RESEARCH LETTER

Anticoagulant and Antiplatelet Use Among Hemodialysis Patients in the United States Without Medicare

To the Editor:

Kidney failure affects more than 725,000 individuals in the United States with an estimated 63% of patients receiving hemodialysis and 7% of patients receiving peritoneal dialysis in 2016.[1] Patients with kidney failure receiving hemodialysis have an increased risk of bleeding, thrombosis, and cardiovascular events vs patients without kidney failure.[2] Despite clear thrombotic risk in patients with kidney failure, especially those with atrial fibrillation,[1] anticoagulant and antiplatelet use is tempered by limited evidence of efficacy, lack of randomized clinical trials, and concern for serious bleeding in patients with atrial fibrillation undergoing long-term dialysis.[3–6] Although some studies indicate that anticoagulants reduce stroke, mortality, and thromboembolism without an increase in bleeding,[4] others indicate that anticoagulants do not decrease mortality rates or risk of stroke in these patients and may increase bleeding.[5] This opposing evidence may be due to anticoagulant dosage, patient bias, stage of kidney disease, and study methodology.[4–6] Faced with contradictory findings, the current cardiovascular treatment guidelines provide vague recommendations on anticoagulant and antiplatelet use in patients with kidney failure.[7]

Medicare generally covers the cost of hemodialysis and associated treatment services as defined by the Centers for Medicare & Medicaid Services.[8] However, approximately 10% of US patients with kidney failure receiving hemodialysis are not insured through Medicare because of a mandated waiting period.[9] The use of anticoagulants and antiplatelets among these patients is particularly poorly understood. Therefore, the objective of this retrospective observational cohort study was to assess the use of anticoagulants and antiplatelets among US patients with kidney failure receiving hemodialysis who do not have primary insurance coverage through Medicare.

Administrative claims data from the Optum Clinformatics Data Mart commercial database (Optum) were analyzed. Detailed methods are found in Item S1 and Table S1.

A total of 77,936 patients initiating hemodialysis between 2014 and 2018 were identified. The study population included 7,400 (9%) patients who met the inclusion criteria. One-fifth of patients in the study (n = 1,495, 20%) were on an anticoagulant and/or antiplatelet while receiving hemodialysis (Fig 1). Among these patients, more used antiplatelets (n = 854, 12%) than warfarin (n = 570, 8%) or direct oral anticoagulants (n = 242, 3%). About 1% of patients were prescribed more than one antiplatelet (n = 50) or an antiplatelet plus a direct oral anticoagulant (n = 37). Patients on anticoagulants and/or antiplatelets were slightly older than patients not on these medications (55 vs 50 years), but roughly the same percentage were male (n = 960, 64% vs n = 3,730, 63%) (Table 1). A larger proportion of patients on anticoagulants or antiplatelets vs those patients not on these medications had a history of cerebrovascular disease (n = 251, 17% vs n = 342, 6%) and myocardial infarction (n = 557, 37% vs n = 720, 12%). Patients who received an anticoagulant and/or antiplatelet used them for about one-third of the time after starting hemodialysis, assuming use at standard doses. Approximately 14% (n = 1,025) of patients had evidence of atrial fibrillation at some point during the full observation period, and more than half (n = 550, 54%) of those used an anticoagulant and/or antiplatelet after hemodialysis initiation. Following a claim including a myocardial infarction diagnosis, 105 (79.5%) patients not on an anticoagulant or antiplatelet started one, while following a claim including an ischemic stroke diagnosis, 42 (73.7%) patients started one (Table S2). Following a claim mentioning a major bleeding event, 137 (67.2%) patients on anticoagulants or antiplatelets at the time of the event stopped their therapy (Table S3).

While 20.2% of patients were administered anticoagulants/antiplatelets following hemodialysis initiation, 23.2% filled at least 1 prescription during the full study period—including before hemodialysis. This suggests a small proportion of patients discontinued anticoagulants/antiplatelets after starting hemodialysis.

Some limitations to the analysis should be considered. Insurance claims data do not reflect patients' full medical histories, coverage continuity, or whether prescribed medication was taken. Additionally, the algorithms for identifying myocardial infarctions, ischemic strokes and major bleeding events from *International Classification of Diseases, Tenth Revision* codes have not been validated. Although the published algorithm identifying major bleeding events from *International Classification of Diseases, Ninth Revision* codes distinguishes between first and subsequent diagnoses in the patient record, the Optum commercial database does

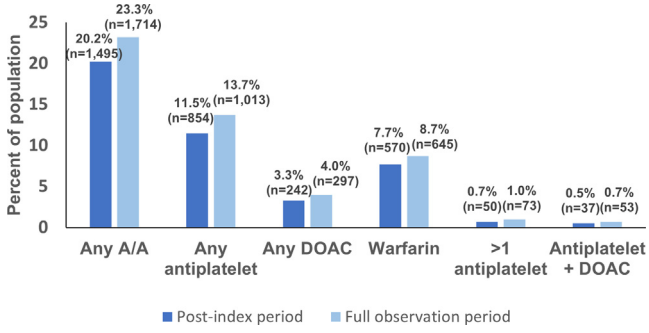

Figure 1. Anticoagulant and antiplatelet use among non-Medicare patients receiving hemodialysis[a]

Abbreviations: A/A, anticoagulant/antiplatelet; DOAC, direct oral anticoagulant.

