EVATEL Study

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

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Background

- Implantable cardioverter defibrillator (ICD) has been shown to be effective to reduce mortality in selected patients.
- The expending indications of this therapy will have an impact on the follow-up (FU) strategy.
- Currently, regular in-office FU are scheduled every 3 months.
- In this context, remote device FU appears to be a promising technique, allowing to transmit information about the 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 compare to conventional in-office FU

- Cost/effectiveness evaluation

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Study design

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

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Selection criteria

- **Inclusion criteria**
  - Adults over 18 years
  - First implantation of a single or dual chamber ICD
  - Primary or secondary prevention
  - ICD 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-D indication

Primary endpoint

- Combined 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
- Evaluated on the 95% confidence interval of the MCE rate difference between the 2 groups with a non-inferiority margin of 5%

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Main secondary endpoints

- Time to onset of the first MCE
- One year survival distribution
- Rate of cardiovascular hospitalization
- Rate of ineffective or inappropriate ICD therapies
- Cost/effectiveness analysis

Sample size

- Non inferiority hypothesis
- Expected rate of MCE in the control group : 20%
- Non inferiority margin : 5%
- Power : 80% - Risk : 5%

Sample size : 1600 patients

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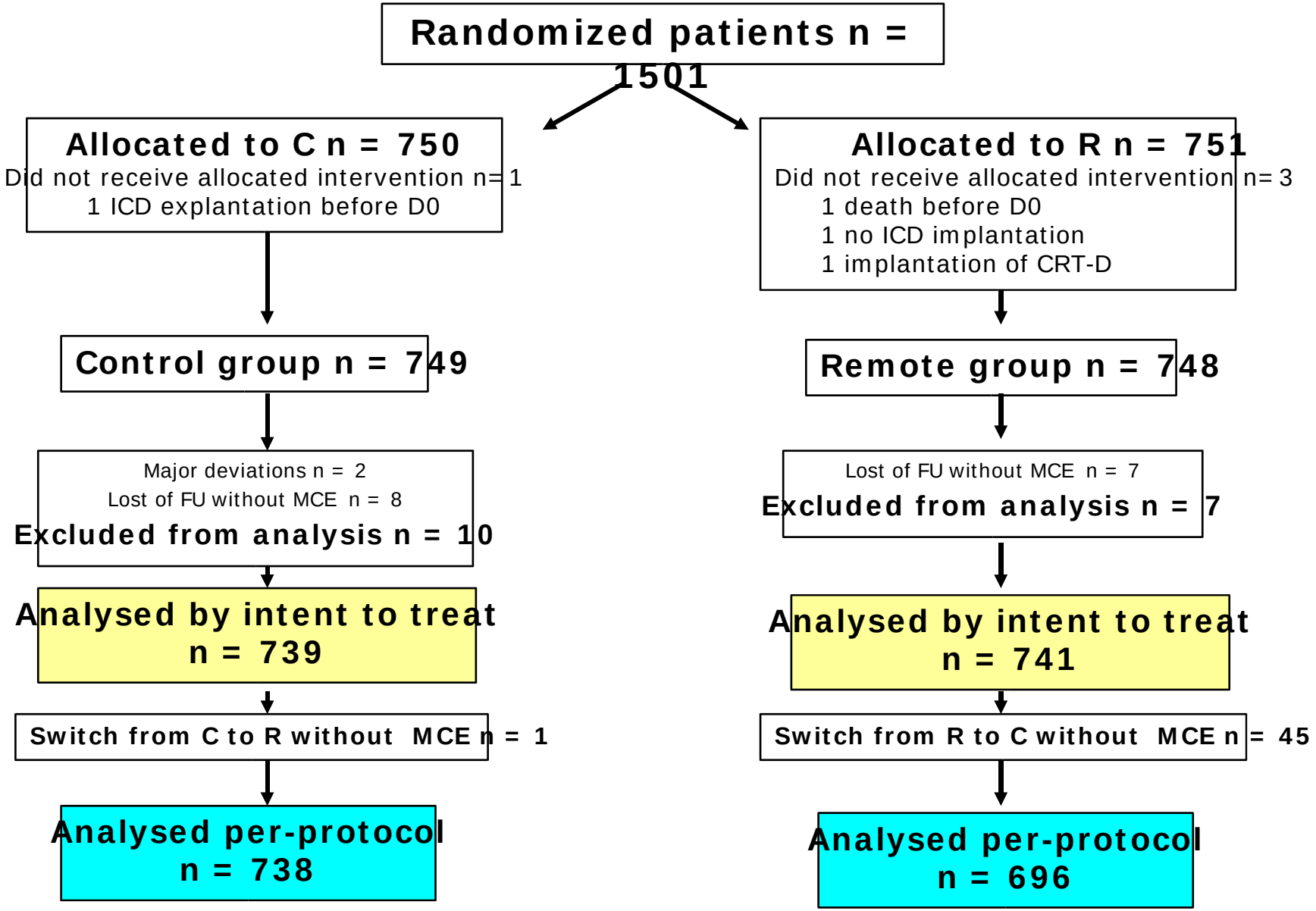
Flow chart


