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## Patient Education for Oral Anticoagulation Therapy

Tammy J. Diehn

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PATIENT EDUCATION FOR ORAL ANTICOAGULATION THERAPY

by

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Master of Science Candidate

An Independent Study

Submitted to the Graduate Faculty

of the

University of North Dakota

in partial fulfillment of the requirements

for the degree of

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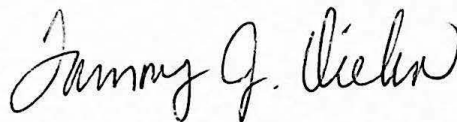
2013

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## Abstract

Oral anticoagulant therapy is recommended as a therapeutic prophylaxis treatment against thromboembolism for patients with atrial fibrillation who are at high risk of having a stroke. While this medication has life saving benefits, potential adverse side effects with life threatening risks also exist. Medication adherence and patient lifestyle decisions influence the associated risks. To reduce potential for patient harm associated with oral anticoagulation therapy, the Joint Commission implemented a national patient safety goal in the ambulatory care setting indicating patient education should be an essential part of an anticoagulation therapy program (2012). Through a comprehensive review of literature, insufficient knowledge was found to negatively impact adherence to therapy and increase the risk of an anticoagulant related adverse event for the patient. The findings were used to guide the development of an oral anticoagulation therapy education booklet. The booklet contains essential components to effectively give patients the necessary knowledge of safe management practices and associated risks of OAT in order to achieve optimal health outcomes. This booklet will serve as a resourceful teaching outline for the healthcare provider and a home reference guide for the patient.

*Keywords:* oral anticoagulant, oral anticoagulation therapy, Coumadin, warfarin, patient education and patient teaching

### Patient Education for Oral Anticoagulation Therapy

Oral anticoagulant therapy (OAT) is used as a primary and secondary prevention treatment of arterial and venous thromboembolism in the ambulatory healthcare setting for patients with mechanical heart valves, pulmonary emboli (PE), deep vein thrombosis (DVT), and most commonly atrial fibrillation (AF). It is recommended as a therapeutic prophylaxis treatment against thromboembolism in patients with AF who are at high risk of having a stroke. AF is a common heart arrhythmia. In 2010, approximately 2.66 million people in the United States (US) were known to have AF. Men and women over 40 years old have a one in four lifetime risk of acquiring AF. The incidence increases with age. The median age with AF in men is 66.8 years and 74.6 years in women. Patients with AF have a five-fold risk of suffering from an ischemic stroke (Centers for Disease Control and Prevention [CDC], 2010).

The vitamin K antagonist (VKA), warfarin (trade name Coumadin<sup>®</sup>) has been known to reduce the risk of ischemic stroke by as much as 68% (Deitelzweig, 2012). Until recently, warfarin was the only OA available in the US. To date, it is the most widely prescribed and only OA available with a known antidote and laboratory test for clinically monitoring blood levels. In 2004, 30.6 million prescriptions were dispensed for warfarin and Coumadin<sup>®</sup> in the US (Wysowski, Nourjah, & Swartz, 2007).

In addition to the well-known benefits of OA, major safety concerns exist because of potential life threatening implications. In 2006, the United States Food and Drug Administration (FDA) required manufacturers of warfarin to place a black box warning on the product to warn against the risk factors for bleeding and also required a warfarin medication guide be given out to the patient with each prescription (Wysowski et al., 2007). Warfarin has been identified as one of the three most commonly implicated medications related to emergency hospitalizations for



adverse drug events (ADE) in older adults in the US. It is estimated that over 33,000 hospitalizations occurred nationwide from 2007-2009 as a result of ADE from warfarin mostly due to its supratherapeutic effects (Budnitz, Lovegrove, Shehab & Richards, 2011). These adverse events are often preventable. According to the Joint Commission's national patient safety goal (NPSG), efforts should be made to reduce the risk of harm associated with taking OA by educating patients and families about the medication that includes importance of ongoing monitoring, compliance, dietary restrictions, and potential for drug reactions and interactions (Moreland et al., 2013).

### **Purpose**

A patient's level of knowledge about oral anticoagulation therapy can influence personal health outcomes. Patients should be encouraged and empowered to play an active role in their treatment plan. An educational partnership should be encouraged to decrease potential risks and improve understanding of the importance of patient adherence (Maddali et al., 2012). Patients on OAT should be given the knowledge to modify lifestyle through health promotions that reduce the risks of an adverse event and provide optimal health outcomes. This study will identify gaps in patient knowledge related to the oral anticoagulant medication, warfarin. The findings will be used to develop an education booklet that will improve patient safety and health outcomes.

### **Significance**

The vitamin K antagonist (VKA) medication, warfarin, is the most common oral anticoagulant used in the ambulatory care setting. Patients who take warfarin require close monitoring due to the drug's pharmacology properties of having a narrow therapeutic index with a long half-life as well as many drug and dietary interactions. Patients should be educated on

key components of oral anticoagulation therapy and the role they play in achieving optimal health outcomes.

### **Conceptual/Theoretical Framework**

The health belief model (HBM) will be used as the theoretical framework to guide this paper and develop an educational booklet for healthcare providers and patients. This social cognition model “attempts to predict future health-related behaviors and outcomes” (Pender, Murdaugh & Parsons, 2011, p. 38). According to the HBM, health behavior is the result of the individual’s own perception of a health threat, and the belief that the threat is decreased because of a certain behavioral response. The presence of signs or and symptom of a disease or encouragement from family or health care professionals are often present that influences the individual to take action (Orensky & Holdford, 2005).

The health belief model can be applied to both preventative and illness role behaviors. The model was developed in the 1950s and originally used in the public health setting to describe why some individuals take action to prevent illness and others do not. Since then the HBM has been used in ambulatory care settings to predict an individual’s health behavior for such things as breast self-examination, condom use, smoking cessation and stroke risk reduction (Pender, Murdaugh & Parsons, 2011). The HBM is applicable to OAT in that it helps to understand how a patient’s perceived susceptibility for having a stroke can predict adherence to OAT; and what influence the healthcare professional has on the patient’s health behavior.

Patients should be encouraged and empowered to play active roles in their treatment plan. The intention of this paper is to apply what is found in the literature and develop a booklet that will be used to increase warfarin related knowledge in patients taking oral anticoagulants. “... thorough education emphasizing benefits of warfarin therapy and decreasing perceived barriers

could increase adherence to therapy, thereby achieving high quality anticoagulation management (HQACM)” (Phillips & Ansell, 2008, p. 65). This booklet will serve as a resourceful teaching outline for the healthcare provider and a home reference guide for the patient to improve patient safety and health outcomes.

### Definitions

Definitions of the terms atrial fibrillation, health literacy, international normalized ratio, narrow therapeutic index, oral anticoagulant, prothrombin time, thromboembolism, and vitamin K antagonist, are given to assist in the understanding of concepts presented.

- Atrial fibrillation (AF): a heart arrhythmia in which the atria (upper chambers of the heart) beats irregularly or “quivers like jello” instead of pumping blood effectively down into the ventricles. This causes blood to pool in the atria which can lead to the formation of blood clots (American Heart Association, 2012).
- Health literacy: “the capacity to obtain, process, and understand basic health information and services to make appropriate health decisions” (CDC, 2012).
- International normalized ratio (INR): “A standard unit used to report the result of a prothrombin (PT) test...attempts to minimize differences between thromboplastin reagents through a calibration process in which all commercial thromboplastins are compared with an international reference preparation (IRP) by the World Health Organization (WHO)...one INR result can be compared to another INR result regardless of how or where the result was obtained worldwide...an individual whose blood clots normally and who is not on anticoagulation should have an INR of approximately 1. The higher the INR is, the longer it takes blood to clot...as the INR increases, the risk of bleeding and bleeding-related events increases...as the INR decreases, the risk of clotting events increases” (Walker, 2004).

- Narrow therapeutic index: a medication agent with a small difference between therapeutic and toxic ranges in dosing that requires titration and close patient monitoring (Hughes & Messerly, 2009).
- Oral anticoagulant: a medication taken by mouth that inhibits blood clot formation (Ansell et al., 2009, p.85).
- Prothrombin time (PT): “a measure of how quickly blood clots” (Walker, 2004).
- Thromboembolism: “ a clot (thrombus) that forms in a blood vessel then breaks loose and is carried by the blood stream and plugs another vessel” (Ansell et al., 2009, p. 85).
- Vitamin K antagonist (VKA): “a medication that inhibits synthesis of the clot-forming substance, prothrombin” (Ansell et al., 2009, p. 96).

#### **Process**

A comprehensive review of the literature began with an electronic search of CINAHL, PUBMED and SCOPUS databases accessed through the Harley E. French Library of the Health Sciences at the University of North Dakota. Keywords used in the search were oral anticoagulant, oral anticoagulation therapy, Coumadin, warfarin, patient education and patient teaching. The search was limited to articles published within the last ten years and written in the English language. Initial results were large, ranging from 8,758 to 2,110, when searching each individual keyword(s). The results were further narrowed down by combining keywords in the search such as oral anticoagulant patient education and warfarin patient teaching.

The advanced electronic search identified 341-378 citations. Titles and abstracts were reviewed to find original research studies about patient knowledge about warfarin and educational content for teaching patients who take oral anticoagulants beyond hospitalizations. Citations were excluded if they did not pertain to adult patients, relate to patient education or

teaching, were not a research article or the primary source of data, or a duplicate from another database. A total of 226 articles were eliminated through this process leaving 152 articles for further review.

Another review of titles and abstracts for the remaining 152 articles was completed this time excluding citations with a primary focus on patient self-management, disease processes other than AF and OA other than warfarin. Citations with studies conducted in other countries irrelevant to practices in the US were also eliminated. Upon review of references in the identified articles, three additional articles were found to meet the criteria and were included. A total of sixteen full text articles were retrieved for inclusion of the data analysis. All articles pertained to patient knowledge of warfarin and/or risks associated with oral anticoagulation therapy, patient adherence and therapeutic control with respect to patient education.

Educational topics for teaching patients on OAT and measuring patient knowledge were extracted. This information was used to develop a patient teaching booklet to be used by healthcare professionals, given to patients new to OAT or as an ongoing reinforcement tool for those already taking an OA. Furthermore, the booklet could serve as a teaching instruction outline guide for healthcare providers in a variety of clinical practice settings including inpatient, ambulatory care or home care to efficiently direct a patient education encounter. The Center for Medicare and Medicaid Service's (CMS) criteria for written educational materials was followed in that simple, easy to understand language was used to make the contents in the booklet clear and effective for patient education.

This comprehensive booklet was used at an anticoagulation clinic (ACC) at a local healthcare organization in the delivery of teaching key education components to patients on OAT. Members of the organization's ACC taskforce comprised of a medical director,

pharmacist, clinic nursing director and registered nurse, all certified in anticoagulation management therapy, reviewed the booklet contents and made recommendations for change prior to implementation. The booklet was evaluated with feedback provided via verbal and email communication from ACC staff that provided the patient teaching.

