The End-stage Renal Disease (ESRD) Prospective Payment System (PPS) and Access to Care: Incremental Distance Traveled by Displaced Patients

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http://www.medpac.gov/chapters/Mar09_CH02b.pdf

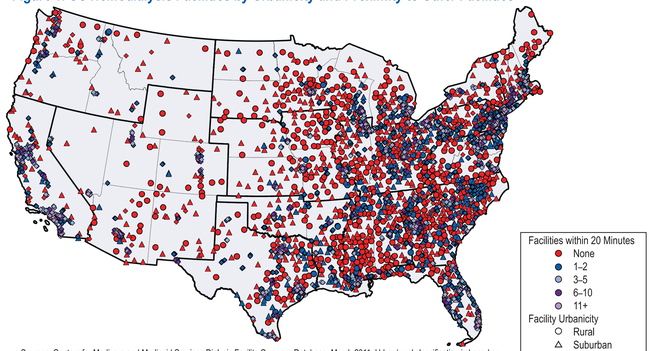
INTRODUCTION

- There are ~5500 ESRD providers in the United States (US), serving approximately 400,000 dialysis patients.[1,2]
- Analysis of the new PPS indicates a reduction of Medicare income for dialysis facilities, with expected losses of:[3]
  - ≥ 5% for 40% of facilities.
  - ≥ 10% for 20% of facilities.
- Rural facilities may be at greater risk of closure, as Medicare margins for these facilities are typically negative and declining.[4]
- Facility closures often reduce access to care, as displaced patients seek alternative sites for care.
  - When facilities close, geographic access is uneven across communities with greater impact on rural vs urban communities.[5]
  - Approximately 25% of US dialysis facilities operate in areas where the next nearest dialysis center is > 20-minute drive away (Figure 1).

OBJECTIVE

- The primary aim of this retrospective modeling study was to estimate how potential dialysis facility closures may affect both the distance traveled and travel time spent by patients for dialysis care.

Figure 1. US Hemodialysis Facilities by Urbanicity and Proximity to Other Facilities



Sources: Centers for Medicare and Medicaid Services Dialysis Facility Compare Database, March 2011. Urban/rural classification is based on the US Department of Agriculture Rural–Urban Commuting Area (RUCA) codes corresponding to each facility's zip code.

METHODS

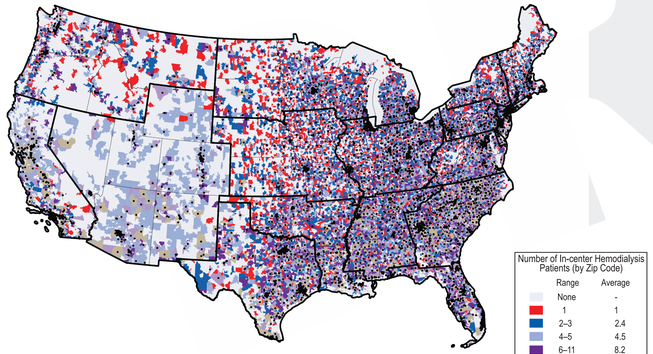
Study Design

- Hemodialysis patient travel time and distance from their homes were modeled to an original and replacement facility using:
  - Dialysis facility locations and characteristics from US government websites.[1,6]
  - Patient location by zip code data from the ESRD Networks.[2]
- Data were limited to patients and in-center hemodialysis facilities located in the 48 continental states, excluding University-affiliated and government-run clinics.
  - After applying the exclusion criteria, a cohort of 5114 in-center dialysis facilities eligible for possible closure were included in the modeling analysis.

Analysis

- Since patient-level data were unavailable, three assumptions were made to estimate travel distances to replacement dialysis:
  1. **Patient Residence:** Estimated from zip code level data.
  2. **Original Dialysis Facility:** Most patients used the dialysis facility closest to their home.
  3. **Replacement Dialysis Facility:** Most patients would choose the next closest facility to their residence.
- Home addresses and dialysis facility locations were geocoded using Microsoft MapPoint 2010 and GPS Visualizer software.
- Driving distances and times were calculated from patients' home to their two closest facilities using custom software developed in Microsoft MapPoint 2010 and Wolfram Mathematica 8.
- Incremental travel distance/time was the difference between travel distance/time to the replacement facility vs to the original facility.
- Two analyses were conducted:
  1. Descriptive analysis of patient travel distances and times, nationally and by region, and urban vs rural.
  2. Cumulative effects on patient travel in a scenario of 50 facility closures per year over the next 3 years (2012–2014), based on national averages of patient travel and patients per facility, stratified by urbanicity.

Figure 2. Geographic Availability of Hemodialysis Facilities and Locations of Hemodialysis Patients



Sources: Centers for Medicare and Medicaid Services Dialysis Facility Compare Database, March 2011. National Patient Prevalence Report to calculate patient density by zip code.

RESULTS

Incremental Travel Effects: Heavy Burden for Rural Patients

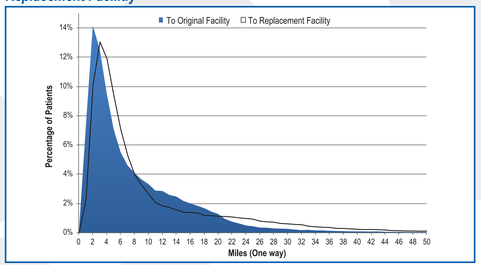
- The average patient would travel an additional 2.7 miles for each one-way trip, or an additional 756 miles per year (Table 1).
- The average rural/suburban patient would travel an additional 12.7 miles per treatment (one way), or 3,556 additional miles per year.
- There would be a shift to longer travel distances for most patients, regardless of current travel distance (Figure 3).

