



Diabetes
Kidney Care

Diabetes with Kidney Disease: Key Facts

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1. Introduction

Diabetes and chronic kidney disease (CKD) are both common long-term conditions in the UK. Diabetes affects about 7.5% of the adult population, and the number of people with the condition is expected to rise significantly¹. CKD prevalence is higher, it is estimated that 13-14% of the adult population in England have CKD (any stage)⁵, and 6-9% of adults have moderate to severe CKD^{5,6}.

One of the important complications of long-term diabetes is kidney damage, which although it only affects a minority of people with diabetes, is a significant cause of kidney failure, which may require dialysis or transplantation. This document sets out important key facts to inform decisions on designing services, and for effectively treating people who have diabetes with kidney disease.

This document builds on two previously successful documents, one on diabetes and another on kidney disease. Diabetes Key Facts², a joint publication between Yorkshire and Humber Public Health Observatory and the National Diabetes Support Team, was published in 2006 and has been updated in recent years. Kidney Disease Key Facts and Figures³ follows a similar model to the diabetes facts, and was developed by NHS Kidney Care and the East Midlands Public Health Observatory in 2010.

Building on the success of these Key Facts reports, this document has been produced to provide key facts about adults with diabetes who also have kidney disease. The information is based on literature searches undertaken during 2010/11 using reliable information sources.

This summary outlines some basic facts about diabetes with kidney disease; for example how common it is, what puts people with diabetes at risk of developing kidney disease, and what can be done about it. The target audience includes primary care professionals, commissioners and also specialists in diabetes or kidney disease.

2. What is diabetes with kidney disease?

In this document we consider diabetes with kidney disease to mean people who are known to have diabetes and have then developed chronic kidney disease (CKD) as a likely result of having diabetes, either due to diabetic nephropathy or vascular damage. Some people with diabetes will have chronic kidney disease for another reason, and specialist investigation may be needed to establish the alternative explanation.

Having diabetes for several years can cause damage to both small and large blood vessels; as a result people with diabetes have a higher risk of developing kidney and cardiovascular disease than the general population. CKD is a term that describes abnormal kidney function or structure. It is commonly classified into five stages which increase in severity from one to five⁶². In a recent UK based study⁴ the increased risk of developing CKD (stages 3b, 4 and 5) in people with diabetes was eight times higher in women and over twelve times higher in men compared to those without diabetes.

Classic diabetes with kidney disease is classified by the extent of protein excretion in the urine. Early kidney disease results in the appearance of small amounts of albumin (a protein which is routinely made by the liver) in the urine (so called 'microalbuminuria'). In some cases microalbuminuria may come and go, but persistent microalbuminuria is evidence of early diabetes with kidney disease (also known as diabetic nephropathy). Without treatment, there is a progressive increase in the amount of albumin in the urine, accompanied by high blood pressure, and then a progressive fall in the efficiency of the kidneys in removing waste products from the blood stream, with eventual end stage renal disease. In routine practice, the amount of albumin in the urine is measured by a urine test, the albumin:creatinine ratio (ACR) and the efficiency of kidney function is measured by a blood test, the serum creatinine concentration. Measuring serum creatinine allows the calculation of the estimated glomerular filtration rate (eGFR), a measure of the rate at which blood is filtered in the kidneys.

Both microalbuminuria and nephropathy in the presence of diabetes are associated with increased total mortality, mortality and morbidity from cardiovascular disease and end stage renal disease. However, interventions along this disease course can prevent either the onset or the progression of microalbuminuria and subsequent diabetes with kidney disease.

3. How common is diabetes with kidney disease in England?

In England the estimated prevalence of diabetes (diagnosed and undiagnosed) in people aged 16 and over is 7.4%¹. The prevalence of moderate to severe chronic kidney disease (stages 3-5 CKD) in people aged 18 and over ranges from 6-9% of the population, depending on the estimates which are used^{5,6}. The prevalence of any CKD (stages 1-5) has been estimated at 13% in women and 14% in men⁵.

3.1. Prevalence of diabetes with kidney disease

Estimates for the prevalence of diabetes with resulting kidney disease vary depending on the study population and the definitions used. The literature suggests that the prevalence of CKD as a result of diabetes varies from 18% to over 30% in all people with diabetes^{7,8,9}.

In a study of adults with diabetes in East London, the prevalence of CKD stages 3-5 was 18%. The demography of the population studied differed from the general population as there were high levels of deprivation and over half the population was classified as non-White⁷. In a study of people with diabetes based in Salford, stage 3-5 CKD was present in 27.5% of the study population⁸. The highest estimate identified was in a study of 17 General Practices in the UK that found 31% of patients with diabetes had CKD stages 3-5 compared to 6.9% of patients without diabetes (although this study was not adjusted for age)⁹.

