Empagliflozin for Heart Failure Patients Irrespective of Ejection Fraction in Spain: A Cost-Effectiveness Study

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BACKGROUND & OBJECTIVES

- Chronic heart failure (HF) is a chronic disease associated with considerable clinical and economic burden and decrease in patients' quality of life.
- There is still a high unmet need for efficacious treatments, especially in patients with HF and >40% ejection fraction (EF). Empagliflozin offers to fill this treatment availability gap based on the EMPEROR-Reduced[1] and EMPEROR-Preserved[2] trials, demonstrating its efficacy and safety on top of standard of care (SoC) for HF patients with EF ≤40% and >40%, respectively.
- The aim of this study was to estimate the cost-effectiveness of empagliflozin in HF treated patients in Spain, regardless of EF.

METHODS

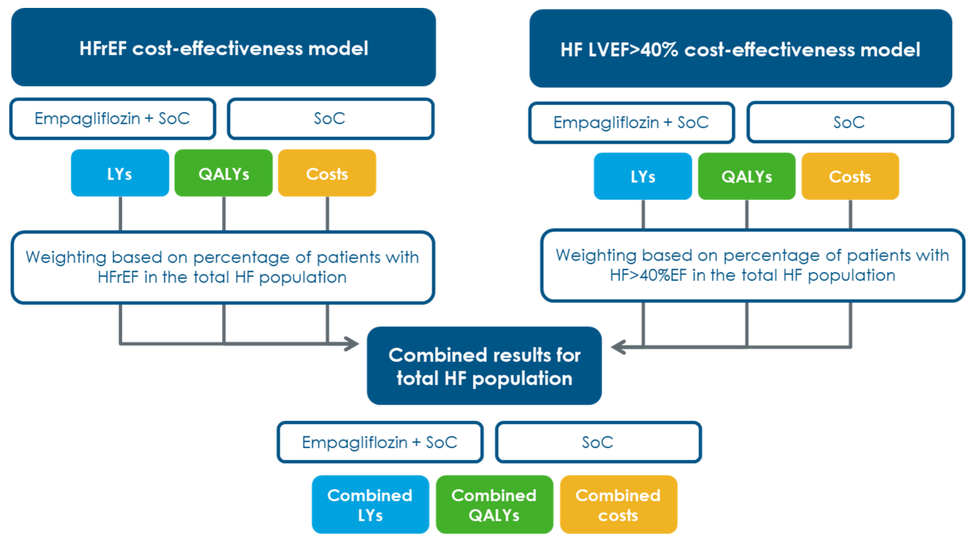
Overview of HF phenotype-specific (reduced, HFrEF, and preserved, HF>40%EF) cost-effectiveness models (CEMs)

- Two Microsoft® Excel based Markov models were previously developed to assess the cost-effectiveness of empagliflozin + SoC compared to SoC alone in the treatment of patients with HFrEF and HF>40%EF, respectively, from the perspective of the Spanish National Health Service (NHS).
- Patients' disease progression was tracked via health states defined by Kansas City Cardiomyopathy Questionnaire - Clinical Summary Score (KCCQ-CSS) quartiles over time.
- Patients' health-related quality of life and resource use over time were tracked as patients move between different health states, adjusting for disutilities associated with hospitalisation for HF (hHF) and adverse events (AEs).
- Included costs regarded treatment acquisition, disease management, acute clinical events management, and adverse events management.
- A 3% annual discount rate was applied to costs and health outcomes.[3]

Combining phenotype-specific models

- To evaluate the impact on the entire HF population the results of the two models were combined using a population-weighted approach (Figure 1) based on the percentage of patients with each phenotype (69.6% with HFrEF and 30.4% with HF>40%EF).[4] As a scenario, a 50% split between the two phenotypes was explored.
- Probabilistic cost-effectiveness results were obtained by sampling the model results for each arm (empagliflozin + SoC, and SoC, separately) according to the percentage abovementioned.

Figure 1. Approach to estimate the combined deterministic ICER from the results of the two phenotype-specific cost-effectiveness models



Abbreviations: HF, heart failure; HFrEF, HF with reduced ejection fraction; HF>40%EF, HF with >40% ejection fraction; LY, life-year; QALY, quality-adjusted life-year; SoC, standard of care.

RESULTS

- From the combined analysis of the entire Spanish HF population, the deterministic results show that on average a patient on empagliflozin + SoC accumulated 6.29 life-years (LYs) and 4.69 quality-adjusted life-years (QALYs) compared to 6.13 LYs and 4.50 QALYs on SoC alone, which amounts to an incremental difference of 0.16 LYs and 0.19 QALYs over a lifetime time horizon (Table 1). Total healthcare costs were €21,050 for empagliflozin + SoC and €20,020 for SoC alone, resulting in an incremental difference of €1,030 (Table 1). The incremental cost-effectiveness ratio (ICER) was €5,446/QALY gained for the overall HF population (Table 1).
- The probabilistic cost-effectiveness results are similar to the deterministic ones, with an ICER of €5,539 (Table 2).
- The deterministic results of subgroup analyses were comparable to the results of the base case analysis, with an absolute maximum change of 32% (Table 3).
- The cost-effectiveness plane shows that the majority of the iterations (78%) lie in the north-east quadrant, where empagliflozin + SoC is more costly and more effective compared with SoC, with 77% falling below the willingness-to-pay (WTP) threshold of €20,000 per QALY gained (Figure 2).
- The deterministic scenario analysis exploring a 50% split between the two phenotypes showed an increase in ICER of €1,016 due to the slightly lower incremental QALYs and higher incremental costs, compared to the base case deterministic results (Table 4).

