Cost-Effectiveness of screening for hepatitis C virus in population born between 1956 and 1970, in Spain

M. Buti[1], R. Domínguez-Hernández[2], MA. Casado[2], E. Sabater[2], R. Esteban[1]

1 Hospital Vall' d'Hebrón, Barcelona, Spain; 2 Pharmacoeconomics & Outcomes Research Iberia, Madrid, Spain

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BACKGROUND

- In Spain, there is a high number of people with undiagnosed hepatitis C virus (HCV) infection. The majority of those were born between 1956-1970[1].
- The World Health Organization recommends the implementation of screening programs for the identification and management of patients with chronic hepatitis C (CHC)[2]. Spanish screening HCV guidelines recommend risk based screening[3].
- It is necessary to define expanded screening strategies for the diagnosis of HCV individuals and to estimate the relationship between the cost of its implementation and health results (or effectiveness) that could be obtained[4].

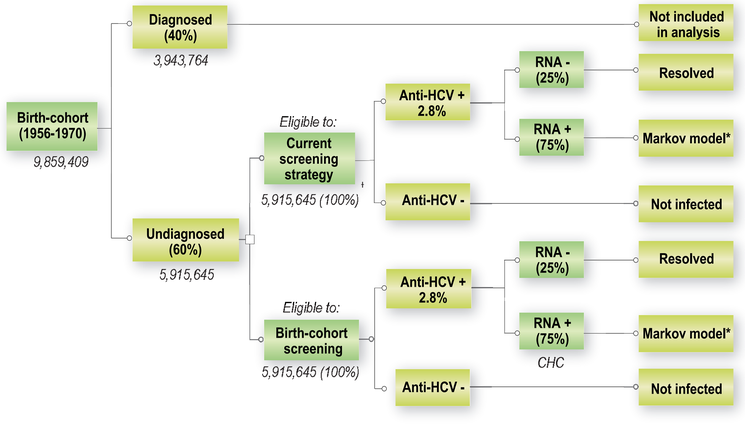
OBJECTIVE

The aim of this study is to assess the cost-effectiveness of expanding risk based with a one time birth cohort based screening compared to no additional screening, in the Spanish population who was born between 1956 and 1970, from the perspective of the Spanish National Health System.

METHODS

- A decision analysis model (Figure 1) was developed to establish the population eligible for screening and a previously validated Markov model[5] was used to simulate the progression of the disease from diagnosis of chronic hepatitis C (CHC) to death.
- In the base case analysis two strategies were compared:
  - Birth cohort screening strategy : Screening 100% of the undiagnosed HCV population born between 1956-1970.
  - Current screening strategy: Screening only high-risk (Prisoners, People Who Inject Drugs, HIV/HCV coinfected) of the undiagnosed HCV population born between 1956-1970, estimated to represent 70 per 10,000.
- In both strategies, 82%[6] of ≥F2 detected cases were treated with the new direct acting antivirals (DAAs), and 18% untreated.
- All population data included in the analysis[1,7-11] were obtained from the literature and validated by experts.
- Sensitivity and specificity of the diagnostic tests included (ELISA, RIBA and PCR) were considered.[12,13]
- Data on the efficacy of DAAs were taken from the most relevant studies about SVR according to genotype and degree of fibrosis.
- Transition probabilities[14-20] and utility values[15] were obtained from the literature.
- For the calculation of the average total cost per patient (€, 2016), only direct health costs were considered: diagnostic test[21-22], pharmacological (ex-factory Price with a 7.5% mandatory deduction)[23,24], monitoring during therapy[25] and disease management by health states.[19,25]
- A lifetime time horizon was considered applying a 3% discount rate to costs and outcomes[26]. Health outcomes evaluated were life years gained (LYG), quality-adjusted life years (QALY) and avoided clinical events associated with the disease.
- The willingness-to-pay threshold considered was €30,000 per QALY gained[27].
- One-way sensitivity analysis (SA) was performed considering (1) a higher percentage (95%) ≥F2 patients been treated, (2) a lower percentage (67%) of undiagnosed patients and (3) a lower percentage (78%) individuals screened.

