

Impact of an Educational Programme on Knowledge of Patients with Replaced Heart Valves on Long Term Warfarin Therapy

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Abstract

Background: Warfarin therapy poses a great challenge for the patient and the physician in striking a balance between bleeding and thrombosis when long term anticoagulation is decided. This drug has a narrow therapeutic range and bleeding or coagulation is an easily reached complication. Shared knowledge between the patient and the managing medical team can tip the balance towards a better control. Commonly the patient may not have the necessary information. This knowledge gap can be bridged by educating the patient through a well-structured educational programme. **Objective:** This study aimed to assess 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. The total number of patients attending the hospital during the study duration was 600 patients. The sample size enrolled in the study was 125 patients. The sampling method used was 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 about the indication of warfarin therapy, the drugs and diseases that affect warfarin action and compliance with the drug prescription improved significantly after implementation of the educational programme. Moreover, their knowledge about the normal results of INR, frequency of its routine measurement and signs of its abnormal results improved significantly. **Conclusion:** The educational programme had a statistically significant positive impact on the participants' knowledge about warfarin coagulation therapy. Construction and implementation of relevant educational programmes can improve the managing strategy and its outcome.

Keywords

Warfarin, Educational Programme, Ahmed Gasim

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1. Introduction

The blood homeostasis is to be kept at a balance between haemorrhage and clotting; any of them is a serious complication. This balance is affected by many factors as part of the extrinsic, intrinsic or both coagulation pathways. The replaced heart valve constitutes a triggering factor in these patients and anticoagulation becomes a necessity as a lifelong management. Warfarin is an anticoagulant drug in common use for a long time with the advantage of being

orally administered [1]. The other face of this drug is that it has a narrow therapeutic range and bleeding or coagulation is an easily reached complication [2].

Therefore, the drug has to be under tight control and all people involved in management care of the patient will be more beneficial if they have the required knowledge of the drug and its implications. In addition to healthcare personnel, the patient is a stakeholder and his/her education about the drug is part and parcel of the management. The required control can be achieved through measurement of the

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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 the required knowledge for betterment of their management outcomes and avoidance of the serious complications. The educational programme took into account the different items of the knowledge domain and improved them through implementation of a well structured educational programme.

2. Methods

The study was conducted in Ahmed Gasim Cardiac Centre in Khartoum North in Sudan. The participants were patients with replaced heart valves on long term warfarin anticoagulation therapy. The total number of the patients

attending the hospital during the study duration was 600 patients. The sample size enrolled in the study was 125 patients.

The sampling method used was 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 educational programme on warfarin anticoagulation therapy.

3. Results

The ages of the participants extended from 20 years to more than 50 years. Gender-wise, 60 (48%) of the participants were males and 65 (52%) were females.

Table 1. Showing the Participants' Response in Pre and post tests about the indication of warfarin

Indication of Warfarin Therapy		Pre and Post		Total
		Pre	Post	
To decrease blood viscosity	Count	16	15	31
	% within Pre & Post	12.8%	12.0%	24.8%
To increase valve work efficiency	Count	14	9	23
	% within Pre & Post	11.2%	7.2%	18.4%
To treat heart disease	Count	4	4	8
	% within Pre & Post	3.2%	3.2%	6.4%
I don't know	Count	5	1	6
	% within Pre & Post	4.0%	0.8%	4.8%
1,2	Count	22	28	50
	% within Pre & Post	17.6%	22.4%	40.0%
1,3	Count	3	15	18
	% within Pre & Post	2.4%	12.0%	14.4%
2,3	Count	1	7	8
	% within Pre & Post	0.8%	5.6%	6.4%
1,2,3	Count	60	46	106
	% within Pre & Post	48.0%	36.8%	84.8%
Total	Count	125	125	250
	% within Pre & Post	100.0%	100.0%	200.0%

(P-value = 0.009)

The participants' knowledge about the indication of warfarin therapy (table 1) improved significantly after the implementation of the educational programme (P-value = 0.009).

Table 2. Showing the Participants' Knowledge in Pre and post tests about the Drugs that interact with Warfarin.

Which drugs can affect (increase or decrease) the efficiency of warfarin?		Pre and Post		Total
		Pre	Post	
Antibiotics	Count	31	20	51
	% within Pre & Post	24.8%	16.0%	40.8%
Anti- malaria drugs	Count	1	2	3
	% within Pre & Post	0.8%	1.6%	2.4%
Drugs used in treatment of liver disease	Count	3	6	9
	% within Pre & Post	2.4%	4.8%	7.2%
I don't know	Count	23	11	34
	% within Pre & Post	18.4%	8.8%	27.2%
1,2	Count	25	2	27
	% within Pre & Post	20.0%	1.6%	21.6%
1,3	Count	13	62	75
	% within Pre & Post	10.4%	49.6%	60.0%

Which drugs can affect (increase or decrease) the efficiency of warfarin?		Pre and Post		Total
		Pre	Post	
1,2,3	Count	29	22	51
	% within Pre & Post	23.2%	17.6%	40.8%
Total	Count	125	125	250
	% within Pre & Post	100.0%	100.0%	200.0%

(P-value = 0.000)

The participants' knowledge about the drugs that interact with warfarin improved significantly after the implementation of the educational programme (P-value = 0.000) (Table 2).

