
Atrial fibrillation (AF) is an independent, modifiable risk factor for ischemic stroke and independently associated with increased mortality. Nonvalvular AF is associated with a nearly 5-fold higher risk of ischemic stroke; this risk progressively increases with age. In a meta-analysis involving 29 clinical studies and 28,044 patients, judicious antithrombotic therapy with adjusted-dose warfarin was shown to reduce risk related to ischemic stroke by nearly 60% and mortality by approximately 25%, without significant increases in hemorrhagic stroke. However, diffusion of evidence-based knowledge from clinical trials into routine clinical practice demonstrates a significant time lag and evidence-to-practice gap; rates of ischemic stroke are therefore higher in clinical practice. We sought to extend previous work by Lakshminarayan et al to examine temporal trends in ischemic and hemorrhagic stroke rates and warfarin use in the Medicare population over a span of 15 years.

Methods. Using the Medicare 5% database, we identified patients with prevalent AF among general Medicare enrollees (aged ≥65 years, excluding end-stage renal disease) for each cohort year, 1992 through 2007. We subsequently calculated ischemic and hemorrhagic stroke rates and warfarin use in each cohort year among patients with prevalent AF. The Medicare 5% database is a rolling replacement cohort provided annually by the Centers for Medicare & Medicaid Services, composed of a random sample of 5% of all Medicare beneficiaries. Patients with at least 1 Medicare Part A inpatient or 2 outpatient/Part B claims with an International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis code for AF/atrial flutter (427.3x) during the cohort year were classified as having AF. Prevalence of AF was separately identified for each cohort year. Patients with both AF and valvular diseases (ICD-9-CM codes 394.x-397.x, 424.1-424.4, and 746.0-746.7) or a procedure code indicating valvular disease/valvular surgery (ICD-9-CM codes 35.1, 35.2, 35.95, 35.96, and 35.99) were excluded. For prevalent and incident AF, an AF date was established as the date of the first AF claim during the year. Stroke rates and warfarin use were identified during the year after the AF date. Strokes were identified from inpatient Medicare claims, with stroke as the principal diagnosis (ICD-9-CM codes 434.x and 436.x for ischemic stroke; and codes 430.x and 431.x for hemorrhagic stroke). A previously described surrogate method was used to identify warfarin-treated patients with AF using at least 3 prothrombin time claims during the year after the AF date. The institutional review board at Hennepin County Medical Center approved the study.

Results. The observed ischemic stroke rate in patients with prevalent AF was 48 per 1000 patient-years in 1992 and progressively declined during the study period, reaching a plateau of approximately 17 per 1000 patient-years in 2006-2007 (Figure). Compared
with 1992, this represented a 65% decrease in ischemic stroke in the Medicare population. In contrast, the hemorrhagic stroke rate remained constant at nearly 2 per 1000 patient-years throughout the study period. Coincident with decreasing ischemic stroke rates was a trend toward greater use of anticoagulation among patients with prevalent AF; warfarin use among patients with prevalent AF increased from 26.7% in 1992 to 63.1% in 2007 (Figure).

Comment. The continued, steady decline in ischemic stroke rates between 1992 and 2007 in patients with prevalent AF is extremely encouraging. This decrease was associated with increasing warfarin use (26.7% in 1992; 63.1% in 2007), which is noteworthy. These data indicate continued dissemination of evidence-based medicine from clinical trials into routine practice. While causality cannot be established on the basis of these observational data, one can hypothesize that diffusion of warfarin into clinical practice likely contributed substantially to reduction in ischemic stroke rates in this time frame, in combination with better control of modifiable atherosclerotic cardiovascular risk factors.

Mercaldi et al7 reported that 41.5% of Medicare patients with nonvalvular AF do not receive anticoagulation; this is concordant with our data showing that 37% of Medicare beneficiaries with AF did not receive warfarin for anticoagulation therapy in 2007. In this patient subset, substantial numbers likely had a personal preference to forego anticoagulation or logistical constraints, making warfarin therapy not feasible. This group of patients might benefit from the advent of newer anticoagulants that do not require frequent monitoring and have a lower reported risk of significant bleeding.

This study is limited owing to the observational design; the declining rates of ischemic stroke with increasing warfarin use reflect temporal associations and not necessarily the effect of anticoagulation. We used a surrogate method to ascertain warfarin use, which could result in understimating numbers of individuals undergoing testing in alternative settings.

In conclusion, ischemic stroke rates continue to decrease in the Medicare population, parallel to increases in warfarin use, although these rates appear to have leveled off. On the basis of these data, the 37% of Medicare beneficiaries not currently receiving warfarin for anticoagulation may offer a window of opportunity for further reduction in ischemic stroke rates and should be targeted in future studies.


Author Affiliations: Division of Cardiology, Department of Medicine, Hennepin County Medical Center and University of Minnesota, Minneapolis (Drs Shroff and Herzog); and Chronic Disease Research Group, Minneapolis Medical Research Foundation, Minneapolis (Drs Solid and Herzog).

Health Care Provider Satisfaction With a New Electronic Progress Note Format: SOAP vs APSO Format

Many health care organizations are deploying electronic health records (EHRs).1 A health care provider’s EHR progress notes are essential for effective communication. However, these notes may increase errors when they are difficult to read.2 Billing requirements, regulatory statements, and extensive inclusion of test results detract from progress note brevity and clarity.3 In our experience, EHR progress notes that include such elements can span 17 electronic pages, rendering actual clinical reasoning extraordinarily difficult to locate. Missing data can lead to lost productivity and increased cost.4 Health care providers’ frustration with EHR progress notes may interfere with EHR adoption and deployment.5 Although the traditional SOAP (Subjective, Objective, As-

Correspondence: Dr Herzog, Chronic Disease Research Group, Minneapolis Medical Research Foundation, 914 S Eighth St, Ste S-406, Minneapolis, MN 55404 (cherzog@cdrg.org).

Author Contributions: Dr Herzog had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. The analysis, interpretation, and reporting of these data are the responsibility of the authors. Study concept and design: Herzog. Acquisition of data: Herzog. Analysis and interpretation of data: Shroff, Solid, and Herzog. Drafting of the manuscript: Shroff and Herzog. Critical revision of the manuscript for important intellectual content: Shroff, Solid, and Herzog. Statistical analysis: Solid. Obtained funding: Herzog. Administrative, technical, and material support: Herzog. Study supervision: Herzog.

Conflict of Interest Disclosures: Dr Herzog has ownership interest in Johnson & Johnson.

Funding/Support: This study was supported by a research contract with Ortho-McNeil-Janssen, Johnson & Johnson.

Role of the Sponsors: Before submission for peer review, the manuscript was reviewed by the sponsor. Comments were sent to the authors, who are solely responsible for the final version.

Additional Contributions: Chronic Disease Research Group colleague Nan Booth, MSW, MPH, ELS, assisted with manuscript editing.