Cost Utility Analysis of End-Stage Renal Disease Treatment Choices (ETC) Model for Chronic Maintenance Dialysis in the United States

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Background

- For eligible patients, renal transplant remains the most cost-effective treatment for end-stage renal disease (ESRD); however, limited availability of donor organs requires many patients with ESRD to rely on dialysis for chronic maintenance of their disease[1]
- Though the cost of in-home compared to in-center dialysis remains uncertain, home dialysis is associated with comparable or better health outcomes[2,3]
- Approximately 12% of dialysis recipients are treated at the patient's home, yet 85% with end-stage renal disease are eligible for home dialysis.[1,4]
- The proposed ETC model includes home dialysis payment adjustments (HDPA) and performance payment adjustments (PPA), which are predicted to yield a net total savings of $185 million in Medicare spending over 6 years.[5]
- We performed a cost-effectiveness of the ETC Model compared to current reimbursement practices for renal dialysis treatment.

- **From the health system perspective, the ETC Model is cost-effective, with an ICER = $67,500***
- **From the societal perspective, the ETC Model is the dominant strategy which was cost-saving and produced more incremental QALYs across all one-way sensitivity analyses**

** Deterministic results, care value assessed based on a willingness-to-pay threshold of $100k – 150k*

Figure 1. Markov Model

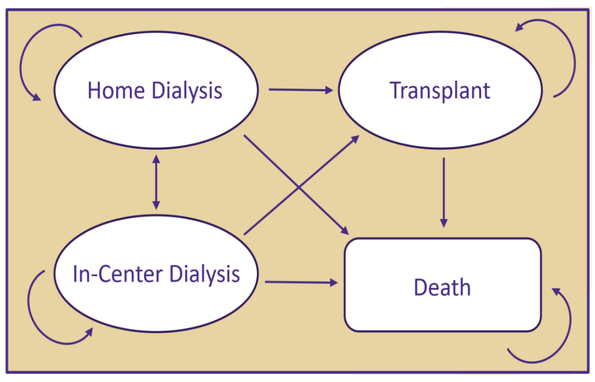


Table 1. Model Assumptions

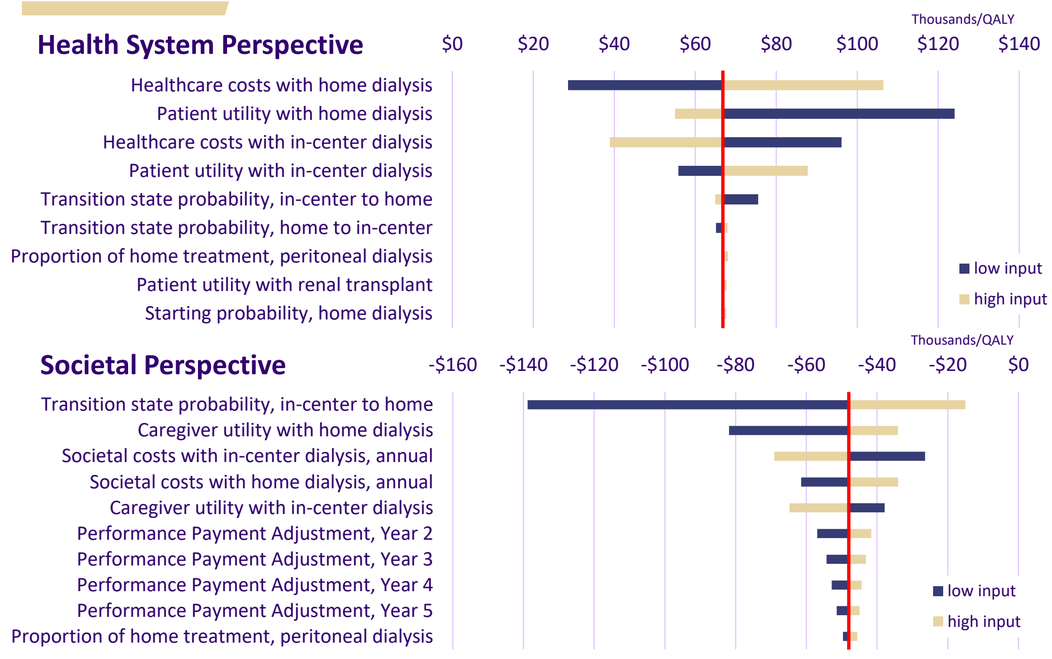
- 3% in-center to home transition probability[5]
- Adverse events equal between strategies[3]
- Transplantation is curative[3]
- Exclusion of pediatric cases and cases of acute renal failure requiring RRT from model[3]
- Annual cycle length over a lifetime horizon with a 3% discount rate for costs and outcomes
- Home dialysis includes hemodialysis and peritoneal dialysis
- Additional tunnel state for entry into home dialysis state created to costs associated with state transition
- No significant transition from in-center to home dialysis before ETC Model implementation
- Input parameters varied by 15% where uncertainty range unknown in one-way sensitivity analysis

Table 1. Key Model Inputs

Input	Point Estimate	Range
Starting probability		
In-center dialysis	0.882	0.750, 1.00
Home dialysis	0.118	0.100, 0.136
Transition state probabilities		
Starting from in-center dialysis		
Transition to home dialysis	0.00	± 15%
Transition to home dialysis (ETC)	0.03	± 15%
Staying on in-center dialysis	0.709	± 15%
Transition to transplant	0.035	± 15%
Progression to death	0.256*	± 15%
Starting from home dialysis		
Transition to in-center dialysis	0.257	0.18, 0.271
Staying on home dialysis	0.452	± 15%
Transition to transplant	0.035	± 15%
Progression to death	0.256*	± 15%
Starting from transplant		
Transition to home dialysis	0.00	± 15%
Transition to in-center dialysis	0.00	± 15%
Staying in transplant	0.943	± 15%
Progression to death	0.057*	± 15%
Health Utility (Health System)		
In-center dialysis	0.690	0.59, 0.80
Home dialysis	0.760	0.62, 0.83
Transplant	0.820	0.74, 0.90
Health Utility (Societal)		
In-center dialysis	1.563	1.33, 1.80
Home dialysis	1.600	1.36, 1.83
Transplant	1.748	1.49, 2.00
Cost (Health System)		
In-center dialysis	$90,971.30	± 15%
Home dialysis	$78,115.14	± 15%
Transplant	$34,780.40	± 15%
Cost (Societal)		
HDPA	3%	0%, 3%
PPA	0%	-13%, 10%
Home dialysis, upfront cost	$5,347.35	± 15%
Home dialysis, annual costs	$129,374.05	± 15%
In-center dialysis, annual costs	$126,929.53	± 15%
Transplant, annual Rx costs	$604.18	± 15%

*Input varies by year and treatment modality, last value carried forward method used for imputing missing data

Figure 2. One-way Sensitivity Analyses



Conclusion

- The implementation of the ETC Model in changing the reimbursement for maintenance dialysis among adult patients with ESRD in US Medicare patients is cost-effective from both the health system and societal perspectives
- From the health system perspective, healthcare costs with home dialysis and patient utility with home dialysis were the most influential parameters in the overall ICER range of the ETC Model ($4,267 - $124,036/QALY)
- Limitations include model assumptions and potential presence of confounding by disease severity in treatment site-specific transition state probabilities
- Future research characterizing the impact of ESRD on caregivers by treatment site is needed

References

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