Avoidable costs by the inclusion of Finerenone in terms of hospitalization due to heart failure (HF) and the progression of Chronic Kidney Disease (CKD) in Type 2 Diabetes (T2D) in Colombia

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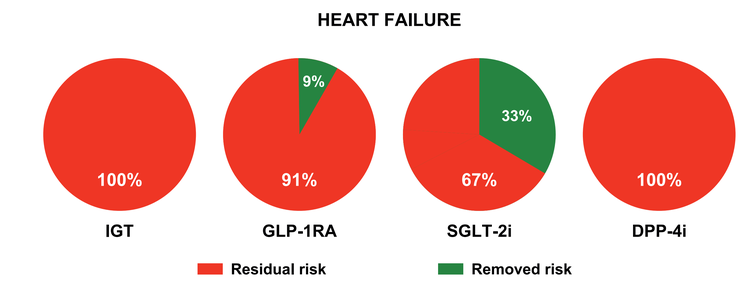
Introduction

The aldosterone escape during chronic therapy with ACE inhibitors or ARBs has been described in patients with heart failure and hypertension, as well as in patients with CKD and T2D. Despite treatment with ACE inhibitors or ARBs and the concomitant use of SGLT2 inhibitors, there remains a high residual risk of cardiorenal events (1-3).

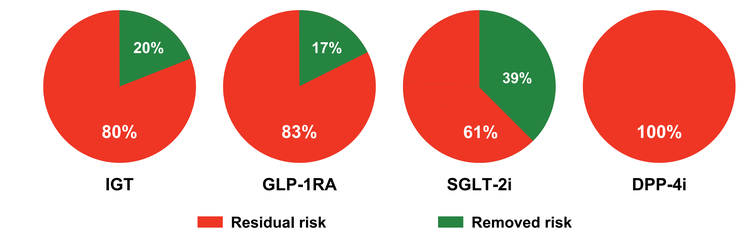
Angiotensin-Converting Enzyme inhibitors (ACEi) or Angiotensin Receptor Blockers (ARBs)

Figure 1. Residual risk for HF hospitalization



IGT: Intensive Glicemic treatment. GLP-1RA: glucagon-like peptide-1 receptor agonist. SGLT-2i: sodium-glucose cotransporter 2 inhibitors. DPP-4i: dipeptidyl peptidase-4 inhibitors Source: Consolidated based on 1-4

Figure 2. Residual risk for renal outcomes



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Finerenone is a selective non-steroidal antagonist of the mineralocorticoid receptor (MR) activated by aldosterone and cortisol, which regulates gene transcription. The combined analysis, FIDELITY, showed heart Failure hospitalization event was the main driver of cardiovascular benefit with finerenone, with a relative risk reduction of 22% compared to placebo (P= 0.0030) and shows not only a 30% reduction in the risk of a sustained decrease >57% in eGFR in addition to optimized therapy with ACEi or ARB, but also a 20% relative risk reduction in the end stage of diabetic kidney disease with finerenone compared to placebo (p = 0.0403). (4).

Estimated Glomerular Filtration Rate (eGFR)

Objetive

To estimate the costs avoided from a social perspective by the inclusion of Finerenone approved for the management of adults with CKD (eGFR ≥ 25 mL/min with albuminuria) and T2D, including the costs avoided from HF hospitalization and the progression of chronic kidney disease.

Methods

Two strategies were evaluated: standard treatment (i.e., ACEi or ARBs) versus standard treatment plus Finerenone, using a Markov model associated to the stages of disease progression using the renal outcome (5).

Figure 3. Standard Treatment Transition Matrix

		Fin				
		Normo	Micro	Macro	ESRD	Death
Start	Normo	1-0.056-p(age)	0.056	0	0	p(age)
	Micro	0	1-0.094-p(age)	0.094	0	p(age)
	Macro	0	0	1-0.056-p(age)	0.056	p(age)
	ESRD	0	0	0	0.87	0.13
	Death	0	0	0	0	1

Figure 4. Standard Treatment + Finerenone Transition Matrix

		Fin				
		Normo	Micro	Macro	ESRD	Death
Start	Normo	1-0.056-p(age)	0.056	0	0	p(age)
	Micro	0	1-0.073-p(age)	0.073	0	p(age) Finerenone
	Macro	0	0	1-0.043-p(age)	0.043	p(age) Finerenone
	ESRD	0	0	0	0.87	0.13
	Death	0	0	0	0	1

Figure 5. How long would it take for a patient to progress?

Without Finerenone, on average, a patient would be in Microalbuminuria for 10 years and in Macroalbuminuria for 17 years before progression.

