

Bioimpedance Devices for the Assessment of Body Fluid Volume for Patients Undergoing Dialysis: A Review

Context

Patients with end-stage renal disease require lifetime renal replacement therapy, most often with either hemodialysis or peritoneal dialysis. During dialysis, hemodynamic instability — hypotension or hypertension — is a common occurrence, which can lead to cardiovascular complications such as left ventricular hypertrophy. An accurate estimation of a patient's body fluid volume can help prevent hemodynamic instability. While subjective methods of estimating body fluid volume can be used, objective methods have been developed to provide more accurate estimates. These include blood volume monitoring, natriuretic peptide measurements, extravascular lung water indices, and bioimpedance methods.

Technology

Bioimpedance devices pass an electrical current through the body and estimate the body fluid volume by the amount of resistance this current endures in the body tissues. Several studies have shown that this method is accurate and reliable for the assessment of body fluids.

Issue

A review of the clinical and cost-effectiveness of, and the evidence-based clinical guidelines for bioimpedance devices will help inform the use of this technology for fluid management in renal dialysis patients.

Methods

A limited literature search was conducted of key resources, and titles and abstracts of the retrieved publications were reviewed. Full-text publications were evaluated for final article selection according to predetermined selection criteria (population, intervention, comparator, outcomes, and study designs).

Key Messages

- The use of bioimpedance devices as adjunctive tools in fluid management may lead to better patient outcomes such as decreased blood pressure, reduced fluid overload, and decreased left ventricular mass index (based on limited evidence).
- No cost-effectiveness information or guidelines on bioimpedance devices for fluid management in renal dialysis patients were found.

Results

The literature search identified 264 citations, with 1 additional article identified from other sources. After screening the abstracts, 9 were deemed potentially relevant, and 5 met the criteria for inclusion in this review — 3 randomized controlled trials and 2 uncontrolled studies.

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RC0534