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COMPARISON OF THE EFFECT OF MULTIMEDIA TRAINING AND LECTURE ON PAIN MANAGEMENT OF PEDIATRIC NURSES AND THEIR PERCEPTION OF LEARNING SATISFACTION: A RANDOMIZED CONTROLLED CLINICAL TRAIL

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ABSTRACT

Introduction and aim: According to the important role of nurses, it is required to apply proper learning techniques for education of theoretical and practical skills for nursing personnel. Therefore this study aimed to compare the effects of lecture and multimedia learning in pain management. The present study examined the effects of two methods on nurses' learning and their perceptions of the instruction satisfaction.

Method: This was a three-stage clinical trial study with 100 nurses from a pediatric educational and medical center affiliated to Guilan University of Medical Sciences. After measuring the knowledge of nurses through a questionnaire, they were randomly assigned to two groups of lecture-based and multimedia software based teaching. The control group received teaching on pain management and proper methods for assessing pain in children and controlling it with drug and non-medical interventions via lecture method. The experimental group only had access to the same educational content as the new multimedia on the DVD. Knowledge level of nurses and their retention in the first and second posttests were measured by the same questionnaire one week and one month after teaching. In addition, nurse's perception, by expressing their opinions on satisfaction with training, was measured using a questionnaire in two groups at the beginning of the study and one month later. Then, data were analyzed using SPSS software and independent t-test and t-repeated test ($p < 0/05$).

Results: The mean score of nurses' learning and retention was increased one week and one month after the intervention in both groups, but the nurses in the treatment group gained a significantly higher score than the control group in the first posttest and retention one month later ($P < 0.001$).

The mean score of nurses' perception of teaching showed an increase in both groups, and despite improvement in change scores, the overall satisfaction score of nurses who watched DVD was higher than nurses in the control group and showed a significant difference ($P < 0.01$) In some aspects, nurses had a positive perception of watching the DVD as compared to nurses in the control group.

Conclusion: According to the results of this study, it seems that multimedia teaching method is appropriate and effective in learning the principles of evaluation and pain management of children and considering the improved information retention and better understanding of nurses, it is recommended to use this method in other in-service training of health professionals.

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Introduction

Pain is defined as "an *unpleasant sensory and emotional experience* associated with actual or *potential tissue damage"* (1, 2) .During hospitalization or outpatient visits, children experience pain during painful procedures, including blood collection,

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intravenous catheter insertion, and bone marrow aspiration, biopsy, insertion of the catheter into the chest and heart(3). Up to 81% of hospitalized *children* report *moderate to severe* levels of *pain(4)*. Today, the American Pain Association (APS) describes pain as the fifth vital sign(5). Inadequate pain relief has some consequences including anxiety and decreased interactions with others, sleep disturbances, motion impairment, decreased appetite, restlessness, decreased quality of life, and increased health and hospital care costs(6). Parents and close relatives of a child with pain often feel distress and anger in the therapeutic systems, and they may feel depressed and guilty if they can't do something to stop or alleviate the pain(7). Based on a large number of studies in different countries, the lack or inadequate knowledge of nurses and even doctors regarding pain assessment and its relief in different ages as well as having a negative attitude regarding pain experience are considered the most important barriers to examination and pain relief(8-11). The adequate pain management is a moral issue(12). Pain management is an important part of health care(11). All of the healthcare team's professionals believed that nurses play a critical role in evaluating and managing patient's pain (13). Despite the efforts made by doctors, trainers and professional organizations as well as the skills and technology available and health care, it is logical that optimal pain management be continuously offered; however, this goal has not been met, and today, in spite of the many efforts of health care providers and technology advancement, it is believed that pain assessment requires training(14, 15). Barriers to pain relief include shortages of personnel, the interval between prescribing drugs by the physician and their administration, nurses' incorrect judgment in areas of knowledge deficits and negative attitude in relation to management and pain assessment. This lack of knowledge can dramatically lead to a misleading assessment of pain. Therefore, having knowledge and skills in assessing and managing pain is a vital step(16, 17) . According to the some studies in Iran, nurses are not familiar with pain management (18, 19) some studies also indicate a poor knowledge of nurses about pain physiology, pain complications, and pain assessments tools. An inadequate assessment and measurement of pain are one of the most important barriers to using the pain assessment tool (16, 20, 21). The results of these studies indicate the need of nurses to receive periodic and in-service training on the pain of children, its complications, and especially regarding its measurement and control(22). To choose appropriate teaching method is one of the most intricate and delicate tips in designing any kind of training. *Lecture* is a *simple, fast* and *cheap teaching method*(18, 23) . *80%* of information delivered by *lectures is forgotten within 8 weeks(19, 23)*. Nowadays, use of suitable audiovisual equipment in lectures has led to efficiency improvement of this method(23, 24) . E-learning is one of the most important accomplishments of the IT era, which has led to a major transformation in educational systems(25). Academic centers are seeking to make the best use of modern technologies through continuing education courses and the application of technology-based learning and e-learning has become a dominant tendency to enhance human resources in organizations(26, 27). Researches show the vast majority of knowledge held by individuals is learned through seeing (75%), hearing (13%) and the other senses – touch, smell and taste (12%). It seems that a *comprehensive approach* to *learning* can lead to increased learner satisfaction, acceleration and continuity of learning(28). In fact, with the growing need for continuing education, the use of electronic equipment has become more popular(29, 30). The typical way to teach through compact discs is that when the content is spoken by the speaker, the relevant film is displayed and important points are inserted on the screen. Therefore, this method makes use of the most important means of transmitting visual and auditory concepts(31, 32). On the other hand, the understanding and satisfaction of learners from electronic learning courses is one of the important and influencing factors in the learning process. The E-learning method will be useful and remain competitive in the environment if it is able to surpass conventional teaching methods to improve learner satisfaction (33-35). This could affect the effectiveness of learning and learners will be more motivated to learn or become more satisfied with the learning process(36). According to the numerous studies on the pain management as well as deficiencies in the knowledge, performance of nurses in the pain assessment and lack of a study on multimedia educational intervention, we decided to investigate the effect of two teaching methods (lecture and multimedia) on learning, memorizing and understanding of nurses working with children from training.

