



Regular Article

Knowledge, satisfaction, and concerns regarding warfarin therapy and their association with warfarin adherence and anticoagulation control



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ABSTRACT

Introduction: A better understanding of patients' knowledge, satisfaction and concerns can identify deficits and help develop targeted patient education. This study aimed to examine patients' knowledge, satisfaction and concerns regarding warfarin therapy and assess their association with warfarin adherence and international normalized ratio (INR) control.

Materials and methods: A cross-sectional survey was conducted in a convenience sample of patients taking warfarin in an anticoagulation clinic. The questionnaire consisted of questions on patients' knowledge, satisfaction and concerns regarding warfarin treatment. Patients' warfarin refill records and time within the therapeutic INR range were retrieved from hospital databases.

Results: One hundred and eighty-three patients participated in the survey. Patients had inadequate knowledge of warfarin–diet and warfarin–drug interactions. Over 40% of the respondents were not satisfied with the waiting time to see a pharmacist. The most common concerns of taking warfarin were worries about warfarin–drug interactions (36.1%), forgetting to take warfarin (26.2%) and worries about side effects (25.7%). Higher satisfaction was associated with better knowledge ($r = 0.24$, $p = 0.001$) and fewer concerns ($r_s = -0.23$, $p = 0.002$). Better knowledge and higher satisfaction were associated with higher warfarin adherence ($r_s = 0.21$ and 0.16 ; $p = 0.01$ and 0.046 , respectively). Better knowledge, higher satisfaction, fewer concerns, and better warfarin adherence were associated with good INR control ($p = 0.003$, 0.02 , 0.03 and 0.003 , respectively).

Conclusions: This study highlighted patients' concerns and deficits in knowledge regarding warfarin treatment, and also demonstrated their association with warfarin adherence and INR control.

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Introduction

Warfarin has been the most commonly used oral anticoagulant to prevent thromboembolism in the past few decades [1]. It increases the international normalized ratio (INR) values to the therapeutic range in patients at risk of thromboembolism [1]. However, the drug's narrow therapeutic range and considerable variability in inter-individual responses may lead to the occurrences of out-of-range INRs [1]. Studies have shown that subtherapeutic and supratherapeutic INR values are associated with a higher risk of thromboembolism and hemorrhage, respectively [2–4]. Therefore, it is important to adhere to warfarin treatment as prescribed and keep INRs within the therapeutic range.

A number of factors may affect INR control in patients taking warfarin. Some factors are inherent, such as genetic variants that can lead to variability in inter-individual warfarin doses and difficulty achieving better INR control [5]. However, other factors that facilitate good INR control are acquired and can be controlled via patients' behavior. For

example, studies have shown that patients with better knowledge and higher medication adherence to warfarin therapy are more likely to have good INR control [6,7]. As such, it is important to assess and identify the deficits in patients' knowledge as well as their satisfaction with and concerns of warfarin therapy, all of which may lead to poor warfarin adherence and INR control. With a better understanding of the gaps and needs, targeted interventions can be developed and incorporated into patient education and clinical practice.

The aims of this study were two-fold: 1) to identify deficits in patients' knowledge as well as their satisfaction with and concerns of warfarin therapy, and 2) to assess these results' association with warfarin adherence and INR control in a multi-ethnic Asian population.

Methods

Patient Recruitment and Data Collection

A cross-sectional survey was conducted in a convenience sample of patients taking warfarin in an anticoagulation clinic (ACC) of the Singapore General Hospital from November, 2012, to April, 2013. The target sample size was 180 in order to have a power of 0.8 to detect a

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small correlation ($r = 0.25$) between patients' knowledge of warfarin therapy and INR control at the 5% significance level, assuming 30% incomplete responses. To be eligible, participants had to be age 21 or older, taking warfarin and able to comprehend English or Chinese. Participants who consented to participate were interviewed face-to-face in English or Chinese, depending on their language preference. Prior to survey administration, two interviewers were trained in order to standardize the administration process. The study was approved by the Singhealth Institution Review Board.

Patients' warfarin refill records for the past three months prior to survey administration were retrieved from the hospital electronic databases in order to calculate the warfarin refill adherence, which was equal to the total days of supply divided by the number of evaluated days during the observation period, multiplied by 100 [8]. In addition, patients' time in the therapeutic INR range (TTR) in the past three months were also retrieved from the same databases. Patients with a TTR of 90% or higher were classified as having good INR control.

Survey Questionnaire

The survey questionnaire was developed based on literature review [7,9–31], patient educational materials provided by the ACC and expert opinions. The questionnaire was composed of four parts, including patients' socio-demographic and warfarin-related clinical characteristics (e.g., duration of taking warfarin), knowledge of warfarin treatment, satisfaction with services and warfarin treatment provided by the ACC, and concerns of warfarin therapy. The two language versions of the questionnaire were evaluated by a panel of multi-disciplinary and bilingual clinical experts (i.e., a researcher with a Ph.D. degree in pharmacy, two physicians with master's degrees in medicine, a clinical pharmacist with a master's degree in pharmacy and a Ph.D. candidate in pharmacy) to ensure local adaptation and equivalence in terms of content, wording and cognitive levels. Both language versions were pilot-tested in a group of patients ($n = 16$) prior to the survey to ensure the questions' clarity and readability.

