Warfarin Knowledge in Patients with Atrial Fibrillation: Implications for Safety, Efficacy, and Education Strategies

Megan B. Smith a, Nedra Christensen a, Shiquan Wang a, Jennifer Strohecker b, John D. Day b, J. Peter Weiss b, Brian G. Crandall b, Jeffrey S. Osborn b, Jeffrey L. Anderson b, Benjamin D. Horne b, Joseph B. Muhlestein b, Donald L. Lappe b, Heidi Moss a, Jessica Oliver a, Krista Viau a, T. Jared Bunch a, b

a Department of Nutrition, Dietetics and Food Sciences, Utah State University, Logan, Utah, and b Intermountain Heart Rhythm Specialists, Department of Cardiology, Intermountain Medical Center, Murray, Utah, USA

Abstract

Background: Multiple factors influence warfarin metabolism and can significantly affect the risk of adverse events. The extent to which patients understand the modifiable factors that impact on warfarin safety and efficacy is unclear.

Methods: A 52-item questionnaire related to knowledge of warfarin was administered to patients with atrial fibrillation in a face-to-face interview with a dietitian. Results were compiled based on five categories: general warfarin knowledge, compliance, drug interactions, herbal or vitamin interactions, and diet.

Results: 100 patients were surveyed. Stroke risk factors included hypertension (57%), heart failure (36%), age >75 years (33%), diabetes (22%), and prior stroke/transient ischemic attack (29%). The majority were either high-school (49%) or college graduates (27%). Ten (10%) had a stroke while on warfarin, 11 (11%) had a blood transfusion, and 26 (26%) had at least one fall. The percentages correct for questionnaire items in the five categories were as follows: general knowledge (62%), compliance (71%), drug interactions (17%), herbal or vitamin interactions (7%), and diet (23%). Neither education level nor duration of therapy correlated with warfarin knowledge. Patients at highest risk of stroke had very low knowledge scores in general.

Discussion: Patients on warfarin have a poor general understanding of the medication, particularly those at highest risk of stroke.

Key Words
Anticoagulants • Atrial fibrillation • Hemorrhage • International normalized ratio • Nutrition • Stroke • Warfarin

Introduction

Atrial fibrillation (AF) is the most commonly observed arrhythmia in clinical practice. As the population continues to age and live longer with risk factors for AF, such as hypertension and heart failure, the prevalence of...
Arrhythmia is likely to increase [1, 2]. Patients with AF are at risk for systemic embolization of atrial thrombi, which can have devastating consequences and adversely impact morbidity and mortality. As a result, antithrombotic therapy, with either anticoagulation or antiplatelet therapy, is considered for most of these patients [3]. Although both agents have been shown to be effective in preventing systemic embolization, anticoagulant therapy is required in most patients due to one or more risk factors for stroke [3].

Although warfarin anticoagulation has been shown to be effective in reducing the risk of stroke, it has a narrow therapeutic index. Patients with a low international normalized ratio (INR) are at risk for thromboembolism, while patients with a high INR are at risk for hemorrhage [4–7]. The requirement of frequent blood tests, maintenance dose variability according to nutritional status, hepatic function, intestinal absorption, drug interactions, and genetic polymorphisms all add to the significant complexity of warfarin therapy [8]. In order to minimize drug variability, extensive efforts have been made to estimate warfarin dosing based upon genetic and clinical factors [8]. Nonetheless, many of the causes of drug variability are related to the effectiveness of patient education and their understanding of the medication, especially in regard to the diet, drug compliance, and drug-drug or drug-supplement interactions [9–11]. Insight into which patients may be at highest risk for educational deficits will identify patient groups that may need innovative and repetitive education [12].

Patients and Methods

Patients

Patients were randomly recruited from a large clinical practice at Intermountain Medical Center (Intermountain Heart Rhythm Specialists) in Murray, Utah, USA. All patients had AF as their primary reason to use warfarin anticoagulation. Patients receiving treatment for their AF participated in the questionnaire only if they gave consent and a dietitian was present to conduct the survey. Administration of the questionnaire was varied as to the time of day, day of the week, and week of the month, depending upon dietitian availability. The questionnaire was reviewed by two registered dietitians and a cardiologist for content validity. Institutional Review Board approval was obtained prior to initiating the study.