Method:

This interventional study was performed on 100 nurses working in 17 Shahrivar Hospital in Rasht in 2016 for three months. The inclusion criteria included having at least six months of working experience in the children's ward, and having at least familiarity with using computer and multimedia CD. After obtaining permission from the Vice-Chancellor of Research of Tabriz and Guilan Universities of Medical Sciences and the Regional Ethics Committee by IR.TBZMED.REC.1395.611 code and registration with IRCT web-site (IRCT201607314613N21), the study began. The written consent was obtained from the participants and objectives of the study were explained for them. The instrument used in this study was a learning questionnaire consisting of 38 items on the pain assessment method in children and pharmaceutical and non-pharmaceutical methods of pain management, including 27 true and false items and 11 multiple-choice items. In the second section, the impact of educational methods was evaluated by a researcher-made questionnaire consisting of 16 items that 4 items tested nurse's opinions about educational content, 3 items for better understanding, 4 items for learning objectives setting, 1 item for feedback, 4 items for their motivation. The items were rated on a *6-point Likert Scales* in 6 = completely satisfied, and 1 = completely dissatisfied. The validity of the questionnaires was verified through content validity and reliability by means of a Cronbach's Alpha (0.7 for Knowledge and 0.9 for satisfaction questionnaires) which were acceptable. At first, the nurses answered the demographic, learning and perception questionnaires regarding the two proposed teaching methods. Then, based on the learning scores, participants were randomly assigned to two intervention (multimedia) and control (lecture) groups (each containing 50 nurses).

In order to design and produce multimedia DVDs for pain management teaching, the teaching content on pain physiology, and how to measure the pain and tools of pain assessment in children as well as the appropriate techniques to pharmacological and non-pharmaceutical interventions for pain relief were prepared by reviewing the relevant literature. Then, by using Mayer's 10 *Principles of Multimedia design*, evaluation criteria for educational materials, and the checklist for evaluating educational materials were examined. This software involves a combination of text, sound, picture, movie and animation and ISpring Suite7 software was used to produce it. The nurses were trained during a four-hour session. *Both* groups received *similar educational content*. PowerPoint and Whiteboard were used to teach nurses in the lecture method. The multimedia group received teaching on how to work with CD during one session in order to ensure their skills in using them. Nurses had access to the same educational content on DVD with a combination of text and sound, video and animation. The first and second posttests were administered one week and then one month after teaching using the same questionnaires for learning and perception in both groups. Then one month after training, the same learning and perception questionnaires were administered in both groups. Data from all samples were analyzed by independent t-test and *repeated measures analysis* of *variance* with baseline adjustment using *SPSS 13 software*. *Repeated measures analysis* of *variance* was employed to investigate the impact of two teaching methods and the retention of the learned materials. T-test was also used to compare the satisfaction level with the received teaching. A significance level of $p < 0.05$ was considered for the study and all nurses (without dropout) were present until the end of the study.

