

## Chapter 13: Renal Transplantation

### *Summary*

- This chapter reports on data returned from 33 units, of which 14 are renal transplant centres.
- Of all the transplant patients on the Registry database, 21.4% are managed by non-transplant centres.
- There has been a progressive decline in the proportion of the prevalent renal replacement therapy patients made up by renal transplants from 51% in 1997 to 46.6% in 2001.
- Variation exists between centres with respect to access to transplantation. There are a number of possible explanations for these differences, which need to be examined further.
- Six per cent of all patients starting dialysis in 2001 were patients with failed transplants; 2.3% of all prevalent transplant failed during 2001.
- The annual death rate of patients with established renal transplants for England & Wales is 2.8% (including patients with failed grafts returning to dialysis).
- The quality of transplant function differs significantly between centres, as does the haemoglobin level.
- Differences in modifiable risk factors for cardiovascular disease also exist, and the control of these factors is often poor. In most centres, there has been a progressive reduction in median serum cholesterol level since 1998.
- Blood pressure measurements returns to the Renal Registry from some centres continue to be poor.

### *Introduction*

In 2001, there were 25 centres in England and Wales performing renal transplantation. A much greater number of renal units, however, contribute to the management and follow-up of patients after transplantation. This chapter reports on data returned from 33 units, of which 14 perform renal transplantation.

As with other sections of this report, individual units can now be identified. This may enable a more meaningful interpretation to be made of the data in future reports when epidemiological, demographic and other differences between units can be considered. Emphasis is placed on access to transplantation, quality of transplant function, haemoglobin level and potentially modifiable cardiovascular risk factors such as blood pressure and

cholesterol. Data comparison with centres with a small number of transplant patients should be interpreted with caution. Centres with fewer than 50 prevalent transplant patients (see Table 13.3 below) have been excluded from further analysis.

### ***Transplants performed in 2001***

In 2001, 871 renal transplants were performed by centres contributing to the Renal Registry. This represents 50% of all renal transplants performed in the UK in that year. The median age of the new transplant recipients was 49 years; 62.6% were male and 37.4% female (Table 13.1).

	<b>Number</b>	<b>Median age</b>	<b>% &gt;65</b>	<b>Median age dialysis</b>	<b>% Dialysis &gt;65</b>
E&W (23 renal units)	871	49.0	13.2%	62	44.1%

**Table 13.1: New transplants from the Renal Registry, 2001**

For the whole of the UK, there were 1385 cadaver transplants and 358 live transplants reported during 2001 ([www.uktransplant.org.uk](http://www.uktransplant.org.uk)). Of these, 1231 cadaver transplants and 319 live transplants were performed in England and Wales.

Table 13.2 shows the primary renal diagnoses in newly transplanted patients and in the established transplant population.

	<b>New transplants in 2001</b>		<b>Established transplants 1/1/01</b>	
	<b>%</b>	<b>No</b>	<b>%</b>	<b>No.</b>
Aetiology uncertain/GN NP	17.7	156	22.4	2051
Glomerulonephritis	20.0	176	18.6	1703
Pyelonephritis	14.6	128	16.8	1536
Diabetes	9.0	79	6.5	596
Renal vascular disease	1.4	12	1.3	122
Hypertension	5.8	51	5.4	497
Polycystic kidney	10.4	91	10.9	996
Not sent	6.9	61	4.1	379
Other	14.2	125	14.0	1288

**Table 13.2: Primary diagnosis of transplant patients in the UK**

GN NP, glomerulonephritis – not histologically proven.

For comparison, in 1999, 7.8% of new transplants occurred in patients whose primary renal diagnosis was diabetic nephropathy.

### ***Patients with established renal transplants***

In 2001, there were 8584 prevalent transplant patients in participating centres; Table 13.3 shows the number of prevalent transplant patients at each centre. Overall, 78.6% of all transplant patients reported to the Registry are managed by centres performing renal transplantation.

Centre	No. of prevalent transplant patients
Bradf	91
<b>Bristol</b>	520
<b>Camb</b>	414
Carls	80
<b>Carsh</b>	333
<b>Covnt</b>	248
<b>Crdff</b>	609
Extr	194
Glouc	51
<b>Guys</b>	710
Heart	142
Hull	152
<b>Leic</b>	429
LGI	161
Livrpl	620
Notts	355
Oxfrd	818
Plym	229
Ports	605
Prstn	113
Redng	6
S Cleve	218
<b>Sheff</b>	385
Stevn	109
Sthend	17
<b>St Jms</b>	473
Sund	107
Swmse	103
Truro	50
Wolve	66
Words	83
Wrex	70
York	23
Eng	7802
Wls	782
<b>E&amp;W</b>	
<b>total</b>	<b>8584</b>

**Table 13.3: Number of prevalent transplant patients in each Renal Registry centre**  
Centres that perform renal transplantation are shown in bold type.

The transfer of patients from the transplant centre back to the referring unit occurs at a variable time after transplantation, ranging from 7 days to 1 year or longer. A more meaningful way of presenting this data is therefore as the transplant prevalence rate (per million population, or pmp) according to health authority of the recipient (Table 13.4).

<b>Region</b>	<b>Health authority</b>	<b>Transplant prevalence pmp</b>
Y01	Gwent	357
Y01	Bro Taf	337
Y01	Avon	320
Y01	Cambridgeshire	318
Y01	Warwickshire	318
Y01	Morgannwg	316
Y01	Oxfordshire	313
Y01	Tees	313
Y01	IOWight, Portsmouth and SE Hampshire	305
Y01	North Cumbria	294
Y01	Sunderland	294
Y01	Calderdale and Kirklees	291
Y01	Leicestershire	286
Y02	Barnsley	281
Y02	Southampton and SW Hampshire	280
Y02	Bradford	277
Y02	Buckinghamshire	277
Y02	South and West Devon	275
Y02	Northamptonshire	265
Y02	County Durham and Darlington	263
Y02	Cornwall and Isles of Scilly	263
Y02	Leeds	261
Y02	Wiltshire	256
Y02	Liverpool	256
Y07	North Wales	252
Y07	Berkshire	251
Y07	Wakefield	248
Y07	Rotherham	248
Y07	Coventry	246
Y07	North and East Devon	244
Y07	Wirral	238
Y07	East Surrey	238
Y07	Nottingham	237
Y07	Brent and Harrow	235
Y07	North and Mid Hampshire	233
Y07	North Nottinghamshire	231
Y07	St Helens and Knowsley	231
Y08	Lincolnshire	226
Y08	Somerset	225
Y08	Bedfordshire	225
Y08	Dyfed Powys	221
Y08	Lambeth, Southwark and Lewisham	217
Y08	North Derbyshire	213
Y08	North Yorkshire	209
Y08	Bexley, Bromley and Greenwich	208
Y08	Gloucestershire	203
Y08	North Cheshire	199
Y08	Sefton	198
Y08	Doncaster	196
Y08	Sheffield	194
Y08	Croydon	192
Y09	East Riding and Hull	174
Y09	South Humber	172
Y09	West Surrey	172
Y09	Dudley	170
Y10	Hertfordshire	155
Y10	Wolverhampton	132

Region	Health authority	Transplant prevalence pmp
Y10	Solihull	126
Y10	South Staffordshire	123
Y10	South Lancashire	118
Y10	South Cheshire	98
Y10	North-West Lancashire	97
Y11	East Lancashire	80
Y11	Morecambe Bay	74
Y11	Walsall	61

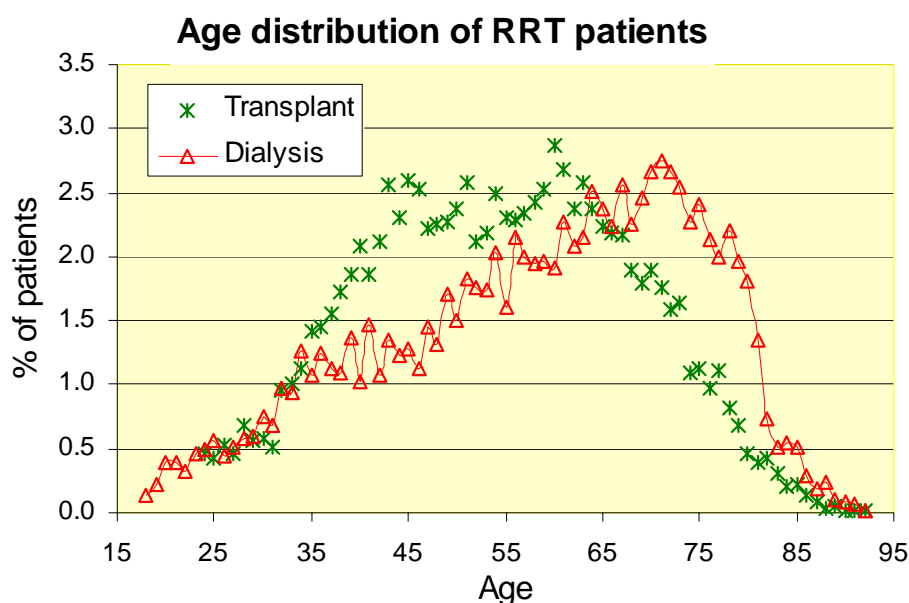
**Table 13.4: Transplant prevalence rate pmp by resident Health Authority of transplant patient**

The proportion of renal replacement therapy (RRT) patients with a functioning transplant has progressively fallen, from 51% in 1997 to 46.6% in 2001 (Table 13.5). Reference to other sections of this report shows that the falling proportion of transplant patients is caused by the increasing number of patients starting dialysis who are over 65 years old and therefore less likely to be suitable for transplantation, together with static transplant activity.

