

The Budgetary Impact of Introducing HDx therapy enabled by Theranova Dialyzer compared to High-Flux Hemodialysis in private sector in the Kingdom of Saudi Arabia

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Introduction

- Theranova** dialyzers are indicated for the treatment of patients in need of chronic or acute hemodialysis.
- HDx** Therapy enabled by **Theranova** dialyzers can provide superior removal of large middle molecules (25kDa to <60kDa) compared to high-flux (HF-HD) hemodialysis (HD) and hemodiafiltration (HDF). Many of these molecules are linked to the development of inflammation, vascular calcifications, cardiovascular disease and all-cause mortality.^{1,2,3}
- HDx** Therapy enabled by **Theranova** dialyzer features an innovative membrane that combines a higher permeability than regular high-flux dialyzers with effective selectively for larger proteins.^{4,5}
- This therapy, where convection and internal filtration take place within **Theranova** dialyzer, opens a new door for dialysis patients, who are believed to benefit form the effective removal of large uremic toxins, as well as for clinics who want to expand dialysis performance without the added burden of HDF.⁶

Objectives

The study assessed the budgetary impact of introducing expanded hemodialysis therapy enabled by **Theranova** dialyzer versus conventional HF-HD in the private sector in the Kingdom of Saudi Arabia (KSA).

Methods

- An excel-based budget impact model was adapted to assess the overall cost of HF-HD patients versus those on **HDx** Therapy enabled by **Theranova** dialyzer over five-years from payers' perspectives, specifically in private sector hospitals.
- The methodology and base case settings are represented in Figure 1 and Table 1, respectively.

