

Mortality following Long and Short Interdialytic Intervals among Hemodialysis Patients

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Introduction

- Increased mortality risk following the long (2-day) interdialytic interval has recently been reported among thrice-weekly hemodialysis (HD) participants in the End-Stage Renal Disease Clinical Performance Measures Project.
- Associations between mortality and long and short (1-day) interdialytic intervals have not yet been assessed in the most recent Medicare cohort.

Methods

- We studied 162,679 U.S. Medicare adult prevalent HD patients on January 1, 2010, alive on January 31, and receiving HD three times weekly on Monday/Wednesday/Friday or Tuesday/Thursday/Saturday.
- Medicare claims for hemodialysis from January 18 to 31, 2010, determined the schedule.
- The study included an as-treated analysis with regards to HD schedule; therefore, the study cohort represented those who adhered to consistent scheduled HD treatments without missed or alternative sessions.

- Follow-up began on February 1, 2010, and was censored at modality change, end of Medicare payer status, recovery of renal function, deviation from HD schedule, loss to follow-up, or December 31, 2010.
- Methods assumed that the same HD schedule was maintained during inpatient stays when HD claims were unavailable.
- All-cause, infectious, and CV mortality rates were computed by days of the HD week: HD₁, HD₂, and HD₃ were the first, second, and third HD sessions; HD₁ denoted the day after the long interdialytic interval; and HD₂ and HD₃ were the days after the short intervals.
- Rates were adjusted with 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.

Results

- Table 1 describes patient characteristics: 49% were age 65 and older, and 54% were white, and 54% had ESRD duration of <4 years.
- Patterns of all-cause mortality mirrored CV with the highest rates on HD₁ (174 and 87 deaths per 1,000 patient years, respectively) followed by HD₃ (155 and 70, respectively); Figs. 1 and 2).
- However, infectious mortality was highest on the day after the first HD session (18 deaths per 1,000 patient years; Fig. 3).
- The highest adjusted all-cause mortality rates were observed on the day after the long interdialytic interval within each demographic subgroup (Fig. 4).
- Mortality was higher on the day after the short interdialytic interval than on days without HD overall (151 and 142 deaths per 1,000 patient years) and within each subgroup except those younger than 65 years old, Hispanics, and other primary diagnosis (Fig. 4).
- While mortality rates were higher for ESRD duration ≥4 than <4 years, patterns were similar within each ESRD duration group. The highest rates occurred on the day after the long interval and the lowest on days without HD (for ≥4 years, 199 and 159 deaths per 1,000 patient years; for <4, 155 and 129; Fig. 4).

Table 1

Characteristic	Value	Characteristic	Value
Age	20-39: 7.0	Ethnicity	Hispanic: 15.7
	40-64: 44.4		non-Hispanic: 84.3
	65+: 48.7	Primary cause of ESRD	diabetes: 44.7
Gender	male: 54.8		hypertension: 29.4
	female: 45.2		glomerulonephritis: 9.9
Race	white: 54.4	ESRD duration	other: 16.1
Af. Am.	35.1	<4 yrs	53.9
other	6.4	4+ yrs	46.1

Figure 2

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

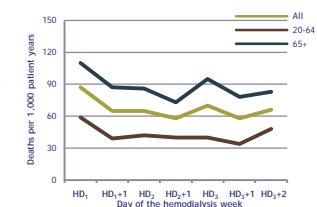


Figure 4

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

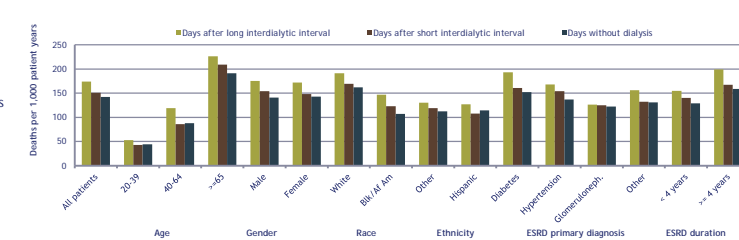


Figure 1

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

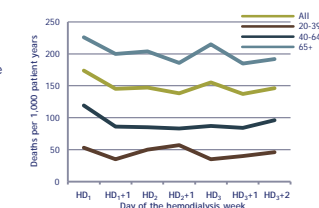
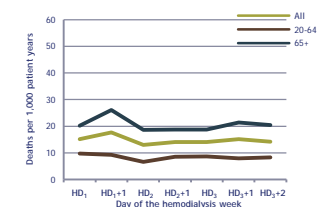


Figure 3

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



Conclusions

- The days after the long and short interdialytic intervals were associated with increased all-cause and CV mortality rates, and the highest rates were on the day after the long interval.
- Compared to all-cause and CV mortality, the peak in infectious mortality was delayed until the second rather than first day after the long interdialytic interval.
- Results support concern regarding association between the 2-day interdialytic interval and elevated adverse outcomes.