Enrollment of Hemodialysis Patients in an Integrated Pharmacy Management Program Is Associated With Reduced Mortality

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Introduction

- DaVita Rx is a specialty dialysis pharmacy service that provides individualized prescription reviews for safety and appropriateness (including renal dosing, allergies, and drug interactions), prior authorization assistance, prescription delivery to homes and dialysis facilities, refill management with regular patient reminders, and access to clinical pharmacists for consultation by telephone.
- A recently published study by the Chronic Disease Research Group (CDRG) demonstrated that hemodialysis patients receiving DaVita Rx integrated pharmacy program services had lower rates of death and hospitalization compared to matched controls.[1]
  - In as-treated analyses, a 21% reduction in mortality rates for DaVita Rx enrollees versus control patients was reported for the study period January 2006 to December 2008.
- Ongoing improvements to the DaVita Rx service since its creation in 2005 mean that evaluation of the impact of enrollment on outcomes in a more contemporary patient population is warranted.

Objectives

- To better understand the impact of DaVita Rx, analyses were conducted to assess the overall effect of DaVita Rx enrollment on mortality rates among patients receiving in-center hemodialysis over the time period January 2011 to September 2012.
- In addition, restriction subgroup analyses were conducted to evaluate whether the association between DaVita Rx and mortality differed among patients on angiotensin converting enzyme inhibitors (ACEi) / angiotensin receptor blockers (ARB) and beta blockers.

Methods

- The analysis considered patients receiving in-center hemodialysis at DaVita facilities from January 2011 through September 2012. DaVita Rx patients were considered beginning at the time of DaVita Rx enrollment (index month). Eligible controls were patients who had never enrolled at DaVita Rx. For eligible controls, an index month was selected at random.
- DaVita Rx patients were propensity score-matched (1:2) to control non-DaVita Rx patients on the basis of index month and baseline patient characteristics.
- The primary outcome of interest was death from any cause. Patients were considered at risk beginning in the index month until death or censoring upon transfer of care, withdrawal from dialysis, modality change (including transplant), or end of study (31 September 2012).
- Mortality rates among DaVita Rx patients and matched controls and incidence rate ratios (IRRs) were estimated using Poisson regression. Because DaVita Rx patients and matched controls were well balanced, covariate terms were not included in the models.
  - Estimation was performed in the overall matched cohort, as well as in sub-cohorts defined by baseline use of ACEi and/or ARB, or beta blockers.
  - Additional analyses were performed in which DaVita Rx patients in each of these sub-cohorts were parsed into those who did and did not receive the medication of interest through DaVita Rx.

Results

- A total of 4,949 DaVita Rx patients were matched to 9,898 control patients who were not enrolled in DaVita Rx. Baseline characteristics for the 2 patient cohorts are presented in Table 1. No significant differences between the DaVita Rx and control groups were observed indicating that the groups were well balanced.
- Over the entire study follow-up period, mortality rate was lower for DaVita Rx patients compared to controls (9.3 vs 14.9 deaths/100 patient-years; IRR 0.63; p<0.001; Figure 1 and Table 2).
- The protective association of DaVita Rx was more pronounced among ACEi/ARB (IRR 0.56; p<0.001) and beta-blocker users (IRR 0.60; p<0.001) than for the overall cohort (Figure 1 and Table 3).
- Among patients receiving ACEi/ARB and beta-blockers, risk was lowest among patients who filled the corresponding medication through DaVita Rx, intermediate among patients who were enrolled in DaVita Rx but filled the corresponding medication elsewhere and greatest among non-DaVita Rx controls (Figure 1 and Table 3).

Table 1: Baseline Patient Characteristics

	Control (Non-DRX) (N = 9,898)	DaVita Rx (DRX) (N = 4,949)	P-Value
Age, years (mean)	58.5	58.7	0.53
Female (%)	47.6	47.0	0.47
Race (%)			0.88
African American	45.9	45.2	
Asian	3.1	3.3	
Hispanic	18.5	19.2	
White	28.8	28.7	
Other	3.7	3.6	
Primary cause of ESRD (%)			0.75
Diabetes	44.7	45.2	
Glomerulonephritis	5.8	5.9	
Hypertension	31.9	32.1	
Other	17.62	16.9	
Vintage, months (mean)	3.14	3.10	0.47
Vascular access type (%)			0.29
Arteriovenous fistula	55.2	53.9	
Arteriovenous graft	18.9	19.2	
Central venous catheter	25.9	27.0	
Primary Insurance (%)			0.84
Medicaid	9.2	9.2	
Medicare	81.5	81.7	
No insurance	0.6	0.7	
Other/unknown	8.7	8.5	
Census Region (%)			0.82
Midwest	14.8	14.9	
Northeast	7.3	7.4	
South	17.5	17.6	
South Atlantic	35.8	34.8	
West	24.7	25.3	
CCI score, (mean)	5.2	5.2	0.45
Kt/V, (mean)	1.64	1.64	0.82
Serum albumin, g/dL (mean)	3.9	3.9	0.64
Serum calcium, mg/dL (mean)	9.02	9.02	0.89
Serum phosphate, mg/dL (mean)	5.27	5.28	0.81
Hemoglobin, g/dL (mean)	11.3	11.3	0.95
Number of hospitalized days, (mean)	0.14	0.13	0.85

Abbreviation: CCI, Charlson Comorbidity Index; DRX, DaVita Rx; SD, standard deviation.