Table 3. Showing the Participants' Response in Pre and post tests about the diseases that affect the result of INR

Do you know some diseases can affect the result of (INR)?		Pre & Post		Total
		Pre	Post	
Diabetes Miletus	Count	15	6	21
	% within Pre & Post	12.0%	4.8%	16.8%
Malaria	Count	16	5	21
	% within Pre & Post	12.8%	4.0%	16.8%
Hepatitis	Count	14	8	22
	% within Pre & Post	11.2%	6.4%	17.6%
Malignant tumors	Count	14	11	25
	% within Pre & Post	11.2%	8.8%	20.0%
1,2	Count	7	1	8
	% within Pre & Post	5.6%	0.8%	6.4%
1,3	Count	5	6	11
	% within Pre & Post	4.0%	4.8%	8.8%
1,4	Count	11	5	16
	% within Pre & Post	8.8%	4.0%	12.8%
2,3	Count	2	4	6
	% within Pre & Post	1.6%	3.2%	4.8%
2,4	Count	2	1	3
	% within Pre & Post	1.6%	0.8%	2.4%
3,4	Count	5	5	10
	% within Pre & Post	4.0%	4.0%	8.0%
1,2,3	Count	5	11	16
	% within Pre & Post	4.0%	8.8%	12.8%
1,3,4	Count	1	49	50
	% within Pre & Post	0.8%	39.2%	40.0%
2,3,4	Count	7	1	8
	% within Pre & Post	5.6%	0.8%	6.4%
1,2,3,4	Count	20	12	32
	% within Pre & Post	16.0%	9.6%	25.6%
Total	Count	124	125	249
	% within Pre & Post	99.2%	100.0%	199.2%

(P-value = 0.000)

The participants' knowledge about the diseases that affect the result of INR 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 normal range of INR

The normal range of (INR) is		Pre & Post		Total
		Pre	Post	
(2 - 3)	Count	93	117	210
	% within Pre & Post	74.4%	93.6%	168.0%
(3 - 4)	Count	27	6	33
	% within Pre & Post	21.6%	4.8%	26.4%
(1)	Count	2	2	4
	% within Pre & Post	1.6%	1.6%	3.2%
Less than (1)	Count	3	0	3
	% within Pre & Post	2.4%	0.0%	2.4%
Total	Count	125	125	250
	% within Pre & Post	100.0%	100.0%	200.0%

(P-value = 0.011)

The participants' knowledge about the normal range of INR improved significantly after the implementation of the educational programme (P-value = 0.011).

Table 5. Showing the Participants' Response in Pre and post tests about the Signs of increased INR

Which of the following are signs of increased (INR)		Pre & Post		Total
		Pre	Post	
Gum Bleeding	Count	15	16	31
	% within Pre & Post	12.0%	12.8%	
Redness in the urine	Count	4	3	7
	% within Pre & Post	3.2%	2.4%	
Headache	Count	7	5	12
	% within Pre & Post	5.6%	4.0%	
I don't know	Count	20	7	27
	% within Pre & Post	16.0%	5.6%	
1,2	Count	13	16	29
	% within Pre & Post	10.4%	12.8%	
2,3	Count	14	4	18
	% within Pre & Post	11.2%	3.2%	
1,2,3	Count	52	74	126
	% within Pre & Post	41.6%	59.2%	
Total	Count	125	125	250
	% within Pre & Post	100.0%	100.0%	

(P-value = 0.011)

The participants' knowledge about the signs of increased INR improved significantly after the implementation of the educational programme (P-value = 0.011).

Table 6. The pre and the post response relevance to *why you did not take your warfarin therapy regularly?* (P-value = 0.000*)

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

* There are significant statistical differences between the Pre and the Post response

Table 7. The pre and the post response relevance to *Where you keep your warfarin tabs in the home* (P-value = 0.015*)

Where you keep your warfarin tabs in the home		Pre & Post		Total
		Pre	Post	
In the refrigerator	Count	19	5	24
	% within Pre & Post	15.2%	4.0%	
In the room away from sun light	Count	85	108	193
	% within Pre & Post	68.0%	86.4%	
In my pocket	Count	1	0	1
	% within Pre & Post	0.8%	0.0%	
Anywhere in the home	Count	17	12	29
	% within Pre & Post	13.6%	9.6%	

1,2	Count	1	0	1
	% within Pre & Post	0.8%	0.0%	0.8%
1,3	Count	1	0	1
	% within Pre & Post	0.8%	0.0%	0.8%
2,3	Count	1	0	1
	% within Pre & Post	0.8%	0.0%	0.8%
Total	Count	125	125	250
	% within Pre & Post	100.0%	100.0%	200.0%

