that when measured over a longer period the reported results will come closer to the national average.

Figure 4 shows the spread of standardised ratios for stroke for all PCTs/LHBs. The results for Nottinghamshire County Teaching PCT are highlighted in black and are as expected when compared against the national level.

Figure 4. Chart showing the spread of standardised ratios for stroke in people with diabetes in PCTs and LHBs

The additional risk of admission to hospital with stroke is 24.9% higher for people with diabetes than in the general population so it is an area for health improvement that should be considered by all health economies. The additional risk of stroke in people with diabetes in Nottinghamshire County Teaching PCT is 24% higher than in the general population of Nottinghamshire County Teaching PCT. It is recommended that Nottinghamshire County Teaching PCT reviews the approach of its Diabetes and Cardiology Care Providers to stroke risk reduction including exercise, diet composition, weight management, smoking, glucose control, blood pressure control and cholesterol control (www.nice.org.uk/cg87; www.nice.org.uk/cg15).
Renal Replacement Therapy

Figure 5 shows the spread of standardised ratios for renal replacement therapy with dialysis or transplantation for all PCTs/LHBs. The results for Nottinghamshire County Teaching PCT are highlighted in black and are as expected when compared against the national level for people with diabetes.

Figure 5. Chart showing the spread of standardised ratios for renal replacement therapy in people with diabetes in PCTs and LHBs

The additional risk of an admission of undergoing renal replacement treatment with dialysis or transplantation is 144% higher for people with diabetes than in the general population so it is an area for health improvement that should be considered by all health economies. The additional risk of undergoing renal replacement therapy in people with diabetes in Nottinghamshire County Teaching PCT is 152% higher than in the general population of Nottinghamshire County Teaching PCT. It is recommended that Nottinghamshire County Teaching PCT reviews the approach of its Diabetes Care Providers to: glucose control and blood pressure control among all patients with diabetes; the early identification of people at increased risk of diabetic kidney disease using the annual Urine Albumin Creatinine Ratio test; and intensive risk reduction intervention in those who are screen positive (www.nice.org.uk/cg87; www.nice.org.uk/cg15).

Due to low numbers, the results for a number of PCTs/LHBs have been suppressed for reasons of statistical and information governance. The results for these PCTs/LHBs appear as a zero value on this figure.
Minor Amputation

Figure 6 shows the spread of standardised ratios for minor amputations for PCTs/LHBs. The results for Nottinghamshire County Teaching PCT are highlighted in black and are as expected when compared against the national level for people with diabetes.

The additional risk of having a minor amputation in people with diabetes is 331% than in the general population so it is an area for health improvement that should be considered by all health economies. The additional risk of having a minor amputation in people with diabetes in Nottinghamshire County Teaching PCT is 382% higher than in the general population of Nottinghamshire County Teaching PCT. It is recommended that Nottinghamshire County Teaching PCT makes a priority of reviewing the approach of its Diabetes Care Providers to risk reduction of peripheral vascular disease and neuropathy using exercise, diet composition, weight management, smoking, glucose control, blood pressure control and cholesterol control. Also to the early identification of people at increased risk of diabetic foot disease using annual foot surveillance of circulation, sensation, risk stratification. And, in those who are screen positive, intensive preventive management within a foot care protection programme; and to the prompt identification of new foot disease and its urgent referral to a multidisciplinary specialist diabetic foot team (www.nice.org.uk/cg87; www.nice.org.uk/cg15; www.nice.org.uk/cg119).
Major Amputation

Figure 7 shows the spread of standardised ratios for major amputations for PCTs/LHBs. The results for Nottinghamshire County Teaching PCT are highlighted in black and are as expected when compared against the national level for people with diabetes.

