

Oregon Health & Science University
School of Medicine

Scholarly Projects Final Report

Title *(Must match poster title; include key words in the title to improve electronic search capabilities.)*

Patterns of anticoagulant adherence for secondary thromboprophylaxis in physically active patients: a single-institution survey study

Student Investigator's Name

Leah Esposito (McCall)

Date of Submission *(mm/dd/yyyy)*

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Graduation Year

2023

Project Course *(Indicate whether the project was conducted in the Scholarly Projects Curriculum; Physician Scientist Experience; Combined Degree Program [MD/MPH, MD/PhD]; or other course.)*

Scholarly Project Curriculum

Co-Investigators *(Names, departments; institution if not OHSU)*

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Concentration Lead's Name

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Project/Research Question

The main question of this study is to address what patterns of adherence and hematological complications are present in athletic patients on long term anticoagulation therapy.

Type of Project *(Best description of your project; e.g., research study, quality improvement project, engineering project, etc.)*

Ethics, Quality Improvement, and Education

Key words *(4-10 words describing key aspects of your project)*

Long term anticoagulation, physical activity, thrombus, quality of life, medication complications

Meeting Presentations

If your project was presented at a meeting besides the OHSU Capstone, please provide the meeting(s) name, location, date, and presentation format below (poster vs. podium presentation or other).

Submitted to The International Society on Thrombosis and Haemostasis annual meeting (pending acceptance)

Publications *(Abstract, article, other)*

If your project was published, please provide reference(s) below in JAMA style.

N/A

Submission to Archive

Final reports will be archived in a central library to benefit other students and colleagues. Describe any restrictions below (e.g., hold until publication of article on a specific date).

N/A

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Next Steps

What are possible next steps that would build upon the results of this project? Could any data or tools resulting from the project have the potential to be used to answer new research questions by future medical students?


Same study question with higher number of participants and questions about complications surrounding time of withholding medications and physical activity.

Please follow the link below and complete the archival process for your Project in addition to submitting your final report.

https://ohsu.ca1.qualtrics.com/jfe/form/SV_3ls2z8V0goKiHZP

Student's Signature/Date (Electronic signatures on this form are acceptable.)

This report describes work that I conducted in the Scholarly Projects Curriculum or alternative academic program at the OHSU School of Medicine. By typing my signature below, I attest to its authenticity and originality and agree to submit it to the Archive.

 Recoverable Signature

X

Student's full name

Men

3/8/23

X

Mentor Name

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Report: Information in the report should be consistent with the poster, but could include additional material. Insert text in the following sections targeting 1500-3000 words overall; include key figures and tables. Use Calibri 11-point font, single spaced and 1-inch margin; follow JAMA style conventions as detailed in the full instructions.

Introduction (≥250 words)

Venous Thromboembolism is a relatively common disorder, affecting 1 to 2 people per 1000 yearly in the United States (6). Lifelong anticoagulation is a treatment option that is recommended in patients who have experienced an unprovoked DVT, or PE, recurrent DVT or PE, or have persistent risk factors for recurrence (1). It is often recommended that these patients not participate in contact or collision sports due to the higher risk of trauma and bleeding, (2) which can be a difficult option for any patient emotionally and financially. Even more issues arise for this option in patients who are elite athletes, or find these types of activities to dramatically increase their quality of life.

Athletes are often thought to not have a significant incidence of thrombosis due to the absence of the frequent risk factors that affect the general public including, smoking, obesity, and a sedentary lifestyle but VTEs are cited as one of the most common causes of fatality in college and high school football players (3). Athletes have many unique risk factors that contribute to this data. These include long periods of reduced mobility in between competition as well as after injury or orthopedic surgery, lower heart rate, higher incidence of blunt trauma and surgery, dehydration, polycythemia, and overdeveloped musculature (5). All of these elements, while not the common risk factors, can all contribute to one or multiple elements of Virchow's triad. It is also theorized that repetitive movement of the upper extremity can lead to effort thrombosis therefore including some non-contact sports in this category of risk (4).