Procedure

Consenting patients completed the 52-item questionnaire (Appendix) under the direction of a registered or student dietitian. The dietitian was available to clarify the meaning of questions, if asked to do so by the patients. Unless assistance was needed, the patients filled out the questionnaire by themselves. To facilitate reporting and analysis, the survey questions were compiled based on five categories: general warfarin knowledge, compliance, drug interactions, herbal or vitamin interactions, and diet.

Data Analysis

The data were stratified by education level, stroke risk as measured by CHADS2 score (age >75 years, hypertension, diabetes mellitus, heart failure, and prior stroke), and duration of warfarin use [13]. Education level was divided into three groups: group 1 (n = 7) – <8th grade education (<9 years of education) and 8th–12th grade education (<9–13 years of education), group 2 (n = 48) – high-school graduate (= 13 years of education), and group 3 (n = 42) – college graduate (= 17 years of education) or advanced degree (>17 years of education). Duration of warfarin use was divided into three groups: group 1 – <1 year (n = 38), group 2 – 1–5 years (n = 32), and group 3 – >5 years (n = 27). For purposes of comparison, the CHADS2 risk scores were divided into three groups: group 1 – 0–1 (n = 44), group 2 – 2 (n = 31), and group 3 – 3–5 (n = 22).

Continuous variables were reported as means ± SD, and comparisons between groups were based on a two-sample t test (parametric). Categorical variables were summarized as percentages, and group comparisons were based on the χ² test or Fisher's exact test, as appropriate. p < 0.05 was considered significant.

Results

Patient Demographics

One hundred patients were surveyed, 62 (62%) males and 38 (38%) females, with an average age of 68 ± 10 years. The basic demographics of the patients are listed in table 1. The majority of these patients were male, had a high-school degree or greater, and had used warfarin in excess of 1 year. Risk factors for thromboembolism were common [age >75 years (33%), heart failure (36%), diabetes mellitus (22%), hypertension (57%), and prior stroke/transient ischemic attack (TIA; 29%)].

Dietary Modification and Supplement Use

The majority of patients reported weight loss or gain on the medication, mainly due to dietary modifications (table 2). Similarly, the majority of patients were using over-the-counter medications, vitamins, and supplements.

Warfarin Use and Outcomes

Forty-one percent reported that warfarin negatively impacted on their quality of life. The most common reason patients felt the medication negatively impacted on their life was the propensity for bleeding. While on warfarin anticoagulation, 10 patients experienced a stroke or TIA attack. The reported stroke or
TIA events were clinical, as they were documented by the questionnaire and patient history. No subclinical stroke or TIA events were accounted for in this study. Most of these patients had a supratherapeutic INR at the time of the event. Twenty percent of patients had experienced blood loss in their stool or urine, and 11 (11%) required a blood transfusion that, upon questioning in the participant interview, was determined to be related to bleeding rather than a surgical procedure or an accident. A transfusion in connection with a surgical procedure or an accident was not counted as bleeding for purposes of this study. This cohort of participants also reported problems with falling, with 32% reporting at least one episode while on the therapy.

Among the 29 participants that sustained a prior stroke/TIA, 26 had a stroke/TIA believed to have been caused by a thromboembolism and 21 did not report blood loss in stool or urine or a blood transfusion not related to a medical procedure or accident. Ten participants

