EE404

Cost Effectiveness of Peritoneal Dialysis Versus Hemodialysis for End-Stage Renal Disease in Turkey

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INTRODUCTION

- Chronic kidney disease (CKD) is a major public health problem that may progress to end-stage kidney disease (ESKD).[1,2]
- Patients with ESKD require renal replacement therapy (RRT), including hemodialysis (HD), peritoneal dialysis (PD), and transplantation.[3]
- In Turkey, HD is the predominant modality, while PD use remains limited.[4]
- Beyond clinical outcomes, the economic impact of dialysis modalities is critical for health policy decisions.
- This study compares PD and HD in Turkey in terms of costs and health outcomes using a cost-effectiveness analysis

OBJECTIVE

The aim of this study was to evaluate the cost effectiveness of PD and HD, used in the treatment of end-stage kidney disease in Turkey, in terms of costs and health outcomes using health economic modelling methods.

METHODS

- A Markov model adapted from a global economic model was developed using Turkish data to evaluate the cost-effectiveness of peritoneal dialysis (PD) compared with hemodialysis (HD). Markov model is presented in Figure 1.
- A global model adapted to Turkey was used to evaluate the cost-effectiveness of peritoneal dialysis (PD) versus hemodialysis (HD).
- The analysis included adult patients with end-stage kidney disease over a 10-year time horizon with a 3% discount rate.
- Inputs were derived from published literature, ERA-EDTA data, and the Turkish Society of Nephrology Registry.
- Costs were assessed from payer and societal perspectives.
- Outcomes included cost per life-year gained, cost per QALY, and ICER.
- Deterministic sensitivity analysis was conducted to explore the impact of parameter uncertainty on model results.

Model Structure

- The model is a **Markov model** that accounts for modality changes during renal replacement therapy.
- The model uses **28-day cycles** and allows transitions between different health states.
- Patients may transition between remaining on the current dialysis modality, switching modality, kidney transplantation, and death.
- The model includes only patients receiving dialysis at baseline, while patients with kidney transplantation at baseline were not included.

Inputs of Model

- Model population consisted of patients with end-stage kidney disease requiring dialysis, based on the **2023 Turkish Society of Nephrology Registry.**
- The base-case analysis used a prevalence-based cohort.
- Clinical parameters, dialysis frequencies, switching probabilities, and complications were derived from published literature.
- Survival inputs were based on ERA-EDTA 2012 Annual Report, while health-related quality-of-life values were obtained from Liem (2008)
- **Cost data were sourced from the local literature** where available, and when not available, **resource use estimates were determined based on expert opinion.**
- Direct costs related to dialysis treatment were estimated using reimbursement prices from the SGK Health Implementation Guideline (SUT).
- Drug costs were calculated based on **SGK reimbursement prices.**
- Costs related to hospitalisations, complications, and kidney transplantation were derived from published literature and available healthcare cost data.

Figure 1. Markov Model Diagram

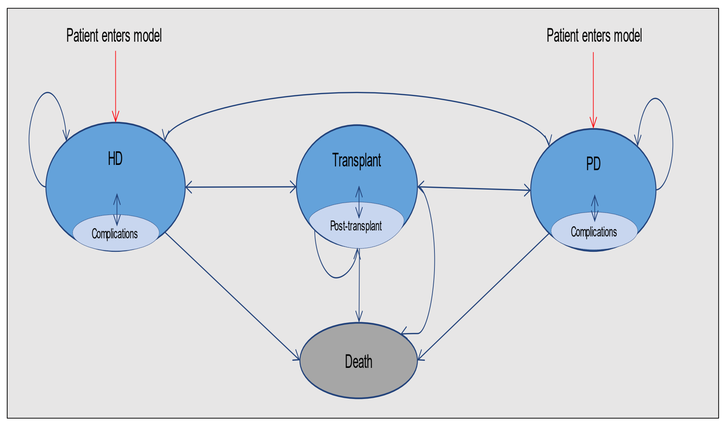


Table 1. Clinical inputs

Parameter	Value
Total patient cohort [5]	67,132
Hemodialysis patients	63,454
Peritoneal dialysis patients	3,678
Dialysis sessions per week	
Hemodialysis[6]	3
Peritoneal dialysis[7]	7
Annual kidney transplantation rate[5]	0.0216
Utility values[8]	
Hemodialysis	0.56
Peritoneal dialysis	0.58
Kidney transplantation	0.81
Hospitalisation probability (28-day)[9,10]	
Hemodialysis (Year 1)	7.05%
Peritoneal dialysis (Year 1)	6.69%

Table 2. Summary costs

Cost Category	PD (USD)	HD (USD)
Direct Costs		
Catheter insertion cost	$74.54	$87.36
Dialysis session cost	$58.62	$126.58
Weekly medication cost	$37.46	$55.65
ESA	$9.82	$12.36
Antihypertensive drugs	$0.78	$0.58
Phosphate binders	$3.13	$3.13
Iron preparations	$19.23	$33.65
Vitamin D	$1.47	$1.88
Secondary hyperparathyroidism drugs	$3.04	$4.05
Hospitalization cost	$205.26	$190.85
Non-hospitalization medical costs	$22.48	$9.54
Kidney transplantation cost (living donor)	$9,030.51	$9,030.51
Kidney transplantation cost (deceased donor)	$15,882.44	$15,882.44
Post-transplant annual follow-up cost	$2,056.50	$2,056.50
Indirect Costs		
Transportation cost (monthly)	$14.29	$4.52
Electricity and water cost (per HD session)	–	$1.19

Fx Rate: 1 USD = 43.0227 TRY. (Jan 2, 2026)

RESULTS

Cost Effectiveness Analysis

- The cost-effectiveness of peritoneal dialysis (PD) versus hemodialysis (HD) was evaluated over a 10-year time horizon using a base-case analysis.
- In the head-to-head comparison, Scenario 1 assumed 100% PD while Scenario 2 assumed 100% HD.
- Results showed that **PD dominated HD, indicating lower total costs and higher clinical outcomes.**
- Over 10 years, **total cost per patient was lower for PD (USD 79,913) compared with HD (USD 107,315).**
- PD was associated with higher life-years gained (5.333 vs 5.123) and higher QALYs (3.192 vs 3.008) compared with HD.
- In the base case scenario ICER was negative, indicating that PD is a dominant treatment strategy compared with HD.
- According to WHO cost-effectiveness thresholds based on GDP per capita, PD can be considered a cost-effective treatment option for patients with end-stage kidney disease.