Figure 1: Methodology

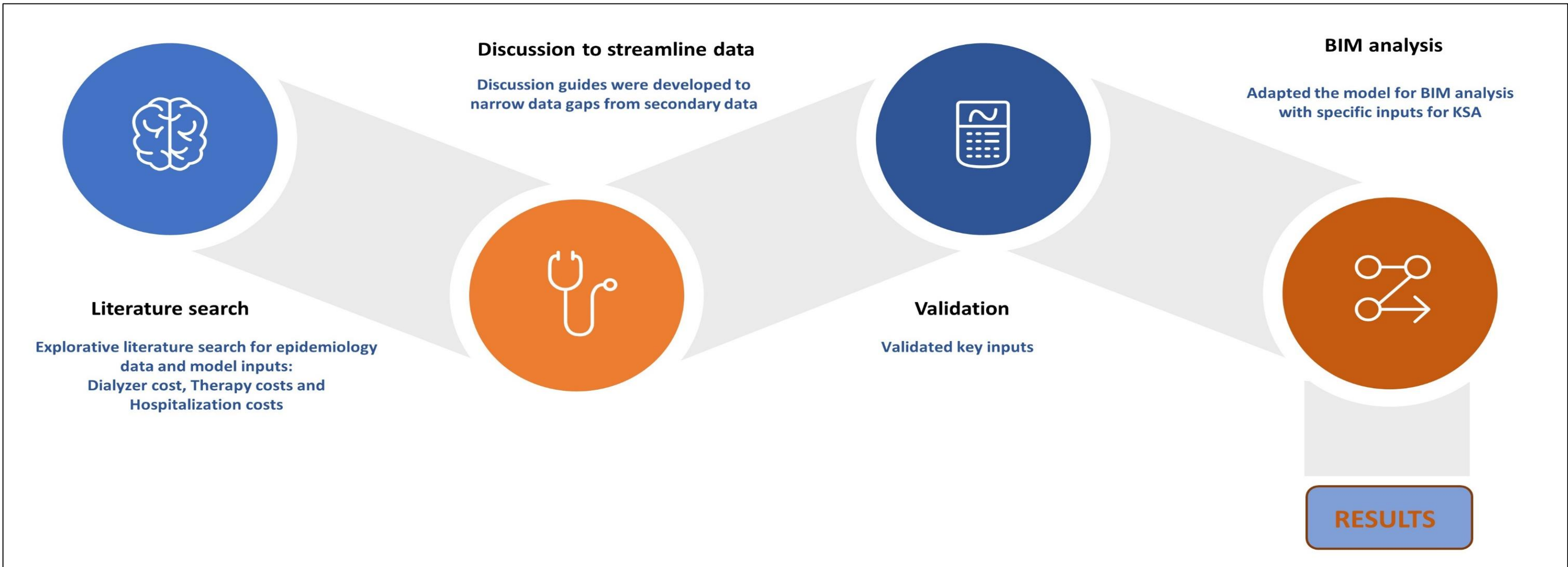


Table 1: Base case settings

Element	Input
Perspective	Private Hospital
Patient Population	ESRD - RRT patients
Intervention	HDx therapy
Comparators	HF-HD
Analytical tool	Microsoft® Excel
Time horizon	5 years
Currency	SAR

Abbreviations: ESKD, End-Stage Kidney Disease HD: Hemodialysis; HDx: Expanded Hemodialysis Therapy; HF, High flux; RRT, Renal replacement Therapy; SAR: Saudi Riyal

- The model inputs included epidemiology data derived from the Saudi Center for Organ Transplantation (SCOT), the unit cost of the healthcare resources used for the management of dialysis related complications, the cost of medications used as well as the costs of **HDx** Therapy enabled by **Theranova** dialyzer and HF-HD dialysis session management in different private hospitals around the kingdom where the number of simulated patients are shown in Table 2. All costs were converted from SAR to USD using conversion rate of 1 SAR = 0.27 USD (as of 30th October 2023).
- For HF-HD, the literature showed that hospitalization mean episodes were 1.02 events per patient per year, which was 45% lower for **HDx** Therapy enabled by **Theranova** dialyzer (Table 3).⁷

Table 2: Model inputs

ESKD Prevalence in the private sector Overtime ^a						
	Baseline year	Year 1	Year 2	Year 3	Year 4	Year 5
ESKD patients in dialysis	3,065	3,218	3,379	3,548	3,726	3,912
ESKD patients in HF-HD	2,605	2,736	2,872	3,016	3,167	3,325
Alternative Scenario Treatments Distribution Hemodialysis Modalities						
	Baseline year	Year 1	Year 2	Year 3	Year 4	Year 5
HF-HD	80%	73%	47%	38%	31%	20%
HDx Therapy	20%	27%	53%	62%	69%	80%

Healthcare resources cost	
Hospitalization	
Hospitalization day cost*	USD 501.66 ^a
Medications	
ESA cost (per Int Unit) ^a	USD 0.01 ^b
Iron cost (per mg)	USD 0.04 ^b

Baseline HD healthcare resources consumption	
Dialyzers	
Dialyzers used (per month) ⁷	13
Hospitalization	
Hospitalization rate (Patient year) ⁷	1.02
Mean episode length of stay (days) ^c	3.5
Medications	
Frequency of ESA usage ⁹	83%
ESA mean dose (International Units per month) ⁹	38,485.94
Frequency of Iron usage ⁹	53%
Iron mean dose (mg per month) ⁹	307.89

Sources: a: IQVIA internal database b: SFDA c: KOL inputs
Abbreviations: ESA: Erythropoietin stimulating agents; ESKD, End-Stage Kidney Disease HD: Hemodialysis;HF, High flux; mg, milligrams; %, Percentage; USD, United States Dollar
Note: *Hospitalization day cost included cerebrovascular accidents, cardiovascular events and Vascular access infection; ^aESA cost included Epoetin alfa, Darbepoetin alfa, Methoxy polyethylene glycol.