For more severe kidney disease as a result of diabetes, the National Diabetes Audit, which surveys people with diagnosed diabetes, suggests that the proportion of people with end stage renal disease (requiring dialysis or transplantation) is increasing. In type 1 diabetes it has risen from 0.8% in 2003-04 to 1.3% in 2008-09; the corresponding figures for type 2 diabetes are 0.3% and 0.5%. This implies that in England approximately 2500 people with type 1 diabetes and 9000 people with type 2 diabetes presently require dialysis or kidney transplantation¹⁰.

Another way of considering the burden of diabetes related to kidney disease is to look at the proportion of people with severe kidney disease, receiving renal replacement therapy (RRT) where diabetes is the cause of their kidney failure. The UK Renal Registry collects information on all people within the UK who receive RRT, and one of the fields collected is the cause of the kidney disease. In 2008, 6574 people, or 14.1% of all patients receiving RRT, had diabetes as the cause of their kidney disease (13.1% in 64 years and under, 16.0% in the 65 years and over age group)¹¹.

3.2. Rate of progression of kidney disease for those with diabetes

The rate of progression of diabetes with kidney disease depends on several factors. These include; the type of diabetes, the management of diabetes e.g. blood pressure and glucose control (see section 5) as well as the presence of other co-existing factors such as cardiovascular disease. The SIGN guidelines²⁵ have reviewed this rate of progression, as described below.

Type 1 diabetes: In type 1 diabetes the prevalence of microalbuminuria at 30 years was about 40%^{12,13}. About a quarter of patients in the Diabetes Control and Complications Trial (DCCT) had proteinuria (diagnosed when there are increasing

levels of albumin in the urine), high creatinine and/or were on RRT 30 years after developing diabetes¹⁴.

Some studies suggest that progression of nephropathy and end stage renal disease due to type 1 diabetes is falling in people diagnosed recently. Some of this reduction may be due to better blood pressure and glucose control^{15,16}.

Type 2 diabetes: The UK Prospective Diabetes Study (UKPDS) trial¹⁷ estimated that from diagnosis to 15 year follow up, the proportion of people with microalbuminuria increased from 12.8% to 39% and the proportion with proteinuria increased from 2.1% to 12.6% (see Table 1 below).

Table 1 Proteinuria and microalbuminuria in people with newly diagnosed type 2 diabetes (15 year follow up)

Follow up (years)	Microalbuminuria (%)	Proteinuria* (%)
Baseline	12.8	2.1
3	14.5	2.5
6	18.3	3.5
9	25.4	6.5
12	34.2	10.3
15	39.0	12.6

Source: UKPDS taken from the SIGN guidelines No. 116. Management of Diabetes¹⁷.

***proteinuria indicates a raised urinary albumin excretion of >300 mg/day**

A later UKPDS study estimated that 15 years after the diagnosis of type 2 diabetes, 38% of patients in the study had developed albuminuria (micro or macro) and 29% renal impairment (defined as a reduced estimated glomerular filtration rate or a doubling in serum creatinine)¹⁸.

It is estimated that a quarter of patients with type 2 diabetes will develop microalbuminuria 10 years following diagnosis¹⁹. The rate of progression through the four different stages of deterioration; i.e. no nephropathy, to microalbuminuria, to macroalbuminuria and finally to elevated plasma creatinine or RRT, was estimated at 2-3% from each stage progressing to a more severe stage per year¹⁹.

4. What is the impact on health and the cost of diabetes with kidney disease?

4.1. Morbidity associated with diabetes with kidney disease

The complications of diabetes with kidney disease are similar to the complications of kidney disease alone which are covered in the Kidney Disease Key Facts and Figures document³.

4.2. Acute kidney injury in people with diabetes

Acute kidney injury (AKI) is the commonly accepted term for acute renal failure. It is a clinical syndrome characterised by a rapid reduction in the excretory function of the kidney, and is diagnosed when one of the following clinical criteria are met²³:

- Serum creatinine rises by $\geq 26\mu\text{mol/L}$ from the baseline value within 48 hours, or
- Serum creatinine rises ≥ 1.5 fold from the baseline value which is known, or presumed to have occurred within one week, or
- Urine output is $< 0.5\text{ml/kg/hr}$ for >6 consecutive hours.

AKI is common in people who develop acute illness and can result in severe, life threatening complications³. Diabetes, proteinuria and chronic kidney disease (CKD) are all independent risk factors for the development of AKI^{20,21,22,23}. This has led to the recommendation that patients with these risk factors should be identified, and appropriate preventative measures should be instituted, as early as possible in their management²³.

Several first line treatments for diabetes with kidney disease, such as angiotensin converting enzyme (ACE) inhibitors and angiotensin II receptor blockers (ARB) may also cause impairment of kidney function or AKI²⁴.

The effect of some of the drugs used to control blood glucose (e.g. insulin and some of the oral blood glucose control medications), may be potentiated in AKI, and dosage will need to be reviewed or medications stopped²⁴.

