Direct Oral Anticoagulant Prescription Trends, Switching Patterns, and Adherence in Texas Medicaid

Shui Ling Wong, MS; Landon Z. Marshall, PharmD; and Kenneth A. Lawson, PhD

**ABSTRACT**

OBJECTIVES: To compare prescription trends, costs, switch patterns, and mean adherence among oral anticoagulants in the Texas Medicaid population.

STUDY DESIGN: Secondary analysis of Medicaid prescription claims data.

METHODS: All oral anticoagulant prescriptions for patients aged 18 to 63 years with 1 or more prescription claims for an oral anticoagulant from July 1, 2010, to December 31, 2015, were included in utilization and expenditure trend analyses. Switch patterns and adherence, measured by the proportion of days covered (PDC), were analyzed over 1 year for patients newly initiated on oral anticoagulant therapy.

RESULTS: Over the 5.5-year study period, direct oral anticoagulant (DOAC) use increased steadily and the proportion of oral anticoagulant prescription expenditures accounted for by DOACs increased substantially. By December 2015, DOACs accounted for one-third of anticoagulant prescription claims and more than 90% of total oral anticoagulant prescription expenditures. The mean cost per prescription was 30 times higher for DOACs than warfarin. A higher proportion of patients with a DOAC as an index drug switched drugs. The overall mean ± SD PDC was 0.71 ± 0.21, with no significant differences among patients on dabigatran, rivaroxaban, and apixaban. Using a PDC cutoff point of 0.80 to indicate adherence (vs nonadherence), 42% of patients were categorized as adherent.

CONCLUSIONS: Texas Medicaid prescription data show a gradual increase in DOAC use with a rapid increase in prescription expenditures. Further exploration of the causes of higher switch rates among DOAC initiators compared with warfarin initiators and nonadherence to DOACs is needed to understand the challenges related to DOAC adoption in practice and to improve patient outcomes.

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An 8-month adherence study in patients with AF conducted in 2011 found that almost 70% of Medicaid patients were adherent to dabigatran (average medication possession ratio [MPR], 0.87). However, about one-fifth of the patients switched to warfarin after initiating treatment with dabigatran. 

There are limited data about DOAC adherence, yet having actual practice evidence is important in understanding patient adherence and, subsequently, patient outcomes. Finally, no current literature has described the use of all 4 DOACs in the Medicaid population. Therefore, this study aims to contribute to the growing literature on utilization of, expenditures on, and adherence to DOACs, with a focus on the Texas Medicaid population.

OBJECTIVES

To compare trends in prescription utilization, expenditures, switching patterns, and adherence among oral anticoagulants in the Texas Medicaid population.

METHODS

This was a secondary analysis of prescription claims data from Texas Medicaid from July 1, 2010, to December 31, 2015. Texas Medicaid provides coverage for more than 4 million beneficiaries. 

This joint federal–state program provides low-income Texans with access to healthcare. These prescription claims data include unique patient identifiers (not actual patient identification numbers), drug name/strength, dispense date, paid amount, National Drug Code, quantity dispensed, days supplied, and patient gender and age. The first part of the study examined utilization and prescription expenditure trends of oral anticoagulants. All Medicaid prescription claims data for patients aged 18 to 63 years with at least 1 prescription claim for an oral anticoagulant (ie, dabigatran, rivaroxaban, apixaban, edoxaban, warfarin) during the study period were included in these analyses.

The second part of the study analyzed switching patterns and adherence for patients who were newly initiated on oral anticoagulant therapy between January 1, 2011, and December 31, 2014 (index period). The index date was defined as the earliest anticoagulant prescription drug claim during the index period, and patients were followed for 1 year (365 days) after the index date. Continuous Medicaid enrollment was required during the 6-month period prior to and the 12-month period following the index date, defined as the pre- and postindex periods, respectively. Only patients defined as new initiators of anticoagulant therapy were included (ie, no anticoagulant claim in the preindex timeframe). Figure 1 illustrates the study timeline.