### **Review of the Literature**

This comprehensive review of the literature (ROL) was conducted to discover what is known about patient knowledge or the lack thereof, related to oral anticoagulation therapy, identification of key teaching components in OAT patient education and recommended methods in delivery of the education.

#### **Predictors of warfarin-related knowledge deficit**

Knowledge deficit of warfarin use was identified in patients on OAT in studies by Baker, Pierce, and Ryals (2011); Brown et al. (2012); Cheah and Martens (2003); Cook-Campbell and Sefton (2010); Fang, Machtinger, Wang, and Schillinger (2006); Hassan et al. (2011); Kim et al. (2011); Mazor et al. (2007); Moreland et al. (2013); Rewiuk, Bednarz, Faryan, and Grodzicki (2007); Smith et al. (2010); and Winans, Rudd, and Triller (2010). In the ROL, studies found the patient's level of health literacy, age, medication adherence and adverse outcomes to be predicting factors for the lack of knowledge.

**Health literacy.** It is important for patients to process and understand the risks and benefits of OAT in order to achieve best therapy outcomes. Cheah and Martens (2003), Cook-Campbell and Sefton (2010), Fang et al. (2006), and Rewiuk et al. (2007) found correlations between limited health literacy and warfarin-related knowledge deficits in patients. In a small descriptive study using a telephone survey that targeted 36 patients recently discharged from homecare services who had been taking warfarin for at least the past 3 months, nearly all (94%)

patients knew the rationale for taking warfarin but less than one-third of the participants had any knowledge of their INR level, therapeutic range and what to do if they missed a dose (Cook-Campbell & Sefton, 2010). Rewiuk et al. (2007) found a parallel between the patient's level of warfarin-related knowledge and actual INR value.

The observational qualitative study conducted by Fang et al. (2006) utilized an abbreviated Test of Functional Health Literacy in Adults (s-TOFHLA) tool to measure the functional health literacy of participants prior to having the individual complete survey related to warfarin knowledge. Sixty percent of participants scored 22 or less, thus classified as having a limited level of health literacy. Patients identified with having limited health literacy level had significantly higher percentages of incorrect answers on the warfarin-related knowledge survey compared to patients with adequate health literacy level (Fang et al., 2006). These findings support the need to "investigate alternative means of communicating the risks and benefits of anticoagulation management to help improve patient understanding, informed decision making and the safe use of warfarin (Fang et al., 2006).

**Patient age.** The elderly, a population of people most often prescribed warfarin, have been identified as having limited health literacy (Fang et al., 2006). Cheah and Martens (2003), Hasan et al. (2011) and Rewiuk et al. (2007) found warfarin-related knowledge in patients to be inversely correlated with a patient's age. In the prospective study conducted by Rewiuk et al. (2007), with the mean participant age being 70 years old, there was statistically significant findings in knowledge deficit for patients 70 years old and older compared to those less than 70 years old ( $3.56 \pm 1.86$  versus  $4.85 \pm 1.94$ ,  $p = 0.0003$ ). In a cross sectional study by Hasan et al. (2011) of 156 participants with a mean patient age of 60.42, a negative correlation was found between a patient's age and knowledge regarding mechanism of action of warfarin ( $r_s = -0.328$ ),

age and knowledge regarding interaction between warfarin and alcohol ( $r_s = -290$ ), and age and knowledge of side effects of warfarin ( $r_s = -261$ ). Cheah and Martens concluded similarly in their small sample descriptive study indicating there was “significant Coumadin knowledge deficit among subjects >65 years of age” (2003 p. 99).

**Medication adherence.** Medication adherence is a modifiable factor with direct implications for patient outcomes when prescribed oral anticoagulants. Adherence encompasses taking the medication as directed for frequency, dosage, time and monitoring for precautionary measures (Kim et al., 2011). Brown et al. (2012) and Kim et al. (2011) conducted studies to evaluate patient warfarin-related knowledge and medication adherence.

A qualitative research study was conducted with four focus groups of patients taking OA medication to determine factors that influence adherence (Brown et al., 2012). Prior to participating in the focus group discussion, each individual was evaluated for self-reported current adherence to OA medication by completing the 6-item Modified Morisky Scale (MMS) (see Appendix A). This is a validated tool used to characterize baseline patient adherence according to motivation and knowledge (Case Management Society of America, 2006). Accordingly, the MMS scores were high for motivation and knowledge, 78.9 and 100% respectively (Brown et al., 2012).

Common themes were identified in each of the 8-10 member focus group discussions. Criteria for a theme to be recognized as such required a participant to spontaneously mention it and/or be supported by at least two people in three of the four groups. Emerged themes of adherence drivers: “reminders from and sense of responsibility to spouse or family members; established personalized routine or system; knowledge or perceived importance of adherence; fear and avoidance of non-adherence consequences; and being proactive and organized (removal



of barriers)” (Brown et al., 2012, p. 356). Emerged themes of adherence barriers: “forgetting, carelessness; insufficient planning, and/or competing priorities; confusion due to complex dosing; lack of knowledge or motivation” (Brown et al., 2012, p. 356). Concerning comments from participants in regards to personal lack of knowledge and motivation included “I’ve taken my pill 4 hours late before, and my levels are fine”; “it’s not going to make that big of a difference if you miss a dose”; “You wouldn’t be able to stop taking it for a dental cleaning if it mattered that much” and “I’m not going to worry myself into having a stroke over one pill” (Brown et al., 2012, p. 356). In the course of the discussions, as many as one-half of all participants acknowledged they have occasionally missed a dose of OA and approximately one-fourth were not concerned this would lead to any harm. Even so, participants did identify education and knowledge as essential to understanding the significance of OA adherence. Approximately 50% of participants mentioned their learning had occurred cumulatively over time (Brown et al., 2012).

In a cross-sectional survey of 204 patients in an outpatient clinic in Korea, Kim et al. (2011) found a positive correlation between warfarin-related knowledge and OA medication adherence ( $7.20 \pm 1.70$  versus  $6.56 \pm 1.84$ ;  $p < .05$ ). A general lack of knowledge related to INR was identified with 74% not knowing their target INR and nearly 85% of participants indicating a low INR was ideal, without regard to a prescribed therapeutic target since a higher INR could lend itself to increased risk of bleeding (Kim et al., 2011). The belief that patient knowledge influences medication adherence was supported in this research with less than 30% of participants being adherent in taking their AO as directed. To better understand how to reduce risks and fears associated with OAT, patients identified education and knowledge as being “foundational to their understanding of the importance of adherence (Brown et al., 2012).

**Adverse outcomes.** For adults 65 years of age and older, warfarin is the most common medication associated with adverse events leading to a hospitalization (Brown et al., 2012). Poor education of OAT was the most reliable risk factor for adverse outcomes in a large cohort study of older high risk patients done by Kagansky et al. (2004). At least one month after a hospital discharge, patients or their caregiver were given a questionnaire to assess the patient's knowledge of OAT and have them evaluate the quality of OAT education received prior to discharge. In this study, Kagansky et al. found more than seventeen percent of patients defined their education as being insufficient and also had higher rates of bleeding (5.2/1,000), putting them at greater risk for adverse outcomes. Additionally, this group of patients had a higher percentage of INR values above the therapeutic range. Equally concerning was the 59.3% of INR measurements found to be in subtherapeutic range for the group of patients who described having had no education or explanation about OAT. Socioeconomic and cognitive variables or functional impairments were not found to be predicting factors for having an increase bleeding rate in participants for this study. According to Wysowski, Nourjah, and Swartz (2007), with 3922 reports of a decreased prothrombin (PT) level and 3901 reports of an increased INR level, these adverse events (AE) were ranked as the top two reported AE for warfarin in the United States from January 1993- mid July 2006.

In a qualitative study that focused on patient safety while taking oral anticoagulants, Moreland et al. discovered many of the 184 respondents of surveyed patients on warfarin were not able to identify the urgency of a situation when asked to categorize a scenario such as loss of vision as a symptom of a stroke or the potential for bleeding after a blow to the head (2013).

Due to the high risk of adverse events and overall complexity of dosing, monitoring and patient compliance, the Joint Commission (JC) has established national patient safety goals

(NPSG) that require a standard approach for providing structured education to patients and families prior to being discharged from an inpatient hospital or ambulatory care setting in an effort to reduce patient harm (Baker et al., 2011; Lahoz, 2011; JC, 2011, 2012; Moreland et al., 2013; Winans et al., 2010). The prevalence of adverse effects has also led to regulatory action from the Federal Drug Administration (FDA). A black box warning of warfarin's bleeding risk must appear on the medication label and a Medication Guide (Appendix B) is required to be given with each prescription (Wysowski et al, 2007). This guide is an educational handout that informs the patient to report signs and symptoms of bleeding immediately (Bristol-Myers Squibb Pharma Company, 2011).

### **Key teaching components**

**Regulatory requirements.** The JC requires hospital and ambulatory care settings to educate prescribers, staff, patients and families on four major components of anticoagulation therapy: Importance of follow-up monitoring, compliance, drug-food interactions and the potential for adverse drug reactions and interactions (JC, 2011, 2012).

**Clinical guidelines.** Managing Oral Anticoagulation Therapy by Ansell, Oertel, & Wittkowsky (2009), the Consensus Statement from the Anticoagulation Forum written by Gardia et al. (2008), and the Institute for Clinical Systems Improvement (ICSI) Healthcare guidelines for Antithrombotic Therapy Supplement by Maddali et al. (2012) are evidence-based clinical guidelines that have also identified criteria to include when educating patients who take warfarin. Inclusion of reasons for OA use; medication trade and generic names, actions, potential interactions and side effects; instructions for administration, explanation of INR values and monitoring; importance of compliance with therapy; and safety precautions are recommended in

all three guidelines. A comparison of guideline educational component recommendations is presented in Appendix C.

Even with following clinical guidelines, the educational content should be applicable to the patient. Moreland et al. cautions, "Factual knowledge of pharmacology of warfarin does not guarantee safe use of warfarin" (2013). They went on to advise that programs should include teaching strategies to help patients recognize situational urgencies that compromise their safety. Reduced incidence of adverse drug events will likely occur through such educational enhancements.

### **Education process**

**Knowledge assessment.** Evaluating the current state of patient knowledge can be a driving force in improving the quality of oral anticoagulation therapy (OAT) and ultimately patient outcomes. As stated in the Delivery of Optimized Anticoagulant Therapy: Consensus Statement from the Anticoagulation Forum, "A knowledge assessment tool may help the clinician to assess an individual patient's educational needs" (Garcia et al., 2008). A standardized, validated tool for reliability to measure patient knowledge was found to be used in two of the studies in the review of literature. According to Baker, Pierz and Ryals, "Validation indicates that the questionnaire has been thoroughly tested for content validity, measures of question difficulty, readability and item/person reliability" (2011, p. 134). Currently, there are two known questionnaires that have been deemed valid and reliable tools for measuring patient knowledge of anticoagulation therapy. The Anticoagulation Knowledge Assessment (AKA) questionnaire was developed and validated on performance reliability by Briggs, Jackson, Bruce and Shapiro in 2005. The AKA questionnaire is a 29 item multiple choice test (see Appendix D).

