

Chapter 7: Adequacy of Haemodialysis and Serum Bicarbonate

Summary

- The urea reduction ratio (URR) has been rising year on year but now appears to have reached a plateau.
- The URR increases the longer an individual has been on dialysis.
- Concentrating on dialysis adequacy during the first few months after starting haemodialysis is likely to improve the median URR for a renal unit.
- Serum bicarbonate is very variable. The reason for the variability is not clear.

Introduction

The Renal Association guidelines offer both KT/V and the URR as markers for the adequacy of haemodialysis but the Registry has chosen the URR for comparative audit.

The Renal Association 3rd Standards Document page 17 states that:

HD should take place at least three times per week in nearly all patients. Reduction of dialysis frequency to twice per week because of insufficient dialysis facilities is unacceptable. (Good practice)

Every patient receiving thrice weekly HD should show:

- ***either urea reduction ratio (URR) consistently >65%***
- ***or equilibrated Kt/V of >1.2 (calculated from pre- and post-dialysis urea values, duration of dialysis and weight loss during dialysis). (B)***

Recommendations

Patients receiving twice weekly dialysis for reasons of geography should receive a higher sessional dose of dialysis, with a total Kt/V urea (combined residual renal and HD) of >1.8. If this cannot be achieved, then it should be recognised that there is a compromise between the practicalities of dialysis and the patient's long-term health. (Good practice)

The Renal Association has endorsed more than one method of sampling for adequacy measurements. The different results produced by the methodologies and whether it accounts for the variations seen between renal units, has been extensively dissected in the 2002 and 2003 Registry reports and will not be discussed further.

As in previous years the number preceding the centre name in all the figures indicates the percentage of missing data for that centre.

Achieved URR

The median URR achieved by each renal unit is shown in Figure 7.1. The variability is wide, ranging from 62% to 76%. This is reflected in the proportion of patients in each renal unit achieving the 65% URR target (Figure 7.2). There is, as expected, a close relationship between a renal unit's median URR and the percentage of patients in the renal unit complying with the 65% target (Figure 7.3). This suggests that in order to achieve 90% compliance with the target, a median URR of at least 72% is required and to achieve 80% compliance a median URR of at least 69% is required.

