

# Evaluation of Survival, Care Pathway and Associated Costs of Telemonitored Heart Failure Patients and Comparison with a Control Group

## Introduction

The rising prevalence of chronic diseases, including chronic heart failure (CHF), combined with an ageing population, represents a real public health problem.

CHF patients are frequently hospitalized, with over 150,000 hospitalizations per year in France<sup>1</sup>.

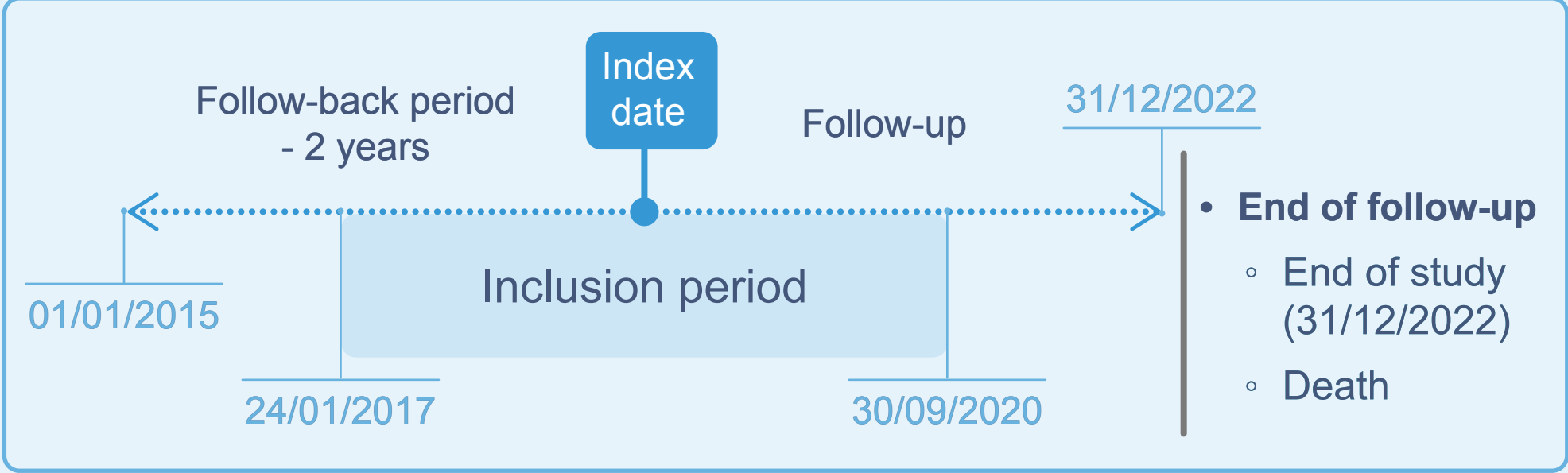
Improved monitoring of these patients, particularly through remote telemonitoring (TM), could reduce the number and duration of hospitalizations<sup>2</sup> and, more generally, improve their quality of life<sup>3</sup>.

The aim of this study was to evaluate the management of TM patients and compare it with non-TM patients.

## Methods

### Study design

A retrospective observational study was conducted using data from the French National Health Data System (SNDS).



### Telemonitored by Newcard

Inclusion of all TM patients with Newcard device for at least 3 months between January 24, 2017 and September 30, 2020, and linkage of their data with the SNDS via the SSUI.

### Non-telemonitored

Random selection of a control group from all heart failure patients in the SNDS.

### Statistical analyses

1:3 matching of the control group with TM patients by year of inclusion, age, gender and using a propensity score adjusted for the following variables: social disadvantage index, medical history (coronary heart disease, diabetes, cancer), treatment history (beta blockers, sacubitril/valsartan, acetylsalicylic acid or clopidogrel, anti-antagonists and related agents, anticoagulants) and previous complete hospitalization for heart failure.

Poisson models were implemented to assess and compare the evolution of the number of treatments consumed over the follow-up period between cohorts.

Costs were expressed in  2022 according to the National Health Insurance perspective. Differences of costs between TM patients and controls were assessed by a negative binomial model with zero inflation over the first year of follow-up, with a retrospective cost adjustment 1 year before the index date.

Patients survival was estimated by the Kaplan-Meier method and compared using the log-rank test. Taking into account a change in the clinical eligibility criteria for the Newcard device in 2020, survival was described over the entire study period and then separately for patients included from 2020 onwards.

