

Developing precise fluid assessment in acute kidney injury– a comparison of clinical assessment versus bioimpedance.

Dr Julia Arnold¹, Professor Indranil Dasgupta^{1,2}, Dr Mark Thomas¹

¹University Hospitals Birmingham NHS Foundation Trust, Heartlands Hospital, Birmingham, United Kingdom, ²Warwick Medical School, Coventry, United Kingdom

Background:

Fluid assessment in acute kidney injury (AKI) is challenging, requiring a trained clinician to determine whether signs- of variable utility- are present. Signs to detect hypovolaemia due to fluid or blood loss have limited sensitivity and/or are not widely used. Relative hypovolaemia is not accompanied by overt hypotension (Liu et al., 2009). Similarly, signs of fluid overload lack sensitivity and specificity to detect its early stages.

Methods:

We have recently started to audit clinical fluid balance assessment in comparison to that provided by bioimpedance in AKI stages 2 and 3. Bioimpedance has the advantages of being validated in renal patients and can be readily applied by nursing staff.

Adult inpatients with AKI stage 2 or 3 referred to the renal team within 72 hours of the AKI alert are included. Volume assessment by a Nephrologist includes supine and standing heart rate and blood pressure, jugular venous pressure and abdominojugular reflex, presence of bibasal crepitations and standardised rating of dependent oedema. Bioimpedance is carried out independently by a trained Renal Nurse using the Fresenius Body Composition Monitor (BCM[®]) on the same day. The Nephrologist is blinded to the bioimpedance result until fluid assessment has taken place. Height and weight are directly measured, or if bedbound we use ulnar length to predict height (<https://www.bapen.org.uk/pdfs/nsw/nsw11/ulna-measurement-nsw11.doc>), and the procedure of Rabito El et al., Revista de Nutrição, 2006 to predict weight.

Preliminary Results/ Case Example:

A 44 year old male with a background of advanced lung carcinoma who had received recent chemotherapy (carboplatin and pemetrexed) was admitted generally unwell with reduced oral intake. He was found to be anaemic with a Haemoglobin of 60 g/L. He was referred to the renal team with an AKI stage 3 (creatinine 265 umol/L, baseline 43 umol/L). Clinical assessment using the parameters outlined above deemed the patient to be hypovolaemic. Bioimpedance demonstrated that the patient's fluid balance was positive by 7.4 litres. Reviewing the fluid prescription charts, this patient had received 12.6 litres of fluid, including a blood transfusion.

Preliminary Conclusions:

Data collection is ongoing and summary data will be presented. In the early stages of this audit, our case example demonstrates a significant discrepancy between clinical fluid assessment versus bioimpedance. Given the subjectivity of traditional clinical measures, bioimpedance may potentially be a useful clinical tool for determining fluid balance in AKI patients.

We would like to acknowledge Rani Joseph, Joanne Rhodes and Margaret Carmody who are carrying out the bioimpedance measurements for this audit.