

Mortality patterns & day of the week: the United States Renal Data System (USRDS)

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Introduction

- In most conventional intermittent hemodialysis programs, intervals between treatments are typically two, two and three days every week.
- There is concern that the long interval (typically Friday-Monday or Saturday-Tuesday) may place patients at risk, especially those who experience difficulty with fluid and potassium restrictions.
- The objective of this ecological study was to evaluate trends in mortality distribution in US patients on renal replacement therapy on different days of the week.

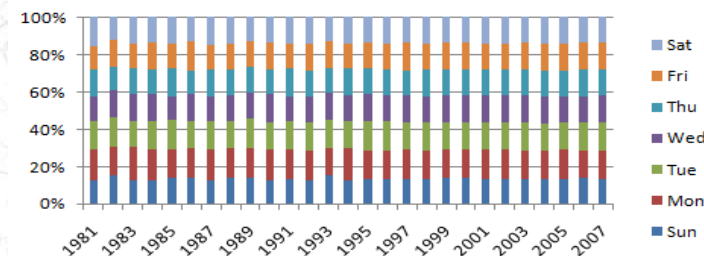
Methods

- We examined all deaths in the USRDS dataset for the years 1980 through 2007.
- The date of death was used to determine the day of the week on which the patient expired.
- Given the expectation that days of the week for death should be randomly distributed, one would expect that 1/7 or 14.29% of all deaths should occur on each day from Sunday to Saturday. The deviation from this expectation was calculated as the $100 \times (\text{observed percentage} - 14.29)/14.29$.

Results

- Although the relative excess narrowed, from 17.4% in 1981 to 7.9% in 2007, it was consistently observed that Monday had the highest proportion of all deaths.
- A similar pattern was observed for Tuesday, with a smaller relative excess than on Monday.
- Mortality was consistently lower on Sundays.

Annual trends in proportion of deaths by day of week



Mortality by day of week, relative percentage deviation from expectation that 1/7th of deaths occur on each day

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Sun	-11.2	7.5	-10.8	-10.6	-2.6	-3.8	-11.5	-3.7	-0.7	-10.3	-4.7	-11.6	5.5	-13.3
Mon	17.4	8.7	24.7	15.0	5.5	15.4	14.8	13.9	9.3	15.3	8.8	12.5	4.5	24.3
Tue	6.2	8.6	-3.1	5.7	10.3	-1.2	7.5	-1.5	13.6	0.2	7.2	5.6	6.2	0.7
Wed	-8.2	0.1	-0.2	4.1	-10.6	0.6	-7.0	-0.4	-5.7	7.4	-6.9	-5.1	0.6	-2.7
Thu	-2.4	-11.5	0.1	-12.1	7.0	-9.9	-1.5	-3.4	-4.6	-7.8	2.8	-0.9	-10.5	-1.5
Fri	-9.8	0.8	-8.4	2.8	-7.6	9.3	-8.6	-5.7	-0.8	-1.6	-5.2	0.9	3.5	-6.1
Sat	7.7	-14.5	-2.5	5.0	-2.2	-10.6	6.1	0.5	-11.3	-3.4	-2.3	-1.6	-9.9	-1.6

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Sun	-4.6	-7.1	-7.6	-7.8	-3.5	-3.8	-7.8	-4.8	-7.9	-8.0	-5.8	-3.9	-6.3
Mon	6.2	9.1	10.7	9.4	6.4	9.0	11.0	8.2	9.2	7.4	8.3	5.1	7.9
Tue	8.9	7.3	1.9	3.6	4.9	2.9	2.4	4.2	2.9	1.5	2.0	4.3	3.3
Wed	-0.7	-0.7	1.7	-3.9	0.0	-2.4	2.1	-1.5	0.7	-0.8	-1.2	-1.2	1.0
Thu	-2.9	-3.5	-6.2	0.2	-4.5	-1.7	-3.7	-2.2	-2.6	-0.4	-2.3	-0.8	-3.2
Fri	-0.5	-3.6	3.6	-3.3	2.5	0.1	-1.8	-2.2	1.4	1.5	-1.4	-0.2	1.4
Sat	-6.6	-1.7	-4.4	1.5	-6.1	-4.2	-2.4	-1.9	-3.8	-1.5	0.1	-3.5	-4.2

Conclusions

- Day-to-day mortality appears to differ substantially in RRT patients in the US, compatible with the hypothesis that long interdialytic intervals may have adverse consequences.