

Improvements in Clinical and Operational Outcomes for a Cohort of Patients Converted From Central Venous Catheter Access

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Introduction

- Arteriovenous fistulae (AVF) are the preferred method of vascular access over central venous catheters (CVC) for patients who require renal replacement therapy.¹
- Improvements in mortality and morbidity have been reported in end-stage renal disease (ESRD) patients transitioned off of CVC usage.^{2,3}
- DaVita created the CathAway program to reduce CVC usage in hemodialysis (HD) patients.
 - The program uses a team of nephrologists, surgeons, social workers and clinical care providers to assist patients transitioning from CVC to AVF.
- Given the Centers for Medicare and Medicaid Services case-mix adjusted bundled prospective payment system for outpatient dialysis,⁴ potential improvements in operational and surrogate biochemical outcomes might also drive the reduction in CVC use among HD patients.
- We examined the impact of vascular access on surrogate biochemical markers and operational parameters.

Methods

- We performed an observational, retrospective study of electronic medical records from HD patients receiving their first AVF/AVG between 1/1/2009 and 3/31/2010.
- Those included in the analysis were:
 - HD patients aged ≥ 18 years, continuously treated 90 days prior to and 180 days subsequent to AVF or AVG insertion.
 - Patients whose CVCs were not used after 14 days subsequent to first non-catheter dialysis session.
- Those excluded from the analysis were:
 - Patients aged ≤ 18 years; peritoneal or home dialysis patients.

Methods

- The study outcomes included:
 - Operational and biochemical outcomes after CVC conversion
 - Change in patients' mean albumin, hemoglobin, dialysis adequacy (Kt/V), and blood flow rate.
 - Change in operational dialysis parameters including heparin use, tissue plasminogen activator use, and missed treatments.
- Our analyses included:
 - Descriptive analyses of demographic information
 - Three-month averages for the cohort from months -6 to -4 before CVC conversion were compared to months +4 to +6 after CVC conversion.
- Statistical significance was determined by T-test. The level of significance was 0.01.

Results

Demographics

	Study Population (N=3,235)
Age in years, mean (SD)	58.88 (15.48)
% Male	51.8
Vintage in years, mean (SD)	1.43 (1.85)
Body Mass Index, mean (SD)	27.47 (7.04)
% Diabetic	46.0
Race, %	
African American	36.9
Hispanic	21.5
Asian, Pacific Islander	4.1
Native American	1.0
Unknown	0.2

Results

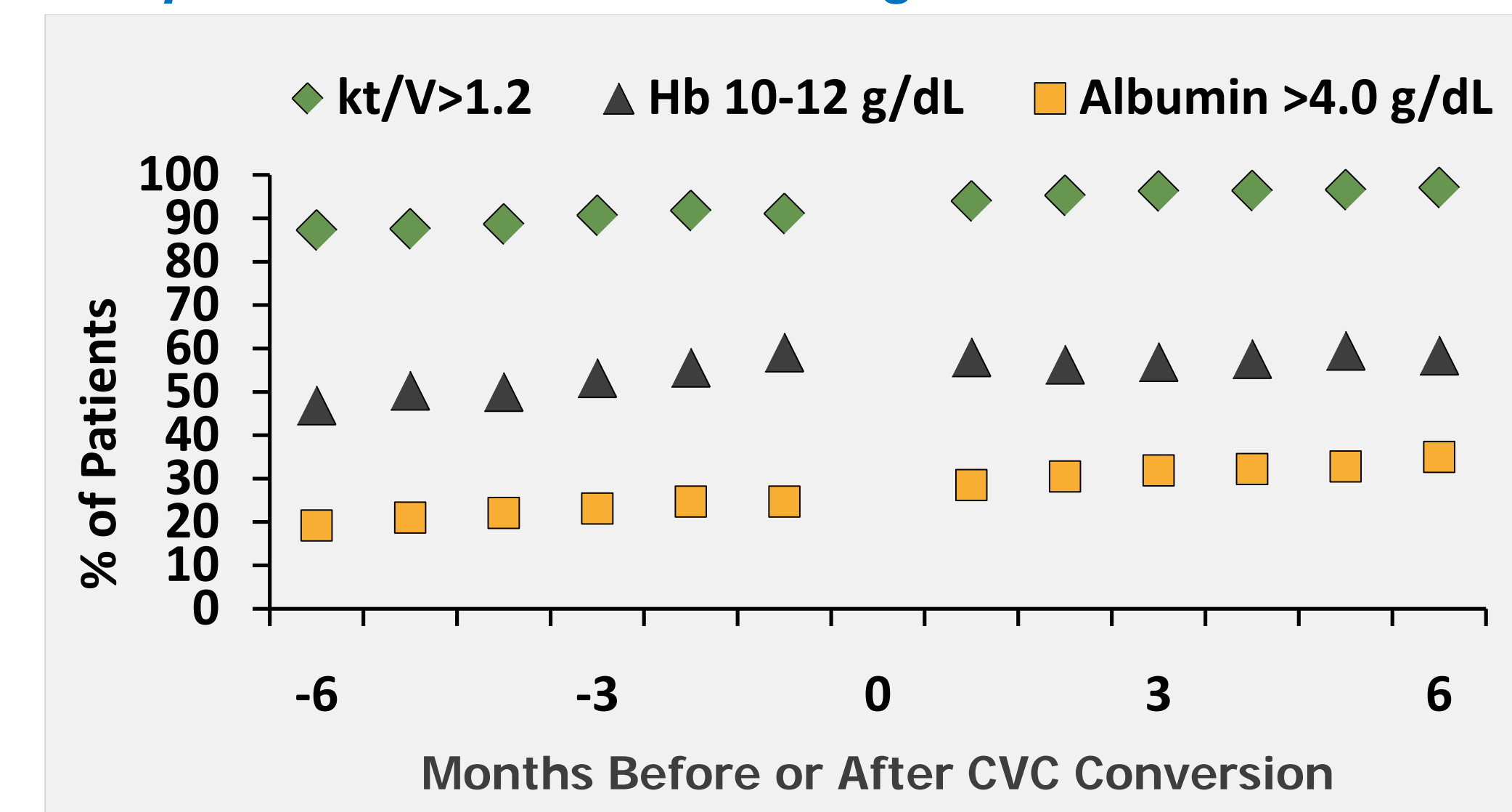
- Of the 3,235 patients transitioning from CVC to a different modality of vascular access, 2,286 patients (70.7%) converted to AVF and 949 patients (29.3%) converted to AVG.

