Anemia Prevalence and Treatment in Patients with Non-Dialysis-Dependent Chronic Kidney Disease

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Introduction

- Anemia is common among patients with chronic kidney disease (CKD). Treatment usually consists of an erythropoiesis-stimulating agent (ESA), iron, and/or red blood cell (RBC) transfusion.
- In contrast to dialysis patients, whose anemia prevalence and treatment have been well studied, little is known about the burden of anemia in stage 3-5 non-dialysis-dependent CKD (NDD-CKD) patients.

Objective

- To examine anemia prevalence, treatment patterns, and cardiovascular outcomes in stage 3-5 NDD-CKD patients by CKD stage, age group, and sex.

Methods

- The MarketScan commercial database, consisting of inpatient and outpatient health care claims and medication claims, was used to identify stage 3-5 NDD-CKD patients aged 18-63 years (younger).
- The 20% Medicare database, containing a random sample of Medicare-covered patients and consisting of Medicare Parts A, B, and D files (inpatient and outpatient health care claims and medication claims), was used to identify stage 3-5 NDD-CKD patients aged 66+ years for anemia prevalence; other analyses were conducted specifically in patients aged 66-85 years (older).

- A 2012 study cohort was identified with a CKD index date between October 1, 2011, and September 30, 2012.
- The baseline period was 1 year before the index date + 90 days. It was used to define CKD stage, anemia, and treatment (Figure 1).
- A 1-year follow-up period was used to define clinical outcomes. CKD stage and comorbid conditions were defined from ICD-9-CM diagnosis codes on one or more inpatient claims or two or more outpatient claims on different dates within 365 days (Figure 1).
- Anemia was defined by diagnosis codes, due to lack of hemoglobin values for NDD-CKD patients in the databases.
- ESA, intravenous (IV) iron, and RBC transfusion (at least one transfusion) use and time to use were evaluated from the date of anemia diagnosis during the baseline year.
- Cardiovascular outcomes in the follow-up period included:
  - Major adverse cardiac events (MACE), defined as all-cause death or non-fatal myocardial infarction or non-fatal stroke
  - Deep vein thrombosis
  - Pulmonary embolism
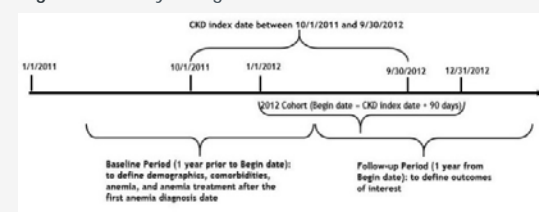 - Phlebitis and thrombophlebitis

Figure 1. Study Design

Table 1. Prevalence of Anemia (%) in Younger Commercially Insured Patients (MarketScan)

	Stage 3	Stage 4	Stage 5
Patient numbers	42,587	8,994	4,607
Anemia prevalence (%)	22.4	41.3	53.9
Age category (%)			
18-44 years	19.6	34.9	50.4
45-54 years	21.4	40.1	50.6
55-59 years	23.0	41.5	56.4
60-63 years	23.3	44.2	56.8
Sex (%)			
Male	18.5	35.1	50.5
Female	27.5	48.5	58.3

Figure 2: Treatment Patterns in Younger Commercially Insured and Older Medicare-covered Patients with Anemia Across CKD Stages
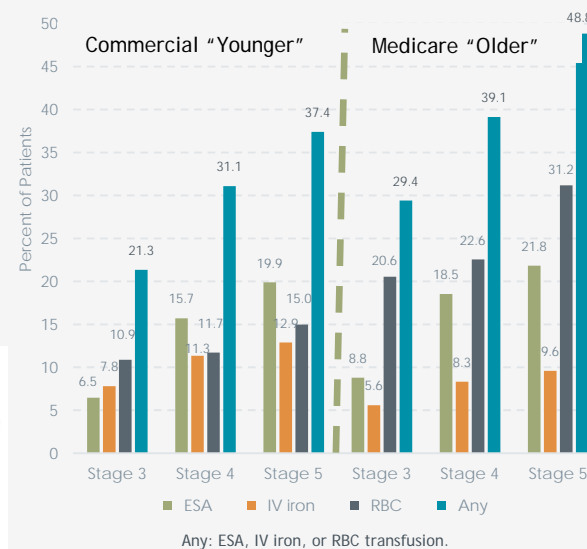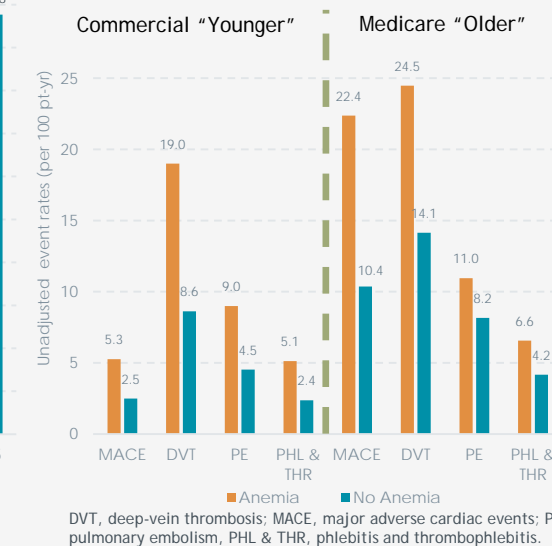

Any: ESA, IV iron, or RBC transfusion.

Table 2. Prevalence of Anemia (%) in Older Medicare-covered Patients

	Stage 3	Stage 4	Stage 5
Patient numbers	201,507	61,237	20,518
Anemia prevalence (%)	46.2	65.8	73.8
Age category (%)			
66-69 years	38.0	59.9	69.0
70-74 years	40.7	62.5	70.9
75-79 years	44.2	63.6	72.9
80-84 years	48.7	66.8	76.4
85+ years	54.2	69.9	77.2
Sex (%)			
Male	43.6	62.6	71.0
Female	48.6	68.3	76.4

Figure 3: Unadjusted Cardiovascular Event Rates (per 100 patient-years) in Younger Commercially Insured and Older Medicare-covered NDD-CKD stage 3-5 Patients by Anemia Status

DVT, deep-vein thrombosis; MACE, major adverse cardiac events; PE, pulmonary embolism, PHL & THR, phlebitis and thrombophlebitis.

Results

- There were 15,716 (28%) 'younger' and 148,550 (52%) 'older' patients with anemia among stage 3-5 NDD-CKD patients in the MarketScan and Medicare databases, respectively.
- Prevalence of anemia increased as CKD stage and age increased and was generally higher among women (Tables 1 and 2).
- The most common form of treatment (at least 1 administration) for anemia was RBC transfusions (22.2% older, 11.7% younger), followed by ESA (12.7% older, 10.8% younger) and IV iron (6.7% older, 9.4% younger).
- Anemia treatment increased by CKD stage (Figure 2) and age.
- MACE and thromboembolic events (unadjusted) increased by CKD stage and were higher in patients with anemia than in those without (Figure 3).

Conclusions

- Approximately half of Medicare and a quarter of commercially insured NDD-CKD patients have anemia.
- Anemia treatment patterns differed by age: older patients received twice as many RBC transfusions as younger patients and were more likely to be treated with ESAs.
- RBC transfusion was commonly used to treat anemia in NDD-CKD patients.
- MACE were more likely among patients with anemia compared to patients without anemia.