Chapter 6: Adequacy of haemodialysis (Urea reduction ratio)

Summary

In England & Wales a uniform method of measuring the post dialysis urea sample (as suggested in the 1997 Renal Association standards document) has still not been implemented. This standardisation is essential to permit meaningful comparative audit among participating renal units.

In England & Wales, 74 % of patients achieved a URR > 65% compared with 65% in 1999 and 57% in 1998.

Due to 'population distribution curves', centres will need to reach a median URR of 75% for almost all patients to have a URR >65%. No centres achieved the RA standard

A cross sectional analysis of patients in 2000 showed there was a continuing rise in URRs over the 2 years from starting dialysis. This rose from 57% achieving a URR > 65% in the first 6 months (48% in 1999) to 83% achieving this at 2 years (73% in 1999).

Within England and Wales, there has been a year on year increase in dialysis adequacy over the four years of the Registry. The Renal Registry data demonstrate that 'adequate' URR results can be achieved. It is hoped that the wide variation in URR achieved in these early cycles of audit of hospital haemodialysis will continue to decrease.

Attention is drawn to the limitation in the use of URR to measure dialysis adequacy. It is used at present as it permits verifiable comparison between centres from the data collected by the Registry.

Haemodialysis frequency

The Standards document states "*The frequency of dialysis should be three times per week in the majority of patients. Reduction of dialysis frequency to twice per week because of insufficient dialysis facilities is unacceptable***".**

Twice weekly haemodialysis is not recommended except where there is good preservation of residual renal function. One would expect this to be well under 10% of total patients

The Registry has found it difficult to obtain complete, or near complete, returns of frequency of dialysis from many renal units and is therefore not sufficiently confident of its figures to publish them. However the clinical directors forum of the Renal Association has recently conducted a survey of this issue (Scoble). In those renal units with good Registry returns there was good concordance of the data between the survey and the Registry. From this survey 53 units have returned data so far,

Whilst overall only 6.2% of patients in the UK dialyse less than three times a week, there is a range between renal units of 0% to 39%. At least 10% of patients dialyse twice weekly in 23% of units, and 6 units had more than 20% dialysing twice weekly. Twice weekly dialysis

is particularly common in Northern Ireland but rare in Scotland. Both the survey and the Registry have ascertained that in Northern Ireland the main reason given was financial constraints. Limitation of resources was a major cause in England, either through physical lack of space (3 units), financial constraints (3), patient preference (3) and nursing staff constraints (1).

Solute clearance Standards

The Renal Standards document considers both Kt/V and Urea Reduction Ratio (URR) as indicators of adequacy of haemodialysis, and recommends that all patients stable on three times a week haemodialysis should have:

A urea reduction ratio > 65%

or ***Kt/V > 1.2 (dialysis and residual renal function)***

Interpretation of results

Formulae for calculation of dialysis clearance

Several different methods are in use for calculating Kt/V, and they give results which vary significantly. Some calculations include the contribution from residual renal function, and need collection of post dialysis urea blood urea samples from the previous dialysis. Other formulae ignore residual renal function, and require, as a minimum, knowledge of pre and post dialysis weights, and duration of treatment. For meaningful comparisons, the Registry would need to calculate Kt/V by a single method from the raw data. This raw data is not available from many units. The simpler calculation of URR, the percentage fall in blood urea during a dialysis session, only requires knowledge of pre and post dialysis blood urea, and thus remains the method used by the Registry. This ignores any contribution to clearance by residual renal function. URR has been shown to correlate with patient survival (Owen, Held).

Post dialysis urea samples

At present, post dialysis sampling methodology is not uniform across units. This has a major effect on post dialysis urea measurements. This is discussed more fully in the 1999 Registry report.

In 2000, the renal standards document recommended the “slow flow” method of collecting post dialysis urea samples, but three methods of collecting samples are described in the new renal standards document. There has been no major move by centres to a single “post urea” measurement technique. In 1999 some of the centres in England moved to the Mactier “stop-dialysate-flow” method (see appendix E), which is the sole recommended method in Scotland. It has been observed that there are often major discrepancies between recommended methods and actual practice. Use of the Mactier method has been shown to give higher post dialysis urea readings and thus a lower URR than the two other main methods in use. Thus centres using this technique will appear to have lower dialysis clearance and lower achievement of the standard compared with centres the other methods.