Outcome Measures

	Months -6 to -4 Mean \pm SD	Months +4 to +6 Mean \pm SD	P Value	% Change
Albumin (g/dL)	3.67 \pm 0.45	3.86 \pm 0.38	<0.0001	5.2
Kt/V	1.61 \pm 0.39	1.70 \pm 0.34	<0.0001	5.6
Hb (g/dL)	11.63 \pm 1.08	11.59 \pm 0.87	0.10 (NS)	0.34
BFR (mL/min)	359 \pm 41	414 \pm 51	<0.0001	15.3
Heparin (U/tx)	11.44 \pm 6.02	4.92 \pm 2.70	<0.0001	57.0
tPA (mg/tx)	0.072 \pm 0.24	0.0051 \pm 0.073	<0.0001	92.9
Missed tx/month	0.92 \pm 1.72	0.85 \pm 1.66	0.10 (NS)	7.6

BFR-blood flow rate; Hb-hemoglobin; U-unit; tx-treatment; tPA-tissue plasminogen activator

Proportion of Patients Achieving Outcome Measures



Limitations

- Our study was observational in nature, thus we can only infer association between CVC conversions and the outcomes studied.

Summary

- After CVC removal, statistically significant improvements were measured in patients' mean serum albumin, dialysis adequacy, and BFR values.
- Reductions in the use of heparin and tissue plasminogen activator were measured after the removal of patients' CVC.
- After CVC removal, no statistically significant changes were measured in patients' mean Hb values or missed treatments.
- Our current findings add to the already compelling rationale to minimize the use of CVC for vascular access in HD patients.

- Clinical practice guidelines for vascular access. *Am J Kidney Dis* 2006;48 Suppl 1:S176-247.
- Wingard RL et al. *Clin J Am Soc Nephrol* 2007;2(6):1170-5.
- Wingard RL et al. *Clin J Am Soc Nephrol* 2009;4 Suppl 1:S114-20.
- Medicare program; end-stage renal disease prospective payment system. Final rule. *Fed Regist* 2010;75(155):49029-214.

Our sincere appreciation goes to the teammates in more than 1,600 DaVita clinics who work every day to take care of patients but also to ensure the extensive data collection on which our work is based. We thank DaVita Clinical Research® (DCR®), and specifically acknowledge Donna Jensen, PhD of DCR for editorial contributions in preparing this poster. DCR is committed to advancing the knowledge and practice of kidney care.

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American Society of Nephrology, Philadelphia, PA Nov 10-13, 2011