The knowledge questions consisted of four domains, including warfarin administration (e.g., color of warfarin tablets), warfarin-drug interactions (e.g., interaction between warfarin and aspirin), warfarin-diet interactions (e.g., interaction between warfarin and soybean products) and adverse effects (e.g., symptoms of warfarin-induced hemorrhage). Each domain consisted of two to four questions, giving a total of eleven questions. Each question had five options, only one of which was correct. A score of "1" was assigned to each correctly chosen option, giving a total knowledge score that ranged from 0 to 11, with a higher score indicating better knowledge.

The satisfaction scale included seven positive statements about the services and warfarin treatment provided by the ACC with Likert-type responses, and each response was assigned a score based on level of satisfaction (i.e., "strongly agree" = 4, "agree" = 3, "neutral" = 2, "disagree" = 1 and "strongly disagree" = 0). Therefore, the total scores of the seven statements ranged from 0 to 28, with a higher score indicating a higher level of satisfaction.

The questionnaire also assessed patient-perceived concerns of warfarin therapy. Ten potential concerns were listed, including warfarin-drug interactions, forgetting to take warfarin, side effects of warfarin, frequency of hospital visits, warfarin-diet interactions, restrictions on usual activities, impact on work, not believing that warfarin is helpful and difficulty following warfarin instructions. Each concern was given a score of "1". Patients were asked to tick all concerns they experienced. The total score ranged from 0 to 10, with a higher score indicating more concerns.

Statistical Analysis

Descriptive statistics were used to describe patients' characteristics along with their knowledge, satisfaction and concern scores. Pearson's

Chi-Square test and independent-samples t-test were used where appropriate to compare socio-demographic and clinical characteristics between respondents and non-respondents. Independent-samples t-test and Mann Whitney U test were used where appropriate to compare the difference in knowledge, satisfaction, and concern scores between patients with and those without good INR control. Correlations between knowledge and satisfaction scores were examined using Pearson's correlation analysis. Spearman's correlation analysis was used to examine 1) the correlations of concern scores with knowledge and satisfaction scores, and 2) the correlations of warfarin refill adherence with knowledge, satisfaction and concern scores. All analyses were performed using SPSS version 21.0. The level of significance was set at probability (p) < 0.05.

Results

Patient Characteristics

Among the 258 patients approached, 183 agreed to participate in the survey, giving a response rate of 70.9%. Patients' characteristics are shown in Table 1. Respondents were evenly distributed between the two genders (49.2% male) and the two language versions (54.6% English) and had a mean \pm SD age of 56.1 ± 13.0 years and mean \pm SD warfarin refill adherence of $92.0 \pm 16.8\%$. A majority of respondents had TTR of less than 90% (61.2%). Non-respondents were older ($p = 0.002$) and more likely to speak Chinese ($p = 0.02$).

Survey Outcomes

The mean \pm SD knowledge score was 6.6 ± 2.3 . More elderly patients ($r = -0.47$, $p < 0.001$) and those with lower education ($p < 0.001$) were more likely to have poor knowledge regarding warfarin treatment. A number of patients (16.9%) gave wrong answers to

Table 1
Socio-demographic and Clinical Characteristics.

Characteristics	Respondents (n = 183) n (%) ^a	Non-respondents (n = 75)	P value
Gender			0.68
Male	90 (49.2)	39 (52.0)	
Female	93 (50.8)	36 (48.0)	
Ethnicity			0.50
Chinese	128 (69.9)	58 (77.3)	
Malay	32 (17.5)	9 (12.0)	
Indian	13 (7.1)	6 (8.0)	
Others	10 (5.5)	2 (2.7)	
Language			0.02
English	100 (54.6)	29 (38.7)	
Chinese	83 (45.4)	46 (61.3)	
Educational level			NA
No school or primary	61 (33.3)	NA	
Secondary	66 (36.1)	NA	
Post-secondary	55 (30.1)	NA	
Marital status			NA
Married	129 (70.5)	NA	
Not married	54 (29.5)	NA	
Indication for warfarin			0.14
AF	22 (12.0)	16 (21.3)	
DVT	94 (51.4)	32 (42.7)	
Others	64 (35.0)	26 (34.7)	
TTR in the past 3 months			0.10
<90 (%)	112 (61.2)	54 (72.0)	
≥90 (%)	68 (37.2)	20 (26.7)	
	mean \pm SD		
Age (years)	56.1 \pm 13.0	61.7 \pm 12.8	0.002
Duration for taking warfarin (years)	7.4 \pm 7.5	NA	NA

AF = atrial fibrillation, DVT = deep vein thrombosis, NA = not available, TTR = time in the therapeutic range. ^a Percentage may not add up to 100% due to missing values.

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