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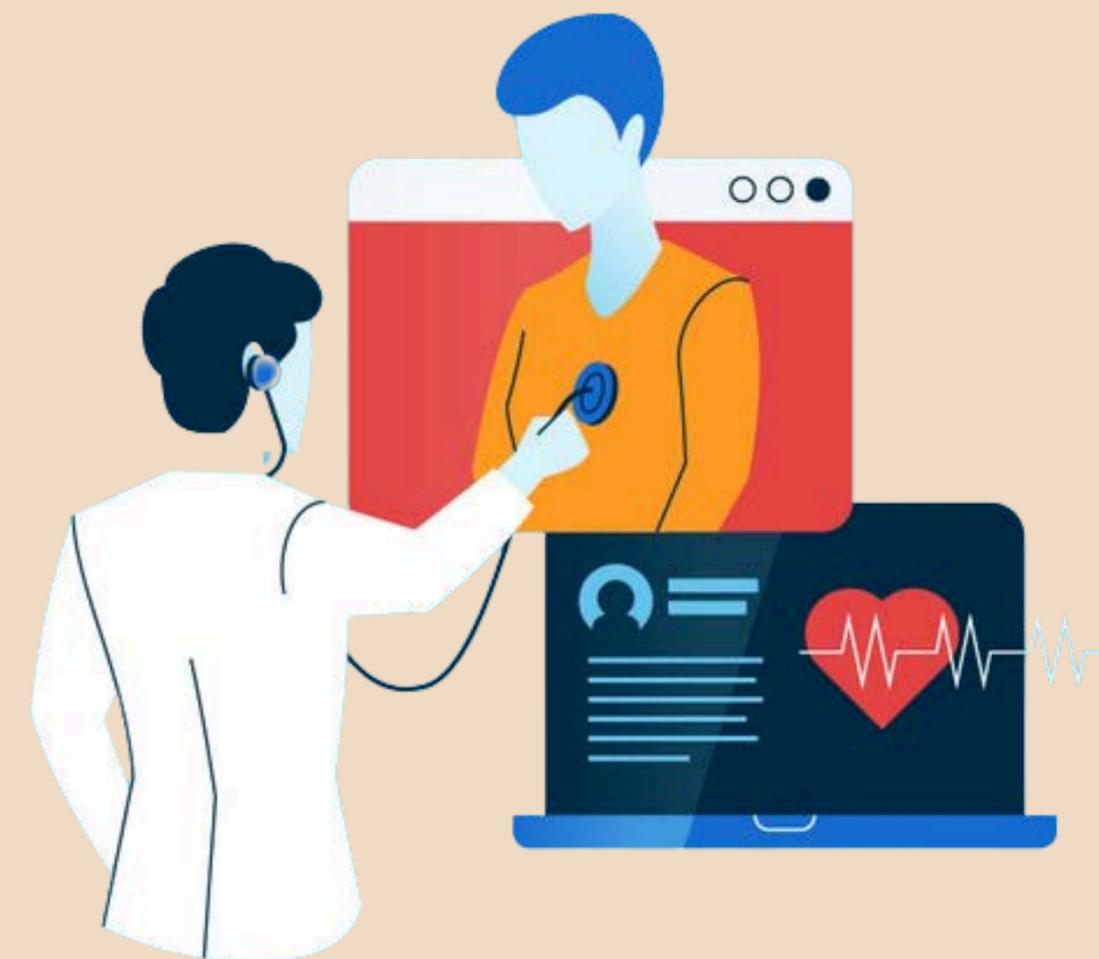

EUHEA
CONFERENCE 2024

The Impact of Telemedicine on The Management of Chronic Conditions in Italy

Diletta Migliaccio^(a), Lucia Leporatti^(a), Marcello Montefiori^(a),
Paolo Petralia^(b), Cristina Ulivi^(b)

^(a) *Department of Economics, University of Genoa, Italy*

^(b) *ASL 4 - Liguria, Italy*

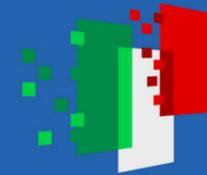




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Introduction



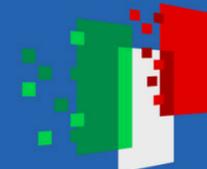
- Health as a primary good
- Inequalities from various factors
- The innovative role of telemedicine
- Empirical evidences are conflicting:
 - Lower utilization and a decrease in costs (Walter et al., 2023)
 - Increase of lower quality visits (Dahlgren et al., 2024)



