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Educational Video Intervention Effects on Periprocedural Anxiety Levels Among Cardiac Catheterization Patients: A Randomized Clinical Trial

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Purpose: To explore the effectiveness of an educational video intervention in lowering periprocedural anxiety among Jordanian patients hospitalized for cardiac catheterization (CATH). There are many potential reasons of anxiety related to CATH including involvement of the heart and the actual test procedure. Methods: A randomized controlled trial took place in a specialized heart institute in Jordan. The sample size was 186 patients who had undergone CATH procedure. Patients anxiety levels were measured by physiological parameters of anxiety (blood pressure, heart rate, and respiratory rate) and by the Spielberger State Anxiety Inventory (SAI). Results: After video education, there was a significant difference in periprocedural perceived anxiety between the groups: preprocedural anxiety levels ($M = 39.03$, $SD = 5.70$) for the experimental group versus ($M = 49.34$, $SD = 6.00$) for the control, $p < .001$, and postprocedural perceived anxiety for the experimental group ($M = 29.18$, $SD = 5.42$) versus ($M = 41.73$, $SD = 5.41$) for the control. Conclusion: Providing an educational video intervention about CATH may effectively decrease periprocedural anxiety levels.

Keywords: anxiety; cardiac catheterization; video; education; clinical trial; nursing care

Cardiovascular diseases (CVDs) are the number one causes of death and loss of quality of life globally (Chang, Peng, Wang, & Lai, 2011; World Health Organization, 2013), and it is the number one killer in Jordan (Jordanian Ministry of Health, 2012). By the year of 2030, almost 23.6 million people will die from CVDs and these are projected to remain the single leading causes of death

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(American Heart Association, 2012; World Health Organization, 2013). Coronary artery disease (CAD) is the most common cause of mortality related to CVDs (World Health Organization, 2013).

CVDs in Jordan are the leading cause of death responsible for 33% of total deaths in 2011 (Jordanian Ministry of Health, 2012). CAD was the largest leading cause of death among both men and women in the United States (Lloyd-Jones et al., 2010). Affecting millions of patients annually, diagnosis and management of CAD represents major challenges to health care systems (Arab-Zadeh, 2012). Cardiac catheterization is a key step in the diagnosis and management of CVDs (Bertrand, 2011). Presently, CATH is the most common diagnostic and interventional procedure worldwide and accounts for approximately six thousand procedures per one million inhabitants (Buzatto & Zanei, 2010). Although CATH is considered a routine and relatively a safe procedure by health care members, previous studies have demonstrated that most patients undergoing CATH experienced it as a potential life-threatening event (Köllner & Bernardy, 2006; Tawalbeh & Ahmad, 2014). Several studies have indicated that most patients experience anxiety when scheduled for CATH (Buffum et al., 2006; Trotter, Gallagher, & Donoghue, 2011) with highest levels occurring in the waiting period immediately prior to the procedure (Chair, Chau, Sit, & Wong, 2012; Tawalbeh & Ahmad, 2013; Taylor-Piliae & Molassiotis, 2001).

BACKGROUND

Anxiety is significant to be assessed and managed in patients undergoing CATH for several reasons. Elevated anxiety associated with CATH has the potential to negatively impact individuals psychologically and physiologically in ways that may also negatively interfere with the procedure and related cardiac functioning (Ghetti, 2011). Studies have validated that unrelieved anxiety can increase sympathetic nervous system activity leading to an increase in blood pressure (BP), heart rate (HR), respiratory rate (RR), myocardial oxygen consumption, and cardiac workload (Chair & Thompson, 2005; Eng et al., 2007). Furthermore, elevated anxiety that activates the sympathetic nervous system, may lead to increasing the force of heart contractions and increasing the risk for arrhythmias, which is one of the major concerns during CATH (Bertrand, 2011; Senay, Huriye, Mehmet, & Mehmet, 2008). Anxiety associated with CATH may lead to the release of catecholamines; epinephrine and norepinephrine which in turn increase endothelial injury and platelet aggregation and contribute to the development of thrombosis and atherosclerosis which is also one of the major concerns during CATH (Buffum et al., 2006). These physiological changes could lead to ischemic chest pain, poor recovery patterns, and sudden death among CAD patients (Sirois, Sears, & Bertolet, 2003).

