

Comorbid Conditions in Persons with Chronic Kidney Disease and Anemia

Jay L. Xue, DVM,PhD^{1,2}, Craig Solid, MS¹ and Allan J. Collins, MD,FACP^{1,2}. ¹Chronic Disease Research Group, MMRF, Minneapolis, MN and ²Medicine, University of Minnesota, Minneapolis, MN.

People with chronic kidney disease (CKD) were more likely to die than those without CKD (Go et al. NEJM 2004;351:1296). Factors contributing to death have not been extensively studied. The objective of our study was to determine comorbid conditions in people with CKD and anemia.

We collected data from a 5% sample of Medicare claims. Included in the study were those who remained alive, were at least 65 years old, and did not receive renal replacement therapy during the 2001-2002 entry period. Participants were followed starting on January 1, 2003 for up to one year. CKD, anemia, cardiovascular disease (CVD), fracture, and cognitive dysfunction were determined by ICD-9-CM diagnostic codes. Logistic regression was used to explore associations of CKD and anemia with the other conditions. Explanatory variables were age, sex, and race.

Overall 1,193,546 persons were included in the study. During the two-year entry period, 5.5% of participants were identified with CKD, 19.6% with anemia, 54.7% with CVD, 10.1% with fracture, and 3.9% with cognitive dysfunction. Among patients without a particular condition during the entry period, incidence during the follow-up period was 2.5% for CKD, 6.9% for anemia, 15.2% for CVD, 4.8% for fracture, and 2.1% for cognitive dysfunction. Table 1 shows that after adjusting for age, sex, and race, the estimated odds ratios of having three specific conditions (CVD, fractures, and cognitive dysfunction) were significantly increased for patients with anemia and CKD, especially when they had indications for both diseases (i.e., the effect of interaction).

Table 1. Odds ratios (95% confidence intervals) for comorbid conditions

	No CKD or Anemia (ref)	CKD only	Anemia only	CKD and Anemia
Entry period				
CVD	1.00	4.16 (4.05 - 4.29)	3.19 (3.16 - 3.23)	9.72 (9.37 - 10.08)
Fracture	1.00	1.55 (1.49 - 1.61)	2.58 (2.54 - 2.62)	2.93 (2.85 - 3.01)
<u>Cogn. dysfunc.</u>	1.00	1.88 (1.78 - 1.98)	2.44 (2.39 - 2.49)	2.96 (2.85 - 3.08)
Follow-up				
CVD	1.00	1.50 (1.41 - 1.59)	1.39 (1.36 - 1.43)	1.82 (1.68 - 1.97)
Fracture	1.00	1.31 (1.24 - 1.38)	1.45 (1.42 - 1.48)	1.61 (1.54 - 1.69)
<u>Cogn. dysfunc.</u>	1.00	1.09 (1.01 - 1.19)	1.44 (1.40 - 1.49)	1.43 (1.34 - 1.53)

In conclusion, people with CKD and/or anemia are more likely to have cardiovascular disease, fractures, and cognitive dysfunction. Those with both CKD and anemia are at a greater risk to have these conditions than those without either CKD or anemia.