Without Finerenone, on average, a patient would be in Microalbuminuria for 13 years and in Macroalbuminuria for 22 years before progression.

Using international guidelines KDIGO 2024, the hazard ratios (HR) for acute myocardial infarction, infarction, heart failure, and hospitalization according to levels of albuminuria/creatinine ratio (ACR) and estimated glomerular filtration rate (eGFR) were taken and adjusted with the HR results of cardiovascular composite outcome of FIDELITY study (4,6).

Figure 6. Survival and Probability of Heart Failure hospitalization with Finerenone

$$S(t)_{fine} = S(t)_{placebo}^{HR\ Finerenone_i} \quad | \quad F(t)_{fine} = 1 - S(t)_{finerenone}$$

Heart Failure hospitalization

Cumulative Survival Finerenone	Cumulative Probability of Heart Failure
S_{fine} = 86,20%	F_{fine} = 13,80%

Source: Calculated from FIDELITY study (6)

Table 1. Hospitalization probabilities for HF by stage for Standard treatment and Standard treatment + Finerenone

Stage	HR Falla Cardiaca	Heart Failure hospitalization	
		Currently treatment	Finerenone
Microalbuminuria	3,0	24.84%	19.97%
Macroalbuminuria	4,1	42.10%	34.70%
End Stage Renal Disease (ESRD)	7,7	94.67%	Not use indicated

The cost of HF hospitalization increase 2,8 times in ESRD stage versus microalbuminuria stage in terms of patient/year cost

End-Stage Renal Disease (ESRD)

$$HF\ costs\ i_{stage\ n} = HF\ costs\ i * Prob\ HF\ events\ i_{stage\ n}$$

Stage	Microalbuminuria	Macroalbuminuria	ESRD
Heart Failure	$454	$769	$1.730

Results

The estimated results are presented per patient in time horizon of 37 years, using an exchange rate of COP$4.061 Colombian pesos per US dollar (USD) for the year 2024, comparing two strategies for managing CKD and T2D, standard treatment and standard treatment + Finerenone.

Table 2. Direct costs análisis of economic burden standard treatment and standard treatment + Finerenone

Costs		Standard Treatment	Standard Treatment + Finerenone	Var.	Var. %
Direct cost of health system	Renal outcomes procedures, hospitalizations and resources	$15.880	$12.664	-$3.216	-$19.5%
	HF Hospitalization	$11.294	$9.468	-$1.826	-$5.8%
	Finerenone	$0	$5.678	-$5.678	NA
Direct cost of out-of-pocket expenses	Medical expenses	$3.413	$3.203	-$210	-5.2%
	No Medical expenses	$6.738	$5.312	-$1.426	-20.4%
Direct cost of Health system		$27.174	$27.809	$625	2.3%
Direct cost of Out-of-pocket expenses		$10.151	$8.515	-$1.636	-16.1%

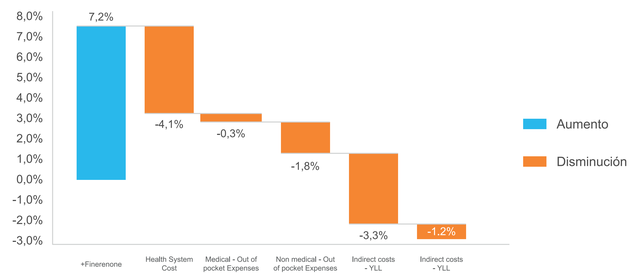
	Standard Treatment	Standard Treatment + Finerenone	Var ($)	Var (%)
Total Direct Costs	$37.325	$36.235	-$1.000	-$2.7%

The indirect costs due to loss of productivity, which correspond to the product of DALYs and the estimated average salary for a person over 40 years old. Using an exchange rate of COP$4.061 Colombian pesos per US dollar (USD) for the year 2024

Table 2. Indirect costs análisis of economic burden standard treatment and standard treatment + Finerenone

Costs		Currently treatment	Currently treatment + Finerenone	Var.	Var. %
Indirect COst (Loss Productivity estimation)	YLL - Years of Life Lost	$28.110	$25.550	-$2.559	-9.1%
	YLD - Years Lived with Disability	$12.994	$12.073	-$920	-7.1%
Total Indirect Costs		**$41.103**	**$37.623**	**-$3.480**	**-8.5%**

Figure 6. Marginal effect of Finerenone treatment alternative compared to standard treatment alone by cost category (% relative to total economic burden)



Conclusions

The inclusion of Finerenone reduces the economic burden of CKD and T2D associated with hospitalization due to HF in 5,7%, equivalent to USD $4.480 per patient in time horizon of 37 years.

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