4.3. Anaemia

Anaemia, which is associated with CKD, may be costly to manage and can have a significant impact on quality of life. The Scottish Intercollegiate Guidelines Network (SIGN) guidelines on the management of diabetes²⁵ report that anaemia is also common in diabetes with kidney disease and develops at an earlier stage of CKD compared to CKD from other causes. The prevalence of anaemia was reported at 22-51% for patients with diabetes with kidney disease compared to 8-14% in patients with CKD from other causes^{26,27}.

4.4. Mortality and diabetes with kidney disease

A paper reporting on the causes of death for people involved in a World Health Organisation (WHO) study in 10 countries found that kidney disease accounted for 21% of all deaths for patients with type 1 diabetes, and 11% of type 2 diabetes²⁸.

There is increased mortality, from cardiovascular disease and all-causes combined, at all stages of diabetes with kidney disease. The SIGN guidelines²⁵ have reviewed this mortality risk, as described below.

Microalbuminuria is associated with an approximately two-fold increase in cardiovascular morbidity and mortality²⁹. In type 2 diabetes the four year mortality for microalbuminuric patients is 32%, and 50% for proteinuric patients^{30,31}. When proteinuria and hypertension are present, the standardised mortality ratio is increased five-fold in men and eight-fold in women with type 2 diabetes, and eleven-fold in men and eighteen-fold in women with type 1 diabetes³².

There is a strong relationship between reduced glomerular filtration rate (GFR a measure of kidney function) and mortality (both all-cause and cardiovascular) in people with diabetes. Lower GFR levels indicate more severe CKD, values of less than 60 ml/min/1.73 m² indicate that at least stage 3 CKD is present. The lower the GFR value, the higher the risk of mortality. In a study of people with type 2 diabetes³³, the hazard ratios for all-cause mortality across different stages of estimated GFR (eGFR) are as below:

- eGFR ≥ 90 ml/min/1.73 m² hazard ratio 1.00
- eGFR 60-89 ml/min/1.73 m² hazard ratio 1.27
- eGFR 30-59 ml/min/1.73 m² hazard ratio 2.34
- eGFR 15-29 ml/min/1.73 m² hazard ratio 9.82

These increased risks are also substantiated in other studies in people with diabetes^{34, 35,36}.

For people with diabetes and advanced (stage 5) CKD requiring dialysis, the one year mortality (assessed on patients requiring dialysis at the beginning of 2008) was 17%. This has decreased from 23.5% in 2000 (it is difficult to interpret this trend as data coverage and the units submitting information change over time), but it is still higher than the one year mortality for all patients (with and without diabetes) on dialysis (11%)¹¹. This suggests that the presence of diabetes in people on RRT is a poor prognostic factor, possibly due to the presence of co-existing risk factors for, or diagnosis of, cardiovascular disease. This finding is supported by the 2004 Dialysis Outcomes and Practice Patterns Study (DOPPS)³⁷ which investigated dialysis outcomes in five European countries, including the UK. It found that the one year mortality in people on dialysis with diabetes was one and a half times higher than for people on dialysis without diabetes.

4.5. Quality of life

Few specific studies on the quality of life in diabetes with kidney disease were identified. Those which were are not UK based and may not be generalisable to the UK population.

A US study suggested that patients with diabetes and CKD experience a reduced quality of life, based on the health-related quality of life (HRQOL) score. These patients scored lower than people with CKD alone³⁸. This finding was also supported by a paper from Mexico which investigated quality of life in people with diabetes and kidney disease. It found low overall HRQOL scores which reduced with increasing duration of the diabetic nephropathy³⁹.

A Danish study assessed quality of life in people with diabetes and advanced (stage 5) kidney disease requiring dialysis, compared to people on dialysis without diabetes and people with long standing diabetes with no kidney disease. They found that the people with diabetes who were on dialysis had a reduced self-rated physical health score, but similar levels of kidney specific quality of life score and mental health quality of life scores to the control groups (based on the Short Form 36 health and wellbeing score and Kidney Disease Quality of Life measures)⁴⁰.

4.6. Diabetes with kidney disease in pregnancy

The physiological changes associated with pregnancy can result in deterioration in the long-term complications of diabetes. In a third of women with preconception microalbuminuria this will progress to proteinuria during pregnancy and up to 60% will develop pre-eclampsia (elevated blood pressure combined with proteinuria in pregnancy). The risk of developing pre-eclampsia is higher in those women who have proteinuria before conception⁴¹.

4.7. What are the financial costs associated with diabetes with kidney disease?

Only one study could be found that estimated this cost for the UK. In 2004 it was estimated that the total annual costs to the NHS for managing diabetes with kidney disease (including people with diabetes and microalbuminuria, overt nephropathy, end stage renal disease and kidney transplantation) was £152 million for type 1 diabetes (range: £125–230 million) and £614 million for type 2 diabetes (range: £532–927 million)⁴². This compares to a total NHS expenditure estimated to be about £90 billion in 2004/05⁴³. These costs are expected to rise as the prevalence of type 2 diabetes in England increases¹.

