Clinical and Economic Impact of the Treatment of Chronic Hepatitis C in Prison Inmates in Spain

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BACKGROUND

- World Health Organisation recommends the treatment of all hepatitis C virus positive (HCV+) patients in order to achieve virus elimination[1].
- Although chronic hepatitis C (HC) prevalence amongst prisoners is high[2], many of them remain untreated.

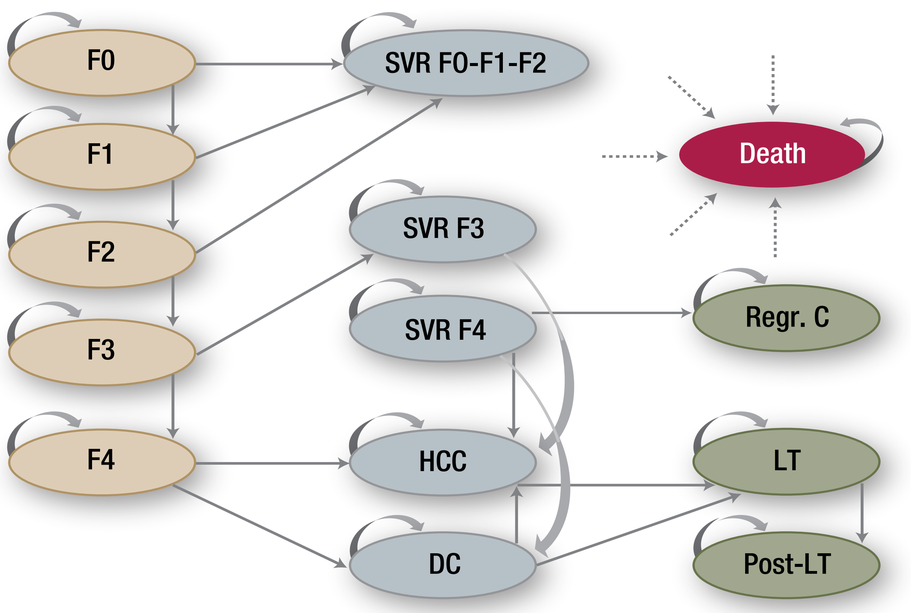
OBJECTIVE

Evaluate long-term healthcare benefits and economic outcomes of treating prisoners with chronic HC treated with direct-acting antivirals (DAA) in Spain.

METHODS

- **Comparators**: Treatment with DAA versus no treatment for chronic HC prisoners.
- **Design**: A previously validated lifetime Markov model[3-4] (Figure 1) was used to simulate the progress of the disease.
- **Time horizon**: Lifetime.
- **Perspective**: National Health System
- **Target population**: 4,408 chronic HC prisoners[5-6] awaiting treatment in Spanish prisons.
- **Baseline characteristic population**: 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)][7]. All of them were identified from published Spanish prisoner studies[7].
- **Interventions**:
  - In the treatment cohort, of the total chronic HC prisoners it was assumed that 50% of the patients were treated in the first year and the remaining 50% in the second year, regardless of fibrosis status. The effectiveness was measured as sustained virological response (SVR) (95%) and it was obtained from Spanish real-world data[8].
  - Untreated patients progressed according to the natural history of the disease.
- **Parameters**:
  - Transition probabilities through the health states of the Markov model and utilities for each state were obtained from the published literature[2-3].
  - The average pharmaceutical cost of DAA per patient (€20,594)[8-9] was obtained from Spanish public sources. It was calculated from the total number of patients treated[2] during the Strategic plan for tackling HC in the Spanish National Health System and the pharmaceutical total cost of the same period[8]. Medical costs of each health state were collected from Spanish studies[3-4].
- **Healthcare benefits and economic outcomes measures**:
  - Cumulative incidence of decompensated cirrhosis (DC), hepatocellular carcinoma (HCC), liver transplant (LT) and liver-related deaths.
  - Life-Years gained (LYG), Quality-Adjusted Life Years (QALY).
  - Total costs.
  - Incremental cost-utility ratio (ICUR).
- **Discount rate**: 3% annual[10] was applied for costs and health outcomes.
- **Willingness-to-pay (WTP) thresholds**: €22,000[11] to €30,000[12] per QALY.
- **Sensitivity analysis**: one-way sensitivity analyses (OWSA) were conducted to asses 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

- Patients entered the model distributed between the fibrosis states and transitioned between the different health states or remained for each 1-year model cycle.

RESULTS

- DAA treatment compared to no treatment yielded 5.0 additional QALY (21.2 vs 16.2) with an incremental total cost of €3,473 (€24,088 vs €20,615) resulting in an ICER of €690 per QALY gained per patient (Table 1).

