

Reducing Prevalence of Alkalosis and Improving Adherence to Bicarbonate Targets Amongst Haemodialysis Patients Through the Use of Reduced Dialysate Bicarbonate

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Background and Aims:

There is evidence that metabolic alkalosis in haemodialysis patients is harmful. An association has been demonstrated between extremes of bicarbonate and clinical outcomes, with significantly increased risk of mortality and hospitalisation with pre-dialysis serum bicarbonate >27mmol/L and <17mmol/L. However, no overall increased mortality risk was observed with moderate pre-dialysis acidosis (serum bicarbonate 19.1-23.0mmol/L).

2015 Renal Registry Data demonstrated 64.3% of haemodialysis patients overall had bicarbonates within target (18-24mmol/L) compared to 65.7% within our centre. Our reported mean pre-dialysis bicarbonate of 23.7mmol/L was above the mean serum bicarbonate 23.2mmol/L seen nationally. In addition, 33.7% of patients were alkalotic, with bicarbonates >24mmol/L. Given concerns of adverse patient outcomes with extremes of bicarbonate, we aimed to investigate whether reducing our dialysate bicarbonate would culminate in overall attainment of bicarbonate targets.

Method:

Mid-week pre-dialysis bicarbonate levels were measured from in centre haemodialysis patients once monthly, from May to August 2017, across 7 dialysis units within our renal service. Following this, in early 2018, we reduced dialysate bicarbonate concentration from 32mmol/L to 31mmol/L. Monthly midweek pre-dialysis bicarbonate levels were then re-measured in March and April 2019.

Results:

Initial analysis of 2103 pre-dialysis bicarbonate levels across May to August 2017 demonstrated median monthly bicarbonate levels of 24.0–25.0mmol/L. 40.7–54.2% (n=199-322) were alkalotic with pre-dialysis bicarbonates >24mmol/L across this period. Of note, 15-23% (n=66-120) had bicarbonate levels associated with increased mortality and hospitalisation (i.e. <17mmol/L or >27 mmol/L).

Subsequent analysis of 1070 bicarbonate levels in March and April 2019 demonstrated a reduction in median pre-dialysis bicarbonate to 22.0mmol/L. Similarly, the proportion of alkalotic patients fell to 11.9–15.3% (n=71-91). 5-9% (n=26-46) bicarbonates were <17 or >27mmol/L. In March 2019, 77.9% of patients had serum bicarbonates in target range compared to 65.7% reported in 2015 overall.

Conclusion:

Initial findings demonstrated substantial alkalosis amongst our dialysis population. A simple measure of altering dialysate by 1mmol/L achieved reductions in overall alkalaemia, and in turn, reduced the

percentage of patients with bicarbonate values theoretically correlating with increased mortality and hospitalization risk.

We have demonstrated that a small change in dialysate bicarbonate increased concordance with bicarbonate targets, without subsequent increased acidaemia. The extent to which adherence with such targets impacts on patient survival and morbidity remains an ongoing debate.