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Objective

The research aims to determine whether telemedicine:

- **Replaces or supplements traditional visits**
- **Changes resource usage**

Relevance of the case of study:

- Geographical conformation
- Demographic setting (Eurostat, 2020)



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References and Italian Context

Telemedicine:

- Bernstein et al. (2010); Aberer et al. (2021)
- Zeltzer et al. (2023); Colbert et al. (2020)

Telemonitoring:

- Gruska et al. (2020); Miranda et al. (2023)
- Hanley et al. (2018); Vasquez-Cevallos et al. (2018)

Italian Reference Law





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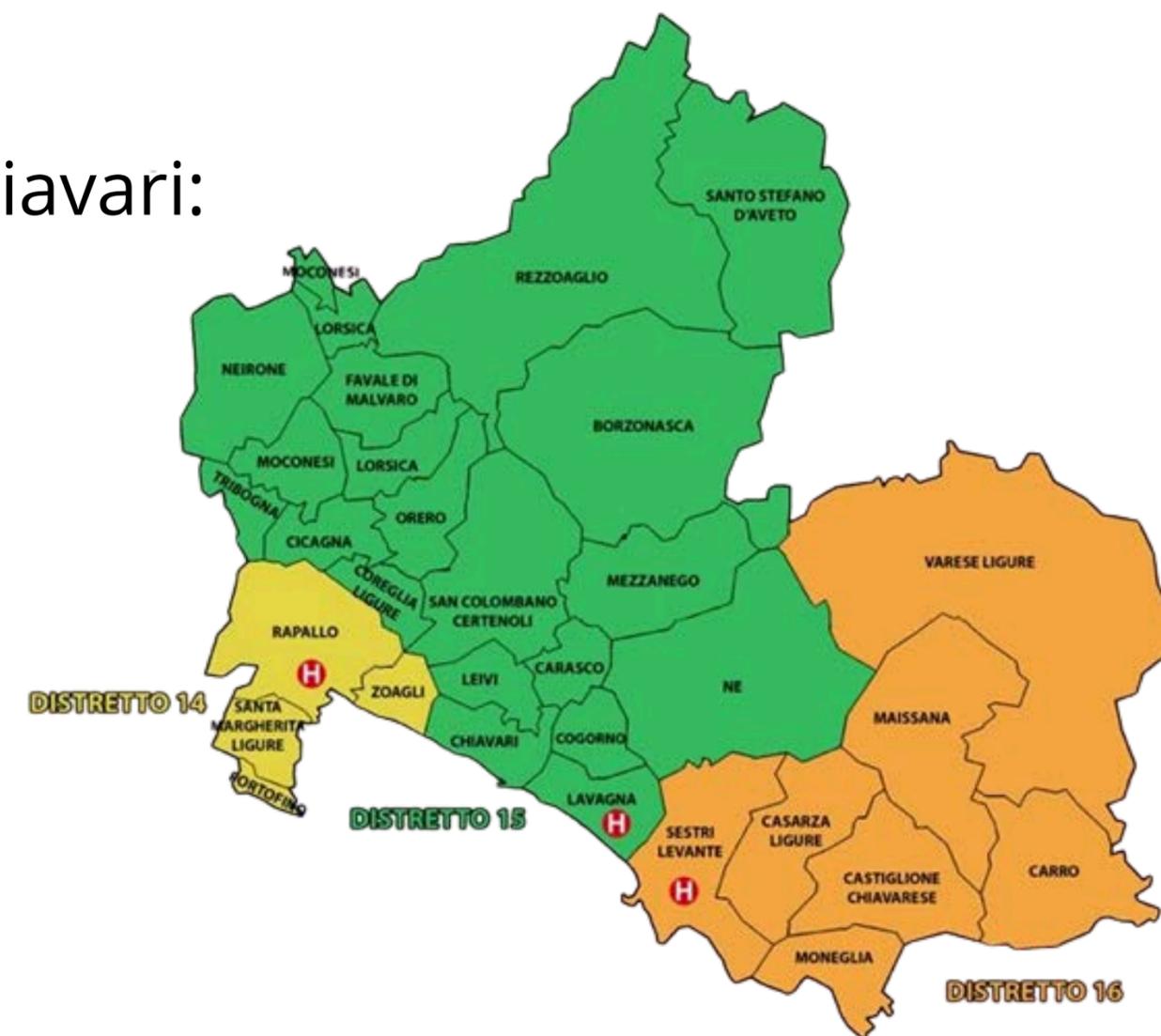
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Dataset

