
Chapter 8

Adequacy of Haemodialysis in UK Adult Patients in 2009: national and centre-specific analyses

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Key Words

Adequacy · Haemodialysis · Urea reduction ratio

Summary

- Data suitable for URR analyses were available in 14,849 (77%) of the 19,316 adult patients receiving HD in the UK at the end of 2009.
- In 2009, 85.5% of haemodialysis patients achieved a URR >65%, a small increase from 83% in 2008. The median URR in 2009 was 74% (compared with 73% in 2008).
- URR dose in the HD population was greater in those surviving on dialysis longer. Eighty-nine percent of patients who had survived on dialysis for more than two years achieved a URR >65% compared with only 68% of those on dialysis for only 6 months.
- There was large variation between centres in the percentage of patients achieving the UK Renal Association's URR guideline. Differences in sampling methodology of post-dialysis urea samples could explain part of the centre variability observed.

Introduction

Amongst patients with established renal failure (ERF), the delivered dose of HD is an important predictor of outcome [1] which has been shown to influence survival [2–4]. The delivered dose of HD depends on treatment (duration and frequency of dialysis, dialyser size, dialysate and blood flow rate) and patient (size, weight, haematocrit and vascular access) characteristics [5]. The two widely accepted measures of urea clearance are Kt/V, the ratio between the product of urea clearance (K, in ml/min) and dialysis session duration (t, in minutes) divided by the volume of distribution of urea in the body (V, in ml) and URR derived solely from the percentage fall in serum urea (URR) during a dialysis treatment. Whilst Kt/V is a more accurate descriptor of urea clearance, its calculation is complex and requires additional data items [6, 7] not commonly reported by most centres. The UKRR has chosen URR rather than Kt/V for comparative audit of haemodialysis adequacy as these results are more widely available.

Based on published evidence, clinical practice guidelines have been developed by various national and regional organisations [8–11]. There is considerable uniformity between them with regard to the recommendations for minimum dose of dialysis although there are differences in the methodology advised. The main objective of this study was to determine the extent to which patients undergoing HD treatment for established renal failure in the UK received the dose of HD recommended in the UK RA clinical practice guidelines [9].

Methods

Seventy-two renal centres in the UK submit data electronically to the UKRR on a quarterly basis [12]. The majority of these centres have satellite units but for the purposes of this study the data from the renal centres and their associated satellite units were amalgamated. Two groups of patients were included in the analyses. Firstly, analysis was undertaken using data from the prevalent HD patient population on 31st December 2009. For this analysis, data for URR were taken from the last quarter of 2009 unless that data point was missing in which case data from the 3rd quarter were taken. As the prevalent population only included those patients alive on 31st December 2009, data from those patients who had died before that date have not been included in the analysis. The second analysis involved incident patients who had started treatment with HD during 2009. For these patients, analysis was undertaken using the last recorded

URR during the quarter in which the patient had started dialysis. Data from patients known to be receiving more or less than thrice weekly HD were omitted from analysis. However, because not all centres report frequency of HD, it is possible that data from a small number of patients receiving HD at a different frequency were included in the analyses.

Analyses of the data from both groups of patients included calculation of the median URR and of the proportion of patients who had achieved the RA guideline (as outlined below) in each of the renal centres as well as for the country as a whole.

All patients with data were included in the statistical analyses at a national level, although centres with fewer than 20 patients, or providing less than 50% data completeness were excluded from the comparison between centres.

The UK RA Clinical Practice Guidelines [9] in operation at the time these data were collected were as follows:

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.

Every patient receiving thrice weekly HD should have consistently:

- ***either URR >65%***
- ***or equilibrated Kt/V (eKt/V) of >1.2 (or single pool Kt/V of >1.3) calculated from pre- and post-dialysis urea values, duration of dialysis and weight loss during dialysis).***

To achieve a URR above 65% or eKt/V above 1.2 consistently in the vast majority of the haemodialysis population clinicians should aim for a minimum target URR of 70% or minimum eKt/V of 1.4 in individual patients.

The duration of thrice weekly HD in adult patients with minimal residual renal function should not be reduced below 4 hours without careful consideration.

Patients receiving dialysis twice weekly for reasons of geography should receive a higher sessional dose of dialysis. 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.

Measurement of the 'dose' or 'adequacy' of HD should be performed monthly in all hospital HD patients and may be performed less frequently in home HD patients. All dialysis units should collect and report this data to their regional network and the UKRR.