Centres achievement of the Standard

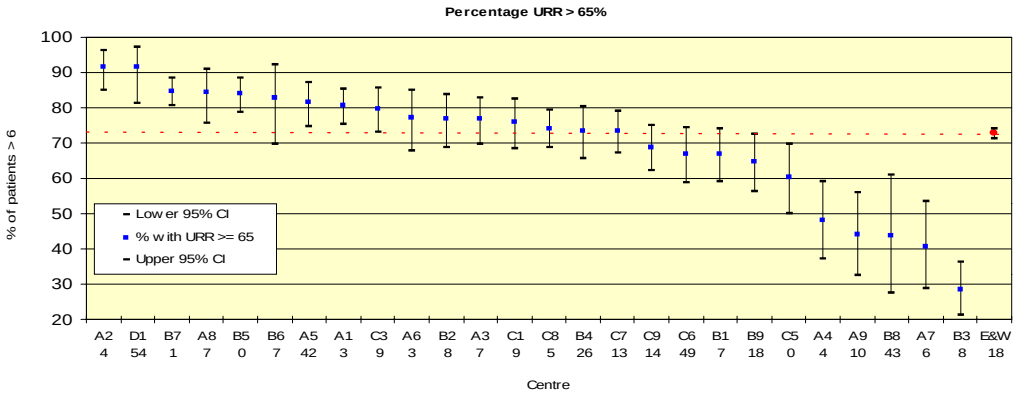


Figure 6.1: Achievement of the RA Standard for haemodialysis clearance

The overall, the achievement of the Renal Association standard improved again in 2000. In England & Wales, 74 % of patients achieved a URR > 65% compared with 65% in 1999 and 57% in 1998.