### Table 1. Basic patient demographics of 100 patients on warfarin anticoagulation for AF

<table>
<thead>
<tr>
<th>Variable</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td>68 ± 10</td>
</tr>
<tr>
<td>Male gender</td>
<td>62 (62)</td>
</tr>
<tr>
<td>Education (highest level obtained, n = 97)</td>
<td></td>
</tr>
<tr>
<td>&lt;8th grade</td>
<td>1 (1)</td>
</tr>
<tr>
<td>8th–12th grade</td>
<td>6 (6)</td>
</tr>
<tr>
<td>High-school graduate</td>
<td>48 (49)</td>
</tr>
<tr>
<td>College graduate</td>
<td>26 (27)</td>
</tr>
<tr>
<td>Advanced degree</td>
<td>16 (16)</td>
</tr>
<tr>
<td>Stroke risk factors</td>
<td></td>
</tr>
<tr>
<td>High blood pressure</td>
<td>56 (57)</td>
</tr>
<tr>
<td>Heart failure</td>
<td>35 (36)</td>
</tr>
<tr>
<td>Age &gt;75 years</td>
<td>33 (33)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>22 (22)</td>
</tr>
<tr>
<td>Prior stroke/TIA</td>
<td>29 (29)</td>
</tr>
<tr>
<td>CHADS2 score</td>
<td></td>
</tr>
<tr>
<td>0 risk</td>
<td>9 (9)</td>
</tr>
<tr>
<td>1 risk</td>
<td>33 (34)</td>
</tr>
<tr>
<td>2 risks</td>
<td>31 (32)</td>
</tr>
<tr>
<td>3 risks</td>
<td>18 (19)</td>
</tr>
<tr>
<td>4 risks</td>
<td>5 (5)</td>
</tr>
<tr>
<td>5 risks</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td></td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>16 (16)</td>
</tr>
<tr>
<td>Coronary artery bypass grafting/stent</td>
<td>19 (19)</td>
</tr>
<tr>
<td>Heart valve surgery</td>
<td>5 (5)</td>
</tr>
<tr>
<td>Duration of warfarin use (n = 97)</td>
<td></td>
</tr>
<tr>
<td>&lt;1 year</td>
<td>38 (39)</td>
</tr>
<tr>
<td>1–5 years</td>
<td>32 (33)</td>
</tr>
<tr>
<td>&gt;5 years</td>
<td>27 (28)</td>
</tr>
<tr>
<td>Frequency of INR checks (n = 97)</td>
<td></td>
</tr>
<tr>
<td>Weekly</td>
<td>14 (14)</td>
</tr>
<tr>
<td>Twice monthly</td>
<td>25 (25)</td>
</tr>
<tr>
<td>Monthly</td>
<td>53 (55)</td>
</tr>
<tr>
<td>&gt;Monthly</td>
<td>3 (3)</td>
</tr>
<tr>
<td>Not sure</td>
<td>2 (2)</td>
</tr>
</tbody>
</table>

### Table 2. Dietary modification and supplement use in patients taking warfarin

<table>
<thead>
<tr>
<th>Variable</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight gain after starting warfarin</td>
<td>24 (24)</td>
</tr>
<tr>
<td>Changed diet to avoid vegetables</td>
<td>6 (25)</td>
</tr>
<tr>
<td>Exercised less</td>
<td>15 (63)</td>
</tr>
<tr>
<td>Consumed more during meals</td>
<td>11 (46)</td>
</tr>
<tr>
<td>Craved less healthy foods</td>
<td>4 (17)</td>
</tr>
<tr>
<td>Weight loss after starting warfarin</td>
<td>22 (23)</td>
</tr>
<tr>
<td>Changed diet to avoid vegetables</td>
<td>10 (45)</td>
</tr>
<tr>
<td>Illness</td>
<td>10 (45)</td>
</tr>
<tr>
<td>Consumed less during meals</td>
<td>8 (36)</td>
</tr>
<tr>
<td>Avoidance of alcohol</td>
<td>0</td>
</tr>
<tr>
<td>Over-the-counter pain medications</td>
<td></td>
</tr>
<tr>
<td>Acetaminophen</td>
<td>43 (43)</td>
</tr>
<tr>
<td>Nonsteroidal anti-inflammatory agents</td>
<td>21 (21)</td>
</tr>
<tr>
<td>Aspirin</td>
<td>10 (16)</td>
</tr>
<tr>
<td>Vitamin supplements (n = 99)</td>
<td></td>
</tr>
<tr>
<td>Multivitamin</td>
<td>49 (49)</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>4 (4)</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>8 (8)</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>8 (8)</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>9 (9)</td>
</tr>
<tr>
<td>Herbal supplements (top 10 listed, n = 99)</td>
<td></td>
</tr>
<tr>
<td>Fish oil</td>
<td>20 (20)</td>
</tr>
<tr>
<td>Glucosamine/chondroitin</td>
<td>9 (9)</td>
</tr>
<tr>
<td>Coenzyme Q10</td>
<td>6 (6)</td>
</tr>
<tr>
<td>Garlic</td>
<td>5 (5)</td>
</tr>
<tr>
<td>Flaxseed</td>
<td>5 (5)</td>
</tr>
<tr>
<td>Green tea</td>
<td>3 (3)</td>
</tr>
<tr>
<td>Ginseng</td>
<td>3 (3)</td>
</tr>
<tr>
<td>Ginger, ginkgo biloba, melatonin</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td></td>
</tr>
<tr>
<td>Daily</td>
<td>4 (4)</td>
</tr>
<tr>
<td>4–6 days/week</td>
<td>2 (2)</td>
</tr>
<tr>
<td>2–3 days/week</td>
<td>3 (3)</td>
</tr>
<tr>
<td>1/week</td>
<td>2 (2)</td>
</tr>
<tr>
<td>&lt;1/week</td>
<td>10 (10)</td>
</tr>
<tr>
<td>Grapefruit consumption</td>
<td></td>
</tr>
<tr>
<td>Daily</td>
<td>4 (4)</td>
</tr>
<tr>
<td>4–6 days/week</td>
<td>0</td>
</tr>
<tr>
<td>2–3 days/week</td>
<td>3 (3)</td>
</tr>
<tr>
<td>1/week</td>
<td>4 (4)</td>
</tr>
<tr>
<td>&lt;1/week</td>
<td>18 (18)</td>
</tr>
</tbody>
</table>
reported sustaining a stroke/TIA while on warfarin. Six of these 10 participants did not report blood loss in stool or urine or a blood transfusion not related to a surgical procedure or accident and were believed to be ischemic (normal, high or unreported INR).

