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Title: The Effect of Anemia on Developing Chronic Kidney Disease and End Stage Renal Disease in Patients with Diabetes

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Abstract:

Diabetes is the leading cause of end-stage renal disease (ESRD), accounting for over 43% of all incident ESRD cases in 2000 (USRDS Annual Data Report, 2002). It has been hypothesized that anemia in patients with diabetes is associated with earlier chronic kidney disease (CKD) and ultimately, ESRD. Our objective was to investigate whether the presence of anemia within diabetic patients is associated with a higher incidence rate of CKD/ESRD.

Diabetic subjects that were continuously enrolled in Medicare through 1996 were identified using the Medicare 5% sample. Subjects with claims for CKD or ESRD were excluded from the sample. For the years 1996 through 2000, patients with

two anemia claims at least 90 days apart were identified as anemic. These patients were followed from 1997 through 2001 to determine the incidence of CKD/ESRD each year. Poisson Regression was used to model the number of incident cases per time eligible each year from 1997 through 2001, adjusting for age, race, and gender, as well as for comorbid conditions that were reclassified prior to each follow up period.

174,295 eligible diabetic subjects were identified in 1996, 4.3% of which were identified as anemic subjects. By the year 2000, 14.8% of subjects had been identified as anemic. Each year, between 6% and 10% of those with anemia developed CKD/ESRD in the follow up year compared to less than 5% for those without anemia, resulting in a statistically significantly higher relative risk (RR) of developing CKD/ESRD for those with anemia. Other factors that significantly increased the risk of developing CKD/ESRD included older age, black race, male gender, congestive heart failure, hypertension, hepatic disease, peripheral vascular disease, and atherosclerotic heart disease.

These results suggest that the presence of anemia in diabetic subjects significantly increases the likelihood of developing CKD/ESRD.

Adjusted* RR of Developing CKD/ESRD Associated with Anemia			
Year	Estimated RR	95% Lower CL	95% Upper CL
1997	1.72	1.59	1.85
1998	1.43	1.34	1.53
1999	1.39	1.30	1.48
2000	1.30	1.22	1.39
2001	1.29	1.21	1.38

*adjusted for age, race, gender and comorbid conditions