

# Knowledge Gained Through Implementation of an Educational Programme Can Help Control Warfarin Therapy

**Mohammed Khalid Hussien<sup>1</sup>, Adam Ahmed Adam<sup>2, \*</sup>**

<sup>1</sup>Nursing Department, Alghad Colleges for Applied Medical Sciences, Najran, Kingdom of Saudi Arabia

<sup>2</sup>Microbiology Department, Faculty of Medicine, Alneelain University, Khartoum, Sudan

## Abstract

**Background:** Intravascular clotting and low viscosity of the blood are two extremes of blood pathology that can result in serious consequences threatening the patient's life. Medical conditions that trigger blood clotting need to be dealt with so as not to end into the serious complication of this disorder. Replaced heart valve is a treatment that activates the coagulation pathway. Anticoagulation therapy becomes a necessity in these patients. In spite of the beneficial effect of warfarin as a blood anticoagulant drug, high anticoagulation may lead to bleeding and low anticoagulation may lead to thrombosis in these patients. Therefore, the drug must be kept under tight control because it has a narrow therapeutic range. The successful management policy of a patient on anticoagulation therapy is essentially a team work including the combined activities of the medical personnel in charge and the patient him/herself. The patient can be involved through education by implementing a structured educational programme for the purpose. **Aim:** The aim of this study was to evaluate the impact of a structured educational programme on the knowledge of patients with replaced heart valves on long term warfarin anticoagulation therapy. **Methods:** The study was conducted in Ahmed Gasim Cardiac Centre in Khartoum North in Sudan. The participants were patients with replaced heart valves on warfarin anticoagulation therapy. Six hundred patients of the hospital attendants were eligible for enrollment but the 240 of them were included in the study by the non-probability convenience sampling. The participants' knowledge about different aspects of warfarin as an anticoagulant was assessed before and after implementation of a structured education programme about warfarin anticoagulation therapy. **Results:** The participants' knowledge improved significantly after implementation of the structured educational programme about the time of warfarin dose, and what to do if a dose is missed. Also their knowledge improved significantly about the diet and drugs that interact with warfarin, warfarin storage at home, keeping an identifying card about warfarin and physician notification if the patient is undergoing surgery. **Conclusion** The structured educational programme had a statistically significant positive impact on the participants' the essential knowledge about warfarin anticoagulation therapy. Construction and implementation of such is advised to be part and parcel of the anticoagulation management package with warfarin.

## Keywords

Warfarin, Educational Programme, Ahmed Gasim

Received: May 23, 2017 / Accepted: August 3, 2017 / Published online: October 17, 2017

© 2017 The Authors. Published by American Institute of Science. This Open Access article is under the CC BY license.

<http://creativecommons.org/licenses/by/4.0/>

---

## 1. Introduction

The normal blood haemeostasis is kept at a balance between

bleeding and coagulation and any derangement can to disastrous consequences [1]. This balance is affected by factors operating in one or both of the extrinsic or intrinsic

---

\* Corresponding author

E-mail address: [abo.khalid200@hotmail.com](mailto:abo.khalid200@hotmail.com) (M. K. Hussien), [aaamzo.adam@gmail.com](mailto:aaamzo.adam@gmail.com) (A. A. Adam)

clotting pathways. Heart valve replacement surgery and the resulting replaced heart valve activate the extrinsic pathway of the clotting system and anticoagulation therapy becomes a necessity [2]. Many blood anticoagulant drugs are used and warfarin one of them that remains in common use for a long time with an advantage of being oral administration [3], [4]. Warfarin has a narrow therapeutic range and bleeding or thrombosis is an easily reached complication [5]. Therefore, the drug has to be under tight control and all people involved in management of the patient will be more beneficial if they have the required knowledge about the drug and its implications. The involvement of the patient as a stakeholder in his/her management is not a redundancy. The patient can be involved through education about the drug by implementing a well-designed structured educational

programme to serve the purpose. Such an educational programme provides the patient with the required knowledge that can change his/her attitude towards the betterment of treatment outcome. The improved patient's knowledge help control warfarin anticoagulation, reflected as absence of complications and within normal readings of the international normalized ratio (INR). The educational programme in this study aimed at educating the patients with replaced heart valves on long term warfarin anticoagulation by equipping them with the required knowledge that enables them to reap the full benefits of warfarin management.

In this educational programme, different components of the knowledge domain were addressed and educated to the participants in a simplified understandable way.