Figure 7. Chart showing the spread of standardised ratios for major amputations in people with diabetes in PCTs and LHBs

The additional risk of having a major amputation in people with diabetes is 210% higher than in the general population so it is an area for health improvement that should be considered by all health economies. The additional risk of having a major amputation in people with diabetes in Nottinghamshire County Teaching PCT is 305% higher than in the general population of Nottinghamshire County Teaching PCT. It is recommended that Nottinghamshire County Teaching PCT makes a priority of reviewing the approach of its Diabetes Care Providers to risk reduction of peripheral vascular disease and neuropathy using exercise, diet composition, weight management, smoking, glucose control, blood pressure control and cholesterol control. Also to the early identification of people at increased risk of diabetic foot disease using annual foot surveillance of circulation, sensation, risk stratification. And, in those who are screen positive, intensive preventive management within a foot care protection programme; and to the prompt identification of new foot disease and its urgent referral to a multidisciplinary specialist diabetic foot team (www.nice.org.uk/cg87; www.nice.org.uk/cg15; www.nice.org.uk/cg119).
## Diabetic Ketoacidosis

Standardised ratios for the prevalence of hospital admissions for diabetic ketoacidosis have been calculated for PCTs and LHBs. These adjust for the age and sex of the local population with diabetes and assess the prevalence of diabetic ketoacidosis compared with England and Wales.

The standardised diabetic ketoacidosis ratios for Nottinghamshire County Teaching PCT and for England and Wales are shown in Table 2.

### Table 2. Standardised ratios for diabetic complications for Nottinghamshire County Teaching PCT

<table>
<thead>
<tr>
<th></th>
<th>Total Expected</th>
<th>Observed</th>
<th>Standardised Ratio*</th>
<th>95% Confidence Interval*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DKA Obs</td>
<td>DKA SMR</td>
<td>Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>Diabetic ketoacidosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nottinghamshire County Teaching PCT</td>
<td>114</td>
<td>121</td>
<td>106</td>
<td>88</td>
</tr>
<tr>
<td>England and Wales in people with diabetes</td>
<td>8469</td>
<td>8469</td>
<td>100</td>
<td>98</td>
</tr>
</tbody>
</table>

Excludes unknown age and sex

* For definitions, please refer to the glossary

Where values are shown as * the data have been suppressed for reasons of statistical and information governance.

RAG (Red-Amber-Green) score key: ■ Higher than expected ■ As expected ■ Lower than expected compared to England and Wales = Data has been suppressed
Figure 8 shows the spread of standardised ratios for diabetic ketoacidosis for all PCTs/LHBs. The results for Nottinghamshire County Teaching PCT are highlighted in black and are as expected when compared against the national level.

**Figure 8. Chart showing the spread of standardised ratios for diabetic ketoacidosis in people with diabetes in PCTs and LHBs**

The number of people being admitted to hospital for diabetic ketoacidosis in Nottinghamshire County Teaching PCT is as expected when compared to people with diabetes in England and Wales. However, diabetic ketoacidosis has been increasing over the whole of England and Wales and there is an imperative to reduce the rate of this largely preventable cause of serious illness everywhere. Therefore, it is recommended that Nottinghamshire County Teaching PCT reviews the approach of its Diabetes Care Providers to the prevention of diabetic ketoacidosis specifically focusing on the services and support for young people with type 1 diabetes.
Mortality Analysis

Data from people who were included in the 2009-2010 NDA and still alive on 31st December 2010 were linked to data from the Medical Research Information Service (MRIS) to identify deaths between 1st January 2011 and 31st December 2011. This gives data on mortality in people with diabetes over a one year period.

The standardised mortality ratios for Nottinghamshire County Teaching PCT and for England and Wales are shown in Table 3.

Table 3. Standardised mortality ratios for Nottinghamshire County Teaching PCT

<table>
<thead>
<tr>
<th>Mortality</th>
<th>PYaR*</th>
<th>Expected Deaths</th>
<th>Observed Deaths</th>
<th>SMR*</th>
<th>95% Confidence Interval*</th>
<th>Additional risk of mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nottinghamshire County Teaching PCT</td>
<td>27505</td>
<td>702</td>
<td>1009</td>
<td>144</td>
<td>135</td>
<td>153</td>
</tr>
<tr>
<td>England and Wales</td>
<td>1930385</td>
<td>46986</td>
<td>65677</td>
<td>140</td>
<td>139</td>
<td>141</td>
</tr>
</tbody>
</table>

* For definitions, please refer to the glossary

RAG (Red-Amber-Green) score key: ■ Higher than expected  ■ As expected  ■ Lower than expected compared to England and Wales

Figure 9 shows the spread of all PCTs/LHBs standardised mortality ratios. The results for Nottinghamshire County Teaching PCT are highlighted in black and are as expected when compared against the national level.