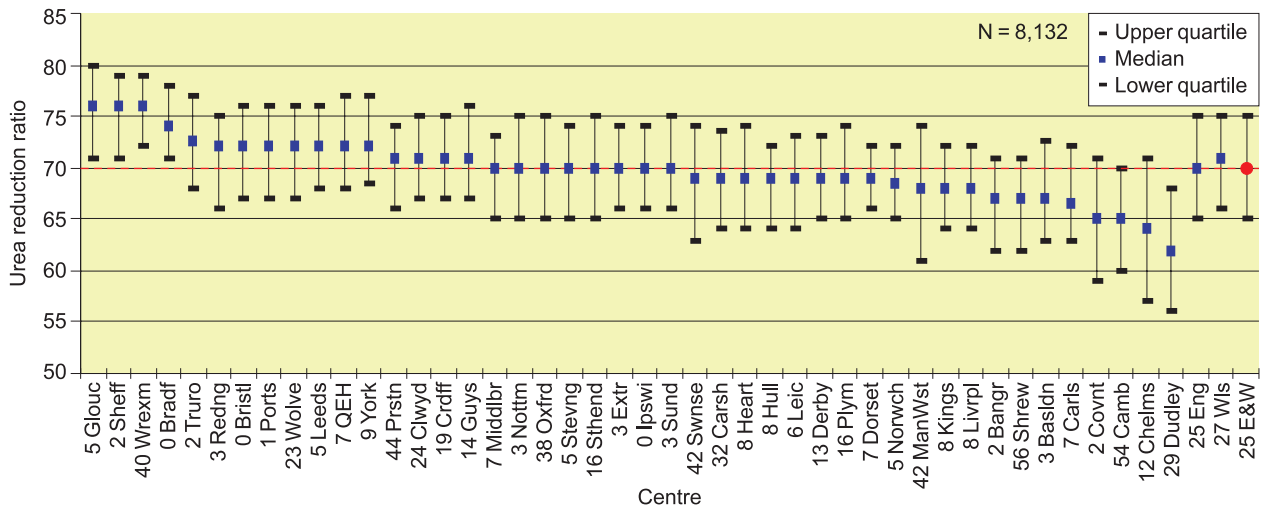


Figure 7.1: Median URR achieved in each centre, 2004

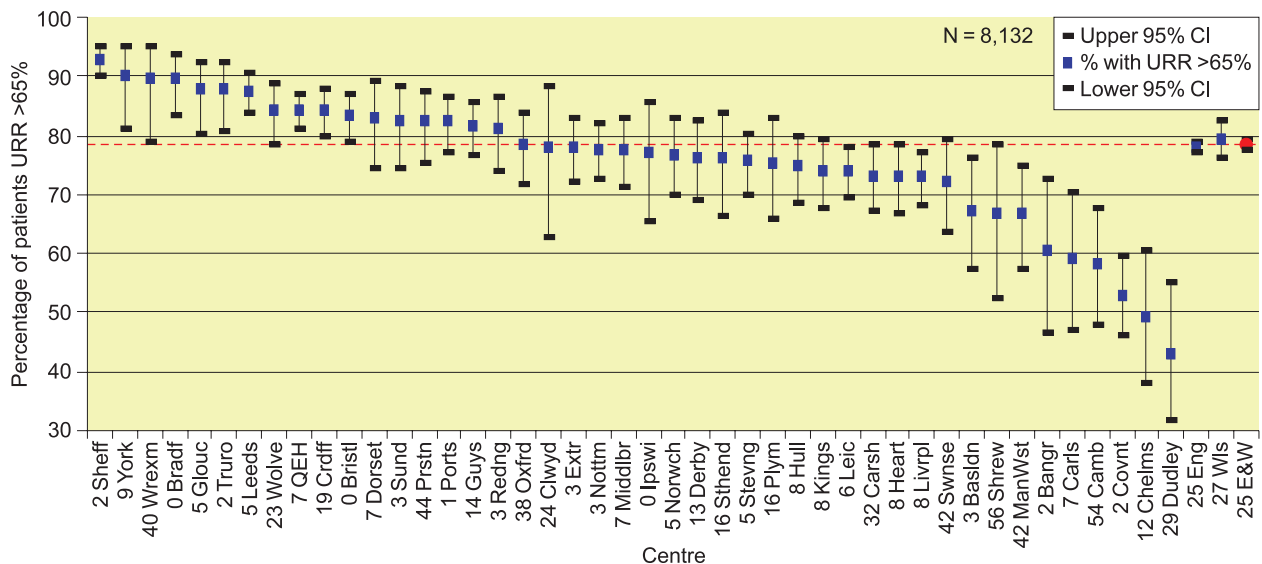


Figure 7.2: Percentage of patients with URR of >65% in each centre, 2004

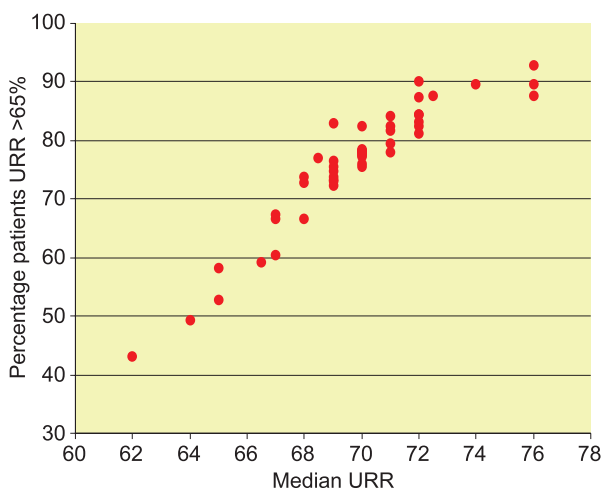


Figure 7.3: Relationship between achievement of URR standard and median URR

Changes in URR over time

Last year, it was reported that in England and Wales the median URR had been rising year on year. The Registry has data on URR for up to seven years (1998–2004), depending on when units joined the Registry, and almost all renal units have demonstrated an improvement in median URR and percentage compliance with the 65% standard over this time. Overall in England and Wales, the rise appears to have reached a plateau (Figures 7.4 and 7.5). Data from individual renal units (Figure 7.6) show that those with the lowest URR several years ago have improved markedly but again suggest that a ceiling has been reached.