## 2. Results

**Table 1.** Showing the Participants' Response in pre and post tests about the regularity on warfarin medication

Why you did not take your warfarin therapy regularly?		Pre and Post test results		Total
		Pre	Post	
No body to bring the tabs to me in exact time	Count	10	7	17
	% within pre and post	8.0%	5.6%	13.6%
Sometimes no pharmacy near my home	Count	34	19	53
	% within pre and post	27.2%	15.2%	42.4%
Sometimes no money with me	Count	43	17	60
	% within pre and post	34.4%	13.6%	48.0%
Sometimes the exact dose not available with me	Count	37	77	114
	% within pre and post	29.6%	61.6%	91.2%
1,2	Count	0	1	1
	% within pre and post	0.0%	0.8%	0.8%
1,3	Count	1	0	1
	% within pre and post	0.8%	0.0%	0.8%
2,3	Count	0	1	1
	% within pre and post	0.0%	0.8%	0.8%
2,4	Count	0	2	2
	% within pre and post	0.0%	1.6%	1.6%
3,4	Count	0	1	1
	% within pre and post	0.0%	0.8%	0.8%
Total	Count	125	125	250
	% within pre and post	100.0%	100.0%	200.0%

The participants' knowledge about the regularity on warfarin medication (Table 1) improved significantly after the implementation of the educational programme (P-value = 0.000).

**Table 2.** Showing the Participants' Response in pre and post tests about storage of warfarin tablets at home

Where you keep your warfarin tabs in the home		Pre and Post test results		Total
		Pre	Post	
In the refrigerator	Count	19	5	24
	% within pre and post	15.2%	4.0%	19.2%
In the room away from sun light	Count	85	108	193
	% within pre and post	68.0%	86.4%	154.4%
In my pocket	Count	1	0	1
	% within pre and post	0.8%	0.0%	0.8%
Anywhere in the home	Count	17	12	29
	% within pre and post	13.6%	9.6%	23.2%
1,2	Count	1	0	1
	% within pre and post	0.8%	0.0%	0.8%
1,3	Count	1	0	1
	% within pre and post	0.8%	0.0%	0.8%

Where you keep your warfarin tabs in the home		Pre and Post test results		Total
		Pre	Post	
2,3	Count	1	0	1
	% within pre and post	0.8%	0.0%	0.8%
Total	Count	125	125	250
	% within pre and post	100.0%	100.0%	200.0%

The participants' knowledge about the about storage of warfarin tablets at home (Table 2) improved significantly after the implementation of the educational programme (P-value = 0.015).

**Table 3.** Showing the Participants' Response in pre and post tests about taking warfarin identifying card with the participant regularity.

Do you always take your warfarin therapy card with you?		Pre and Post test results		Total
		Pre	Post	
Always the card with me	Count	74	116	190
	% within pre and post	59.2%	92.8%	152.0%
No I'm not taking my card	Count	7	1	8
	% within pre and post	5.6%	0.8%	6.4%
Sometimes	Count	39	8	47
	% within pre and post	31.2%	6.4%	37.6%
I didn't have a card	Count	5	0	5
	% within pre and post	4.0%	0.0%	4.0%
Total	Count	125	125	250
	% within pre and post	100.0%	100.0%	200.0%

The participants' knowledge about the about taking warfarin identifying card with him/her regularity (Table 3) improved significantly after the implementation of the educational programme (P-value = 0.000).

**Table 4.** Showing the Participants' Response in pre and post tests about the fruits and vegetables which can affect the result of INR.

Do you know the fruits and vegetables which can affect the result of (INR?)		Pre and Post test results		Total
		Pre	Post	
Vegetables and fruits which content Iron	Count	21	11	32
	% within pre and post	16.8%	8.8%	25.6%
Vegetables and fruits which content Calcium	Count	11	11	22
	% within pre and post	8.8%	8.8%	17.6%
Vegetables and fruits which content Potassium	Count	6	13	19
	% within pre and post	4.8%	10.4%	15.2%
No vegetables or fruits can affect (INR) result	Count	15	6	21
	% within pre and post	12.0%	4.8%	16.8%
1,2,3	Count	72	84	156
	% within pre and post	57.6%	67.2%	124.8%
Total	Count	125	125	250
	% within pre and post	100.0%	100.0%	200.0%

The participants' knowledge about the about taking warfarin identifying card with him/her regularity (Table 4) improved significantly after the implementation of the educational programme (P-value = 0.033).

