Anemia is Associated with Higher Healthcare Utilization and Costs in Non-Dialysis-Dependent Chronic Kidney Disease Patients

Suying Li,[1] Haifeng Guo,[1] Shaum Kabadi,[2] Sean Zhao,[2] David T. Gilbertson,[1] Louise Sargent Heuer,[2] Yi Peng,[1] Trudy Pendergraft,[2] Wendy L. St. Peter [1]

[1] Chronic Disease Research Group, Minneapolis, MN; [2] AstraZeneca, Wilmington, DE

Introduction

- Anemia is common among patients with chronic kidney disease (CKD).
- Little is known about healthcare utilization (HCU) and costs in stage 3-5 non-dialysis-dependent (NDD)-CKD patients.

Objective

- To examine the economic burden of anemia, including associated HCU and costs, among stage 3-5 NDD-CKD patients.

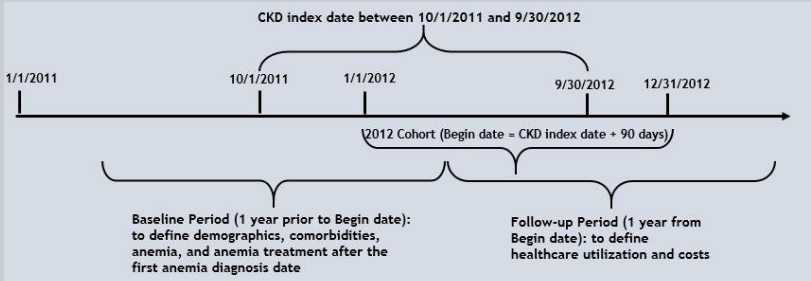
Methods

- This was a retrospective, observational database study. Patients with a CKD diagnosis (index date) between October 1, 2011, and September 30, 2012 were identified. As shown in **Figure 1**, the baseline period, 1 year before the index date + 90 days, was used to define CKD, anemia, and comorbid conditions. A 1-year follow-up period was used to define HCU and costs.
- The study population consisted of stage 3-5 NDD-CKD patients aged 18 to 63 years from MarketScan database. Patients with and without anemia were selected from the study period of 2011-2013 if they had commercial insurance coverage and were not on dialysis during a 1-year baseline period, and were enrolled in a health plan for at least 1 day during a follow-up period.

Methods - continued

- CKD and anemia were defined from ICD-9-CM diagnosis codes on 1 or more inpatient claims or 2 or more outpatient claims on different dates within 365 days.
- HCU included visits to the hospital or emergency department, outpatient visits, and specialty physician visits. Healthcare costs included payment for inpatient, outpatient, and pharmacy.
- Unadjusted HCU was expressed as number of claims per patient-year (PPY).
- Adjustment of HCU to compare patients with and without anemia was conducted using Poisson regression models with number of each HCU as dependent variable adjusting for patient demographics, baseline comorbidity, and CKD stage.
- Unadjusted costs were calculated by dividing the total payments during follow-up by total follow-up years and expressed as $PPY.

Figure 1. Study Design for 2012 Cohort



Results

- Among 56,188 stage 3-5 NDD-CKD patients that were identified, 28% (*n* = 15,716) had anemia.
- Stage 3-5 NDD-CKD patients with anemia were more likely to be female and have higher prevalence of comorbidities compared to those without anemia (**Table 1**).
- As shown in **Table 2**, patients with anemia utilized more inpatient and outpatient services compared to those without anemia.
- After adjusting for patient demographics, baseline comorbidity, and CKD stage, claims for hospitalization for anemic patients was 1.4 times higher, and nephrologist and hematologist visits were 1.5 and 2.9 times higher than patients without anemia, respectively (**Figure 2**).
- As shown in **Figure 3**, unadjusted healthcare costs for patients with anemia were 2.2 times higher than patients without anemia ($38,096 PPY vs. $17,739 PPY, respectively); inpatient costs were 2.8 times higher in patients with anemia compared to without anemia ($15,704 PPY vs. $5,602 PPY, respectively).