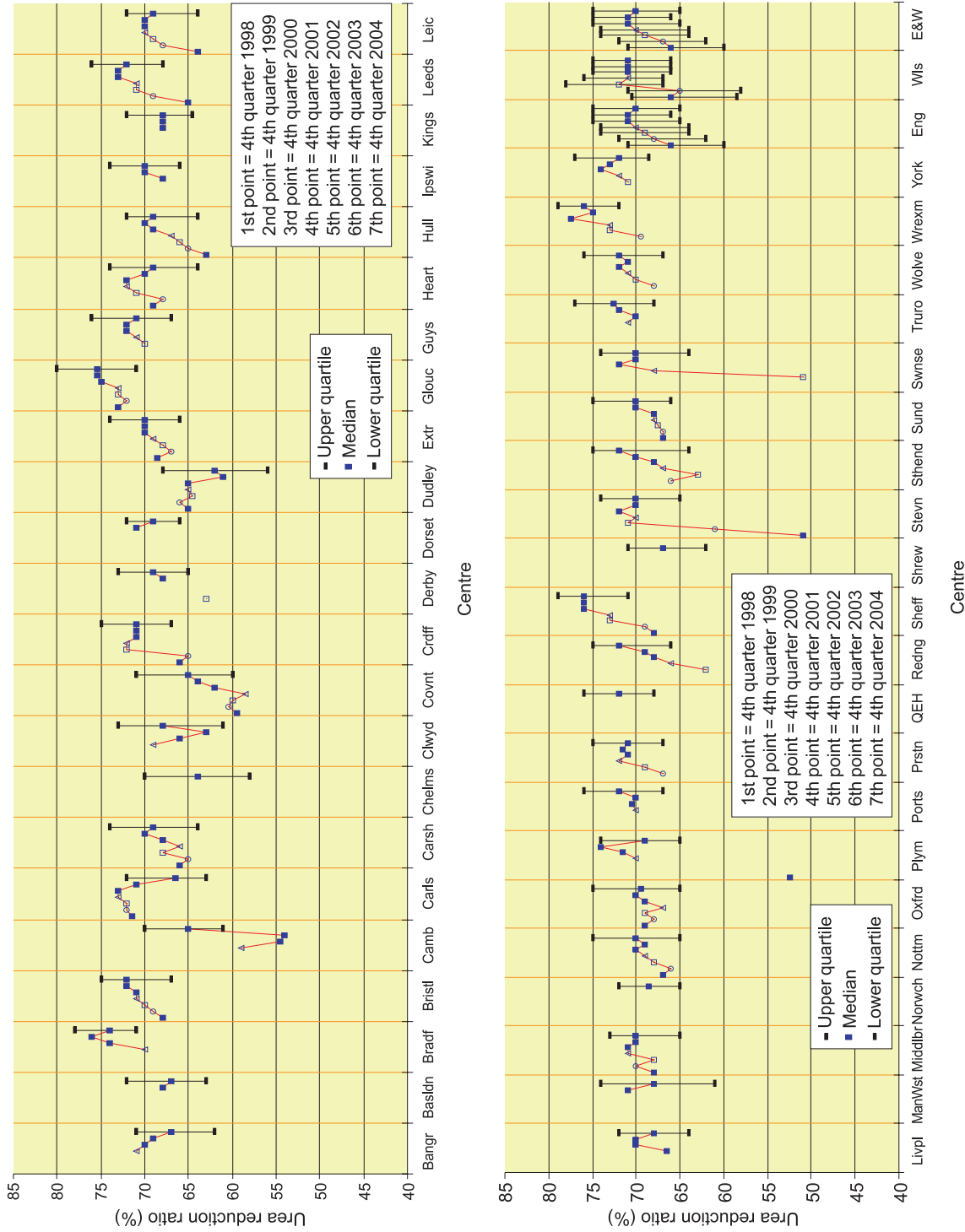


Figure 7.4: Change in median URR from 1998 to 2004

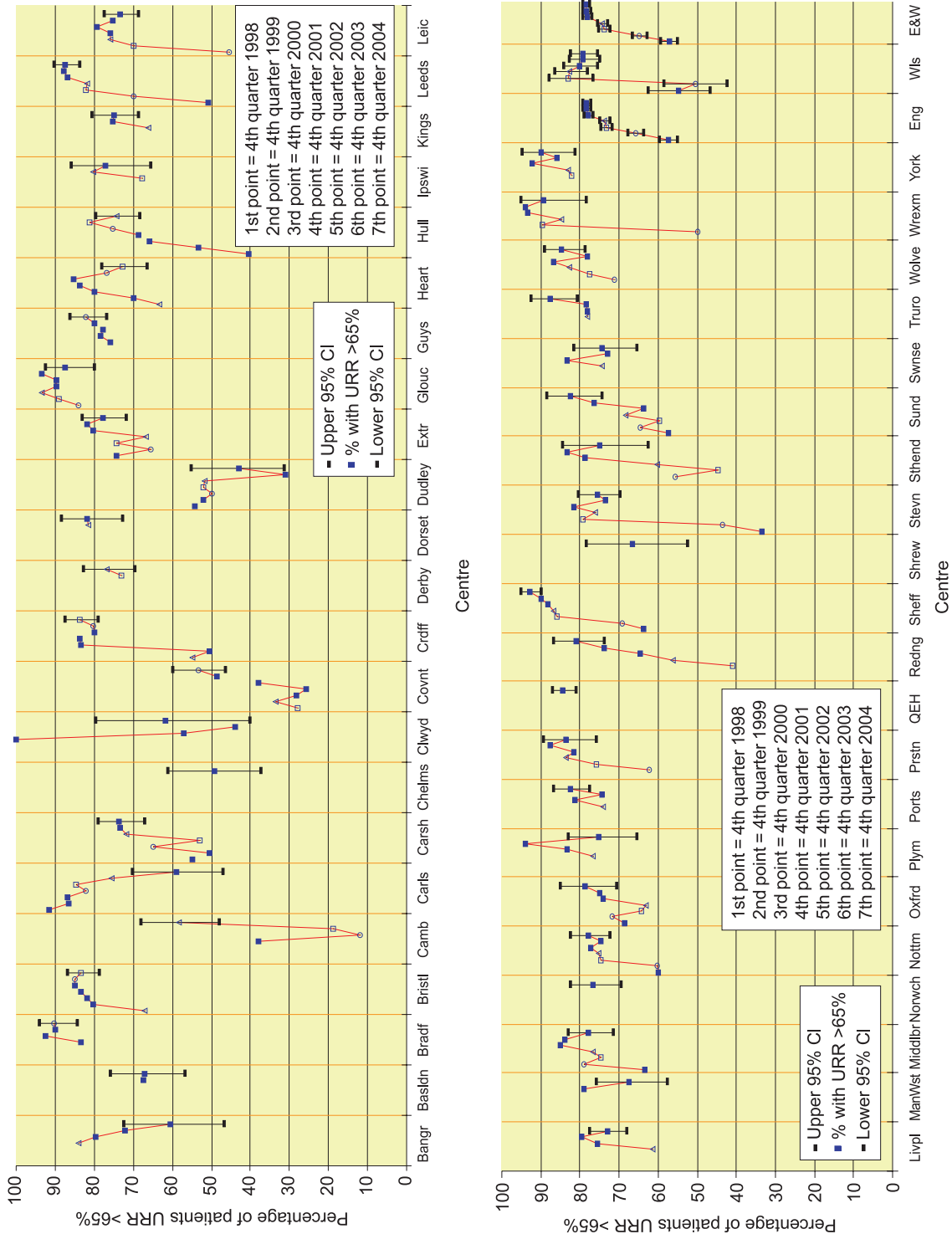


Figure 7.5: Change in achievement of