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Table 3: Clinical effects

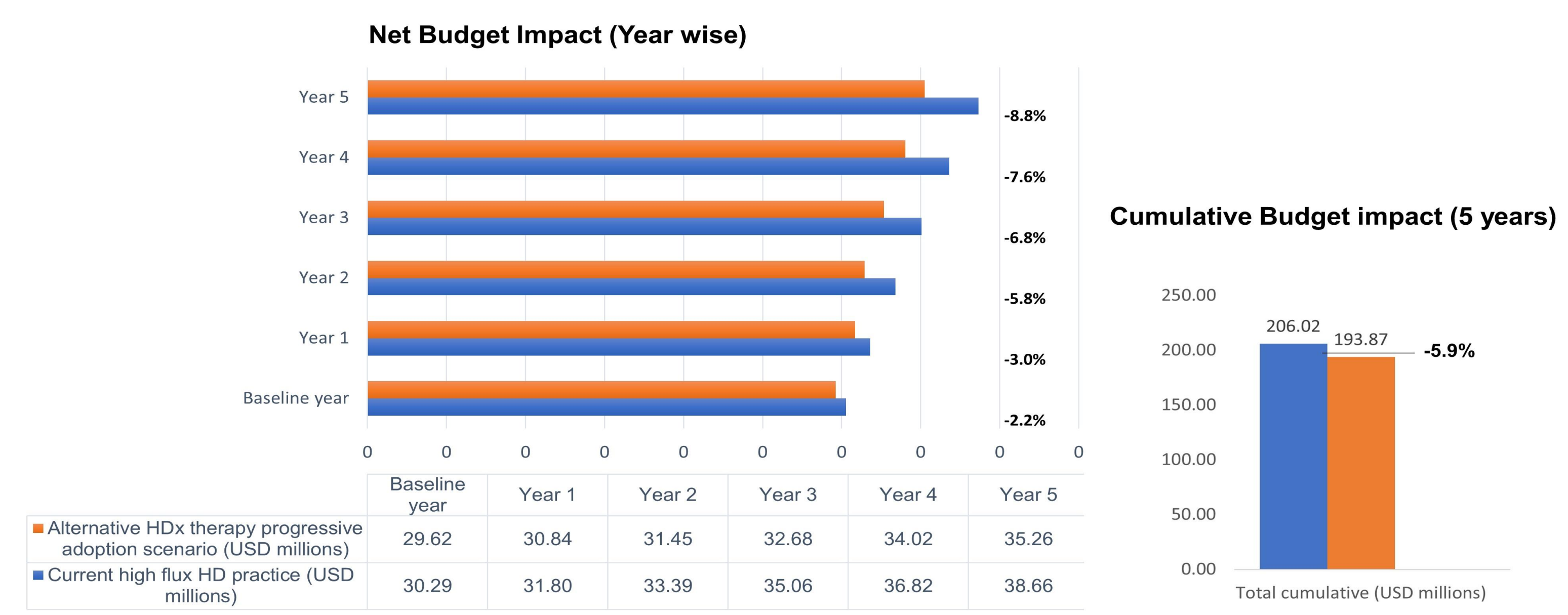
	HD baseline risk	Change after HDx therapy exposure	Variation %
Hospitalization mean episodes ⁷	1.02	-0.46	-45.1%
ESA (mean dosage IU) ¹⁰	181,318	-13,194	-7.3%
Iron (mean dosage mg) ¹⁰	959	-200	-20.9%

Abbreviations: ESA: Erythropoietin stimulating agents; HD: Hemodialysis ; **HDx** Therapy: Expanded Hemodialysis therapy enabled by **Theranova** dialyzer; HF, High flux; IU: International units; mg, milligrams; %, Percentage

