

# Renal services for people with diabetes in the UK

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## Abstract

Diabetic nephropathy is a serious complication of diabetes that can lead to end-stage renal failure (ESRF). It is now the most common cause of ESRF in patients accepted onto renal replacement therapy (RRT) programmes in the UK. Rates of diabetic ESRF are more common in ethnic minority populations. The risk of developing diabetic ESRF is higher in Type 1 diabetes but in absolute terms more patients with Type 2 diabetes develop ESRF and are treated. There is still unmet need for RRT amongst patients with diabetes who develop ESRF. The shortage of organ donors, especially amongst ethnic minorities, means that dialysis is the mainstay of treatment in patients with diabetes and ESRF. This is now largely hospital haemodialysis with an increasing proportion being delivered in satellite units. Demand for RRT from patients with diabetes will increase due to demographic change and the increasing prevalence of diabetes, particularly Type 2, in the population. To meet this challenge closer liaison between those primarily caring for patients with diabetes (primary care physicians and diabetologists) and nephrologists is required to ensure effective surveillance of renal function, to increase early referral and to agree protocols of subsequent care. Continued expansion of high-quality RRT is needed that ensures equity of access with particular targeting in areas with large ethnic minority populations. A national priority must be an increase in the kidney transplant rate.

**Keywords** diabetic nephropathy, renal replacement therapy

**Abbreviations** ESRF, endstage renal failure; HD, hospital haemodialysis; PD, peritoneal dialysis; pmp, per million population; RRT, renal replacement therapy; CRF, chronic renal failure

## Introduction

This paper reviews the provision of renal services in the UK for diabetic patients with renal disease in the light of the forthcoming diabetic national service framework. The main focus is a renal replacement therapy for diabetic endstage renal failure.

## Diabetic nephropathy

Progressive renal damage is a serious complication of both Type 1 and Type 2 diabetes and in some it leads to end-stage renal failure (ESRF), which is inevitably fatal unless treated by renal replacement therapy (RRT). Renal damage usually occurs in people with diabetes as a consequence of microvascular

disease, which is exacerbated by hypertension. In the early stages of disease diagnosis requires the detection of increased albumin levels, below the levels normally found on routine urinalysis ('microalbuminuria'). As the severity of damage increases, the level of proteinuria rises and becomes detectable using routine testing. Such renal damage is usually asymptomatic and detected only by surveillance or as a result of investigations for other diabetic complications.

Untreated, there is a progressive decline in renal function leading to ESRF. Early diagnosis is essential as both the development of microalbuminuria and the progression to overt proteinuria are reduced by tight diabetic control [1,2]. In addition, a reduction in blood pressure reduces proteinuria, probably slowing the rate of decline of renal function [3,4].

Diabetic ESRF is a multistage process usually developing over 15–25 years following the development of diabetes. However, this time course may appear shorter in Type 2 subjects because the diabetes remains undiagnosed for a number

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**Table 1** International comparison of annual acceptance rates for diabetic ESRF\*

Country	Overall annual acceptance rate (pmp)	Diabetic ESRF acceptance rate (pmp)	Percentage of RRT patients with diabetes	Prevalence of diabetes (%)*
Singapore (1998) [30]	158	79	50	11.3
USA (1998) [30]	320	128	40	8.0
New Zealand (1998) [31]	85	34	40	8.0
Czech Republic (1998) [30]	136	50	37	11.7†
Finland (1998) [32]	76	27	36	5.5‡
Germany (1998) [30]	148	52	35	4.2
Austria (1998) [30]	125	39	31	3.8
Canada (1997) [30]	152	44	29	5.0§
Chile (1998) [30]	122	33	27	1.4¶
Australia (1998) [31]	80	19	24	6.0
Japan (1999) [30]	249	60	24	7.4
Malta (1998) [30]	123	28	23	9.9**
Sweden (1998) [30]	119	27	23	6.4†
Poland (1998) [30]	66	12	18	5.7
Netherlands (1998) [30]	93	15	16	3.6
UK (1998) [7]	96	15	16	3.5
Italy (1997) [30]	119	18	15	7.1
Hungary (1998) [30]	148	22	15	6.6
Norway (1998) [30]	91	9	10	3.6

\* Age 20–79 unless specified. Diabetes prevalence data are taken from *Diabetes Atlas 2000* published by the International Diabetes Federation, Brussels, 2000.

† All ages.

‡ 45–64 years.

§ 18–74 years.

¶ Adults > 20.

