Cost-effectiveness of biologic therapies for rheumatoid arthritis in a large public hospital in Ecuador

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Introduction

Rheumatoid arthritis (RA) is an inflammatory chronic disease with a prevalence of 0.5–1.0% worldwide (Figure 1) (1). In Latin American countries, such as Mexico and Argentina, the RA prevalence attains 0.9% and 1.6%, respectively (2). According to international reports, biologic agents are an effective option to treat RA, to improve the patient's quality of life and reduce the disease joint damage. However, these drugs are more expensive than other available treatments (1,3).

Figure 1. Prevalence of rheumatoid arthritis in the adult population of various world regions (Source: Nature Reviews Rheumatology , 2010).

Objectives

The aim of this study was to evaluate the annual cost-effectiveness of biologic agents used for the treatment of RA patients in a large public hospital, Guayaquil, Ecuador.

Methods

The analysis used a Markov chain model to determine the effectiveness of biological agents used in RA management during one year (November 2013-December 2014). Study variables were determined mainly by direct costs of disease as complementary tests, number of visits in ambulatory services, number of hospitalization days, drug administration cost and direct drug costs. Biological agents included were Etanercept (50mg/sc/weekly), Adalimumab (40mg/sc/every other week), Rituximab (1000mg/ IV- day 1 and day 15) and Tocilizumab (8mg/kg/IV every 4 weeks). Costs were based on Ecuadorian National Reference (2014-2015) and institutional costs. The effectiveness of each drug was assessed according to American College of Rheumatology (ACR) criteria and Quality Adjusted Life Years (QALYs) based on published evidence. Cost-effectiveness analysis was reported based on Incremental Cost Effectiveness Ratio (ICER). In addition, a stochastic sensitivity analysis was performed to enable decision makers to be fully aware of the range of possible eventualities.

Results

RA management direct costs of each biological therapy were Etanercept $20,456.78, Adalimumab $14,996.78, Rituximab $9,358.79 and Tocilizumab $8,400.95, each one detailed in Table 1. The most cost-effective biologic agents per patient were Adalimumab (ICER $25,856.52 per QALYs) and Etanercept (ICER $91,000.00 per QALYs). The less cost-effective therapies ordered were Tocilizumab and Rituximab (Table 2).

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Table 1. Description of Biological Therapy Direct Cost

		Etanercept	Adalimumab	Rituximab	Tocilizumab
Direct Cost	Tests and Ambulatory Visits	$ 170.31	$ 170.31	$ 170.75	$ 170.75
	Administration Drug Visit	$ 6.47	$ 6.47	$ 35.48	$ 106.44
	Drug Costs	$ 20,280.00	$ 14,820.00	$ 9,152.56	$ 8,123.76
Total		$ 20,456.78	$ 14,996.78	$ 9,358.79	$ 8,400.95

Costs in American Dollars (USD)

Table 2. Cost- Effectiveness Analysis

Initial Analysis

Therapy	Cost	QALYs	C/E ($/QALY)	Incremental Cost (USD)	Incremental QALYs averted	ICER
Tocilizumab	8,400.95	0.75	11,201.27	8,400.95	0.75	11,201.27
Rituximab	9,358.79	0.73	12,820.26	1,178.64	-0.02	-47,892.00
Adalimumab	14,996.78	0.58	25,856.52	5,637.99	-0.15	-37,586.60
Etanercept	20,456.78	0.64	31,963.72	5,504.20	0.06	91,000.00

Final Analysis

Therapy	Cost	QALYs	C/E ($/QALY)	Incremental Cost (USD)	Incremental QALYs averted	ICER
Adalimumab	14,996.78	0.58	25,856.52	14,996.78	0.58	25,856.52
Etanercept	20,456.78	0.64	31,963.72	5,460.00	0.06	91,000.00

Costs in American Dollars (USD)

Discussion

According our model results, Adalimumab turned out to be the most cost-effective option despite the fact that other biological therapies had higher QALYs and lower prices. Studies conducted in Spain and USA found similar results showing that Adalimumab was the best cost-effective option in RA patients with costs of €66,057 and $63,769 respectively (4,5). By contrast, other economic studies carried out in USA showed that the best cost- effective option to treat RA was Etanercept (6). The differing results of the Curtis et al study could be explained by two factors: first, efficacy was determined on the basis of criteria of an algorithm, and second, Etanercept costs were lower than those of Adalimumab, $43,935 and $52,752, respectively.

The present study has some limitations. First, the program was developed only in one healthcare center in Guayaquil. Second, the study period was limited to12 months. Third, Infliximab was not included in analysis, because all articles searched in the literature presented Infliximab QALYs in addition to Methotrexate. Therefore, Infliximab was excluded from our model analysis.

Conclusions

This work demonstrated that, according to the model analysis, Adalimumab is the better choice for AR cost-effective therapy in Ecuador with a ICER of $25,856.52 and can therefore substantially reduce the financial burden of healthcare institutions management of these patients.

Acknowledgements

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