Findings

The average age of the nurses was 36 years and most of them had bachelor degree and were permanently employed and had worked rotating shift. They did not receive any training on pain management and experienced pain during in their lives and had a history of childcare with pain (Table 1). There was no significant difference between the demographic characteristics of both training groups ($p > 0.05$). At the beginning of the study, there was no significant difference in the nursing learners' scores in both groups ($p > 0.05$), but there was a significant difference between post-test scores one week later and retention one month later ($P < 0.001$). On the other hand, a week later the average change in learning scores in the multimedia group was increased compared to the lecture group (5.42 vs. 2.24) ($P < 0.03$) as well as the retention score compared to the pretest score (4.86 vs. 1.56) was increased one-month later ($P < 0.01$) (Table 2). In order to compare the mean of individual learning scores in both lecture and multimedia groups, the results of *repeated measures analysis of variance* showed that the time trend in learning of participants was significant in both groups ($P = 0.009$). However, there was no significant statistical difference between the time-group interaction ($P = 0.947$) (Fig. 1).

At the beginning of the study, there was no difference between the mean scores of nurses' perception and satisfaction from teaching in both groups, but significant difference was found in the scores one month after the training of the multimedia group compared with the lecture group ($P < 0.001$) (Table 3). The results of *repeated measures analysis* of *variance* showed that the time trend in satisfaction of nurses participating in the study was significant ($P<0.001$). But the interaction of time and group did not show a significant statistical difference ($P=0.370$). Furthermore, comparing two lecture and multimedia groups regarding the time trend also showed that the perception of the nurses participating in the study ($P<0.001$) and their increase in the multimedia group were significantly higher than the lecture group and the differences were statistically significant ($P=0.009$) (Fig. 2). In addition, the results of the scores of nurse's perception dimensions of teaching at the beginning and one month after the intervention in the multimedia and lecture groups indicated that there was only a statistical significant difference between the mean and standard deviation of content satisfaction and better understanding in both groups (Table 4).

Discussion

The findings of this study showed that nurse's learning scores increased one week and one month after teaching by traditional and multimedia methods, but this increase was significantly higher in multimedia teaching method. In this regard, the results of this study are in line with the results of the studies by Khandan, Khakbazan and Jabari, suggesting that the multimedia teaching method is superior to lecture(37). In addition, these results are consistent with the results of the study entitled as the effect of educational software method of arrhythmias stimulator on the level of knowledge of electrocardiograms interpretation in nurses suggesting increased knowledge of nurses in the interpretation of arrhythmias(38). Furthermore, the results of the study by Vahabi showed *increased learning rate* of the *nurses* about *triage* (39)as well as electrocardiogram interpretation learning of the students that were consistent with the results of this study. According to other researchers, it seems that the superiority of multimedia teaching method can be attributed to factors such as the convenience and easy access to educational content via the computer which result in increased learning ability of learners(40). Although teaching during the class session leads to tiredness feeling and learning at a specified and predetermined hour can lead to a widespread curtailment in learning, lack of time and place limitations in the multimedia teaching method improved the satisfaction of nurses. However, the findings of the study by Shahsavari et al(41), Qezelbash et al. (42)and Aslani Malayeri (43)are inconsistent with the results of our study, showing the superiority of lecture as a traditional teaching method. Shirley et al. suggested that education is effective when there is a communication between the learner and teacher(44). The reason for the discrepancy of the findings of various studies can be attributed to the nature of the courses taught, the study conditions and the statistical population used. In the posttest one month later, the multimedia teaching method had a greater effect on retention of nurses than lecture. Of course, a