Among the 4 participants who sustained stroke/TIA while on warfarin and reported blood loss in stool or urine or a blood transfusion not related to a surgical procedure or an accident, 1 patient was believed to be ischemic (low INR), 2 were believed to be hemorrhagic (high INR), and 1 was classified as unknown etiology (unreported INR).

The survey was completed for all patients. Regarding general warfarin knowledge, the majority of patients (78%) understood what a therapeutic INR level was [2, 14]. Seventy-six percent of patients could recall their last or current INR level. All patients knew that they were using the medication.

**Compliance**

The vast majority (95%) reported using warfarin as directed by their physicians. Twenty-four patients reported skipping a dose in the past year. Two patients had not refilled their warfarin prescription, and 1 reported missing INR checks due to cost concerns.

**Drug Interactions**

Of the patients, 72% were aware that medications interact with warfarin, and 54% asked a pharmacist about interactions before taking the medication. Regarding over-the-counter medications, 62% asked a physician about potential interactions with pain medications, and 33% asked about stomach remedy interactions.

**Herbal or Vitamin Interactions**

One third of the patients (35%) were aware that vitamins interact with warfarin. Some patients were aware of a potential interaction with herbal supplements (48%), and 44% of patients review a supplement ingredient label to understand the product fully before use.

**Diet**

Only 68% of patients knew that dietary changes impact warfarin anticoagulation. Similarly, 9% of patients reported that vitamin K is not received from food sources, and another 8% were unsure of sources of vitamin K. Fifty-nine percent of patients knew that grapefruit interacted with warfarin. The patients were asked about the relative vitamin K content of 25 common foods. The vitamin K content of foods was broken down into four categories: (1) 0–9; (2) 10–29; (3) 30–89, and (4) 90–1,200 μg. Many patients refused to complete some or all of these questions, citing lack of knowledge. A blank response was considered incorrect. The highest score was 67% (n = 2) and the lowest score was 0% (n = 24). The highest percentage of correct answers for a single food item was 50%, and the lowest percentage for a single food item was 5%. Another study found that the weakest area of knowledge relating to anticoagulation control regarded the vitamin K content of foods [15].

The average score for the questionnaire, or the percentage of questions answered correctly, for the total population (n = 100) by category was 64% (general knowledge), 71% (compliance), 17% (drug interactions), 7% (herbal or vitamin interactions), and 23% (diet). When combining all categories (general knowledge, compliance, drug interactions, herbal or vitamin interactions, and diet) for the total population, the average percentage of correct responses was 36%. The average score on the specific knowledge questions (drug, herbal or vitamin, and diet) for the total population was 16%.

We sought to understand how education level influences survey scores favorably or unfavorably. There were no significant differences between the groups in any category with respect to the baseline maximum education level achieved. Next, we examined if duration of warfarin use may impact knowledge. This finding is corroborated by Davis et al. [11]. Similar to education, duration of therapy did not significantly influence the scores between groups. The results are shown in figure 1. Finally, we examined knowledge based upon CHADS2 risk scores. The results are shown in figure 2. Patients with higher CHADS2 scores, who are at greater risk of thromboembolism, tended to score at or below the mean in all but one category: diet. In order to determine how age influenced knowledge, we examined knowledge based upon age <75 versus >75 years. There were no significant differences between the groups.

**Discussion**

A major finding identified in this study was that those at highest risk for thromboembolism displayed at best an average, and often a lower, level of drug knowledge. The data analyzed included CHADS2 scores, which are based on validated risk factors for both stroke and death in patients with AF [13, 16, 17]. The CHADS2 score has been used as a standard by practitioners to determine the need for anticoagulation in patients with AF [18]. Patients with
CHADS2 scores of 3–5 displayed less basic knowledge of warfarin compared to others. The duration of warfarin use was not associated with an increased understanding of the proper use of the medication. Drug education, if provided at all, is often delivered at the beginning of therapy. These data, at a minimum, underscore the need for knowledge surveillance in these patients, even if the patients display an initially acceptable knowledge.