Post-dialysis blood samples should be collected either by the slow-flow method, the simplified stop-flow method, or the stop dialysate flow method. The method used should remain consistent within renal units and should be reported to the Registry.

The RA clinical practice guidelines for HD dose apply specifically to patients undergoing thrice weekly HD. In these patients it is recommended that blood for biochemical measurement (including pre-dialysis urea for URR) should be taken before the mid-week dialysis session [9].

A potentially confounding factor is the methodology used for taking the post-dialysis blood sample. Advice given to renal centres following a postal survey in 2002 [13] aimed to achieve uniformity and this was reflected in the RA guidelines [14]. These recommended that the post-dialysis blood samples

should be collected either by the stop flow method, the simplified stop flow method or the stop-dialysate-flow method. No reliable data are available to clarify whether the important variations in post-dialysis sampling methodology that were identified at that time persist.

Results

Data completeness

Data regarding HD dose (URR) were available from 63 of the 72 renal centres which submitted data to the UKRR (table 8.1). Data were available for 77% (14,849) of the total prevalent population (19,316) treated with HD who met the inclusion criteria for these analyses.

Completeness in the 63 centres reporting URR data was generally good, with 51 centres reporting on more than 90% of patients and only one centre (Wirral) with less than 50% completeness. The centre reporting on less than 50% of prevalent patients was not included in the centre-level analyses although the patients were included in the national analyses. URR data were not received from nine centres (Brighton, London Barts, London Kings, London Royal Free, London St Georges, Manchester Royal Infirmary, Newcastle, Stoke, Swansea). The number preceding the centre name in each figure indicates the percentage of missing data from that centre.

Of the total incident patient population (4,531) starting HD during 2009 and meeting the inclusion criteria for URR analyses, 52% (2,362) had URR data available during the first quarter of treatment.

Thirty-two centres submitted data regarding URR within 3 months of starting HD on more than 20 patients, representing more than 50% of their incident patient population.

Achieved URR

For prevalent patients, the median URR (74% for UK; centre range 67%–80%) and percentage (85.5% for UK; centre range 56%–98%) attaining the RA guideline of a URR >65% from 62 renal centres are shown in figures 8.1 and 8.2. Figure 8.3 illustrates the close relationship between the two. All of the 47 centres which achieved a URR >65% in at least 80% of patients had a median URR of at least 70%. The 4 centres with a median URR of 68% or less achieved the RA guideline for HD dose in less than 65% of their patients. As

Table 8.1. Percentage completeness of URR data returns

Centre	% complete	Centre	% complete
Abrdn	99	L Rfree	0
Airdrie	100	L St.G	0
Antrim	99	L West	95
B Heart	95	Leeds	97
B QEH	95	Leic	99
Bangor	97	Liv Ain	68
Basldn	98	Liv RI	93
Belfast	97	M Hope	63
Bradfd	89	M RI	0
Brightn	0	Middlbr	95
Bristol	100	Newc	0
Camb	85	Newry	99
Cardff	94	Norwch	96
Carlis	100	Nottm	99
Carsh	92	Oxford	79
Chelms	100	Plymth	97
Clwyd	100	Ports	95
Colchr	99	Prestn	83
Covnt	97	Redng	96
D & Gall	98	Sheff	96
Derby	98	Shrew	94
Derry	93	Stevng	94
Donc	98	Sthend	95
Dorset	76	Stoke	0
Dudley	70	Sund	97
Dundee	97	Swanse	0
Dunfn	99	Truro	98
Edinb	99	Tyrone	98
Exeter	99	Ulster	100
Glasgw	97	Wirral	35
Glouc	100	Wolve	77
Hull	96	Wrexm	97
Inverns	90	York	68
Ipswi	100	England	75
Kent	93	N Ireland	98
Klmarnk	96	Scotland	98
L Barts	0	Wales	64
L Guys	91	UK	77
L Kings	0		

previously reported, there continued to be considerable variation between renal centres, with 19 centres attaining the RA clinical practice guideline in >90% of patients and 5 centres attaining the guideline in <70% of patients.

Changes in URR over time

The change in the percentage attainment of the RA clinical practice guidelines (URR >65%) and the median URR for the UK from 1998 to 2009 are shown in figure 8.4. Northern Ireland has provided data since 2005 and was included in these analyses.