5. What makes people with diabetes at risk of developing kidney disease?

5.1. Hypertension

High blood pressure is an important risk factor in the development of kidney disease in people with diabetes. Hypertension has been identified as a risk factor using a range of study designs including prospective studies and reviews. A selection of this evidence base is referenced here^{18,44,45}.

5.2. Hyperglycaemia (high blood glucose levels)

Several studies have suggested that in people with diabetes, poor regulation of blood glucose is an independent risk factor for the development of diabetes with kidney disease. The papers referenced illustrate the relationship in both type 1 and type 2 diabetes^{18, 44,46}.

5.3. Ethnicity

A study based in East London on people with diabetes type 1 or 2 with a high proportion of people from non-White ethnic groups, showed that stage 3 chronic kidney disease (CKD) was less common in Black and South Asian populations compared to the White population (odds ratios 0.5 and 0.8 respectively). This finding was reversed for more advanced stages of CKD. CKD stages 4 and 5 were more common in the Black and South Asian groups compared to the White population (odds ratios 1.3 and 1.5 respectively)⁷. The studies that were identified suggest that the higher probability of stage 4 and 5 CKD in minority ethnic populations with diabetes may in part reflect genetic differences between the ethnic populations⁴⁷.

The relationship between ethnicity and diabetes with kidney disease is complex. Factors affecting this relationship may include differing levels of deprivation in minority ethnic groups, access to diabetes care and variation in diabetes management. These factors are all the subject of ongoing research.

5.4. Smoking

Smoking is a well established risk factor for the development of diabetes with kidney disease in type 2 patients^{48,49,50,51}.

5.5. Genetic predisposition

For people with diabetes, there is evidence to suggest that the presence of a first degree relative with diabetes with kidney disease is a risk factor for the development of albuminuria or nephropathy^{52,53,54}.

5.6. Deprivation

People with diabetic nephropathy, commencing renal replacement therapy in England and Wales between 1997 and 2004 were more likely to come from socially deprived areas⁵⁵ (this study included people from White ethnic groups only).

5.7. Other risk factors

Several additional risk factors for development of kidney disease have been identified in studies^{18,44,56}. These include:

- Baseline urinary albumin excretion
- Duration of diabetes
- Raised total/low density lipoprotein, cholesterol and triglyceride levels

Obesity is an important risk factor in the development of type 2 diabetes, although no evidence could be identified that it is an independent risk factor in the development of kidney disease in people with diabetes. More information on diabetes and obesity is available in the Diabetes Key Facts² document.

6. Sources of information on what can be done for diabetes with kidney disease?

6.1. Coordinated approach to diabetes with kidney disease

A study examining the action required to reduce the burden of diabetes with kidney disease suggested that coordinated actions could be taken to combat diabetes with kidney disease. These included:

- Campaigns aimed at the prevention of type 2 diabetes
- Screening for early diabetes with kidney disease
- Increasing patient awareness
- Using medications of proven effectiveness
- Conducting research into new therapies⁵⁷

6.2. NICE guidelines on the management of diabetes and kidney disease

Key national guidelines which indicate best practice in the management of people with diabetes and kidney disease include the following, which can be accessed through the links below:

- [CG 15. Diagnosis and management of type 1 diabetes in children, young people and adults.](#)
- [CG 66. Type 2 diabetes: the management of type 2 diabetes \(update\).](#)
- [CG 73. Early identification and management of CKD in adults in primary and secondary care.](#)

The diabetes treatment guidelines recognise the close relationship between diabetes with kidney disease and other complications of diabetes such as retinopathy, foot problems and cardiovascular disease. The guidelines above, along with the NICE chronic kidney disease (CKD) guidelines⁶², stress the importance of a holistic approach to management including provision of information and education, lifestyle advice and work to optimise the health of people with risk factors for progressive CKD e.g. cardiovascular disease, smoking and hypertension.

NICE Quality Standards define clinical best practice within different topic areas. The [CKD Quality Standards](#) include a recommendation on diabetes with kidney disease and are available from the link above. The NICE Quality Standards for diabetes are in development and will be available in March 2011 from the [NICE website](#).

6.3. Effective treatments for diabetes with kidney disease

The management of diabetes with kidney disease can be broken down into:

- Prevention/screening for kidney disease in people with diabetes
- Treatment and reduction in progression of microalbuminuria in people with diabetes
- Treatment and reduction in progression of diabetes with kidney disease

The treatment regimes which can reduce or prevent the progression of diabetes into diabetes with kidney disease were reviewed by the Scottish Intercollegiate Guidelines Network²⁵ in 2010. The interventions in the bullet points below have been

found to be effective; for further details on the evidence of effectiveness please see the SIGN guidelines²⁵.

