continued from page 319

Evaluation of Warfarin Patients with Low Time in Therapeutic Range (TTR) for Transition to Non–Vitamin-K Oral Anticoagulant (NOAC) Therapy

To the Editor:

Time in therapeutic range (TTR) is a widely accepted metric used to evaluate the safety and efficacy of warfarin therapy. Patients with low TTR (< 65%) are at higher risk of poor outcomes, and current antithrombotic guidelines recommend interventions to improve low TTR.[1] One possible intervention includes switching therapy to a non–vitamin-K oral anticoagulant (NOAC), such as dabigatran, apixaban, edoxaban, betrixaban, or rivaroxaban, also referred to as direct-acting oral anticoagulants (DOACs). As a quality improvement initiative, we developed and applied a locally established systematic approach to determine which patients with low TTR (< 65%) met the criteria for transition to a NOAC.

Between May and July 2018, we conducted a retrospective chart review of an academic medical center's anticoagulation clinic. The project was exempt from review by our Institutional Review Board. Each patient's TTR was calculated over a three-month period, and patients with a low TTR were assessed for NOAC eligibility as described in Table 1.

Table 1 NOAC Eligibility/Ineligibility Criteria

Eligibility Criteria		
Adults aged ≥ 18 years	Received continuous care from clinic[a]	Had 3-month TTR score < 65%
Ineligibility Criteria		
Valvular disease	Hypercoagulable condition	Current pregnancy
Active cancer	Severe renal impairment[b]	Hepatic impairment[c]
BMI > 40/ Weight > 120 kg	Poor adherence[d]	Significant drug interaction(s)[e]

[a] Patients actively engaged in care during specified time period–attending scheduled office visits and/or responding to follow up by phone
[b] Creatinine clearance < 15 mL/min
[c] Acute hepatitis, chronic active hepatitis, cirrhosis
[d] Patients taking recommended dose < 80% of time during specified period
[e] Strong cytochrome-P450 3A4 and/or P-glycoprotein inhibitors or inducers

We identified 140 adult patients taking warfarin with a target international normalized ratio (INR) of 2.0 to 3.0 and a recorded TTR. Seventy patients (50%) had a TTR < 65% and underwent further analysis. Most patients with low TTR were female (n = 39; 56%). The average age, weight, and body mass index (BMI) ± standard deviation were 62 ± 15 years, 93 ± 29 kg, and 32.5 ± 9.1 kg/m^2, respectively. The most common anticoagulation indications were venous thromboembolism (n = 27; 39%) and atrial fibrillation (n = 23; 33%). We found an identified cause for TTR < 65% in 61 patients (87%), with the most common reasons being poor adherence (n = 17; 28%) and diet fluctuations (n = 11; 18%).

Almost one-third (n = 22; 31%) of patients with TTR < 65% were candidates for NOAC therapy based on our pre-defined eligibility criteria (Table 1). Among the remaining 48 patients, the most common ineligibility criteria that were met included: valvular disease (n = 11; 23%); obesity (n = 9; 19%); adherence (n = 9; 19%); hypercoagulable condition (n = 9; 19%); severe renal or hepatic impairment (n = 6; 13%); and significant drug interaction (n = 4; 8%).

Data from our institution indicate that a sizeable percentage of warfarin-treated patients exhibit low TTR and would likely benefit from therapy intervention. Although NOAC therapy seems attractive for these patients, we believe a systematic review process is required to ensure that a NOAC is a safe and effective alternative. Our analysis showed that roughly one-third of patients with low TTR would be appropriate candidates for NOAC therapy based on the process employed. For the remaining patients, we were able to isolate other causes for low TTR, including suboptimal adherence and diet inconsistencies. Targeted interventions in these patients are likely warranted to improve clinical outcomes.

Overall, routine TTR monitoring combined with a structured assessment process can identify opportunities for improved anticoagulation care. For selected patients, this approach can help facilitate a safe and effective transition to NOAC therapy.

Lindsey M. Fovel, PharmD; Christopher D. Miller, PharmD, BCPS; Robert W. Seabury, PharmD, DABAT; Luke A. Probst, PharmD, BCPS; and Lara Horvath, PharmD, BCACP

REFERENCE

1. Lip GYH, Banerjee A, Boriani G, et al. Antithrombotic therapy for atrial fibrillation: CHEST guideline and expert panel report. *Chest* 2018;154(5):1121–1201. doi: 10.1016/j.chest.2018.07.040 ■

Dr. Fovel is a PGY-1 pharmacy resident at Upstate University Hospital in Syracuse, New York; Dr. Horvath is an ambulatory care pharmacist at Upstate Health Care Center in Syracuse; Dr. Seabury is a clinical staff pharmacist at Upstate University Hospital, Syracuse; Dr. Probst, a P&T editorial board member, is the executive director of pharmacy services at Upstate University Hospital and clinical assistant professor in the pediatrics and medicine departments at SUNY Upstate Medical University, Syracuse; and Dr. Miller is the associate director of clinical pharmacy services and research at Upstate University Hospital, Syracuse.