Randomized patients n = 1501
Allocated to C n = 750
Did not receive allocated intervention n= 1
1 ICD explantation before D0
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
Control group n = 749
Remote group n = 748
Major deviations n = 2
Lost of FU without MCE n = 8
Excluded from analysis n = 10
Lost of FU without MCE n = 7
Excluded from analysis n = 7
Analysed by intent to treat n = 739
Analysed by intent to treat n = 741
Switch from C to R without MCE n = 1
Switch from R to C without MCE n = 45
Analysed per-protocol n = 738
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 switch

	Control n = 1	Remote n = 55
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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Population 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
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			0.0673
Structural heart disease	681 (90.9%)	700 (93.5%)	
Electrical disease	68 (9.1%)	49 (6.5%)	
Structural heart disease etiologies	467 (62.3%)	479 (64.0%)	
Ischemic cardiomyopathy	133 (17.8%)	138 (18.4%)	
Dilated cardiomyopathy			
NYHA class			0.2051
I	262 (35.7%)	231 (31.4%)	
II	370 (50.5%)	394 (53.5%)	
III	101 (13.8%)	111 (15.1%)	
LVEF			0.2144
< 35%	412 (56.4%)	436 (59.6%)	
≥ 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) – Non-inferiority hypothesis

	Control n = 739	Remote n = 741	Difference (Rate) (95% CI)
Number of patients with at least 1 MCE	210 (28.4%) [25.2 to 31.7]	214 (28.9%) [25.6 to 32.1]	0.5 [- 4.1 to 5.1]
95% CI			p = 0.0101

Per protocol analysis (N= 1434) – Non-inferiority hypothesis

	Control n = 738	Remote n = 696	Difference (Rate) (95% CI)
Number of patients with at least 1 MCE	210 (28.5%) [25.2 to 31.7]	210 (30.2%) [26.8 to 33.6]	1.7 [- 3.0 to 6.4]
95% CI			p = 0.0026