Table 1. Deterministic cost-effectiveness results for the overall HF population

Outcome (per patient)	Empagliflozin + SoC	SoC	Incremental
Total discounted LYs	6.29	6.13	0.16
Total discounted QALYs	4.69	4.50	0.19
Total discounted costs	€21,050	€20,020	€1,030
ICER (cost/QALY gained)	**€5,446**	-	-

Abbreviations: ICER, incremental cost-effectiveness ratio; QALY, quality-adjusted life-year; SoC, standard of care

Table 2. Probabilistic cost-effectiveness results for the overall HF population

Outcome (per patient)	Empagliflozin + SoC	SoC	Incremental
Total discounted LYs	6.25	6.09	0.16
Total discounted QALYs	4.67	4.47	0.19
Total discounted costs	€21,011	€19,947	€1,064
ICER (cost/ QALY gained)	**€5,539**	-	-

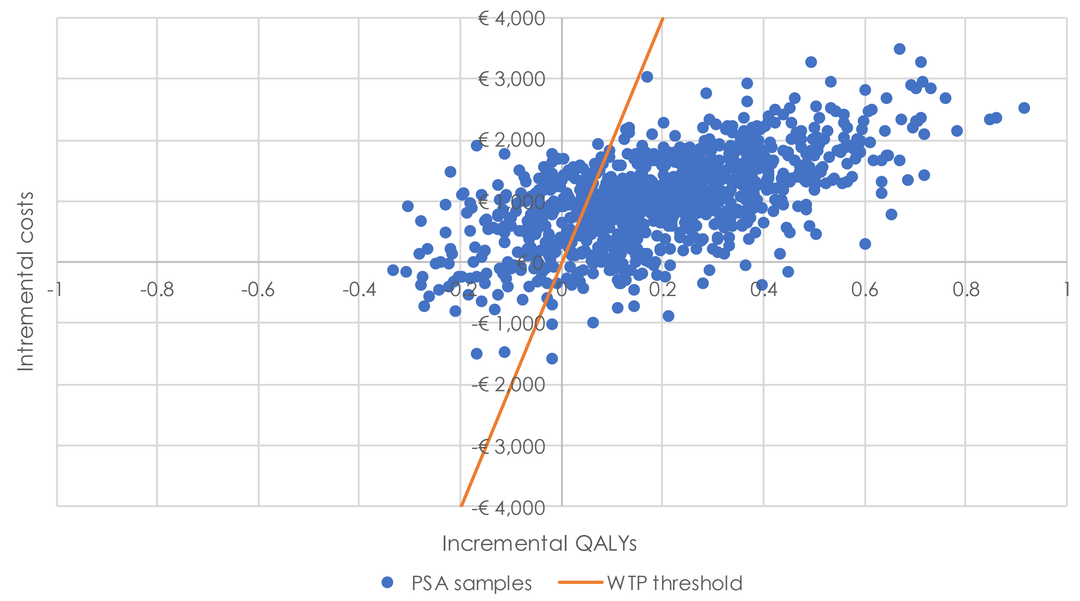
Abbreviations: ICER, incremental cost-effectiveness ratio; QALY, quality-adjusted life-year; SoC, standard of care

Table 3. Deterministic cost-effectiveness results by subgroups of interest

Subgroup	ICER (cost/QALY gained)	% change from base-case
T2DM at baseline	€4,224	-22%
No T2DM at baseline	€6,326	16%
Baseline age < 65 years	€3,694	-32%
Baseline age ≥ 65 years	€6,670	22%
Baseline eGFR < 60 mL/min/1.73m^2	€5,948	9%
Baseline eGFR ≥ 60 mL/min/1.73m^2	€4,927	-10%

Abbreviations: eGFR, estimated glomerular filtration rate; ICER, incremental cost-effectiveness ratio; QALY, quality-adjusted life-year; T2DM, type II diabetes mellitus

Figure 2. Cost-effectiveness plane for empagliflozin + SoC compared with SoC alone for the overall HF population



Abbreviations: HF, heart failure; PSA, probabilistic sensitivity analysis; QALY, quality-adjusted life-year; SoC, standard of care; WTP, willingness to pay

Table 4. Scenario analysis with a 50% split between the two phenotypes

Outcome (per patient)	Empagliflozin + SoC	SoC	Incremental
Total discounted LYs	6.50	6.37	0.13
Total discounted QALYs	4.81	4.65	0.16
Total discounted costs	€20,106	€19,050	€1,056
ICER (cost/QALY gained)	**€6,462**	-	-

Abbreviations: ICER, incremental cost-effectiveness ratio; QALY, quality-adjusted life-year; SoC, standard of care

CONCLUSIONS

- The combined analysis results show empagliflozin as the first intervention to be an efficacious and cost-effectiveness treatment option for all HF patients, regardless of EF phenotype.
- Thus, for empagliflozin HF patients' treatment decision making should be independent of EF.

References

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Declaration of interest
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