Table 1. Baseline Characteristics and Comorbid Conditions in Stage 3-5 NDD-CKD Patients with and without Anemia

	With Anemia	Without Anemia	Standardized Difference
N of Patients	15,716	40,472	
Age, %			
18-44 yrs	11.0	12.2	3.9
45-54 yrs	23.9	25.1	2.7
55-59 yrs	28.3	27.6	-1.5
60-63 yrs	36.8	35.1	-3.6
Female, %	52.1	40.0	-24.5
Comorbidity, %			
ASHD	23.6	13.9	-24.9
CHF	21.4	9.0	-35.0
CVA/TIA	10.0	4.8	-20.1
PVD	19.1	7.5	-34.5
Cardiac (other)	23.5	9.7	-37.7
COPD	15.7	7.9	-24.2
GI bleeding	8.9	1.4	-34.7
Liver disease	7.1	2.5	-21.5
Dysrhythmia	19.5	9.5	-28.7
Cancer	14.2	7.7	-20.9
Diabetes	52.5	40.2	-24.9
Hypertension	85.4	73.8	-29.1

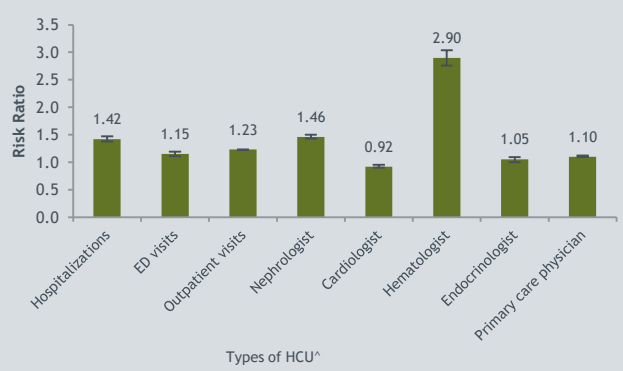
ASHD - Atherosclerotic heart disease; CHF - Congestive heart failure; CVA/TIA - Cerebrovascular accident/transient ischemic attack; PVD - Peripheral vascular disease; COPD - Chronic obstructive pulmonary disease; GI - Gastrointestinal

Table 2. Unadjusted Healthcare Utilization in Stage 3-5 NDD-CKD Patients with and without Anemia

	With Anemia	Without Anemia
Number of claims, per person-year		
Hospitalizations	0.63	0.25
ED visits	0.58	0.34
Outpatient visits	32.01	20.59
LOS among all patients (days)		
Mean	2.61	0.93
Median	0.00	0.00
LOS among patients with at least one hospitalization (days)		
Mean	10.96	7.52
Median	5.00	4.00
Physician visits, per person-year		
Nephrologist	1.60	1.02
Cardiologist	0.94	0.69
Hematologist	0.46	0.11
Endocrinologist	0.33	0.27
Primary care physician	5.27	4.03

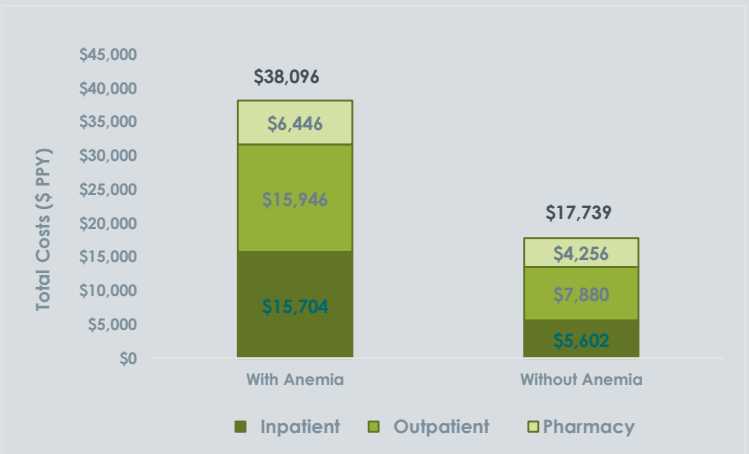
LOS - Length of stay

Figure 2. Adjusted Healthcare Utilization in Stage 3-5 NDD-CKD Patients with Anemia vs. without Anemia



^ Results are significant with p-value < 0.05.

Figure 3. Unadjusted Costs in Stage 3-5 NDD-CKD Patients with and without Anemia



Conclusions

- Stage 3-5 NDD-CKD patients with anemia have more comorbidities and incur more costs than NDD-CKD patients without anemia. Stage 3-5 NDD-CKD patients with anemia use more healthcare resources than patients without anemia after adjusting for patient demographics, comorbidity, and CKD stage.
- Future analyses of costs should include adjustment for covariate imbalance. Greater efforts should be taken to manage costs associated with anemia in NDD-CKD patients.

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