The impact of asthma severity on the total cost of asthma patients in the Valencia region

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Introduction

Asthma is a chronic disease that affects more than 5% of the adult population and represents a high socioeconomic resource consumption in industrialized countries. These costs are expected to increase in the coming years as a result of factors such as the increased prevalence and life expectancy of the population and the emergence of new therapeutic modalities.[1,2]

There are limited studies evaluating costs of asthma in Spain. The AsmaCost study (2009) estimated the economic impact of asthma in Spain in €1726 per patient/year from a societal perspective, and in €1533 per patient/year from the perspective of the National Health Service. Medications (32.1%), diagnostic tests (27.3%), and hospitalization (15.2%) were the largest portions of spending.[3]

Objective

To determine the impact of asthma severity on the total cost of asthma treatment for patients in the Valencia region public-health system.

Methods

This open-label, multicentre, observational study involved retrospective collection of clinical and socio-demographic data (NCT01114906). Healthcare resource use during the previous 12 months was assessed from patients' clinical histories, using records from the primary care data base (SIA+GIA) and data collected by specialists. Population and prevalence data were used to establish the number of participating centres and the number of patients recruited in the three provinces of the Valencia region (conditioned randomised selection). Local source costs were updated to 2012 prices. Outpatients (primary care and specialist) of both genders over 15 years diagnosed with asthma in the Ambulatory Electronic Clinical History (SIA+GIA) were included. Patients who had participated in a clinical trial, within the last twelve months, were excluded.

Results

Sociodemographic and clinical characteristics

▶ 261 patients were recruited from Allergology and Pulmonology Units of four hospitals in Alicante, Castellón and Valencia.

Table 1. Distribution of patients according to the socio-demographic and clinical characteristics.

Sociodemographic characteristics	N	%
Patient's nr.: n=261		
16 – 65 years	214	82
> 65 years	47	18
Mean age, years±SD	47.2±18.3	
Gender, n=261		
Women	182	70
Men	79	30
Smoking habit, n=259		
Yes	28	11
No	196	76
Former Smoker	35	13
Exposure to irritating agents at work, n=260		
Yes	35	13
No	225	87
Clinical Characteristics	N	%
Asthma severity, n=259		
Intermittent	55	21
Mild persistent	83	32
Moderate persistent	99	38
Severe persistent	22	9
Time since diagnosis, n=258		
1-10 years	176	68
11-20 years	57	22
> 20 years	25	10
Asthma-related comorbidities, n=261*		
Seasonal rhinitis	73	28
Perennial rhinitis	73	28
Nasal polyposis	30	11
Other comorbidities not related to asthma, n=260		
Yes	250	96
No	10	4
Therapeutic compliance, n=259		
Good achiever	223	86
Compliance ≥ 50%	31	12
Compliance < 50%	5	2

Direct medical resources use

➢ Data of healthcare direct resources use is described in Table 2 and Figures 1.A and 1.B.

Table 2. Mean and unit costs of direct resource use according to asthma severity.

	Mean±SD	Intermittent asthma mean±SD	Mild persistent asthma mean±SD	Moderate persistent asthma mean±SD	Severe persistent asthma mean±SD	Unit cost (€)	p-value
Direct medical sources							
Diagnostic tests carried out (mean of tests per patient/year)							
Forced spirometry; n=167 (64.0%)	1.57±1.89	1.30±0.46	1.31±0.70	1.51±0.74	3.19±5.65	26.05	0.003
Forced spirometry with bronchodilator test; n=98 (37.5%)	1.29±0.57	1.25±0.44	1.27±0.62	2.20±0.84	41.15	0.028	
Exhaled nitric oxide; n=39 (14.9%)	1.10±0.44	0.88±0.35	1.00±0.00	1.11±0.32	2.00±1.00	17.06	0.006
Chest X-ray; n=66 (25.3%)	1.19±0.56	1.12±0.35	1.14±0.35	1.17±0.54	1.50±1.07	25.40	0.445
Hemogram; n=51 (19.5%)	1.10±0.36	1.00±0.00	1.07±0.26	1.04±0.21	1.33±0.71	6.65	0.506
Biochemistry; n=46 (17.6%)	1.11±0.38	1.00±0.00	1.08±0.28	1.05±0.22	1.33±0.71	1.97	0.253
Prick test; n=61 (23.4%)	1.03±0.18	1.00±0.00	1.08±0.27	1.00±0.00	1.50±1.00	82.10	0.410
Total IgE; n=79 (30.3%)	1.06±0.29	1.00±0.00	1.04±0.21	1.06±0.25	1.18±0.60	11.47	0.475
Specific IgE; n=57 (21.8%)	1.07±0.32	1.00±0.00	1.06±0.24	1.04±0.20	1.40±0.89	29.96	0.398
Pharmacological treatment of asthma (patients distribution)							
Salbutamol; n=159 (60.9%)	--	30 (54.5%)	41 (49.4%)	71 (71.7%)	19 (86.4%)	0.05	--
Terbutaline; n=27 (10.3%)	--	6 (10.9%)	5 (6.0%)	14 (14.1%)	2 (9.1%)	0.03	--
Salmeterol; n=8 (3.1%)	--	0 (0.0%)	2 (2.4%)	5 (5.1%)	1 (4.5%)	0.35	--
Formoterol; n=10 (3.8%)	--	0 (0.0%)	4 (4.8%)	5 (5.1%)	1 (4.5%)	0.43	--
Ipratropium bromide; n=22 (8.4%)	--	0 (0.0%)	4 (4.8%)	13 (13.1%)	5 (22.7%)	0.27	--
Tiotropium bromide; n=37 (14.2%)	--	2 (3.6%)	5 (6.0%)	21 (21.2%)	9 (40.9%)	1.63	--
Beclometasone; n=3 (1.1%)	--	0 (0.0%)	0 (0.0%)	3 (3.0%)	0 (0.0%)	0.08	--
Fluticasone; n=21 (8.0%)	--	1 (1.8%)	5 (6.0%)	6 (6.1%)	9 (40.9%)	0.36	--
Budesonide; n=38 (14.6%)	--	6 (10.9%)	18 (21.7%)	8 (8.1%)	5 (22.7%)	0.16	--
Budesonide/form.; 111 (42.5%)	--	22 (40.0%)	36 (43.4%)	47 (47.5%)	6 (27.3%)	0.63	--
Salmeterol/flutic.; n=105 (40.2%)	--	8 (14.5%)	24 (28.9%)	56 (56.6%)	15 (68.2%)	0.69	--
Form./Beclomet.; n=33 (12.6%)	--	1 (1.8%)	17 (20.5%)	12 (12.1%)	3 (13.6%)	0.40	--
Montelukast; n=142 (54.4%)	--	23 (41.8%)	36 (43.4%)	65 (65.7%)	18 (81.8%)	1.44	--
Omalizumab; n=24 (9.2%)	--	0 (0%)	1 (1.2%)	11 (11.1%)	12 (54.5%)	343.41	--