Patients who met the following criteria were included for switching and adherence analyses: (1) had at least 2 prescription claims for an oral anticoagulant (dabigatran, rivaroxaban, apixaban, warfarin) during the index period, (2) had no prescription for an oral anticoagulant during the 6-month preindex period, (3) were aged 18 to 63 years at the index date, and (4) were continuously enrolled in Texas Medicaid during their pre- and postindex periods.

Continuous enrollment was determined based on the presence of any prescription drug claim in 3 consecutive 6-month periods (6 months preindex, 0-6 months post index, and 7-12 months post index). Patients having only 1 prescription claim for an oral anticoagulant during the index period, patients not continuously enrolled in Texas Medicaid, patients with any prescription claim(s) for an oral anticoagulant during the 6-month period before the index date, and patients with more than 1 type of oral anticoagulant claim on the same day were excluded from the study.

Switching was defined as the presence of a claim for any oral anticoagulant in the follow-up period that was different from the index drug. Adherence was estimated using proportion of days covered (PDC), defined as total days the drug was available divided by 365 days. When dispensings overlapped, the full length of each filled prescription was accounted for and the start date of the second prescription was forwarded to be at the end of
the previous prescription.16 Because warfarin users can have frequent dose adjustments to therapy, prescription claims may not accurately estimate warfarin adherence.19 For that reason, adherence was only calculated for patients newly initiating anticoagulant therapy with a DOAC and who were determined to be nonswitchers during the postindex follow-up period.

According to the American College of Chest Physicians Clinical Guidelines for Antithrombotic Therapy and Thrombosis (2012), at least 3 months of anticoagulation therapy is recommended for the treatment of DVT and PE.20 However, durations of treatment are variable according to specific patient needs and preferences. According to the product information for rivaroxaban2 and apixaban,3 the recommended treatment duration for DVT and PE is at least 6 months. Therefore, in order to more accurately calculate adherence to DOACs, we further limited our adherence calculations to individuals with at least 1 prescription for the index oral anticoagulant during the 6-month period starting 6 months after the index anticoagulant prescription. This was our attempt at capturing adherence in chronic users of these medications.18

To illustrate trends, drug utilization and prescription expenditures were plotted against time in months. For continuous variables, means and SDs were reported and analysis of variance (ANOVA) was used to determine if differences existed among groups. Scheffe’s post hoc test was used to identify differences among specific groups. For categorical variables, frequencies were reported and proportions were compared using χ² tests. All analyses were performed at a .05 level of significance using STATA version 14 (STATACorp; College Station, Texas). Human subjects approval was granted by the Institutional Review Board of the University of Texas at Austin.

RESULTS

Trends of Oral Anticoagulant Utilization

Over the 5.5-year study period, there were 277,147 oral anticoagulant prescription claims. The average monthly number of prescription claims for oral anticoagulants increased consistently from 2460 (July-December 2010) to 4672 (January-December 2015). Warfarin was the only oral anticoagulant available before the introduction of the first DOAC, dabigatran. Since its introduction in October 2010, dabigatran has consistently accounted for less than 5% of total monthly anticoagulant prescription claims (Figure 2).

The uptake of rivaroxaban as measured by prescription claims increased at a higher rate than that of dabigatran (Figure 2; Appendix Table 1 [Appendix available at ajmc.com]). By October 2012, rivaroxaban usage surpassed that of dabigatran, and it alone has accounted for more than 10% of total monthly anticoagulant prescription claims since August 2013. Apixaban followed a similar trend. In December 2015, rivaroxaban and apixaban accounted for 14% and 13% of oral anticoagulant claims, respectively. The number of warfarin prescription claims increased during the study period, from 36,206 in 2011 to 41,015 in 2015, but the overall proportion of oral anticoagulant claims for warfarin decreased by 24%. From 2011 to 2015, the total annual number of prescription claims for DOACs increased almost 15-fold, from 1053 to 15,043. By the end of 2015, warfarin usage had steadily declined to about 70% of total oral anticoagulant claims, with DOACs accounting for about 30% of the claims.