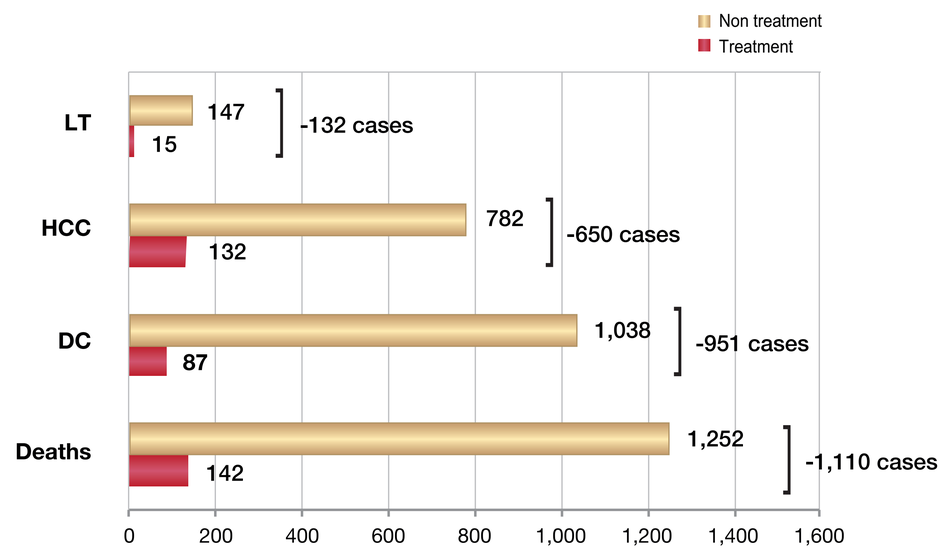
Table 1. Cost-effectiveness results per patient (Base case)

	Total Cost	QALYs	ICUR
Treatment cohort	€24,088	21.2	
Non treatment cohort	€20,615	16.2	
Difference (Treatment vs Non treatment)	**€3,473**	**5.0**	**€690**

QALY, Quality-adjusted life years; ICUR, incremental cost-utility ratio.

- The model estimated a reduction in liver complications in the DAA treated cohort of 92% in DC, 83% in HCC and 88% of liver-related deaths, avoiding 132 LT (90%) (Figure 2). In addition, savings of €104 M would be generated in the management of liver complications: €15 M in DC, €21 M in HCC and €68 M in LT.

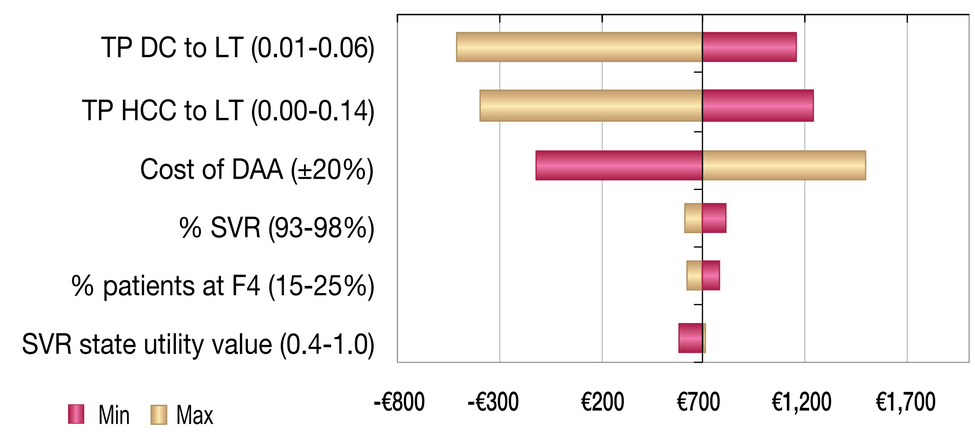
Figure 2. Clinical events avoided



DC, decompensated cirrhosis; HCC, hepatocellular carcinoma; LT, liver transplant; Deaths, liver-related deaths.

- OWSA confirmed the robustness of results to changes in the model variables. The parameters with the greatest influence on the results were the transition probabilities of receiving a LT from either DC and HCC and DAA costs (Figure 3).

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

DAA treatment of all prisoners with chronic hepatitis C who are currently awaiting treatment in Spanish prisons not only decreases morbidity, mortality and the need for liver transplantation, but is also an efficient strategy with an ICUR below accepted WTP thresholds.

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Poster: PIN38

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