Table 1. Incremental Distances Traveled

	Mean Incremental Miles Traveled	
	Per Treatment (One Way)	Per Patient Per Year
Total	2.7	756
Rural/Suburban	12.7	3,556
Urban	0.3	84

Miles per year is based on 140 average annual treatments per patient (round-trip mileage), derived by dividing total annual hemodialysis treatments from the 2009 Cost Reports[7] by total patients.

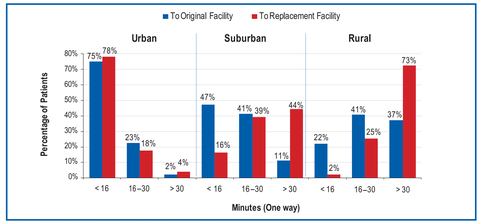
Figure 3. Distribution of Patient Travel Distance to Original Versus Replacement Facilitiy



Travel Times for Rural Patients

- Travel times would greatly increase for rural patients (Figure 4).
  - 78% of rural patients travel ≥ 16 minutes one way to their original facility compared with 98% to a replacement facility.
  - 72% of rural patients would have to travel > 30 minutes one way to a replacement facility.

Figure 4. Distribution of Patient Travel Time by the Rural/Urban Status of the Patient Residence



Travel time to replacement facility was shorter for some patients.

Regional Differences with Rural Implications

- Travel for dialysis differs by:
  - Region of the country, with the lowest travel distances in the Northeast and the highest in the South Central states (Figure 5).
  - ESRD Network regions, with the percentage of patients who would need to travel > 30 minutes each way to a replacement dialysis facility ranging from 2% in region 3 (New Jersey) to > 30% in regions 12 (Heartland) and 15 (Intermountain) (Figure 6).
- Regions and networks with the longest patient travel also have disproportionately high percentages of rural and suburban patients.

Figure 5. Mean Patient Travel Distances by Region

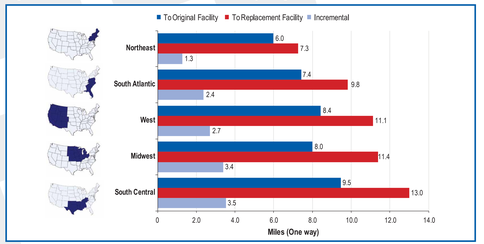
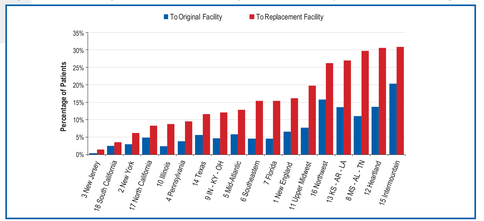


Figure 6. Percentage of Patients Traveling > 30 Minutes, by ESRD Network Region



Cumulative Travel Effects

- Nearly 10,000 patients could be displaced over the next 3 years by facility closures (Table 2).
- The cumulative additional travel burden on patients displaced could be 15 million miles, of which > 13 million would be traveled by patients in rural/suburban locations.

Table 2. Patients Affected if 150 Facilities Close/Consolidate, 2012–2014

	2012	2013	2014
Facility Closures (Cumulative)			
Total	50	100	150
Rural/Suburban	14	28	42
Urban	36	72	108
Displaced Patients (Cumulative)			
Total	3,326	6,652	9,978
Rural/Suburban	626	1,252	1,878
Urban	2,700	5,400	8,100

The number of facility closures in rural and urban areas was assumed to be in proportion to the current makeup of the dialysis landscape.

DISCUSSION

- Increased travel could have significant implications for patient health outcomes and quality of life.
  - Previous studies have reported that patients traveling ≥ 16 minutes (one way) for dialysis have lower quality of life and higher mortality rates.[8]
- Longer travel time can increase the financial burden for patients and their families,[9] by increasing direct and indirect medical costs. These costs include higher transportation cost, lost productivity, and time and wage loss for family members.
- Monitoring of geographic-access challenges for patients associated with closures could best be focused on the more rural ESRD Networks regions (eg, Networks 8, 12, 13, 15).
- The calculations of travel distance and time to the original facility were validated against similar estimates in recent literature on patient travel for dialysis services in the US.[4,8]
  - Several alternative patient-to-facility allocation models were developed for sensitivity testing. The model/results presented here were more conservative than the alternative models.

Limitations

- The analysis presented here is based on population-level data.
  - Exact patient location was not known and assumptions and modeling techniques were required to estimate patient residence and dialysis facility preference.
- Estimates of incremental travel did not factor in new facility construction. Additional facilities could mitigate the effects of closures on travel for some patients.
- Estimates may be conservative. The number of rural facilities affected could be higher, as rural facilities appear to be at greater risk. Patient travel to replacement facilities was based on the minimum distance needed to travel.

CONCLUSIONS

- Dialysis facility closures and increased travel for patients could have significant implications for clinicians, policy makers, and patients, especially in rural/suburban areas. This could exacerbate existing disparities in the dialysis system.
- Further research is needed to evaluate the effect of travel distance on treatment outcomes.
- An unintended consequence of a bundled cost containment system may be an impact on patient transportation and cost.

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