Regardless of how the data were stratified, patients exhibited very little or no knowledge relating to diet, or drug-drug or drug-supplement interactions. These data likely explain part of the variability in the effectiveness of warfarin therapy and highlight the need for innovative education approaches. In addition, such factors can be positively influenced through intervention and education, improving patient outcomes [6, 7, 19, 20].

Regarding nutrition, weekly differences in dietary intake of vitamin K are known to alter the stability of anticoagulation control with warfarin [21–23]. Even relatively small increases in vitamin K intake (150 μg/day in vitamin K-replete patients or 25 μg/day in vitamin K-depleted patients) will lower the INR [21, 22]. A prospective study of 43 anticoagulated patients found that changes in vitamin K intake and variability in INR correlated and that a weekly change of 714 μg of vitamin K would alter the INR by 1 unit [24]. These data highlight the sensitivity of the therapeutic window of warfarin anticoagulation to alterations in diet. Although patients are warned about leafy vegetables that can contain very high levels of vitamin K (one half cup of frozen spinach contains >500 μg of vitamin K), other items are less commonly known to interact with warfarin, such as herbal supplements and multivitamins [25].

In our study, 68% of the participants were unaware that their diet could alter the effectiveness of their warfarin therapy. Seventeen percent of participants did not know that vitamin K is present in various foods, and 27% were unable to accurately interpret a nutrition fact label. While other participants were generally aware of the presence of vitamin K in foods and could accurately interpret a nutrition fact label, the average score on the food-specific questions was 23%. This lack of knowledge may have led to many patients answering the food-specific questions incorrectly or simply declining to answer them. These data demonstrate the general ineffectiveness of commonly used education techniques regarding the impact of diet on warfarin therapy.

Similarly, many drugs and herbal products interact with the metabolism of warfarin. These drugs can lead to under- or overcoagulation by causing INR-independent changes, such as altered platelet function or gastrointestinal bleeding. Interactions between warfarin and other medications or herbal products are a widespread problem in clinical practice. In one study, nearly one third of patients taking warfarin had also been prescribed a medication known to adversely interact with warfarin [25]. Compounding the problem of drug-drug interactions is the frequent self-administration of vitamins and herbal and nonherbal supplements. It is estimated that 20% of
the US population uses supplemental products [26]. These reports illustrate a general lack of awareness that vitamins and supplements have pharmacologic properties, which decreases the efficacy and safety of warfarin therapy. The majority of supplements commonly used interacts with warfarin and often increases bleeding risk [27]. In questions regarding vitamins and supplements, only a minority felt that they interacted with warfarin. As the use and variety of supplements are projected to increase, it is very important that patients’ and physicians’ understanding increase to avoid significant drug-supplement/vitamin interactions.

Compliance to medications of any type is essential to receive the study-validated benefits. In a prior study of elderly patients, noncompliance to warfarin was estimated at 21%. Patients sampled missed pills more often than they took too many [28]. Another finding in the same study was that patients often perceived that they were more compliant than they actually were. Since our study was comprised of a subjective personal analysis, no comparison of actual compliance to perceived compliance could be made. However, 24% did admit to missing doses. We did not observe a tendency to ‘make up’ a missed dose by taking two or more pills on a subsequent day.

**Alternative Therapies to Warfarin**

Long-term warfarin therapy is challenging in many clinical aspects, some of which are highlighted in this study. For these reasons, a number of alternative therapies have emerged that may eventually replace warfarin. For example, many factor Xa inhibitors and oral direct thrombin inhibitors are currently being evaluated for their safety and efficacy compared to warfarin. Of these, dabigatran has shown promise as an alternative therapy that may have a superior safety and efficacy profile [29]. This drug was studied in the RE-LY (Randomized Evaluation of Long-Term Anticoagulation Therapy) Trial, which evaluated the efficacy and safety of dabigatran (at two doses) relative to warfarin. The RE-LY trial was the first to demonstrate that dabigatran may be superior to adjusted-dose warfarin [29].