Chi-square analysis showed statistically significant (P < .001) relationships between drug type and gender and drug type and age category. There were higher proportions of claims for dabigatran (n = 4633; 52.4%) and edoxaban (n = 20; 55.6%) among males (Appendix Table 2). Conversely, female patients accounted for greater proportions of claims for rivaroxaban (n = 12,314; 56.5%), apixaban (n = 3819; 51.9%), and warfarin (n = 121,316; 54.1%). There were more claims for patients in the older age group (aged 45–63 years) (n = 193,809; 73.9%) than the younger group (aged 18–44 years) (n = 68,581; 26.1%) for all drug types.

Trends of Prescription Expenditures

In October 2011, 1 year after its initial availability, dabigatran accounted for about 5% of the total prescription claims but almost half of the total oral anticoagulant prescription expenditures covered by Texas Medicaid (Figures 2 and 3). Rivaroxaban continued to account for an increasing proportion of DOAC prescription expenditures, with dabigatran and rivaroxaban accounting for about 30% ($30,000) and 40% ($41,000), respectively, of total oral anticoagulant expenditures.
in December 2012. Apixaban contributed to the increasing proportion of prescription expenditures, driving the combined DOAC prescription expenditures to exceed 87% (> $219,000) and 88% (> $320,000) of the total Texas Medicaid expenditures for oral anticoagulants in December 2013 and December 2014, respectively. In 2015, DOAC utilization accounted for more than $4.7 million (90%) of the total oral anticoagulant prescription expenditures in Texas Medicaid.

Two-way ANOVA showed that the mean cost per prescription of dabigatran, rivaroxaban, and apixaban increased significantly (P < .001) each year from 2011 to 2015, except from 2011 to 2012, when that of dabigatran decreased (eAppendix Table 3). Based on the latest data in 2015, dabigatran, rivaroxaban, and apixaban cost more than $300 per prescription, about 30 times the cost of warfarin.

Switching Patterns

Overall, 3.5%, 11.7%, 2.1%, and 82.8% of new users were started on dabigatran, rivaroxaban, apixaban, and warfarin, respectively. Among new users of oral anticoagulants who were followed for 1 year, the proportions of patients who switched to another oral anticoagulant were 17.9%, 24.5%, 15.6%, and 9.2%, respectively (Table 1). Chi-square analysis showed a statistically significant relationship (P < .001) between drug type and switch status. Compared with patients who were initiated on warfarin, a higher proportion of patients with a DOAC as an index drug switched drugs during the 12-month postindex period (P < .001).

Further examination of the switching patterns using χ² analysis revealed a significant relationship between age group and switch patterns. A higher proportion of younger patients versus older patients switched from warfarin to a DOAC (72.7% vs 63.8%) and from a DOAC to warfarin (17.3% vs 16.1%) (Table 1). Conversely, older patients accounted for a higher proportion of patients who switched from a DOAC to another DOAC compared with younger patients (20.1% vs 10.0%). Overall, switching to a DOAC occurred more frequently than the reverse: 704 patients switched from warfarin to a DOAC or from the index DOAC to a different DOAC, whereas only 139 patients switched from a DOAC to warfarin.

Adherence

The mean adherence was compared among nonswitcher DOAC patients, using PDC as the adherence measure. The overall mean ± SD PDC was 0.71 ± 0.21. Using an adherence cutoff point of 0.80 to indicate adherence/nonadherence, 42% of patients were categorized as adherent. One-way ANOVA showed no significant differences in mean PDC among the patients on dabigatran, rivaroxaban, and apixaban (P = .359) (Table 2).