Anxiety may also impact long-term outcomes for cardiac patients undergoing CATH. Preprocedural anxiety related to CATH predicts anxiety on subsequent occasions and an impairment in the physical role of future functioning 1 year later regardless of the severity of CAD (Strik, Denollet, Lousberg, & Honig, 2003; Trotter

et al., 2011). Given the potentially serious consequences of untreated anxiety, the assessment of anxiety is necessary, yet this assessment rarely occurs as a part of routine care.

Preprocedural education related to CATH is generally provided by nurses (Buzatto & Zanei, 2010), who have several alternatives such as verbal education, pamphlets, booklets, audiotapes, and videos (Jamshidi, Abbaszadeh, Kalyani, & Fakhondeh, 2013). Patients' education using an educational video before CATH shown to be more effective in improving patients' knowledge, reducing their anxiety and effectively maximizing their outcomes than the use of educational pamphlets and oral education alone (Buzatto & Zanei, 2010; Jamshidi et al., 2013). Furthermore, the video method was ranked by surgical patients, particularly patients prior to elective cardiac surgery as the preferred way of providing preoperative information over individualized methods of instruction, written materials, and Internet-based instructions (Suhonen & Leino-Kilpi, 2006). Overall, the use of educational video presentation regarding CATH and the CATH laboratory environment improves patients' knowledge and reduces their anxiety levels (Jamshidi et al., 2013; Trotter et al., 2011).

A literature search was conducted using PubMed, Ovid, ProQuest, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Arabic Journals, Wiley Online Library, EBSCOhost Research Databases, A to Z Full Text Periodicals, Science Direct, and Oxford Journals (OUP Journals) databases for the period from 1990 to 2013 that are available to provide a full-text article. A subsequent search using the same databases, as well as the Internet search engine Google scholar, exploring the keywords *nursing care*, *anxiety*, and *cardiac catheterization* was conducted. These words were explored independently as well as in various combinations to accomplish relevant literature to this topic. Within the reviewed databases, there are currently no published studies yet that involve the use of randomized clinical trials to assess the effect of educational video intervention provided individually on periprocedural anxiety in cardiac populations, which is recommended by previous literature (Chair & Thompson, 2005; Torrano, Veiga, Goldmeier, & Azzolin, 2011). Also, no one has measured this periprocedural anxiety objectively by comparing physiological parameters associated with anxiety and subjectively by using self-reported anxiety measure to assess psychological manifestations of anxiety. Literature also recommended further research to evaluate educational video intervention in samples of patients undergoing CATH cross cultures (Chair et al., 2012).

Arabs usually believe in fate and that God is the direct and eventual controller of all what happens. In the Arab culture, one needs to believe in God's will and pray to bring comfort and calmness. Furthermore, social life in the Arab region is characterized by "situation-centeredness," in which loyalty to the extended family is superior over individual needs and goals (Nydell, 2005). More specifically, separation from the family may lead to stress and anxiety, therefore, family contribution will help in providing psychosocial care and should be considered by nurses (Lovering, 2012). In Jordan, The impact of educational interventions in periprocedural anxiety among CATH patients has not yet been investigated. Therefore, this study is conducted and

aimed toward exploring the effectiveness of an individually provided educational video intervention in lowering periprocedural anxiety among Jordanian patients hospitalized for CATH procedure.

