

**Table 1: Baseline Patient Characteristics**

Variable	COPD with Anemia (n = 27,932)	Non-anemic COPD (n = 104,492)	P value
<b>Demographics</b>			
Age, mean (SD), years	77.5 ± 7.8	74.7 ± 7.6	<0.001
Age distribution (years, %)			
65–69	19.0%	31.5%	<0.001
70–74	20.1%	23.0%	
75–79	21.4%	18.7%	
80–84	18.7%	13.7%	
> 84	20.6%	12.1%	
Male (%)	34.2%	42.4%	<0.001
<b>Pulmonary Characteristics of Interest Present in the Six Month Baseline Period</b>			
Concomitant asthma diagnosis	25.2%	22.6%	<0.001
Use of supplemental oxygen	9.8%	3.7%	<0.001
<b>Comorbidities, % (by ICD-9 coded organ system) Present in the Six Month Baseline Period</b>			
Infectious and parasitic	1.7%	1.4%	<0.001
Skin disorders	2.3%	2.2%	NS
Digestive disorders	2.5%	2.5%	NS
Mental disorders	3.3%	2.9%	<0.001
Genitourinary disorders	3.9%	3.3%	<0.001
Blood diseases	4.3%	0.8%	<0.01
Nervous system	4.4%	6.3%	<0.001
Musculoskeletal disorders	7.7%	9.0%	<0.001
Other respiratory disorders	8.3%	8.8%	<0.001
Endocrine and metabolic	8.5%	7.9%	<0.001
Circulatory disorders	26.8%	26.0%	<0.01

**Abbreviations:** COPD – Chronic obstructive pulmonary disease, NS – not significant

Specific rates of health care utilization during the six months prior to the index date (i.e., prior to identification of these patients having anemia) were greater for patients with co-morbid anemia (Table 2). During the six-month baseline period, anemic persons had significantly more claims for hospitalizations, ICU care, and episodes of acute exacerbations of COPD (AECB) and pneumonia. For example, being classified with co-morbid anemia was associated with a greater need for ICU care (15.5 claims per 100 patients with anemia during the baseline period vs. 7.3 claims per 100 patients without anemia,  $p < 0.001$ ). These differences indicate greater baseline severity of illness among patients with COPD and anemia.

Table 3 presents the unadjusted total claims (charges) and reimbursements (payments) after the index date (in 2004 dollars). Average annual payments from Medicare were substantially higher among those with anemia. Medicare spent \$1,466 per patient per year among COPD patients with anemia vs. \$649 per patient per year in non-anemic COPD patients ( $p < 0.001$ ). Resource utilization rates among patients with anemia (Table 4.), as well as payments for COPD patients with anemia were higher in every resource utilization category (Figure 2). Rates of mechanical ventilation, ICU care, emergency department

visits, and other resource use were also higher among COPD patients diagnosed with anemia (Table 4).

Costs for Medicare enrollees in both groups, with and without anemia, rose after the index date. The increase in claims was 78.1% for COPD patients with anemia and 50.9% for patients without anemia ( $p < 0.001$ ); the increase in payments was 71.5% for patients with anemia and 48.5% among patients without anemia ( $p < 0.001$ ). Using linear regression to control for baseline differences in severity of illness (e.g., number of co-morbid illnesses, need for ventilation support, and episodes of pneumonia and acute exacerbations of chronic bronchitis in the six months prior to the index date) and preceding health care use (e.g., frequency of hospital admissions and emergency room care for COPD) the incremental independent annual per patient charges and reimbursements associated with anemia among COPD patients were calculated to be \$8,811 ( $p < 0.001$ , 95% CI: \$8,136 to \$9,487) for charges and \$3,582 ( $p < 0.001$ , 95% CI: \$3,299 to \$3,865) for payments. The independent contribution of anemia to costs in COPD was present in all categories of resource utilization (Figure 3). Of note, anemia care (defined as medical claims with an anemia diagnosis) did not appear to account directly for these incremental differences in cost.