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The effectiveness of video and handbook learning media on acquisition of knowledge on healthcare process in liver cancer patients received first trans-arterial chemoembolization: A randomized control-trial

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Abstract

Background and significance: Trans-arterial chemoembolization becomes a treatment of choice among liver cancer patients. Normally, patients are anxious and terrified to the procedure. This is due to the incomprehension and lack of knowledge. Aim of the study: Investigators would like to compare the effectiveness of video and handbook learning media. Method: A purposive sampling of 80 volunteered, literate, liver cancer patients, aged >18, was enrolled in the study. After 40-item pretest, participants were randomized equally into two groups. The experimental group watched the video, while the control group studied the handbook. Both materials contained the same didactic information. Consequently, the post-test was performed immediately. Moreover, the final test was implemented within 45-60 days. Pre and post-test scores as well as pre and final test scores were calculated for the relative growth scores and the knowledge retention scores respectively. Data were expressed as mean ± standard deviation, and analyzed by Independent t-test, Exact probability and Mann-Whitney U test. Findings: The demographic characteristics were insignificant differences between the two groups. However, the study illustrated that the video had higher relative growth and retention of knowledge scores than that of the handbook significantly. Conclusion: The video was more effective than the handbook in promoting health education on Trans-arterial chemoembolization. Implications for nursing practice: video learning media was an effective educational tool to improve memorization. In addition, the knowledge retention score yielded the best prediction on academic gains.

Keywords**:** *handbook learning media, health education, knowledge retention, video learning media*

1. Introduction

Liver cancer is a serious disease and a significant health issue worldwide. Regarding cause of death, it ranks fifth in men and ninth in women (Ferlay et al., 2015). In Thailand, it is ranking first and third of cancer in male and female patients respectively (Ferenci et al., 2010). It is usually categorized as hepatocellular-carcinoma (HCC), being the most frequent with 90% and cholangio-carcinoma (CCA) with 10%. It was reported that a number of patients were often detected as late as in the moderate stage or in the incurably severe stage. The main factors are as follows: Hepatitis B virus infection, chronic Hepatitis C, Alcohol exposure, Aflatoxin, Diabetes Mellitus, Hypertension, obesity and fatty liver (Mittal & El-Serag, 2013; Yang et al., 2002).

In an early stage, liver cancer can be cured with surgery and thermal needle destruction of the tumor. However, many patients are likely to see the doctor only when tumors have spread. One of the well-known treatment methods is Transarterial chemoembolization (TACE) (Llovet et al., 2002), which can cause serious complications such as renal failure, hepatitis, infection or bleeding in the gastrointestinal tract (Clark, 2006; Jia & Jiang, 2017).

Concerning the quality of nursing services and standard healthcare, Chulabhorn Hospital is equipped to provide patients the knowledge and understanding of TACE, especially at the first episode of treatment. Importantly, TACE is an invasive technique performed in a full conscious patient. Still, there is a variety of learning technique for patients. Visual media are superior to contemporary materials in knowledge assessment (Albert, Buchsbaum, & Li, 2007).

2. Objective

The objective of this study was to compare the effectiveness of the two learning media - video and handbook on knowledge achievement, relative growth, and knowledge retention in liver cancer patients receiving first trans-arterial chemoembolization (Wakefield, Loken, & Hornik, 2010).

3. Materials and methods

A purposive sampling of 80 patients with Hepatocellular carcinoma, undergoing first TACE during October 2015 to June 2017, was enrolled in the study. Inclusion criteria were volunteers aged over18 years, good communication with audiovisual aids, comprehension of video and handbook learning media and being able to complete the questionnaire. Exclusion criteria were patients with psychological or mental problems.

3.1 Development of video and handbook

The video and handbook comprised of the same didactic information regarding health education for Heptocellular Carcinoma (HCC) and Transarterial Chemoembolization (TACE). The objective was to help patients understanding the disease and treatment as well as facilitating them for the procedure correctly. Both were developed in parallel and validated for content validity, objectivity and internal reliability. Three interventionists at Chulabhorn Hospital verified contents for its accuracy, comprehensivity and appropriateness with the Index-item objective congruence (IOC) of 0.9 and 0.88 respectively. Seven nurses and 3 blue-collar workers tested the devices with the alpha Cronbach reliability of 0.87 and 0.89 respectively.