URR standard (>65%) from 1998 to 2004

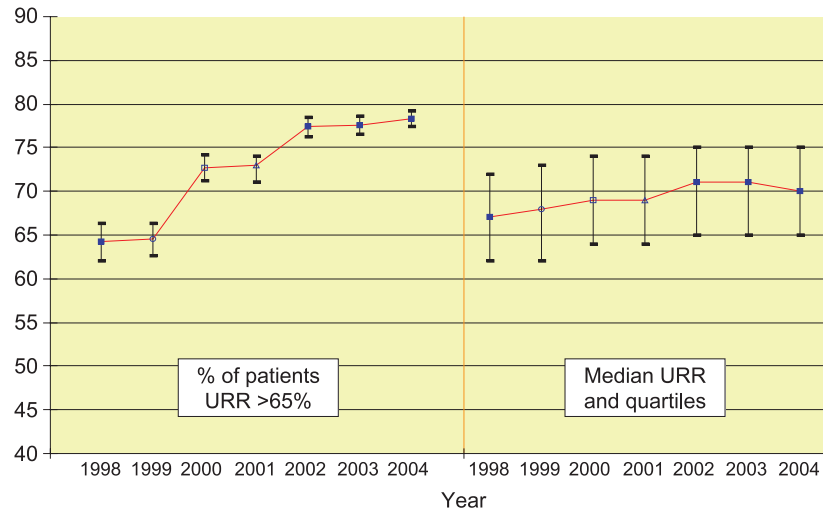


Figure 7.6: Change in the percentage of patients with URR >65% and the median URR between 