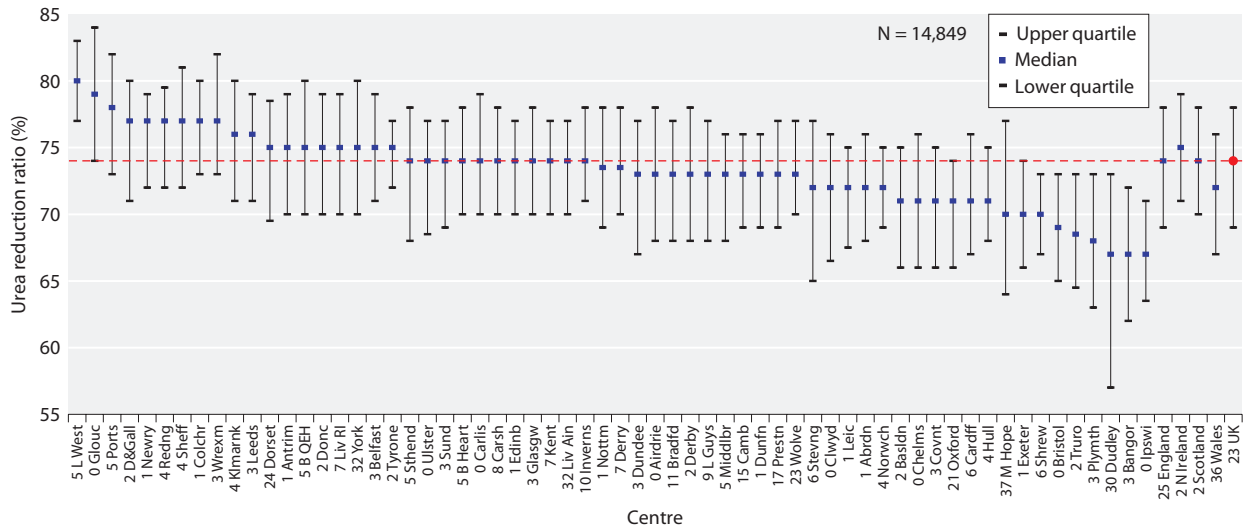


Fig. 8.1. Median URR achieved in prevalent patients in each centre, 2009

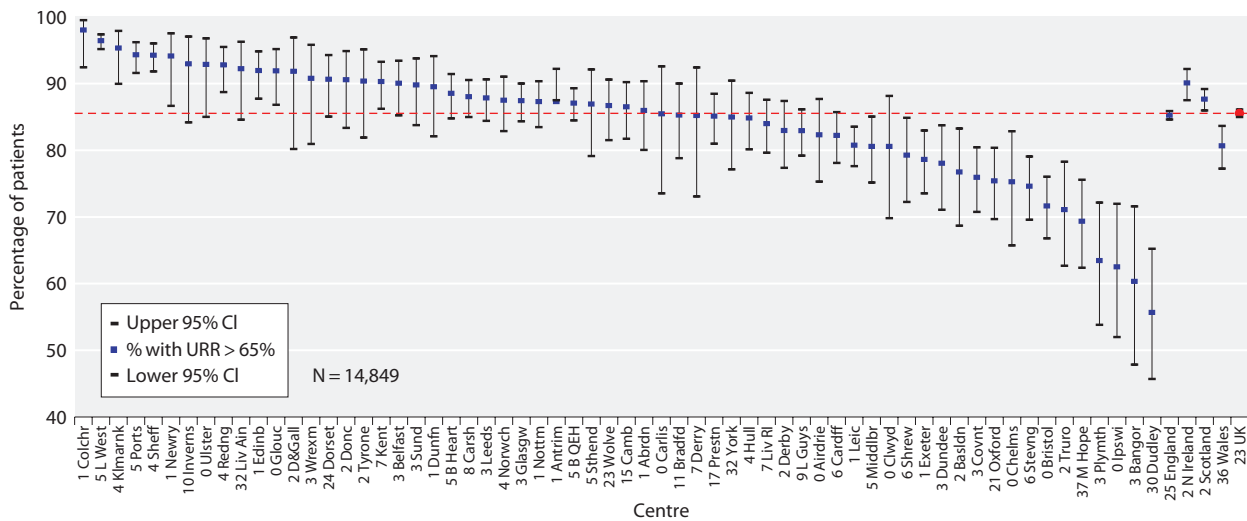


Fig. 8.2. Percentage of prevalent patients with URR >65% in each centre, 2009

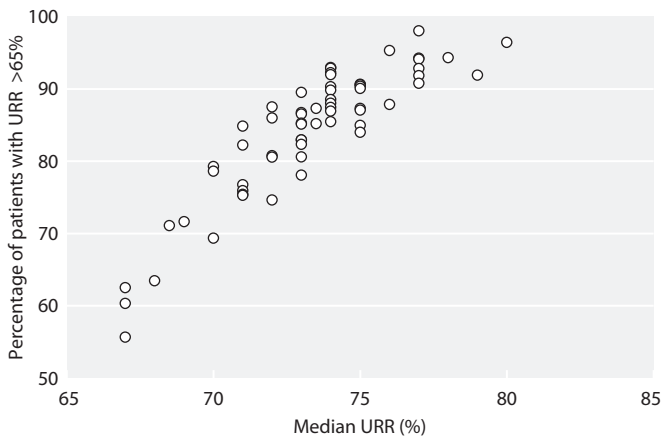


Fig. 8.3. Relationship between achievement of the Renal Association guideline for URR and the median URR in each centre, 2009

The proportion of patients attaining the RA guideline increased from 56% to 85.5% whilst the median URR has risen from 67% to 74% during the same time period.

Variation of achieved URR with time on dialysis

The proportion of patients who attained the RA guideline for HD was greater in those who had survived on dialysis longer (figure 8.5). Of those dialysed for less than 6 months, 68% had a URR >65%, whilst 89% of patients who had survived for more than two years attained the guideline in 2009.

The median URR during the first quarter after starting HD treatment of the incident HD population in the UK in 2009 was 66% (figure 8.6).

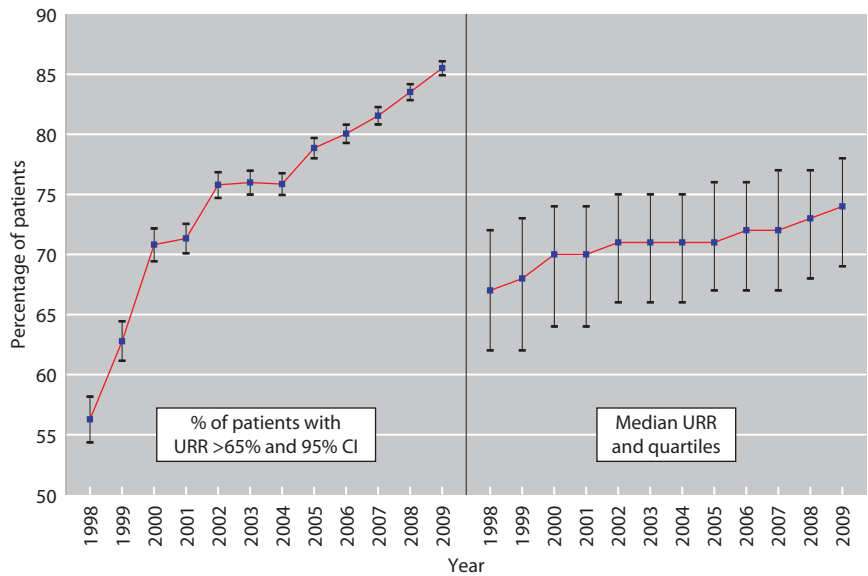


Fig. 8.4. Change in the percentage of patients with URR >65% and the median URR between 1998 and 2009 in the UK

Discussion

The dose of delivered HD is recognised as having an important influence on outcome in ERF patients treated with HD and has been shown to correlate with survival [2, 3]. It is therefore reassuring that the proportion of UK patients achieving the RA guideline for URR has been increasing in the last decade, with 85.5% of the HD population achieving the URR guideline in 2009.

In order to consistently achieve a URR >65% the UK RA clinical practice guidelines recommend that

clinicians should aim for a minimum target URR of 70%. The median URR of patients undergoing HD in the UK in 2009 was 74% (centre range of 67%–80%) and only 6 centres had a median URR under 70%. Median URR showed a good correlation with the percentage achievement of URR target by centre. With the exception of two centres (Stevenage, Manchester Hope), those centres that reached a median URR $\geq 70\%$ all managed to achieve the target URR in at least 75% of their population.