\*\* 35–64 years.

of years. The lifetime risk of renal impairment in diabetes is of the order of 30%. It is greater in people with Type 1 diabetes, although the majority of patients with diabetic ESRF have Type 2 diabetes because of the higher prevalence of this type of diabetes. Patients with diabetic nephropathy often have associated microvascular and macrovascular complications, which are a significant cause of morbidity and mortality. Some patients with diabetes develop ESRF due to other causes.

## ESRF and RRT

RRT can either be by dialysis or transplantation. Dialysis is expensive as it is technically complex and has to be given lifelong. It is estimated to cost between 1.5% and 2% of the total NHS budget [5].

The number of people in the UK who are accepted onto RRT has expanded significantly in the last decade. Acceptance rates in the UK were only 20 per million population (pmp) per year in 1982 [6]. By 1992 they were 65 pmp in England [6] and a national survey of all renal units in 1998 estimated that they were 92 pmp in England, 105 pmp in Scotland, 128 pmp in Wales and 96 pmp overall in the UK [7].

This growth has largely been due to liberalization of the referral and acceptance onto RRT of older patients and/or those with comorbidity such as diabetes, rather than any rise in incidence of ESRF. In the UK in 1982, of all those on RRT, only 11% of patients were over 65 and 8% had diabetic

ESRF, compared with 47% and 19%, respectively, in 1998 [7].

Diabetic nephropathy is now the most common cause of ESRF. Currently over 1000 people with diabetic ESRF are accepted onto the RRT programme in the UK. Moreover, the UK Registry [7] showed that in 1998 in England there was an additional 5–6% of patients with diabetes but with other recorded causes of ESRF. Diabetic nephropathy was recorded in 9.5% of all existing patients on RRT. Nevertheless the overall acceptance rate and diabetic ESRF acceptance rate are less than some Western European and other developed countries.

Table 1 shows the total acceptance rates, proportion with diabetic ESRF and diabetic ESRF acceptance rates for 1997–98, and the prevalence of diabetes in a number of countries. These data show considerable variation in the treated diabetic ESRF rate that is not fully explained by the prevalence of diabetes in the population. They suggest an unmet need for RRT amongst patients with diabetic ESRF in the UK.

Age and, especially, comorbidity have a major influence on the referral of patients with chronic renal failure (CRF) to a nephrologist [8]. Whilst in some cases it may be appropriate not to refer patients with severe comorbidity (such as multiple complications of diabetes), there is concern that some patients who may benefit from RRT are not being referred. There is substantial variation between renal units in the proportions of new patients with diabetic ESRF (from 10–28%) that may reflect not only variation in local need but also referral practice [7].

## Is population need for RRT being met?

The two key population determinants of the incidence of ESRF are age and ethnic minority composition. Population-based studies have shown that ESRF rises steeply with increasing age [8,9]. Treated ESRF is more common in people from the Indian subcontinent and in those of West African or Caribbean descent, with age standardized rates four-fold higher than in whites [10]. The main contributor to this excess is Type-2 diabetic ESRF [10]. The age at presentation of diabetes is lower in ethnic groups than in the white population, thereby increasing both the duration of diabetes and the risks of renal complications. The increased risk of ESRF in ethnic minorities rises with age; this is important as these populations have a young age distribution and this will change in the next few decades, potentially leading to increased rates of Type 2 diabetes and hence of ESRF [11].

Diabetic nephropathy and ESRF are significantly (> 10 times) more common in Asian diabetic patients than in white diabetic patients, i.e. not only are Asians more likely than whites to develop diabetes, they are more likely to develop renal complications thereafter [12]. Data from the USA show a similar susceptibility in African-Americans [13]. It is not clear whether this results from greater inherent susceptibility to renal damage following onset of diabetes, poorer control of diabetes, or both.

Hypertension as the underlying cause of ESRF is also significantly commoner in these ethnic groups than in whites, particularly in African-Caribbeans (four-fold, 2.5-fold in Asians), reflecting their significantly higher prevalence of hypertension [12].

The acceptance rate necessary to meet the need for RRT is difficult to quantify precisely. A realistic figure, taking account of ethnic minority population need, ESRF in the very elderly and clinical thresholds, is a current national acceptance rate in the range of 120–130 pmp, though this will rise in future due to changing demography and the increased incidence of Type 2 diabetes.

## Types of RRT for patients with diabetes

Survival of patients with diabetes on RRT is poorer than for patients with primary renal diseases, though this is largely due to the associated cardiovascular disease [14,15].