A single-center cross sectional study at the Veterans Affairs (VA) Tennessee Valley Healthcare System - Alvin C. York campus in the outpatient anticoagulation clinic (ACC) used the AKA questionnaire to assess the current level of warfarin-related knowledge in their ACC patients. A staff pharmacist or nurse provides education to each patient and/or the primary caregiver at the initial ACC visit, no matter how long a patient had been taking warfarin (Baker et. al., 2011). Therefore, all patients had received education about oral anticoagulation therapy OAT prior to completing the AKA questionnaire making this a retrospective study. 185 patients consented to participate in the study and returned a questionnaire. The mean test score was 78.1% or 22 correct answers. 137 or 74.1% of participants achieved a passing score on the test by answering at least 21 questions correctly. None of the participants answered all questions correctly. This study had an adequate sample size with a greater than 70% participant response rate. However, the sample had a gender bias in that all but seven participants were male.

The researchers of the VA study chose the AKA questionnaire because it was a valid test containing nine content areas applicable to patient education programming including medication, medication administration, medication interactions, activity, diet, side effects, informing healthcare providers, procedures and lab monitoring (Baker et. al., 2011). A major gap in this study was that patients did not complete the questionnaire in a controlled environment. In fact, of 185 total participants, 171 completed the questionnaire outside of the facility and then returned it to the ACC clinic. There was a possibility that somebody either assisted or completed the questionnaire for the patient. This could explain a higher than expected pass rate. A strength of the study was that in addition to assessing patient knowledge, the results also identified eight frequently missed questions. This information led to improvements in patient education programming at the Alvin C. York ACC (Baker et. al, 2011).

In 2006, the Oral Anticoagulation Knowledge (OAK) test was created and the contents validated, making it a reliable instrument to assess patient knowledge of warfarin therapy (Zeolla, Brodeur, Dominelli, Haines & Allie). The copyrighted OAK test has 20 multiple choice questions (Appendix E). The OAK test was used to evaluate patient knowledge in a prospective quantitative study by Winans et al. (2010). The findings were statistically supported when compared to a baseline group of test taking individuals already on long term warfarin therapy achieving a mean score of 72%, which was also consistent with the original OAK test validation study completed by Zeolla et al. (Winans et al., 2010). All of the other studies reviewed in the ROL used a non-validated approach to assess or evaluate the level of the patient's knowledge deficit related to OAT. Table 1 outlines the methods and tools used to obtain data collection in each respective study.

Table 1

*Patient Knowledge Questionnaires*

Authors	Subjects	Site of research	Questionnaire
Baker et. al., 2011	185 patients	Anticoagulation clinic at ACY Veterans Affairs	Anticoagulation Knowledge Assessment (AKA) test, 29 multiple choice questions (validated tool)
Brown et. al., 2012	38 patients from 4 focus groups	US east coast cities	4 focus group discussion panels moderated by qualitative researchers
Cheah & Marten, 2003	50 patients recently discharged from a hospitalization	Midwestern US Metropolitan Hospital	"What do you know about Warfarin?" questionnaire
Cook-Campbell & Sefton, 2010	35 patients discharged in past 2 weeks	Home	11 open ended questions
Fang et. al., 2006	179 ethnically diverse, low income	Anticoagulation clinic at San Francisco General Hospital	8 multiple questions
Kagansky et. al., 2004	323	Kaplan-Harzfeld Medical Center in southern Israel	Unknown number of open ended questions
Kim et. al., 2011	204	Outpatient cardiovascular clinic in Korea	10 yes or no structured questions
Mazor et. al., 2007	317 patients	Anticoagulation Clinic, UMass Memorial Medical Center, Worcester, MA	Pre and post test questionnaire, multiple choice
Moreland et. al., 2013	184 patients	Anticoagulation Clinic at UC Davis Medical Center	21 scenario questionnaire, multiple choice to define urgency to the scenario
Rewiuk et. al., 2007	61 patients taking OA and admitted from ER to the hospital for any reason	Poland Hospital	Questionnaire, multiple choice;
Singla et. al., 2003	180 patients	Group class, US	4 item questionnaire immediately after the class
Smith et. al., 2010	100 patients in outpatient clinic	Intermountain Medical Center, Murray, Utah	52 item questionnaire, Yes or no and multiple choice
Stafford et. al., 2012	47 total comprised of general practitioners, pharmacists and patients (consumers)	Australian community	Semi-structured questions
Winans et. al., 2010	20 inpatients with structured education from pharmacist & 20 inpatients with education from "usual care"	Bassett Medical Center, Cooperstown, NY	Oral anticoagulation Knowledge (OAK) Test, 20 multiple choice questions (validated tool)

**Structure.** A systematic approach with standardized practices that includes patient involvement should be used to reduce risks associated with anticoagulation therapy (Holbrook et al., 2012; Maddali, 2012; JC, 2012). In the Winans et al. (2010) study that measured patient knowledge using the OAK test, patient education regarding warfarin therapy was provided to study participants new to OAT. Twenty of the hospitalized patients received structured education from a pharmacist. Another group of twenty patients received the education in a non-standardized format through usual care from staff nurses. Prior to discharge, participants were given the OAK test to evaluate warfarin knowledge to determine outcomes of the education. The structured education program covered all concepts on the test. In this study, patients who received the structured education from a pharmacist performed better on the test achieving a mean score of 64%. The lowest test score achieved from this group was 55%, which was also the mean percentage score for participants who received non-structured education through usual care (Winans et al., 2010). Through the use of the OAK test, this study demonstrated differences in test results between structured and non-structured education programming. This study was limited as being a small study of 40 participants at a single facility.

**Setting.** The Joint Commission standard calls for face to face interaction but does not specify a preference for a single patient teaching session versus a group setting. One study was found that evaluated a group education setting. Singla, Jasser and Wilson (2002), described a group education class to be a positive and beneficial experience for staff and patients. The class included a structured education program using a slide presentation of key components to deliver the patient teaching to the group and identified by staff as an advantage over repetition of an individualized education session. Only 8% of participants indicated they would have preferred a personal education session. 73% of patients indicated their experience was enhanced specifically



by attending a group setting. This was evident through a written survey that patients were asked to complete to rate their knowledge before and after the group education session. The results indicated patients had gain understanding in all four areas: their need for Coumadin (92% before, 97% after), how vitamin K affects your INR test (49% before, 96% after), knowledge of signs of serious bleeding (74% before, 92% after) and understanding what an INR test is (36% before, 91% after) with the latter having the most impressive incline. Results supported the group setting to be an effective learning environment for the participants in the study.

**Patient-centered.** “Delivery of optimized anticoagulant care should address the educational needs of patients and their caregivers” (Garcia et al., 2008, p. 65). To positively influence treatment outcomes, the educational approach should aim to address specific knowledge deficiencies and needs of the individual patient (Cheah & Martens 2003; Garcia et al., 2008; Smith et al., 2010; Stafford et al., 2012; Wofford, Wells & Singh, 2008). There is an assumption that “patients are able to comprehend written educational materials and oral clinical communication about their medical conditions and treatment plans” (Fang et al., 2006). To achieve best outcomes, age and health literacy should be a consideration for methods of education (Cheah & Martens, 2003; Garcia et al., 2008; Smith et al., 2010). The elderly patient may have special needs in regards to mental capacity and sensory perception. For the elderly population, multiple, short segmented education encounters may be necessary that would allow for adequate time to process information, ask questions and validate understanding (Cheah & Martens, 2003). The AC Forum Consensus Statement encourages optimized anticoagulation therapy should include local health literacy rates as a consideration when developing patient education materials (Garcia et al., 2008). The patient’s readiness to learn should also be considered (Ansell et al., 2009).

**Ongoing education.** Assessment of patient knowledge, beliefs, practices and education about warfarin should be an ongoing process (Cook-Campbell et al., 2010; Mazor et al., 2007). In a descriptive study by Cook-Campbell et al., (2010) of 36 patients discharged from a homecare agency, the length of time on warfarin did not predict knowledge. Ongoing, periodic reinforcement of the key patient educational materials is necessary to ensure a clear understanding of all the concepts (Ansell et al., 2009; Cook-Campbell et al., 2010; Mazor et al., 2007; Smith et al., 2010).

## Discussion

### Interpretation

Oral anticoagulants offer life saving benefits to patients; yet potential life threatening risks also exist. In multiple studies, deficits in warfarin related knowledge have been identified in patients who take OA. Research has demonstrated a positive correlation between patient knowledge and health outcomes. Warfarin education to increase patient knowledge is essential in order to achieve optimal patient outcomes and reduce adverse risks associated with oral anticoagulation therapy.

Patients should be encouraged to take an active role in OAT. Patient safety and outcomes are enhanced when patients are actively involved in, understand, and take responsibility for their care. Patient participation and engagement in the learning process in order to improve personal health outcomes is supported by the health belief model which predicts patients will take action if they perceive a personal risk is involved and believe the benefits to act are greater than barriers they may be up against, and/or they are enticed by healthcare professionals or family members to do so.

A methodical approach should be taken in the patient education process. The first step, through use of a validated tool, pre-education and post-education knowledge assessments should be completed by the patient. The results of these assessments will provide valuable information in order to meet the patient's individualized needs. This information will serve to measure the patient's level of knowledge before and after the education and identify specific gaps in knowledge to guide further educational needs. The information obtained can also be used to identify areas for continuous quality improvement within the program. Ideally, an assessment would be completed periodically as needed to help identify gaps in knowledge over a period of time.

Next, a structured education program should be written at a level that is understandable to the patient and formatted to include key components identified in the evidence-based clinical guidelines such as reasons for OA use, information about OA medications, potential interactions and side effects, the meaning of INR values and the importance of monitoring INRs, importance of compliance with therapy, and safety precautions found in the review of literature. The content should be taught in intervals of time, since there is a significant amount of essential information in the content. Minimally, the initial session should include the four key topics identified by the Joint Commission: importance of follow-up monitoring, compliance, drug-food interactions and the potential for adverse drug reactions and interactions (2011, 2012).

Additionally, the education should be provided by a trained healthcare professional (Lahoz, 2011). Winans et al. (2010) found a greater gain in patients' knowledge when they received structured education that was provided by a trained pharmacist compared to "usual care" from a nurse or physician. Education provided by a trained healthcare professional is most pertinent. The pharmacist as the teacher is not necessary for successful patient education. This

could have been done by a trained healthcare professional including a registered nurse or physician. The healthcare professional plays a vital role in the learning experience, an influential person who is viewed by the patient as a motivating factor in the patient's health behavior according to the health belief model.