- Period covered: 2019-2022
- Healthcare administrative data from ASL4 - Chiavari:
 - Emergency Room Admissions
 - Pharmaceutical Records
 - Patient Demographics
 - Exemption Registry by Pathology
 - Diagnostic and Therapeutic Services
 - Hospital Discharge Records

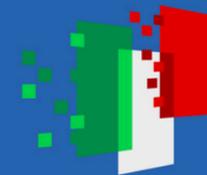




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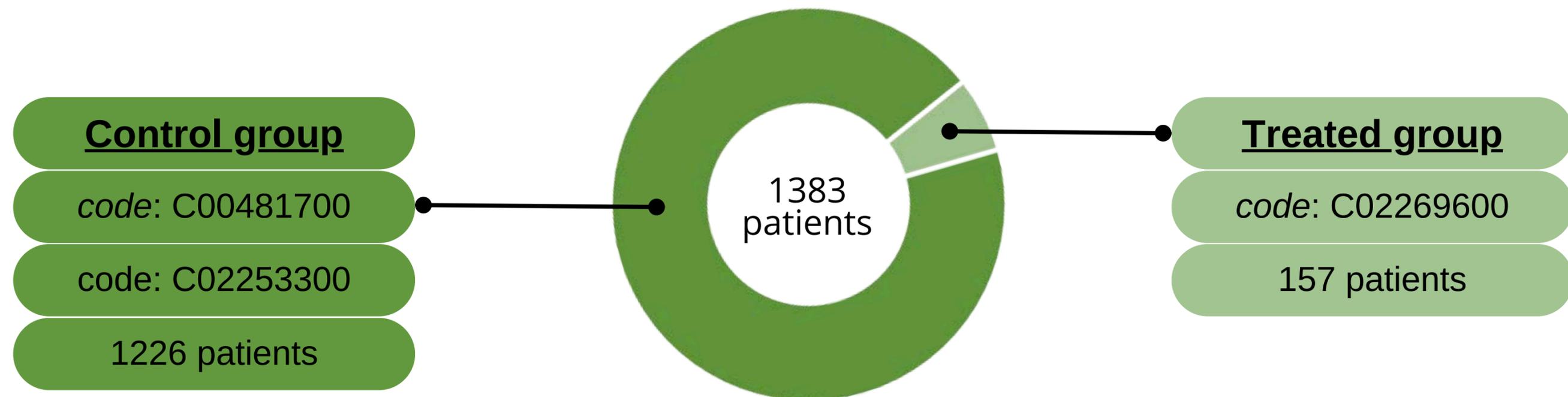
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Inclusion Criteria

- Residence in the ASL4 territory
- Presence of heart disease: having received hospitalisation or visits for pacemakers, defibrillators, loop recorders, or CCM

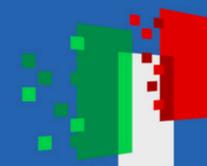




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Empirical Strategy

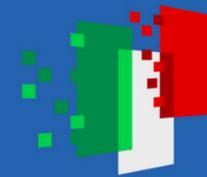
- Panel dataset, annual and monthly
- Outcome variables: proxies for resource consumption
 - Number of ED visits
 - Number of hospitalizations
 - Number of specialist visits
 - Number of cardiac specialist visits
- Independent variables:
 - Demographic characteristics
 - Health status characteristics
 - Temporal variables



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Econometric Approach

- Prevalence of non-continuous variables
- Peak over zeros
- Tobit model with random effects

$$y_{it}^* = \beta_0 + \beta_1 X_{it} + \delta Exposure_{it} + \lambda(Exposure_{it} * time_t) + time_t + \alpha_i + u_{it}$$