* There are significant statistical differences between the Pre and the Post response

Table 8. The pre and the post response relevance to *do you always take your warfarin therapy card with you?* (P-value = 0.000*)

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

* There are significant statistical differences between the Pre and the Post response

4. Discussion

The notion of patient education has changed the center of patient management from physician domination to physician-patient partnership approach [3]. The role of the patient is widely accepted as an active partner in healthcare, and not just a passive object of diagnostic testing and medical treatment. For decades, educational programmes for patients especially in chronic diseases were known to improve the management outcomes [4]. The educational programme in this study took into consideration the different knowledge domains as an attempt to improve them; a situation which was significantly fulfilled. The patients' knowledge about the indication of warfarin therapy improved significantly after implementation of the educational programme (p=0.009) (table 1). The findings in this study were consistent with different reports that stated patient's knowledge of anticoagulation therapy as an important point in achieving and maintaining optimal therapy outcome as well as reducing adverse events [5]. *Danielle et al.* also reported the importance of the patients' knowledge about the indication of warfarin therapy in patients susceptible to intravascular blood coagulation [2]. This knowledge will lead the patient to take seriously the issue of anticoagulation in his/her health condition; a situation that makes the patient comply with the medical advice of the treating physical and the accompanying healthcare personnel. The participants' knowledge about the drugs that interact with warfarin improved significantly after the implementation of the educational programme (P-value = 0.000) (Table 2). There are some drugs that can potentiate the effect of warfarin including different antibiotics such as azole

antifungals, macrolides, quinolones, Cotrimoxazole, penicillins and other drugs like phenytoin [6], [7]. Moreover, there are other drugs that can also potentiate the effect of warfarin and increase the INR result such as proton pump inhibitors exemplified by pantoprazole [8] [9]. *Teklay et al.* reported that warfarin interaction with co-prescribed drugs such as antibiotics, anticoagulant, diuretics and NSAIDs was associated with increased INR value and a consequent bleeding. This complication can be avoided if the patient is educated about taking other drugs only with medical prescription while he/she on warfarin therapy coupled with the physician knowledge about the patient warfarin medication. The participants' knowledge about the diseases that affect the result of INR improved significantly after implementation of the educational programme (P-value = 0.000) (table 3). There are some diseases like acute upper respiratory tract infection and active cancer, which can increase the risk of excessive anticoagulation even without usage of drugs for these diseases [10]. The patients on warfarin anticoagulation will benefit a lot if educated about the diseases that increase or decrease warfarin effect. Prior knowledge about such diseases enables the patient on warfarin to seek medical help promptly. The participants' knowledge about the normal range of INR improved significantly after implementation of the educational programme (P-value = 0.011) (table 4). It was reported that knowledge of the patient about the normal INR is extremely helpful since a reading outside the normal range is a sinister indicator for an imminent life threatening complication [11]. Such knowledge can be an important monitoring point for the patients who use to do INR measurement without

appointment with the treating physician. Anticoagulation with warfarin for patients with replaced hearts valves is a lifelong treatment and the patients become familiar with the drug and if they are given the right knowledge they can be helpful to themselves and to their treating healthcare personnel. The participants' knowledge about the signs of increased INR improved significantly after implementation of the educational programme (P-value = 0.011) (table 5). It was reported that knowledge of the patient about the normal INR is extremely helpful since a reading outside the normal range is a sinister indicator for an imminent life threatening complication [11]. Such knowledge can be an important monitoring point for the patients who use to do INR measurement without appointment with the treating physician. Anticoagulation with warfarin for patients with replaced hearts valves is a lifelong treatment and the patients become familiar with the drug and if they are given the right knowledge they can be helpful to themselves and their treating health personnel. Frequent monitoring of INR value is vital in predicting the treatment outcome of patients on warfarin. The patients need counseling about drug interactions and the manifestations of warfarin related bleeding complications. The educational programme designed and implemented in this study improved significantly the entire knowledge of the patients with replaced heart valves on long term warfarin management. The quantity and quality of the knowledge about warfarin is inversely proportional with the risks of the serious complications [12], [13], [14]. The success of the educational programme for patients on warfarin therapy can be a surrogate marker for the success of educational programmes on other anticoagulation therapy.

The compliance with warfarin prescription enables the treating physician to undertake a successful follow up of the patients. One study recommended the strict adherence of the treating physicians and their anticoagulated patients to warfarin dose and dosing [15]. The knowledge gap in this study can be bridged by simplifying the information and emphasizing on its importance. The educational programme improved the knowledge of the patients significantly about the reasons that patients did not take their warfarin tablets regularly (p=0.000) (Table (6)). The educational programme in this study equipped the patients with right the information and obviated the reasons of non-compliance.

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 (7)). 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 to its validity by date. The knowledge of the patients about the proper

storage conditions of warfarin tablets ensures an effective drug during its labeled validity. The educational programme improved significantly the patients' knowledge about the importance of taking the warfarin identifying card with the patient (p=0.000) (Table (8)). 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.

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