Year	% with functioning transplant
1997	51.0
1998	49.9
1999	47.3
2000	46.9
2001	46.6

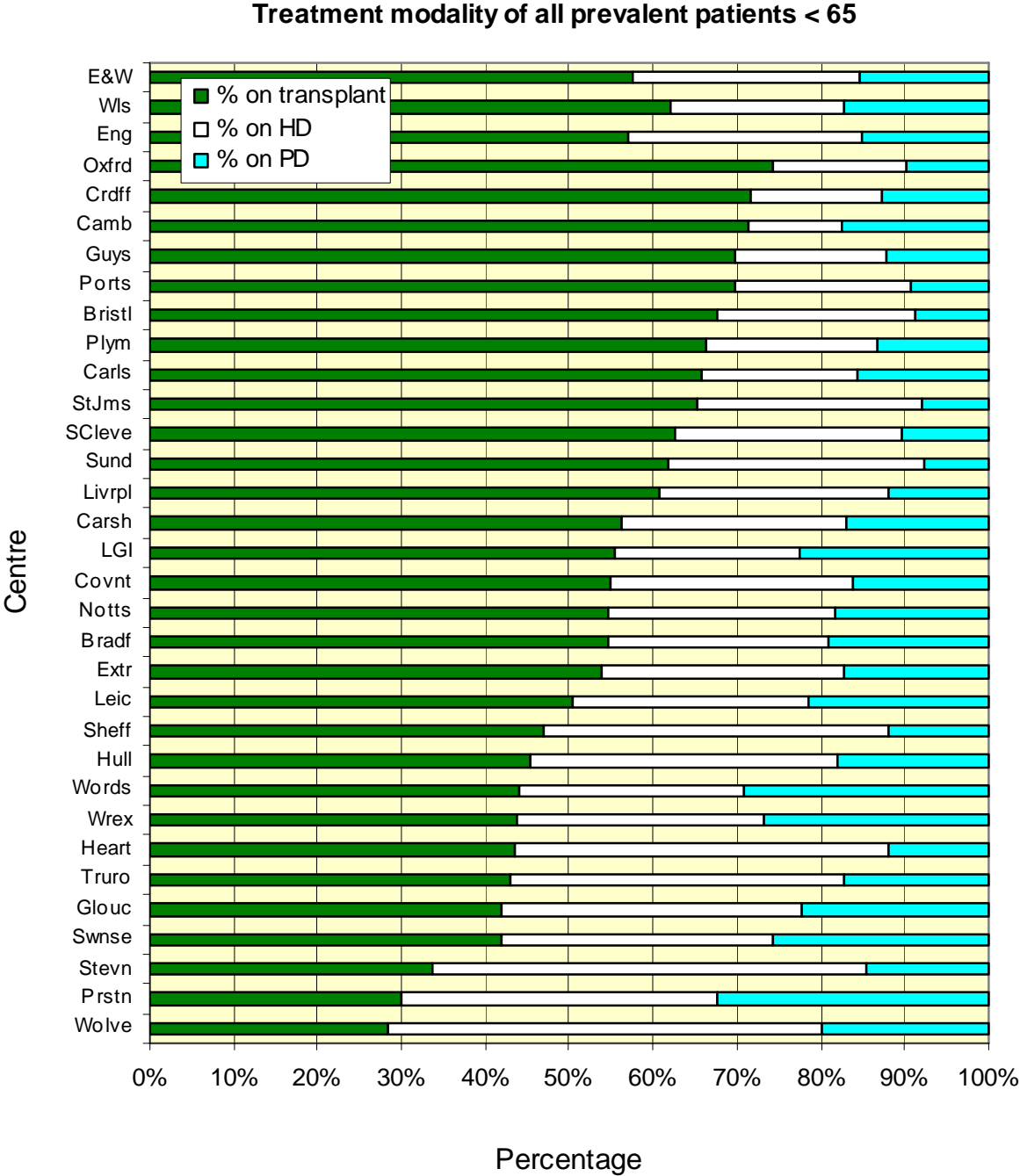
**Table 13.5: Annual proportion of RRT patients with a functioning transplant since 1997 (E&W)**

Figure 13.1 shows the age distribution of prevalent transplant patients compared with that of the dialysis population from which they were drawn. The median age of the transplant patients was 49 years, compared with 62 years for the dialysis population; 13.2% of the total prevalent transplant population and 44.1% of the prevalent dialysis population were over 65 years old.



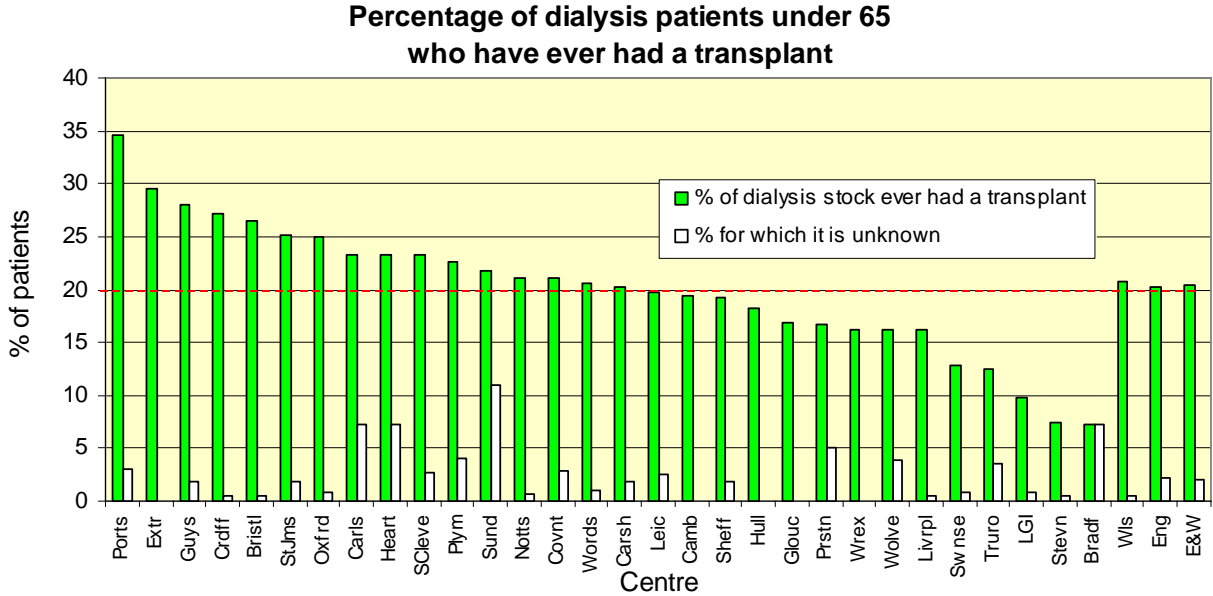
**Figure 13.1: Age histogram of dialysis and transplant patients**

Figure 13.2 shows the proportion of prevalent patients at each participating centre aged less than 65 years receiving renal replacement therapy according to treatment modality at the end of 2001. This age cut off has been chosen as most patients receiving a renal transplant for the first time are less than 65 years old. Overall for England and Wales, 57% of all RRT patients under 65 years is made up by transplant patients. If all patients receiving RRT are included (i.e. those over 65 years old as well), this proportion falls to 46.6%.



**Figure 13.2: Treatment modality of all prevalent patients under 65 years old**

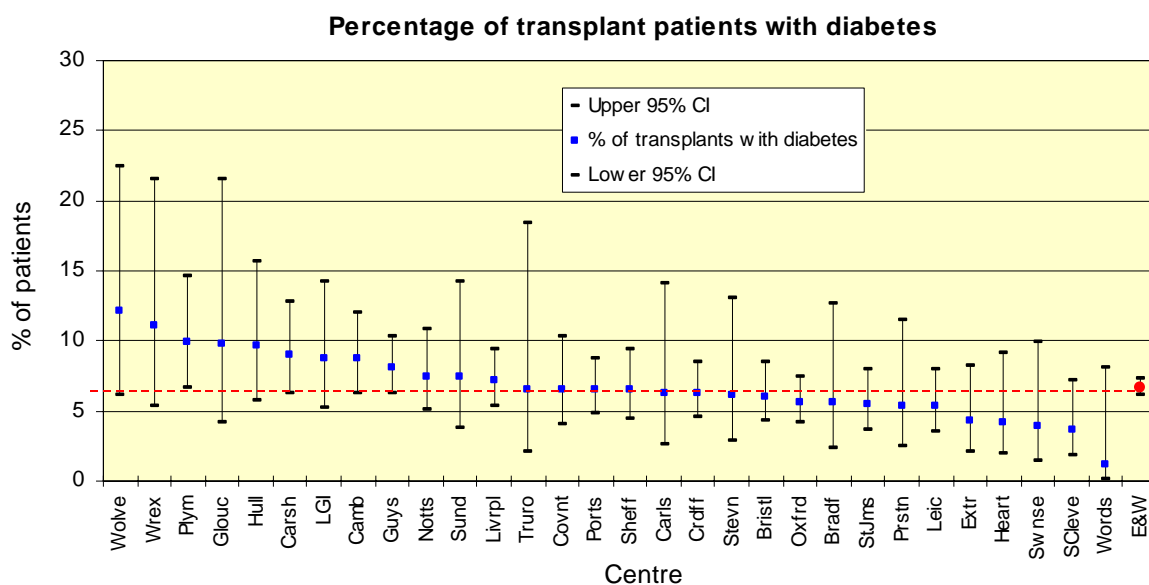
Figure 13.3 shows the proportion of prevalent dialysis patients under 65 years at each participating centre old who have ever had a renal transplant. These figures are an underestimate, as some patients had no information regarding previous transplantation when transferring in on dialysis from a non-Registry unit and are treated as ‘unknown’. In spite of this, there is an apparent wide variation (7.2–34.7%) between centres in access to transplantation. As stated earlier, a proportion of patients originating from non-transplant units may be followed up at the main transplant centre after transplantation (particularly those in clinical trials) and may account for some of the observed difference. A difference may also exist between transplant centres in the selection criteria used for accepting patients onto the waiting list. In addition, patients in older units are likely to have had a longer opportunity for transplantation than those in newer units, and older units are consequently more likely to have a larger number of transplant patients. Another possible explanation for this variation is the difference in the proportion of prevalent dialysis patients made up of individuals from ethnic minority groups (who are harder to blood group and HLA match and thus transplant). Data returns from Registry centres on ethnicity unfortunately remain incomplete, making this hypothesis impossible to test at present.



**Figure 13.3: % of prevalent dialysis patients aged <65 years who have ever received a transplant**

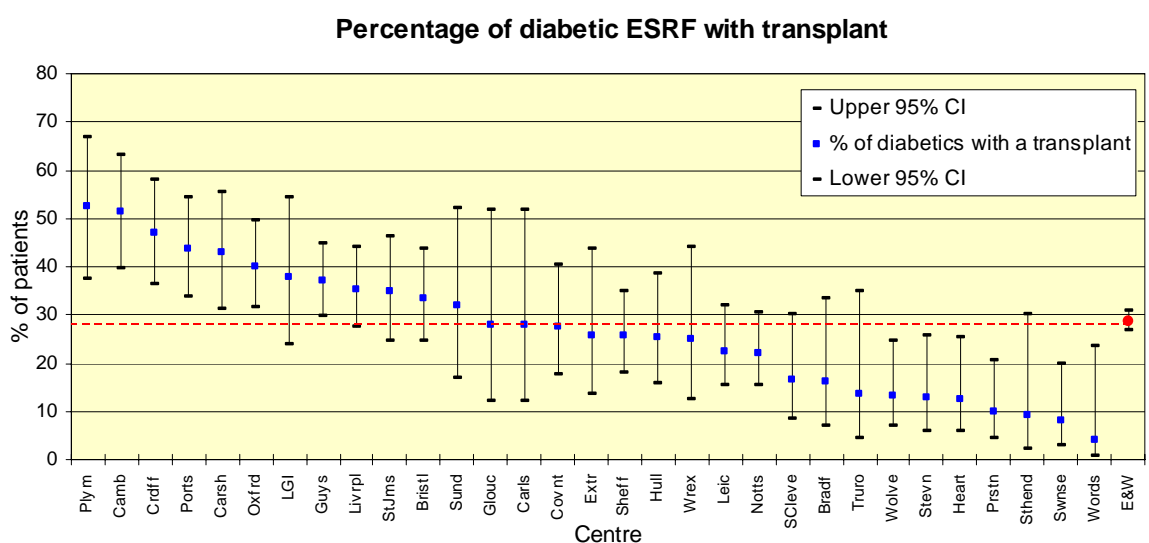
***Transplantation in patients with diabetes mellitus***

Figure 13.4 shows the proportion of all patients in each Registry centre with a functioning renal transplant on 31 December 01 whose primary renal failure diagnosis was diabetes mellitus. Overall, in England and Wales, 6.7% of all transplant patients have diabetes mellitus as the cause of end-stage renal failure (ESRF).