The educational experience should be patient-centered. The results of the knowledge assessment tool should be used to develop an individualized teaching plan to prioritize the delivery of education. As identified in the review of literature, health literacy, age and medication adherence all impact the patient's level of warfarin related knowledge. These factors, which have been shown to contribute to gaps in knowledge, should be considered being accommodating to the specific needs of the patient. The health belief model indicates patients are driven toward healthy behaviors when they can place value on the seriousness of a situation. This is consistent with recommendations to teach patients about situational urgencies and consequences of non-adherence to the treatment. Essentially, education that is personally meaningful to the patient is a motivational factor in the process of learning.

Finally, reinforcement of the education component is necessary. Handouts are valuable tools for patients. These handouts should be written in a clear, easy to read format. According to the Center for Medicare Education (n.d.) materials should be written with short lists and examples to reinforce, be organized with most important information first using headers to introduce new sections, use short words and sentences, in 12 or 13 point serif type font and tested with a readability formula.

Finally, the educational process of oral anticoagulation therapy should include reinforcement of information. This should continue throughout the duration of the therapy, which for many patients is lifelong. A review of the information is also necessary for patients whenever

changes in their health status may affect their OAT such as with an illness, change of medication, upcoming invasive procedures or surgery. Reinforcement of educational concepts on an ongoing basis will increase patient knowledge. Through a formal education process such as this, patient knowledge will be improved, adverse risks of OAT will be reduced the risks and optimal patient outcomes will be achieved.

### **Outcome/Dissemination**

The information gained in the review of literature was used to create a booklet (see Appendix F) that serves as a resourceful teaching outline for the healthcare provider and a home reference guide for the patient on oral anticoagulation. Upon completion of the booklet, members of the organization's anticoagulation clinic taskforce were given a hard copy and asked to review the booklet contents and make recommendations for change prior to implementation. A medical director, pharmacist, clinic nursing director, and registered nurse all certified in anticoagulation management therapy critiqued the contents. A public relations and clerical person were also given a hard copy to evaluate the formatting of the contents to ensure the booklet met the CMS requirements for patient materials.

The verbal feedback was very positive. Revisions were made to incorporate the recommendations for change which were primarily related to formatting and choice of words. The final Word document was forwarded via email to the administrative assistant who electronically converted it to a PDF file to place on the organization's intranet for health professionals to access. Additionally, 200 booklets were printed and bound. A copy was given to each patient at their first visit to the newly established anticoagulation clinic. It continues to be used in practice for all new patients at the anticoagulation clinic.

Several of the patients who received the booklet when the ACC clinic opened verbally expressed great satisfaction to the ACC nurse about the booklet indicating much of the information was unknown to them previously despite having been on OAT for a length of time. Healthcare professionals within the organization have also verbally expressed they have found the booklet to be useful for guiding them with “usual care” patient teaching needs. The booklet has been an asset with over 400 hardbound copies distributed to date.

### **Implications for Nursing**

#### **Practice**

It is estimated that approximately 4 million Americans are taking warfarin to reduce their risk of a thromboembolism (Garcia & Schwartz, 2011). While this medication can offer the patient life saving benefits, patients are at great risk for adverse effects due to the medication’s narrow therapeutic index. In fact, warfarin is one of the most commonly implicated medications for adverse drug events in the older adult with over 33,000 hospitalizations nationwide from 2007-2009 as a result of adverse drug events considered to be often preventable (Budnitz, Lovegrove, Shehab & Richards, 2011). Studies have shown there is a definite warfarin-related knowledge deficit in patients taking an oral anticoagulant. Insufficient knowledge related to warfarin therapy has been associated with adverse drug events (Ansell et al., 2009).

#### **Education**

Warfarin related patient education has been identified as essential to reducing patient risks and improving health outcomes for patients taking OA. A structured OAT education program is effective in providing information to gain the knowledge to achieve optimal OAT. It is important for healthcare providers and patients to have an evidence-based resource, such as a comprehensive booklet, that contains key components as identified by evidence-based clinical

guidelines and regulatory agencies. Written materials can provide positive reinforcement of information during face to face interaction between a healthcare provider and patient in the patient teaching process (Hughes & Messerly, 2009).

### **Policy**

A policy will need to be developed outlining the structured education approach for patients receiving oral anticoagulation therapy services at this healthcare facility. The booklet that was created for this project will meet the criteria for the use of standardized education material that includes key components of information. The policy should include an assessment of patient knowledge using a validated assessment tool. Education outcomes should be measured and used to develop an individualized patient teaching plan and also for continuous quality improvement of the structured educational program.

### **Research**

Patient knowledge deficit related to oral anticoagulation therapy was well documented in the research. Health literacy, age, medication adherence and adverse outcomes of OAT were identified as being predictors of OA related knowledge deficit in patients. Increased knowledge of OA has been attributed to reducing safety risks and improving outcomes for patients.

Through research of evidence based clinical guidelines for OAT, key components of patient education and best practices for the delivery of the education were discovered. A standardized approach of structured education provided by a trained health professional is recommended. There is opportunity for further research to determine if differences in outcomes exist related to type of trained health professional providing the teaching (pharmacist vs. registered nurse).

Most of the research conducted thus far has been in small studies within a single facility. It would be recommended that research should expand to larger studies of many facilities across the United States to allow for greater generalizations of populations. Patient education has predominantly focused on the OA medication, warfarin. As new OA medications emerge, research will be needed to determine what adaptations are needed for OAT patient education programs.

### **Summary/Conclusion**

After reviewing the literature, it is evident there is a clear relationship between oral anticoagulant related knowledge and patient outcomes. A structured education program tailored to the individual's learning needs is most effective for increasing knowledge to achieve optimal outcomes in patients taking oral anticoagulants. Patients should be encouraged to play an active role in the educational process. Evidence based practice guidelines are available to provide direction on which components of education are essential. Validated knowledge assessment tools should be used to measure patient education outcomes and as a continuous quality improvement indicator for the overall educational program.



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**APPENDIX A**

**Modified Morisky Scale**

Question	Motivation	Knowledge
1. Do you ever forget to take your medicine?	Yes(0) No(1)	
2. Are you careless at times about taking your medicine?	Yes(0) No(1)	
3. When you feel better do you sometimes stop taking your medicine?		Yes(0) No(1)
4. Sometimes if you feel worse when you take your medicine, do you stop taking it?		Yes(0) No(1)
5. Do you know the long-term benefit of taking your medicine as told to you by your doctor or pharmacist?		Yes(0) No(1)
6. Sometimes do you forget to refill your prescription medicine on time?	Yes(0) No(1)	

(Case Management Society of America, 2006)

## APPENDIX B

## Medication Guide

**MEDICATION GUIDE**    **Rx ONLY**  
**COUMADIN® (COU-ma-din)**  
 (warfarin sodium)

Read this Medication Guide before you start taking COUMADIN (warfarin sodium) and each time you get a refill. There may be new information. This Medication Guide does not take the place of talking to your healthcare provider about your medical condition or treatment. You and your healthcare provider should talk about COUMADIN when you start taking it and at regular checkups.

**What is the most important information I should know about COUMADIN?**

COUMADIN can cause bleeding which can be serious and sometimes lead to death. This is because COUMADIN is a blood thinner medicine that lowers the chance of blood clots forming in your body.

- You may have a higher risk of bleeding if you take COUMADIN and:
  - are 65 years of age or older
  - have a history of stomach or intestinal bleeding
  - have high blood pressure (hypertension)
  - have a history of stroke, or "mini-stroke" (transient ischemic attack or TIA)
  - have serious heart disease
  - have a low blood count or cancer
  - have had trauma, such as an accident or surgery
  - have kidney problems
  - take other medicines that increase your risk of bleeding, including:
    - a medicine that contains heparin
    - other medicines to prevent or treat blood clots
    - nonsteroidal anti-inflammatory drugs (NSAIDs)
  - take warfarin sodium for a long time. Warfarin sodium is the active ingredient in COUMADIN.

**Tell your healthcare provider if you take any of these medicines. Ask your healthcare provider if you are not sure if your medicine is one listed above.**

Many other medicines can interact with COUMADIN and affect the dose you need or increase COUMADIN side effects. Do not change or stop any of your medicines or

**COUMADIN® (warfarin sodium)**

start any new medicines before you talk to your healthcare provider.

**Do not take other medicines that contain warfarin sodium while taking COUMADIN.**

- **Get your regular blood test to check for your response to COUMADIN.** This blood test is called an INR test. The INR test checks to see how fast your blood clots. Your healthcare provider will decide what INR numbers are best for you. Your dose of COUMADIN will be adjusted to keep your INR in a target range for you.
- **Call your healthcare provider right away if you get any of the following signs or symptoms of bleeding problems:**
  - pain, swelling, or discomfort
  - headaches, dizziness, or weakness
  - unusual bruising (bruises that develop without known cause or grow in size)
  - nosebleeds
  - bleeding gums
  - bleeding from cuts takes a long time to stop
  - menstrual bleeding or vaginal bleeding that is heavier than normal
  - pink or brown urine
  - red or black stools
  - coughing up blood
  - vomiting blood or material that looks like coffee grounds
- **Some foods and beverages can interact with COUMADIN and affect your treatment and dose.**
  - Eat a normal, balanced diet. Talk to your healthcare provider before you make any diet changes. Do not eat large amounts of leafy, green vegetables. Leafy, green vegetables contain vitamin K. Certain vegetable oils also contain large amounts of vitamin K. Too much vitamin K can lower the effect of COUMADIN.
- Always tell all of your healthcare providers that you take COUMADIN.
- Wear or carry information that you take COUMADIN.

**See "What are the possible side effects of COUMADIN?" for more information about side effects.**



**COUMADIN® (warfarin sodium)****What is COUMADIN?**

COUMADIN is prescription medicine used to treat blood clots and to lower the chance of blood clots forming in your body. Blood clots can cause a stroke, heart attack, or other serious conditions if they form in the legs or lungs.

It is not known if COUMADIN is safe and effective in children.

**Who should not take COUMADIN?****Do not take COUMADIN if:**

- your chance of having bleeding problems is higher than the possible benefit of treatment. Your healthcare provider will decide if COUMADIN is right for you. Talk to your healthcare provider about all of your health conditions.
- you are pregnant unless you have a mechanical heart valve. COUMADIN may cause birth defects, miscarriage, or death of your unborn baby.
- you are allergic to warfarin or any of the other ingredients in COUMADIN. See the end of this leaflet for a complete list of ingredients in COUMADIN.

**What should I tell my healthcare provider before taking COUMADIN?**

Before you take COUMADIN, tell your healthcare provider if you:

- have bleeding problems
- fall often
- have liver or kidney problems
- have high blood pressure
- have a heart problem called congestive heart failure
- have diabetes
- plan to have any surgery or a dental procedure
- have any other medical conditions
- are pregnant or plan to become pregnant. See "Who should not take COUMADIN?"
- are breast-feeding. You and your healthcare provider should decide if you will take COUMADIN and breast-feed.

**COUMADIN® (warfarin sodium)**

Tell all of your healthcare providers and dentists that you are taking COUMADIN. They should talk to the healthcare provider who prescribed COUMADIN for you before you have any surgery or dental procedure. Your COUMADIN may need to be stopped for a short time or you may need your dose adjusted.