METHOD

Sample and Setting

A randomized controlled trial with one experimental group and one control group was used. A sample of 186 Jordanian patients admitted for their first diagnostic CATH at a major specialized heart institute affiliated with the Royal Medical Services (RMS), Amman, Jordan were considered for the study. The patients were enrolled from June to September of 2013. The intervention group received the education session and materials in Arabic by the principal investigator. All patients were admitted to cardiac care units in the hospital, were placed in separated rooms prior to, and after a CATH procedure. This separate room layout is very important to avoid contamination of the clinical trial intervention and facilitate the individuality of the educational sessions.

Exclusion criteria were (a) patients admitted for an emergency CATH, (b) history of previous CATH, (c) patients with cognitive impairment, (d) patients with a history of taking psychotropic agents, (e) those having major hearing or visual difficulties because hearing and visual capabilities are needed to comprehend the material presented in the educational intervention, (f) those having a life-threatening or an associated major illness such as renal failure or cancer because these serious illnesses may differently affect patients' anxiety level and their way of dealing with stressful events, and (g) those have deteriorated health conditions prior to or post-CATH and need to be admitted for intensive care unit. All of these criteria were assessed by the principal investigator of the study.

Ethical Considerations

The study method and protocol were approved by the ethical committee at the University of Jordan and the institutional review board of the military medical services. A written informed consent was obtained from all patients.

Intervention

After 15–30 min of being arrived to their rooms, patients' baseline physiological measures of systolic and diastolic BP, HR, and RR for all the participants were obtained by the assigned nurses, who recorded the readings in a specific vital signs recording sheet. After giving standardized instructions to respond to Spielberger State Anxiety Inventory (SAI), participants were asked to complete the Arabic version of the SAI.

Then, the patients were randomly allocated to experimental and control groups, using a computer-generated randomization list. Patients in the experimental group individually received a preprocedural educational intervention. Those in the control group received only brief verbal instruction from nurses and cardiologist. However, both groups received the usual care provided by the institute health care members.

The control group patients received information on a CATH procedure through brief verbal instructions from nurses and cardiologists

Recruitment, intervention, and data collection took place during the morning and early afternoon hours, between 7 a.m. and 2 p.m. excluding holidays and weekends. A gentle reminder not to enter the patients' rooms was visible on the door with a sign indicating "Study taking place," to decrease interruption during the educational session and data collection. Usual care interventions provided for CATH patients included monitoring of vital signs, maintaining a patent intravenous infusion, and administration of medication. Furthermore, before signing the informed consent, the CATH procedure is explained to the patients. As the procedural instructions such as time for fasting, skin preparation, the need to increase the fluid intake after a CATH, also the potential complications are presented which may increase the patients' anxiety level.

The preprocedural educational intervention is an approximate 30-min educational session consisting of a 25-min educational video that was provided individually; a booklet summarized the material provided within the video and 5-min discussion. The educational video covers information related to an overview of the cardiovascular system, coronary atherosclerosis, and CATH-related education, in particular, CATH-related education designed to familiarize patients with the events occurring before, during, and after the procedure including instructions for home care after discharge. After viewing the video, patients were encouraged to ask for further information. Finally, patients received the booklet to be reviewed and encouraged to read it. The intervention was provided on an individual basis in each patient's own room and was conducted by the principal researcher of this study.

Outcome Assessment

Increase in anxiety levels alters physiological responses and induces hypertension, tachycardia, elevated temperature, and tachypnea; thus, vital signs were used to assess anxiety levels. These physiological responses were measured at baseline before randomization, within 2 hr before receiving CATH to standardize the measurement for all patients (based on previous literature findings that anxiety associated with CATH is highest on the day of the procedure just prior to CATH), and post-CATH (at 6–24 hr after CATH and prior to discharge). Anxiety during CATH was not measured because of the specificity of the procedure in which the patients are required to be calm and less communicative (Figure 1).