**Figure 13.4: Percentage of current transplant patients with diabetes mellitus, by centre**

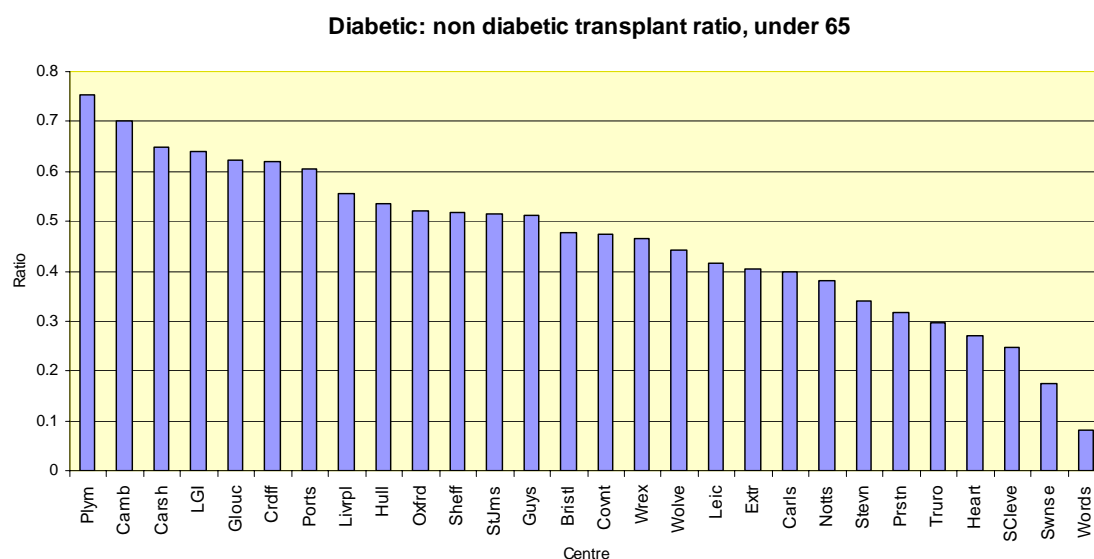
The percentage of diabetic ESRF patients with a transplant was examined by Registry unit to explore whether there was a difference between centres in their approach to transplanting patients with this diagnosis (Figure 13.5).



**Figure 13.5: Percentage of diabetic ESRF patients with a transplant, by centre**

There is a very wide variation (4–52.4%) between centres in the proportion of diabetic patients with ESRF who have a transplant. To explore further a possible difference in access to transplantation for diabetic patients between centres, the proportion of transplanted diabetic patients and transplanted non-diabetic patients under 65 was expressed as a ratio for each centre (Figure 13.6). This age limit was used in an effort to make the populations more comparable, as most patients receiving a transplant are under 65, and diabetic patients on RRT have a lower median age than other patients.





**Figure 13.6: Ratio of patients aged <65 years with a transplant, diabetics: non-diabetics**

The ratio was wide, ranging from 0.75 to less than 0.1. To identify reasons for the observed differences between centres, a number of variables would need to be examined. These include the overall percentage of live ESRF patients with diabetes, the median age of this diabetic cohort and the percentage of the cohort originating from ethnic minorities (and thus likely to experience difficulty in blood group and HLA matching).

Nevertheless, ESRF patients with diabetes mellitus seem less likely to receive a transplant than other ESRF patients because of a number of possible factors, including ethnicity. It is also likely that significant comorbidity may make them less suitable for transplantation. This hypothesis will be tested in future Registry reports as more complete comorbidity data become available.

### ***Failed transplants***

In 2001, patients whose transplants failed in that year made up 6% of the total number of patients starting RRT. Among prevalent transplant patients, 2.3% of transplants failed during 2001, similar to figures reported from the Australian and Canadian Registries.

### ***Survival of patients with established renal transplants***

Table 13.6 shows the Kaplan–Meier 1 year patient survival for established transplant patients (transplanted for at least 6 months) alive on 1 January 2001.

	Transplant censored at dialysis			Transplant including dialysis returns		
	England	Wales	E&W	England	Wales	E&W
No. of patients	5896	745	6641	5896	745	6641
Kaplan-Meier 1 year survival	97.3%	98.0%	97.4%	97.1%	97.8%	97.2%
95% CI	96.9–97.8	96.9–99.0	97.0–97.8	96.7–97.5	96.8–98.9	96.8–97.6

**Table 13.6: Survival during 2001 of established transplant patients alive on 1 January 2001**

## Quality of transplant function

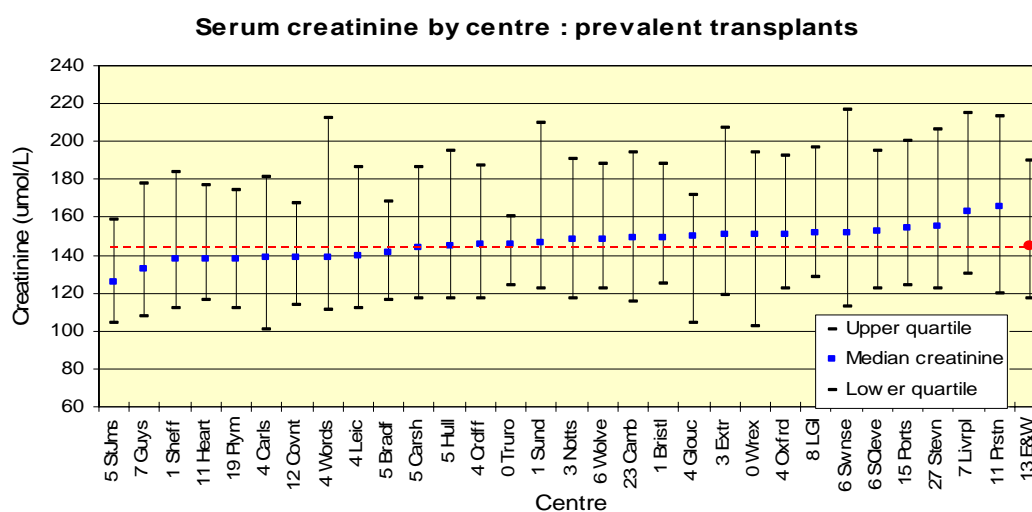
This analysis considered transplant patients on 31 December 2001 whose transplant had been functioning for at least 1 year. The most recent serum creatinine reading within 6 months was used in the analysis. The relationship between primary diagnosis and graft function is shown in Table 13.7. A greater percentage of patients with diabetes mellitus have a creatinine level above 200  $\mu\text{mol/L}$  than do patients in other diagnostic groups.

Diagnosis	% with creatinine < 200 $\mu\text{mol/L}$ (no. of pts)
Aetiology uncertain*	80.5
Glomerulonephritis	76.6
Pyelonephritis	78.0
Diabetes	72.0
Renal vascular disease	88.0
Hypertension	77.2
Polycystic kidney	82.7
Not sent	83.1
Other	78.4

\* Includes 'glomerulonephritis – not histologically proven'.

**Table 13.7: Relationship between transplant function and primary renal diagnosis**

Figure 13.7 shows the median serum creatinine of prevalent transplant recipients for each centre. There is no statistically significant difference in median creatinine values between centres.



**Figure 13.7: Median serum creatinine level of prevalent transplant patients, by centre**

Figure 13.8, however, shows the percentage of established transplant patients with a serum creatinine greater than 250 mcumol/L for each unit. The differences between units are significant but unexplained, although they may include differences in the degree of HLA matching, immunosuppressive regimens and attitude to the use of marginal donors.

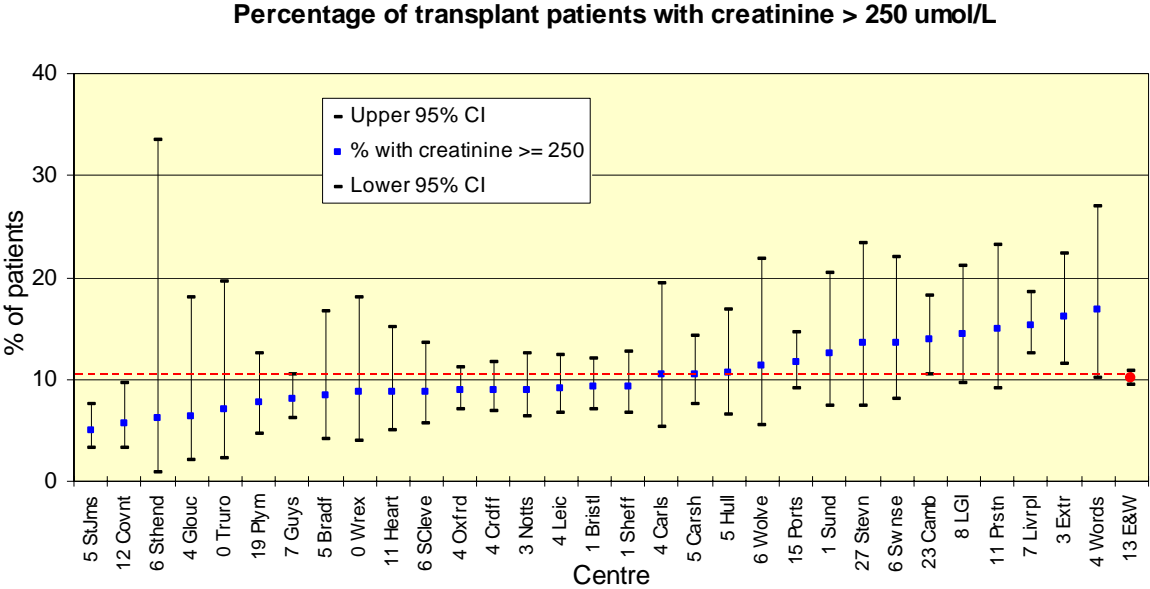


Figure 13.8: % of established transplant patients with a serum creatinine > 250 mcumol/L

**Haemoglobin in transplanted patients**

Considering the whole transplant population on the Registry, haemoglobin level was, as expected, lower in women and in patients with a higher serum creatinine concentration (Table 13.8).