Whilst transplantation is the most cost-effective treatment of ESRF, supply of organs is limited. As diabetes is a relative contraindication to transplantation, largely because of associated cardiovascular disease, patients with diabetes accepted onto RRT are more likely to be treated by dialysis than patients without diabetes. This is compounded by the shortage of ethnic minority organ donors. There is considerable variation in the entry of dialysis patients onto transplant waiting lists between units and overall the chances are lower than in patients without diabetes [7].

Previously, peritoneal dialysis (PD) was the favoured mode of dialysis, but this has shifted to hospital haemodialysis (HD)

particularly in older patients with diabetes, due to the technical complexity of PD and the increasingly frail condition of patients accepted for RRT. HD is usually provided thrice weekly in a renal unit. Availability of dialysis facilities and acceptance rates onto RRT are variable throughout the country. Historically, renal services in the UK developed around a small number of renal units, mainly in the larger cities associated with university teaching hospitals. There is strong evidence that access to treatment has been determined partly by the patient's proximity to a renal centre [16–18].

In the last decade there has been an expansion of satellite dialysis units, usually run by nurses, which are linked to the main renal unit, and which provide a more local HD service. Some autonomous renal units have opened that are consultant led and that provide the full range of renal services except transplantation. Such a policy has allowed the expansion of renal service provision despite the pressure of limited space in main units. It has also begun to tackle the geographical inequities. Recent evidence shows that people with diabetes are being treated in satellite units in similar proportions to all patients on HD, with the main reasons for ineligibility being vascular access problems, instability on dialysis and substantial comorbidity.

## Early referral to nephrologists

The referral of diabetic patients to nephrologists early in their course of renal disease is of great importance in establishing a definite diagnosis, initiating interventions aimed at halting or retarding the progression of CRF, reducing associated comorbidity (e.g. renal bone disease) and reducing cardiovascular risk [19]. Key components are improving the control of hypertension and the use of ACE inhibitors [20].

One of the targets of the recent Kidney Alliance report [21] is to reduce the incidence of diabetic ESRF. There is evidence that a specialist nephrology clinic can alter the rate of decline of renal function in patients with diabetes [4]. Moreover there is evidence that diabetic patients tolerate late stage renal failure poorly and should be started on RRT earlier than nondiabetics [22]. As with other patients those with diabetes face the problem of late referral, whereby referral to a dialysing renal unit is not made until 1–4 months of the patient requiring dialysis [22]. This is inadequate time not only for establishing access for dialysis (i.e. vascular and peritoneal) and for counselling patients but also for realizing the benefits of the interventions above [19]. Late referred patients are in a poorer clinical state at the start of RRT [23], and are more likely to receive emergency HD and to stay on it long term [24], to have increased initial complications [25], a longer duration of hospitalization [26] and to have poorer survival on RRT [25]. The Kidney Alliance document [21] sets a target of improving interdisciplinary collaboration in the management of patients with diabetes.

Currently about 35–40% of all patients starting RRT are referred late [8,25–27], and although about half are inevitable due to acute or very late presentation, in the others there is often

documented renal failure and therefore missed opportunities for earlier referral, particularly in patients with diabetes. In a study of 60 diabetic patients starting RRT in two renal units over 1 year, 17 (28%) started RRT within 4 months of being referred to the renal unit and 67% of these started within 1 month. This is despite 11 (65%) of the 17 having known chronic renal failure for longer than 1 year prior to referral [28].

### Future trends in ESRF and the demand for RRT

Despite expansion of RRT services in the UK, demand for increased provision will continue for the foreseeable future for a number of reasons. First, the 'steady state' position (whereby new acceptances for RRT equal deaths on RRT) has not been reached even at today's acceptance rates. Second, currently there is unmet need for RRT. Third, the increased incidence of Type 2 diabetes, compounded by the ageing of the population, especially ethnic minorities, will lead to a substantially higher incidence of diabetic ESRF, despite advances in treatment. Fourth, ongoing improvements in the quality of RRT prompted by standard setting and clinical governance should improve patient survival. Similar trends have already registered significant increases in the need for and provision of RRT services in the USA and in Germany [29].

### Summary

The key elements of development of renal services for patients with diabetes are:

- closer liaison between those primarily caring for such patients (primary care physicians and diabetologists) and nephrologists, to ensure effective surveillance of renal function, to increase early referral and to agree protocols of subsequent care;
- continued expansion of high-quality RRT that ensures equity of access with particular targeting in areas with large ethnic minority populations;
- national priority to increase the kidney transplant rate.

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