EVATEL Study

Remote follow-up of patients implanted with an ICD
The prospective randomized EVATEL study

Philippe Mabo, Pascal Defaye, Nicolas Sadoul,
Jean Marc Davy, Jean-Claude Deharo, Salem Kacet,
Eric Bellissant, Jean Claude Daubert

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Disclosures

- **Biotronik: research grants, consulting**
- **Boston Guidant: research grants, consulting**
- **Medtronic: research grants, consulting**
- **St Jude Medical: research grants, consulting**
- **Sorin: speaker, research grants, consulting**

Background

- Implantable cardioverter defibrillator (ICD) reduces mortality in selected patients.
- Expending indications result in increasing number of implantations with impact on follow-up strategy and health-care organisation.
- Currently, regular in-office follow-up is recommended every 3 months.
- In this context, remote monitoring appears to be a promising technique, allowing to get information about device status and delivered therapies without the need for in-office visit.

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Aims of the study

- To evaluate safety and efficiency of ICD remote FU as compared to conventional in-office FU

- Cost/effectiveness evaluation

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Study design

- Randomized, prospective, open-label multicentre French trial
- Two groups
  - Control : conventional in-office follow-up at the implant centre every 3 months
  - Remote follow-up: remote transmission to the implant centre every 3 months
- In office visit at 6 weeks and 12 months for all patients
- One-year FU

Selection criteria

- **Inclusion criteria**
  - Adults over 18 years
  - First implantation of a single or dual chamber ICD
  - Primary or secondary prevention indication
  - ICD device with data transmission features
  - Phone network compatible with remote transmission
  - Ability to correctly use the transmission system
  - Written inform consent

- **Exclusion criteria**
  - NYHA class IV
  - Life expectancy < 1 year
  - CRT indication

Primary endpoint

- **Combined clinical endpoint**
- **Rate of major cardiovascular events (MCE) occurring during the first year after ICD implantation**
  - **Death (all causes)**
  - **Hospitalization for a cardiovascular event**
  - **Ineffective therapy**
  - **Inappropriate therapy**

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Main secondary endpoints

- **Time to first MCE**
- **Time to all-cause death**
- **Rate of cardiovascular hospitalisation**
- **Rate of ineffective or inappropriate ICD therapies**
- **Cost/effectiveness analysis:** *pending*

Sample size

- Expected rate of MCE in the control group : 20%
- Power : 80% - Risk : 5%
- Non inferiority hypothesis: evaluated on the 95% confidence interval of the MCE rate difference between the 2 groups with a non-inferiority margin of 5%