In addition, nonpharmacologic therapies may also become more significant in the management of these patients. The WATCHMAN device was evaluated in the PROTECT AF non-inferiority trial, in which over 700 patients with non-valvular AF were randomly assigned in a 2:1 ratio to either the device or to long-term warfarin (INR 2.0–3.0). In the current study, there was a similar reduction in thromboembolism with the device cohort showing much lower rates of significant bleeds [30].

Nonetheless, these new therapies will be costly (and invasive, with respect to nonpharmacologic therapies). Such characteristics limit the immediate impact of these new therapies on the increasingly large AF population.

The authors acknowledge several limitations to this study. First, the questionnaire was not pilot tested and was created based upon current practices in warfarin education. This is the initial use of this indexed warfarin survey, which is based upon fundamental concepts of vitamin K dietary education. Validation of this questionnaire is necessary in order to strengthen the inferences drawn from the data collected [31]. Additional studies are required for validation and confirmation of this study. Also, patient responses and data were self-reported, which may introduce the possibility or error. In comparison to other disease states in the medical history (hypertension, diabetes, heart failure, and prior stroke), we found an >90% correlation with survey-reported history.

**Conclusion**

The findings of this study highlight the general knowledge deficit in the AF population regarding warfarin therapy. As described in the Discussion, the negative impact of this deficit on the effectiveness of warfarin therapy is significant and can be severe. Effective patient education has the potential to greatly reduce this knowledge deficit. We therefore conclude that educational strategies must be devised that will better target the specific knowledge deficiencies of AF patients regarding warfarin and positively influence treatment outcomes. Further, these educational resources must not be static and will need to be reused frequently throughout a patient’s warfarin therapy, be it in person or through electronic media. Such reeducation should be innovative and include a review of the basic guidelines for warfarin use and should highlight the consequences of potential interactions with over-the-counter drugs and herbal supplements. Furthermore, validation of the educational materials must occur in order to ensure positive patient outcomes [32].

**Disclosures**

Knowledge of Warfarin Safety and Efficacy in AF Patients

Appendix

Age __________

Please circle:

Gender
Male
Female

Education Level
Less than the 8th grade
8–12th grade
High-school graduate
College graduate
Advanced degree

Stroke Risk Factors
(1) High blood pressure? Yes/No
(2) Heart failure? Yes/No
(3) Age >75 years? Yes/No
(4) Diabetes? Yes/No
(5) Prior stroke or mini-stroke (TIA)? Yes/No
(6) Prior stroke or mini-stroke when on Coumadin? Yes/No
If you had a stroke on Coumadin, was your blood level:
(a) Too low
(b) Normal
(c) Too high
(d) Not sure

Other Cardiac Problems
(1) Have you had a prior heart attack? Yes/No
(2) Have you had a stent or bypass surgery? Yes/No
(3) Do you have any problems with your heart valves? Yes/No
If yes, was the problem:
(a) Narrow
(b) Leaky
(c) Not sure
(4) Have you had surgery for your heart valves? Yes/No