The structured questionnaire of the study was composed from three parts. Part 1 is the sample characteristics, which consists of a checklist and fill in the gap question type concerning demographic variables such as age and income as well as other sample characteristics such as past medical history and antihypertension treatment. The second part is the anxiety-related vital signs sheet. Systolic and diastolic BP were measured by auscultation of the brachial pulse with a stethoscope using a standard mercury sphygmomanometer calibrated based on the calibration of manufacture. Finger pulse oximetry was used to measure HR. Pulse oximetry accurately estimates HR at rest and during submaximal exercise. Finally, RR was measured manually for a full minute.

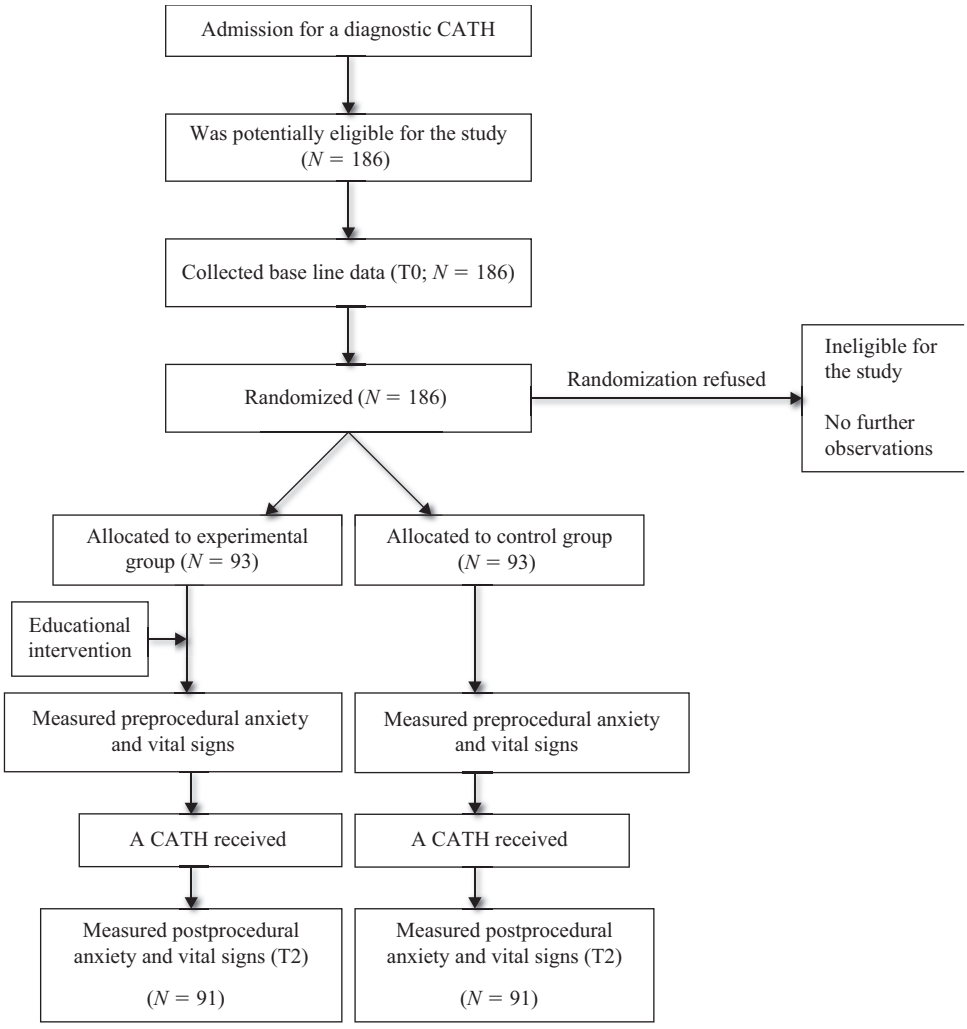

Figure 1. The study protocol and data collection point. CATH = cardiac catheterization.

