

Forecasting the cost of illness of RA in Italy: a simulation model

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Agenda

- Background
- Objectives
- Methods
- Results

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General background

- Rheumatic diseases are 100 of different types and with different symptoms
- 10% of the population worldwide is suffering for rheumatic diseases and the chronic evolution probability is variable from 20 to 80%
- In the USA about 40 millions of people are affected
- Rheumatic diseases can be inflammatory or not
- Inflammatory diseases end up in chronic conditions with non reversible inabilities if not treated promptly
- Rheumatoid Arthritis (RA) affects 412.000 people in Italy
- Several studies investigated the costs of RA although never based on a model taking into account the natural history of the disease

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Objectives

- Implementing a natural history of disease based model to forecast the economic impact of RA over time in Italy
- Analysing differences among Italian regions
- Analysing differences between working categories

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RA epidemiology

- Prevalence: 411.262
- Incidence: 6/10.000 inhabitants
- 35-50 age of first symptoms
- 4 women each man affected

RA: natural history of disease

Steinbrocker classification

Stage 1: patient can perform her/his daily activities

Stage 2: daily activities moderately compromised

Stage 3: daily activities compromised

Stage 4: patient is confined to bed

RA: Study design

- Modelling natural history of disease
 - Markov model based on clinical and epidemiological data
 - Individual transition from stage 1 to stage 4 (assumed yearly)
- Estimation of direct and indirect costs
 - Economic data
- Forecasting results over time
 - Macroeconomic data

RA: data sources

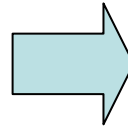
- Epidemiological data
 - SDO 2005
 - ANMAR, FIR, CENSIS (2008)
- Clinical data
 - Leardini et al. (2002)
- Resource uptake
 - Leardini et al (2002)
 - SDO 2005
 - ISTAT (2006); loss in work productivity
- Macroeconomic data
 - ISTAT (2006)
 - OECD (2009)
 - Banca d'Italia (2008)

Prevalence

AR (ICD-9 CM Diagnostic categories (714 -714.9))

Patients admitted

Region	Ord.	DH.	Total
Piemonte	623	347	970
V. Aosta	6	7	13
Lombardia	1.615	4.399	6.014
P.A.Bolzano	102	119	221
P.A.Trento	141	75	216
Veneto	739	289	1.028
Friuli V. Giulia	127	151	278
Liguria	527	1.143	1.670
Emilia Romagna	708	744	1.452
Toscana	705	780	1.485
Umbria	69	107	176
Marche	366	59	425
Lazio	1.498	1.752	3.250
Abruzzo	473	378	851
Molise	68	74	142
Campania	644	1.300	1.944
Puglia	660	302	962
Basilicata	90	51	141
Calabria	606	399	1.005
Sicilia	674	1.230	1.904
Sardegna	659	322	981
Italia	11.100	14.028	25.128



Region	Prevalence	Prevalence per 100 ab
Piemonte	27.969	0,64
V. Aosta	327	0,26
Lombardia	72.356	0,76
P.A.Bolzano	3.808	0,79
P.A.Trento	4.176	0,83
Veneto	20.320	0,43
Friuli V. Giulia	7.269	0,60
Liguria	18.570	1,15
Emilia Romagna	23.790	0,57
Toscana	22.737	0,63
Umbria	4.291	0,49
Marche	7.647	0,50
Lazio	49.668	0,94
Abruzzo	12.928	0,99
Molise	3.211	1,00
Campania	38.026	0,66
Puglia	19.730	0,48
Basilicata	3.834	0,65
Calabria	18.587	0,93
Sicilia	40.077	0,80
Sardegna	11.941	0,72
Italia	411.262	0,70

Other data (Censis, Anmar, SIR, 2008)

Geographic distribution of gender					
	NW	NE	Center	South	ITALIA
M	0,287	0,286	0,25	0,273	0,274
F	0,713	0,714	0,75	0,727	0,726

Working category	M (%)	F (%)	TOTAL (%)
Housewife	0	0,516	0,378
Farmer	0,017	0,004	0,008
Worker in industry	0,102	0,021	0,043
Teacher	0,136	0,164	0,156
Manager	0,028	0,015	0,019
Merchant	0,079	0,017	0,034
Business	0,017	0,002	0,006
Retired	0,58	0,237	0,333
Unemployed	0,017	0,017	0,017
Other	0,01	0,004	0,003
Student	0,005	0,003	0,003