PD saves approximately **$27,000 per patient**
PD provides **higher QALYs**
PD is a **dominant strategy vs HD**

Table 3. Cost-Effectiveness Analysis Results per Life-Year Gained (LYG)

	Total Cost (USD)	Incremental Cost (USD)	Life Years Gained	Incremental Life Years	ICER
Scenario 1 (PD)	$79,913.60	- $27,401.34	5.333	0.209	Dominant
Scenario 2 (HD)	$107,318.95		5.123		

Fx Rate: 1 USD = 43.0227 TRY. (Jan 2, 2026)

Table 4. Cost-Effectiveness Analysis Results per QALY

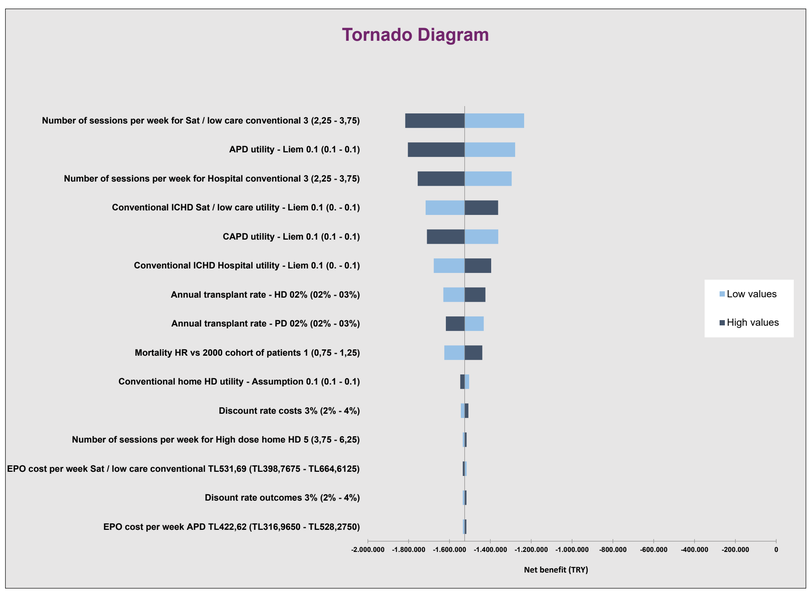
	Total Cost (USD)	Incremental Cost (USD)	QALY	Incremental QALY	ICER
Scenario 1 (PD)	$79,913.60	- $27,401.34	3.192	0.184	Dominant
Scenario 2 (HD)	$107,318.95		3.008		

Fx Rate: 1 USD = 43.0227 TRY. (Jan 2, 2026)

Sensitivity Analysis

- Sensitivity analysis was conducted to explore the impact of parameter uncertainty on model results.
- All model **input parameters were varied by ±25% to test** the reliability of the results.
- The analysis was conducted using a **simulation of 1,000 patients**.
- **Results were presented using a tornado diagram**, illustrating the sensitivity of model outcomes to changes in input parameters.
- The **most influential parameters were** weekly dialysis session frequency and APD utilization, while the least influential parameters were the discount rate and weekly EPO use.

Figure 2. Tornado Diagram



Abbreviations: *CKD, Chronic Kidney Disease; ESKD,* end-stage kidney disease; RRT, Renal replacement therapy; *PD, Peritoneal dialysis; ERA/EDTA, European Renal Association/European Dialysis Transplantation Association; QALY, Quality Adjusted Life Years;.ICER, Incremental Cost Effectiveness Ratio, SGK, Social Securiy Institution; SUT, Health Implementation Guideline; ESA, WHO, World Health Organization; GDP, Gross Domestic Product; LYG, Life Year Gained; APD, Automated Peritoneal Dialysis; EPO, Erythropoietin.*

DISCUSSION

- This study evaluated the **cost-effectiveness of peritoneal dialysis (PD) vs hemodialysis (HD)** in Turkey. Results showed that **PD provides lower costs and better health outcomes**, indicating a **dominant strategy**.
- However, **PD utilization remains low in Turkey**, highlighting the need to better understand **barriers to uptake.**
- Even **modest increases in PD utilization** may lead to **significant reductions in healthcare expenditures over 10 years**, highlighting the **economic value of policies promoting PD**.
- Further research may help identify **clinical, organizational, and patient-related factors** influencing PD adoption in routine practice.

CONCLUSION

- This study evaluated the **cost-effectiveness of peritoneal dialysis (PD) compared with hemodialysis (HD)** in patients with end-stage kidney disease in Turkey.
- The results of the economic model showed that **PD is a dominant treatment strategy**, providing **lower costs and improved health outcomes** compared with HD.
- Scenario analyses demonstrated that **increasing the utilization of PD** could generate **substantial cost savings** for the healthcare system.
- Depending on the scenario, increasing the **PD share from the current 5% to 8–20%** could lead to **significant public savings over a 10-year period.**
- These findings suggest that **expanding the use of PD** may improve both the **economic efficiency of the healthcare system** and **patient outcomes in Turkey.**

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