[a]Index date is the first date of hemodialysis

Table 1. Demographics for Patients Using vs Not Using Antiplatelets/Anticoagulants After Initiating Hemodialysis

Time period	On Any A/A (N=1,495)	Not on any A/A (N=5,905)
Postindex[a] date period		
Age (y), mean (SD)	54.5 (8.0)	49.4 (11.3)
Sex (male), n (%)	960 (64.2%)	3,730 (63.2%)
Preindex date time observed (d), mean (SD)	1,125.4 (943.7)	980.1 (867.5)
Postindex date time observed (d), mean (SD)	884.8 (132.3)	842.0 (211.0)
Charlson Comorbidity Index, mean (SD)	6.1 (2.7)	4.7 (2.7)
Medical history, n (%)		
Abdominal aortic aneurysm	23 (1.5%)	42 (0.7%)
Atherosclerosis	813 (54.4%)	1,201 (20.3%)
Cerebrovascular-related diseases	251 (16.8%)	342 (5.8%)
Peripheral artery disease	393 (26.3%)	651 (11.0%)
Myocardial infarction history	557 (37.3%)	720 (12.2%)

Abbreviations: A/A, anticoagulant/antiplatelet; SD, standard deviation.
[a]Index date is the first date of hemodialysis.

not. The lack of distinction between first and subsequent diagnoses also means that records for events such as myocardial infarction or stroke may refer to a history of such events rather than an event at the time the claim was recorded. Additionally, patients receiving hemodialysis on anticoagulants/antiplatelets used them only about a third of the time after initiating hemodialysis, assuming use at standard doses. If instructed to take at reduced doses, they may have been on these therapies longer. Beyond standard claims data limitations, the study depended on non-Medicare medical coverage data, which presented challenges because of the nature of insurance coverage surrounding hemodialysis. The analysis was limited to 30 months of follow-up because of the typical 30-month Medicare transition period. Results may not be generalized to a Medicare population.

In this retrospective claims-based study, we found that one-fifth of non-Medicare patients with kidney failure were being treated with an antiplatelet and/or anticoagulant while receiving hemodialysis. Our results are similar to those found in an analysis of a Medicare hemodialysis population using US Renal Data System data.[1] In that study, an estimated 20% of the Medicare hemodialysis population with a history of cardiovascular disease received an antiplatelet and 3% received a direct oral anticoagulant. Our study also found that more than half of patients with atrial fibrillation used an antiplatelet and/or anticoagulant after initiating hemodialysis.

More research is warranted to understand the risk–benefit profile of anticoagulants and antiplatelets in treating patients with kidney failure receiving hemodialysis. Our findings can provide context for quantifying the use of these medications among this patient population.

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SUPPLEMENTARY MATERIAL

Supplementary File (PDF)

Item S1: Detailed Methods.

Table S1: Major Bleeding Events That Were Identified Using *ICD-9* and *ICD-10* Codes

Table S2: The Proportion of Patients Not Using A/A Who Had a Myocardial Infarction or Stroke and Then Started A/A

Table S3: The Proportion of Patients Using A/A Who Had a Major Bleeding Event and Then Stopped Using A/A

ARTICLE INFORMATION

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REFERENCES

1. Saran R, Robinson B, Abbott KC, et al. US Renal Data System 2018 Annual Data Report: epidemiology of kidney disease in the United States. *Am J Kidney Dis*. 2019;73(3)(suppl 1):A7-A8. doi:10.1053/j.ajkd.2019.01.001

2. Parker K, Mitra S, Thachil J. Is anticoagulating haemodialysis patients with non-valvular atrial fibrillation too risky? *Br J Haematol*. 2018;181(6):725-736.
3. Kuno T, Takagi H, Ando T, et al. Oral anticoagulation for patients with atrial fibrillation on long-term hemodialysis. *J Am Coll Cardiol*. 2020;75(3):273-285.
4. Devabhaktuni SR, Mounsey JP. Should Oral oral anticoagulation be used in ESKD patients on hemodialysis with atrial fibrillation?: PRO. *Kidney360*. 2021;2(9):1405-1408.
5. Lidgard B, Bansal N. Should oral anticoagulation be used in ESKD patients on hemodialysis with atrial fibrillation?: CON. *Kidney360*. 2021;2(9):1409-1411.
6. Mavrakanas TA, Charytan DM, Winkelmayer WC. Direct oral anticoagulants in chronic kidney disease: an update. *Curr Opin Nephrol Hypertens*. 2020;29(5):489-496.
7. January CT, Wann LS, Calkins H, et al. 2019 AHA/ACC/HRS focused update of the 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol*. 2019;74(1):104-132.
8. Centers for Medicare & Medicaid Services. Medicare coverage of kidney dialysis & kidney transplant services. Published 2020. Accessed November 17, 2020. https://www.medicare.gov/Pubs/pdf/10128-medicare-coverage-esrd.pdf
9. National Kidney Foundation. Medicare. Published 2020. Accessed November 23, 2020. https://www.kidney.org/patients/medicare