According to the American College of Chest Physicians 10th version of antithrombotic guidelines, it is recommended that patients who experience an unprovoked DVT who have a high risk of bleeding, which would include athletes who wish to resume competitive activity, should be given 3 months of anticoagulation (1). However, if the patient is at low or moderate risk of bleeding it is recommended that they be given a longer regimen to lower the chance of recurrence. This brings up the unique dilemma of treating these patients for longer in order to reduce another thrombotic event or treating more conservatively in order to reduce the risk of bleeding.

Because of the increasing availability of low molecular weight heparins and direct oral anticoagulants that have a shorter half-life than warfarin, it has been proposed that an individualized intermittent treatment approach could meet the demands of an athlete's competitive endeavors while also mitigating the risk of VTE recurrence and major bleeding (7,8). This proposed expert opinion approach involves a period of withholding anticoagulation medication prior to athletic activity and then resuming it directly afterwards if no trauma has occurred (7,8). The proposition, while when used has been safe, effective and rewarding, has not been thoroughly examined in the literature.

Methods (≥250 words)

This study consisted of a patient survey for patients of Oregon Health & Science University. Inclusion criteria were ambulatory and hospitalized patients 18-80 years old on oral anticoagulation for at least 1 month after index thrombotic event for secondary thromboprophylaxis. Patients were excluded if they were taking warfarin. Patients were asked if they felt there was any aspect of their health that was

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affecting their level of physical activity other than their anticoagulation medication. Patients who responded yes were excluded from the study. Patients were recruited in one of four ways: 1) in-person during ambulatory clinic visits to the classical hematology department, using a paper consent and survey; 2) using an online consent form and Qualtrics survey, which was provided to patients via a URL (landing page <https://www.anticoag.net/anticoagulation-in-athletes>); 3) calling eligible patients after retrospective chart review of patient panels for adult classical hematology providers at OHSU; 4) using a Twitter post by co-investigator Dr. Sven Olson (@Svematologist) with brief study description and invitation to participate via the URL mentioned above. The language of the tweet read as follows: *“Attention medical providers: Please consider the following survey for adult patients w/ previous clotting hx on DOACs or LMWH for >1 month; how do you manage anticoagulation around physical activity?”* 5) using a Twitter post by co-investigator Dr. Bethany Samuelson Bannow with a brief study description and invitation to participate via the URL mentioned above. The language of the tweet read as follows: *“Are you ≥ 18 and on a blood thinner? Researchers in OR would love to hear about how you manage your blood thinner around physical activity. Please consider taking (or sharing!) this 10min survey to share your experiences.”*

The survey questions asked whether and how frequently patients voluntarily withheld doses of their respective anticoagulants around the time of physical activities as well as type of anticoagulation, reason for anticoagulation, bleeding complications and basic demographic information. All completed forms were uploaded into a HIPPA compliant, password protected Qualtrics database. Data was analyzed using descriptive statistics within this database.

Results (≥500 words)

A total of 37 responses were collected on the Qualtrics database. Five surveys were started and not completed, leaving a final number of 32 completed surveys. Of these responses 40.6% identified as male and 59.4% identified as female. The mean age of the entire cohort was 49.6 years. The majority (78.4%) of the respondents identified their country of origin as the United States with 90.3% identifying Oregon as their state of residence. The majority of respondents also identified as White (85.3%), followed by Hispanic (8.9%), Black (2.9%), and Native American (2.9%).

All respondents were taking an oral anticoagulant, the majority of which was apixaban (72.7%) followed by rivaroxaban (21.2%), dabigatran (3.0%) and other (3.0%). When asked what aspects were personally important to respondent when deciding on a blood thinner 62.1% responded with none, 24.1% responded with need for monitoring, 10.3% responded with diet, and 3.4% responded with cost. The majority of respondents identified deep vein thrombosis (DVT) (36.4%) as the inciting event for anticoagulation followed by pulmonary embolism (PE) (33.3%), then other (stroke, hepatic vein thrombosis) (21.2%), then clot in the arm (9.1%).