DISCUSSION

To the best of our knowledge, this is the first study to describe the utilization of all currently available DOACs in a Medicaid population.
Trends of Oral Anticoagulant Utilization and Prescription Expenditures

Consistent with prior reports, our study findings showed a gradual increase in the uptake of new oral anticoagulation medications, although there were a few months of delay in the uptake of each DOAC after FDA approval.\(^\text{10,13,23}\) According to a national audit, dabigatran prescriptions increased to about 18% of all oral anticoagulant visits in US ambulatory practice by the end of the first year after its introduction.\(^\text{11}\) Following rivaroxaban introduction, the trends in utilization and expenditures are analogous with those found in the study conducted by Desai et al, in terms of the increasing uptake of rivaroxaban and decreasing proportion accounted for by dabigatran and warfarin.\(^\text{11}\)

In addition, rivaroxaban utilization was observed to increase at a much higher rate (>5000 prescriptions in 2013) (eAppendix Table I) compared with dabigatran. This may be due to rivaroxaban’s FDA-approved indications at the time of approval and once-daily dosing in patients with AF.\(^\text{5,8}\) The results in this study suggest that apixaban may follow a similar trajectory, as it had (as of 2015) already started to displace the earlier drugs. It should also be noted that the increasing use of newer DOACs may be encouraged by the changes in guidelines that prefer DOACs over warfarin, growing physician experience, and approval of new indications.\(^\text{10}\)

As of July 2016, all DOACs were classified as preferred drugs on the Texas Medicaid Preferred Drug List, except for edoxaban, which requires prior authorization. It is interesting to note that rivaroxaban was moved to nonpreferred agent classification from July 2014 to July 2015.\(^\text{15}\) Correspondingly, there was a slight reduction in rivaroxaban prescription claims and expenditures during this period. Compared with men, women generally have a higher risk of thromboembolism and lower odds of receiving both DOACs and warfarin.\(^\text{12,15,28}\) Our unadjusted analysis shows a higher proportion of rivaroxaban, apixaban, and warfarin claims for women compared with men. Recent studies suggest that women treated with warfarin experience safety and efficacy similar to that experienced by men when treated with DOAC agents.\(^\text{27,28}\) Therefore, our results suggest that the practice of anticoagulation treatment for female patients may be moving in a positive direction with the availability of DOACs, which have favorable safety and efficacy profiles compared with warfarin.

The adoption of DOACs into practice imposed a significantly higher cost burden to Texas Medicaid between 2010 and 2015. However, these higher expenditures have been demonstrated to be cost-effective relative to warfarin.\(^\text{29-33}\) Nevertheless, more research is needed to better understand the cost impact and cost-effectiveness of DOACs in actual practice.\(^\text{32,34}\)

Switching Patterns

This study reports a switch rate of 18% among patients initiated on dabigatran compared with 3 studies that reported dabigatran switch rates of less than 10%, 16%, and 21%, respectively.\(^\text{10,12,14}\) Analyses of Texas Medicaid data revealed that the switch rates for patients initiated on any DOAC ranged from 15% to 25%, as opposed to a switch rate of less than 10% for patients initiated on warfarin. Although this study did not have information on why patients switched drugs, common reasons for switching include an occurrence of bleeding complications, nontolerance of therapy, and patient’s or physician’s preference.\(^\text{35,36}\) The higher switch rate among DOAC users compared with warfarin users demonstrates the need for further research to understand DOAC management.

A Dutch study reported that the rate of patients who switched from warfarin to a DOAC is double that of the reverse.\(^\text{21}\) Similarly, our findings show that switching off of initial anticoagulant therapy in patients starting warfarin occurred at a rate twice that of DOACs. The switch rate to a DOAC is anticipated to increase in the future with more availability, as well as improved safety and efficacy profiles, of DOACs.

Adherence

Our study found a relatively low mean adherence for anticoagulant therapy as measured by PDC (mean ± SD = 0.71 ± 0.21), with no significant difference among dabigatran, rivaroxaban, and apixaban. However, 2 recent studies reported that rivaroxaban users have higher adherence compared with dabigatran and apixaban users.\(^\text{16,37}\) An earlier study on dabigatran in Medicaid reported an average MPR of 0.87.\(^\text{12}\) Other actual practice studies have demonstrated similar nonadherence to DOACs or a high proportion (≥25%) of nonadherent patients.\(^\text{21,22,54,58,59}\) It should be noted that the nonadherence to DOACs in this study may also be attributed to the younger patient population examined, as younger patients have been associated with lower adherence.\(^\text{87,89}\)