- Control of blood pressure and proteinuria
- Treatment with Angiotensin Converting Enzyme (ACE) Inhibitors and Angiotensin Receptor Blockers (ARBs)
- Intensive control of blood glucose
- Multifactorial interventions including a combination of improved glucose control, blood pressure control, lipid lowering, aspirin, smoking cessation, exercise programmes and dietary intervention

6.4. Patient awareness and education

Improving awareness and knowledge of the diabetes disease process may also be beneficial in reducing progression to kidney disease and end stage renal disease. In a sample of people with diabetes, those who were aware they also had CKD were more likely to meet appropriate glucose levels⁵⁸. Another study found that patients who felt that they could control their diabetes (rather than leave it to chance) were less likely to be on dialysis⁵⁹.

6.5. Diabetes with kidney disease in pregnancy

The National Service Framework for diabetes standard 9 suggests several recommendations for women with diabetes and kidney disease who are considering pregnancy or who are already pregnant. As with all people with diabetes who are considering pregnancy counselling and pre conception advice should be available⁴¹.

- Women with diabetes who are considering pregnancy should receive an assessment for the presence of any long-term complications, particularly eye and renal complications, and treatment, if indicated.
- Women who have diabetes with kidney disease have an increased risk of hypertension during pregnancy and should therefore be closely monitored. As diabetes with kidney disease may progress during pregnancy, their kidney function should be closely monitored throughout their pregnancy.

ACE inhibitors are associated with an increase in risk of congenital malformation in pregnancy. Both ACE inhibitors and ARB should be avoided throughout pregnancy²⁵.

6.6. Other guidelines including diabetes with kidney disease management

- [Scottish Intercollegiate Guidelines Network. Management of diabetes. 2010.](#)
- [Scottish Intercollegiate Guidelines Network. Diagnosis and management of CKD. 2008.](#)
- [Department of Health. National Service Framework for Diabetes. 2001.](#)
- [NHS Diabetes \(2009\) NICE and diabetes: a summary of relevant guidelines.](#)
- [Renal Association, Royal College of Physicians. Chronic Kidney Disease in Adults: UK Guidelines for Identification, Management and Referral. 2006.](#)

Measures to prevent the onset of diabetes and to manage CKD and end stage renal disease are not covered in this document as they are included in the Diabetes Key Facts² and Kidney Disease Key Facts and Figures³ documents respectively.

7. What is cost effective?

7.1. Screening for kidney disease in people with diabetes and hypertension

In a US setting, which may not be applicable to the UK, annual screening for kidney disease and adequate blood pressure management was cost effective for patients with type 2 diabetes and hypertension. It led to substantial improvement in long-term patient outcomes for a minor increase in cost⁶⁰. This finding was supported by an Australian study (again this may differ from the UK) performed on people with type 1 and 2 diabetes who had poorly controlled blood glucose⁶¹.

NICE guidance⁶² currently recommends that all people with diabetes should be screened for kidney disease annually. This is reflected in the GP Quality and Outcomes Framework indicators for diabetes, covered in section 8.

7.2. Strategies to prevent diabetes with kidney disease

A 2004 review considered the value of strict glucose control, early hypertension treatment, dietary protein restriction and lipid-lowering therapy in preventing kidney disease in people with diabetes⁶³. It concluded that evidence for aggressive blood pressure control was the strongest, although it was not clear whether angiotensin converting enzyme (ACE) inhibitors had a benefit over and above their action to control blood pressure. There were significant doubts about the cost effectiveness of protein restriction and cholesterol lowering, although other clinical reasons e.g. coronary heart disease prevention, offered a strong case for lipid lowering therapy. Strict control of hyperglycaemia was difficult to cost as various levels of input were required. The authors concluded that the health and economic burden of diabetic nephropathy is so great that even costly interventions will be worth exploring.

7.3. Treatment of type 2 diabetes with kidney disease with ACE inhibitors and angiotensin receptor blockers

ACE inhibitors are the recommended first line treatment for diabetes with kidney disease while angiotensin receptor blockers (ARB) are recommended if ACE inhibitors cannot be tolerated⁶². The two reviews below consider the cost effectiveness of ARB treatment.

A meta-analysis performed in 2005 reviewed the cost effectiveness of the use of an ARB, compared to alternative therapies (calcium channel blocker). They identified seven studies which suggested that the ARB treatment in patients with type 2 diabetes, hypertension and advanced nephropathy is both life and cost-saving compared to the calcium channel blocker or a control group⁶⁴. A more recent study suggested that in hypertensive patients with type 2 diabetes and microalbuminuria, early ARB treatment is more effective than late ARB treatment at improving survival and reducing costs⁶⁵.

Another cost effectiveness analysis assessed the cost effectiveness of another ARB in patients with type 2 diabetes and kidney disease, in comparison with conventional antihypertensive treatment (not including ACE inhibitors or other ARBs). It found that the ARB treatment was cost-saving from the perspective of the NHS in the UK because it reduced the incidence of end stage renal disease in comparison with a non ACE inhibitor or non ARB antihypertensive regimen. There was no comparison of the ARB against ACE inhibitor in this study⁶⁶.