90.6% of respondents reported participating in regular physical activity. 17.4% of these individuals sometimes skip doses of their medication in anticipation of activity. The mean age of those who withheld medication was 33.3 versus 61.7 for non-withholders. 60% of withholders identified pulmonary embolism as the inciting event for initiation of anticoagulation while non-withholders identified DVT (29.2%), PE (29.2%) and other (29.2%) equally as the inciting event. Since the inciting event 100% of the withholding individuals have recovered with no leftover symptoms while 71.4% of the non-withholders have completely recovered. When asked on average how many days per week do you not take your blood thinner (including not taking one of two daily doses) the majority of withholders (60%) selected 3-4 days while the majority of non-withholders (70.8%) selected 0 days. The reasons cited for non withholders missing doses included forgetting them (80%), skipping for a medical procedure (13.3%) and fear of bleeding (6.7%). Non-withholders were more likely to be taking their blood thinner for >12 months (100% vs 66.7%).

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The rate of experiencing of bleeding complications was 60% for withholders and 25% for non-withholders. The type of bleeding experienced by non-withholders included gum bleeds (25%), heavy menstrual bleeding (25%), bruising (12.5%), nosebleeds (12.5%), bloody stools (12.5%), and bleeding in the spleen (12.5%). For non-withholders bleeding complications included nosebleeds (33.3%), gum bleeds (33.3%), and heavy menstrual bleeding (33.3%).

54.2% of Non-withholders report that being on a blood thinner has not changed their level of physical activity compared to 60% of withholders reporting at least some change in their physical activity. However, 87.5 % of non-withholders report being recreational in their activity before and after initiation of treatment while 60% of withholders reported being high level competitive in their activities before initiation (Table 1). The most common activity for non-withholders was Hiking/Walking (29.3%) compared to Running for withholders (19.1%). Withholders reported participating in more high-risk sports such as wrestling, mountain biking, downhill skiing/snowboarding and basketball (Figure 1).

Discussion (*≥500 words*)

Our study is taking the first step in establishing a much-needed area of research for return to play after VTE. Our results in general show that patients who are otherwise healthy, and have recovered from their inciting event remain physically active. It is important to encourage this mindset as physical activity has been shown to be associated with a lower risk of mortality following a DVT (9), and provides an avenue for VTE prophylaxis (10). Additionally, physical activity has been shown to reduce symptoms of anxiety and depression (11) which may be pervasive in competitive athletes who are forced to be removed from play due to anticoagulation use.

Those that withheld were more likely to be younger, higher-level athletes, who had been on their anticoagulation medication for more than a year. Withholders who reported being high level competitive in their activity were also more likely to feel that being on a blood thinner had changed their level of physical activity. This makes sense as those who are higher level tend to have certain risk factors that make them more prone to recurrence or bleeding complications (5), and therefore may be more likely to be encouraged to abstain from certain activity. While withholders had a higher bleeding complication rate than those that did not withhold, it was never established if these complications occurred around the time of physical activity and medication withholding. There were also only 3 individuals who withheld medication around physical activity which exaggerated the complication rate in this group. Additionally, complications reported by non-withholders did not include the more serious types of bleeding such as bloody stools, bruising, and bleeding in the spleen that were present in the non-withholding group. This phenomenon was present despite those in the withholding group participating in more high-risk sports.

While this is one of the first studies that examines the real world patterns of medication use in this population, there are limitations. The most notable is the size and lack of diversity of the study cohort. The size is small and includes mostly White individuals residing in Oregon which therefore decreases the power and generalizability of the results. We only examined individuals that were otherwise healthy which most likely exaggerates the level and types of activity that patients on long term anticoagulation participate in. Lastly are the limitations associated any survey study including validity and inflexibility. This is due to the general nature of survey questions as they are designed to be understandable by many individuals. Future research should focus on the complication rates occurring around the timing of medications holidays. It would also be helpful to design a randomized control trial to compare complications rates between those who are active and do not withhold and those who are active and do withhold to control for possible confounding variables.

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Conclusions (2-3 summary sentences)

It seems that patients who are in otherwise good health on anticoagulation remain regularly physically active in a recreational sense. Those who withhold medication seem to be younger, high level competitive athletes who have recovered from their inciting event. Bleeding event rate is higher in withholders; however, it was never assessed if these events occurred around the time of medication holidays or physical activity. Overall, this study gives some initial insight into medication habits of these patients, and more research is needed to fully assess safety of “medication holidays.”

References (JAMA style format)

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