COST-EFFECTIVENESS ANALYSIS OF THE TREATMENT FOR CHRONIC HEPATITIS C IN SPANISH PRISONERS

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BACKGROUND

- Chronic Hepatitis C (CHC) is a prevalent disease in prisoners[1], with a significant impact on morbidity and mortality. Although the clinical guidelines recommend prioritizing the treatment of prisoners[2], many Spanish prisoners remain untreated.
- According to World Health Organization recommendations, treating all HCV+ patients is necessary to achieve hepatitis C virus elimination[3].

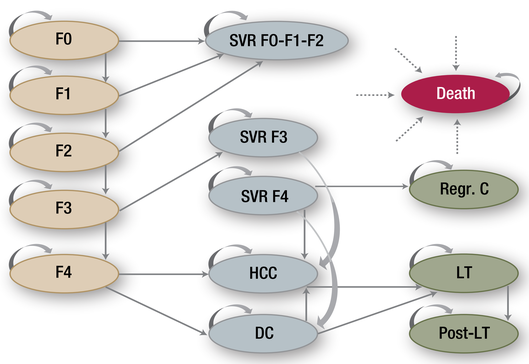
OBJECTIVE

Estimate the cost-effectiveness and health gains associated with direct-acting antivirals (DAA) for the treatment of CHC in the Spanish prison population.

METHODS

- A lifetime Markov model[4-5] (Figure 1) was used to simulate the treatment and disease pathway of a cohort of 4,408 CHC prisoners[6-7] initiating treatment with DAA versus the same cohort without treatment.
- Cohort baseline characteristics: average age of 45 years, genotype distribution [49% (GT1), 1% (GT2), 24% (GT3) and 26% (GT4)] and fibrosis score [44% (F0-F1), 19% (F2), 16,% (F3) and 20% (F4)] were identified from published Spanish prisoner studies[8].
- Of the total of 4,408 CHC prisoners, in the treatment cohort, it was assumed that the patients were treated over two years (50% of patients each year), regardless of fibrosis status. The probability of sustained virological response (SVR) (95%) was derived from Spanish real-world data[2].
- Untreated patients progressed according to the natural history of the disease.
- Transition probabilities through model health states and utility values were obtained from the published literature[4-5].
- The average drug cost of DAA per patient (€20,594)[2,9] was obtained from Spanish public sources. It was calculated from the total number of patients treated[2] during the Strategic plan for tackling Hepatitis C in the Spanish National Health System (NHS), and the total costs of the same period[9]. Medical costs of each health state were collected from published Spanish studies[4-5].
- From the NHS perspective, the model estimated the cumulative incidence of liver complications and liver-related deaths, Life-Years Gained (LYG), Quality-Adjusted Life Years (QALY), total costs, and the incremental cost-effectiveness ratio (ICER). A 3% annual discount rate[10] was applied for costs and health outcomes.
- Willingness-to-pay (WTP) thresholds considered were €22,000[11] to €30,000[12] per QALY.
- One-way sensitivity analyses (OWSA) were conducted to assess the effect of the uncertainty of key model inputs.

Figure 1. Markov model structure for chronic Hepatitis C

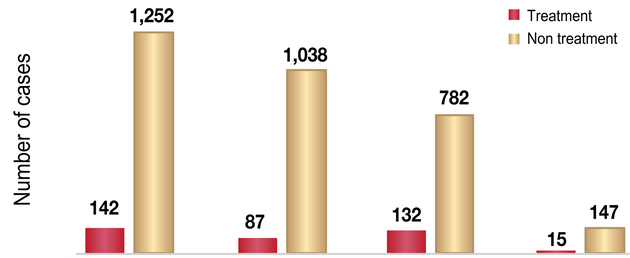


METAVIR scoring system: F0, no fibrosis; F1, mild fibrosis; F2, moderate fibrosis; F3, severe fibrosis; F4, cirrhosis; DC, decompensated cirrhosis; HCC, hepatocellular carcinoma; LT, liver transplant; Regr. C, regression cirrhosis; SVR: Sustained Virological Response

RESULTS

- The model estimated a reduction in liver complications in the DAA treated cohort of 92% in decompensated cirrhosis (DC), 83% in hepatocellular carcinoma (HCC) and 88% in liver related deaths, avoiding 132 liver transplants (90%). In addition, the cost associated with the management of such complications would be reduced (Figure 2).
- DAA treatment compared to no treatment yielded 5.0 additional QALYs per patient (21.2 vs 16.2) and an incremental total cost of €3,473 per patient (€24,088 vs €20,615) resulting in an ICER of €690 per QALY gained per patient (Table 1).
- OWSA confirmed the robustness of results to changes in the model variables. The parameters with the greatest influence on the results were the probability of receiving a liver transplant from DC or HCC and the cost of DAA (Figure 3).

Figure 2. Clinical events avoided for the cohort of 4,408 patients

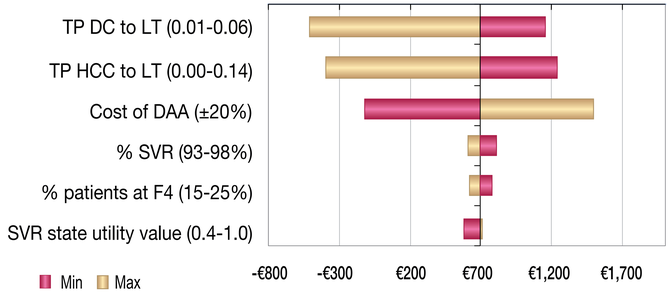


	Liver related deaths	Decompensated Cirrhosis	Hepatocellular Carcinoma	Liver Transplant
Number of cases avoided	**1,110**	**951**	**650**	**132**
Reduction of cases	**88%**	**92%**	**83%**	**90%**
Costs avoided (millions €)	**–**	**15**	**21**	**68**

Table 1. Cost-effectiveness results per patient (Case Base)

	Treatment cohort	Non treatment cohort	Incremental Difference Treatment vs Non treatment
Life Years Gained	**22.9**	**19.1**	**3.8**
Quality-Adjusted Life Years	**21.2**	**16.2**	**5.0**
Total Cost	**€24,088**	**€20,615**	**€3,473**
Drug	€20,294	€0	€20,294
Treatment monitoring	€1,028	€0	€1,028
Disease management	€2,766	€20,615	- €17,849
Incremental Cost-Effectiveness Ratio (ICER)			**€690**

Figure 3. Sensitivity analysis results: Tornado Diagram



DAA, direct-acting antiviral; DC, decompensated cirrhosis; HCC, hepatocellular carcinoma; LT, liver transplant; SVR, sustained virological response; TP, transition probability.

CONCLUSION

In the analysis, DAA treatment for all prisoners with CHC, who are currently awaiting treatment, would offer significant long-term health benefits; reducing the burden of chronic liver complications and improving life expectancy. In addition, treatment is a cost-effective option, not a cost-effective option with an ICER below accepted WTP thresholds.

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