The third part is the Arabic version of Spielberger's State-Anxiety Inventory (SAI) that is a subscale of the State Trait Anxiety Inventory (STAI) developed by Spielberger (1968, 1977; Spielberger, 1983). The SAI is a 20-item self-reported instrument used to evaluate an individual's temporal feelings of apprehension, tension, nervousness, and worry, using a 4-point Likert format (1 = *not at all*, 4 = *very much so*). Possible scores range from 20 to 80 with higher scores indicating greater anxiety. However, scores on the SAI scale increase in response to physical danger and psychological stress, and decrease as a result of relaxation training (Chair & Thompson, 2005). Cronbach's alpha of the SAI items in this study was .88. Content validity of the scale was established by a panel of experts including three nurses with more than 10 years experience in caring for CATH patients and three cardiologists who frequently performed CATH procedures.

Independent samples *t* tests were performed to examine mean differences in age, anxiety levels, BP, HR, and RR at each time of measurement between the two groups. The level of significance was set prior at .05. The Statistical Package for the Social Science (SPSS) software Version 21.0 was used to analyze the study data (International Business Machines Corporation, 2012).

RESULTS

There were 186 patients who agreed to participate in the study. However, four patients (2%) did not complete the third part of the questionnaire at post-CATH; those patients were frustrated about the need to have a coronary artery bypass graft (CABG) surgery and refused to finish the questionnaires. Thus, 182 patients participated in all of the study phases, indicating a response rate of 98% (Figure 1). There were 105 males (57.7%). The mean age was 54.6 years (*SD* = 11). Most patients (74.2%) were married. More than half of the patients (53.3%) had less than the second secondary level of education. Most of the sample (70.3%) was unemployed (retired, housewife, unemployed).

Most of the patients (67.0%) had a medical history. Among comorbidities, hypertension was found in (29.1%) and diabetes in (18.7%) of the patients. Moreover, (19.2%) of the patients had both hypertension and diabetes. Most of the patients who had hypertension (89.7%) were treated by angiotensin-converting enzyme (ACE) inhibitors in combination with or without diuretics. Most of the patients (56%) were nonsmokers (quit, nonsmoker), whereas (44%) of the patients were smokers (cigarettes 92.5%, hookah [Argeelah] 7.5%). The mean of smoking years was 12.47 years (*SD* = 16.8), and the mean of the number of cigarettes per day was 11.92 cigarettes (*SD* = 16.1). Smoking hookah was on a daily basis for all of the patients who smoke hookah.

The two groups were comparable with respect to all of the mentioned sample characteristics (Table 1). Furthermore, there were no significant differences in baseline anxiety levels (measured in the admission day for CATH), systolic BP, diastolic BP, HR, and RR (Table 2). Independent *t* test was performed to assess if the mean preprocedural anxiety differed significantly for the experimental group compared with the control. The analysis revealed that the mean preprocedural anxiety differed significantly, $t(180) = 11.88$, $p = .001$. Mean preprocedural anxiety for the experimental group ($M = 39.03$, $SD = 5.7$) was about 10 scores lower than mean preprocedural anxiety for the control group ($M = 49.34$, $SD = 6.0$). In additional analysis, a chi-square test was performed to assess if there was a group difference in the distribution of gender, marital status, living place, living with whom, educational level, occupational status, having a surgical history, having a medical history, diabetes treatment, hypertension treatment, smoking, and having health education. There were no statistically significant differences between the two groups in any of the sample characteristics. Only perceived anxiety was reduced.

Analysis revealed that only "perceived anxiety" was reduced in the treatment group, whereas reduction in physiological measures was not. The mean postprocedural anxiety differed significantly, $t(180) = 15.64$, $p < .001$. Mean postprocedural anxiety

TABLE 1. Comparison of the Sample Characteristics Between the Two Groups at Baseline Time