significant increase in the mean scores after the intervention in the lecture and multimedia groups indicates the positive impact of teaching in both methods. Consistent with the recent study, Issa et al. also emphasized that computer-based teaching would enhance participants' learning(45). Moreover, the results of a study by Khatooni indicated the effectiveness of educational software on improving the cognitive, communication and practical skills of students which were consistent with the results of our study(46). Therefore, we can say that modern multimedia teaching method is better able to enhance persistent learning compared with the traditional methods (lecture). Perhaps the well-established reason for improved ability to recall the information learned in the multimedia approach is due to the similarity of the hierarchical layout of the concepts in the long-term memory of human and as a result, the information remains in memory for a long time(47-49). Furthermore, there are several factors which may contribute in the improved learning of multimedia group, including providing elaborations for the lesson, the presentation of organized content, the active participation and involvement of learners with the subject matter while studying, benefitting from audio and video facilities for greater attractiveness and better understanding of the content for the user and increased productivity and using a comprehensive database. The most important multimedia advantage over other forms of teaching is the flexible provision of information from one hand and providing feedbacks on the other hand. The main purpose of the multimedia application is to help learners to learn and to increase their literacy(50) . In addition, in a study by Michel, it was found students who used both methods had gained higher scores than those who used only lecturer method(51). Integration of movies, photos and animations with educational texts increases interest in learning and creating a balance between visual, written, and audio learning(52). The application of this method makes it possible to provide suitable individual learning opportunities tailored to the individual's talent(53). In other words, in order to design educational programs, it is better for planners to use a human-centered approach that focuses on the use of technology to help human cognition. Additionally, in a study by Nikolaraizi et al., it was shown that teaching through software package has increased the level of knowledge and learning(54) . Also, the perception and satisfaction of the participants in the multimedia teaching group were significantly higher than the lecture group. The results of a study by

Aggarwal showed that students who used multimedia teaching methods and were able to observe practical activities prior to attending the patient's bedside, were more satisfied, because it can provide for the learner to attain more mastery in learning, as well as enhance self-confidence. However, since there were no time and space limitations for the participation of learner in the multimedia teaching method, they had a more tendency toward it(55) . According to the theory provided by Jamshidi, diverse learning environment such as the Internet and computer allows learners to exploit diverse environments that emphasize learning theory at any time and place based on individual differences(56). Since today the multimedia teaching method is considered and emphasized as an important and binding step to provide lifelong teachings in all occupations and professions, it is recommended to pay special attention to the teaching method in the nursing profession. In this regard, research has shown that the multimedia teaching method is able to offer more convenient facilities and conditions for learners in terms of time and place.

Conclusion

The results of the study indicated that both lecture and multimedia teaching methods had a great effect on improving the level of nurses' learning in pain management and their level of satisfaction. However, in a multimedia approach, both the amount of information received and the recall of information have been observed to be higher and easier. Given the relative advantage mentioned and the difficulty for the participation of nurses in programs due to lack of nursing staff and their widespread *pre-occupation*, it is suggested to use the multimedia approach as a complementary teaching method, so that all nurses are able to obtain information in their preferred time and place.

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Table 1. Describes the baseline characteristics of the nurses participants in study between the two groups (n=100)

Demographic characteristic n(%)	**Multimedia (n=50)**	**Lecture(n=50)**	**χ^2 or t P value**
Age (year, M±SD)	37.88±7.03	36.74±6.53	*0.42
Marital status Frequency (%)Single Married/other	13(26) 37(74)	20(40) 30(60	****0.137**
Level of Education Frequency (%) Bachelor Master of Science	 47.94 3(6)	 49(98) 1(2)	*****0.363**
Previous pain instruction Frequency (%)**)** NO	40(80) 3(6) 7(14)	37(74) 2(4) 11(22)	*****0.648**

YES Unsure			
Organizational post Frequency (%) Nurse Head nurse Supervisor	 47(94) 2(4) 1(2)	 46(92) 2(4) 0.0	***0.559
Work type Frequency (%) Fixed Shift	 18(36) 32(64)	 16(32)) 34(68)	***0.679
Type of employment Frequency (%) Official Contractual	 33(66) 17(34)	 37(74) 13(26)	**0.673
Years of practice (year, M±SD)	12.78±6.58	12.42±6.53	*0.78

Table 2. Compare learning score of nurses in Pre-test, Post-test and Retention Test in two group

Group	Pre-Test (n=50)	Post-Test (n=50)	changes	P value (paired t test)	Pre-Test (n=50)	Retention Test (n=50)	changes	P value (paired t test)
Multimedia)50= (n	36.58±5.63	42.00±2.47	5.42±6.22	P<0.01	36.58±5.63	41.44±2.61	4.86±6.18	P<0.01
Lecture)50=(n	35.9±2±6.80	38.16±4.00	2.24±8.23	P=0.060	35.92±6.80	37.48±3.52	1.56±6.66	P=0.104
P value (inde-pendent t test(	p>0.05	P=0.001	P<0.03		P=0.001	P=0.001	P=0.01	