Results

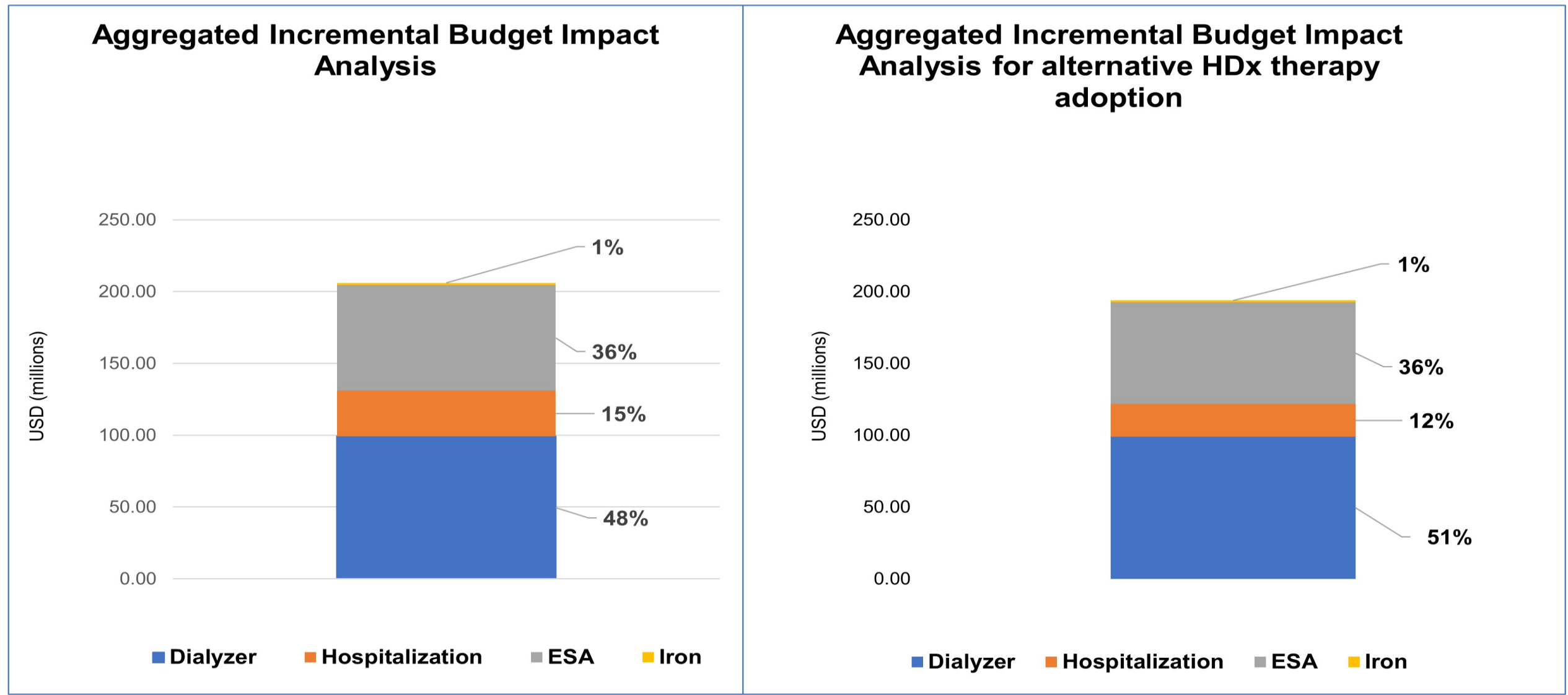
- Total cost of conventional HF-HD Therapy was USD 11,626.20 per patient per year, while the total cost of the alternative **HDx** Therapy enabled by **Theranova** dialyzer was USD 10,347.21 per patient per year.
- Cost savings ranged between 2.2-8.8% on annual basis and cumulative savings of 5.9% with **HDx** Therapy enabled by **Theranova** dialyzer when compared to HF-HD therapy, over 5 years (Figure 2).

Figure 2: Incremental net budget analysis, year wise and cumulative for 5 years comparing current HF-HD therapy versus alternative HDx Therapy enabled by Theranova dialyzer



- Further analysis of the cost burden showed that the costs of hospitalization, dialyzer and the dose of ESA were the major contributors for the overall cost of both current HF-HD therapy and alternative **HDx** Therapy enabled by **Theranova** dialyzer scenario (Figure 3).
- Comparative analysis indicated a potential total net savings of USD 12.15 million over the duration of 5 years with the introduction of **HDx** Therapy enabled by **Theranova** dialyzer driven primarily by the reductions in hospitalization (USD 8.64 million [71%]) followed by reductions in dose of ESA (USD 2.7 million [22%]).
- The overall cost saving of USD 1,278.99 per patient per year was due to reductions in hospitalization and reductions in dose of ESA, USD 918.27 and USD 302.13, respectively.
- Over 5 years, the overall cost savings per patient treated in private sector hospitals was USD 6,394.41.

Figure 3: Net budget analysis of major contributors in cost for HF-HD and HDx Therapy enabled by Theranova dialyzer, for 5 years



Conclusions

- The study showed a potential total net savings of USD 6,394.41 per patient with the use of **HDx** Therapy enabled by **Theranova** dialyzer, over 5 years.
- Providing **HDx** Therapy enabled by **Theranova** dialyzer as an alternative-therapy to HF-HD may reduce hospitalizations and use of medications.
- The economic benefits associated with HD practice in KSA further emphasizes the need for broader usage of different HD modalities.

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Disclosures

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