Please Answer the Following Questions:
(1) Have you ever experienced bleeding in your urine or stools? Yes/No
(2) Have you ever received a blood transfusion because of bleeding? Yes/No
(3) Have you fallen in the past year? Yes/No
(4) If you have fallen in the past year, how many times? __________
(5) How long have you been on Coumadin? __________
(a) Less than 1 year
(b) 1–5 years
(c) 5–10 years
(d) Greater than 10 years
(e) Not sure
(6) Do you take your Coumadin as prescribed by your doctor? Yes/No
(7) Do you ever skip your Coumadin dose? Yes/No
(8) Do you ever double up your Coumadin dose? Yes/No
(9) Do you ever not refill your Coumadin because of costs? Yes/No
(10) What is the most common reason why you may not take your Coumadin dose?
(a) Costs
(b) Forgetting
(c) Mixing up medications
(d) Lack of desire
(e) Illness
(f) None of the above
(11) Have you gained weight after starting Coumadin? Yes/No
(12) If yes, approximately how much weight have you gained? __________
(13) If yes, why do you think you gained the weight? (Circle all that apply)
(a) Changed diet and avoided vegetables
(b) Exercised less
(c) Ate more at each meal
(d) Craved new foods that were less healthy
(14) Have you lost weight after starting Coumadin? Yes/No
(15) If yes, approximately how much weight have you lost? __________
(16) If yes, why do you think you lost the weight? (Circle all that apply)
(a) Changed diet and avoided many foods
(b) Illness
(c) Ate less at each meal
(d) Stopped drinking alcohol
(17) What is considered a normal INR (blood Coumadin level)?
(a) Less than 1
(b) 2–3
(c) 4–5
(d) Greater than 5
(e) Not sure
(18) Do you know what your current INR (blood Coumadin level) is? Yes/No
(19) Approximately how often do you get your INR (blood Coumadin level) checked?
(a) Once a week
(b) Twice a month
(c) Once a month
(d) Twice a year
(e) Once a year
(f) Never
(20) Do you ever not get your INR (blood Coumadin level) checked because of costs? Yes/No
(21) Are you aware that your other medications can interact with Coumadin? Yes/No
(22) Do you ask your pharmacist before starting a new medication if it interacts with Coumadin? Yes/No
(23) Do you ever take over-the-counter pain medications? Yes/No
(24) If yes, which ones? (Circle all that apply)
Excedrin®, Tylenol® (acetaminophen) Aleve® (naproxen)
Advil® (ibuprofen) Motrin® (ibuprofen) Aspirin
(25) Do you ask your doctor before using over-the-counter pain medications? Yes/No
(26) Do you ever take over-the-counter stomach remedies? Yes/No
(27) If yes, which ones? (Circle all that apply)
Tagamet HB® (cimetidine) Pepto Bismol® (bismuth subsalicylate)
Laxatives Stool softeners Alka-Seltzer®
(28) Do you ask your doctor before using over-the-counter stomach remedies? Yes/No
(29) Do you take vitamin supplements? Yes/No
(30) If yes, which ones? (Circle all that apply)
Multivitamin (dose: ) Vitamin A (dose: )
Vitamin E (dose: ) Vitamin D (dose: )
Vitamin C (dose: )
(31) Are you aware that vitamin supplements can interact with Coumadin? Yes/No
(32) Do you take any herbal or natural medications or supplements? Yes/No
(33) Do you think getting enough vitamin K is important?
(a) Yes
(b) No
(c) Not sure
(34) What do you think vitamin K does for us? (Circle all that apply)
(a) Improves eye sight
(b) Strengthens bones
(c) Improves the texture and softness of skin
(d) Helps to form clots
(e) It is an anti-oxidant to help the body
(35) Do you take any herbal or natural medications or supplements? Yes/No
(36) If yes, which ones? (Circle all that apply)
- Garlic
- Ginger
- Glucosamine
- Ginkgo biloba
- Coenzyme Q10
- Green tea
- St. John’s wort
- Flaxseed
- Melatonin
- Papaya extract
- Ginseng
- Soy protein products
- Fish oil supplements that contain EPA or DHA

(37) Are you aware that natural medications or supplements can interact with Coumadin? Yes/No

(38) Do you ask your doctor before using a natural medication or supplement if it interacts with Coumadin? Yes/No

(39) Do you know how to interpret a supplement fact label on natural medications or supplements? Yes/No

(40) How often do you drink alcoholic beverages?
- (a) Every day
- (b) 4–6 days a week
- (c) 2–3 days a week
- (d) Once a week
- (e) 2–3 times a month
- (d) Once a month
- (e) Less than once a month
- (f) Never

(41) How often do you use tobacco products?
- (a) Every day
- (b) 4–6 days a week
- (c) 2–3 days a week
- (d) Once a week
- (e) 2–3 times a month
- (d) Once a month
- (e) Less than once a month
- (f) Never

(42) Can changing your diet change your Coumadin dose?
- (a) Yes
- (b) No
- (c) Not sure

(43) How often do you drink grapefruit juice or eat grapefruit?
- (a) Every day
- (b) 4–6 days a week
- (c) 2–3 days a week
- (d) Once a week
- (e) 2–3 times a month
- (d) Once a month
- (e) Less than once a month
- (f) Never

(44) Are you aware that grapefruit and grapefruit juice interact with Coumadin?
- (a) Yes
- (b) No
- (c) Not sure

(45) Are you aware that you get vitamin K from the foods you eat?
- (a) Yes
- (b) No
- (c) Not sure

