Cost-effectiveness of dapagliflozin compared to DPP-4 inhibitors as combination therapy with metformin in the treatment of type 2 diabetes mellitus without established cardiovascular disease in Colombia

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Introduction

- Type 2 diabetes (T2D) is a chronic and progressive disease, characterized by natural or acquired resistance to insulin and changes in the process of insulin secretion [1].
- SGLT2 inhibitors or DPP-4 inhibitors are the preferred therapeutic options for the control of hyperglycemia in patients with T2D without established cardiovascular disease [2,3].

Objective

- To evaluate the incremental cost-effectiveness of dapagliflozin versus DPP-4 inhibitors in addition to metformin in the treatment of T2D, from the perspective of the Colombian health system

Methods

- The time horizon was 5 years and a discount rate of 5% was applied. We considered a third-party payer perspective. All costs were expressed in US dollars from 2020 (1 USD = $3,693.36 COP).
- We considered a cost effectiveness threshold of 1 GDP (US$ 5,710.0) and 3 GDP per capita (US$ 17,129.9) per additional QALY
- We used the Cardiff model . Micro- and macrovascular complications incidence was estimated using DECLARE-TIMI risk equation, incorporating the effect of treatment on modifiable risk factors. **Figure 1** show the model structure.
- **Tables 1 and 2** show treatments differentials, acquisition costs and utilities.
- Event and health state costs were obtained from literature or from base case healthcare resource utilization with clinical experts. We considered prices from local tariff manual[4], the latest SISMED drug price report [10] and the price regulation circulars, in accordance to accepted local methods.
- We performed univariate and probabilistic sensitivity analyses

Results

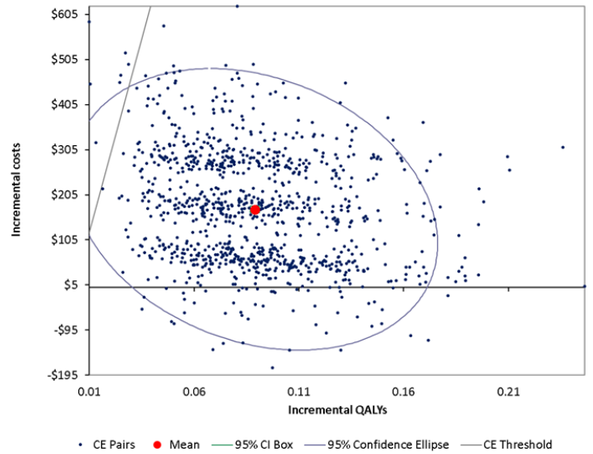
- Base case results show that Dapagliflozin is a cost effective alternative

Table 3. Base case results.

	Dapa+Met	DPP4+Met	Difference
Per patient			
Costs (with discount)	$ 2,316.97	$ 2,149.17	$ 167.80
QALY gained (with discount)	3.407	3.493	0.085
Life years (with discount)	4.401	4.401	0.000
Cost/QALY gained	$ 1,964.80		
Abbreviations: QALY: Quality-adjusted life years			

- Results were consistent in sensitivity analysis. 99.2% of simulations showed ICER below the 3 GDP threshold

Figure 2. Probabilistic sensitivity analysis



Conclusions

- The combination of dapagliflozin with metformin is a cost-effective option compared to DPP-4 + metformin inhibitors in the treatment of T2D without established cardiovascular disease for the Colombian health system

Figure 1. Structure of the model in the analysis of T2D

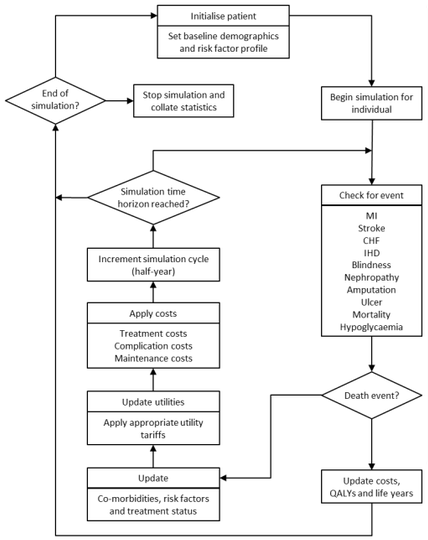


Table 1. Efficacy and safety parameters used in the model

Effect of treatment	Met+Dapa (Average, SE)	Met+DPP-4 (Average, SE)	
Δ HbA1c (%)	-0.670 (0.148)	-0.560 (0.061)	[5]
Δ SBP (mm Hg)	-4.300 (1.617)	-2.100 (1.036)	[5]
Δ DBP (mm Hg)	-1.800 (0.800)	-1.400 (0.561)	[6,7]
Δ TC (mg/dl)	7.795 (2.413)	1.160 (2.466)	[7,8]
Δ HDL (mg/dl)	1.871 (0.773)	1.933 (1.160)	[7,9]
Δ Hematocrit (%)	1.700 (0.200)	-0.300 (0.200)	[7,10]
Δ Weight (kg)	-3.300 (0.898)	-0.710 (0.403)	[5]
Acquisition costs (US$)	Met+Dapa (Average, SE)	Met+DPP-4 (Average, SE)	
Base case	$ 365.6	$ 263.8	[11]
Adverse effects			
Non-severe hypoglycemia	0.031	0.046	[12]
Severe hypoglycemia	0.0004	0.001	[12]
Genital infection	0.123	0.000	[12]
Urinary infection	0.074	0.054	[12]
Abbreviations: DBP: Diastolic blood pressure, BMI: Body mass index, SBP: Systolic blood pressure, TC: Total cholesterol			

Table 2. Utilities employed in the model.

Variable		
Utilities	**Parameter**	Source
T2D complications		
Ischemic cardiomyopathy	0.042	DECLARE-TIMI 58
Myocardial infarction	0.055	Clarke et al. [13]
Congestive heart failure	0.108	Clarke et al. [13]
Stroke	0.164	Clarke et al. [13]
Amputation	0.280	Clarke et al. [13]
Blindness	0.074	Clarke et al. [13]
End-stage renal disease	0.263	Currie et al. [14]
Diabetic ulcer	0.170	Bagust et al. [15]
PCI	0.038	Gonçalves et al [16]
CABG	0.038	Assumed
Non-severe hypoglycemia	0.042	Currie et al [17]
Severe hypoglycemia	0.047	Currie et al [17]
Adverse events		
Urinary tract infections	-0.00283	Barrie et al [18]
Genital infection	-0.00283	Assumed
Changes in weight		
Increase in BMI by one unit	-0.0472	Lane et al. [19]
Decrease in BMI by one unit	+0.0171	Lane et al. [19]

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