

# Bridge to avoid ICD implantation with wearable cardioverter defibrillators

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Adv Interv Cardiol 2020; 16, 2 (60): 227–228

DOI: <https://doi.org/10.5114/aic.2020.96072>

The wearable cardioverter-defibrillator (WCD) is an option [1, 2] for patients at high risk, not yet candidates for an implantable cardioverter-defibrillator (ICD) [3, 4]. A cost/effectiveness analysis should take into account fixed (device-related) and running (hospitalization, ICD-related risk of infections) costs.

We present a retrospective analysis with regard to the raw costs of all consecutive WCDs (LifeVest; Zoll Medical) applied from April 2017 to September 2018 in our center.

Clinical and demographic data were collected in our hospital database.

From the study period, the only commercial policy of our WCD Country Zoll Medical Distributor was to offer the device for a monthly rent with an average cost of € 3,500 (3,400 to 4,000).

Statistical analysis was performed by means of SPSS 20.0 (IBM Inc., Armonk, New York, USA).

Written informed consent was obtained from all the patients to accept and be followed up with the WCD. Since the study relates to an economic analysis of care strategies and does not include any assessment of patient clinical status, therapies and care, it was notified to our Institutional Ethics Committee according with their rules.

A total of 16 patients (57.7 ±14.8 years old; 75% males) were enrolled in the study (4 patients with acute myocarditis, 4 patients with a recent myocardial infarction, 4 patients with a recent dilated cardiomyopathy diagnosis, 2 oncologic patients receiving cardiotoxic chemotherapy and 2 patients with nonsustained ventricular arrhythmias considered at high risk).

No patients presented sustained ventricular arrhythmias during the observation period; neither appropriate nor inappropriate shocks were delivered by the device.

At the end of the “wearing period”, at re-assessment, 11/16 patients (69%), did not have indications for ICD implantation (NO-ICD study group), who were compared with the 5/16 (31%) patients who underwent ICD implantation (ICD study group).

In the univariate comparison no variable characterized the study groups (Table I).

In the NO-ICD study patients, the mean left ventricular ejection fraction (LVEF) values at baseline and at the end of WCD wearing period were 32.2 ±10.1 vs. 44.7 ±7.4% respectively.

The WCD rental cost for the NO-ICD group (average 26 months for all patients’ cumulative rental period) was € 91,000 versus € 70,000 for the ICD group (average 20 months for all patients’ cumulative rental period).

According to the aim of the present analysis, if the NO-ICD study patients had been implanted with an ICD, based on their clinical features they would have been fitted with a single chamber (VR) or dual chamber (DR) traditional ICD or alternatively a subcutaneous ICD (S-ICD). In our patients there were no cases of CRT-D indications. Considering that an average VR/DR ICD and S-ICD costs around € 8,000 and € 15,000, respectively, the estimated implanting fixed cost for these patients would have been roughly € 88,000 for a VR or DR ICD and up to € 165,000 for an S-ICD.

The present study is a retrospective analysis, which limits any clinical and economic analysis.

In conclusion, the WCD may be cost saving when considering the high rate of patients who may exit from ICD indications, especially with extended WCD worn periods.

## Conflict of interest

The authors declare no conflict of interest.

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Received: 13.03.2020, accepted: 13.03.2020.

**Table I.** Univariate comparison between the study groups

Clinical variables	NO-ICD group	ICD group	P-value
Age [years] mean ± SD	55.9 ±17.4	60.7 ±9.6	0.5
Male, n (%)	7 (70)	5 (83.3)	0.5
Hypertension, n (%)	2 (20)	3 (50)	0.2*
Dyslipidemia, n (%)	2 (20)	2 (33)	0.6*
Diabetes mellitus, n (%)	3 (30)	2 (33)	1*
Smoking habit, n (%)	3 (30)	5 (83)	0.1*
ACEi/ARB, n (%)	5 (50)	5 (83)	0.3*
Beta-blockers, n (%)	9 (90)	5 (83)	0.7
Amiodarone, n (%)	4 (40)	2 (33)	1*
Valsartan/sacubitril, n (%)	2 (20)	0	0.5*
Diuretics, n (%)	8 (80)	5 (83)	0.8
Antiarrhythmic drugs, n (%)	8 (80)	4 (66)	0.5
Statins, n (%)	5 (50)	3 (50)	1*
Inappropriate shocks	0	0	/
Previous MI, n (%)	1 (10)	3 (30)	0.1*
Atrial fibrillation detected by WCD, n (%)	2 (20)	1 (16)	1*
Coronary artery disease, n (%)	1 (10)	3 (30)	0.1*
LVEF at baseline (%), mean ± SD	32.3 ±10.1	33 ±13.7	0.9
LVEF at end of WCD wearing period (%), mean ± SD	44.7 ±7.4	36.3 ±11.3	0.09
Days of WCD wearing, n (%)	77.5 (43.7)	95.5 (63)	0.3**
WCD wearing [h/day] n (%)	22.2 (2.1)	22.5 (1.8)	0.8

ACEi – angiotensin converting enzyme inhibitors, ARB – angiotensin receptor blocker, LVEF – left ventricular ejection fraction, WCD – wearable cardioverter-defibrillator, MI – myocardial infarction. \*Fisher’s exact test. \*\*Mann-Whitney U test.

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