1998 and 2004 in England & Wales

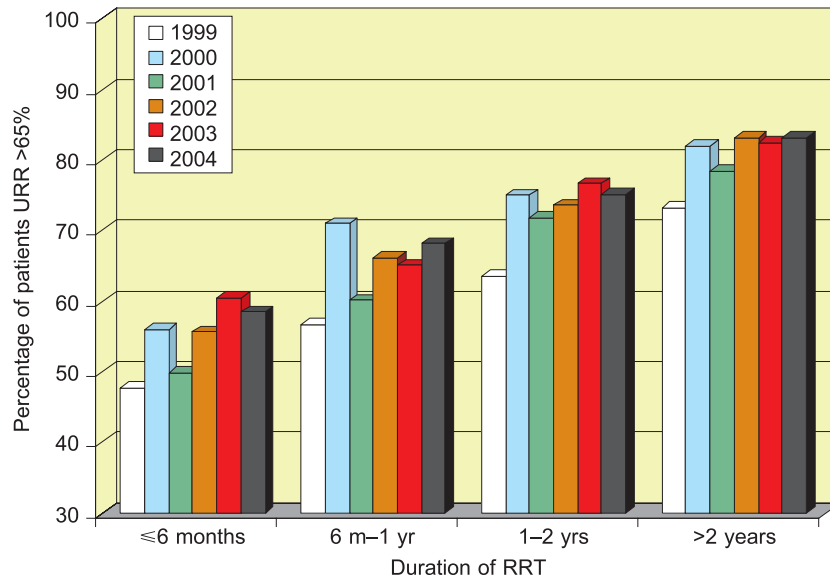


Figure 7.7: Percentage of patients achieving URR standard (>65%) against duration of time on RRT