Variables	Experimental Group (N = 91)		Control Group (N = 91)		p Value
	M (*SD*)	*N* (%)	*M* (*SD*)	*N* (%)	
Age (years)	55.2 (10.5)		53.9 (11.9)		.431
Gender					
Male		51 (56.0)		54 (59.3)	.654
Female		40 (44.0)		37 (40.7)	
Marital status					
Single		10 (11.0)		6 (6.6)	.188
Married		68 (74.7)		67 (73.6)	
Widowed		13 (14.3)		18 (19.6)	
Educational level		45 (49.5)		42 (57.2)	
< Second secondary		21 (23.1)		16 (17.6)	.877
Second secondary		13 (14.3)		7 (7.7)	
Diploma		12 (13.2)		14 (15.4)	
Baccalaureate		0 (0.0)		2 (2.2)	
Master					
Employed		26 (28.6)		28 (30.8)	.795
Unemployed		65 (71.5)		63 (69.3)	
Has a medical history					
Hypertension		21 (23.1)		32 (35.2)	.226
Diabetes		20 (22.0)		14 (15.4)	
Hypertension and diabetes		19 (20.9)		16 (17.6)	
Has no medical history		31 (34.1)		29 (31.9)	
Hypertension treatment					
ACE inhibitors		33 (37.5)		46 (52.2)	.320
β-Blockers		6 (6.8)		3 (3.4)	
ACE inhibitors + β-blockers		5 (5.7)		1 (1.1)	

(*Continued*)

TABLE 1. Comparison of the Sample Characteristics Between the Two Groups at Baseline Time (*Continued)*

	Experimental Group (N = 91)		Control Group (N = 91)		
Variables	*M* (*SD*)	*N* (%)	*M* (*SD*)	*N* (%)	*p* Value
Smoking					
Yes		37 (40.7)		43 (47.3)	.479
No		40 (44.0)		34 (37.4)	
Quit		14 (15.4)		14 (15.4)	
Cigarettes		32 (35.2)		42 (46.2)	.242
Hookah		5 (5.5)		1 (1.1)	
Smoking years	11.10 (16.2)		13.88 (17.3)		.258
Number of cigarettes (cigarettes/day)	11.26 (16.9)		12.58 (15.3)		.582

Note. *M* = mean; *SD* = standard deviation; ACE = angiotensin converting enzyme.

for the experimental group (M = 29.18, SD = 5.42) was about 12.55 scores lower than mean postprocedural anxiety for the control group (M = 41.73, SD = 5.41). Compared with the normative group, the mean score of postprocedural anxiety for the experimental group was lower than that for the normative group, but the mean score of postprocedural anxiety for the control group was within the range of that for the normative group .The effect size as indexed by η^2 was .57; this is a

TABLE 2. Outcome Variables of the Study Total Sample (*N* = 182) and Comparison Between the Two Groups at Baseline Time

	Total Sample (N = 128)	Experimental Group (N = 91)	Control Group (N = 91)	
Variables	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*p* Value
Baseline total preprocedural anxiety	50.77 (5.6)	51.37 (5.0)	50.18 (6.1)	.152
Baseline systolic blood pressure (mmHg)[b]	125.11 (14.2)	124.40 (15.6)	125.82 (12.6)	.499
Baseline diastolic blood pressure (mmHg)	78.10 (9.4)	78.86 (9.9)	77.33 (8.9)	.277
Baseline heart rate (beat/minute)	78.16 (7.4)	77.68 (6.5)	78.64 (8.2)	.386
Baseline respiratory rate (breath/minute)	19.00 (1.8)	19.16 (1.7)	18.87(1.9)	.277

Note. *M* = mean; *SD* = standard deviation.

TABLE 3. Comparison of Vital Signs Between the Two Groups at Preprocedural Time (*N* = 182)

Variables	Experimental Group (*N* = 91) *M* (*SD*)	Control Group (*N* = 91) *M* (*SD*)	*t*	*p* Value
Preprocedural systolic blood pressure (mmHg)	123.85 (15.04)	126.81 (12.55)	1.445	.150
Preprocedural diastolic blood pressure (mmHg)	76.87 (8.90)	78.74 (8.02)	1.488	.139
Preprocedural heart rate (beat/minute)	78.79 (4.27)	79.63 (5.00)	1.212	.277
Preprocedural respiratory rate (breath/minute)	19.32 (1.65)	19.10 (1.48)	−0.994	.321

Note. *M* = mean; *SD* = standard deviation.

large effect. This study suggests that receiving individually an educational video intervention about CATH may also significantly decrease postprocedural anxiety levels.