Gender	Creatinine mcmol/L	Haemoglobin							No. with data
		Mean Hb	Std dev	5th Centile	Lower quartile	Median Hb	Upper quartile	95th Centile	
Male	<250	13.4	1.7	10.6	12.3	13.4	14.6	16.1	3344.0
Male	250+	11.4	1.7	8.8	10.4	11.4	12.5	14.7	456.0
Female	<250	12.4	1.6	9.7	11.3	12.4	13.5	15.0	2216.0
Female	250+	10.8	1.6	8.1	9.9	10.9	11.9	13.2	206.0

Table 13.8: Relationship between Hb, creatinine and gender in transplant patients

There are no recommended haemoglobin Standards for renal transplant patients. Figure 13.9 shows the median haemoglobin level for prevalent transplant patients at least 6 months after transplantation according to Registry centre.

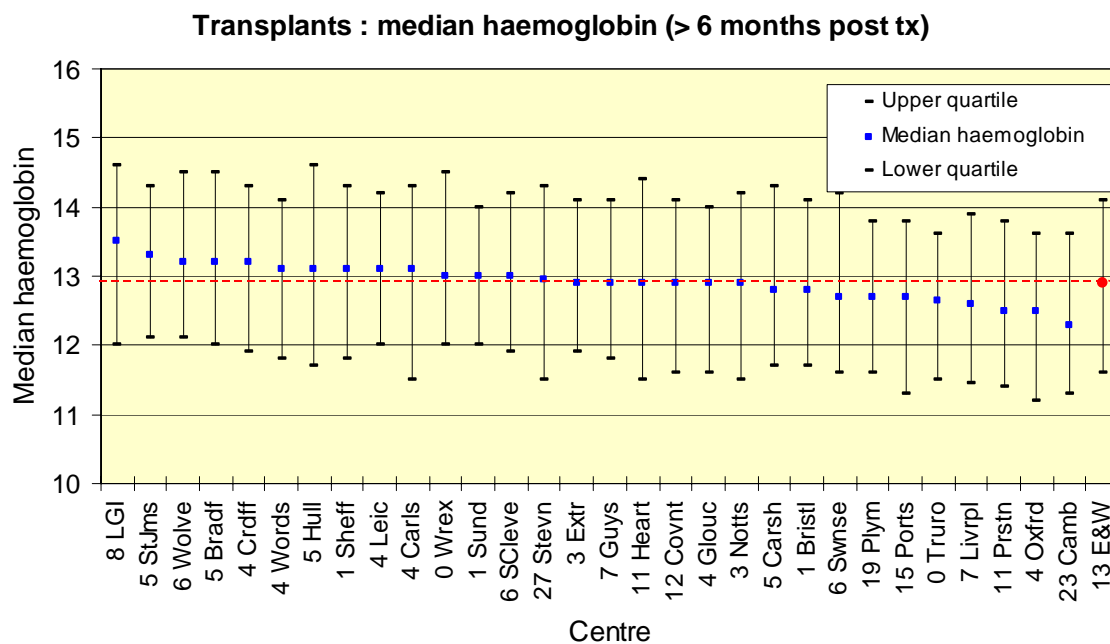


Figure 13.9: Median haemoglobin of transplant patients, by centre

Figure 13.10 shows the percentage of transplant patients in each unit with a haemoglobin concentration of less than 10 g/dL. The variation of 0.8–9.5% between centres with a level less than 10 g/dL is unexplained. Possible reasons include quality of graft function, type of immunosuppression (i.e. the use of azathioprine and mycophenolate mofetil) and use of erythropoietin when there are failing grafts.

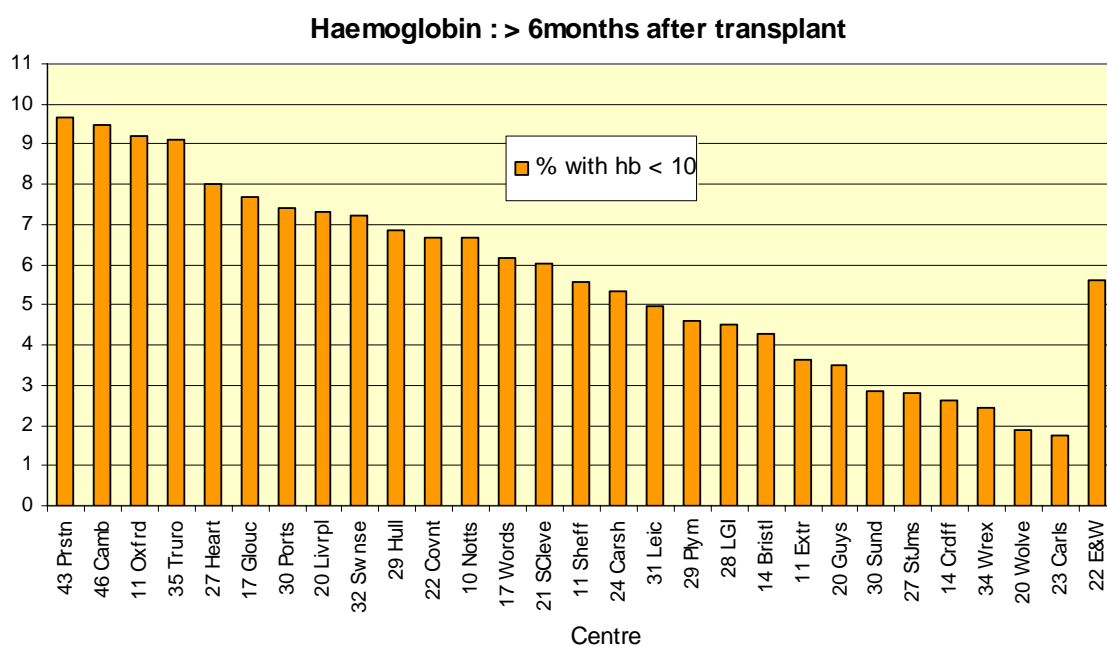


Figure 13.10: Haemoglobin level achieved in established transplant patients, by centre

Figure 13.11 shows the relationship between median haemoglobin and median serum creatinine of the transplantees at each centre. This relationship between haemoglobin and serum creatinine levels in centres did not reach significance, suggesting that factors related to centres other than graft function (e.g. type of immunosuppression and use of erythropoietin) are important.

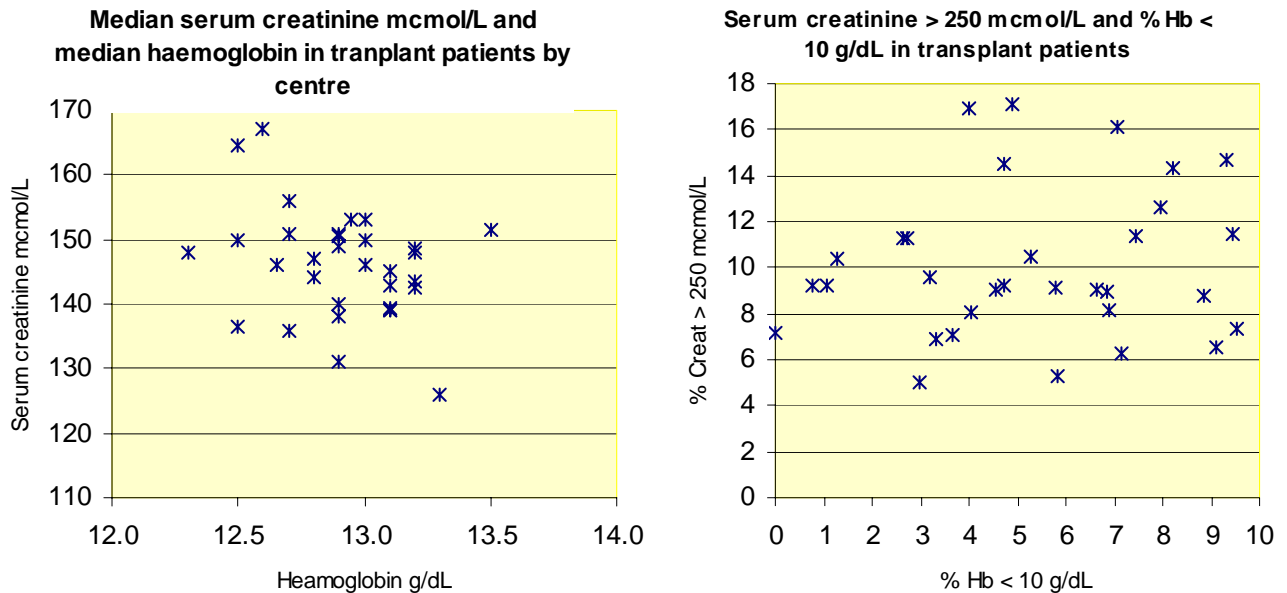


Figure 13.11: Scattergrams showing the relationship of Hb and serum creatinine by centre

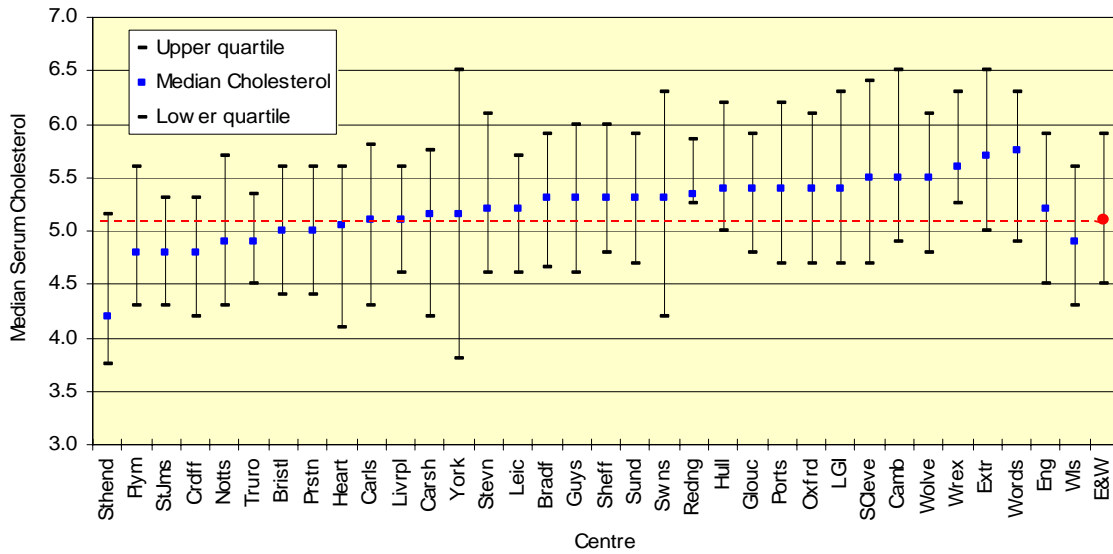
### ***Serum cholesterol***

No recommendations have been made in either the Renal Association or British Transplant Society Standards documents regarding a target cholesterol level in renal transplant recipients.

This analysis considered all transplant patients on 31 December 2001 whose grafts had been functioning for at least 1 year. The most recent serum cholesterol over a 12 month period was used, and the cholesterol level was harmonised for inter-laboratory variation. Results were available from 4714 patients. No serum cholesterol value had been recorded in 32.6% of the prevalent transplant patients over that year, but this figure has improved from one of 47% in 1999.