Tell your healthcare provider about all the medicines you take, including prescription and non-prescription medicines, vitamins, and herbal supplements. Some of your other medicines may affect the way COUMADIN works. Certain medicines may increase your risk of bleeding. See "What is the most important information I should know about COUMADIN?"

Know the medicines you take. Keep a list of them to show your healthcare provider and pharmacist when you get a new medicine.

**How should I take COUMADIN?**

- Take COUMADIN exactly as prescribed. Your healthcare provider will adjust your dose from time to time depending on your response to COUMADIN.
- You must have regular blood tests and visits with your healthcare provider to monitor your condition.
- If you miss a dose of COUMADIN, call your healthcare provider. Take the dose as soon as possible on the same day. Do not take a double dose of COUMADIN the next day to make up for a missed dose.
- Call your healthcare provider right away if you:
  - take too much COUMADIN
  - are sick with diarrhea, an infection, or have a fever
  - fall or injure yourself, especially if you hit your head. Your healthcare provider may need to check you

**What should I avoid while taking COUMADIN?**

- Do not do any activity or sport that may cause a serious injury.

**COUMADIN® (warfarin sodium)**

What are the possible side effects of COUMADIN?

COUMADIN may cause serious side effects including:

- See "What is the most important information I should know about COUMADIN?"
  - **Death of skin tissue (skin necrosis or gangrene).** This can happen soon after starting COUMADIN. It happens because blood clots form and block blood flow to an area of your body. Call your healthcare provider right away if you have pain, color, or temperature change to any area of your body. You may need medical care right away to prevent death or loss (amputation) of your affected body part.
  - **"Purple toes syndrome."** Call your healthcare provider right away if you have pain in your toes and they look purple in color or dark in color.

Tell your healthcare provider if you have any side effect that bothers you or does not go away.

These are not all of the side effects of COUMADIN. For more information, ask your healthcare provider or pharmacist.

Call your doctor for medical advice about side effects. You may report side effects to FDA at 1-800-FDA-1088.

**How should I store COUMADIN?**

- Store COUMADIN at 59°F to 86°F (15°C to 30°C).
- Keep COUMADIN in a tightly closed container, and keep COUMADIN out of the light.

**Keep COUMADIN and all medicines out of the reach of children.**

**General information about COUMADIN.**

Medicines are sometimes prescribed for purposes other than those listed in a Medication Guide. Do not use COUMADIN for a condition for which it was not prescribed. Do not give COUMADIN to other people, even if they have the same symptoms that you have. It may harm them.

**COUMADIN® (warfarin sodium)**

This Medication Guide summarizes the most important information about COUMADIN. If you would like more information, talk with your healthcare provider. You can ask your healthcare provider or pharmacist for information about COUMADIN that is written for healthcare professionals.

If you would like more information, go to [www.coumadin.com](http://www.coumadin.com) or call 1-800-321-1335.

**What are the ingredients in COUMADIN?**

Active ingredient: Warfarin Sodium

Inactive ingredients: Lactose, starch, and magnesium stearate. The following tablets contain:

- 1 mg: D&C Red No. 5 Barium Lake
- 2 mg: FD&C Blue No. 2 Aluminum Lake and FD&C Red No. 40 Aluminum Lake
- 2-1/2 mg: D&C Yellow No. 10 Aluminum Lake and FD&C Blue No. 1 Aluminum Lake
- 3 mg: FD&C Yellow No. 6 Aluminum Lake, FD&C Blue No. 2 Aluminum Lake, and FD&C Red No. 40 Aluminum Lake
- 4 mg: FD&C Blue No. 1 Aluminum Lake
- 5 mg: FD&C Yellow No. 6 Aluminum Lake
- 6 mg: FD&C Yellow No. 6 Aluminum Lake and FD&C Blue No. 1 Aluminum Lake
- 7-1/2 mg: D&C Yellow No. 10 Aluminum Lake and FD&C Yellow No. 6 Aluminum Lake

This Medication Guide has been approved by the U.S. Food and Drug Administration.

COUMADIN is distributed by:



**Bristol-Myers Squibb**

Princeton, New Jersey 08543 USA

COUMADIN® is a registered trademark of Bristol-Myers Squibb Pharma Company.

\*\*The brands listed (other than COUMADIN®) are registered trademarks of their respective owners and are not trademarks of Bristol-Myers Squibb Company.

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APPENDIX C

**Clinical Guideline Comparison of Education Components Related to Patient Teaching of Warfarin Therapy**

Managing Oral Anticoagulation Therapy	The Anticoagulation Forum	Institute for Clinical Systems Improvement
<p>General Patient Education:</p> <ul style="list-style-type: none"> <li>• Reason for use: Avoid or prevent recurrence of thromboembolic event</li> <li>• Mechanism of action of warfarin</li> <li>• Side effects of warfarin: minor bleeding, skin rash, loss of hair</li> <li>• Explanation of PT/INR</li> <li>• Duration of therapy</li> <li>• Visit frequency and blood testing</li> <li>• Importance of compliance with follow up visits</li> <li>• Notify all health professionals of warfarin therapy</li> <li>• Inform anticoagulation provider prior to any scheduled surgeries or dental procedures</li> <li>• Fall precautions and physical activity</li> </ul> <p>Medication:</p> <ul style="list-style-type: none"> <li>• Name of drug: brand and generic</li> <li>• How much to take: color, strength, number of tablets</li> <li>• Refill procedure- importance of not running out</li> </ul>	<ul style="list-style-type: none"> <li>• Reason for initiating anticoagulation therapy and how it relates to clot formation</li> <li>• Name of drug (generic and trade) and how it works to reduce risk of clotting complications</li> <li>• Potential duration of therapy</li> <li>• Meaning and significance of INR</li> <li>• Need for frequent INR testing and target INR values for patient's treatment</li> <li>• Narrow therapeutic index of warfarin and importance of regular monitoring to minimize risk of bleeding/thrombosis</li> <li>• Common signs/symptoms of bleeding and what to do if occur</li> <li>• Common signs/symptoms of clotting complications and what to do if occur</li> <li>• Precautionary measures to minimize risk of trauma or bleeding</li> <li>• Influence of dietary vitamin K use on effects of VKA</li> <li>• Potential drug interactions (Rx, OTC, herbal) and what to do when normal medication regimens change</li> </ul>	<ul style="list-style-type: none"> <li>• Mechanism of action of warfarin</li> <li>• Time of day to take warfarin</li> <li>• Explanation of INR, target range and regular testing</li> <li>• Signs and symptoms of bleeding and the provider should be contacted immediately if bleeding signs are present</li> <li>• Notify provider if illness, injury or change in physical status</li> <li>• Inform all health care providers of OAT (invasive procedures, surgery, dental work)</li> <li>• Drug interactions</li> <li>• Role of Vitamin K</li> <li>• Minimizing trauma risk</li> <li>• Effect of exercise</li> <li>• Effect of personal habits: alcohol</li> <li>• Effect of certain health conditions: CHF, thyroid, diarrhea</li> </ul>

<ul style="list-style-type: none"> <li>• Use only one pharmacy</li> <li>• Potential interaction with other medications</li> <li>• Report all medication changes to the anticoagulation provider including new and discontinued medications</li> <li>• Verify safety of new medication with anticoagulation provider and determine if closer follow up is needed</li> </ul> <p>Adherence</p> <ul style="list-style-type: none"> <li>• Encourage compliance</li> <li>• Take warfarin at same time, preferably in evening</li> <li>• Keep track and report missed doses to anticoagulant provider. Do not double up to make up for a missed dose.</li> <li>• Use a compliance method such as pill box, written dose instructions, calendar</li> </ul> <p>Bleeding</p> <ul style="list-style-type: none"> <li>• Signs &amp; symptoms of bleeding: major and minor</li> <li>• Bleeding severity, severe, sudden headache, melena, hematemesis</li> <li>• Avoid risky behaviors</li> <li>• What to do if bleeding occurs: clinic vs. go to ER</li> <li>• Distinguish a new problem from an old one: chronic nose bleeds,</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid or limit alcohol consumption</li> <li>• Need for birth control for women of child-bearing age</li> <li>• Importance of notifying all healthcare providers (physicians, dentists) of OAT</li> <li>• Importance of notifying anticoagulation provider when dental, surgical or invasive procedures and hospitalizations are scheduled</li> <li>• When to take anticoagulant medications and what to do if a dose is missed</li> <li>• Importance of carrying an identification</li> <li>• Documentation that education of the patient (or caregiver) has occurred</li> </ul>	<ul style="list-style-type: none"> <li>• Self-monitoring: INR log, dose MedicAlert bracelet or card</li> </ul>
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<p>hemorrhoids</p> <p>Disease management</p> <ul style="list-style-type: none"> <li>• Signs of disease recurrence             <ul style="list-style-type: none"> <li>○ PE: sudden shortness of breath or chest pain</li> <li>○ DVT: swelling, pain, heat, numbness in extremity</li> <li>○ CVA: numbness, tingling, sudden loss or change in speech or vision, loss of consciousness, fall, sudden vertigo, facial droop, sudden weakness in a limb</li> </ul> </li> <li>• Importance of knowing baseline and new onset of symptoms</li> </ul> <p>Diet</p> <ul style="list-style-type: none"> <li>• Foods high in vitamin K</li> <li>• Understanding why vitamin K alters therapy</li> <li>• Consistency of high vitamin K containing foods</li> <li>• Avoidance of crash diet</li> <li>• Report loss of appetite</li> </ul> <p>Other factors altering therapy</p> <ul style="list-style-type: none"> <li>• Report to anticoagulation provider changes such as acute illness, diarrhea, nausea, vomiting, fever, congestive heart failure</li> </ul> <p>Alcohol</p> <ul style="list-style-type: none"> <li>• Discourage consumption</li> <li>• Set a drinking limit per day</li> <li>• Explain binge drinking can cause sudden increase in INR</li> </ul>		
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<ul style="list-style-type: none"><li>• Impact of long standing history of alcohol use/abuse</li><li>• Increased risk of GI bleeding</li><li>• Increased risk of injury causing serious bleeding</li></ul> <p>Pregnancy</p> <ul style="list-style-type: none"><li>• Do not become pregnant while on warfarin</li><li>• Use birth control</li><li>• Risk of fetal harm</li><li>• Inform anticoagulation provider if you think you may be pregnant or are planning to get pregnant</li><li>•</li></ul>		
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(Ansell et al., 2009; Garcia et al., 2008; Maddali et al., 2012)

## APPENDIX D

## Anticoagulation Knowledge Assessment (AKA) Instrument

(Correct answers indicated with \*)

1. Which one of these medications is recommended if you are taking Coumadin (warfarin) and want relief from a headache?
  - a. Advil
  - b. Motrin
  - c. Aspirin
  - d. Tylenol\*
  
2. Which of the following food items would interfere with your Coumadin (warfarin) medication?
  - a. Bacon
  - b. Broccoli\*
  - c. Bananas
  - d. Peeled cucumbers
  