(46) How much vitamin K (in μg) do the following foods contain? Please circle the amount:
- Canned tuna in oil (3 oz)
- 0–9 10–29 30–89 90–1,200
- Iceberg lettuce (1 cup)
- 0–9 10–29 30–89 90–1,200
- Cooked spinach (1 cup)
- 0–9 10–29 30–89 90–1,200
- Coleslaw (3/4 cup)
- 0–9 10–29 30–89 90–1,200
- Red grapes (1 cup)
- 0–9 10–29 30–89 90–1,200
- Green leaf lettuce (1 cup)
- 0–9 10–29 30–89 90–1,200
- Walnuts (14 halves)
- 0–9 10–29 30–89 90–1,200
- Grapefruit juice (1 cup)
- 0–9 10–29 30–89 90–1,200
- Red wine (3.5 fl oz)
- 0–9 10–29 30–89 90–1,200
- Olive oil (1 tablespoon)
- 0–9 10–29 30–89 90–1,200
- Cooked asparagus (4 spears)
- 0–9 10–29 30–89 90–1,200
- Raw celery (1 stalk)
- 0–9 10–29 30–89 90–1,200
- Vanilla ice cream (1/2 cup)
- 0–9 10–29 30–89 90–1,200
- Avocado (3 oz)
- 0–9 10–29 30–89 90–1,200
- 75% lean ground beef (3 oz)
- 0–9 10–29 30–89 90–1,200
- Roasted chicken (1 drumstick)
- 0–9 10–29 30–89 90–1,200
- Raw pineapple (1/2 fillet)
- 0–9 10–29 30–89 90–1,200
- Swiss cheese (1 oz)
- 0–9 10–29 30–89 90–1,200
- 2% milk (1 cup)
- 0–9 10–29 30–89 90–1,200
- Hard-boiled egg (1 large)
- 0–9 10–29 30–89 90–1,200
- Chunky peanut butter (1 tablespoon)
- 0–9 10–29 30–89 90–1,200

(47) Do you know how to interpret a nutrition fact label on food products? Yes/No

(48) How many meals do you eat each day?
- (a) One
- (b) Two
- (c) Three
- (d) Four
- (e) Five
- (f) Less than one
- (g) More than 5

(49) How many meals do you eat each day with vitamin K?
- (a) One
- (b) Two
- (c) Three
- (d) Four
- (e) Five
- (f) Less than one
- (g) More than 5
- (h) Not sure

(50) Is it important to watch how much vitamin K you get each day when you are on Coumadin?
- (a) Yes
- (b) No
- (c) Not sure

(51) Do you believe that taking Coumadin negatively influences your quality of life? Yes/No

(52) If yes, why do you think Coumadin negatively influences your quality of life? (Circle all that apply)
- (a) Frequent blood draws
- (b) Don’t get to eat your favorite foods
- (c) Diet is too restrictive
- (d) No longer drink alcohol or only occasionally
- (e) Worry about bleeding
- (f) Feel unwell or experience side effects of medication

Cooked broccoli (1 cup) 0–9 10–29 30–89 90–1,200
Vegetable oil (1 tablespoon) 0–9 10–29 30–89 90–1,200
Canned tuna in oil (3 oz) 0–9 10–29 30–89 90–1,200
Iceberg lettuce (1 cup) 0–9 10–29 30–89 90–1,200
Cooked spinach (1 cup) 0–9 10–29 30–89 90–1,200
Coleslaw (3/4 cup) 0–9 10–29 30–89 90–1,200
Red grapes (1 cup) 0–9 10–29 30–89 90–1,200
Green leaf lettuce (1 cup) 0–9 10–29 30–89 90–1,200
Walnuts (14 halves) 0–9 10–29 30–89 90–1,200
Grapefruit juice (1 cup) 0–9 10–29 30–89 90–1,200
Red wine (3.5 fl oz) 0–9 10–29 30–89 90–1,200
Olive oil (1 tablespoon) 0–9 10–29 30–89 90–1,200
Cooked asparagus (4 spears) 0–9 10–29 30–89 90–1,200
Raw celery (1 stalk) 0–9 10–29 30–89 90–1,200
Vanilla ice cream (1/2 cup) 0–9 10–29 30–89 90–1,200
Avocado (3 oz) 0–9 10–29 30–89 90–1,200
75% lean ground beef (3 oz) 0–9 10–29 30–89 90–1,200
Roasted chicken (1 drumstick) 0–9 10–29 30–89 90–1,200
Raw pineapple (1/2 fillet) 0–9 10–29 30–89 90–1,200
Swiss cheese (1 oz) 0–9 10–29 30–89 90–1,200
2% milk (1 cup) 0–9 10–29 30–89 90–1,200
Hard-boiled egg (1 large) 0–9 10–29 30–89 90–1,200
Chunky peanut butter (1 tablespoon) 0–9 10–29 30–89 90–1,200
References


Knowledge of Warfarin Safety and Efficacy in AF Patients

Cardiology 2010;116:61–69 69