The distribution of serum cholesterol in prevalent transplant recipients according to centre is shown in Figure 13.12.

**Median Serum Cholesterol for Transplant Patients by Centre**

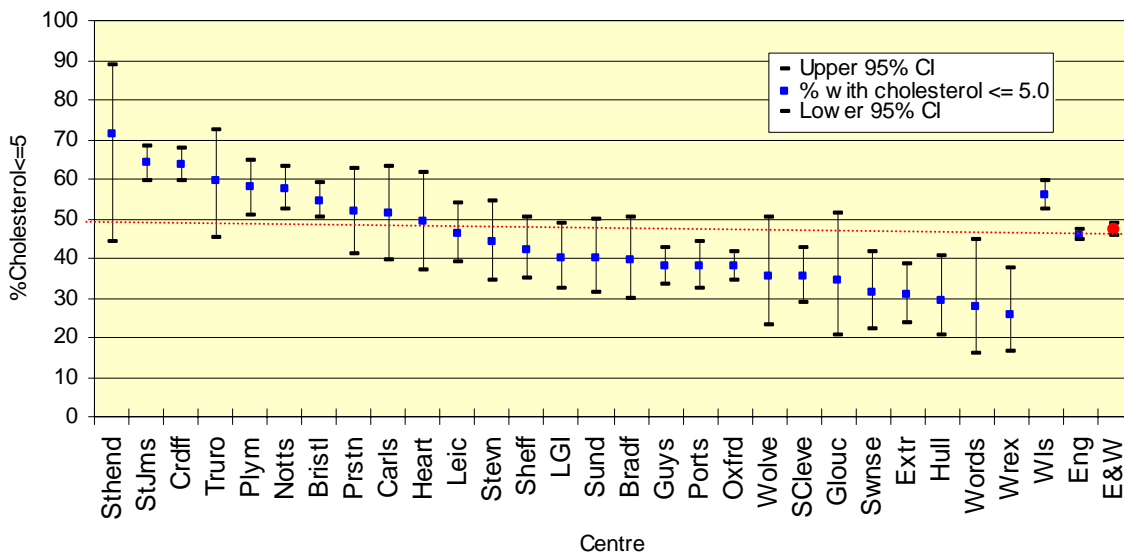


**Figure 13.12: Median serum cholesterol for transplant patients, by centre**

In most units, the median serum cholesterol level is above the recommended level for primary prevention in the high-risk, non-transplant population (5.0 mmol/L).<sup>1</sup>

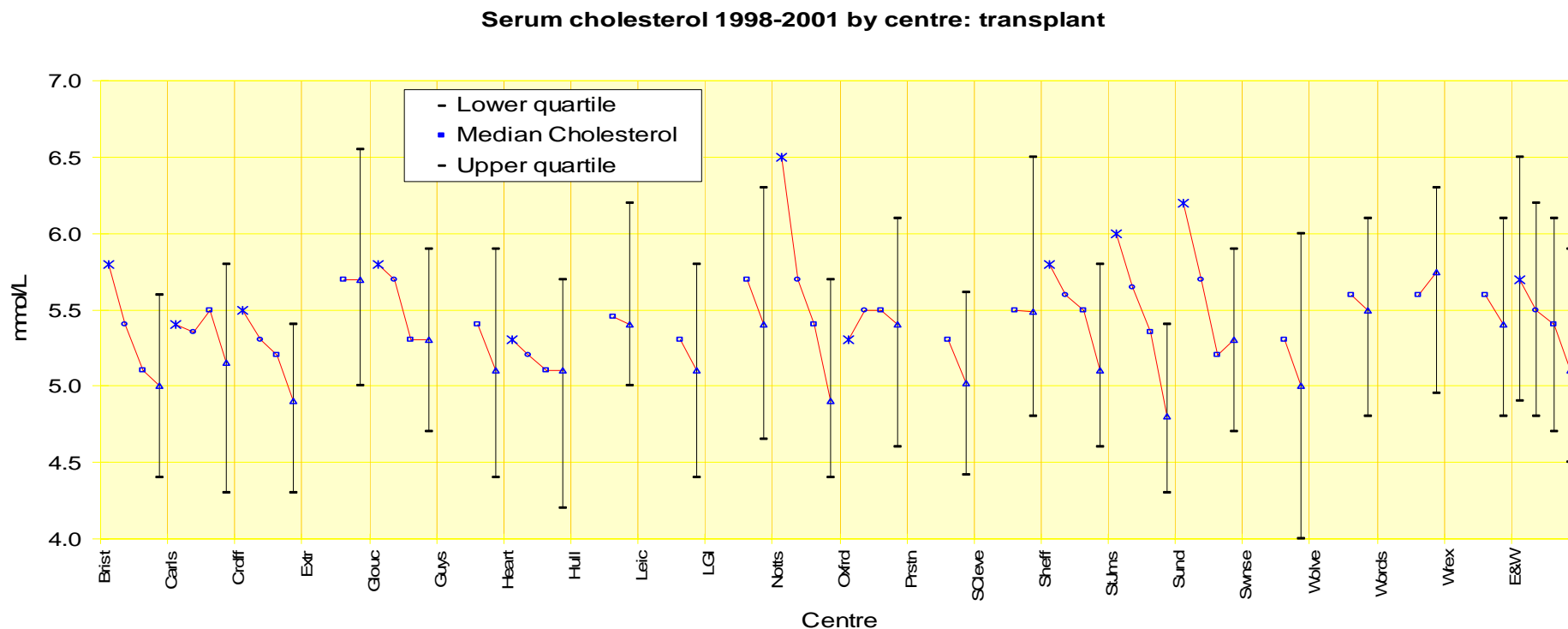
Figure 13.13 shows the percentage of prevalent transplant patients for each Registry centre with a serum cholesterol level below 5.0 mmol/L. A chi-squared test showed significant differences between units ( $\chi^2=288$ , d.f.=31,  $p<0.001$ ) and may be accounted for by differences in the use of HMG CoA reductase inhibitors (statins) as well as immunosuppressive drug regimes.

**% Prevalent transplant patients with cholesterol ≤ 5**



**Figure 13.13: Percentage of transplant patients with a cholesterol level of 5 mmol/L or less**

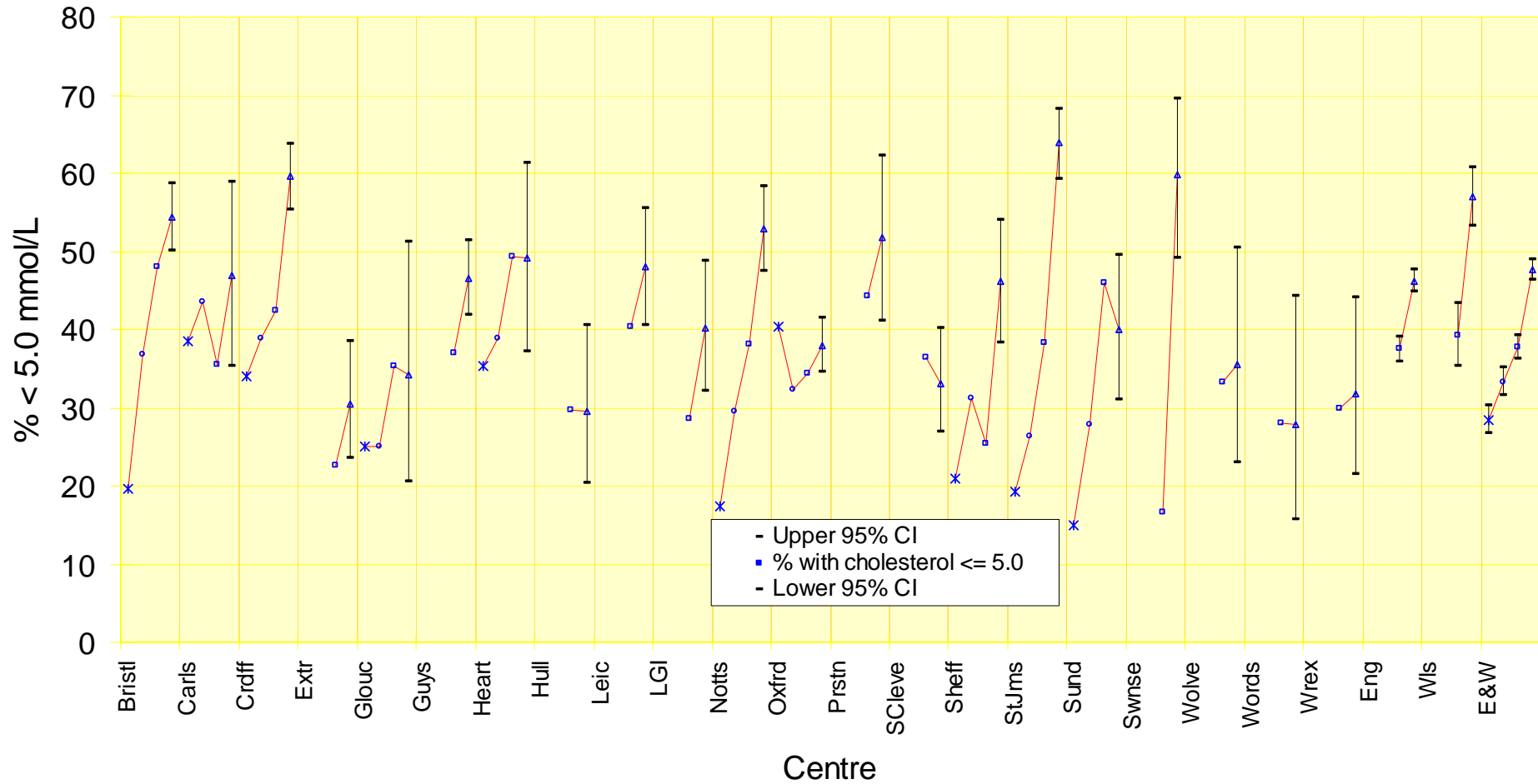
## Changes in serum cholesterol 1998–2001



**Figure 13.14: Median serum cholesterol in transplant patients, by centre, 1998–2001**

Figure 13.14 shows the consecutive annual median serum cholesterol by centre since 1998. In most cases, a progressive fall in cholesterol level is observed. Similarly, Figure 13.15 shows the annual percentage of patients with a serum cholesterol below 5.0 mmol/L for each centre since 1998. Although there is a significant difference between centres, there is in most cases within centres overall a progressive improvement in cholesterol level. The marked improvement observed in some centres suggests a change in policy over this time, with a more active approach to cholesterol lowering.

