Cost-Effectiveness and Budget Impact Analysis of Remdesivir for the Treatment of COVID-19 in Greece

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Introduction and Objectives

Remdesivir was developed as an intravenous antiviral treatment for hospitalized patients with moderate and severe Covid-19. It has shown improved clinical outcomes in a wide range of indicators, including time of recovery and likelihood of disease progression, and has been approved for emergency use in several countries including Europe. The objective of this study was to perform a budget impact and a cost-effectiveness analysis of treatment with remdesivir in combination with standard of care (SoC) in hospitalized Covid-19 adult patients requiring supplemental oxygen in Greece versus SoC alone.

Methods

A projected cohort-based model with a time horizon of 50 years formed the basis of the analysis. The model predicts costs and outcomes of hospitalized COVID-19 adults patients requiring non-invasive supplementary oxygen and has two arms: a) treatment of patients with SoC with the addition of remdesivir and b) treatment of patients only with SoC. The model was populated with country-specific data. Clinical data were sourced from the ACTT-1 trial (1), cost data were sourced from literature, while resource use data were elicited from experts' opinion through structured interviews, as there are no publicly available data at the time of the study. The analysis was conducted from a third-party payer perspective. Costs refer to year 2020 in Euro. Both costs and outcomes were discounted at 3% per annum. In addition, in order to account for uncertainty and to evaluate the robustness of model outcomes, a univariate and a probabilistic sensitivity analyses (PSA) were performed.

Results

In the base case, the cost effectiveness analysis of remdesivir in combination with SOC was found to yield more life yeas gained (LYG) and quality adjusted life years (QALYs) compared to SoC alone (18.17 versus 16.72 and 13.80 versus 12.69 respectively). In addition, patients treated with remdesivir+SoC had 0.87, 1.49 and 1.37 less days of hospital stay in the general ward, intensive care unit (ICU) and ICU with mechanical invasive ventilation (MIV) settings respectively compared to patients treated only with SoC (Table 2). Patients receiving remdesivir+SoC were estimated to incur savings of €4,742 per patient compared to SoC alone. The ICER of remdesivir+SoC was estimated at -4,290.9 per QALY gained against SoC alone (Table 1 and Figure 1). Univariate sensitivity analysis demonstrated that the addition of remdesivir in the treatment of hospitalized Covid-19 adults patients requiring supplemental oxygen remains dominant, with ICERs ranging from -9,258 to -2,732 per QALY gained. In addition, PSA demonstrated that under a willingness-to-pay threshold of €30,000/QALY, Remdesivir was cost effective in 95.4% of iterations compared to the SoC. Budget impact analysis estimated for an annual project cohort of 10,000 hospitalized COVID-19 patients requiring supplemental oxygen, the addition of remdesivir occur savings of €47,420,740.34 for the third party payer for one year.

Table 1.Base case of the cost effectiveness analysis results

Scenario	LYG	Incremental LYG	QALYs	Incremental QALYs	Total cost (€)	Additional cost (€)	ICER (€/QALY)
SoC	16.72	-	12.69	-	17,333	-	-
Remdesivir +SoC	18.17	1.45	13.80	1.11	12,591	-4,742	-4,290.9

Table 2. Additional clinical outcomes

Scenario	Length of stay (days)			Deaths
	General Ward	**ICU**	**ICU+MIV**	
Remdesivir +SoC	5.4	2.43	1.19	371
SoC	6.27	3.92	2.57	1,140
Difference	-0.87	-1.49	-1.37	-769