3. While on Coumadin (warfarin) medication, in which of the following would you go directly to the emergency room?
  - a. Small bruises
  - b. Your appetite dramatically increases
  - c. Nosebleed which will not stop bleeding\*
  - d. Gums which bleed for a few seconds after brushing teeth
  
4. You just remembered that you forgot to take your evening Coumadin (warfarin) medication dose last night. You would:
  - a. skip the dose of Coumadin (warfarin) you missed\*
  - b. take the missed Coumadin (warfarin) dose right now
  - c. wait and take 2 doses of Coumadin (warfarin) this evening
  - d. take one-half of the missed dose of Coumadin (warfarin) right now
  
5. While on Coumadin (warfarin) you:
  - a. should not eat spinach
  - b. can eat spinach one time a month
  - c. can eat as much spinach as you would like whenever you would like
  - d. can eat spinach but need to eat the same amount regularly every week\*
  
6. While out with friends for dinner, you have just finished your third glass of wine. This amount of alcohol consumed in a single evening will:
  - a. cause a decrease in your INR
  - b. cause an increase in your INR\*
  - c. not affect you or your Coumadin (warfarin) in any way

- d. make you sick when taking Coumadin (warfarin) medication
7. While in your pharmacy, you notice multivitamins are on sale. After some thought, you decide that you may need a multivitamin. You would:
  - a. purchase the multivitamin and begin taking it regularly
  - b. not take a multivitamin because it will cause a blood clot while taking
  - c. start taking it and bring the multivitamin to your next Coumadin Clinic visit to show the pharmacist
  - d. purchase the multivitamin but not start taking it until you talked with the pharmacist at your Coumadin Clinic\*
8. If you ran out of your prescription for your Coumadin (warfarin) you would:
  - a. borrow Coumadin (warfarin) from a friend, as long as it is the same dose as yours
  - b. call and ask for refills for that day so you do not miss a dose of Coumadin (warfarin)\*
  - c. wait until your next appointment that is just a few days away to get a new prescription
  - d. do nothing because you have taken Coumadin (warfarin) long enough, otherwise there would be more refills on your prescription
9. Which of the following is an effect of Coumadin (warfarin) medication that will most likely be experienced?
  - a. Stroke
  - b. Leg clot
  - c. Bruising\*
  - d. Blood in the urine
10. You have a cold, which includes a runny nose and a cough. You:
  - a. could safely take Nyquil to help get rid of the runny nose and cough
  - b. take your friend's medication that he/she uses for a bad cold because he/she is also on Coumadin (warfarin) medication
  - c. would call the Coumadin Clinic and tell him/her you are on Coumadin (warfarin) medication and ask what you can take for your cold\*
  - d. decide it is safer to suffer through the cold because most cold medications will interact with your Coumadin (warfarin) medication
11. When making a dental appointment while taking Coumadin (warfarin) medication, you need to remember you:
  - a. cannot have procedures done on your teeth while taking Coumadin (warfarin)
  - b. must tell your dentist you are taking Coumadin (warfarin) well in advance of having any procedure done\*
  - c. can have procedures done and there is not a need to tell the dentist about the Coumadin (warfarin)
  - d. can have the dental procedure done if when you arrive at your dental appointment you tell the dentist you are taking Coumadin (warfarin)
12. When the need arises to take an antibiotic (to get rid of an infection) while taking Coumadin (warfarin), you need to:



- a. take half of the prescribed length of therapy, and then call the Coumadin Clinic
  - b. refuse to take any new medication because you are taking Coumadin (warfarin)
  - c. wait until your next Coumadin Clinic visit and then tell the pharmacist about the antibiotic
  - d. call the Coumadin Clinic right away and let them know you are starting a new medication\*
13. Coumadin (warfarin) works:
- a. in my liver to make my blood thicker
  - b. in my liver to make my blood thinner\*
  - c. in my kidneys to make my blood thicker
  - d. in my kidneys to make my blood thinner
14. The best time of day for me to take my Coumadin (warfarin) is:
- a. at lunchtime
  - b. in the evening\*
  - c. in the morning before breakfast
  - d. any time of day when I remember
15. Which of the following is an effect of my Coumadin (warfarin) medication that I will most likely experience if my INR is too high?
- a. A clot in the leg
  - b. Minor bleeding\*
  - c. Clot in the lung
  - d. Bleeding in the brain
16. Which of the following drinks can decrease the effectiveness of your Coumadin (warfarin)?
- a. Deans 2% low-fat milk
  - b. Hershey's chocolate shake
  - c. Tropicana orange juice
  - d. Ensure nutritional supplement\*
17. While taking Coumadin (warfarin), which of the following represents a situation when you should to go to the emergency room?
- a. You cough up blood\*
  - b. Your nose bleeds slightly while blowing it
  - c. You gums bleed after brushing your teeth then it stops quickly
  - d. You have cut yourself while shaving and you control the bleeding
18. Your neighbor brings over this great "all natural" herbal supplement she just bought from her chiropractor. She swears that this helps all her aches and pains and recommends that you take it when you ache. Your decision is to:
- a. take her advice, realizing that you could use this herbal supplement
  - b. start taking the herbal supplement and tell your pharmacist at the next office visit
  - c. ask your pharmacist if the herbal supplement will interact with your medications before you take it\*

- d. avoid taking herbal supplements altogether because all medications interact with Coumadin (warfarin)
19. Once you have reached a stable Coumadin (warfarin) dose, a PT/INR blood test:
- a. should be checked once a year
  - b. should be checked once every 3 months
  - c. should be checked at least once every 4 weeks\*
  - d. does not need to be checked once you are on a stable Coumadin (warfarin) dose
20. The results of your PT/INR test tells the pharmacist:
- a. how thick or thin your blood is while taking Coumadin (warfarin)\*
  - b. how well your kidneys are working since taking Coumadin (warfarin)
  - c. what your average blood sugar level was since taking Coumadin (warfarin)
  - d. how much alcohol you have been drinking since taking Coumadin (warfarin)
21. While taking Coumadin (warfarin), you should call your Coumadin Clinic when you get:
- a. a backache
  - b. an upset stomach
  - c. a tension headache
  - d. diarrhea for more than 1 day\*
22. While on Coumadin (warfarin) you need to be routinely monitored for which of the following:
- a. PT/INR tests\*
  - b. Potassium levels
  - c. Blood glucose levels
  - d. Kidney function tests
23. Which of the following may have a significant effect on how well your Coumadin (warfarin) works?
- a. Changes in your mood
  - b. Changes in sleep habits
  - c. How much water you drink
  - d. Using over the counter medications\*
24. While taking Coumadin (warfarin), which of the following should lead you to the emergency room?
- a. Loss of appetite
  - b. Brown loose stools
  - c. Urine becomes red in color\*
  - d. A quarter size bruise on your arm
25. Which of the following foods could affect how well your Coumadin (warfarin) works?
- a. Celery
  - b. Carrots
  - c. Cole slaw\*

- d. Green beans
26. You have generic and brand Coumadin (warfarin) tablets at home that are both the same dose. You should:
- a. take both because they work differently
  - b. take only brand or only generic, but not both\*
  - c. not take either until you call the Coumadin Clinic
  - d. alternate days by taking brand on one day and generic on the next day
27. Once your Coumadin (warfarin) is stopped, how long does it take to get the medication to get out of your system?
- a. 5 hours
  - b. 5 days\*
  - c. 5 weeks
  - d. 5 months
28. After starting Coumadin (warfarin), how long (in months/years) would you expect to be taking Coumadin (warfarin)?
- a. 1 year
  - b. 1 month
  - c. It depends on each person's needs\*
  - d. If you start Coumadin (warfarin), you will have to be on the medication for the rest of your life
29. Which of the following activities are more risky while taking Coumadin (warfarin)?
- a. Playing football, because you can hit your head\*
  - b. Taking a bath, because soap interacts with Coumadin (warfarin)
  - c. Playing cards because using your hands a lot will cause a blood clot
  - d. Walking a lot, because exercise is not good for you while taking Coumadin (warfarin)

(Briggs, Jackson, Bruce, Shapiro, 2005).

## APPENDIX E

## The Oral Anticoagulation Knowledge (OAK) Test

Instructions: For each question, place an X in the box next to the answer you think is correct or best completes the sentence correctly. Please answer all questions.

(correct answers = )

1. Missing one dose of Coumadin (warfarin):
  - a. has no effect
  - b. can alter the drug's effectiveness
  - c. is permissible as long as you take a double dose the next time
  - d. is permissible as long as you watch which foods you eat
2. You can distinguish between different strengths of Coumadin (warfarin) tablets by what?
  - a. color
  - b. shape
  - c. size
  - d. weight
3. A patient on Coumadin (warfarin) therapy should contact the physician or healthcare provider who monitors it when:
  - a. another physician adds a new medication
  - b. another physician stops a current medication
  - c. another physician changes a dose of a current medication
  - d. all of the above
4. Occasionally eating a large amount of leafy greens vegetables while taking Coumadin (warfarin) can:
  - a. increase your risk of bleeding from Coumadin (warfarin)
  - b. reduce the effectiveness of the Coumadin (warfarin)
  - c. cause upset stomach and vomiting
  - d. reduce your risk of having a blood clot
5. Which of the following vitamins interacts with Coumadin (warfarin)?
  - a. vitamin B12
  - b. vitamin A
  - c. vitamin B6
  - d. vitamin K
6. When is it safe to take a medication that interacts with Coumadin (warfarin)?
  - a. if you take the Coumadin (warfarin) in the morning and the interacting medication at night
  - b. if your healthcare provide is aware of the interaction and checks your PT/INR ("Protime") regularly
  - c. if you take your Coumadin (warfarin) every other day

- d. it is never safe to take a medication that interacts with Coumadin (warfarin)
7. The PT/INR (“Protime”) test is:
- a. a blood test used to monitor your Coumadin (warfarin) therapy
  - b. a blood test that is rarely done while on Coumadin (warfarin)
  - c. a blood test that checks the amount of vitamin K in your diet
  - d. a blood test that can determine if you need to be on Coumadin (warfarin)
8. Coumadin (warfarin) may be used to:
- a. treat people that already have a blood clot
  - b. treat people that have high blood sugar levels
  - c. treat people with high blood pressure
  - d. treat people with severe wounds
9. A patient with a PT/INR (“Protime”) value below their “goal range”:
- a. is at an increase the risk of bleeding
  - b. is at an increase the risk of having a clot
  - c. is more likely to have a skin rash from the Coumadin (warfarin)
  - d. is more likely to experience side effects from Coumadin (warfarin)
10. Taking a medication containing aspirin or other non-steroidal anti-inflammatory medications such as ibuprofen (Motrin® / Advil®) while on Coumadin (warfarin) will:
- a. reduce the effectiveness of the Coumadin (warfarin)
  - b. increase your risk of bleeding from the Coumadin (warfarin)
  - c. cause a blood clot to form
  - d. require you to increase your dose of Coumadin (warfarin)
11. A person on Coumadin (warfarin) should seek immediate medical attention:
- a. if they skip more than two doses of Coumadin (warfarin) in a row
  - b. if they notice blood in their stool when going to the bathroom
  - c. if they experience a minor nosebleed
  - d. if they develop bruises on their arms or legs
12. Skipping even one dose of your Coumadin (warfarin) can:
- a. cause your PT/INR (“Protime”) to be above the “goal range”
  - b. increase your risk of bleeding
  - c. cause your PT/INR (“Protime”) to be below the “goal range”
  - d. decrease your risk of having a clot
13. Drinking alcohol while taking Coumadin (warfarin):
- a. is safe as long as you separate your dose of Coumadin (warfarin) and the alcohol consumption
  - b. may affect your PT/INR (“Protime”)
  - c. does not affect your PT/INR (“Protime”)
  - d. is safe as long as you are on a low dose