- Data censoring
- Heterogeneity not observed between individuals



Results and Discussion

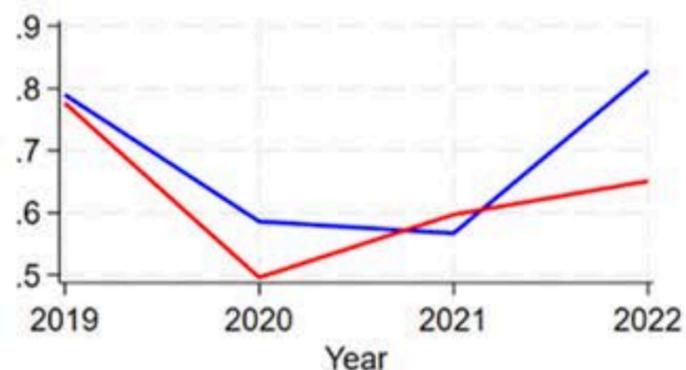
- Descriptive statistics

Variables	Control Group					Treated Group				
	Mean	Std. Dev	%	Min	Max	Mean	Std. Dev	%	Min	Max
Demographic characteristics										
Age group:										
• Age group 0-45			0,90%					3,82%		
• Age group 46-65			6,36%					23,57%		
• Age group 65+			92,74%					72,61%		
Gender:										
• Female			40,21%					33,12%		
• Male			59,79%					66,88%		
Health status characteristics										
Number of exemptions	1,234	1,221	.	0	7	1,397	1,180	.	0	5
Number of drugs purchased	5,972	4,143	.	0	30	6,050	3,916	.	0	19
Charlson Comorbidity Index	1,585	2,190	.	0	15	1,453	2,180	.	0	15