Post-Test after 1 week
Retention Test after 1 month

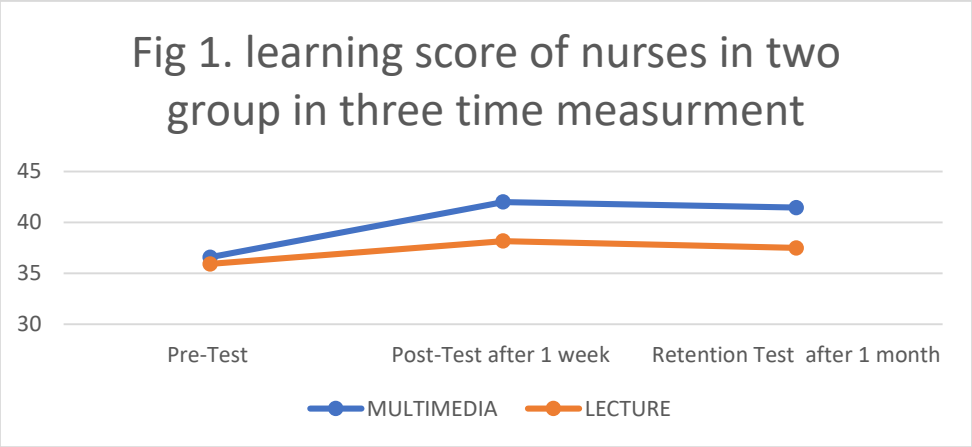

Table3. Compare Perception score of nurses in Pre-test, and Post-test in two group

Group	Pre-Test (n=50)	Post-Test (n=50)	changes	P value (paired t test)
Multimedia)50= (n	87.44±4.10	93.72±3.75	4.86±6.18	P<0.01
Lecture)50=(n	85.60±5.04	91.18±5.04	1.56±6.66	P=0.104
P value (independent t test(	p>0.05	P=0.001	P=0.001	

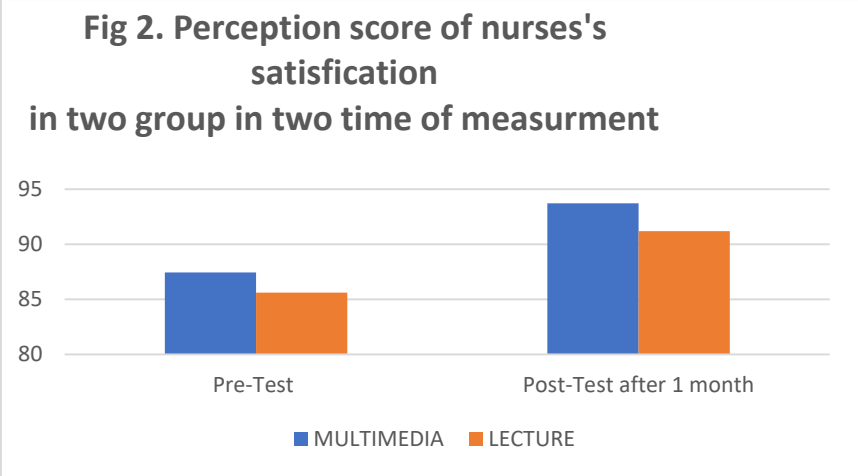

Table4. Compare Dimension of Perception score of nurses in Pre-test, and Post-test in two groups

Dimension of Perception score	group	Pre-Test (n=50)	Post-Test after 1 month (n=50)	score changes	P value (paired t test)
Content	Multimedia (n=50)	1.36±23.34	0.98±23.64	1.28±3.00	0.001
	Lecture (n=50)	1.56±23.12	1.92±22.70	1.95±0.42	
Better under-standing	Multimedia (n=50)	1.19±17.46	0.86±17.54	1.20±0.08	0.01
	Lecture (n=50)	1.17±17.12	1.23±16.98	1.35±0.14	
Setting learn-ing objectives	Multimedia (n=50)	1.21±17.137	1.21±17.37	1.04±5.82	0.27
	Lecture (n=50)	1.19±17.00	1.60±22.54	1.44±5.54	
Feedback	Multimedia (n=50)	0.40±5.80	0.48±5.82	0.37±0.02	0.23
	Lecture (n=50)	0.50±5.56	0.46±5.70	0.60±0.14	
Motivation	Multimedia (n=50)	1.21±23.46	1.21±23.52	0.93±0.06	0.18
	Lecture (n=50)	1.59±22.80	1.39±23.26	1.86±0.46	

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