Clinical data from Leardini et al (2002)

- 200 patients
- Average duration of disease for patients:
 - in Stage 1 (24,5% of cases): 5,6 (+/- 6,1) $p > 0,0005$
 - in Stage 2 (26,5%): 9 (+/- 7,2) $p > 0,000$
 - in Stage 3 (27%): 13,4 (+/- 8) $p > 0,0000$
 - in Stage 4 (22%): 20,8 (+/- 9) $p > 0,000$
- Transition probabilities were estimated assuming a normal distribution for duration of every stage

Resources uptake (Leardini et al. 2002)

Working Days lost

Stage	Days
I	21
II	48
III	83
IV	77

Average cost for patient
admitted: 95 euro

Cost DH: 58,85 euro

	%	Cost
Retired from work		
I	4%	€ 744,50
II	20%	€ 3.894,70
III	11%	€ 2.278,20
IV	16%	€ 3.042,80
Informal care		
I	14%	€ 739,30
II	45%	€ 3.457,40
III	57%	€ 5.985,50
IV	82%	€ 7.159,00
Caregiver		
I	4%	€ 88,30
II	15%	€ 149,20
III	31%	€ 1.167,30
IV	27%	€ 1.033,00

Costs per working hour (€)

(ISTAT, 2006)

Piemonte	19,46	Puglia	15,89
Val d'Aosta	19,46	Basilicata	15,89
Liguria	19,46	Calabria	15,89
Lombardia	19,94	Sicilia	18,91
Veneto	17,25	Sardegna	16,54
Trentino	17,25	ITALY	17,748
Friuli	17,25		
Emilia Romagna	18,89		
Toscana	17,1		
Marche	17,1		
Umbria	17,1		
Lazio	21,8		
Abruzzo	16,34		
Molise	16,34		
Campania	17,1		

Direct costs (Leardini et al. 2002)

	Stage 1	Stage 2	Stage 3	Stage 4
Diagnostics	€ 61,40	€ 79,00	€ 105,30	€ 114,60
Instrumental exams	€ 55,80	€ 88,80	€ 77,00	€ 73,30
Laboratory	€ 130,60	€ 162,60	€ 177,60	€ 206,50
Phisiotherapy	€ 43,40	€ 65,60	€ 89,80	€ 157,00
Drugs	€ 558,10	€ 1.074,30	€ 1.051,10	€ 1.102,70
Hospital admiss	€ 399,60	€ 751,70	€ 1.466,70	€ 1.968,50
Rehabilitation	€ 106,40	€ 94,00	€ -	€ -
Day hospital	€ 60,90	€ 101,70	€ 59,40	€ 13,40
Transports	€ 113,10	€ 110,50	€ 247,80	€ 134,70
Home care	€ 50,10	€ 222,00	€ 840,00	€ 1.689,70
Other	€ 64,00	€ 160,00	€ 121,80	€ 236,40
Total	€ 1.643,40	€ 2.910,20	€ 4.236,50	€ 5.696,80