14. Once you have been stabilized on the correct dose of Coumadin (warfarin), about how often should your PT/INR("Protime") value be tested?
- a. once a week
  - b. once a month
  - c. once every other month
  - d. once every 3 months
15. It is important for a patient on Coumadin (warfarin) to monitor for signs of bleeding:
- a. only when their PT/INR ("Protime") is above the goal range
  - b. at all times
  - c. only when their PT/INR ("Protime") is below the goal range
  - d. only when you miss a dose
16. The best thing to do if you miss a dose of Coumadin (warfarin) is to?
- a. double up the next day
  - b. take the next scheduled dose and tell your healthcare provider
  - c. call your healthcare provider immediately
  - d. discontinue Coumadin (warfarin) altogether
17. When it comes to diet, people taking Coumadin (warfarin) should:
- a. never eat foods that contain large amounts of vitamin K
  - b. keep a diary of all of the foods they eat
  - c. be consistent and eat a diet that includes all types of food
  - d. increase the amount of vegetables they eat
18. Each time you get your PT/INR ("Protime") checked, you should:
- a. skip your dose of Coumadin (warfarin) on the day of the test
  - b. avoid eating high fat meals on the day of the test
  - c. avoid foods high in vitamin K on the day of the test
  - d. let your doctor know if you missed any doses of Coumadin (warfarin)
19. Which of the following over-the-counter products is most likely to interact with Coumadin (Warfarin)?
- a. nicotine replacement therapies
  - b. herbal / dietary supplements
  - c. allergy medications
  - d. calcium supplements
20. A patient with a PT/INR("Protime") value above the "goal range":
- a. is at an increased risk of having a clot
  - b. is more likely to have drowsiness and fatigue from Coumadin (warfarin)
  - c. is at an increased risk of bleeding
  - d. is less likely to experience side effects from Coumadin (warfarin)

(Zeolla, Brodeur, Dominelli, Haines & Allie, 2006, *copyrighted*)

**APPENDIX F**

**Patient Teaching Booklet**

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## Anticoagulation Clinic contact information

To schedule an appointment or talk to the anticoagulation nurse call:



**XXX-XXX-XXXX**

or

toll free **1-888-XXX-XXXX** ext. **XXXX**

For your convenience, appointments are available at the main campus in [City] as well as the satellite clinics in [City] and [City].

## When to call the Anticoagulation Clinic

- If you miss a dose of Coumadin<sup>®</sup> (warfarin)
- If there is a change in your current medications (including medications prescribed by your healthcare provider, over-the-counter medications, herbal or natural products, vitamins or supplements)
- If your dietary intake of vitamin K containing foods increases or decreases
- If you notice unusual or prolonged bleeding or significant bruising
- If you develop a fever or illness (vomiting, diarrhea, infection, pain or swelling)
- If you have been scheduled for a surgical or dental procedure
- If your warfarin tablet changes in appearance (color, shape, size) when your prescription is refilled
- If anyone instructs you to stop, hold or change your warfarin therapy
- If you are pregnant or planning to get pregnant
- If you plan to travel for an extended period of time
- If you have questions about your warfarin therapy

**In case of emergency  
CALL 911**

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## Common reasons for taking warfarin

**Atrial fibrillation:** Atrial fibrillation (*A-tre-al fi-bri-LA-shun*), a type of irregular heartbeat, is a fairly common heart disorder that you may or may not feel. Sometimes your heart will beat too fast or out of rhythm and may cause blood clots. Sometimes atrial fibrillation is also called A-fib.

**Blood clots in the lung:** A blood clot that forms in another part of your body, such as in your leg, can break loose and move through the blood to your lungs. The clot then gets stuck within a blood vessel that brings blood to the lungs (called a pulmonary embolism, *PULL-mun-ary EMbo-lizm*). If the lungs cannot get enough blood, they will be damaged, and you could stop breathing.

**Blood clots:** Blood clots (DVT, deep vein thrombosis, *throm-BO-sis*) form in a vein. The veins deep inside your leg, especially the calf and thigh, are the most common areas where clots occur. Blood clots can lead to damage of the blood vessels in your leg and break loose and cause other organ damage.

**Family history:** Some people are more likely to get blood clots because of a family history. You may have a genetic condition that causes your blood to form potentially dangerous clots.

**Heart attack:** A heart attack is caused by a lack of blood supply to the heart. The lack of blood happens when one or more of the blood vessels pumping blood to the heart are blocked.

**Heart valve disease:** Heart valve disease is any problem in one or more of the four valves in the heart. Heart valves keep blood flowing in one direction. They act as a door that swings open, allowing blood to flow through the sections of the heart.

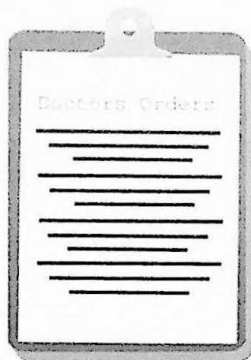
**Heart valve replacement:** There are many types of artificial valves that are used to replace your own heart valve. The material used to make these valves may cause blood to stick and form clots.

**Stroke:** A stroke is caused by a blood clot that blocks a blood vessel in the brain. This blockage cuts off the blood flow to a part of the brain and can cause problems with your speech, swallowing, or movement of different parts of your body. You may be at a higher risk for a stroke if you've had a heart attack.

## Why am I taking an anticoagulant?

Your healthcare provider has prescribed this medication for you to prevent the formation of harmful clots or to treat an existing blood clot. Blood clots may form in veins, arteries, or even with the chambers of the heart or on heart valves. Blood clots can create blocks in blood vessels or cut the blood supply to a portion of the body. Sometimes blood clots can break into fragments called “emboli” and be swept along by the blood. Emboli from veins travel through the heart and lodge in the lung, causing a pulmonary embolus (PE). Emboli from the heart or arteries can cause a stroke if they lodge in the brain.

**By preventing clots from forming, it reduces the risk of stroke (brain attack), heart attack or pulmonary embolism in people who have atrial fibrillation, a history of stroke, heart valve replacement, deep vein thrombosis (DVT) or pulmonary embolism (PE).**



The reason I am taking this medication:

\_\_\_\_\_

## What is Coumadin<sup>®</sup> or warfarin?

Coumadin<sup>®</sup> (brand drug name) and warfarin (generic drug name) are anticoagulant medications, sometimes called “blood thinners”. The definition of *anti – coagulant* is “against clotting”. These drugs are used to **prevent clotting** in the blood **by extending the time it takes for your blood to clot**. It works in the liver to decrease the production of natural blood components called clotting factors.



The name of the anticoagulant medication my healthcare has prescribed for me is: \_\_\_\_\_

## What are the PT/INR blood tests?

Prothrombin Time (PT) is measured in seconds and is the time it takes for your blood to form a clot. International Normalized Ratio (INR) is a more consistent way of reporting the PT and widely used to monitor warfarin therapy. **You do not have to fast (go without eating) for these tests.**

Your *therapeutic target INR goal range* is based on the medical reason you are taking warfarin. Most people have an INR goal range between 2.0 – 3.0. For certain medical conditions the goal range is set slightly higher (2.5 -3.5).

When your result falls **within your range**, it means your level is **“therapeutic”**.

In general, if your INR is **below your target INR range**, you are at **greater risk of forming clots**. In this case, your healthcare provider may prescribe a higher dose of warfarin for you.

If your INR is **above your target INR range**, you are at **greater risk of having bleeding complications**. This means your blood is “too thin”. In this situation, your healthcare provider may prescribe a lower dose of warfarin for you.



My target INR goal range is \_\_\_\_\_

## How often do I need to get my blood tested?

When you first start taking warfarin and anytime your dose is adjusted, you may need to get your blood tested once or twice a week. When your results are consistently in range and your warfarin dose becomes stable, the frequency may decrease to every 4-6 weeks. The frequency of your INR tests will be determined by the ACC staff.

**Close monitoring of your INR is necessary to reduce your risk of blood clots and bleeding complications** associated with warfarin therapy. It is important that you get your blood tested on the date and time you are scheduled.

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## How do I take my medication?

Warfarin is taken **once a day** as directed by your healthcare provider and ACC staff. Important information about taking this medication:

- Take it about the **same time every day**, preferably in the evening
- May be taken with or without food
- **Never skip a dose**
- **Never take a double dose**



Try not to miss a dose of warfarin. If you miss a dose and remember the same day, you may take it later than the scheduled time. If it is the next day, please call the ACC for further instructions. If it is a weekend or holiday and you are unable to reach us, simply skip the missed dose and resume your normal dose the next day. Be sure to mark the missed dose on your calendar and report it at your next Anticoagulation Clinic visit.

## How much medication do I need to take?

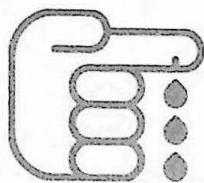
The dose or amount of warfarin needed varies from person to person. Your body's response to warfarin is monitored by a blood test called Prothrombin time (PT) or International Normalized Ratio (INR). Your warfarin dose is adjusted based on your INR result to meet your target goal range for your medical condition.



## What are signs of too much warfarin or a high INR?

### Minor Bleeding:

- Gum bleeding
- Occasional nosebleed
- Easy bruising
- Menstrual bleeding that is heavier than normal
- Prolonged bleeding after a minor cut

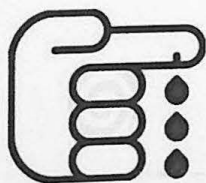


You may notice very minor bleeding from time to time even when an INR is within target range. If you are unsure whether the bleeding is of concern, call the Anticoagulation Clinic. You may need to get your INR level checked.

### Major Bleeding:

- Red, dark, coffee or cola colored urine
- Red, black or tarry stool
- Frequent or excessive bleeding from the gums or nose
- Vomiting coffee-colored substances or bright red blood
- Coughing up red-tinged secretions
- Unusual swelling, pain, stomach ache, headache, dizziness or weakness
- Unexplained or sudden appearance of bruising
- Excessive menstrual bleeding
- Continuous or excessive amount of bleeding
- If you have a serious fall or hit your head

**It is important to know that you can be bleeding inside your body even if you cannot see any blood.**



If you develop any of these signs or symptoms of **major** bleeding, **OR**, if you are involved in any type of **traumatic accident**, such as a **car accident** or **fall down** and **hit your head** on the ground, you should **go to the nearest hospital emergency department immediately** to be evaluated by a healthcare provider for serious bleeding problems.