**Cholesterol 1998 - 2001 percentage < 5.0 mmol/L : transplant**



**Figure 13.15: % of transplant patients with a serum cholesterol of <5.0 mmol/L, 1998–2001**



## Blood pressure

The third edition of the Renal Association's *Standards and Audit Measures*, published in August 2002, recommends blood pressure targets for renal transplant recipients of less than 130 mmHg systolic blood pressure (SBP) and less than 80 mmHg diastolic blood pressure (DBP) (strength of recommendation B).<sup>2</sup> However, during the period of data collection for this report (2001 and before), no recommendations existed. Therefore, as in earlier reports, the Standards recommended for dialysis patients in the second edition (<140/90 mmHg for age <60 years, and <160/90 mmHg for age 60 or over) have been adopted for the following analysis.<sup>3</sup>

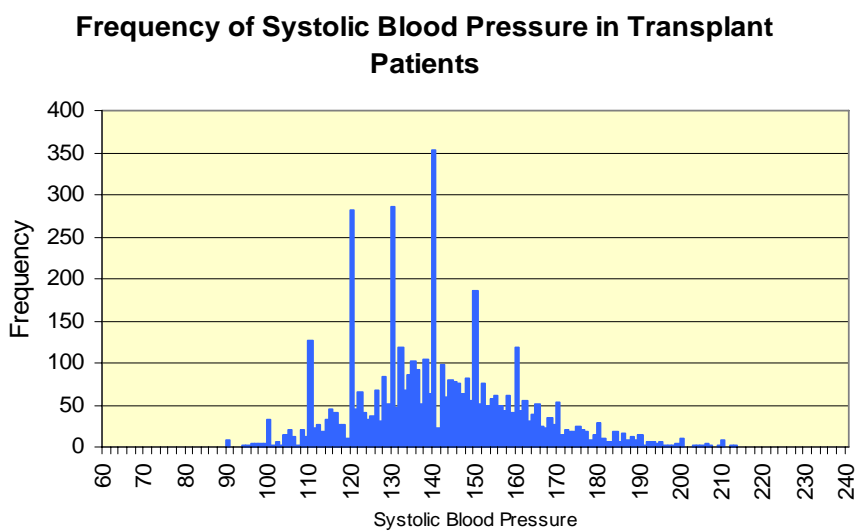
There may be errors caused by incomplete data returns. Table 13.9 shows the percentage of renal transplant recipients with blood pressure data. Disappointingly, the completeness of blood pressure returns continues to be poor, and efforts will need to be taken to encourage better returns in the future.

<b>% with a blood pressure return from last 6 months</b>		
Centre	Age <60	Age >60
Notts	88.9	95.3
Sheffield	86.2	96.5
Cardiff	81.6	94.2
St James	71.7	97.6
Bradford	67.2	100
Words	61.8	81.0
Leicester	56.2	92.1
Liverpool	55.1	81.5
Coventry	53.8	70.7
Cambridge	50.9	66.2
Truro	44.4	60.0
Stevenage	35.8	33.3
S Cleveland	29.3	45.3
Bristol	25.9	37.9
Oxford	23.2	34.3
Exeter	11.2	13.6
LGI	1.9	0.0
Guys	0.4	0.0
Sunderland	0.0	0.0
Hull	0.0	0.0
Gloucester	0.0	10.0
Swansea	0.0	4.3
Southend	0.0	0.0
Carlisle	0.0	0.0
Preston	0.0	0.0
Wrexham	0.0	0.0
Wolves	0.0	0.0
Carlshalton	0.0	0.0
Portsmouth	0.0	0.0
York	0.0	0.0
Heartlands	0.0	0.0

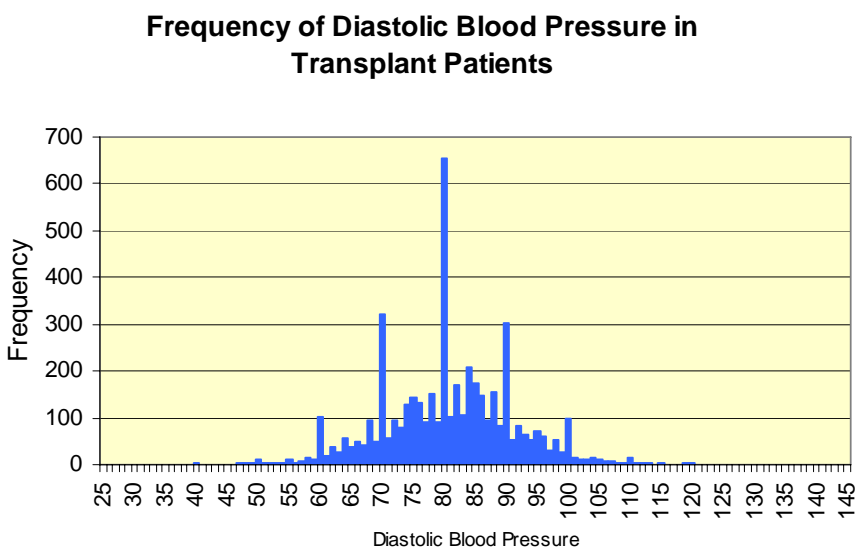
% with a blood pressure return from last 6 months		
Centre	Age <60	Age >60
Reading	0.0	0.0
Plymouth	0.0	0.0
E&W	35.1	44.0

**Table 13.9: Completeness of blood pressure returns for transplant patients**

Blood pressure recordings may also be subject to a variety of biases. Healthy patients with infrequent clinic attendance will have infrequent blood pressure assessment. High blood pressure readings may be selectively included or excluded from computer records depending on operator bias. The method and number of blood pressure measurements has not been standardised between units. Figures 13.15 and 13.16 reflect the bias of digit preference when blood pressure is measured by manual devices, with frequent rounding of readings to the nearest zero.



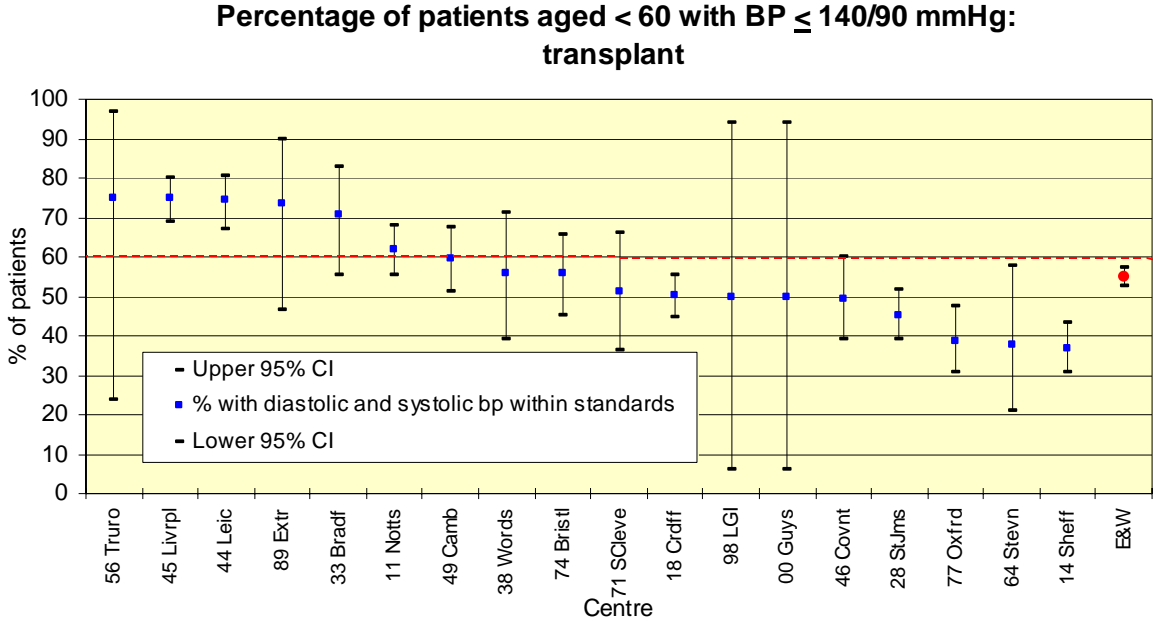
**Figure 13.16: Frequency of SBP in transplant patients**



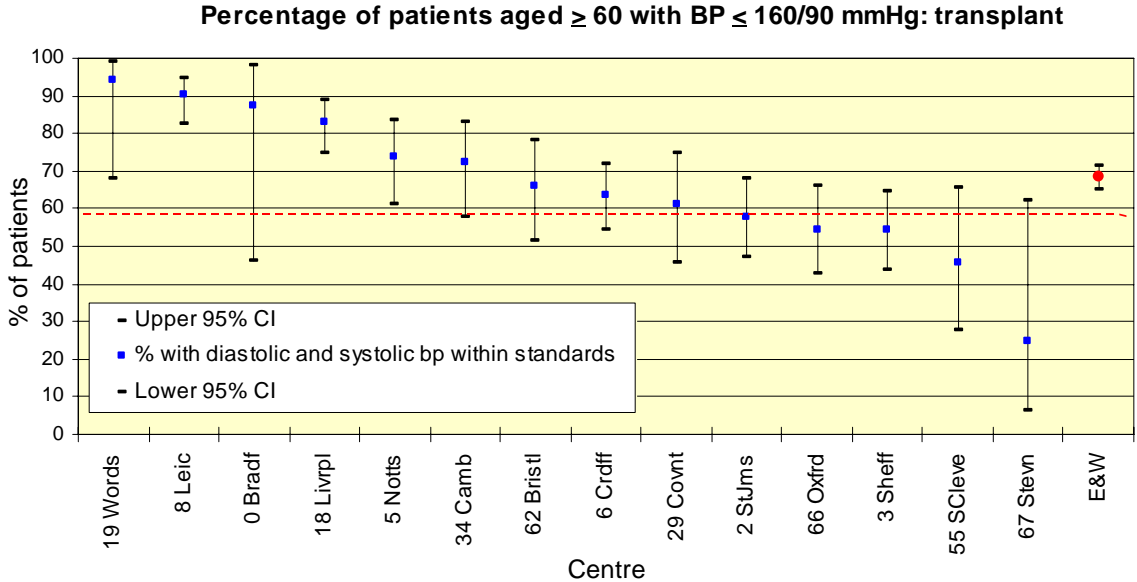
**Figure 13.17: Frequency of DBP in transplant patients**

Figures 13.17 and 13.18 show the proportion of transplant patients achieving the Renal Association Standards for chronic renal failure (second edition) in each centre for those aged less than 60 years and those aged 60 years or older respectively.

Because the blood pressure target for older patients is less stringent, a greater proportion of older patients achieved the blood pressure standards overall: 68.4% versus 54.9% in the younger age group. These overall results for E&W have not changed since 1999.