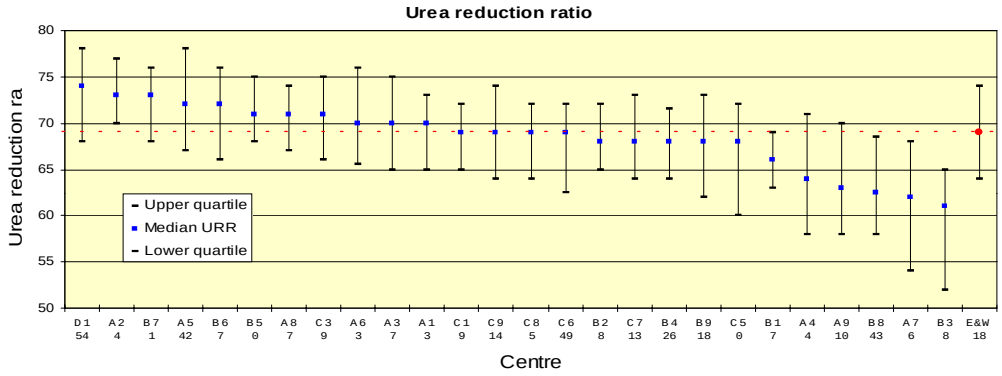


Figure 6.2: Percentage patients with URR ≥ 65% in the last quarter of 2000

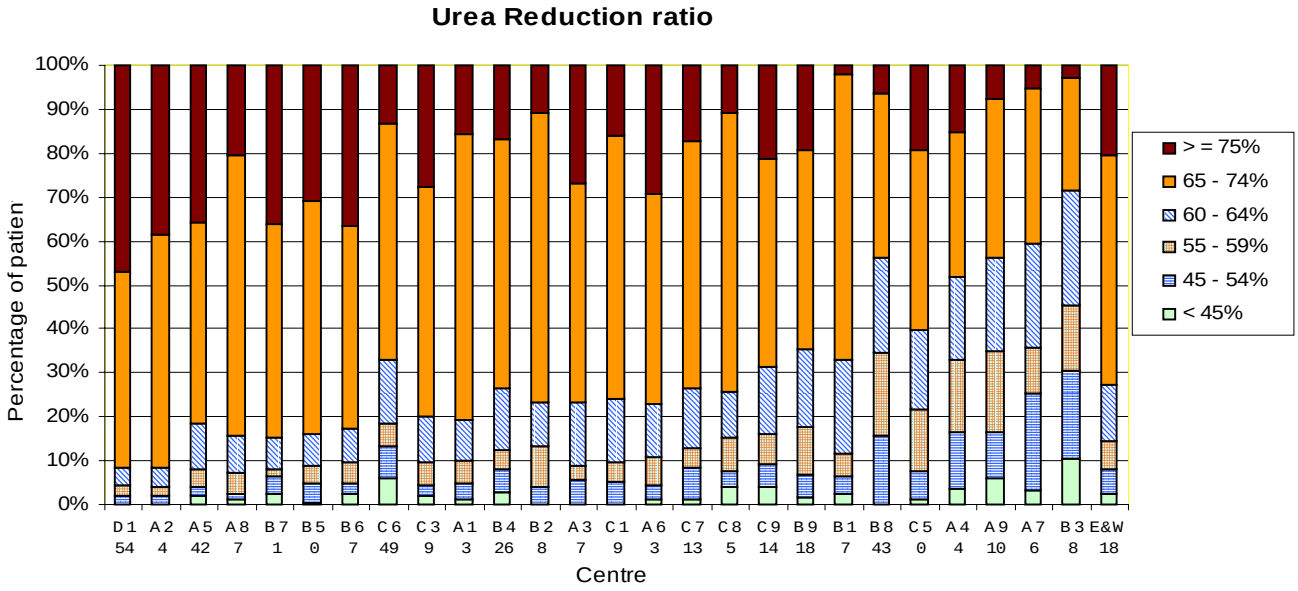


Figure 6.3 Urea reduction ration distribution

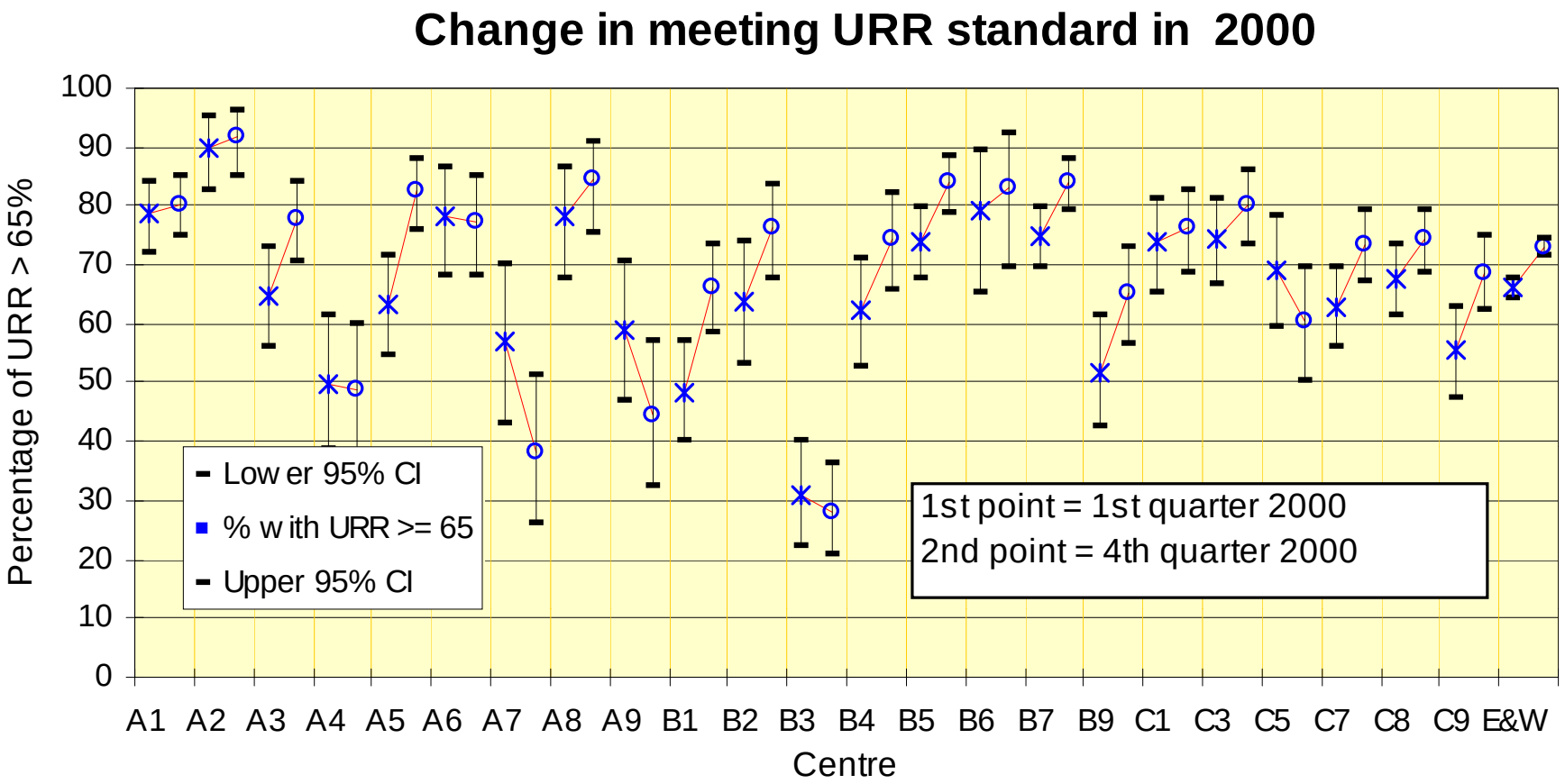


Figure 6.4: Change in meeting URR standard in 2000

Changes achievement of URR standard during 1998-2000

Centre	Percentage patients with URR>65%			
	Quarter 1 1998	Quarter 4 1998	Quarter 4 1999	Quarter 4 2000
A1	59	67	80	80
A2	96	84	89	92
A4	56	55	51	49
A5	46	57	51	83
A6				77
B1	67	40	52	66
B3	18	29	34	28
B4	53	60	62	75
B5	51	51	70	84
B6	70	92	87	83
B7	71	64	70	84
B9	61	55	50	65
C1	50	64	82	76
C3	68	64	70	80
C5	73	57	65	60
C7	49	61	62	73
C8	62	45	70	74
E&W	**57**	**57**	**65**	**74**

Table 6.1: Change in achievement of URR standard during 1998-2000

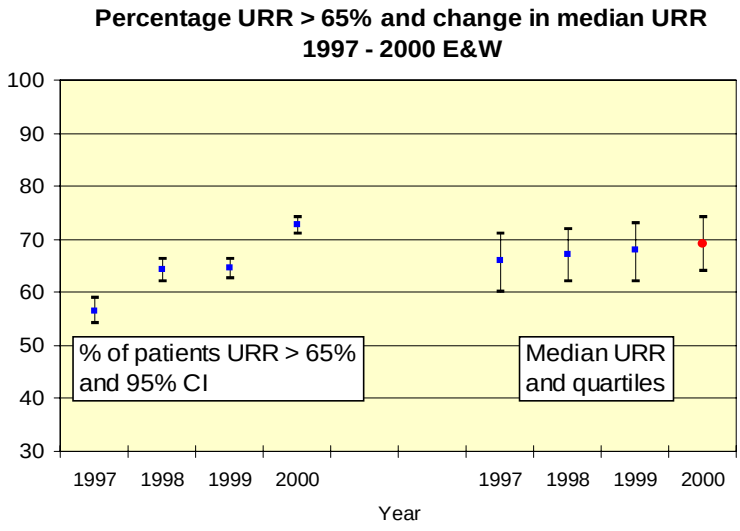


Figure 6.4: Percentage URR . 65% and change in median URR 1997- 2000