Finally, independent samples *t* tests were performed for systolic BP, diastolic BP, HR and RR, measured prior to and post-CATH, to assess whether or not the means of these vital signs differed significantly between the two groups. The analyses revealed that there were no significant differences at any of the two times between the two groups regarding all of these vital signs ($p > .05$; Table 3 and Table 4). Moreover, in both groups, these vital signs remained nearly within normal limits at the two times of measurement.

TABLE 4. Comparison of the Outcome Variables Between the Two Groups at Postprocedural Time (*N* = 182)

Variables	Experimental Group (*N* = 91) *M* (*SD*)	Control Group (*N* = 91) *M* (*SD*)	*t* test	*p* value
Postprocedural systolic blood pressure (mmHg)	121.10 (10.2)	122.97 (11.8)	1.145	.254
Postprocedural diastolic blood pressure (mmHg)	76.30 (6.5)	76.15 (6.8)	−0.145	.885
Postprocedural heart rate (beat/minute)	77.63 (3.9)	78.04 (3.8)	0.731	.466
Postprocedural respiratory rate (breath/minute)	19.18 (1.8)	18.93 (1.4)	−1.01	.316

Note. *M* = mean; *SD* = standard deviation.

DISCUSSION

High levels of anxiety can be debilitating and may interfere with natural functioning. Besides, it is unpleasant feeling, it can induce a strong negative impact on the individual's physical health. Under the conditions of this study, the results show the effectiveness of using educational video intervention about CATH in lowering periprocedural anxiety associated with the procedure. Nevertheless, using this educational video may not significantly affect physiological parameters associated with anxiety. Although the benefits of educational videos on patients' psychological status are well recognized from the relevant literature, limited knowledge has been developed on the effect of educational video on patients with cardiac diseases. Several studies have indicated that education via video instructions about invasive procedures such as CATH is more effective in reducing the level of anxiety than the use of educational pamphlets and oral education alone (Chair et al., 2012; Jamshidi et al., 2013). This study contributes new knowledge to literature in a large sample from a newly explored setting in Jordan. The study findings may add to the knowledge on promoting psychological status through addressing the educational needs of cardiac patients, particularly those undergoing their first diagnostic CATH.

The significant difference regarding the anxiety levels between the two groups supports the effectiveness of using educational video intervention before CATH, which is reported in previous literature (Jamshidi et al., 2013; Köllner & Bernardy, 2006). This may have occurred because of the knowledge gained from the educational video received prior to CATH. Specifically, the knowledge gained from the educational video further enabled patients in the experimental group to develop a more accurate cognitive expectation about the procedure. Anxiety among patients awaiting elective CATH could be alleviated if adequate factual explanations about CATH were provided to them (Harkness, Morrow, Smith, Kiczula, & Arthur, 2003). Similarly, a low level of anxiety was reported before and after percutaneous coronary intervention (PCI) among patients because of the adequate facilities, orientation, and health education provided to them by the health care members (Eng et al., 2007).

In this study, the content of educational video intervention includes not only factual information about CATH but also contains sensory information. By factual information, desirable knowledge and informational needs of the patients might be met and that could help their anxiety reduction. However, sensory information refers to knowledge about the environment acquired by the way of the senses and includes what the patient may hear, smell, see, taste, and touch that enable him or her to interpret experiences obtained from the external and internal environments (Tawalbeh & Ahmad, 2013). Although the CATH environment and equipment may be frightening to the patients, environmental and procedural information as well as sensory expectations during CATH were seldom explained (Chair et al., 2012).

