Economic Burden of Anemia-Related Transfusions in Medicare Dialysis Patients

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Introduction

- Red blood cell transfusions are undesirable anemia management outcomes and current guidelines recommend avoidance of use when possible.
- As a result, avoidance of transfusions in dialysis patients is a quality measure instituted by Medicare.
- While previous studies have investigated the burden of transfusions in Medicare dialysis patients, none has investigated transfusions and their associated costs due specifically to anemia itself (that is, in the absence of acute medical indication).

Objective

- To estimate Medicare spending for inpatient and outpatient transfusions administered solely to manage anemia in maintenance dialysis patients.

Methods

- The United States Renal Data System ESRD dataset was used to analyze both incident and prevalent patients receiving dialysis in 2014 with Medicare part A/B coverage.
- Transfusions were identified using ICD-9-CM procedure/revenue center codes.
- Hospitalizations studied were those with 0- or 1-day stays with anemia as the principal diagnosis and no evidence of other reasons for the hospitalization based on diagnosis, procedure, and DRG codes (see **Figure 1**).
- We identified outpatient, emergency department (ED), and observation stays (OBS) that appeared to be solely for transfusions using an algorithm similar to that applied to identify transfusion hospitalizations.
- We calculated total Medicare payments by identifying costs directly associated with the transfusion itself and related screening or monitoring costs in the pre- (day -3 to day -1) and post- (day 1 to day 3) period, and post-transfusion-related complications (**Figure 2**).

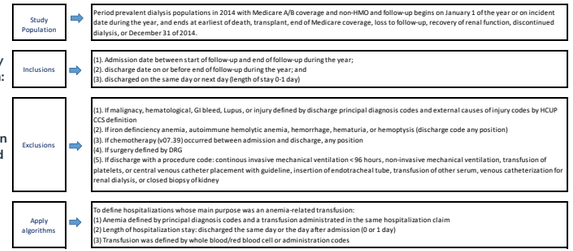

Figure 1. Study design schema: identifying hospitalization whose main purpose was an anemia-related transfusion

Results

Table 1. Selection of patients and identification of transfusions

	Selection Process	2014 cohort	
	Patient inclusion criteria	N of patients	N of claims
	Period prevalent dialysis in 2014	577,576	—
	After requiring Medicare A/B coverage	356,582	—
Identifying anemia-related IP transfusions	Hospitalized in study year	191,619	477,094
	Hospitalization length: 0-1 days	82,770	119,512
	After exclusion criteria	57,881	80,313
	Applying claim-based algorithm for anemia		
	Final IP transfusions due to anemia	**904**	**974**
Identifying anemia-related ED/OBS transfusions	ED visit or observational stay in study year	200,684	609,748
	Same day or next day discharge	193,902	557,501
	After exclusion criteria	69,534	136,457
	Applying claim-based algorithm for anemia		
	Final ED/OBS transfusions due to anemia	**1064**	**1264**
Identifying anemia-related OP transfusions	Other outpatient visit (not ED visit or observational stay) in study year	341,160	5,439,905
	Same day or next day discharge	280,417	1,807,208
	After exclusion criteria	242,769	1,195,423
	Applying claim-based algorithm for anemia		
	Final OP transfusions due to anemia	**5009**	**7431**

IP: inpatient, OP: outpatient, ED: emergency department, OBS: observation stay

Figure 2. Timeline of the estimation of Medicare paid costs for anemia-related transfusions.

1. For Inpatient transfusion, costs included Medicare Part A inpatient costs for this hospitalization, outpatient hospital services, and Part B physician/supplier costs for the same hospitalization.

2. For transfusions identified from outpatient settings (including ED visits/observation stays and non-ED visits/observation stays), costs included Part A costs for outpatient services for blood transfusion and Part B physician/supplier costs for the same service.

3. Additional Medicare expenditures related to transfusions included:
   3.1 pre-/post-screening and monitoring on Part A outpatient and Part B physician claims;
   3.2 post- transfusion-related complications (febrile non-hemolytic transfusion reaction, air embolism, or phlebitis; acute hemolytic transfusion reaction; allergic reaction; TRALI; TACO; delayed hemolytic transfusion reaction; and hyperkalemia)

Table 2. Characteristics of patients with anemia-related transfusions

	Patients from IP		Patients from ED/OBS		Patients from OP	
Characteristics	Percent	Count	Percent	Count	Percent	Count
Overall	100	904	100	1064	100	5009
Mean age (SD)	60.5	15.6	61.0	15.4	63.8	15.0
Sex						
Female	45.2	409	48.3	514	47.0	2,355
Race						
White	53.1	480	54.0	575	63.9	3,198
Black	39.6	358	40.2	428	32.5	1,627
Other	7.3	66	5.7	61	3.7	184
Cause of ESRD						
Diabetes	38.3	346	39.8	423	38.6	1,933
Hypertension	30.2	273	27.7	295	29.2	1,461
Glomerulonephritis	11.8	107	13.7	146	12.1	607
Other	19.7	178	18.8	200	20.1	1,008
ESRD duration						
<1 year	28.1	254	25.9	275	29.1	1,457
1-<3 years	23.0	208	23.3	248	23.9	1,199
3-<5 years	19.8	179	17.5	186	17.4	871
5+ years	29.1	263	33.4	355	29.6	1,482

Table 3. Medicare paid costs, total and average per transfusion, for anemia-related transfusions in patients dialyzing in 2014

Setting for Transfusions	N	Direct Transfusion Costs	Related Costs	Total Costs	Costs per Transfusion
Inpatient	974	$7,362,817	$4,271	$7,367,088	$7564
ED/OBS	1264	$1,451,228	$15,392	$1,466,620	$1160
Other outpatient	7431	$4,741,086	$206,339	$4,947,425	$666
Total	9669	$13,555,131	$226,002	$13,781,133	$1425

Summary

- We identified 9669 transfusions associated with anemia in the absence of other acute illness: 974 inpatient (IP), 1264 ED/OBS, and 7431 other outpatient (**Table 1**).
- Patients who had anemia-related transfusions in the IP or ED/OBS settings, as opposed to other outpatient settings, were more likely younger and of black race (**Table 2**).
- Total Medicare payments for these transfusions were $13.78 million: $7.37 million for IP, $1.47 million for ED/OBS, and $4.95 million for other outpatient.
- Inpatient transfusions accounted for 10% of total anemia-related transfusions, but for over 50% of total transfusion costs (**Table 3**).

Limitations

- Costs included only those paid by Medicare. Patient out-of-pocket or third-party costs (~15% of the total) were not considered.
- For anemia-related IP transfusions, costs were limited to those accrued during a short (0-1 day) hospitalization stay, likely underestimating true costs.
- Data are from 2014, and transfusion rates have declined since then.

Conclusions

- While the introduction of ESAs have transformed anemia treatment and current guidelines recommend avoiding transfusions when possible, anemia-related transfusions are still occurring and translate to substantial costs.
- Savings can potentially be achieved by more closely following anemia treatment guidelines and through the use of outpatient settings in lieu of more expensive care settings.

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