

Noninvasive Bioimpedance Monitoring Differentiates Cardiogenic from Pulmonary Causes of Acute Dyspnea in the Emergency Department

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Objective

To determine if a noninvasive bioimpedance device (BioZ[®] CDM 4000 Hemodynamic Monitor, CardioDynamics International Corporation, CA) can differentiate cardiogenic from pulmonary causes of acute dyspnea in patients presenting to the ED.

Design

Retrospective chart review.

Setting/Population

A suburban teaching hospital ED. Convenience sample of patients, aged ≥ 50 years, presenting to the ED between 3/95 and 9/96 with acute dyspnea who were monitored with the BioZ.

Experimental Protocol

- As per routine, BioZ cardiac index (CI), stroke index (SI), ejection fraction (EF), and left stroke work index (LSWI) measurements were electronically recorded several times for each patient over 20 minutes.
- After hospital discharge, the mean BioZ parameters for each patient were compared with the final diagnosis.
- Final diagnosis was determined by 4 physicians independently reviewing each chart, blinded to BioZ data.
- Patients were excluded if they had both cardiogenic and pulmonary causes for acute dyspnea or if there was disagreement among the reviewers in classifying the patients.

Statistics

PT-tests and Fisher's exact tests, sensitivity and specificity were calculated for each BioZ parameter.

Results

A total of 62 patients were monitored. The final study group consisted of 40 patients: 17 with cardiogenic (congestive heart failure) and 23 with pulmonary (pneumonia, asthma, bronchitis, and/or obstructive disease) causes for dyspnea.

The 2 groups were similar in age and gender, but differed significantly by mean measured CI, SI, EF, and LSWI ($p < 0.05$).

The sensitivity and specificity for cardiogenic dyspnea for the following parameters and values were:

CI < 3.7 (100%/48%)

SI < 32 (76%/65%)

EF $< 50\%$ (88%/65%)

LSWI < 37 (82%/70%)

Conclusion

In ED patients with clinically clear diagnoses, BioZ measurements can differentiate cardiogenic from pulmonary causes of acute dyspnea.