

Hospital Admissions following Long and Short Interdialytic Intervals among Hemodialysis Patients

Tricia L. Roberts, MS, Robert N. Foley, MD, David T. Gilbertson, PhD, Allan J. Collins, MD

United States Renal Data System, Minneapolis Medical Research Foundation, University of Minnesota Twin Cities

Introduction

- An increased risk of cardiovascular (CV) hospital admissions after the long (2-day) interdialytic interval among hemodialysis (HD) patients has recently been reported.
- We assessed this association among a large, current cohort of Medicare HD patients, with additional analysis of all-cause admissions, infectious admissions, and the short (1-day) interdialytic interval.

Methods

- Data included 162,672 U.S. Medicare adult prevalent HD patients on January 1, 2010, alive on January 31, receiving HD three times weekly on a Monday/Wednesday/Friday or Tuesday/Thursday/Saturday schedule, and without a bridge hospitalization spanning the start of follow-up.
- HD schedule was determined from Medicare claims from January 18 to 31, 2010. Patients were excluded with an unscheduled or missed HD session during this two-week period.

- Included patients had Medicare Parts A and B coverage, were U.S. residents, and were age 20 years and older.
- Follow-up for hospital admissions began on February 1, 2010, and continued until censoring at death, modality change, end of Medicare payer status, recovery of renal function, deviation from HD schedule not during a hospital stay, loss to follow-up, or December 31, 2010.
- Infectious and CV admissions were determined by principal ICD-9-CM diagnosis codes.
- Admission rates by day of the dialysis week were adjusted using the Poisson model and direct adjustment:
 - Rates for all patients and by ESRD duration were adjusted for age, gender, race, Hispanic ethnicity, and primary diagnosis.
 - Rates by age, gender, and primary diagnosis were adjusted for the other four factors.
 - Rates by race and ethnicity were adjusted for age, gender, and primary diagnosis.

- HD₁, HD₂, and HD₃ denoted the days with dialysis sessions: Monday, Wednesday, and Friday, or Tuesday, Thursday, and Saturday.
- The days after dialysis were defined as HD₁+1, HD₂+1, and HD₃+1: Tuesday, Thursday, and Saturday, or Wednesday, Friday, and Sunday.
- The second day without dialysis after HD₃ was HD₃+2: Sunday or Monday, respectively.

Results

- All-cause, CV, and infectious admissions by day of the HD week produced a sawtooth pattern with higher rates on the days with an HD treatment (HD₁, HD₂, and HD₃) after the long and short interdialytic intervals than on the preceding and following days (Figs. 1-3).
- For all-cause, CV, and infectious admissions, the highest adjusted rates occurred on HD₁, the day after the long interdialytic interval (respectively, 2,101, 682, and 501 admissions per 1,000 patient years; Figs. 1-3).
- The all-cause admission rate on the day after the long interdialytic interval was 1.5 times the rate on days after the short interdialytic intervals (1,412) and 1.9 times the rate on days without HD (1,093; Fig. 4).

Table 1

Characteristics of included prevalent hemodialysis patients, on January 1, 2010, alive on January 31, and receiving HD three times weekly (N=162,672). Values are column percentages.

	Age	Gender	Race	Ethnicity	Primary cause of ESRD	ESRD duration
	20-39	male	white	Hispanic	hypertension	<4 yrs
	40-64	female	black	non-Hispanic	diabetes	4-9 yrs
	65+	other	Hispanic	non-Hispanic	glomerulonephritis	>9 yrs
					other	<4 yrs
					other	4-9 yrs
					other	>9 yrs
					other	>9 yrs

Figure 2

Adjusted cardiovascular admission rates on different days of the hemodialysis week, by age, 2010.

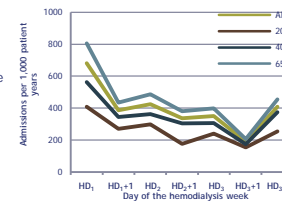


Figure 4

Adjusted annualized all-cause admission rates, on days after the long and short interdialytic intervals and days without dialysis, by patient demographics, 2010.

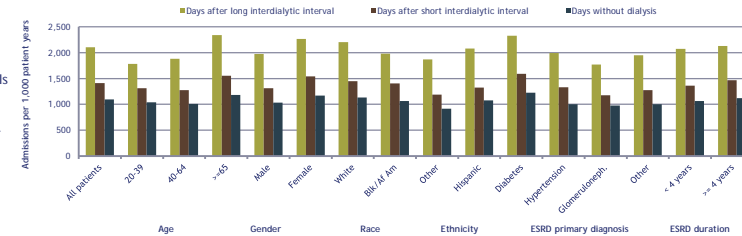


Figure 1

Adjusted all-cause admission rates on different days of the hemodialysis week, by age, 2010.

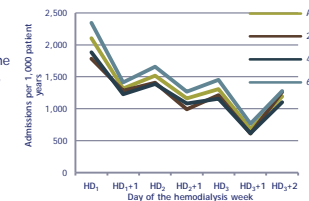
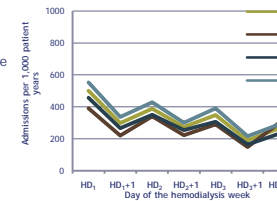


Figure 3

Adjusted infectious admission rates on different days of the hemodialysis week, by age, 2010.



- Patterns were consistent across demographic groups: admission rates were highest on the days after the long interdialytic interval, followed by the days after the short interval, and were lowest on days without dialysis (Fig. 4).

Conclusions

- The days after the long and short interdialytic intervals among HD patients were associated with elevated all-cause and infectious admissions in addition to CV.
- Results suggest a potential need to further evaluate the U.S. standard frequency of HD treatments.