In the last 4 years, England & Wales have shown a substantial rise in the percentage of patients achieving a URR > 65% but still lag behind the US, where 82% of patients achieve a URR >65% with a median URR of 71.4%. The median URR in E&W is 69%. Because of the steepness of the distribution curve around this point, there need only be a small change in median URR to achieve a large change in achievement of the standard, as is illustrated in figure 6.4. It would only need a small improvement in median URR to obtain the same results as in the US. The US data sits on the UK predictive line of identity between median URR and % achieving URR>65%. This indicates that distributions of data and working practice in the two countries may have close similarities.

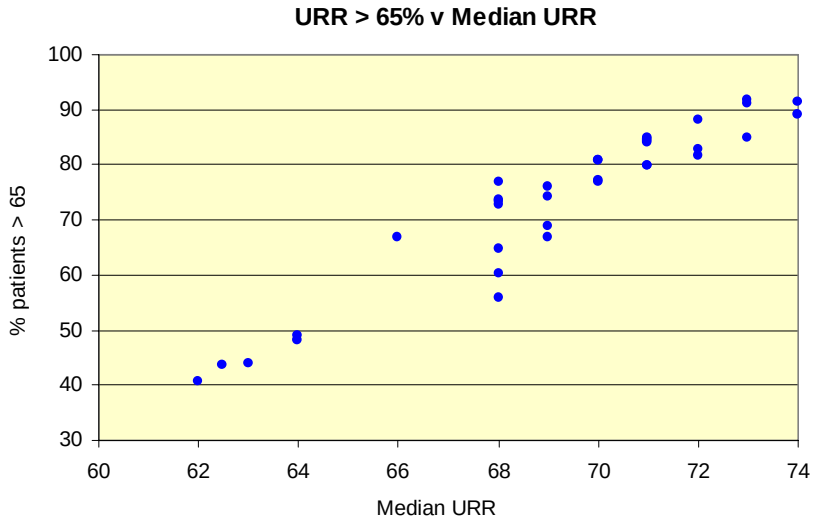


Figure 6.5: URR achievement and median URR

The improvement in attainment of the URR standard in England and Wales from 1997 to 2000 looks impressive (fig 6.4), but some caution must be used in interpretation, as there are increasing numbers of renal units each year, and thus different renal units included. That the improvement is real is suggested by the significant improvement in performance of participating units during 2000.

