

## Soft target weight: a novel haemodialysis protocol which allows dry weight variability and reduces excessive ultrafiltration

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### Background

Excessive ultrafiltration, in terms of either a large volume or a fast rate, is associated with intra-dialytic symptoms, loss of residual function and mortality in haemodialysis patients. A major contributor to excessive ultrafiltration is within-individual variation in ultrafiltration volume, which arises from variation in pre-dialysis weight, and the concept of achieving a fixed target weight by the end of dialysis. Haemodialysis protocols which allow variable target weight have not been studied.

### Methods

Weight variation was observed in haemodialysis patients and healthy controls to estimate the proportion of pre-dialysis weight variation due to dry weight variation. These estimates were used to derive a novel protocol for setting ultrafiltration. Mathematical modelling was used to simulate the effect of the novel protocol on haemodialysis parameters.

### Results

Amongst 20 haemodialysis patients mean(sd) pre-dialysis weight was 102.98(1.03)% of target weight. Amongst 10 healthy individuals mean(sd) daily weight was 100.0(0.71)% of average weight. A four-component model of pre-dialysis weight was derived using these estimates, in which the best estimate of pre-dialysis excess fluid is the midpoint of excess weight and average fluid gain, and a novel protocol (termed "soft target-weight") proposed in which this estimate is used to set ultrafiltration for haemodialysis. In simulations designed to model the effect on dialytic weight changes, the novel protocol reduced ultrafiltration variation by more than half (0.59 vs 1.28% of target weight,  $p < 0.001$ ), without increasing the variation in post-dialysis fluid excess. Excessive ultrafiltration rates (over 13ml/h/kg) were far less frequent using the soft target weight protocol (1.6% vs 7.1% of sessions,  $p < 0.001$ ).

### Conclusion

Considering dry weight as variable allows the development of a novel protocol for ultrafiltration in which target weight does not have to be achieved: it is therefore a soft target. This protocol is predicted to substantially reduce ultrafiltration variation, therefore limiting excessive ultrafiltration rates. Clinical studies are planned to evaluate this protocol, which is a zero-cost intervention with the potential to improve symptoms as well as clinical outcome for haemodialysis patients.