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PATIENT MOBILITY FOR CARDIAC IMPLANTABLE DEVICES AMONG ITALIAN REGIONS

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Introduction: Many patients who need the implant of a Cardiac Implantable Electronic Devices (CIED) seek care in a region other than that where they live. As a consequence, costs for the residence region may increase. Currently, this phenomenon has not been thoroughly described. In 2019, a project coordinated by the National Health Institute and involving the Italian Association of Arrhythmology and Cardiostimulation (AIAC) started to implement the Italian National Registry of Defibrillators and Pacemakers (RIDEP) as part of the Italian National Implantable Prosthesis Registry (RIPI) established by law in 2017 (DPCM 3/3/2017).

Aim of this study is to describe the interregional mobility for these procedures performed in Italy.

Materials and Methods: In order to measure the interregional mobility, the Hospital Discharge Data (HDD) database was queried from 2001 to 2017 using ICD-9 procedure codes, single and combined, selected by cardiologists, relating to pacemakers (PM) and implantable cardioverter-defibrillators (ICD) procedures and arranged into 16 groups of procedures. Two indices for active and passive mobility among Italian regions were calculated, representing attractive (AI) and escape (EI) indices for a region.

Results: In 17 years, the total number of procedures steadily increased. ICD procedures raised from 3,141 in 2001 to 24,255 in 2017 (Table 1). Analysis of interregional mobility highlights that the northern regions Lombardy and Emilia Romagna have the highest attractive index, while the highest escape index is recorded in the southern regions Calabria and Campania (Table 2).

Conclusion: The patients' flow from the southern to the northern Italian regions is more evident for seeking ICD procedures than PM procedures. The results of this investigation might help the design of the national registry data collection. The national registry allows a thorough traceability of all the implanted patients and the related devices thus supporting safety and efficient governance.

Procedure	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
PM	48,028	50,117	51,344	54,119	56,631	57,941	60,944	61,452	62,451	63,329	63,348	63,498	64,795	65,840	66,053	66,837	65,923
ICD	3,141	4,458	5,995	7,554	11,230	12,246	14,084	16,141	17,630	19,459	20,520	20,774	21,870	22,688	23,540	25,116	24,255
TOTAL	51,169	54,575	57,339	61,673	67,861	70,187	75,028	77,593	80,081	82,788	83,868	84,272	86,665	88,528	89,590	91,953	90,178

Table 1: Number of PM and ICD procedures performed in Italy from 2001 to 2017
(source: Italian Hospital Discharge Database 2001-2017)

Region	PM						ICD					
	2001		2009		2017		2001		2009		2017	
	AI	EI	AI	EI	AI	EI	AI	EI	AI	EI	AI	EI
Piedmont	4.25	3.79	3.31	3.17	3.17	3.82	9.27	11.76	3.79	11.19	3.62	7.78
Valle D'Aosta	8.62	19.70	7.94	9.38	12.21	18.16	0	100.00	9.09	37.59	0	22.22
Lombardy	5.89	2.04	4.90	1.80	6.31	1.86	24.29	1.92	15.54	1.39	16.32	2.38
P.A. Bolzano	1.82	4.93	3.14	3.49	3.17	5.86	0	12.50	2.08	12.96	4.29	4.29
P.A. Trento	8.35	9.27	6.21	7.96	4.94	6.01	11.36	4.88	4.69	17.57	10.81	5.71
Veneto	2.88	3.96	2.70	2.47	2.99	2.16	4.44	3.37	5.28	4.86	4.06	6.24
Friuli Venezia Giulia	5.69	1.67	4.85	2.26	2.31	2.84	5.56	1.92	7.39	2.06	6.74	1.97
Liguria	5.68	7.81	5.93	8.85	6.01	9.65	7.50	14.94	6.85	16.98	4.81	12.42
Emilia Romagna	5.92	3.80	5.96	3.66	7.74	4.73	8.91	7.84	8.79	10.37	13.04	7.02
Tuscany	4.61	1.90	4.34	1.69	4.04	1.95	10.65	10.65	8.72	3.13	6.67	4.86
Umbria	5.83	8.96	6.64	6.73	7.66	7.37	11.76	40.00	14.96	19.40	10.37	19.23
Marche	4.12	5.29	3.83	5.95	4.16	6.78	11.49	11.49	-94.09	11.38	4.80	13.33
Lazio	4.69	3.46	4.30	3.14	3.27	3.82	9.29	7.23	6.13	5.77	4.61	5.41
Abruzzo	4.92	5.72	5.21	7.10	4.93	6.79	9.52	24.00	5.92	14.63	8.12	13.35
Molise	17.65	19.11	16.99	10.83	18.18	18.97	25.80	75.00	21.25	25.89	13.68	21.15
Campania	1.85	6.98	1.56	5.24	1.63	4.90	4.52	27.09	1.44	14.22	3.07	5.48
Apuilia	3.32	4.93	1.87	3.98	2.64	4.37	7.72	9.06	5.65	5.77	3.49	6.19
Basilicata	12.98	15.12	8.29	10.54	12.86	10.50	12.50	61.11	6.84	12.38	9.34	16.24
Calabria	1.24	13.36	1.95	13.59	1.04	12.64	2.44	50.62	1.71	31.67	1.42	22.49
Sicily	0.62	3.47	0.66	2.40	0.84	2.35	1.27	15.68	1.42	8.82	1.00	5.43
Sardinia	0.65	2.66	0	2.96	1.68	2.27	0	6.25	0	11.56	0.54	4.20

Table 2: attractive and escape indices for PM and ICD procedures for Italian regions (years 2001, 2009 and 2017)