➢ **The consumption of direct medical resources increases with the severity of asthma** (Figure 1.A and B).

Figure 1.A and B. Visits and hospital admissions according to asthma severity.

➢ No direct non-medical resource utilization has been collected.

Indirect non-medical resources use

➢ Just 1.1% of patients (one patient with mild and two patients with moderate asthma) reported time off sick related to asthma with a mean (SD) of 57 (75.22) days (mild: 19 days; moderate: 76.5 (95.5) days).

➢ No indirect medical costs (future costs) were analysed.

Treatment effectiveness

➢ The treatment effectiveness, along the 12 months of monitoring, was evaluated by the specialists on a 0-100 scale. Four categories were established: Poor effectiveness [E ≤ 25]; Reasonable [25 < E ≤ 50]; Good [50 < E ≤ 75] and Highly [E > 75].

➢ It has been contrasted with the costs using an analysis of variance (ANOVA) to identify significant differences.

➢ There are significant differences according to the four categories in the direct resource costs and the total costs.

➢ **Costs decrease with increasing treatment effectiveness** (Table 3).

Table 3. Costs of asthma management according to treatment effectiveness by asthma type.

	Low effectiveness, mean±SD (€)	Reasonable effectiveness, mean±SD (€)	Good effectiveness, mean±SD (€)	Highly effectiveness, mean±SD (€)	p-value
Direct costs	4631.95	2305.20±1412.07	1676.35±1191.52	1181.83±896.07	<0.001
Diagnostic tests costs	38.64	196.81±285.03	99.23±86.19	88.32±78.17	0.012
Asthma pharmacological costs	3295.53	1192.50±547.39	928.92±535.84	747.37±612.88	<0.001
Comorbidities pharmacological costs	--	54.34±30.26	33.16±16.83	54.45±36.65	0.008
Exacerbations pharmacological costs	10.80	4.02±3.07	30.83±70.42	29.82±54.39	0.883
Visits costs / hospital admissions	1286.98	914.38±893.77	647.85±818.75	391.43±425.76	0.001
Indirect costs	--	--	6370.86±6909.32	703.53	0.624
Mean total cost	4631.95	2305.20±1412.07	1846.24±1903.12	1185.81±900.99	<0.001

Asthma-related cost

➢ The average (SD) cost of asthma care was €1,423 (1,337) per patient/year.

➢ The mean (SD) cost per patient with intermittent, mild, moderate and severe asthma was €780 (605), €1,030 (688), €1,747 (1,521) and €3,111 (1,829), respectively.

➢ There were significant differences in cost according to asthma severity.

➢ **Mean total costs increase as asthma severity increases** (Table 4).

Table 4. Total costs of asthma management according to asthma severity.

	Intermittent asthma mean±SD	Mild persistent asthma mean±SD	Moderate persistent asthma mean±SD	Severe persistent asthma mean±SD	p-value
Pharmacological costs of comorbidities	60.00±23.81	50.67±48.96	45.13±20.56	31.24 ±31.55	0.124
Pharmacological costs of asthma	460.30±377.82	630.54±481.15	993.36±509.97	1588.03±938.34	<0.001
Pharmacological costs exacerbations	23.96±51.68	29.83±54.68	35.48±69.14	4.95±3.98	0.619
Diagnostic testing costs	68.91±65.62	89.40±73.29	101.59±85.18	149.86±194.15	0.005
Visits/Hospital admissions costs	300.47±354.49	336.94±354.14	516.59±500.89	1371.47±1194.66	<0.001
Total cost direct resources	780.24±604.67	1011.97±611.18	1626.23±827.25	3110.93±1829.39	<0.001
Indirect costs	--	1,485.23	5980.01±7462.60	--	0.709
Average total cost	780.24±604.67	1029.86±687.94	1747.04±1520.53	3110.93±1829.39	<0.001

For all tables: only the lines with a significant difference have been marked.

Conclusions

Asthma severity and control are the main determinants of costs for patients with asthma in the Valencia region. Therapy optimization is key to achieving improved asthma management and to reduce the cost burden to the public health system.

References

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