

# Hospital admissions for vascular access infection in incident hemodialysis patients from 1993 to 2006

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## Introduction

- Mortality rates in the first year of hemodialysis (HD) have not improved in the last decade, while admissions for infection have increased.
- Assessment of concurrent trends in vascular access (VA) infections in the first year of dialysis could reveal a potential contributor to this lack of progress.
- Recent data show a decrease in catheter placements among prevalent patients, but the use of catheters remains high during the early months of dialysis.
- We assessed trends in admissions for VA infection as an area of concern given the lack of significant progress in mortality, infectious admissions, and catheter use during the first year of dialysis.

## Methods

- We described admissions for VA infection among 692,934 adult, U.S. incident HD patients from 1993 to 2006.
- Included Medicare patients were residents of the 50 states, the District of Columbia, Puerto Rico,

and the Territories, had valid demographic data, and did not have AIDS as a primary or secondary cause of death.

- Patients were grouped by age:
  - Patients age 20-64 survived the first 90 days after initiation and were followed from day 90. This is because in-center hemodialysis patients who are <65 years old and without disability cannot bill Medicare until then.
  - Patients age  $\geq 65$  were followed from the day after initiation.
- Admission rates for VA infection and general infection were computed during intervals in the first year after initiation.
- Admissions for VA infection were identified from inpatient claims with principal ICD-9-CM code 996.62.
- Rates by age were adjusted for gender, race, and primary diagnosis. Rates were computed using a model-based adjustment method with an interval Poisson model, and the reference cohort included incident HD patients, 2005, who were alive at day 90 after initiation.

- Additional analyses described adjusted rates of outpatient intravenous (IV) antibiotic use, blood cultures, and bacterial cultures among the age  $\geq 65$  group in the first year after initiation.

## Results

- Increasing percentages of patients were older, male, and with diabetes as a primary diagnosis in 2006 than in 1993 (Table 1).
- Adjusted admission rates for VA infection increased notably across years and were 2 to 3 times higher in 2006 than 1993 in each interval and age group (Figures 1-3).
- The rise in admissions for VA infection stabilized from 2002 to 2006 during 3 to 12 months after initiation (Figures 1-3).
- Trends were similar in VA and general infection among patients age 65 and older, and VA infection appeared to account for a large proportion of the general infection admissions (Figures 3 and 4).
- Respectively, admission rates for VA and general infection in months 3-6 for 2006 were as follows; age 20-44, 336 and 704 per 1,000

Table 1: Patient characteristics, as column percentages

Age	Ages 20-64		Ages 65+	
	1993 (N=13,940)	2006 (N=23,249)	1993 (N=21,643)	2006 (N=36,267)
20-44	29.9	24.0		
45-64	70.1	76.0		
65-74			58.7	44.5
75-84			35.7	43.6
85+			5.6	11.9
Gender				
male	54.6	58.1	50.0	53.0
female	45.4	41.9	50.0	47.0
Race				
white	52.6	53.6	73.6	75.7
African American	42.9	41.2	23.8	20.7
other	4.5	5.3	2.6	3.6
Primary diagnosis				
diabetes	46.8	52.7	34.4	41.8
hypertension	26.0	22.4	41.9	34.8
glomerulonephritis	11.5	7.3	8.4	4.5
other	15.6	17.7	15.3	19.0

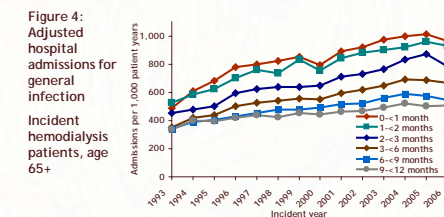
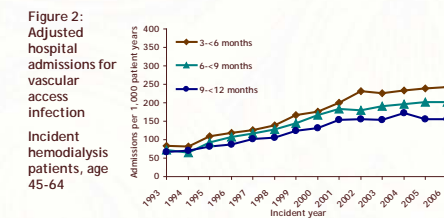


Figure 1: Adjusted hospital admissions for vascular access infection Incident hemodialysis patients, age 20-44

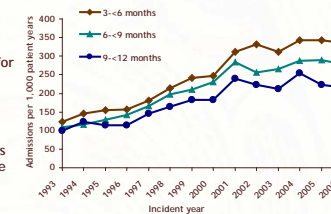


Figure 3: Adjusted hospital admissions for vascular access infection Incident hemodialysis patients, age 65+

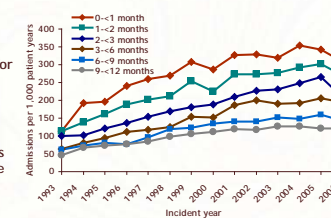
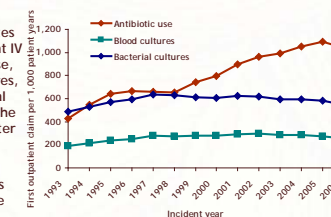


Figure 5: Adjusted rates of outpatient IV antibiotic use, blood cultures, and bacterial cultures in the first year after initiation Incident hemodialysis patients, age 65+



patient years; age 45-64, 242 and 593; and age  $\geq 65$ , 194 and 665.

- Outpatient IV antibiotic use increased dramatically during 1993 to 1996 (from 428 to 667 per 1,000 patient years; Figure 5) and also during 1998 to 2005 (from 655 to 1,094). Outpatient blood cultures and bacterial cultures rose gradually during 1993 to 1997 and then stabilized.

## Conclusions

- Admissions for VA infection in the first year of HD more than doubled from 1993 to 2006. This increase may be consistent with the rise in outpatient IV antibiotic use.
- The stabilization of admissions for VA infection after 2002 during months 3 to 12 after initiation suggests a hint of recent progress.
- This trend is consistent with prevalent data showing stabilized admission rates for VA infection which may reflect decreased catheter placements in recent years.
- However, admissions for VA infection in the early months of HD remain high, and the marked increase may contribute to the high mortality rates particularly in the elderly.