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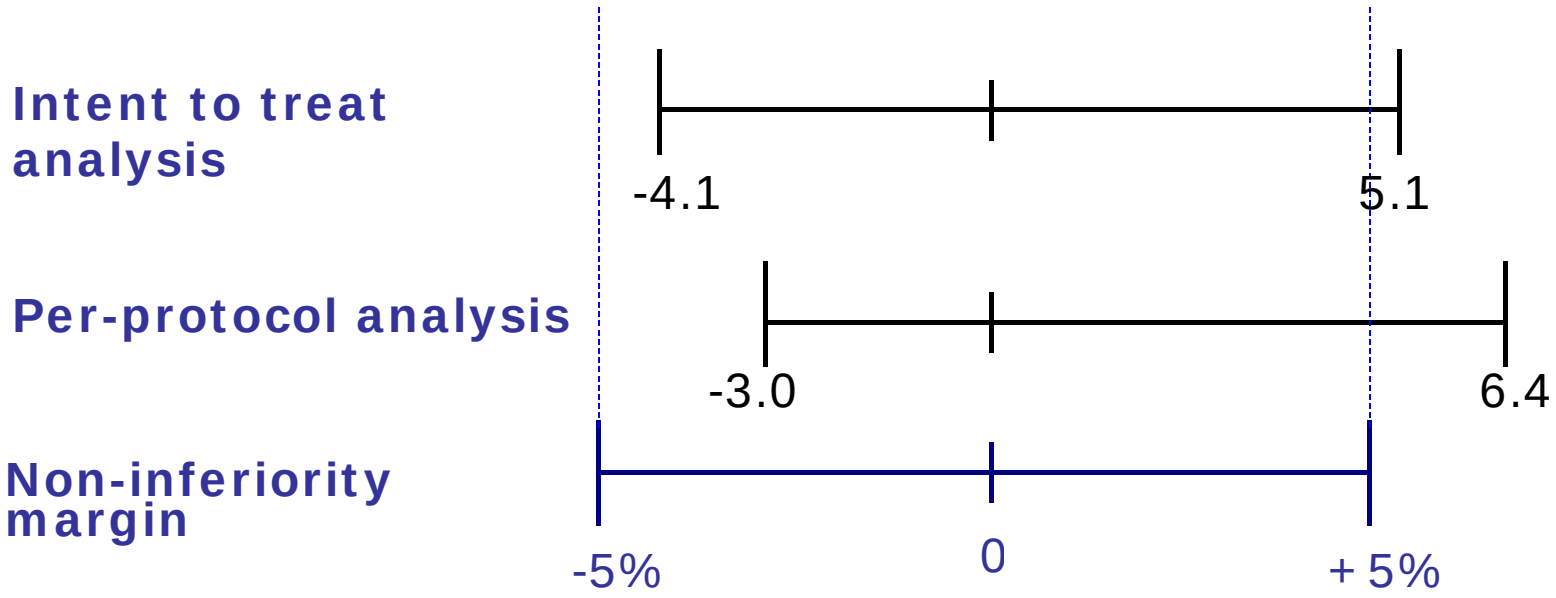
Primary endpoint (2)



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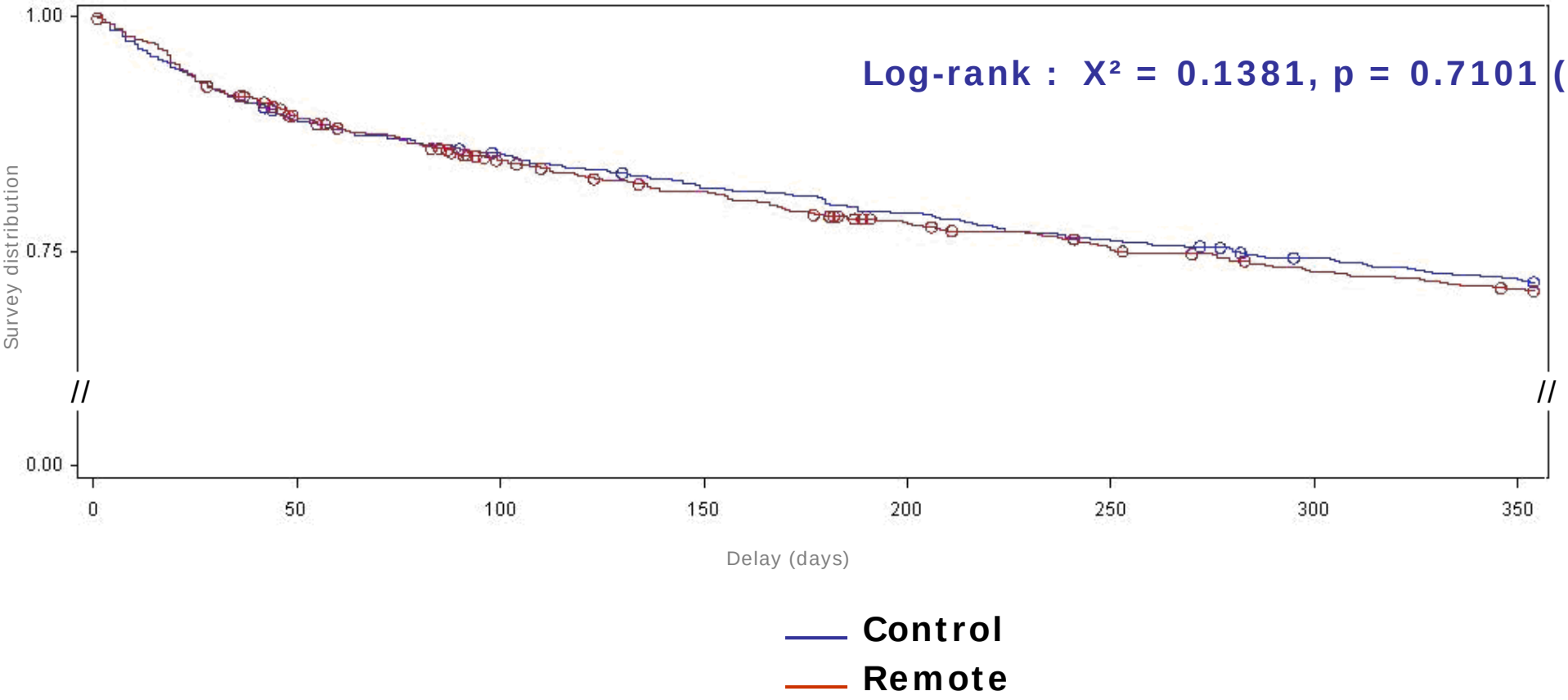
Time to the first major cardiovascular