**Table 5.** Showing the Participants' Response in pre and post tests about missing warfarin dose.

When you forget to take your warfarin dose during the day. What do you do?		Pre and Post test results		Total
		Pre	Post	
I take it when I remember	Count	52	73	125
	% within Pre and Post	41.6%	58.4%	100.0%
I take two doses tomorrow	Count	10	4	14
	% within Pre and Post	8.0%	3.2%	11.2%
I take only the prescribed dose tomorrow	Count	51	13	64
	% within Pre and Post	40.8%	10.4%	51.2%
I contact my doctor immediately	Count	11	6	17
	% within Pre and Post	8.8%	4.8%	13.6%
1,4	Count	1	29	30
	% within Pre and Post	0.8%	23.2%	24.0%
Total	Count	125	125	250
	% within Pre and Post	100.0%	100.0%	200.0%

The participants' knowledge about missing warfarin dose (Table 4) improved significantly after the implementation of the educational programme (P-value = 0.000).

**Table 6.** Showing the Participants' Response in pre and post tests about informing the surgeon in case he/she is undergoing surgery

When you do any surgery not by your treating doctor what do you tell him		Pre & Post		Total
		Pre	Post	
I consult my treating doctor first	Count	62	111	173
	% within Pre and Post	49.6%	88.8%	138.4%
I inform this doctor I am using warfarin therapy	Count	42	1	43
	% within Pre and Post	33.6%	0.8%	34.4%
I show the doctor my warfarin therapy card	Count	21	2	23
	% within Pre and Post	16.8%	1.6%	18.4%
Does not inform any one	Count	0	1	1
	% within Pre and Post	0.0%	0.8%	0.8%
1,2	Count	0	3	3
	% within Pre and Post	0.0%	2.4%	2.4%
1,3	Count	0	2	2
	% within Pre and Post	0.0%	1.6%	1.6%
2,3	Count	0	1	1
	% within Pre and Post	0.0%	0.8%	0.8%
1,2,3	Count	0	2	2
	% within Pre and Post	0.0%	1.6%	1.6%
1,3,4	Count	0	2	2
	% within Pre & Post	0.0%	1.6%	1.6%
Total	Count	125	125	250
	% within Pre and Post	100.0%	100.0%	200.0%

The participants' knowledge about informing the surgeon in case he/she is undergoing surgery (Table 5) improved significantly after the implementation of the educational programme (P-value = 0.000).

### 3. Discussion

The knowledge of the patients about taking the prescribed dose of warfarin on time improved statistically after implementation of the educational programme ( $p=0.000$ ) (Table 1). Taking the prescribed dose of warfarin on the right is of paramount importance. The compliance with warfarin prescription enables the treating physician to undertake successful patients follow. Different studies recommended the strict adherence of the treating physicians and their anticoagulated patients to warfarin dose and dosing improved significantly the treatment outcome [6], [7]. The education programme made a significant positive change in the knowledge of the patients about the storage of warfarin at home ( $p=0.015$ ) (Table 2). The importance of the knowledge about the proper storage of warfarin cannot be overemphasized. The drug may expire by exposure to the unsuitable environmental conditions regardless of its validity by date [8]. The knowledge of the patients about the proper storage conditions of warfarin tablets that ensures an effective drug during its labeled validity. The educational programme improved significantly the participants' knowledge about the importance of taking the warfarin identifying card with them ( $p=0.000$ ) (Table 3). This step is a caution step that caters for an expected emergency condition that might happen to the patient when he/she is not with a companion. The emergency condition might not be common but if it happens and the patient is comatose or cannot give information, the identifying card can be a life saving tool.

The educational programme improved the participants' knowledge significantly about the fruits and juices that interact with warfarin ( $p=0.033$ ) (Table 4). There are many fruits and juices that interact with warfarin [9], [10]. Therefore, knowledge about these food items is essential in preventing over or under medication with warfarin which may put the patient at the risk of haemorrhage or thrombosis. The educational programme improved the participants' knowledge significantly about what to do when warfarin dose is missed ( $p=0.000$ ) (Table 5). The educational programme improved the knowledge of the patients significantly about the reasons that patients did not take their warfarin tablets regularly. The participants were equipped with right the information and obviated the reasons of non-compliance and what to do if a dose is missed. After execution of the educational programme the patients became significantly aware of the need to inform their treating physicians in case they were undergoing surgery ( $p=0.000$ ) (table 6). Patients on warfarin undergoing surgery stop the drug in the perioperative period for fear of bleeding and warfarin medication can be resumed postoperatively. Bridging with short-acting anticoagulants is not necessary [11]. Regarding the information to be provided to the patients on warfarin anticoagulation is to inform the treating surgeon that the patient is on warfarin and the rest will be cared for by him/her. Different studies that bridging reported no casualties for patients on long term warfarin therapy that were undergone surgery when they received the bridging anticoagulation regimen [12], [13], [14]. The educational

programme implemented in this study made a quantum leap in improvement of the knowledge of the participants about warfarin therapy which will be reflected on their attitude towards warfarin anticoagulation therapy.