## What are symptoms of too little warfarin or low INR?

### Blood Clotting:

- Sudden weakness in any limb
- Numbness or tingling anywhere
- Visual changes, loss of sight or inability to speak
- Dizziness or faintness
- New pain, swelling, redness or warmth in an extremity
- New shortness of breath or chest pain



If you develop any of these signs or symptoms **go to the nearest hospital emergency department immediately** to be further evaluated by a healthcare provider.

## What are the side effects of warfarin?

Side effects of warfarin therapy are not common. The most serious side effect of warfarin is bleeding. In rare instances, people experience hair loss or a skin rash when taking warfarin.

**If you experience something abnormal that you feel may be caused by taking warfarin, please contact the Anticoagulation Clinic.**

## Does warfarin interact with other drugs?

Warfarin interacts with **MANY** other medications including medicines prescribed by your healthcare provider as well as over the counter medicines, herbs and vitamin supplements. The Anticoagulation Clinic may order more frequent INR checks whenever a potential drug interaction occurs with your warfarin therapy. **Tell your doctors, pharmacists, dentists or any healthcare provider that you are taking warfarin.** Other drugs can cause your INR to go too high (placing you at risk for bleeding) or cause your INR to go too low (placing you at risk for blood clots).

**It is extremely important that you contact the Anticoagulation Clinic whenever you start, change or stop any medication, herb or vitamin.**

**Please check with ACC even if the medication was prescribed by your healthcare provider.**

## Common types of prescription drugs that may interfere with warfarin

(This is a partial list)

- Antibiotics
- Analgesics (pain medications)
- Anticonvulsants (seizure medications)
- Antidepressants
- Antiplatelet drugs
- Diabetes drugs
- Gastrointestinal drugs
- Gout treatments drugs
- Lipid lowering drugs (to treat high cholesterol)
- Steroids (such as prednisone)
- Thyroid drugs
- Antiarrhythmic drugs (heart medications)
- Antifungal drugs



# Aspirin and aspirin-containing products may increase your risk of bleeding when you are also taking an anticoagulant!



Avoid taking products containing aspirin unless ordered by your healthcare provider. The following is a partial list of some common over the counter (OTC) medicines that you should talk with your healthcare provider or Anticoagulation Clinic staff before taking. These include pain relievers, cold medicines, or stomach remedies such as:

- Advil® or Motrin® (ibuprofen)
- Alka-Seltzer®
- Excedrin®
- Pamprin HB®
- Sine-off®
- Aleve® or Naprosyn® (naproxen)
- Ex-lax®
- Midol®
- Nuprin®
- Pepto-Bismol®
- Tagamet HB® (cimetidine)
- Zantac® (ranitidine)
- Pepcid AC (famotidine)
- Bayer®
- Bufferin®
- Nyquil®

Drug Facts	
Active ingredient (in each tablet)	Purpose
Chondroitine sulfate 2 mg	Aspirin
<b>Uses:</b> Temporarily relieves these symptoms due to hay fever or other upper respiratory allergens: <input type="checkbox"/> sneezing <input type="checkbox"/> runny nose <input type="checkbox"/> itchy watery eyes <input type="checkbox"/> itchy throat	
<b>Warnings:</b> Ask a doctor before use if you have: <input type="checkbox"/> stomach ulcers or a bleeding problem such as hemorrhoids or chronic bronchitis <input type="checkbox"/> stomach ulcers due to an unexplained stomach pain <input type="checkbox"/> a doctor or pharmacist before use if you are taking tranquilizers or sedatives	
<b>When using this product:</b> <input type="checkbox"/> Discontinue use if you have severe stomach pain <input type="checkbox"/> Avoid alcohol, caffeine, and tobacco as they may increase stomach irritation <input type="checkbox"/> Do not use when driving a motor vehicle or operating machinery <input type="checkbox"/> Aspirin may affect blood sugar levels in children	
<b>Directions:</b> Adults and children 12 years and over: Take 2 tablets every 4 to 6 hours and not more than 12 tablets in 24 hours. Children 6 years to under 12 years: Take 1 tablet every 4 to 6 hours and not more than 6 tablets in 24 hours. Children under 6 years: Ask a doctor	

Drug Facts (continued)	
<b>Other information:</b> Store at 20° to 25° C (68° to 77° F) in original container. <input type="checkbox"/> Contains aspirin	
<b>Inactive ingredients:</b> Cellulose, croscarmellose sodium, hydroxypropyl methylcellulose, polyethylene glycol, polyethylene glycol 400, polyethylene glycol 600, polyethylene glycol 800, polyethylene glycol 1000, polyethylene glycol 1500, polyethylene glycol 2000, polyethylene glycol 3000, polyethylene glycol 4000, polyethylene glycol 6000, polyethylene glycol 8000, polyethylene glycol 10000, polyethylene glycol 15000, polyethylene glycol 20000, polyethylene glycol 30000, polyethylene glycol 40000, polyethylene glycol 60000, polyethylene glycol 80000, polyethylene glycol 100000	

**Always read the label before taking any over-the-counter (OTC) medication!**

## Vitamins, minerals & herbal medicines may cause dangerous drug interactions with warfarin!



Even if the label says "all natural", it might not be safe to take with warfarin. The following is a partial list of vitamins, minerals and herbal medicines that have been known to interact with blood thinners:

- Alfalfa
- Aloe Gel
- Aniseed Angelica (Dong Quai)
- Aspen
- Black Cohosh
- Black Haw
- Celery
- Centrum Silver
- Coenzyme Q10
- Dandelion
- Fenugreek
- Garlic
- Ginger
- Ginkgo Biloba
- Glucosamine & Chondroitin
- Green Tea
- Horseradish
- Licorice
- Mistletoe
- Multivitamins containing vitamin K
- Nettle
- One-a-day vitamins
- Onion
- Parsley
- Red Clover
- St. John's Wort
- Sweet Clover
- Yarrow

**Always talk with the Anticoagulation Clinic staff before taking any supplement.**

## Do I need to follow a special diet when taking warfarin?

Certain foods can affect how well your warfarin works for you. Foods high in vitamin K, such as leafy green vegetables, may decrease the effect of your warfarin, lowering your INR level. The most important thing to remember is to keep your diet the same as before. If you always eat a salad for lunch, then continue to do so. Be consistent and do not binge on foods that are high in vitamin K. The following is a partial list of foods that are high in vitamin K:



- Avocado
- Asparagus
- Blueberries
- Broccoli
- Brussel sprouts
- Cabbage
- Collard greens
- Garbanzo beans
- Green scallions
- Green tea Endive
- Kale
- Lentils
- Lettuce
- Liver
- Noodles (egg/spinach/cooked)
- Nuts
- Oils (canola, soybean)
- Peas
- Sauerkraut
- Salad dressings
- Seaweed
- Spinach
- Wheat flour
- Turnip greens
- Watercress

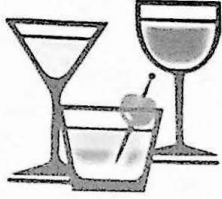
**Talk to the Anticoagulation Clinic staff before making any major changes in your diet or starting a weight loss program.**

## Other dietary considerations

Many dietary supplements contain vitamin K and therefore may also decrease the effect of your warfarin. Examples of these products include Ensure<sup>®</sup>, Boost<sup>®</sup> and Carnation<sup>®</sup> Instant Breakfast Drink. Weight loss drinks may have similar effects.

## Lifestyle considerations

Is it safe to drink alcohol while taking warfarin?



It is recommended that you avoid alcoholic beverages. If you choose to consume alcohol, it should be in moderation (1-2 drinks) to avoid complications. **Excessive drinking can greatly increase your INR level and increase your risk of bleeding.**

Is it safe to travel while taking warfarin?

Plan ahead and follow these travel recommendations:

- Inform the Anticoagulation Clinic of your travel plans
- Know your INR target range and when to have your INR level checked
- Take your medications as close to the same time each day as possible
- Take an adequate supply of warfarin with you
- Carry your medications with you instead of in your luggage
- Eat a consistent diet
- If you require medical or dental attention while traveling, inform the doctors and nurses that you are taking warfarin

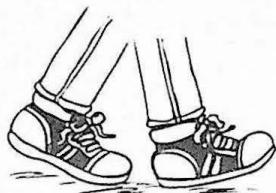


Is it safe to get pregnant while taking warfarin?



You should not take warfarin if you are pregnant. There are other, safer anticoagulation medications for women who are pregnant. **Talk to your healthcare provider or Anticoagulation Clinic staff if you are planning on becoming pregnant.**

## Is it safe to exercise and be active while taking warfarin?



Physical activity is important to your health. Activities such as walking, jogging, swimming and gardening are usually safe. Avoid sports or activities that put you at risk for injury. **Inform the Anticoagulation Clinic staff of any changes in your activity level (more or less activity than usual) as it may affect your INR level.**

## Dentist

Always tell your dentist you are taking warfarin. There is no reason to stop warfarin for routine dental check-ups and simple teeth cleaning. **Contact the Anticoagulation Clinic prior to any dental procedure.**



## What if I get sick?



Acute illness will change your body's response to warfarin and may cause your INR to go up and increase your risk of bleeding. You may need to have your INR level checked more frequently during and immediately after an illness. Contact the Anticoagulation Clinic any time you start an antibiotic or if you experience any of the following conditions or symptoms:

- Congestive heart failure (CHF)
- Fever
- Influenza
- Viral or bacterial infection
- Nausea
- Vomiting
- Diarrhea

## What if I need to have surgery?

Inform all healthcare providers you are taking warfarin. Contact the Anticoagulation Clinic staff prior to any surgery. **They will work with you and your surgeon to manage your INR level and medication dosing prior to the procedure.**





## Staying safe while taking warfarin

### Preventing injury indoors:

- Be very careful using sharp objects such as knives and scissors.
- Use an electric razor.
- Use a soft toothbrush.
- Use waxed dental floss.
- Do not use toothpicks.
- Wear shoes or non-skid slippers in the house.
- Be careful when you trim your toenails.
- Do not trim corns or calluses yourself.



### Preventing injury outdoors:

- Always wear shoes.
- Wear gloves when using sharp tools.
- Take precautionary measures around power tools.
- Avoid activities that can easily hurt you.
- Wear gardening gloves when doing yard work.
- Wear a helmet when you ride a bike.

### Who should know I am taking warfarin?



It is very important to tell your healthcare provider at each visit and each pharmacy where you have prescriptions filled. It is recommended that you wear a medical alert identification bracelet/necklace or carry a wallet card that will alert emergency healthcare providers that you are taking warfarin.

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Room: CRSC 103  
Location: Thesis/Independent Study  
Cabinet

Patient Education



CSC11572