Individualizing hypertension treatment with impedance cardiography: a meta-analysis of published trials

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CRD summary
This review appeared to confirm the value of using impedance cardiography guided derived haemodynamic data as an adjunct to therapeutic decision-making in the treatment of hypertension. This conclusion may not be wholly reliable due to a number of problems with the conduct and reporting of the review.

Authors' objectives
To evaluate the use of individualising hypertension treatment with impedance cardiography (ICG) guided therapy for the attainment of blood pressure control in hypertensive patients.

Searching
MEDLINE and The Cochrane Library were searched. Search terms were provided. Internet searches were carried out (there were no further details). No search dates were reported. The authors did not report whether any limitations were placed on study publication status or language.

Study selection
Randomised controlled trials (RCTs) that compared ICG therapy versus standard medical care for treatment of adults with a history of mild to resistant essential hypertension were eligible for inclusion in the review. Non-randomised prospective interventional clinical trials that demonstrated the impact of ICG-guided therapy after a predetermined treatment period were eligible for inclusion. Eligible studies had to report data on blood pressure control and clinical outcomes. Studies of women with toxaemia in pregnancy were excluded from the review.

Study duration ranged from three weeks to 4.7 months.

The authors did not state how papers were selected for the review.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
Success rates for systolic and diastolic blood pressure were extracted and odds ratios (ORs) calculated. Change in mean systolic and diastolic blood pressure was extracted.

The authors did not state how the data were extracted for the review.

Methods of synthesis
Success rates were combined for RCTs and pooled odds ratios with 95% CIs were calculated. Findings from uncontrolled single-arm studies were summarised using a narrative synthesis. Tables compared actual and expected data.

Results of the review
Five studies (n=759) were reported in the review: two RCTs (n=268) and three single-arm prospective trials (n=491). Sample size ranged from 56 to 322.

Both RCTs reported a significant difference in blood pressure success in favour of ICG-guided blood pressure treatment versus standard care (OR 2.41, 95% CI 1.44 to 4.05). In the ICG-guided arms of the combined randomised trials, 67% of patients achieved a blood pressure goal of less than 140/90mmHg. Combined overall success rates were
similar (68%) in the three single-arm studies.

**Authors' conclusions**
The results of this meta-analysis confirmed the value of using ICG-derived hemodynamic data as an adjunct to therapeutic decision-making in the treatment of hypertension.

**CRD commentary**
This review answered a clearly defined research question. It was unclear whether all relevant data were included in the review as the authors did not report whether any language and publication restrictions were applied. It appeared that the review only included published data, which raised the possibility of publication bias. Risks of reviewer error and bias were unclear as the authors did not report how many reviewers were involved in study selection and data extraction. The reliability of the studies was unclear as no assessment of methodological quality was reported. The studies used generally had small sample sizes and most were single-arm studies. However, the main study findings were based on two randomised controlled trials that appeared to be appropriately powered. It was difficult to assess how similar the included studies were as few details of the populations and study characteristics were reported. Given these limitations, the conclusions of the review may not be wholly reliable.

One of the authors worked for CardioDynamics. The other authors were consultants for the same company and had received funding from other pharmaceutical companies.

**Implications of the review for practice and research**

**Practice:** The authors stated that ICG may contribute to the control of hypertension and reduction in costs if adopted by the medical community and insurers.

**Research:** The authors did not state any implications for research.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.