**Figure 13.18 Percentage of patients aged <60 with a BP below 140/90 mmHg**

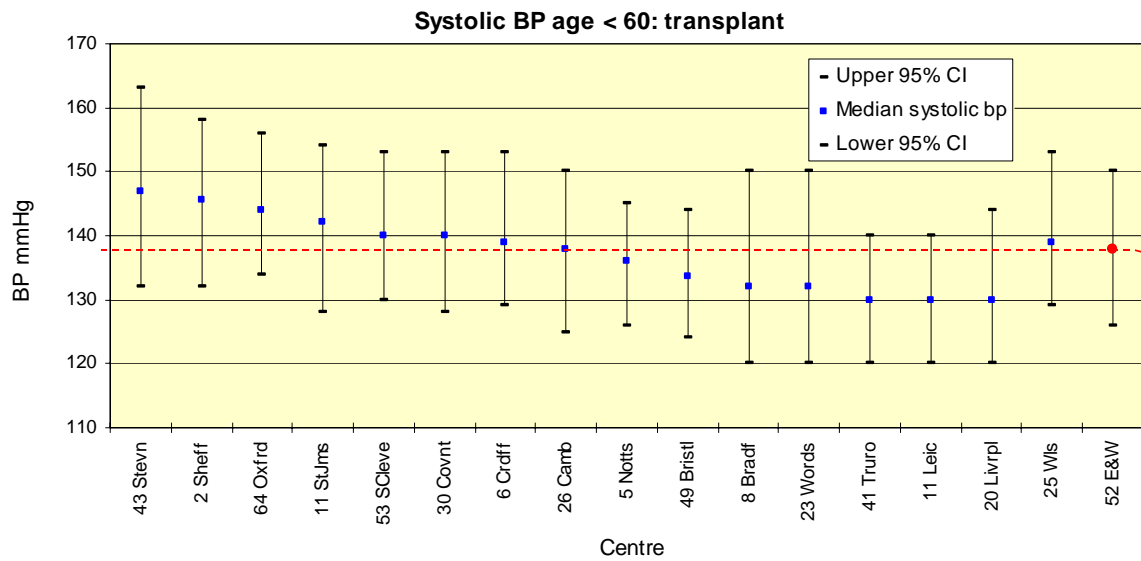


**Figure 13.19: Percentage of patients aged over 60 with a BP below 160/90 mmHg**

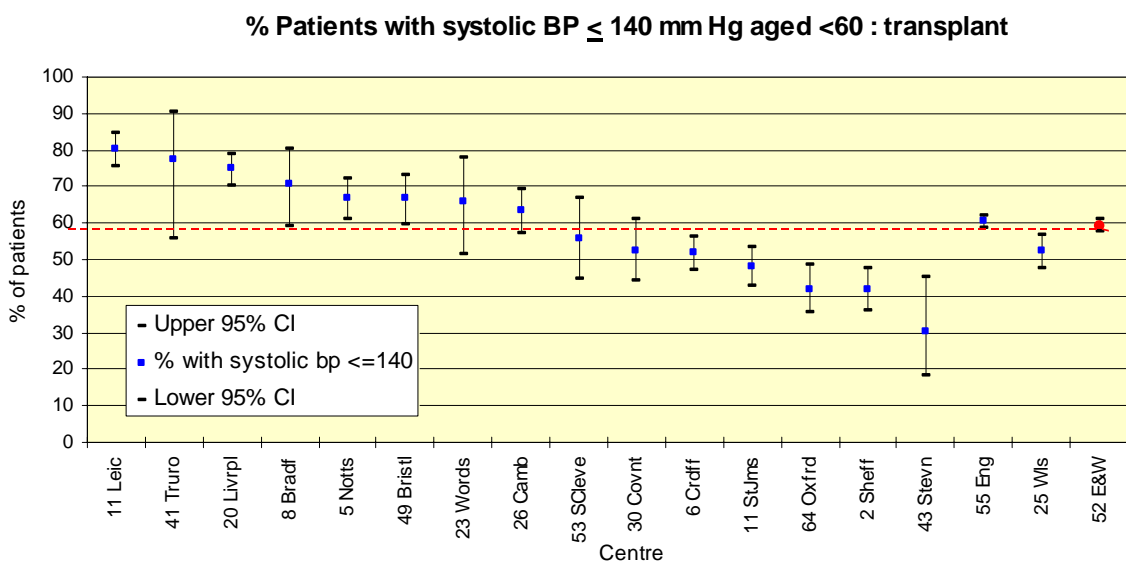
For transplant patients, aged under 60, the percentage of patients reaching the Standard for both systolic and diastolic blood pressure differed significantly between centres ( $X^2 = 150.6$ , d.f. = 18,  $p < 0.001$ ).

For transplant patients, aged 60 or more, the percentage of patients reaching the Standard for both systolic and diastolic blood pressure differed significantly between centres ( $X^2 = 80.4$  d.f. = 17,  $p < 0.001$ ).

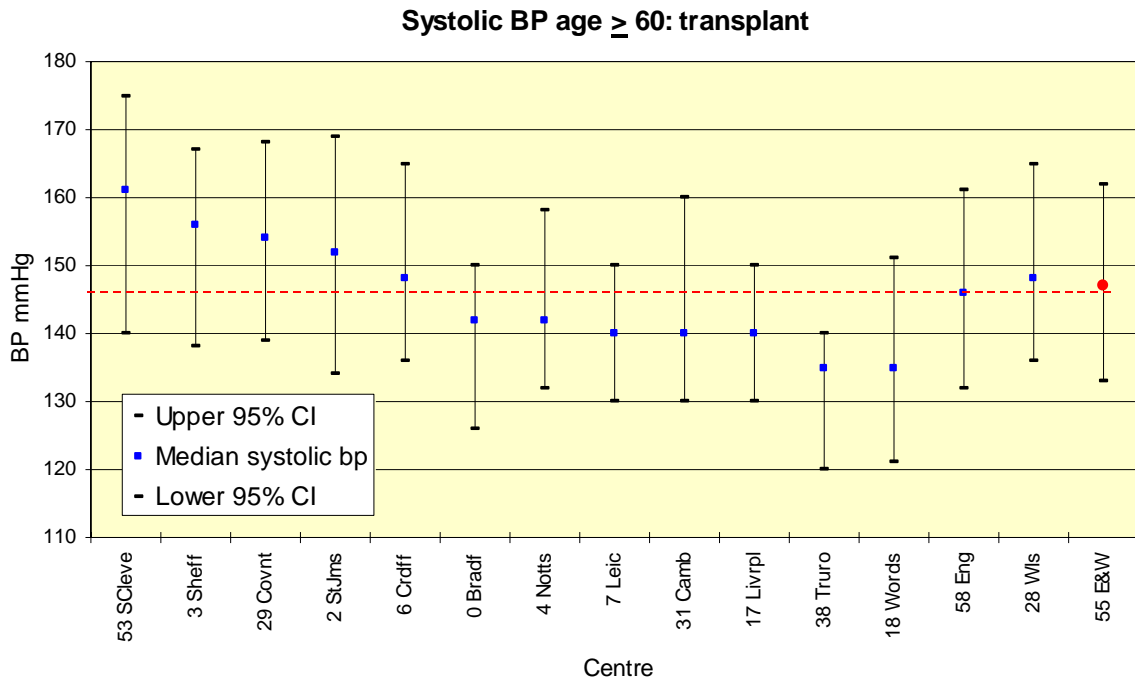
Figures 13.20–13.25 show the SBP and DBP for each age range by centre together with the proportion of patients achieving the Renal Association chronic renal failure Standards (second edition) for each measure. The overall median SBP is higher in those aged over 60 years, at 147 mmHg compared with 138 mmHg in the younger age group. The overall median DBP in those below and above 60 years is 80 mmHg.



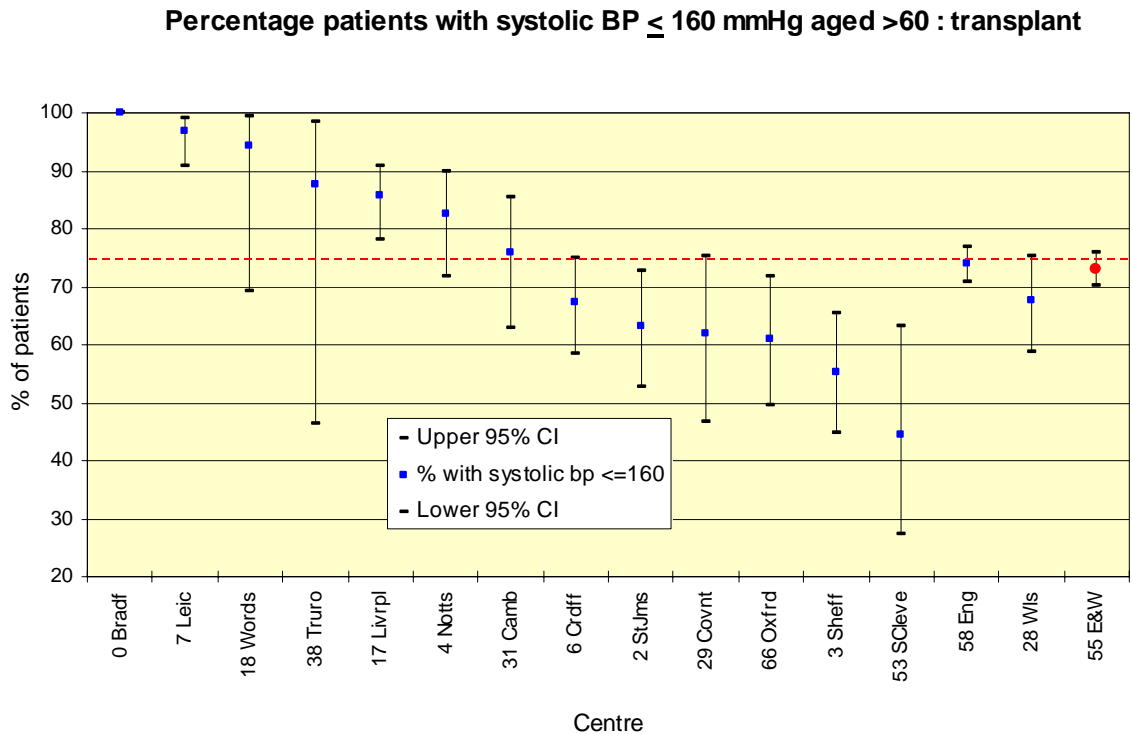
**Figure 13.20: Transplant patients aged less than 60: median SBP**