The 5-minute VDO was prepared, arranged and organized for animation and sound effect. The Siriraj Informative Technology Department operated 2-dimensionally animated movies, while the Thurakit Bandit Sound Lab manipulated the sound merging. The Eed Studio compiled movies and sound together for launching.

The patients were randomized equally by computer program into two groups: A – video learning media and B – handbook learning. A pre-test and post-test was performed before and immediately after the 15-minute study. In addition, a final, unannounced test was implemented after 45-60 days.

A 40-item questionnaire was well tested for validity and reliability. The index of item objective congruence and internal reliability was 0.91 and 0.953 respectively.

3.2 Data analysis

Sample size was calculated from a previous study by using the STATA/SE version 12. Achievement, gain and retention scores were expressed as percentage, mean and standard deviation. Categorical data were analyzed by Chi-square test, whereas a comparison between the two groups was examined by nondependent t test and Mann-Whitney U test using the STATA/SE version 12. A $p < 0.05$ was considered as statistically significant difference at 95% Confidence Interval. The formula was as follows (Kanjanawasee, 1990):

(i) $G1 = 100\ (Y-X)/(F-X)\ \%$

(ii) $G2 = 100\ (Z-X)/(F-X)\ \%$

(iii) $R = 100-[(G1)-(G2)]\ \%$

where G1 = Relative growth score1,G2 = Relative growth score2, X = Pre-test score, Y = Post-test score, Z = Final test,F= Full score, R = Retention of knowledge

3.3 Definition

The relative growth score (Demaidi, 2014) is a proportion with the original scores in the denominator. It is measure of the proportion of gain. The difference scores between pretest and post-test, pretest and final test1 are calculated for the relative growth score1 (G1), relative growth score2 (G2)

The relative growth score difference is determined as knowledge retention score. Therefore, the difference between G1 and G2 is worked out for the knowledge retention score (R) (Vichitvejpaisal, Panjamawat, & Varasunun, 2011)

The healthcare process is a set of interrelated or interacting healthcare activities which transforms inputs into outputs. In health care, awareness of the need for better management of systems and processes is finally starting to take root. Nurses are keen to become familiar with examples of how institutions achieve it in practice (Hansmann, 2018).

Promoting Health Education is the process of enabling patients to increase control over and to improve their health. It moves beyond a focus on individual behavior towards a wide range of social and environmental interventions. Health promotion serves the core mission of hospital by supporting patients and creating healthy learning environments (American College Health Association (ACHA), 2018)

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4. Results

Table 1 Demographic characteristics between the two groups

Variables	Total	Video (n = 40)	Handbook (n = 40)	*p*-value
Age (mean ± SD)	60.6 ± 9.6	60.6 ± 9.8	60.7 ± 9.5	0.936
Gender (%)				0.790
Female	18 (25.5)	8 (20.0)	10 (25.0)	
Male	62 (77.5)	32 (80.0)	30 (75.0)	
Educational				0.121
Primary school	30 (37.5)	13 (32.5)	17 (42.5)	
High school	23 (28.6)	16 (40.0)	7 (17.5)	
Bachelor	22 (27.5)	10 (25.0)	12 (30.0)	
Master-Doctorate	5 (6.3)	1 (2.5)	4 (10.0)	

** P < .05*

Table 2 The achievement, relative growth and retention of knowledge scores between the two groups

Variables	Video (n = 40)	Handbook (n = 40)	*p*-value
Achievement scores			
Pretest (X)	18.1± 7.3	17.4 ± 8.8	0.432
Post-test (Y)	35.5 ± 3.7	35.0 ± 3.3	0.313
Final test (Z)	34.9 ± 3.4	31.8 ± 4.6	0.001*
Relative growth score(%)			
Gain 1 (G1)	77.3 ± 21.1	76.6 ± 14.3	0.225
Gain 2 (G2)	71.9 ± 24.2	60.2 ± 21.2	0.003*
Knowledge retention (R%)	94.7 ± 15.9	83.6 ± 17.6	< 0.001**

** P < .05*

The participants of both video and handbook groups were (female: male) 8:32 and 10:30, aged 60.6 ± 9.8 and 60.7 ± 9.5 with education grouped as primary school, high school, bachelor and master-doctorate 13:17, 16:7, 10:12, and 1:4 respectively. The demographic characteristics between the two groups were not statistically significant difference (Table 1).