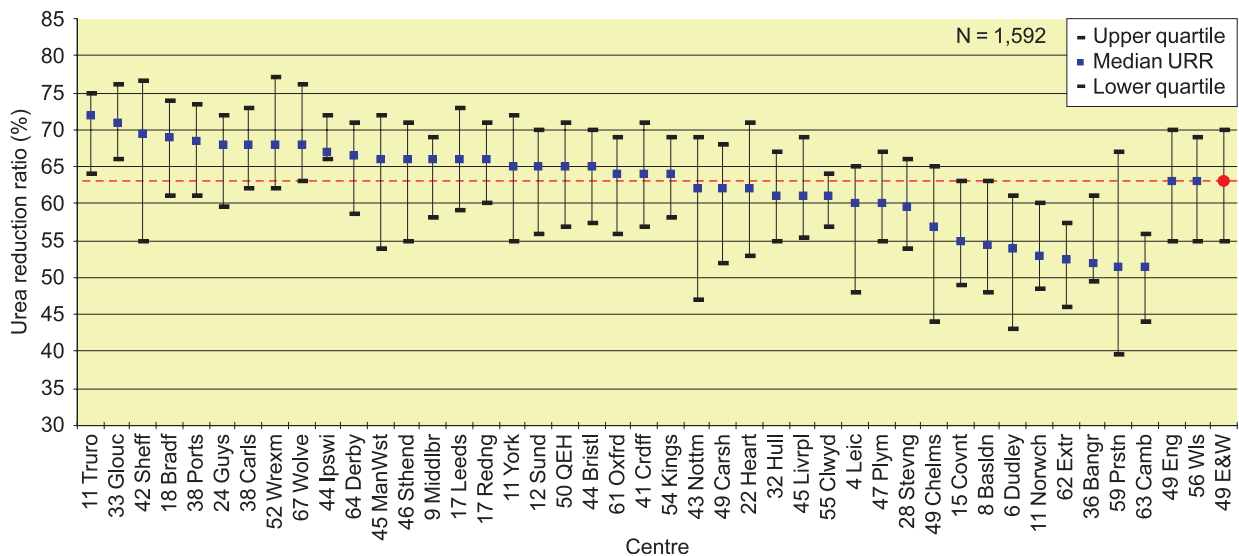


Figure 7.8: Median URR in patients who started dialysis in 2004 at the end of the first quarter after starting

Figure 7.7 shows that patients who have been dialysing the longest have the highest URR. This has been true for the seven years that the Registry has been collecting data. Individual renal unit data for patients starting dialysis in 2004, (Figure 7.8) shows that for patients starting dialysis (Figure 7.8) shows that in this group the median URR can be as low as 51% or as high as 72%. There is no proven explanation for the variability but it is as likely to reflect renal unit practice as it is co-morbidity.

Commentary

What do the 2004 data for dialysis adequacy show us? Probably two things: firstly that for the best performing renal units this may be nearly as good as it is going to get, and secondly that if you want to do well, you have to aim high.

Whilst dialysis is delivered with three, four hour sessions a week then the scope for improving the best dialysis as measured by the URR is limited. Better access, less infection and developments which limit cardiovascular instability will make some improvements possible but our

current model for dialysis delivery sets limits and boundaries.

Serum bicarbonate

The Renal Association Standards state that:

Serum bicarbonate, before a haemodialysis (HD) session, measured with minimal delay after venepuncture should be between 20 and 26 mmol/L (evidence level C).

For patients treated with continuous ambulatory peritoneal dialysis (CAPD) serum bicarbonate, measured with minimal delay after venepuncture, should be between 25 and 29 mmol/L (evidence level B).

In Chapter 6 of the 2004 Registry report, it was reported in depth on a renal unit survey investigating the reasons for inter-unit variability in serum bicarbonate.

There was considerable variability in the median bicarbonate and hence compliance with the standard between renal units both for haemodialysis (Figures 7.9 and 7.10) and peritoneal dialysis (Figures 7.11 and 7.12).