Figure 1: Mortality Among DaVita Rx Patients Versus Controls

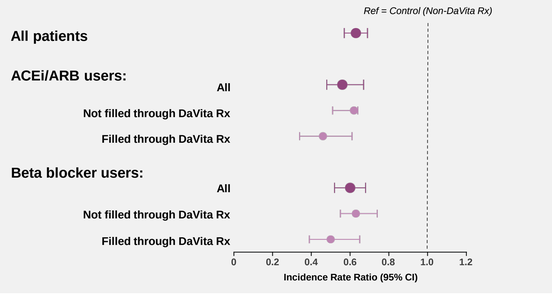

Table 2: Mortality Rates: All Patients

	Control (Non-DRX) (N = 9,898)	DaVita Rx (DRX) (N = 4,949)
Overall		
At-risk time	11,868	5,588
Deaths	1,764	522
Mortality rate	14.9 (14.2-15.6)	9.3 (8.6-10.2)
IRR (95% CI)	1 (ref)	0.63 (0.57-0.69) p < 0.001

Abbreviations: CI, confidence interval; DRX, DaVita Rx; IRR, incidence rate ratio.

Table 3: Mortality Rates: Beta Blocker and ACEi/ARB Users

	Control (Non-DRX)	DaVita Rx (DRX)		
		All DRX Patients in Study	Patient Uses DRX, BUT corresponding medication not from DRX	Patient Uses DRX, AND corresponding medication is from DRX
ACEi/ARB Users				
Number of patients	3,301	1,905	1,278	627
At-risk time	3,964	2,198	1,474	724
Deaths	577	180	132	48
Mortality rate	14.6 (13.4-15.8)	8.2 (7.1-9.5)	9.0 (7.6-10.6)	6.6 (5.0-8.8)
IRR (95% CI)	1 (ref)	0.56 (0.48-0.67) p < 0.001	0.62 (0.51-0.64) p < 0.001	0.46 (0.34-0.61) p < 0.001 p* = 0.07 [a]
Beta Blocker Users				
Number of patients	4,797	2,633	1,918	715
At-risk time	5,733	2,985	2,163	822
Deaths	887	276	212	64
Mortality rate	15.5 (14.5-16.5)	9.2 (8.2-10.4)	9.8 (8.6-11.2)	7.8 (6.1-10.0)
IRR (95% CI)	1 (ref)	0.60 (0.52-0.68) p < 0.001	0.63 (0.55-0.74) p < 0.001	0.50 (0.39-0.65) p < 0.001 p* = 0.11 [a]

p is p-value for difference between DaVita Rx patients receiving drug of interest through DaVita Rx vs DaVita Rx patients receiving drug of interest through another source.
Abbreviations: ACEi, angiotensin converting enzyme inhibitor; ARB, angiotensin receptor blocker; CI, confidence interval; DRX, DaVita Rx; IRR, incidence rate ratio.

Conclusions

- DaVita Rx enrollment was associated with a 37% reduction in mortality rate among patients receiving in-center hemodialysis over the period January 2011 to September 2012.
  - The magnitude of the protective DaVita Rx-mortality association was greater than that observed in the previously published CDRG study.
  - This difference may be related to improvements in DaVita Rx service that occurred between the 2 study periods.
- Reductions in mortality for DaVita Rx patients compared to controls were greater among patients using ACEi/ARB and beta blockers (44% and 40%, respectively).
  - In each case, risk was lowest for patients who received the corresponding medication through DaVita Rx, intermediate for DaVita Rx patients who filled the corresponding medication elsewhere, and greatest for non-DaVita Rx controls.
  - This improvement may derive from “carry-over” effects if other medications were provided through DaVita Rx (refill management and reminders provided for one medication may prompt better adherence across all medications taken), or it may be that vulnerable patients benefit generally from intensive renal-focused pharmacy care.

References

1. Weinhandl ED, Arneson TJ, St Peter WL. Clinical outcomes associated with receipt of integrated pharmacy services by hemodialysis patients: a quality improvement report. *Am J Kidney Dis*. 2013;62(3):557-567

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