## References

- [1] Hideo Sato, Koji Yamamoto, Akihito Kakinuma, Yoshinori Nakata and Shigehito Sawamura, Accelerated activation of the coagulation pathway during cardiopulmonary bypass in aortic replacement surgery: a prospective observational study, *J Card Surg*, 2015) 10:84 , DOI 10.1186/s13019-015-0295-9
- [2] Russo A, Grigioni F, Avierinos JF, et al. Thromboembolic complications after surgical correction of mitral regurgitation incidence, predictors, and clinical implications. *J Am Coll Cardiol* 2008; 51:1203-11.
- [3] Munir Pirmohamed, Warfarin: almost 60 years old and still causing problems, *Br J Clin Pharmacol*. 2006 Nov; 62(5): 509–511.
- [4] J P Hanley, Warfarin reversal, *J Clin Pathol*. 2004 Nov; 57(11): 1132–1139.
- [5] Boonyawat K, Caron F, Li A, Chai-Adisaksopha C, Lim W, Iorio A, Lopes RD, Garcia D, Crowther MA., Association of body weight with efficacy and safety outcomes in phase III randomized controlled trials of direct oral anticoagulants: a systematic review and meta-analysis, *J Thromb Haemost*. 2017 Apr 13 (pubmed).
- [6] Imran F. Khudair and Yolande I. Hanssens, Evaluation of patients' knowledge on warfarin in outpatient anticoagulation clinics in a teaching hospital in Qatar, *Saudi Med J* 2010; Vol. 31 (6): 672-677.
- [7] Xiaoxi Yao, Neena S. Abraham, G. Caleb Alexander, William Crown, Victor M. Montori, Lindsey R. Sangaralingham, Bernard J. Gersh, Nilay D. Shah, Peter A. Noseworthy, Major Bleeding Among Patients With Atrial Fibrillation, *J Am Heart Assoc.*, February 2016, Volume 5, Issue 2 <https://doi.org/10.1161/JAHA.115.002834>
- [8] Kathleen Holloway and Terry Green, Edelisa Carandang, Hans Hogerzeil, Richard Laing and David Lee, Drug and therapeutics committees A practical guide, WHO/EDM/PAR/2004.1
- [9] May Choi, Marcy Mintz and Duane Bates, Interaction between Warfarin and Apple Juice, *Can J Hosp Pharm*. 2016 Jan-Feb; 69 (1): 42–44. PMID: PMC4777580
- [10] Tauqeer Hussain Mallhi, Azmi Sarriff, Azreen Syazril Adnan, Yusra Habib Khan, Muhammad Imran Qadir, Azhar Amir Hamzah and Amer Hayat Khan, Effect of Fruit/Vegetable-Drug Interactions on CYP450, OATP and p-Glycoprotein: A Systematic Review, *Trop J Pharm Res*, October 2015; Available online at <http://www.tjpr.org>.
- [11] James Matthew Wight, and Malachy Oliver Columb, Perioperative bridging anticoagulation for atrial fibrillation—the first randomised controlled trial, *Perioper Med (Lond)*. 2016; 5: 14.
- [12] Sedat Belli, Huseyin Ozgur Aytac, Hakan Yabanoglu, Erdal Karagulle, Alper Parlakgumus, Tarik Zafer Nursal, and Sedat Yildirim, Results of Surgery in General Surgical Patients Receiving Warfarin: Retrospective Analysis of 61 Patients, *Int Surg*. 2015 Feb; 100(2): 225–232.
- [13] Thomas L. Ortel, Perioperative management of patients on chronic antithrombotic therapy, *Blood*. 2012 Dec 6; 120(24): 4699–4705. PMID: PMC3653565
- [14] Naamah Jacobs Weltman, Yasmeen Al-Attar, Johnson Cheung, David Philip Bruce Duncan, Ashley Katchky; Amir Azarpazhooh, Lusine Abrahamyan, Management of Dental Extractions in Patients taking Warfarin as Anticoagulant Treatment: A Systematic Review, *J Can Dent Assoc* 2015;81:f20