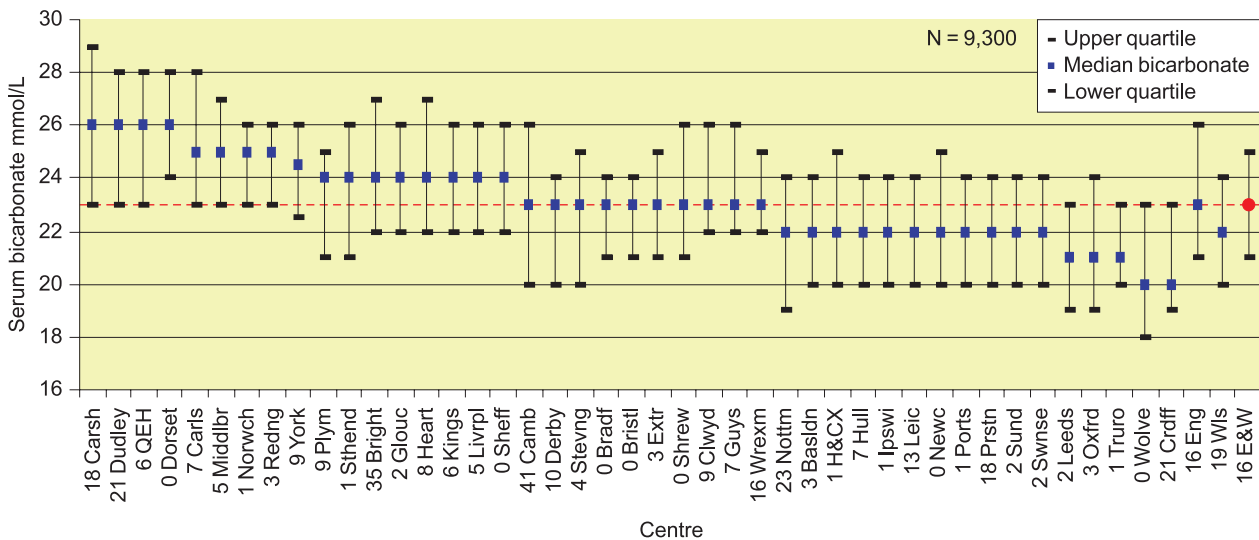


Figure 7.9: Median serum bicarbonate in patients treated with haemodialysis

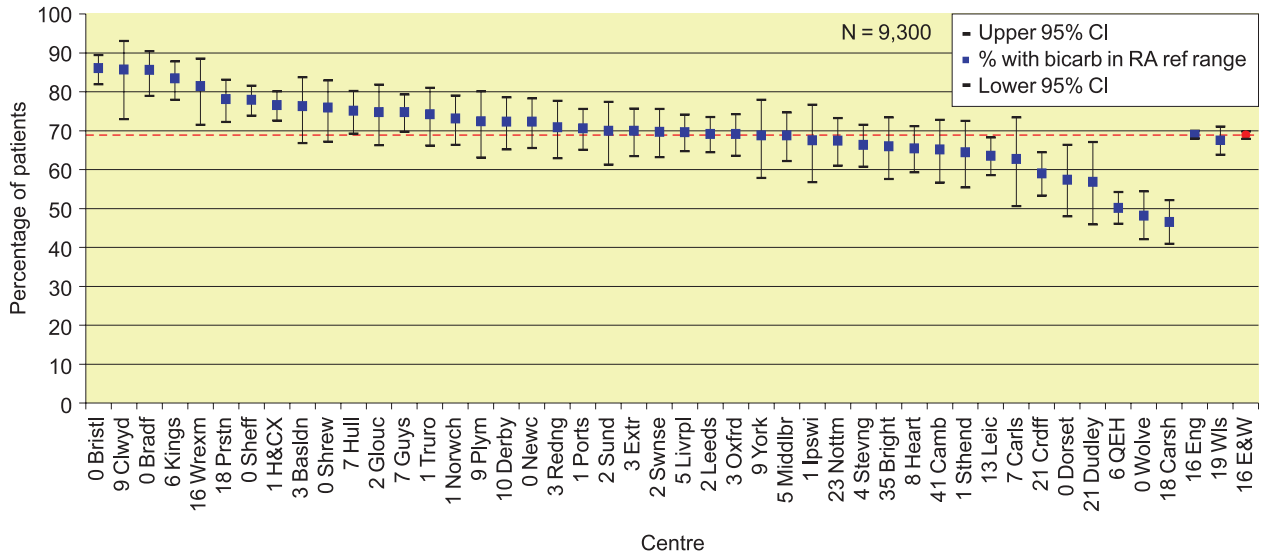


Figure 7.10: Percentage of patients treated with HD with bicarbonate 20–26 mmol/L