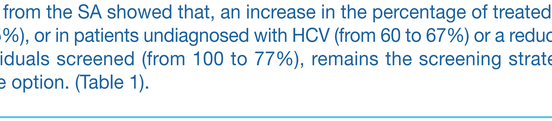
Figure 1. Decision tree and follow-up diagram



† Screening only for 70 per 10,000 person for being considered at high-risk. CHC, Chronic hepatitis C; HCV, Hepatitis C virus.
*Distribution of patients at entry into the Markov model according to genotype and degree of fibrosis

RESULTS

Figure 2. Population screening vs. No screening



- In the birth-cohort screening strategy more individuals would be screened and diagnosed with CHC compared current screening strategy (Figure 2).

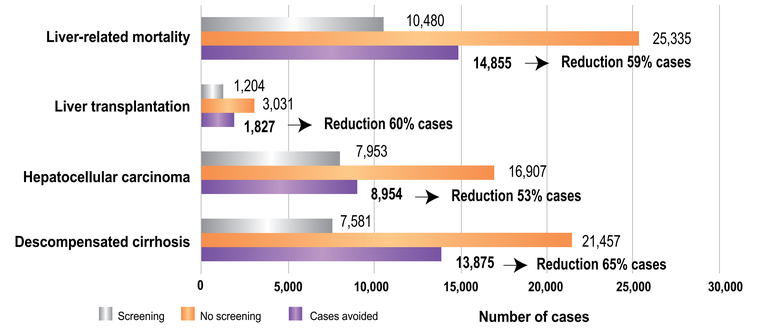
Table 1. Cost-effectiveness results per patient

	ΔCosts (€)	ΔLYG	ΔQALYs	ICER/QALY
Base-Case (82% of ≥F2 treated)				
Birth cohort screening vs. current screening strategy	13,767	1.75	2.14	€ 6,423
Sensitivity analysis (SA 1) (95% of ≥F2 treated)				
Birth cohort screening vs. current screening strategy	15,518	2.03	2.48	€ 6,249
Sensitivity analysis (SA 2) (67% undiagnosed)				
Birth cohort screening vs. current screening strategy	13,891	1.77	2.17	€ 6,409
Sensitivity analysis (SA 3) (78% screened)				
Birth cohort screening vs. current screening strategy	10,375	1.32	1.61	€ 6,428

ICER, Incremental Cost-Efectiveness Ratio; LYG, Life Year Ganed; QALY, Quality-adjusted Life Year; Δ Incremental

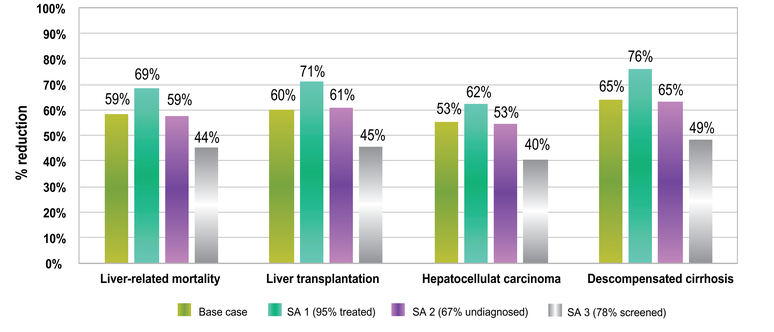
- In comparison with current screening strategy, screening of the population born between 1956-1970, showed better health outcomes per patient (15.89 QALY vs 13.74 QALY), although with higher costs (€32,217 vs €18,450), with an incremental cost-effectiveness ratio of €6,423 per QALY gained (Table 1).
- Results from the SA showed that, an increase in the percentage of treated patients (from 82 to 95%), or in patients undiagnosed with HCV (from 60 to 67%) or a reduction in number of individuals screened (from 100 to 77%), remains the screening strategy as a cost-effective option. (Table 1).

Figure 3. Number of cases avoided (Base-case, 82% of ≥F2 patients treated)



- The birth cohort screening strategy results in a reduction in the number of liver events when compared with current screening strategy (Figure 3).

Figure 4. Percentage Reduction in Advanced Liver Disease: Base-case vs. Sensitivity analysis



- An increase in the number of patient ≥F2 treated (from 82 to 95%) would lead to an increase in the percentage of liver events avoided (Figure 4).
- A reduction in the number of individual screened (from 100 to 78%) or an increase in the patients undiagnosed (from 60 to 67%) with HCV would reduce the percentage of events avoided.

CONCLUSION

Screening of the Spanish population born 1956-1970 is a cost-effective strategy compared current screening strategy of risk based screening, considering a willingness-to-pay threshold of €30,000 per QALY. In addition, it improves quality of life of patients reducing morbidity and mortality associated with CHC.

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