## Conclusion

Cardiac telemonitoring appeared to be associated with higher costs compared to the non-telemonitored group, particularly for costs related to outpatient consultations (total and cardiology) and medical device reimbursements. However, it is important to take into account the potential clinical benefits of telemonitoring, such as increased survival, when assessing its cost-effectiveness.

## References

- <sup>1</sup> L'insuffisance cardiaque : Quand le c ur se fatigue irr m diatement [Internet]. Fondation pour la Recherche M dicale. [cited 2021 Mar 24]. Available from : <https://www.frn.org/recherches-maladies-cardiovasculaires/insuffisance-cardiaque>
- <sup>2</sup> Anker SD, Koehler F, Abraham WT. Telemedicine and remote management of patients with heart failure. Lancet. 2011 Aug 20;378(9792):731 9.
- <sup>3</sup> Hofmann R, V ller H, Nagels K, Bindl D, Vettorazzi E, Dittmar R, et al. First outline and baseline data of a randomized, controlled multicenter trial to evaluate the health economic impact of home telemonitoring in chronic heart failure - CardioBBEAT. Trials. 2015 Aug 11;16:343.

## Abbreviations

CNAM: Caisse Nationale de l'Assurance Maladie; CNIL: Commission Nationale de l'Informatique et des Libert s; HDH: Health Data Hub; ICC: Insuffisance Cardiaque Chronique; SNDS: Syst me National des Donn es de Sant ; MS: Telemonitored; SSUI: Social Security Unique Identifier

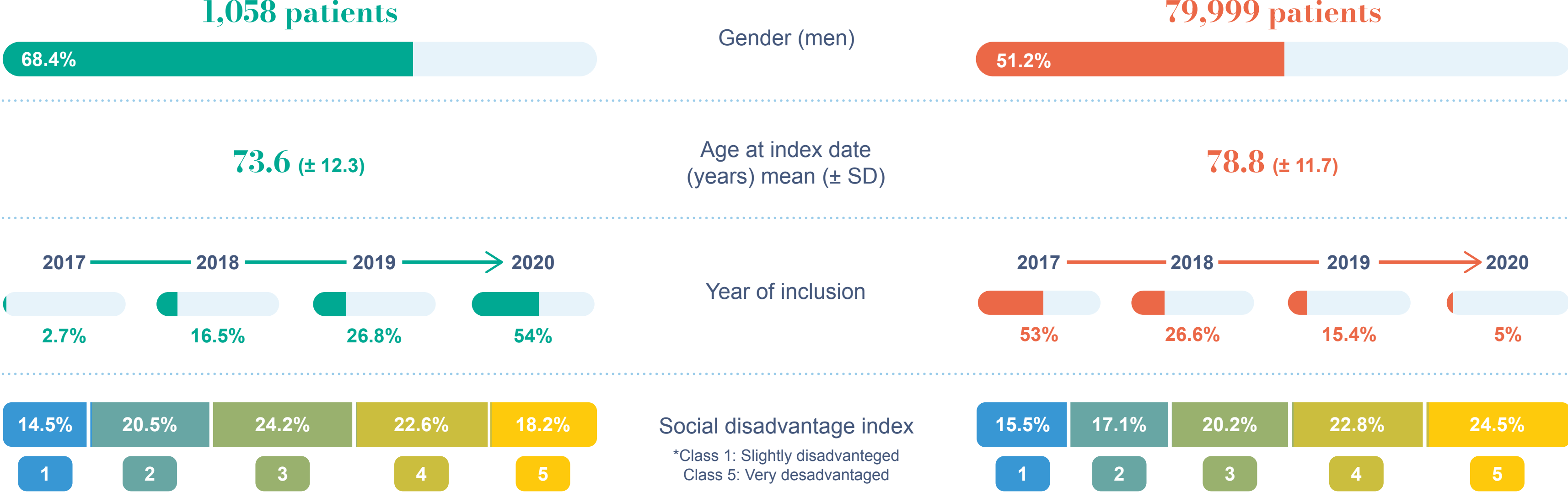
## Data sources

SNDS study registered with HDH, approved by CESREES on June 17, 2021 and by CNIL on November 4 November 2021 - the agreement with CNAM was signed on September 23, 2022.