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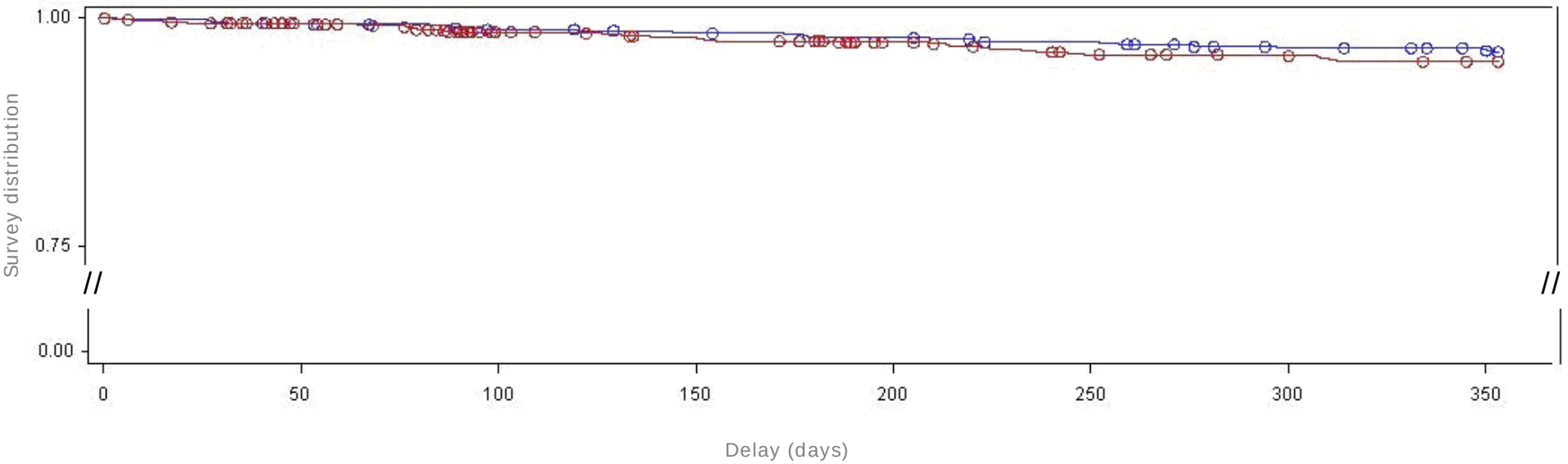
Time to death

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



Control

Remote

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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

- Included population < 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
- Switches from remote to control group mainly due to phone network connexion
- Short follow-up

Conclusions

- 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 terms of survival.
- Significant reduction of inappropriate therapies in the remote group.
- ICD remote FU may be proposed as a safe alternative to in-office FU.

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