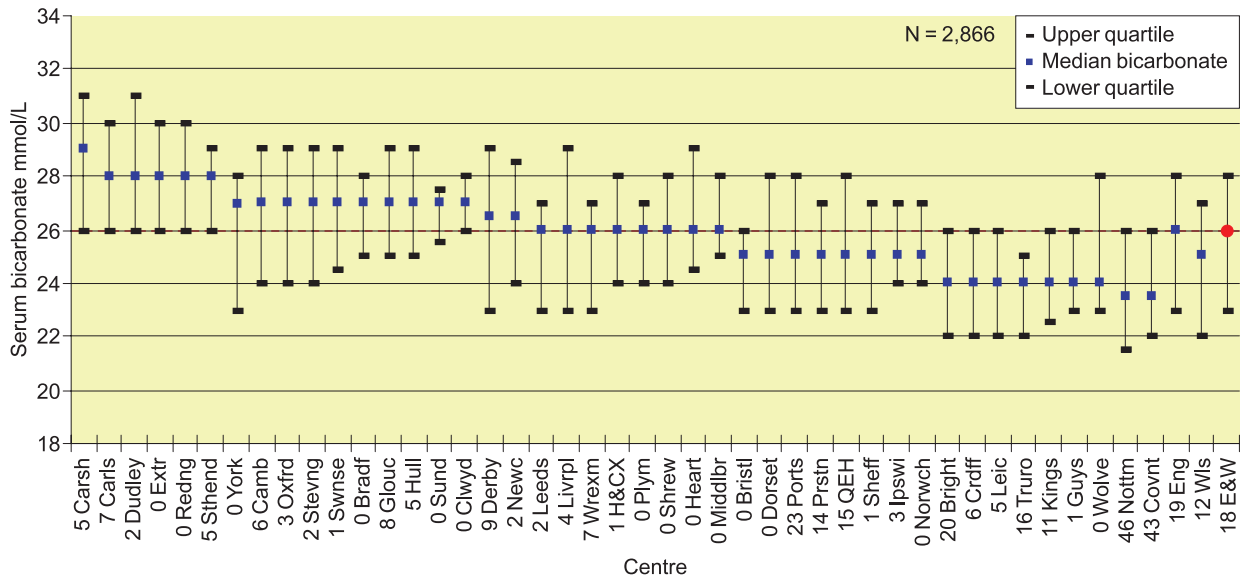


Figure 7.11: Median serum bicarbonate in patients treated with peritoneal dialysis

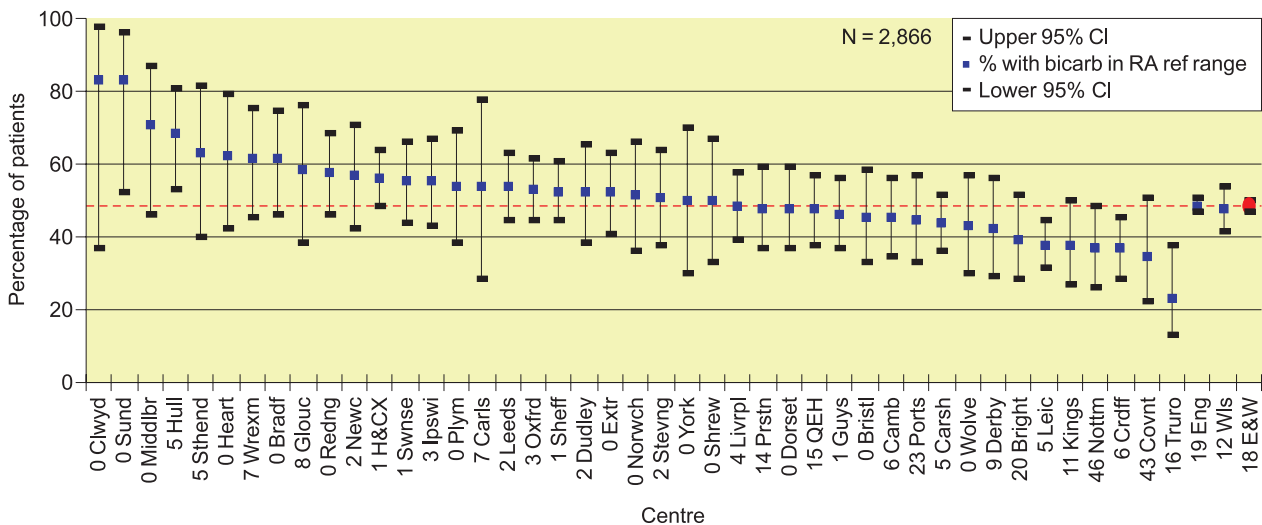


Figure 7.12: Percentage of patients treated with PD with bicarbonate 25–29 mmol/L

Serum bicarbonate is generally higher in patients treated with peritoneal dialysis than in patients treated with haemodialysis. Compliance with the Renal Association Standard is however much lower in the peritoneal dialysis patients compared with the haemodialysis

patients, (48.5% vs 68.9% in England and Wales).

Much of the variability may lie in the transportation and processing of the specimens and its significance is uncertain.