Figure 1. Point estimate of the ICER of Remdesivir + SoC vs. SoC

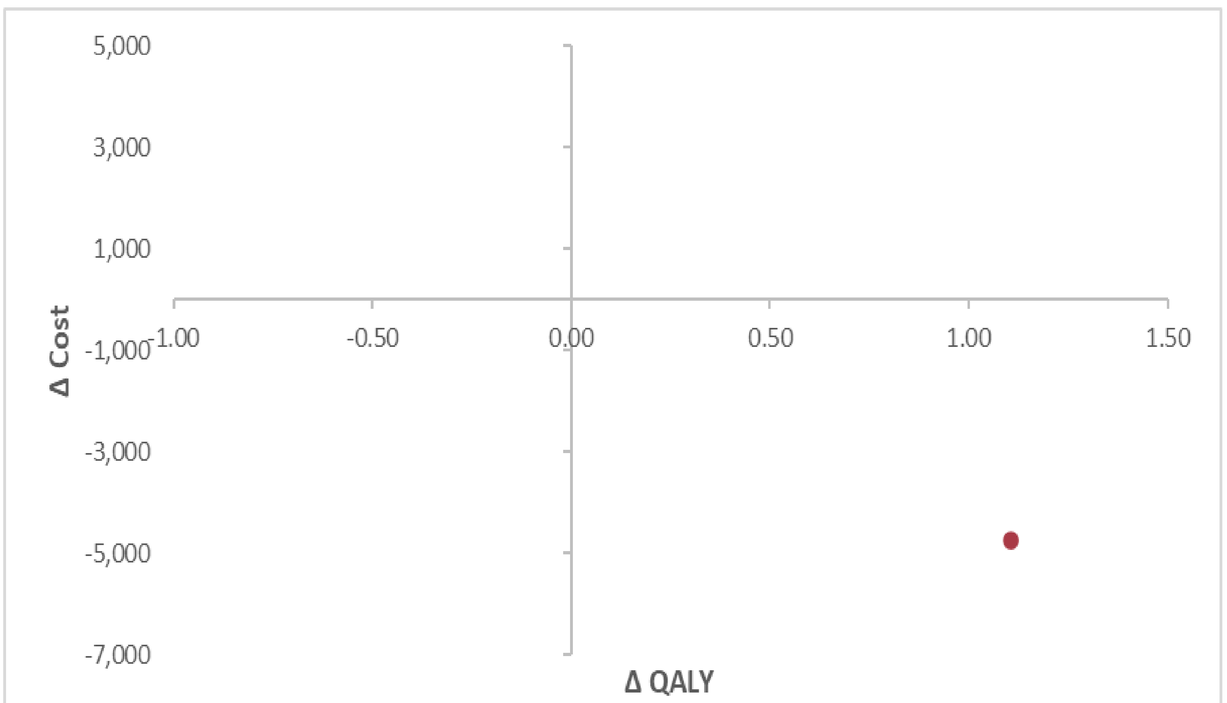
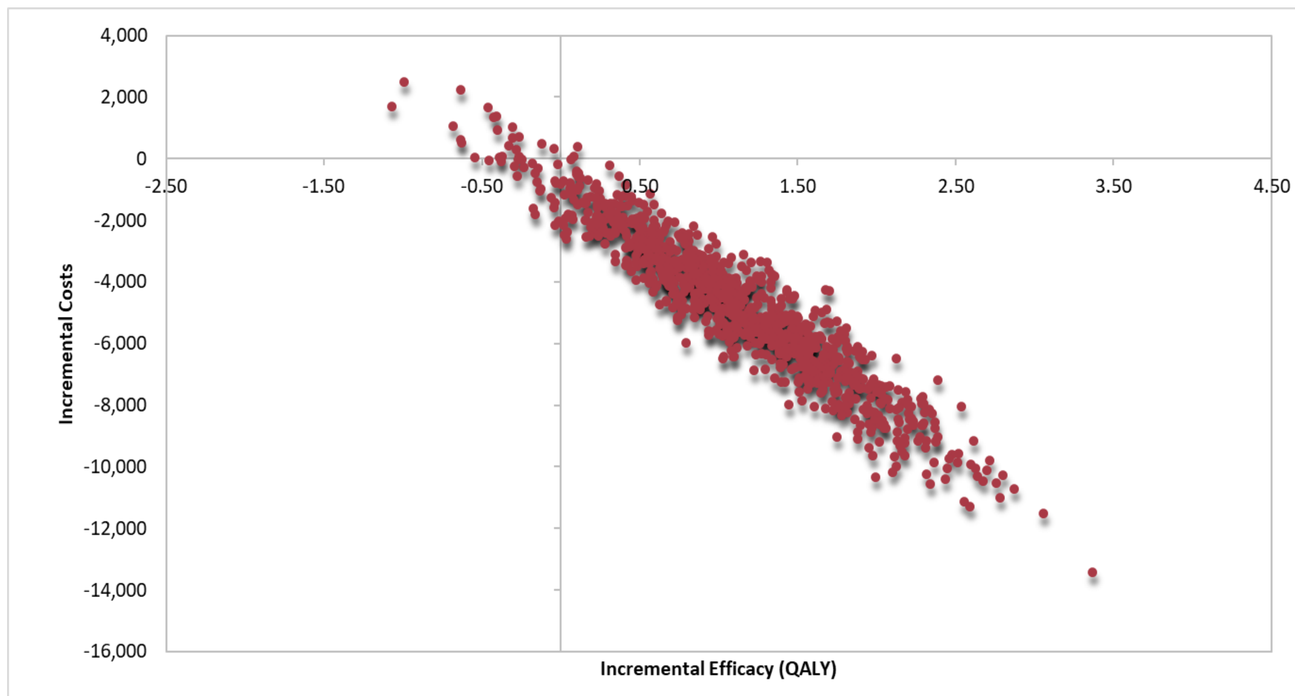


Figure 2. PSA results



Limitations

The study does not incorporate estimates on possible rehospitalizations or rehabilitations. In this sense, it provides calculations that are rather conservative for the value of remdesivir. In addition, the model did not include possible long term side effects of COVID-19, which needs additional hospital care. Finally, the model does take into account indirect costs and savings of the disease and the treatment, thus, probably resulting to conservative estimates of the pharmacoeconomic value of remdesivir.

Conclusions

Remdesivir+SoC was found to be cost effective (dominating) compared to SoC alone in the Greek environment, as the treatment led not only to better clinical outcomes, but also in savings for the third party payer. In addition, less length of hospital stay in general ward and intensive care units (ICU) due to remdesivir can release hospital beds, especially crucial ICU beds, in times of pandemic outbreak. We hope that this cost-effectiveness analyses will contribute to the general discussion policy in regards to the disease management for Greece, taken into account recent policies from international organizations, such as the WHO recommendation for the expansion for remdesivir to patients with severe disease in latest update to COVID-19 Guideline.

References

1. 1 Beigel JH, Tomashek KM, Dodd LE, et al. ACTT-1 Study Group Members. Remdesivir for the Treatment of Covid-19 - Final Report. N Engl J Med. 2020 Nov 5;383(19):1813-1826. doi: 10.1056/NEJMoa2007764

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