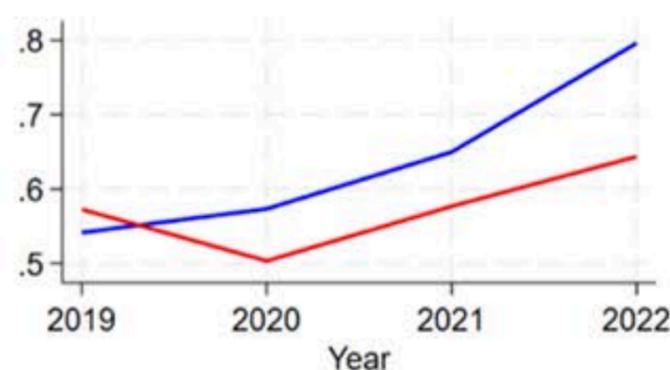


Results and Discussion

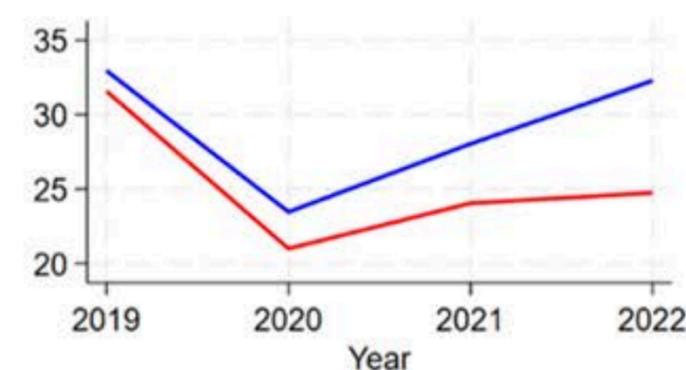
- Descriptive statistics



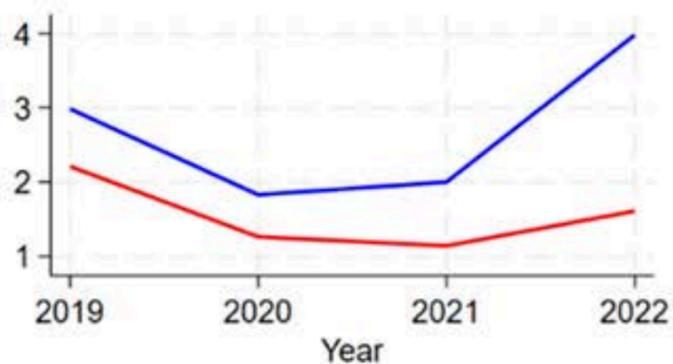
a) Average number of ED visits



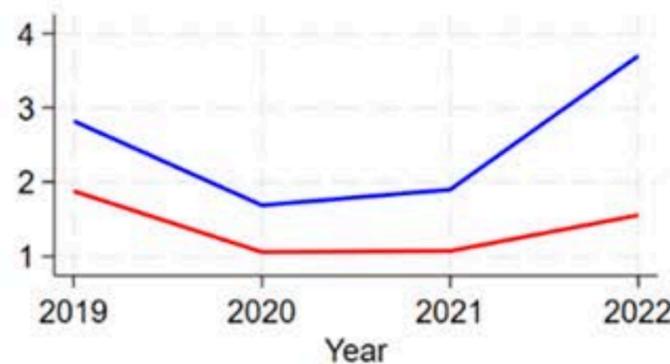
b) Average number of hospitalizations



c) Average number of specialistic visits



d) Average number of cardiology specialist visits



e) Average number of cardiology specialist visits, by discipline code

— Treated Group
— Control Group



Results and Discussion

- Margins of Tobit regression per year

Variables	Number of ED visits	Number of hospitalizations	Number of specialistic visits	Number of cardiology specialist visits	Number of cardiology specialist visits, by discipline code
Exposure	0.020** (0.008)	-0.008 (0.007)	0.386** (0.185)	0.239*** (0.014)	0.216*** (0.014)
Demographic characteristics	YES	YES	YES	YES	YES
Health status characteristics	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES
Observations	50,507	50,507	50,507	50,507	50,507
Number of patients	1,200	1,200	1,200	1,200	1,200

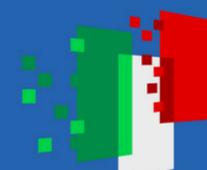
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1



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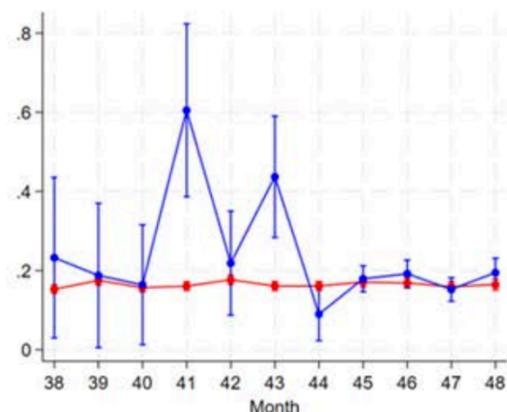
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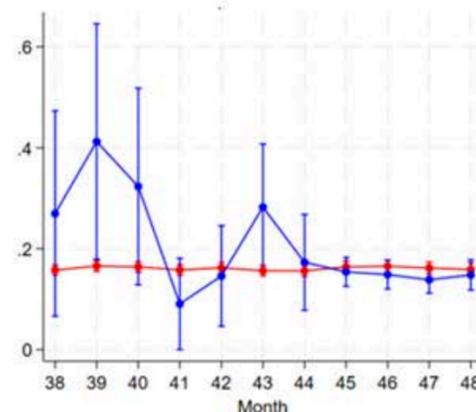
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Results and Discussion