The poor adherence to DOACs found in this study calls for further investigation into the risk factors for nonadherence to DOACs, particularly in view of poor adherence even when medications are provided at no cost to Medicaid patients. Additionally, health professionals and other stakeholders should look for opportunities to improve adherence with DOACs, such as delivering patient education and using technology aids as reminders, to optimize the safety and effectiveness of these promising agents.\(^\text{40,41}\)

Limitations

This retrospective data analysis has several limitations. First, because the data were from prescription claims databases, inaccuracies and coding errors may have occurred. Second, our analyses were limited to the study period specified and the utilization trends may change over time. On the same note, we were unable to provide detailed information on edoxaban use, because it had just recently been introduced into the market at the time of our study. Third,
measurements of switching and adherence were based on prescription claims data, assuming that the patient is taking the medication. Fourth, the results from this study may not be generalizable beyond the Texas Medicaid population. Fifth, no comparison could be made between warfarin and DOAC adherence. This is because patients on warfarin typically have frequent dosage adjustments, and prescription claims may not accurately estimate PDC.

CONCLUSIONS

Overall, the data show a gradual increase in new oral anticoagulant use in the Texas Medicaid population with a rapid increase in oral anticoagulant prescription costs. This study’s findings show that the cost per DOAC prescription is markedly higher (30 times higher) than that of warfarin. There is a need to further explore the causes of higher switch rates among DOAC users and nonadherence to DOACs. These findings provide an early utilization trend profile in the Medicaid population and aid in our understanding of the challenges accompanying DOAC adoption in practice.

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Authorship Information: Concept and design (SLW); acquisition of data (SLW, LZM, KAL); drafting and interpretation of data (SLW, LZM, KAL); administrative, technical, or logistic support (LZM, KAL); and important intellectual content (SLW, LZM, KAL).

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REFERENCES

19. Proportion of days covered (PDC): percentage of patients who filled at least two prescriptions for a non-warfarin oral anticoagulant on two unique dates of service at least 180 days apart, received greater than 60 days supply of the medication, and who met the PDC threshold of 60% during the measurement period.
20. Authors report no relationship or financial interest with any entity that would pose a conflict of interest with the subject matter of this article.

Authorship Information: Concept and design (SLW); acquisition of data (SLW, LZM, KAL); drafting and interpretation of data (SLW, LZM, KAL); statistical analysis (SLW, LZM, KAL); administrative, technical, or logistic support (LZM, KAL); and supervision (KAL).
**eAppendix Table 1.** Frequency and Proportion of Prescription Claims by Year for Oral Anticoagulants in Texas Medicaid (2011-2015), n (%)

<table>
<thead>
<tr>
<th>Anticoagulants</th>
<th>Year</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>$\chi^2$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2011</td>
<td>2012</td>
<td>2013</td>
<td>2014</td>
<td>2015</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dabigatran</td>
<td>992 (2.7)</td>
<td>1573 (3.2)</td>
<td>1926 (3.1)</td>
<td>1935 (3.4)</td>
<td>2418 (4.3)</td>
<td></td>
<td>25,000</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Rivaroxaban</td>
<td>61 (0.2)</td>
<td>1175 (2.4)</td>
<td>5685 (9.1)</td>
<td>7826 (13.6)</td>
<td>7058 (12.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apixaban</td>
<td>-</td>
<td>-</td>
<td>214 (0.3)</td>
<td>1617 (2.8)</td>
<td>5531 (9.9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edoxaban</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>36 (0.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warfarin</td>
<td>36,206 (97.2)</td>
<td>46,182 (94.4)</td>
<td>54,761 (87.5)</td>
<td>46,179 (80.2)</td>
<td>41,015 (73.2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>37,259 (100)</td>
<td>48,930 (100)</td>
<td>62,586 (100)</td>
<td>57,557 (100)</td>
<td>56,058 (100)</td>
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</tr>
</tbody>
</table>
**eAppendix Table 2.** Frequencies and Proportions of Oral Anticoagulant Prescription Claims by Gender and Age Category