8. What is being done about diabetes with kidney disease?

Measures to prevent the onset of diabetes and to manage chronic kidney disease (CKD) and end stage renal disease are not covered in this document as they are included in the Diabetes² and Kidney Disease Key Facts³ documents respectively. Initiatives include primary prevention (healthy lifestyle strategies), the Vascular Risk Assessment programme, the Quality and Outcomes Framework (QOF) indicators relating solely to either the management of diabetes or CKD alone, and renal replacement therapy (RRT). Several other initiatives specific to the prevention of kidney disease in people with diabetes are outlined below.

8.1. Quality and Outcomes Framework measures of care for diabetes

There are three diabetes indicators which relate specifically to the identification and management of diabetes with kidney disease; the definitions are below:

- DM 13: The percentage of patients with diabetes who have a record of microalbuminuria testing in the previous 15 months
- DM 15: The percentage of patients with diabetes with a diagnosis of proteinuria or microalbuminuria who are treated with ACE inhibitors (or Angiotensin II Receptor Blockers)
- DM 22: The percentage of patients with diabetes who have a record of estimated glomerular filtration rate (eGFR) or serum creatinine testing in the previous 15 months

The 2009/10 achievement for the QOF indicators above are shown in table 2. These indicators exclude people excepted from the QOF figures. Exceptions can result for a number of reasons, e.g. a medication may be contraindicated for clinical reasons. As the exception rate may vary by PCT the indicators should be interpreted with these limitations in mind.

Table 2 Summary of diabetes with kidney disease QOF indicators 2009/10

QOF indicator (definitions above)	England average	PCT range
DM 13	88.5%	80.7% to 92.5%*
DM 15	88.8%	79.1% to 94.8%
DM 22	97.0%	93.4% to 98.7%

Source: The Information Centre for Health and Social Care, QOF 2009/10 online database

*Excludes single PCT outlier of 61.1%

Since 2006/07 there has been a slight increase in the overall England achievement for DM 13; achievement has risen from 85.6% to 88.5% in 2009/10. The achievement in the other two indicators has remained relatively static from 2006/07 to 2009/10.

- The results of the QOF programme, with data reported at practice, PCT, SHA and England level can be accessed at the [NHS Information Centre for Health and Social Care website](#).
- Further analysis of the QOF indicators at Practice level is available in the [Association of Public Health Observatories Practice Profiles](#).

- CKD QOF data can be accessed from the CKD QOF Toolkit. This allows analysis of CKD data at practice level with national, regional, PCT and Local Authority level comparisons. New GP Commissioning Cluster geographies can also be generated and investigated. The toolkit can be found on the [NHS Kidney Care website](#).

8.2. National Diabetes Audit

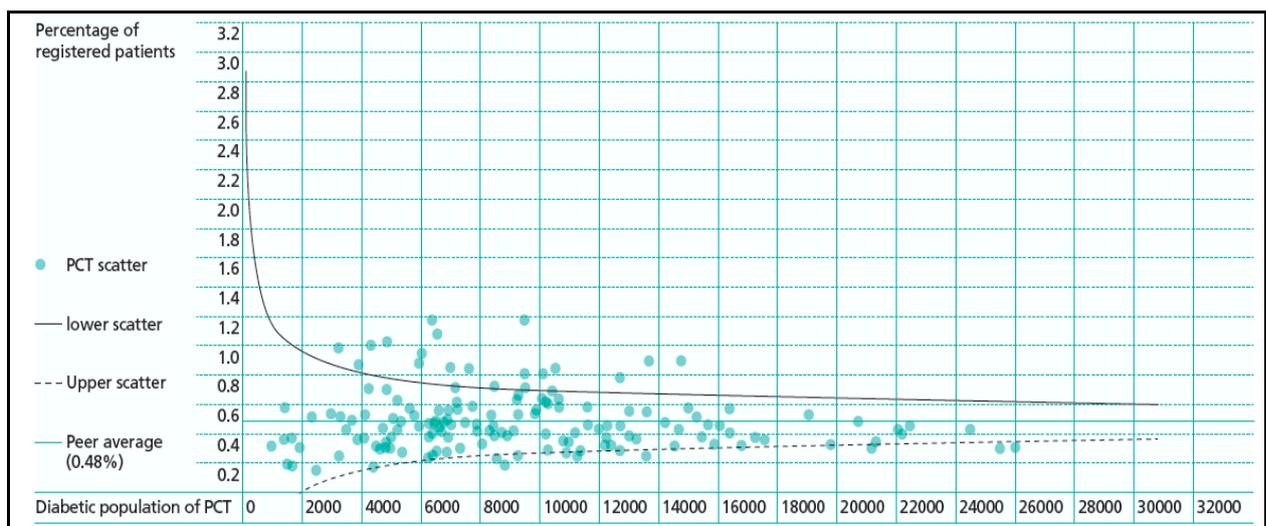
The National Diabetes Audit is undertaken annually¹⁰, and compliance against several key care processes is reviewed. Measuring urine albumin:creatinine ratio (ACR), which detects the earliest stage of kidney disease, was the lowest rate care process in 2008/09. For all people with diabetes in the survey 64.8% had the ACR measured in the previous 12 months (68.1 per cent in Type 2 diabetes and 51.30 per cent in Type 1 diabetes). This has, however, increased from 19% in type 1 diabetes and 21% in type 2 diabetes in 2003/04.

