EVALUATION OF STANDARD UREA Kt/V FOR FREQUENT HAEMODIALYSIS PRESCRIPTIONS

Poster No.
MP412

2 Jun 2014

J.K. Leypoldt[1], A. Bernardo[1], M. Muller[1], T.C. Marbury[2], B.F. Culleton[1]

[1]Baxter Healthcare Corporation, Deerfield, Illinois; [2]Orlando Clinical Research Center, Orlando, Florida, United States

Introduction and Objective

Standard urea Kt/V (stdKt/V) is one measure for assessing the adequacy of frequent haemodialysis prescriptions (Daugirdas, Semin Dial 2014), and European Best Guidelines on dialysis strategies suggest monitoring this measure to determine the adequacy of haemodialysis treatments when prescribed more frequently than thrice weekly (Tattersall et al, Nephrol Dial Transplant 2007). KDOQI Guidelines suggest calculating stdKt/V from either single-pool urea Kt/V (spKt/V) or equilibrated Kt/V (National Kidney Foundation, Am J Kidney Dis 2006); however, recent work has suggested improved approximate equations for calculating both spKt/V (Daugirdas et al, Nephrol Dial Transplant 2013) and stdKt/V (Daugirdas et al, Kidney Int 2010) for frequent haemodialysis prescriptions .

The objective of this study was to determine the significance of using improved approximate equations for spKt/V and stdKt/V during haemodialysis applied 4 times per week.

Data Collection

Data for these retrospective analyses were obtained during an 8-wk clinical trial in 20 patients; these data were collected during treatments using the VIVIA Haemodialysis System (Baxter Healthcare Corporation, Deerfield, IL, USA) at DaVita Clinical Research (Minneapolis, Minnesota) and Orlando Research Clinical Center (Orlando, Florida).

Values of spKt/V and stdKt/V were determined weekly (N=135) by measuring predialysis and postdialysis serum urea concentrations. Net ultrafiltration volume was determined by the difference between predialysis and postdialysis body weight.

Equations

KDOQI spKt/V equation (Daugirdas, J Am Soc Nephrol 1993):

$$spKt/V = -\ln[R - 0.008 \times t] + (4 - 3.5 \times R) \times UF/BW_{post}$$

KDOQI stdKt/V equation (Leypoldt et al, Semin Dial 2004):

$$stdKt/V(c) - \frac{168 \times (1 - \exp(-eKt/V))/t}{[1 - \exp(-eKt/V)]/(eKt/V) + 168/F/t - 1}$$

where

$$eKt/V = 0.924 \times spKt/V - 0.395 * (spKt/V)/t + 0.056$$

Improved spKt/V equation for 4 times per wk haemodialysis (Daugirdas et al, Nephrol Dial Transplant 2013):

$$spKt/V = -\ln[R - 0.009 \times t] + (4 - 3.5 \times R) \times UF/BW_{post}$$

Improved stdKt/V equation (Daugirdas et al, Kidney Int 2010):

$$stdK/V - (stdKt/V(c)/[1 - 0.74/F \times UFw/(0.55 \times BW_{post})]$$

In these equations,

R = postdialysis-to-predialysis urea concentration ratio

F = number of treatments per week

t = treatment time per session in hours

UF = net ultrafiltration per session

Ufw = weekly net ultrafiltration

BW_{post} = postdialysis body weight

Results

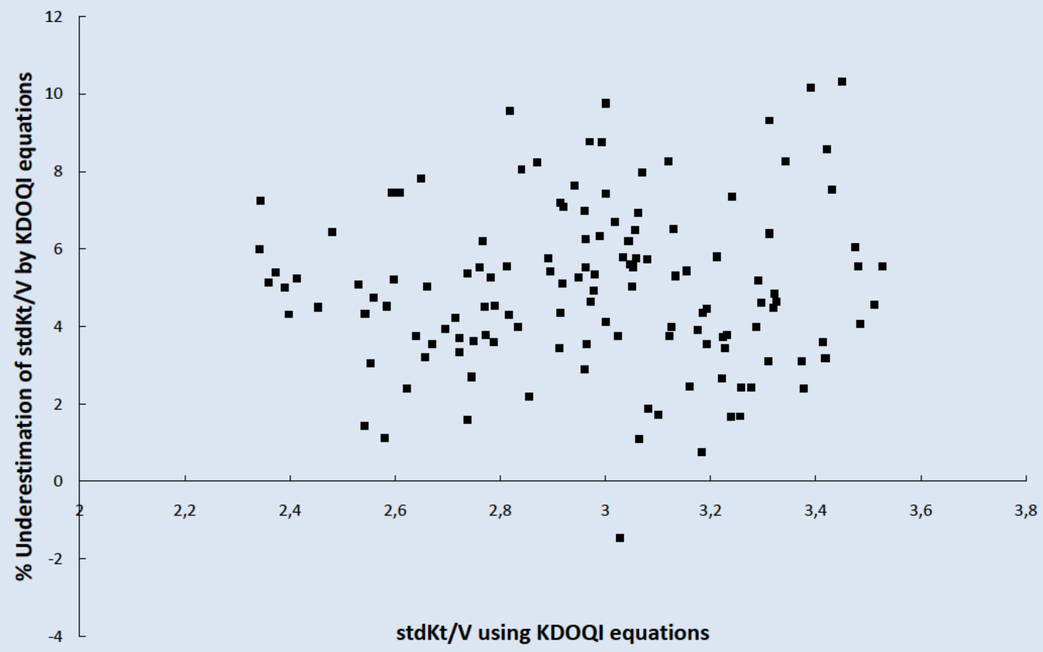
Table 1: Patient and treatment characteristics.

Characteristics	Mean ± Standard Deviation (or N. %)
Age (years)	50 ± 8
Female Sex (N, %)	9, 45%
Predialytic Body Weight (kg)	83.6 ± 17.8
Postdialytic Body Weight (kg)	81.1 ± 17.3
Predialysis urea concentration (mmol/L)	18.8 ± 6.0
Postdialysis urea concentration (mmol/L)	5.7 ± 2.6
Treatment Time (hrs)	4.0 ± 0.2

Table 2: Calculated measures of dialysis adequacy.

Calculated Adequacy Index or Measure	Mean ± Standard Deviation
spKt/V	
KDOQI equations	1.47 ± 0.29
Improved equations	1.49 ± 0.30
stdKt/V	
KDOQI equations	2.97 ± 0.30
Improved equations	3.12 ± 0.32

Figure 2: Percent underestimate of stdKt/V by KDOQI equations. The mean standard deviation of this underestimate was 5.0 2.1%.



Conclusions

- ✓ Conventional equations suggested by KDOQI Guidelines for calculating spKt/V and stdKt/V will typically underestimate the true values.
- ✓ The clinical significance of using improved equations for calculating spKt/V and stdKt/V is modest during haemodialysis applied 4 times per week.

DOI: 10.3252/pso.eu.51era.2014