Calculated sample size : 1600 patients

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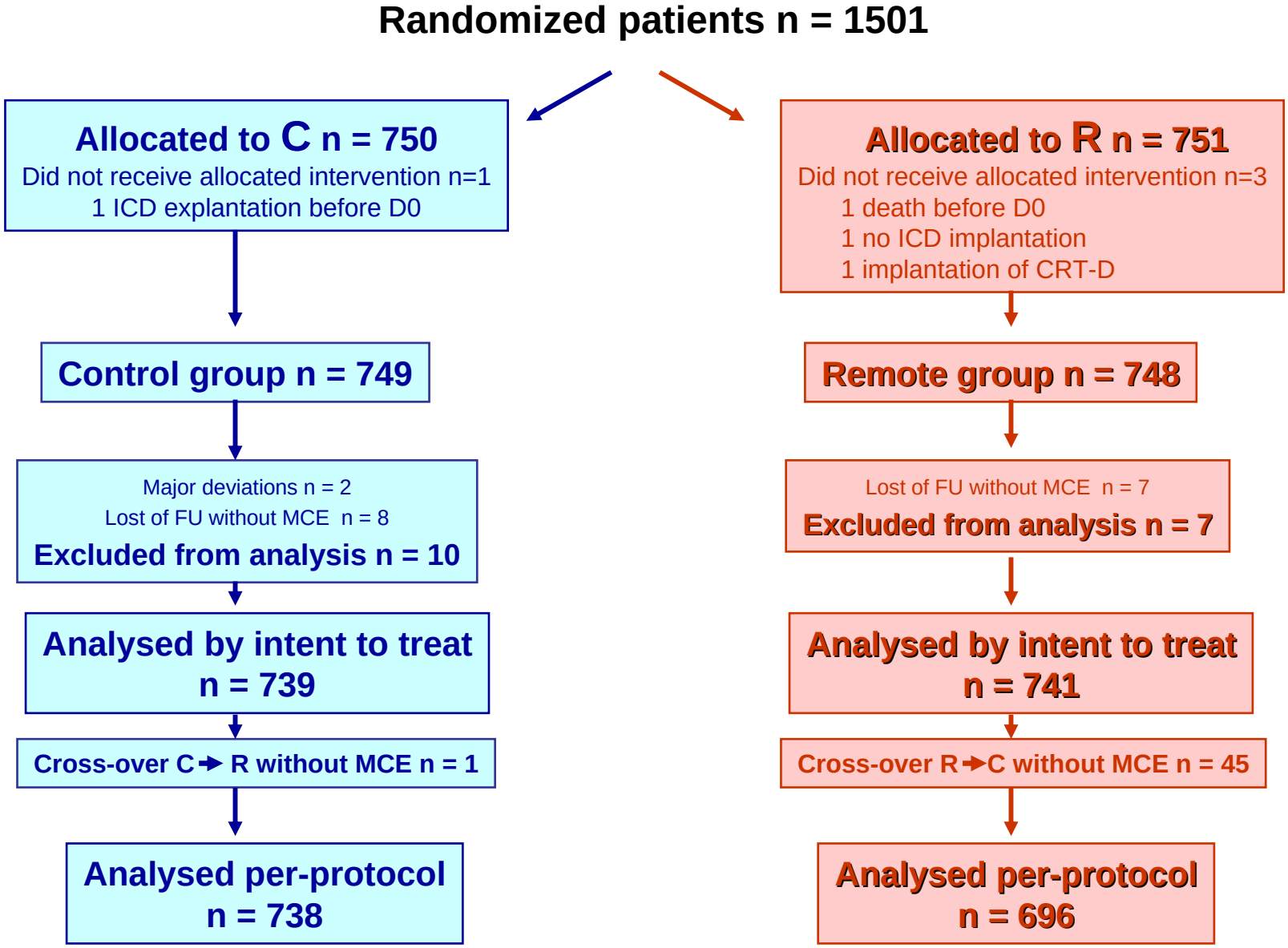
Flow chart


Randomized patients n = 1501
Allocated to C n = 750
Did not receive allocated intervention n=1
1 ICD explantation before D0
Control group n = 749
Major deviations n = 2
Lost of FU without MCE n = 8
Excluded from analysis n = 10
Analysed by intent to treat n = 739
Cross-over C → R without MCE n = 1
Analysed per-protocol n = 738
Allocated to R n = 751
Did not receive allocated intervention n=3
1 death before D0
1 no ICD implantation
1 implantation of CRT-D
Remote group n = 748
Lost of FU without MCE n = 7
Excluded from analysis n = 7
Analysed by intent to treat n = 741
Cross-over R → C without MCE n = 45
Analysed per-protocol n = 696

ICD manufacturers and types

		Control n = 750	Remote n = 749*
Manufacturer	Biotronik	315 (42.0%)	308 (41.1%)
	Boston-Guidant	40 (5.3%)	35 (4.7%)
	Medtronic	229 (30.5%)	237 (31.6%)
	St Jude Medical	166 (22.1%)	169 (22.6%)
Type	Single chamber	503 (67.1%)	488 (65.2%)
	Dual chamber	247 (32.9%)	261 (34.8%)

*all implanted devices

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Reasons for Cross-over

	Control n = 1	Remote n = 55
Unexpected phone network not compatible with remote transmission	_	32 (58.2%)
Patient unable to use correctly the transmission system	_	6 (10.9%)
Patient wish	1 (100.0%)	4 (7.3%)
Patient condition requiring conventional close follow-up	_	2 (3.6%)
Unknown	_	1 (1.8%)
Other	_	10 (18.2%)

Data are numbers of patients (percentages)

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Patient Baseline Characteristics (1)