Macroeconomic data

Inflation(ISTAT): 2%

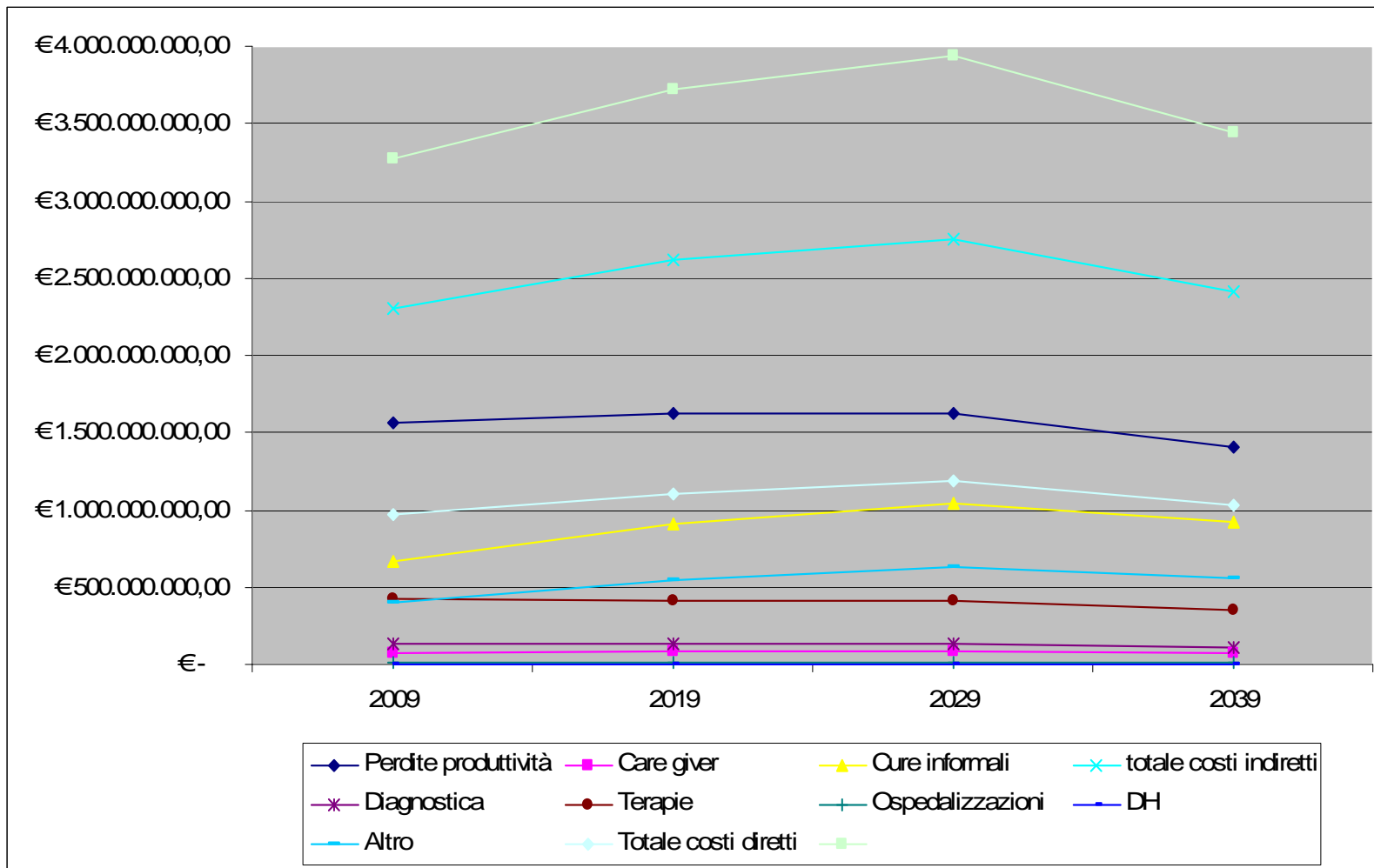
Discounting: 5%

Unemployment: 6,1% (M); 9,9% (F) also characterized on a regional base

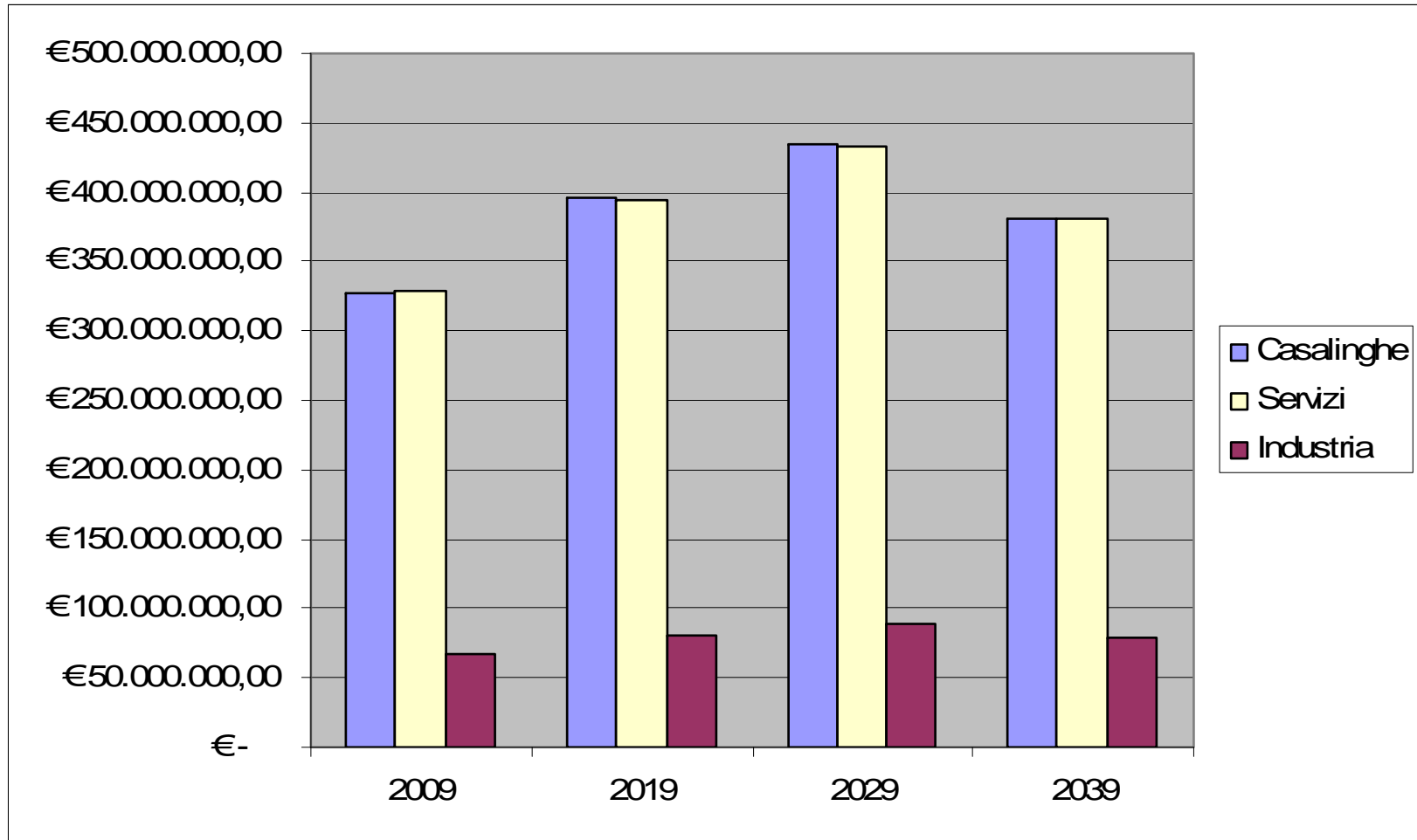
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Indirect costs	2009	2019	2029	2039
Productivity loss	€ 1.563.059.136,56	€ 1.625.076.025,46	€ 1.624.038.936,88	€ 1.406.263.735,01
Care giver	€ 69.113.195,99	€ 88.330.016,93	€ 88.129.173,08	€ 76.782.147,11
Informal care	€ 666.008.399,03	€ 903.965.442,05	€ 1.043.972.100,12	€ 923.148.042,90
<i>Total indirect costs</i>	€ 2.298.180.731,59	€ 2.617.371.484,44	€ 2.756.140.210,08	€ 2.406.193.925,03
Direct costs				
Diagnostics	€ 136.624.526,50	€ 127.894.731,97	€ 128.179.792,06	€ 110.594.526,92
Treatments	€ 425.499.067,92	€ 406.799.340,00	€ 407.958.737,07	€ 352.315.626,71
Hospitalizations	€ 10.436.415,00	€ 13.520.251,57	€ 15.176.337,57	€ 13.370.863,76
DH	€ 4.238.120,30	€ 4.431.868,59	€ 3.930.754,09	€ 3.358.910,67
Other	€ 397.338.519,36	€ 550.746.585,08	€ 626.800.252,26	€ 553.742.930,13
<i>Total direct costs</i>	€ 974.136.649,08	€ 1.103.392.777,22	€ 1.182.045.873,04	€ 1.033.382.858,19
TOTAL	€ 3.272.317.380,66	€ 3.720.764.261,66	€ 3.938.186.083,12	€ 3.439.576.783,22



RA: costs for working categories



Conclusion

- RA costs are variable between **3,3 bln and 4 bln of euros** (expected peak 2029).
- Total costs up to 2039 would be **114 bln of euros**
- Regions with higher costs
 - Lombardy (13,25% of total national costs);
 - Lazio (9,4%);
 - Sicily (7,3%)
- Productivity losses sustained by the national insurance (INPS) for RA would vary between **0,67% (2009) and 0,7% (2029) of the total social security expenditure**
- Direct costs that SSN would be charged with would be **1% of total health expenditure** (2009-2039)

- Recommendations
 - Establish early arthritis clinic (EAC) within LHUs in Italy
 - Appropriate and timeliness use of new biologic drugs
 - Launch an integrated welfare policy (Health, Labour, Social Services)