A combination of procedural and sensory data is proved to be the most effective type of information in reducing patient anxiety (Buzatto & Zanei, 2010). Because most patients in this study had received only primary education, an educational video may be more appropriate than a printed brochure. Anxiety is reduced when better quality information is provided. This happens when nurses are able to clear

patients' doubts and join technical information to their sensory-perceptive explanation (Ahmad, Al-Daken, & Ahmad, 2015; Harkness et al., 2003). When the nurse explains theoretical issues to the patients' using one or more illustrative strategies, this help patients understand the stages of the procedure which leads to better results (Buzatto & Zanei, 2010).

On the other hand, the higher preprocedural and postprocedural anxiety levels in the control group might be related to the type of education received from the usual care provided to them through brief verbal instructions from nurses and cardiologists. Lack of detailed information about CATH as well as detailed sensory experience associated with unfamiliarity and doubt about the procedure may be a factor of anxiety associated with CATH (Chang et al., 2011; Torrano et al., 2011). In addition, the use of technical language by doctors to provide information to the patient undergoing CATH was identified by patients as a barrier to understanding (Lyons, Fanshawe, & Lip, 2002).

Considering all of different assessment times in this study, the results showed that attending an individually provided educational video made no significant impact on any of the physiological parameters of anxiety measured in this study. There were no significant differences in means of systolic BP, diastolic BP, HR, and RR between the two groups throughout any phase of the assessment times. Moreover, these physiological parameters remained nearly within normal limits, although around 48% of the patients suffered from arterial hypertension. The unanticipated findings from this study are possible to be attributed to premedication effect. Information regarding current medication regime of patients was overlooked as many of this study's patients had a history of hypertension. It is feasible that patients were taking antihypertensive medications, as means for their systolic BP, diastolic BP, and HR were within normal limits. Almost 47% of the patients used ACE inhibitors which in turn reduced BP and 8% used beta-blockers which also reduced changes in the physiological system, specifically the HR. It is possible that effects of medications masked the physiological changes associated with anxiety. Comparable studies reported similar premedication effects (Argstatter, Haberbosch, & Bolay, 2006).

IMPLICATIONS AND CONCLUSIONS

There is still a need to replicate this study with different settings and different educational video interventions. This study assessed patients' anxiety at times of pre- and postintervention; future studies investigating the long-term patterns of illness perception change and effects of educational intervention (e.g., a few weeks post-CATH) can be conducted.

Educational intervention in this study was provided on an individual basis; the possibility of preparing CATH patients in groups in the interest of cost-effectiveness deserves to be studied. Only those patients admitted for an elective first CATH were involved, further studies involving patients with previous experience with CATH and patients admitted for an emergency CATH could give a holistic picture about anxiety associated with CATH and could enable making comparisons between these types

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of patients. Finally, providing the educational intervention in the day before CATH was found to be effective. Future studies to evaluate the effectiveness of educational video intervention that is provided as soon as patients are informed of their need to undergo CATH could be considered.

As a limitation of the study, results should be read with caution, especially for patients who were taking antihypertensive medications or beta-blockers such as ACE inhibitors. The physiological parameters of anxiety such having normal BP and HR could be attributed for these medications. It is possible that lack of control for medications may have obscured any impact on these measures. For future studies, we suggest to adopt different methodological/procedural aspects that might overcome this limitation. It is noteworthy to emphasize that the hospital policy was not to administer any sedatives before or during CATH procedure. There was a relatively short follow-up period, and it is therefore unclear whether changes in illness representations including anxiety associated with a CATH procedure remain stable over an extended time, particularly those who were in need for a PCI or a CABG surgery.

In conclusion, an educational video intervention was found to be more effective in lowering periprocedural perceived anxiety associated with CATH than usual cares. A key strength of this study included the use of an experimental design, the assessment of the psychological and physiological aspects of anxiety, and the assessment of these aspects at key times for CATH patients. The findings of this study can contribute to the knowledge in promoting the psychological status of cardiac patients through addressing their educational needs.

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