	Control n = 750	Remote n = 751	p value
Gender, male	628 (83.7%)	646 (86.0%)	0.2166
Age, years	59±13	60±13	0.1654
ICD indication			
Primary prevention	481 (64.1%)	489 (65.1%)	0.6656
Secondary prevention	269 (35.9%)	261 (34.8%)	
Documented ventricular arrhythmia	373 (49.7%)	355 (47.3%)	0.3397
Ventricular fibrillation	101 (13.5%)	81 (10.8%)	0.1116
History of atrial arrhythmia	142 (18.9%)	179 (23.8)	0.0206

Continuous variables are means±SD. Categorical variables are numbers of patients (percentages)

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Population Characteristics (2)

	Control n = 750	Remote n = 751	p value
Underlying disease			
Structural heart disease	681 (90.9%)	700 (93.5%)	0.0673
Electrical disease	68 (9.1%)	49 (6.5%)	
Structural heart disease etiologies			
Ischemic heart disease	467 (62.3%)	479 (64.0%)	
Non-ischemic cardiomyopathy	133 (17.8%)	138 (18.4%)	
NYHA class			
I	262 (35.7%)	231 (31.4%)	0.2051
II	370 (50.5%)	394 (53.5%)	
III	101 (13.8%)	111 (15.1%)	
LVEF			
< 35%	412 (56.4%)	436 (59.6%)	0.2144
≥ 35%	318 (43.6%)	295 (40.4%)	
Heart failure hospitalisation (within 1 year before inclusion)	141 (18.9%)	179 (23.8%)	0.0185
Chronic associated diseases			
Arterial hypertension	284 (37.9%)	310 (41.3%)	0.1832
Diabetes	154 (20.5%)	163 (21.7%)	0.5784
Chronic respiratory disease	98 (13.1%)	113 (15.0%)	0.2698
Chronic renal failure	41 (5.5%)	50 (6.7%)	0.3336

Data are numbers of patients (percentages)

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Primary endpoint (1)

(Death/ CV hospitalisation/ Ineffective or inappropriate therapy)

Intent to treat analysis (N=1480)

	Control n = 739	Remote n = 741	p
Number of patients with at least 1 MCE 95% CI	210 (28.4%) [25.2 to 31.7]	214 (28.9%) [25.6 to 32.1]	NS

Non-inferiority hypothesis

Difference (95% CI)	**0.5 % [- 4.1 to 5.1]**	**p = 0.0101**

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Primary endpoint (2)

(Death/ CV hospitalisation/ Ineffective or inappropriate therapy)

Per protocol analysis (N=1434)

	Control n = 738	Remote n = 696	p
Number of patients with at least 1 MCE 95% CI	210 (28.5%) [25.2 to 31.7]	210 (30.2%) [26.8 to 33.6]	NS