Figure 9. Chart showing the spread of standardised mortality ratios in people with diabetes in PCTs and LHBs
For all PCTs/LHBs deaths are 36% higher for people with type 2 diabetes and 135% higher for people with type 1 diabetes than in the general population so is an area for health improvement that should be considered by all health economies. The additional risk of mortality in people with diabetes in Nottinghamshire County Teaching PCT is 44% higher than in the general population of Nottinghamshire County Teaching PCT. It is recommended that Nottinghamshire County Teaching PCT reviews the approach of its Diabetes and Cardiology Care Providers to cardiovascular risk reduction including exercise, diet composition, weight management, smoking, glucose control, blood pressure control and cholesterol control (www.nice.org.uk/cg87; www.nice.org.uk/cg15) and to the management of heart failure according to NICE guidance (www.nice.org.uk/cg108).
Glossary

**Standardised ratio**
The standardised ratio is a form of indirect standardisation. The age and sex specific rates for each complication of a chosen population (usually the relevant national or study aggregate population) are applied to the age and sex structure of the subject population to give an expected number of complications. The observed number of events is then compared to the expected and is usually expressed as ratio (observed/expected). For presentation purposes the standardised ratio is usually expressed per 100. By definition, the standard population will have a standardised ratio of 100. Standardised ratios above 100 indicate that the complication count observed was greater than that expected from the standardised complications rates and for standard ratios below 100 that it was lower.

**Expected complications**
The expected complication count is that which would occur if the observed subject population experienced the standard population’s age and sex specific complication rates.

**Population-years-at-risk (PYaR)**
The population-years-at-risk is the total amount of time at risk experienced by the population. For example, during the one-year mortality follow-up period a person who survives the whole year contributes one year to the total PYaR; a person who dies after 3 months contributes only 0.25 years to the total.

**Standardised mortality ratio (SMR)**
The SMR is a form of indirect standardisation. The age and sex specific mortality rates of a chosen standard population (usually the relevant national or study aggregate population) are applied to the age and sex structure of the subject population to give an expected number of deaths. The observed number of events is then compared to the expected and is usually expressed as a ratio (observed/expected). For presentation purposes, the SMR is usually expressed per 100. By definition, the standard population will have a SMR of 100. SMRs above 100 indicate that the death count observed was greater than that expected from the standard mortality rates and SMRs below 100 that it was lower.

**Expected deaths**
The expected death count is that which would occur if the observed subject population experienced the standard population’s age and sex specific mortality rates.

**Confidence interval (CI)**
A confidence interval is a range of values that quantifies the imprecision in the estimate of a statistic. Specifically it quantifies the imprecision that results from random variation in the estimation of the value; it does not include imprecision resulting from systematic error (bias). In public health many indicators are based on what can be considered to be complete data sets and not samples, e.g. mortality rates based on death registers. In these instances the imprecision arises not as a result of sampling variation but of ‘natural’ variation. The indicator is considered to be the outcome of a stochastic process, i.e. one which can be influenced by the random occurrences that are inherent in the world around us. In such instances the value actually observed is only one of the set that could occur under the same circumstances. Generally in public health, it is the underlying circumstances or process that is of interest and the actual value observed gives only an imprecise estimate of this ‘underlying risk’.

The width of the confidence interval depends on three things:

1. The sample or population size from which the estimate is derived.
2. The degree of variability in the phenomenon being measured.
3. The required level of confidence - this is an arbitrary value set to give the desired probability that the interval includes the true value. In medicine and public health the conventional practice is to use 95 per cent confidence.
For a given level of confidence, the wider the confidence interval, the greater the uncertainty in the estimate.

**Suppression**

When the observed number of people with a particular complication in a PCT/LHB is small (between 1 and 5); the data for that particular complication for that PCT/LHB has been suppressed from publication for reasons of statistical and information governance.

**Further Information**

For further information, including NDA methodology and national summary reports, please visit the website for the [National Diabetes Audit](http://www.nda.nhs.uk).