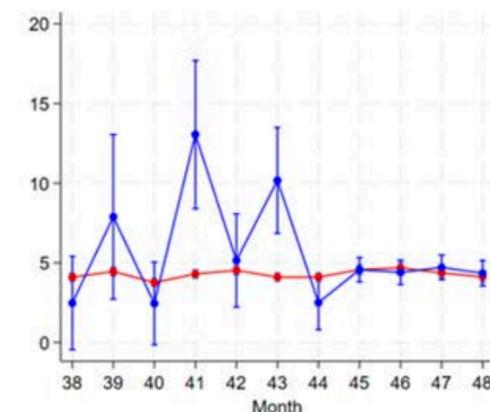
- Margins of Tobit regression per month



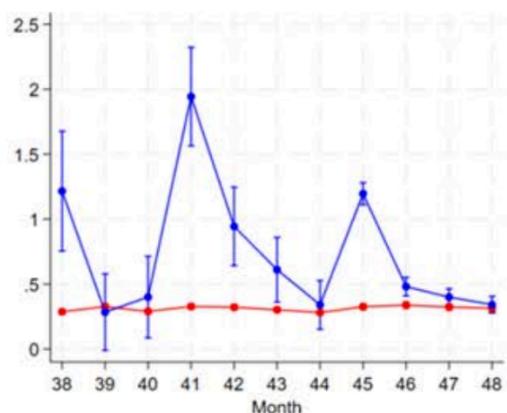
a) Linear prediction of ED visits



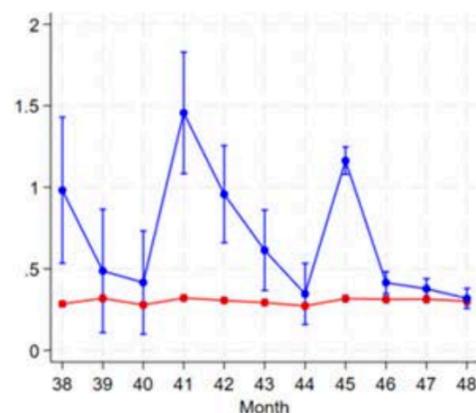
b) Linear prediction of hospitalizations



c) Linear prediction of specialistic visits



d) Linear prediction of cardiology
specialist visits



e) Linear prediction of cardiology
specialist visits, by discipline code

● Control Group
● Treated Group



Robustness check

- Margins of Poisson regression per year

Variables	Number of ED visits	Number of hospitalizations	Number of specialistic visits	Number of cardiology specialist visits	Number of cardiology specialist visits, by discipline code
Exposure	0.024** (0.010)	-0.008 (0.012)	0.449*** (0.067)	0.148*** (0.011)	0.125*** (0.010)
Demographic characteristics	YES	YES	YES	YES	YES
Health status characteristics	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES
Observations	50,507	50,507	50,507	50,507	50,507
Number of patients	1,200	1,200	1,200	1,200	1,200

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1



Heterogeneity checks

- Tobit margins results per year

Outcome	Exposure- Baseline annual model	Age			Gender		Charlson	
		0-45	46-65	>65	Female	Male	Charlson 0	Charlson >0
Number of ED visits	0.020** (0.008)	0.049 (0.038)	0.008 (0.014)	0.029*** (0.009)	0.046*** (0.015)	0.009 (0.009)	0.033*** (0.011)	0.009 (0.011)
Number of hospitalizations	-0.008 (0.007)	-0.036 (0.040)	-0.021 (0.013)	0.005 (0.009)	-0.003 (0.013)	-0.010 (0.009)	0.000 (0.007)	-0.017 (0.011)
Number of specialistic visits	0.386** (0.185)	0.570 (0.811)	-0.042 (0.313)	0.545** (0.224)	0.413 (0.346)	0.371* (0.220)	0.238 (0.277)	0.430* (0.249)
Number of cardiology specialist visits	0.239*** (0.014)	0.223** (0.095)	0.305*** (0.037)	0.215*** (0.016)	0.235*** (0.024)	0.240*** (0.018)	0.256*** (0.022)	0.227*** (0.019)
Number of cardiology specialist visits, by discipline code	0.216*** (0.014)	0.231** (0.102)	0.285*** (0.036)	0.186*** (0.016)	0.204*** (0.023)	0.219*** (0.017)	0.240*** (0.022)	0.199*** (0.018)

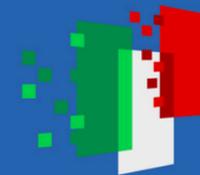
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Conclusions and Limitations

Results

- Greater use of NHS resources
- Complementary rather than substitute service
- Unmet demand for care

Limitations

- Only one year of implementation
- Groups are not perfectly balanced
- Lack of information such as deaths or transfers
- Very large age groups



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Thanks for the attention!

For further information:
Diletta Migliaccio
diletta.migliaccio@edu.unige.it