Non-inferiority hypothesis

Difference (95% CI)	**1.7% [- 3.0 to 6.4]**	**p = 0.0026**

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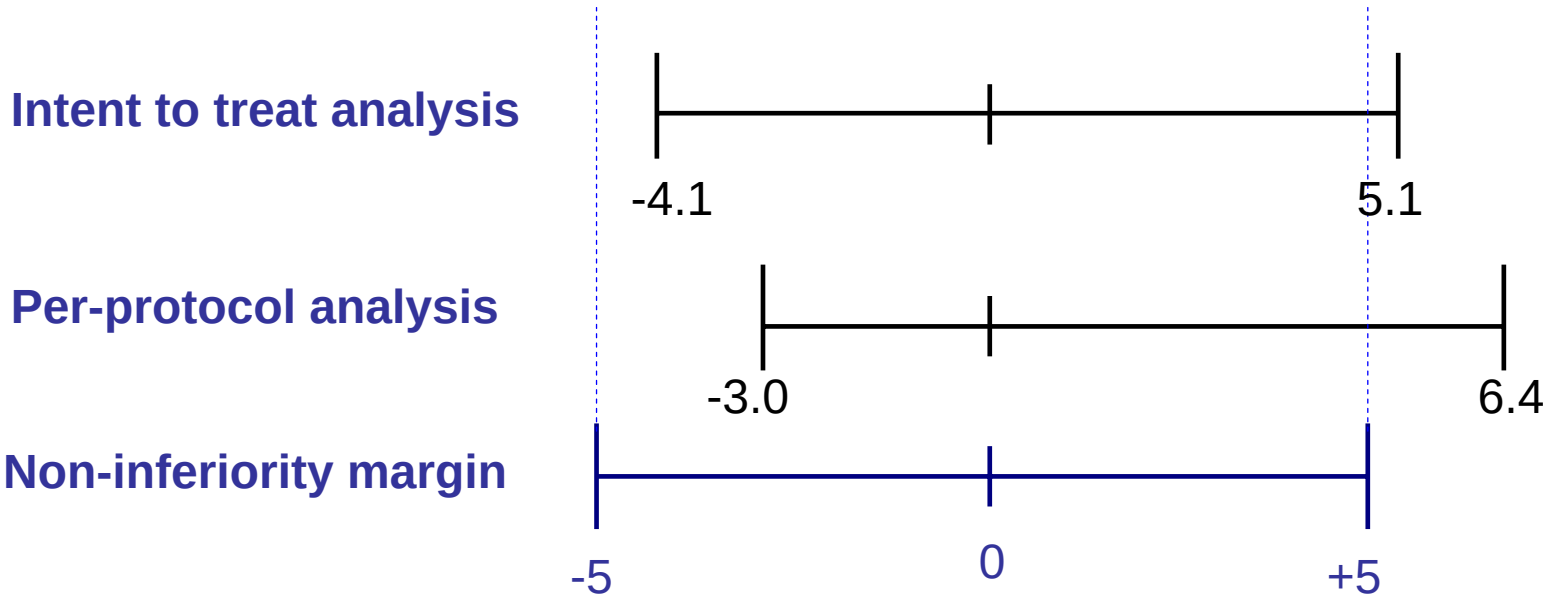
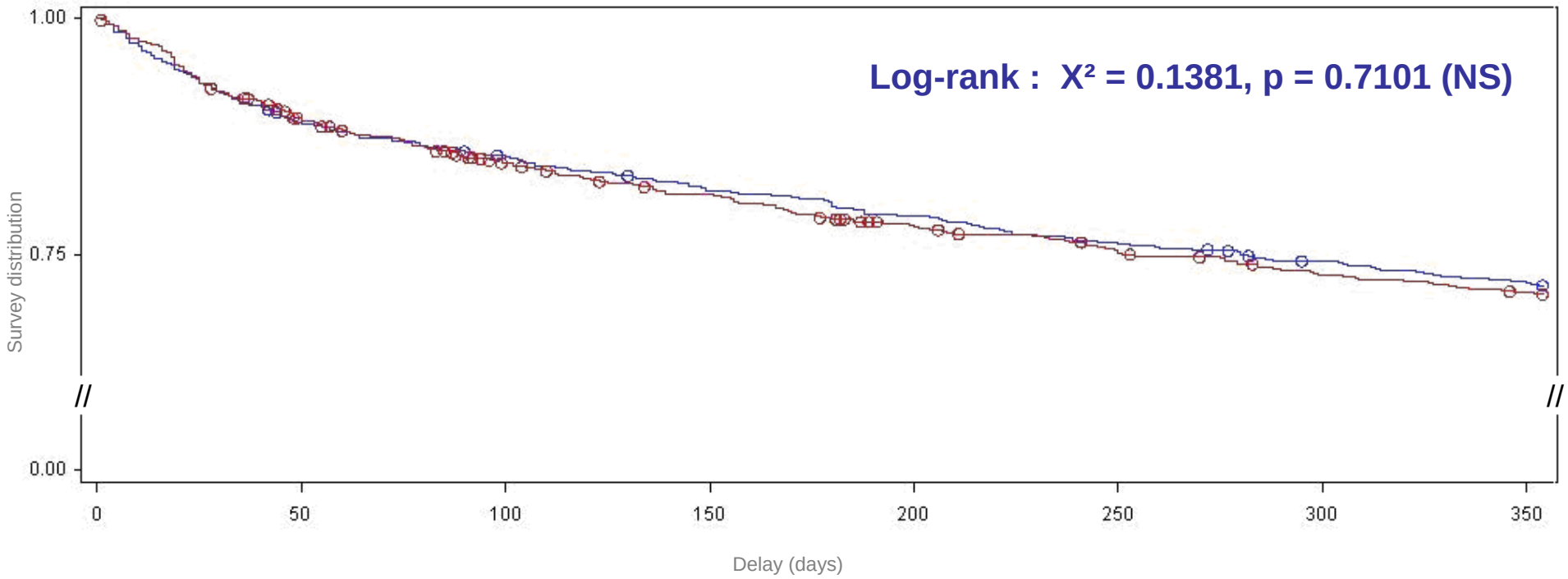
Primary endpoint (3)