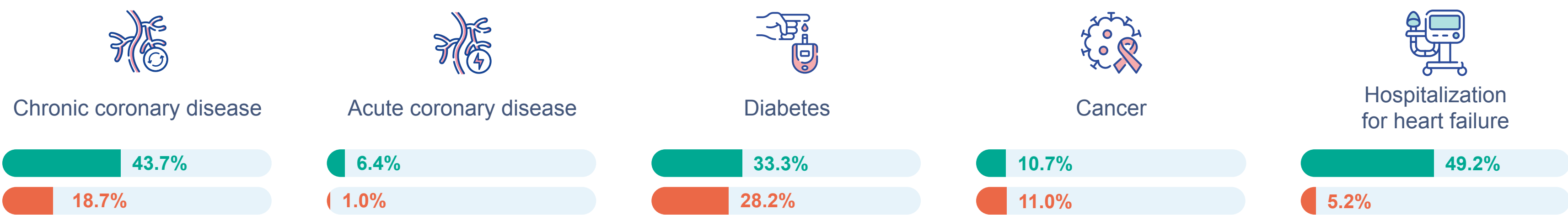
## Results



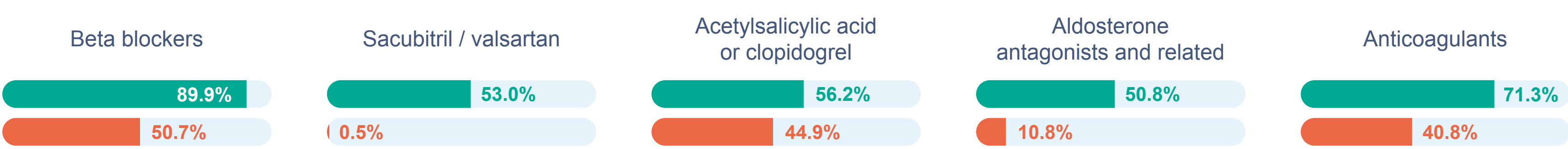
### Demographic characteristics



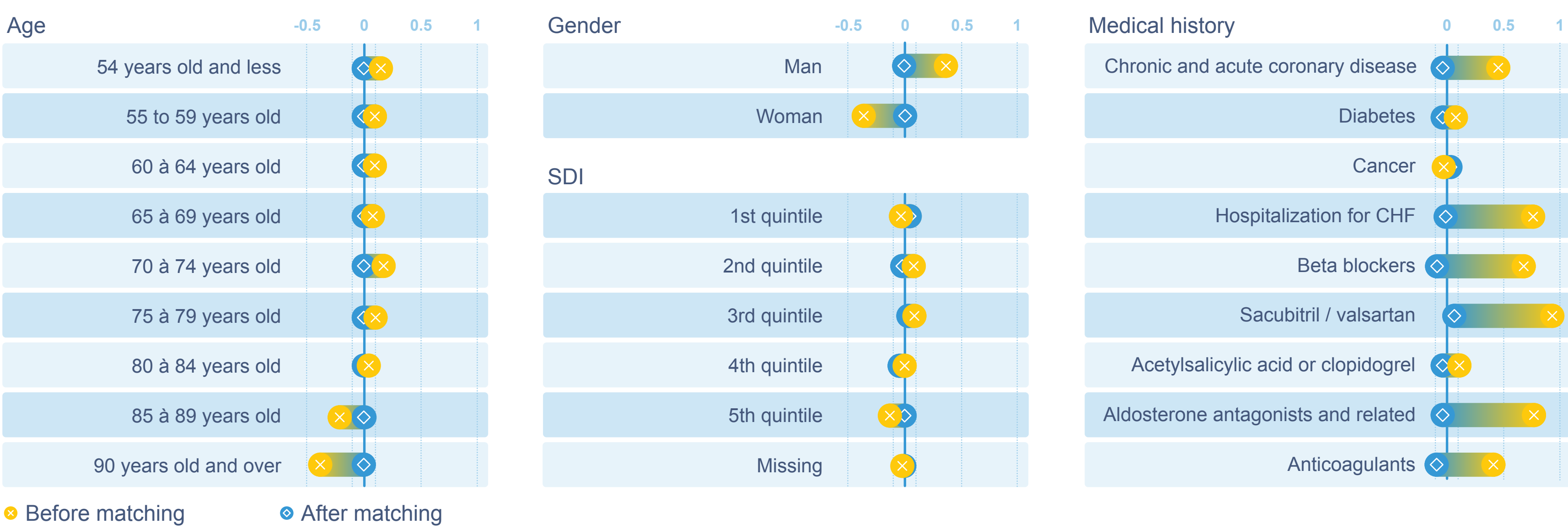
### Comorbidities and medical history



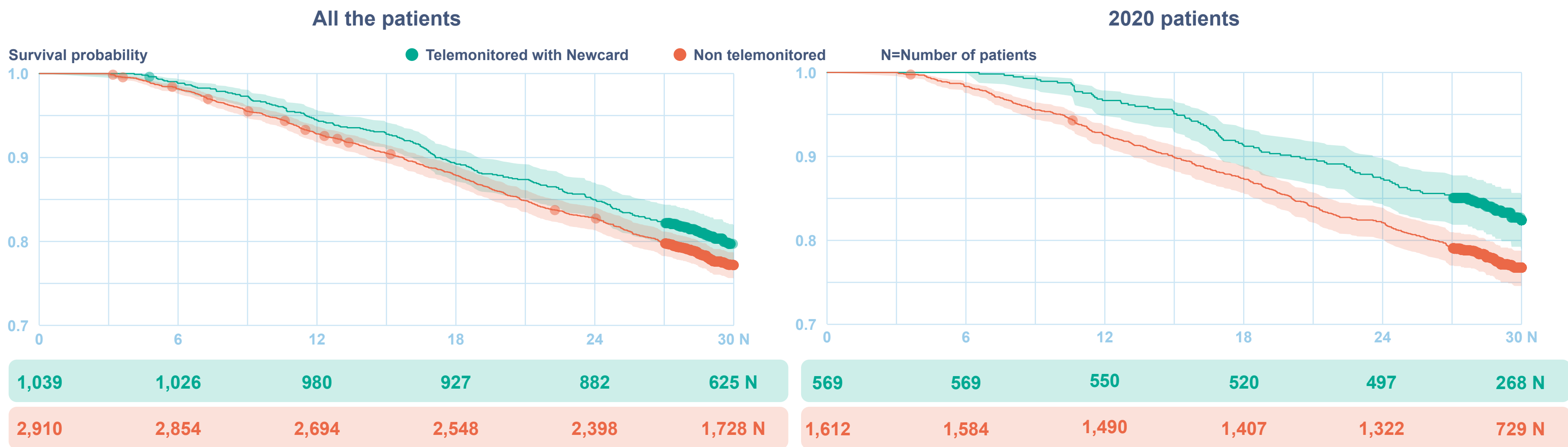
### Treatments history



### Matching (standardized differences)



### Survival



### Arrival through emergency

Variable	Number of patients with the event		Relative risk (95% CI)	p-value
Arrival through emergency	646	1,844		0.4929
Number of emergency arrivals followed by a hospitalization	557	1,587		0.6064
Number of emergency arrivals not followed by a hospitalization	259	861		0.0043
Variable	Average number of emergency arrivals (95% CI)		Relative risk (95% CI)	p-value
Number of emergency arrivals	0.0028 [0.0026 ; 0.0030]	0.0030 [0.0029 ; 0.0032]		0.0415
Number of emergency arrivals followed by a hospitalization	0.0024 [0.0023 ; 0.0026]	0.0025 [0.0024 ; 0.0026]		0.8882
Number of emergency arrivals not followed by a hospitalization	0.0015 [0.0014 ; 0.0017]	0.0018 [0.0017 ; 0.0019]		0.0294

