

# Mortality trends in transplant-listed dialysis patients vs. the general population in the United States, 2000-2009

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## Introduction

- Apparently encouraging survival gains continue to accrue in the US dialysis population. It is unknown, however, whether these salutary trends reflect improving survival in the general population or differences in comorbidity in the dialysis population.
- As exclusion of serious ongoing medical issues is a prerequisite for transplant listing, survival comparisons by mode of dialysis in listed patients has the potential to mitigate the confounding effect of non-constant evolution of comorbidity burdens.
- Hence, we compared annual dialysis mortality estimates from the time of first listing for transplantation in the United States between 2000 and 2009 using expected mortality rates from the general population as reference point.

## Objectives

- To compare actual/expected (from general population) mortality ratios among dialysis patients placed on the transplant waiting list dialysis in the US between 2000 and 2009.

## Methods

- USRDS standard analytical files were used to select dialysis patients, without a previous transplant, first placed on the transplant wait-list in the index years.
- Follow-up began at the day of listing and ended at the earliest occurrence of death, renal transplantation or one year of follow-up.
- To calculate expected mortality rates, general population annual mortality rates from 66 possible subgroups were used. These 66 subgroups consisted of 11 age groups, 2 gender groups and 3 race-ethnicity groups (White, Black, Hispanic).
- Poisson regression was used to calculate actual mortality rates in dialysis patients.
- For reference purposes, all analyses were repeated in the overall prevalent dialysis populations.

## Results

- Compared to 2000, patients listed in 2009 were older and more likely to be male, African American, Hispanic, diabetic, hypertensive, on dialysis >1 year and to be on hemodialysis (Table 1).
- Actual/expected mortality ratios in the listed population declined from 6.4 to 4.9 between 2000 and 2009. Ratios declined in all subgroups except those of Hispanic ethnicity (Figure 1).
- Less marked declines were also seen in actual/expected mortality ratios in the overall dialysis population. Ratios declined in all subgroups studied (Figure 2).

Table 1  
Dialysis patient characteristics, 2000 vs 2009

	List		All	
	2000	2009	2000	2009
	27,639	18,165	93,353	112,017
	Column %			
< 15 yrs	1.1	1.5	0.6	0.5
15-24.9 yrs	34.8	29.6	14.5	12.4
25-64.9 yrs	52.9	53.3	35.1	38.2
≥ 65 yrs	11.2	15.5	49.8	48.9
Male	59.4	61.7	53.5	56.7
Female	40.6	38.3	46.5	43.3
White	51.0	41.8	56.6	55.5
African American	32.9	36.1	29.5	29.4
Hispanic	16.1	22.1	14.0	15.1
Diabetic ESRD	38.9	41.7	45.3	45.0
Hypertensive ESRD	21.6	23.6	26.9	28.8
Other ESRD	39.5	34.6	27.8	26.1
≤ 1 yr on dialysis	48.8	47.8	0.0	0.0
> 1 yr on dialysis	51.2	52.2	0.0	0.0
Hemodialysis	82.8	86.1	91.7	93.6
Peritoneal dialysis	17.2	13.9	8.3	6.4

Table 2  
Mortality rates, per 100 person-years in US dialysis patients, 2000 vs. 2009

	Mortality rate 2000	Mortality rate 2009	% Decrease	
			Unadjusted	Adjusted
Transplant List				
Actual	5.8 (5.4, 6.3)	4.4 (4.1, 4.8)	23.9 (15.3, 31.6)	24.2 (15.3, 32.1)
Expected	0.9	0.6	-	-
Overall Dialysis				
Actual	29.2 (28.8, 29.5)	25.5 (25.2, 25.8)	12.5 (10.9, 14.0)	14.4 (12.8, 16.0)
Expected	2.8	2.6	8.8	-

Adjustment for age, sex and race-ethnicity.

Figure 1  
Actual/expected mortality ratios in listed patients

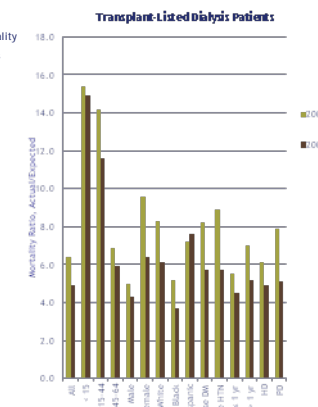
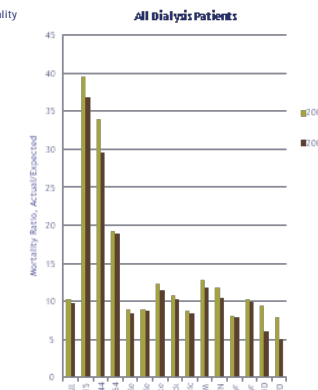
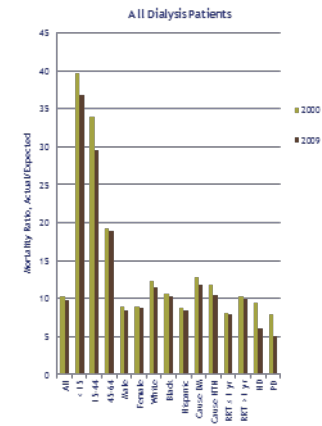


Figure 2  
Actual/expected mortality ratios in all patients



## Conclusions

- Improvements in mortality in dialysis patients are accruing more rapidly than in the general population, suggesting that general population trends are not responsible.
- The survival improvement is especially marked in dialysis patients placed on the transplant list. As exclusion of serious ongoing medical issues is a pre-requisite for transplant listing, case mix differences are unlikely to be responsible.



<p>Mode of Dialysis at Listing</p> <table border="1"> <thead> <tr> <th>Yrs on rrt</th> <th>HD (85.6%)</th> <th>PD</th> </tr> </thead> <tbody> <tr> <td>&lt; 15</td> <td>0.7</td> <td>6.7</td> </tr> <tr> <td>15-44</td> <td>30.0</td> <td>35.0</td> </tr> <tr> <td>45-64</td> <td>54.5</td> <td>47.3</td> </tr> <tr> <td>65+</td> <td>14.8</td> <td>11.1</td> </tr> <tr> <td>Female</td> <td>37.6</td> <td>44.2</td> </tr> <tr> <td>Diabetic: ESRD</td> <td>41.9</td> <td>33.0</td> </tr> <tr> <td>Initial PD</td> <td>2.6</td> <td>75.4</td> </tr> <tr> <td>&gt; 1 yr on dialysis</td> <td>55.3</td> <td>45.9</td> </tr> </tbody> </table> <p>P = 0.001 for all HD Vs: PD comparisons</p>		Yrs on rrt	HD (85.6%)	PD	< 15	0.7	6.7	15-44	30.0	35.0	45-64	54.5	47.3	65+	14.8	11.1	Female	37.6	44.2	Diabetic: ESRD	41.9	33.0	Initial PD	2.6	75.4	> 1 yr on dialysis	55.3	45.9
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<p>TABLES: Please do not use the space bar to align numbers in columns; the numbers will not print properly. If you aren't sure how to set the tabs to create columns, just ask Ed or Sue; we'll be happy to show you.</p>																												