MCE rate difference (%) between the 2 groups (95% CI)



Time to first major cardiovascular event



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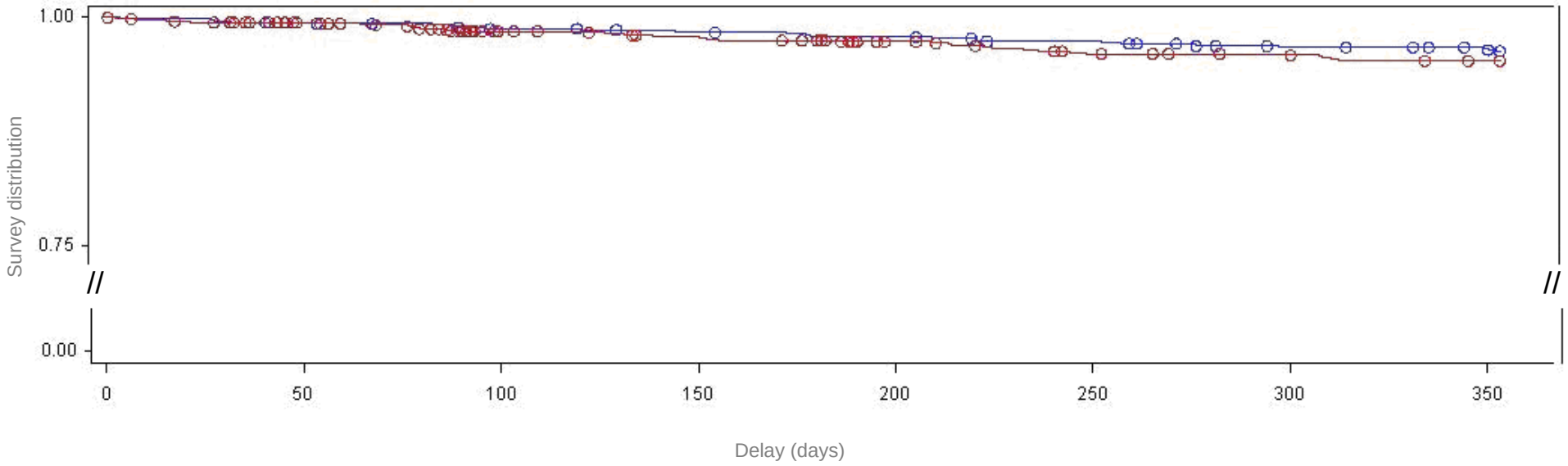
Time to all-cause death

Log-rank : $X^2 = 1.0147$, $p = 0.3138$ (NS)



Secondary endpoints

	Control n = 738	Remote n = 696	p value
Hospitalization for a cardiovascular event	**152 (20.6%)**	**172 (24.7%)**	**0.0625**
Inappropriate or ineffective therapy	**60 (8.1%)**	**38 (5.5%)**	**0.0452**
Ineffective therapy	***5 (0.7%)***	***6 (0.9%)***	***0.6889***
Inappropriate therapy	***55 (7.5%)***	***33 (4.7%)***	***0.0325***

Data are numbers of patients (percentages)

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Study limitations

- **Enrollment inferior to the calculated sample size**

  inclusion period limited to 2 years
- **Some differences at baseline between the 2 groups**

  with possibly sicker patients in the remote group
- **Cross-over from remote to control group mainly due**

  to unexpected phone network connexion problem
- **Short follow-up**

Conclusions

- **EVATEL is the first controlled trial aimed at assessing the impact of ICD remote f/u on clinical outcomes**
- **The non-inferiority hypothesis between the two groups was not validated**
- **Nevertheless, a difference between groups on the primary endpoint has not been demonstrated**
- **No difference in survival**
- **Significant reduction of inappropriate therapies in the remote group**
- **Results do not question the place of ICD remote FU as a safe alternative to in office FU but no impact on the prevention of major clinical events was demonstrated**
- **Health care utilization: pending**

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