<table>
<thead>
<tr>
<th>Demographic Variables</th>
<th>Total, n (%)</th>
<th>Dabigatran, n (%)</th>
<th>Rivaroxaban, n (%)</th>
<th>Apixaban, n (%)</th>
<th>Edoxaban, n (%)</th>
<th>Warfarin, n (%)</th>
<th>$\chi^2$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>141,676</td>
<td>4211 (47.6)</td>
<td>12,314 (56.5)</td>
<td>3819 (51.9)</td>
<td>16 (44.4)</td>
<td>121,316</td>
<td>214.1</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(54.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(54.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>120,714</td>
<td>4633 (52.4)</td>
<td>9491 (43.5)</td>
<td>3543 (48.1)</td>
<td>20 (55.6)</td>
<td>103,027</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(46.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(45.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age category, years</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-44</td>
<td>68,581</td>
<td>1278 (14.4)</td>
<td>5775 (26.5)</td>
<td>1428 (19.4)</td>
<td>8 (22.2)</td>
<td>60,092</td>
<td>849.5</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>45-63</td>
<td>193,809</td>
<td>7566 (85.6)</td>
<td>16,030 (73.5)</td>
<td>5934 (80.6)</td>
<td>28 (77.8)</td>
<td>164,251</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(73.9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(73.2)</td>
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</tr>
</tbody>
</table>
**Table 3. Mean Cost Per Prescription ($) of Oral Anticoagulants by Year in Texas Medicaid (2011-2015)**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Mean Cost Per Prescription (SD)</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dabigatran (n = 8844)</td>
<td>258.6* (137.2)</td>
<td>239.9 (75.1)</td>
<td>256.7* (40.5)</td>
<td>290.2 (49.1)</td>
<td>312.4 (60.5)</td>
<td></td>
</tr>
<tr>
<td>Rivaroxaban (n = 21,805)</td>
<td>153.2 (79.5)</td>
<td>203.1 (81.2)</td>
<td>257.9 (82.9)</td>
<td>278.2 (94.2)</td>
<td>318.8 (105.1)</td>
<td></td>
</tr>
<tr>
<td>Apixaban (n = 7362)</td>
<td>-</td>
<td>-</td>
<td>251.7 (42.8)</td>
<td>285.4 (51.4)</td>
<td>305.4 (77.0)</td>
<td></td>
</tr>
<tr>
<td>Edoxaban (n = 36)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>278.1 (28.4)</td>
<td></td>
</tr>
<tr>
<td>Warfarin (n = 224,343)</td>
<td>13.6 (13.8)</td>
<td>9.5 (10.8)</td>
<td>8.5 (11.1)</td>
<td>8.9 (11.6)</td>
<td>10.5 (13.7)</td>
<td></td>
</tr>
<tr>
<td>Total (N = 262,390)</td>
<td>20.3 (47.8)</td>
<td>21.6 (54.0)</td>
<td>39.6 (87.0)</td>
<td>62.7 (115.1)</td>
<td>91.6 (142.2)</td>
<td></td>
</tr>
</tbody>
</table>

Analysis of variance showed overall significant model. F = 120,000; df = 18, 262,389; P <.001.
There was a significant interaction between year and drug. F = 2070.34; df = 10, 262,371; P <.001.
Scheffe’s post hoc test showed that all group means are significantly different except a.
Year 2010 data was excluded due to incomplete data.
**eAppendix Table 4.** Proportions of Patients Who Switched Oral Anticoagulant Therapy by Index Drug

<table>
<thead>
<tr>
<th>Index Drug</th>
<th>Switch n (%)</th>
<th>No Switch n (%)</th>
<th>$\chi^2$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dabigatran</td>
<td>46 (17.9)</td>
<td>211 (82.1)</td>
<td>190.9</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Rivaroxaban</td>
<td>212 (24.5)</td>
<td>653 (75.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apixaban</td>
<td>24 (15.6)</td>
<td>130 (84.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warfarin</td>
<td>561 (9.2)</td>
<td>5560 (90.8)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>