In 2008/09 the other care processes had higher compliance rates. These varied from 77.3% for an eye examination to 94.2% with a blood pressure measurement in the previous 12 months.

8.3. Variation in treatment for diabetes with end stage renal disease by PCT

The National Diabetes Audit collects information on the number of people with diabetes who are being treated for end stage renal disease. The funnel plot below (Figure 1) shows the variation in end stage renal disease treatment among all the PCTs in England. Those above the upper curve have significantly higher rates than the others. There are several reasons for this variation; the rates of diabetes and end stage renal disease are higher, the population age structures may differ or because they offer more dialysis and transplantation.

Figure 1 End stage renal disease treatment for people with Type 2 diabetes - all PCTs in England: funnel plot showing 95% confidence intervals



Source: The Information Centre for Health and Social Care. National Diabetes Audit Executive. Summary 2008-09¹⁰

NB. PCTs above the upper curve have significantly higher rates of renal disease

The 2009 UK Renal Registry report (December 2008 data) examined people with diabetes on Renal Replacement Therapy (RRT) in relation to the total population of people on RRT. Several differences in the two populations were identified. In people with diabetes on RRT the median age at the start of RRT was 56 (compared to 47 in patients without diabetes). The average number of years on RRT was 2.9 compared to 6.2 in people without diabetes and the proportion of people with diabetes with a functioning transplant was 29% compared to 51% to people without diabetes¹¹.

- For further information on the National Diabetes Audit please visit the [NHS Information Centre for Health and Social Care website](#).
- For further information on the Renal Registry Report, please visit the [UK Renal Registry website](#).

8.4. The commissioning for diabetes with kidney disease services

NHS Diabetes and NHS Kidney Care have developed a commissioning guide for services for people with diabetes and kidney disease⁶⁷. This commissioning guide consists of:

- A description of the key features of good diabetes and kidney care
- A high level intervention map. This intervention map describes the key high level actions or interventions (both clinical and administrative), that diabetes and kidney care services should undertake in order to provide the most efficient and effective care, from admission to discharge (or death) from the service. It is not intended to be a care pathway or clinical protocol, rather it describes how a true 'diabetes without walls' service should operate going across the current sectors of health care.

The Commissioning for Diabetes and Kidney Care Services guide is available from the [NHS Diabetes website](#).

8.5. Examples of good practice approaches to joint diabetes and kidney disease services identified in journals

- A combined diabetes renal clinic concentrating on vascular risk factor management⁶⁸. Setting: Monklands Hospital, Lanarkshire, UK
- A nurse-led clinic in addition to a traditional diabetes renal clinic to manage cardiovascular risk factors⁶⁹. Setting: City Hospital, Birmingham, UK
- A nurse-led protocol based clinic to maximise blood pressure control⁷⁰. Setting: Aintree University Hospitals, Liverpool, UK
- Pharmacist-led, protocol-driven clinic to offer intensive treatment to patients with diabetic nephropathy picked up at the traditional secondary care clinic⁷¹. Setting: Stirling Royal Infirmary, Livilands, Stirling, UK

9. Glossary

ACE inhibitor:

A type of drug used to lower blood pressure. Studies indicate that it may also help prevent or slow the progression of kidney disease in people with diabetes. ACE is an acronym for angiotensin-converting enzyme.

ACR:

Albumin Creatinine Ratio. A test measuring protein in the urine.

ARB:

Angiotensin Receptor Blocker. A type of drug used to lower blood pressure. Studies indicate that it may also help prevent or slow the progression of kidney disease in people with diabetes.

Complications of diabetes:

Health problems which result from diabetes. There are both short and long-term complications associated with diabetes.

eGFR:

Estimated Glomerular Filtration Rate. The GFR is a measure of the rate at which blood is filtered by the kidneys, and is measured in millilitres per minute (ml/min).

ESRD:

End Stage Renal Disease. A long-term irreversible decline in kidney function for which renal replacement therapy (RRT) is required if the individual is to survive.

Glucose:

A blood sugar and source of energy.

Glucose tolerance test:

Blood test used to make the diagnosis of diabetes, including gestational diabetes.

Hazard ratio:

The hazard ratio is one of a range of statistics used to assess the risk of a particular outcome (or disease) if a certain factor (or exposure) is present.

Incidence:

How often a disease occurs; the number of new cases of a disease among a certain group of people for a certain period of time.

Kidney Disease:

Abnormal kidney function or structure. People who have had diabetes for a long time may have kidney damage, also called nephropathy.