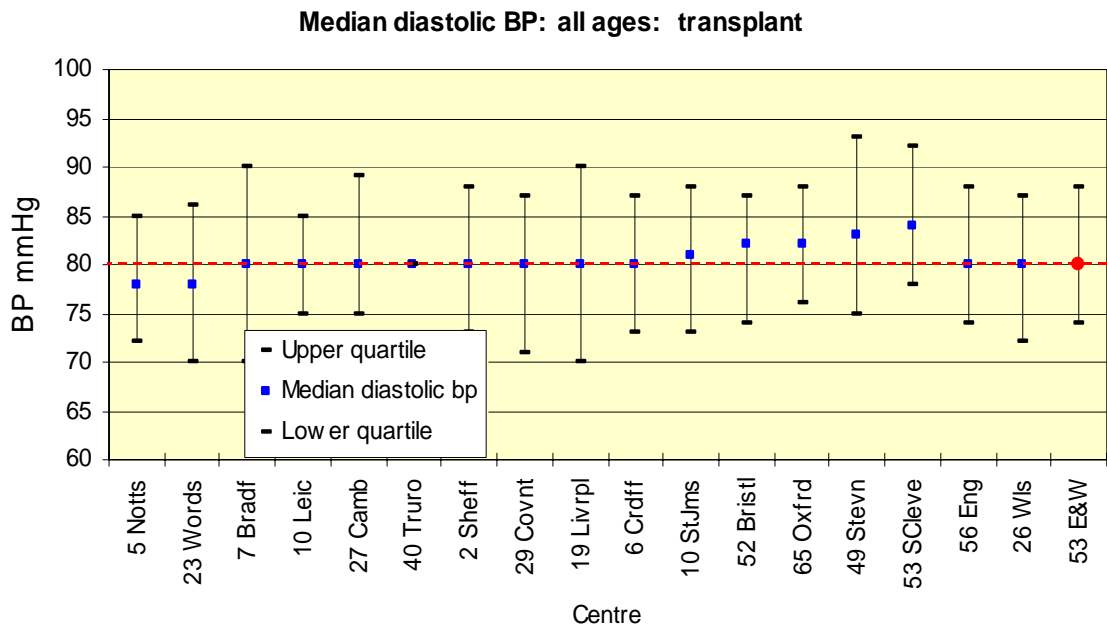
**Figure 13.21: Percentage of transplant patients aged less than 60 with SBP under 140 mmHg**



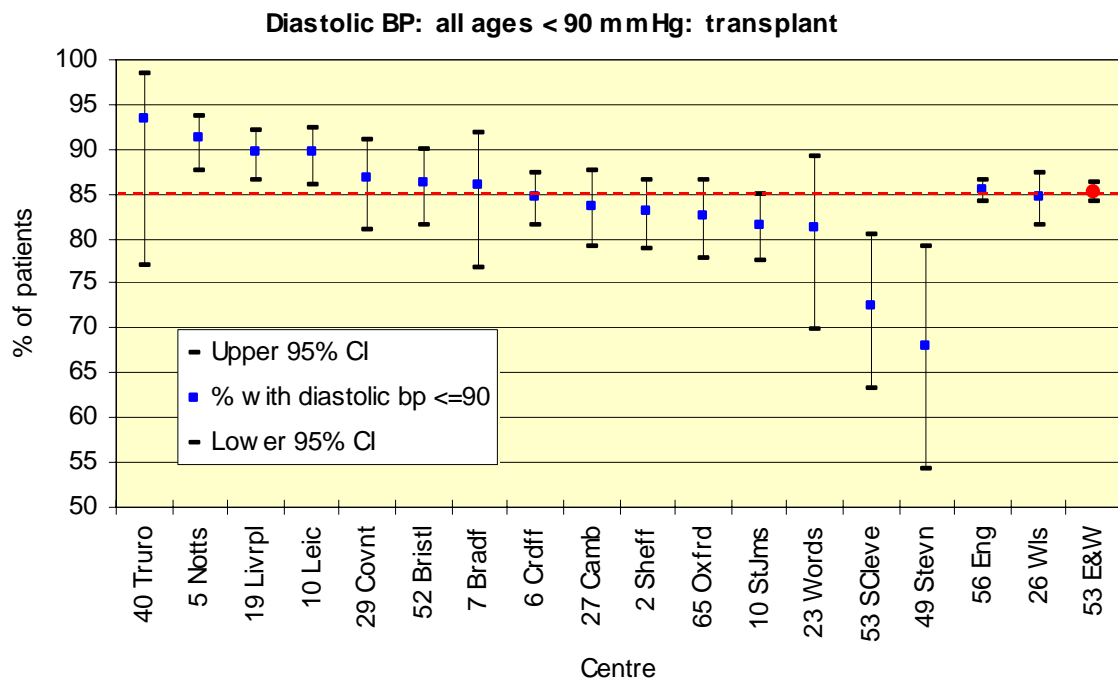
**Figure 13.22: Transplant patients aged over 60: median SBP**



**Figure 13.23: Percentage of patients aged over 60 with SBP less than 160 mmHg**



**Figure 13.24: Transplant patients, all ages: median DBP**



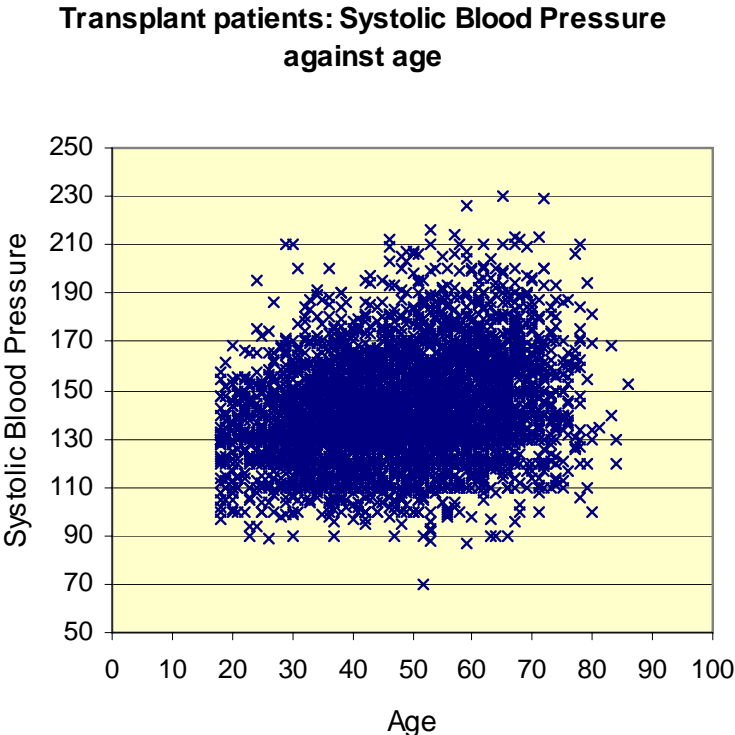
**Figure 13.25: Percentage of patients of all ages with DBP less than 90 mmHg**

The relationship between SBP, DBP and mean arterial blood pressure and transplant function, as reflected by serum creatinine level, is shown in Table 13.10. It is not possible to determine whether higher blood pressure causes or results in poorer graft function. As the Registry collects further sequential data on these patients, the relationship of blood pressure both before and after transplantation to graft and patient survival will be investigated.

Serum creatinine	Median mean arterial blood pressure	Median SBP	Median DBP
< 150 mmol/L	99.0	138.0	80.0
150–250 mmol/L	101.0	140.0	80.0
> 250 mmol/L	103.0	143.0	82.0

**Table 13.10: Relationship between BP and graft function in transplant patients in E&W**

Figures 13.26 and 13.27 show the relationship between blood pressure and age in transplant patients, the pattern observed being similar to that seen in the general population. SBP rises with age; DBP rises up to the age of 50–60 years, then stabilises and subsequently falls slightly.<sup>4</sup>



**Figure 13.26: Transplant patients: SBP versus age**

## Transplant patients: Diastolic Blood Pressure Against Age

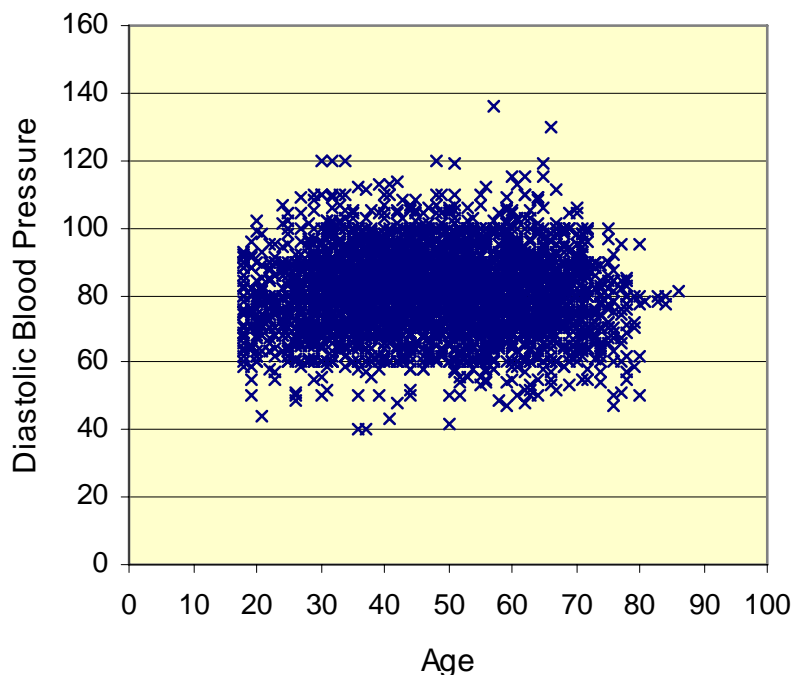


Figure 13.27: Transplant patients: DBP versus age

### Conclusion

This chapter reports on data returned from 30 units with 50 or more prevalent transplant patients. Fourteen units perform renal transplantation and account for 78.6% of the Registry prevalent transplant patients. Data on 50% of all renal transplants performed in 2001 in the UK are presented, together with data on the prevalent renal transplant population.

There has been a progressive decline in the proportion of the prevalent renal replacement therapy patients made up by renal transplants, from 51% in 1997 to 46.6% in 2001.

Variation exists between centres with respect to access to transplantation for both all patients receiving RRT and those whose primary diagnosis is diabetes mellitus. More complete returns on ethnicity are required to be able to examine further the reasons for this difference.

Six per cent of all patients starting dialysis in 2001 were patients with failed transplants; 2.3% of all prevalent transplant failed during 2001.

The annual death rate of patients with established renal transplants for England & Wales is 2.8% (including patients with failed grafts returning to dialysis).

The quality of transplant function differs significantly between centres, as does the haemoglobin level. Differences in modifiable risk factors for cardiovascular disease such as serum cholesterol and blood pressure also exist. Overall, there has been a progressive



reduction in the median serum cholesterol level from 1998 to 2001. The return of blood pressure data from some centres remains poor.

The identification of individual centres may enable a more meaningful interpretation to be made of the data in future reports when epidemiological, demographic and other differences can be considered.

## **References**

1. Wood D, Durrington P, Poulter N, McInnes G, Rees A, Wray R. Joint British recommendations on prevention of coronary heart disease in clinical practice. *Heart* 1998;80(2):S1–S29.
2. Renal Association Standards Subcommittee. *Treatment of Adult Patients with Renal Failure: Recommended Standards and Audit Measures*, 3rd edn. London: Royal College of Physicians, 2002.
3. Renal Association Standards Subcommittee. *Treatment of Adult Patients with Renal Failure: Recommended Standards and Audit Measures*, 2nd edn. London: Royal College of Physicians, 1997.
4. Whelton PK. Epidemiology of hypertension. *Lancet* 1994;344:101–106.