In 2009, 89% of patients in the UK who had survived on HD for more than 2 years achieved the target of a

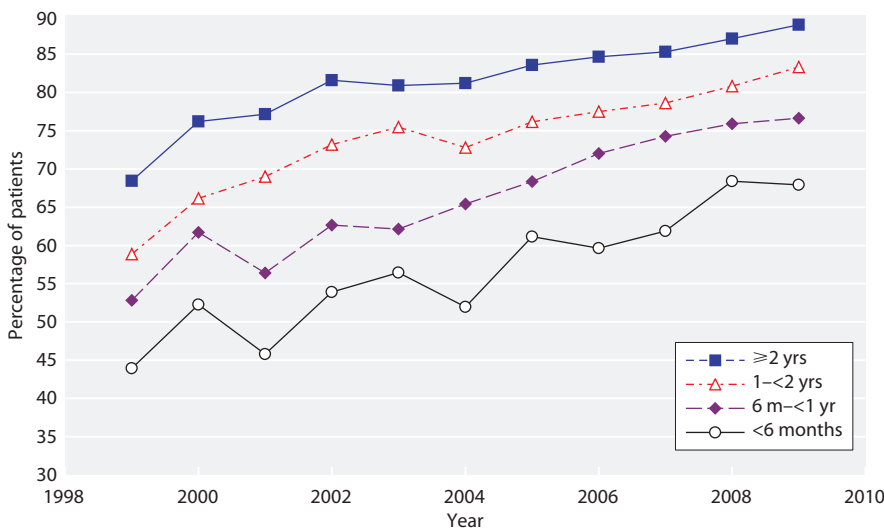


Fig. 8.5. Percentage of prevalent haemodialysis patients achieving URR >65% by survival on haemodialysis between 1999 and 2009

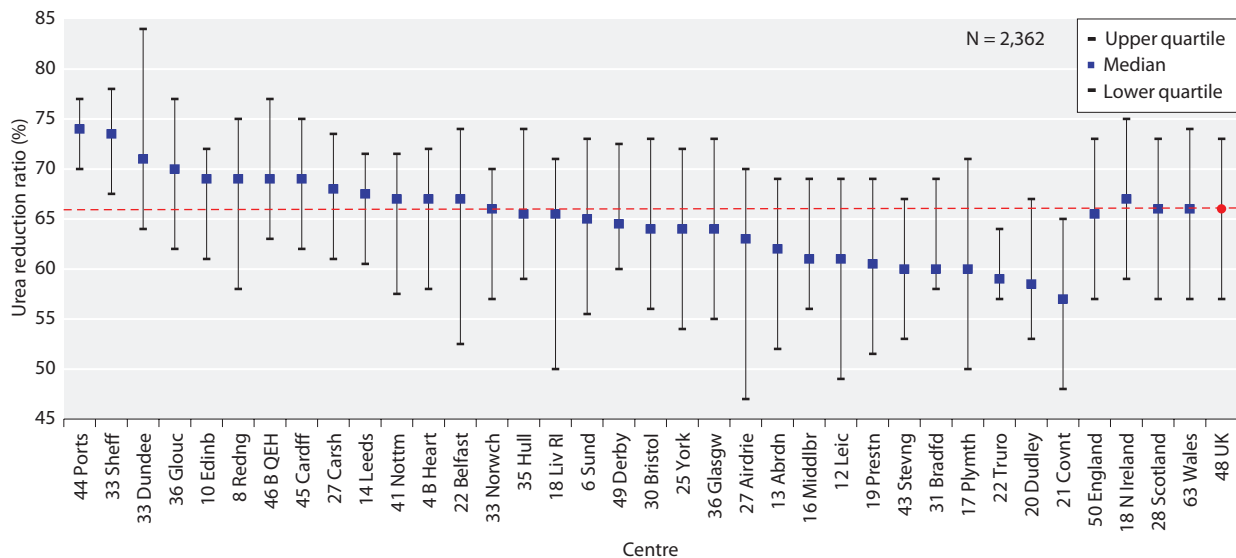


Fig. 8.6. Median URR in the first quarter after starting RRT in patients who started haemodialysis in 2009

URR >65%. The figure for patients during the first 6 months after starting treatment was lower (68%).

There was a wide range (56%–98%) of achievement of the RA guideline between different centres which is likely to reflect genuine differences in HD dose although inconsistency in sampling methodology for the post-dialysis urea sample may play a part [13].

The use of urea clearance for measurement of HD dose is criticised by some [15] arguing that outcome is

improved by longer treatment time independently of urea removal [5, 16–20] and that clearance of ‘middle molecules’ has an important impact [21, 22]. However, no consensus has yet emerged on alternative markers of HD dose and whilst this is the case the UKRR will continue to audit HD adequacy on the basis of urea clearance as assessed by URR.

Conflicts of interest: none

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