Our association ERA/EDTA, in collaboration with the ISPD, must focus on all these educational issues and take action to offer more adequate training and exposure to PD, in order to equip the young nephrologists in the future with the appropriate knowledge, regarding the best therapeutic options for the individualized ESRD patient.

Conflict of interest statement. None declared.

Department of Internal Medicine-Nephrology, Patras University Hospital, Patras, Greece

Costas Fourtounas Jannis G. Vlachojannis

E-mail: cfourt@usa.net


doi: 10.1093/ndt/gfn374

Letters and Replies

Advance Access publication 5 August 2008

Correcting hypervolaemic hypernatraemia

Sir,

Nguyen and Kurtz [1] have provided a formula to help achieve a negative Na\textsuperscript{+} + K\textsuperscript{+} balance and a negative water balance to treat hypervolaemic hypernatraemia by infusing a modelled volume of isotonic glucose (D5W) and furosemide.

The formula, however, is not easy to use. Besides knowing the initial [Na\textsuperscript{+}] and deciding on a required endpoint in [Na\textsuperscript{+}] and a desired reduction in total body water (VMB), you will have to know the initial total body water (TBW\textsubscript{1}), and what is more demanding, you will have to know the combined [E\textsubscript{urine}] = [Na\textsuperscript{+}] + [K\textsuperscript{+}] in urine over the treatment course.

In practice, knowing both TBW\textsubscript{1} and [E\textsubscript{urine}] is not straightforward. In their patient example, the authors happen to know in advance that [E\textsubscript{urine}] is going to be 80 mmol/l, and from that they compute a volume of D5W infusate of 5.6 l. If instead of assuming that [E\textsubscript{urine}] is known, we let it vary between, say, 60 mmol/l and 140 mmol/l, we get from the authors’ formula a volume of infusate between 2.4 l and 8.2 l. Even more important, if we keep the volume of infusate at 5.6 l and investigate the final [Na\textsuperscript{+}] resulting solely from changing the [E\textsubscript{urine}] within the range 60–140 mmol/l, we get a new [Na\textsuperscript{+}] ranging from 123 mmol/l to 146 mmol/l. This uses a new ancillary formula we have devised solely with the intent of avoiding accidents secondary to using the formula given by Nguyen and Kurtz at face value (ignoring, as they do in their example, non-renal outputs and non-infusate inputs):

\[
\text{Na}_2 = \{(\text{Na}_1 + 23.8)^*\text{TBW}_1 - \text{V}_{\text{IVF}}*1.03*\text{[E\textsubscript{urine}]} + 1.03*\text{[E\textsubscript{urine}]}*\text{V}_{\text{MB}})/(\text{TBW}_1 + \text{V}_{\text{MB}}) - 23.8
\]

The patient’s history, which the authors use to illustrate the utility of their formula, is extraordinary. The patient is not stated to be demented, to have diabetes insipidus or osmotic diuresis, or to have been denied access to water, or to have been given hypertonic saline, yet this elderly lady with congestive heart failure develops hypernatraemia that is said to be secondary to furosemide treatment. This is indeed a rare occurrence, and hypernatraemia would be more likely under those circumstances.

Besides that, as previously demonstrated [2], the modelled intercept term 23.8 from Edelman [3] is very uncertain with 99% CI including 0 since all measurements of (exchangeable sodium + exchangeable potassium)/total body water were very far from 0.

Hence, returning to the patient’s history, we fully agree with the authors that any formula is dangerous without frequent and comprehensive assessment of the response to treatment. In practice, administering furosemide and D5W (or water per os?) would not be much helped by using a formula with at least two unknown central entries always in need of an update. Rather, the existence of a pseudo-accurate formula might comfort the caretakers unduly into becoming less scrupulous. This pertains in particular to a situation in which the underlying pathophysiology is not well understood, for instance, the absence of the expected increased Na excretion under hypernatraemia [4] as in the patient described.

Conflict of interest statement. None declared.


doi: 10.1093/ndt/gfn414