Kidneys:

Two organs in the lower back that clean waste and poisons from the blood. They also control the level of some chemicals in the blood such as hydrogen, sodium, potassium, and phosphate.

Microalbuminuria:

The presence of small but abnormal amounts of albumin (a protein made by the liver) in the urine. Microalbuminuria is defined as excretion of between 30 and 300 mg of albumin a day in the urine.

Mortality Rate:

The death rate; the number of people who die of a certain disease compared with the total number of people. Mortality is most often stated as deaths per 1,000, per 10,000, or per 100,000 persons.

Nephropathy:

Any disease of the kidneys. Kidney damage caused by diabetes is called diabetic nephropathy.

Odds ratio:

The odds ratio is one of a range of statistics used to assess the odds of a particular outcome (or disease) if a certain factor (or exposure) is present.

Prevalence:

The number of people in a given group or population who are reported to have a disease.

Renal:

A term that is used interchangeably with kidneys.

RRT:

Renal Replacement Therapy. A treatment for end stage renal disease. It can take a number of forms; kidney transplantation, haemodialysis or peritoneal dialysis.

Risk Factor:

Traits that make it more likely that a person will get an illness. For example, a risk factor for getting type 2 diabetes is having a family history of diabetes.

Type 1 diabetes:

A condition in which the pancreas makes so little insulin that the body can't use blood glucose as energy. Type 1 diabetes most often occurs in people younger than age 30 and must be controlled with daily insulin injections.

Type 2 diabetes:

A condition in which the body either makes too little insulin or can't use the insulin it makes to use blood glucose as energy. Type 2 diabetes most often occurs in people older than age 40 and can often be controlled through diet and physical activity plans. Some people with type 2 diabetes take oral diabetes medications or insulin.

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This document refers to reputable sources (e.g. guidelines and appraised resources from the Centre for Reviews and Dissemination). It also includes other articles and resources. To appraise these resources for quality please use a checklist such as [CASP checklists](#).

Some of the references have been taken from the SIGN guidelines No.116 Management of Diabetes. Where the primary research has not been appraised by this report's authors, it is acknowledged in the references and the findings reflect the interpretation of the SIGN team.

11. Hyperlink index

Document hyperlink (in order of appearance)	Full URL
CG 15. Diagnosis and management of type 1 diabetes in children, young people and adults.	http://guidance.nice.org.uk/CG15
CG 66. Type 2 diabetes: the management of type 2 diabetes (update).	http://www.nice.org.uk/guidance/index.jsp?action=byID&o=11983
CG 73. Early identification and management of CKD in adults in primary and secondary care.	http://guidance.nice.org.uk/CG73
CKD Quality Standards	http://www.nice.org.uk/guidance/qualitystandards/chronickidneydisease/ckdqualitystandard.jsp
NICE website.	http://www.nice.org.uk/guidance/qualitystandards/indevelopment/diabetes.jsp
Scottish Intercollegiate Guidelines Network. Management of diabetes. 2010.	http://www.sign.ac.uk/guidelines/fulltext/116/index.html
Scottish Intercollegiate Guidelines Network. Diagnosis and management of CKD. 2008.	http://www.sign.ac.uk/guidelines/fulltext/103/index.html
Department of Health. National Service Framework for Diabetes, standards 10 and 11. 2001.	http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/Browsable/DH_4096591
NHS Diabetes (2009) NICE and diabetes: a summary of relevant guidelines.	http://www.diabetes.nhs.uk/news.php?o=107
Renal Association, Royal College of Physicians. Chronic Kidney Disease in Adults: UK Guidelines for Identification, Management and Referral. 2006.	http://www.renal.org/CKDguide/full/CKDprintedfullguide.pdf
NHS Information Centre for Health and Social Care website.	http://www.qof.ic.nhs.uk/
Association of Public Health Observatories Practice Profiles.	http://www.apho.org.uk/PRACPROF/
NHS Kidney Care website.	http://www.kidneycare.nhs.uk/_Resourcestodownload-Toolkits.aspx
NHS Information Centre for Health and Social Care website.	http://www.ic.nhs.uk/services/national-clinical-audit-support-programme-ncasp/diabetes
UK Renal Registry website.	http://www.renalreg.com/
NHS Diabetes website.	http://www.diabetes.nhs.uk/commissioning_resource/step_3_service_improvement/diabetes_and_kidney_care/
YHPHO website.	http://www.yhpho.org.uk/resource/item.aspx?RID=8872
CASP checklists.	http://www.sph.nhs.uk/what-we-do/public-health-workforce/resources/critical-appraisals-skills-programme

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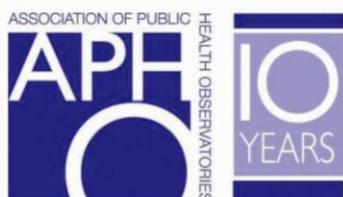
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Kidney Care

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