The video and handbook groups earned achievement (pre-test, post-test and final test) scores of 18.1 ± 7.3, 35.5 ± 3.7, 34.9 ± 3.4 and 17.4 ± 8.7, 35.0 ± 3.3, 31.8 ± 4.6 respectively. The pre-test scores were similar, while the post-test scores showed a meaningful increase. However, both scores showed no significant difference between the two groups (p = 0.432 and 0.313). In addition, though the final test scores of both groups appeared to decrease from the post-test ones; the video group showed a much higher score than the handbook significantly (p = 0.001*) (Table 2).

The video and handbook groups achieved the following relative growth (gain) scores: G1, G2 as 77.3 ± 21.1%, 71.9 ± 24.2% and 76.6 ± 14.3%, 60.2 ± 21.2%. The G1 of both groups was comparable (p = 0.225); while G2 of the handbook group achieved a sharply lower score than that of the video group significantly (p = 0.003*) (Table 2).

The calculated knowledge retention of the video group showed a much higher outcome than that of the handbook group significantly (< 0.001**) (Table 2).

5. Discussion

The outcomes of the video and handbook learning groups showed that the patients' demographic characteristics, pre-test, post-test and relative growth (G1) scores were not statistically significant differences; however, the video group showed much higher scores of the final test, relative growth (G2) and knowledge retention (R) than those of the handbook group.

We administered the pretest to the participants to determine their prior knowledge of the subject. This reduced the possibility that study results might be confounded by baseline differences in pre-existing knowledge among the groups. However, the indifference of pretest scores implied that it was appropriate to screen these patients for basic information on the selected subject and to monitor their progress.

Between the two groups, the increase of post-test and high percentages of G1 scores indicated that all participants gained better understanding of TACE from either means of learning. This could imply that both instructional methods containing understandable real materials were effective in teaching patients before the first intra-arterial chemotherapy.

The mild decrease in final test and G2 scores of the video group in particular implied that the developed audiovisual media could help patients retained understanding of healthcare process. It provided a unique learning format that required application of knowledge rather than memorization. By this means, patients gained in content understanding and retention of knowledge. The significant result of the R score might not represent an outcome of the carry-over effects, since patients were more likely to recall most of the matters. This agreed with previous study by Vichitvejpaisal who confirmed that the R score was the best prediction on academic gains (Vichitvejpaisal, Panjamawat, & Varasu, 2014). Armstrong, et al., supported this finding. They disclosed that video learning media was more effective educational tool for teaching sun protective knowledge and encouraging sunscreen use than written materials (Armstrong, Idriss, & Kim, 2011). This might be because special senses such as vision and hearing other than somatic senses or mechanoreception could improve memorization (Čepon, 2013; Guyton & Hall, 2006; Jagodzinski & Wolski, 2011; Salina et al., 2012). Furthermore, Moonaghi, et al. (2003) claimed that the demons trating method was more effective in practical learning skill than the video learning media (Moonaghi, Derakhshan, Valai, & Mortazavi, 2003); and Vichitvejpaisal (2001) insisted that the text-based technique was still a convenient method of learning (Vichitvejpaisal, et al. 2001).

6. Conclusion

The video-watching learning method was more effective than the handbook method. It was practical not only to help patients gained in content understanding but also to facilitate nurses promoted in health education on first TACE (trans-arterial chemoembolization).

6.1 Limitations of the study

It must be emphasized that we recorded only patients undergoing health care services in a single hospital.

6.2 Implications for nursing practice

This manuscript adheres to the applicable CONSORT guidelines. After Chulabhorn Research Institutional Review Board approval (no. 017/2015) on October 1, 2015; Ms. Ruechuta Molek, a principal investigator, registered her clinical study via ClinicalTrials.gov (NCT02768428) on May 11, 2016 prior to the start of the trial and any patient enrollment undertaken. The written informed consent was obtained from all subjects, a legal surrogate, the parents or legal guardians for minor subjects, or the requirement for written informed consent was waived by the Institutional Review Board.

Quite a few of printing matters in various medical fields have been used in health communication to educate patients at Chulabhorn hospital for many years. In addition, its contents have not been well tested for validity and reliability. This study reveals that the video learning media can be implied for its application to the benefits of nursing practice in health communication.

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