### Cost

Cost items	Mean cost (�) at 12 month-follow-up (95% CI)	Relative risk (95% CI)	p-value
	TM Newcard, N = 1,039	Non TM, N = 2,910	
Total	1,345.50 [1,272.00 ; 1,423.20]	1,141.00 [1,103.30 ; 1,179.90]	<.0001
Outpatient consultations	46.23 [44.78 ; 47.73]	26.40 [25.89 ; 26.91]	<.0001
Cardiologist consultations	19.59 [18.86 ; 20.35]	6.24 [6.00 ; 6.48]	<.0001
General practitioner consultations	20.52 [19.88 ; 21.19]	18.23 [17.88 ; 18.58]	<.0001
Hospital consultations	30.23 [28.22 ; 32.38]	28.41 [27.26 ; 29.60]	0.1261
Drugs	251.79 [240.69 ; 263.41]	173.62 [168.99 ; 178.38]	<.0001
Biological exams	32.23 [30.87 ; 33.66]	23.78 [23.16 ; 24.41]	<.0001
Medical imaging and procedures	43.88 [41.26 ; 46.67]	38.81 [37.34 ; 40.34]	0.0009
Medical devices	120.29 [111.58 ; 129.69]	67.07 [63.84 ; 70.46]	<.0001
Hospitalizations	931.30 [853.41 ; 1016.3]	998.57 [944.61 ; 1,055.6]	0.1845
Transportations	69.91 [64.01 ; 76.36]	66.65 [63.01 ; 70.51]	0.3681
Paramedics	88.06 [79.30 ; 97.79]	83.36 [78.08 ; 88.99]	0.3810