Achievement of standards in new renal replacement therapy patients starting haemodialysis

As reported last year, URRs were lower in new patients on haemodialysis than in patients from the same unit established on treatment for more than 3 months (fig 6.6). This may in part be due to early patients retaining a degree of residual renal function and needing less dialysis. However the 2000 data shows a considerable improvement URR in this early period indicating that there are additional factors involved.

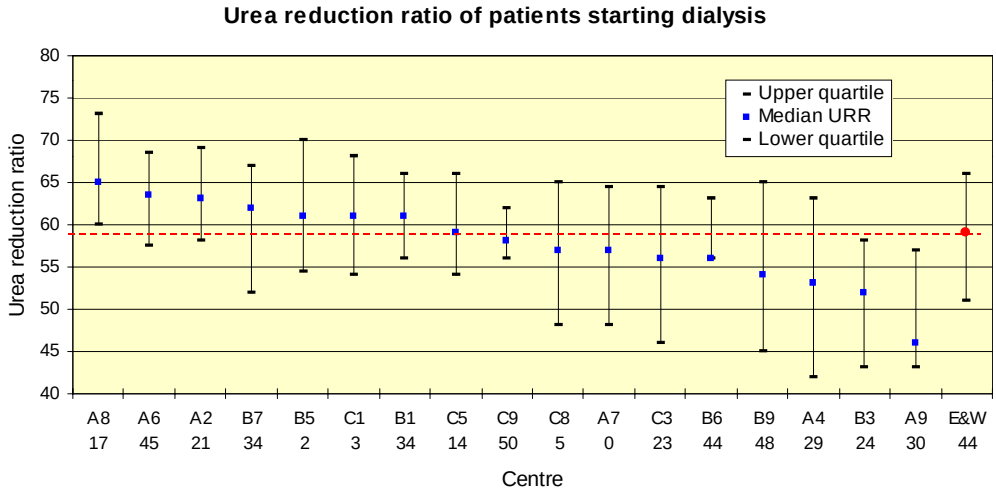
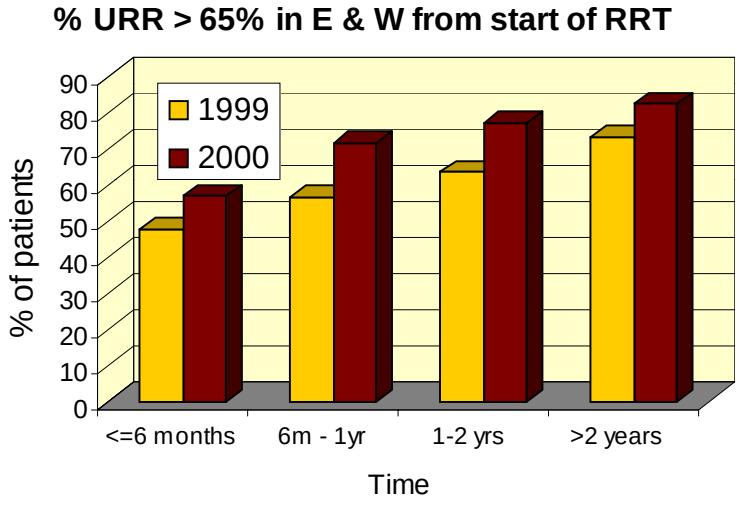


Figure 6.6: Median URR within first three months of HD

As shown in last years report, URRs were lower in patients starting dialysis than those of all HD patients at the same unit (which excludes patients within the first 3 months). This in part was probably partly due to a degree of residual renal function, although the 2000 data shows a considerable improvement in this target (Fig 6.7) indicating that there are additional factors involved In the UK, URRs slowly increased with time on RRT with the median URR changing from 66% (64% in 1999) in the first 6 months to 71% (69% in 1999) at 2 years. Although the change in median URR is small, due to the steep slope of the distribution curve, there is a substantial increase in the percentage of patients with a URR > 65% throughout these time periods (fig 6.7). This does not necessarily indicate that the URR of individuals increases with time. It may be that those patients who died in the earlier periods had a lower URR than the survivors. The Registry is collecting sequential individual patient data and will analyse this at a later date. The year on year improvement in dialysis clearance is also reflected in these figures.



This figure shows "cross-sectional" results for all patients at the year-end on dialysis for the specified time

Figure 6.7 Change in URR by length of time on RRT in 1999 –2000