International Journal of Risk & Safety in Medicine 22 (2010) 137–148
DOI 10.3233/JRS-2010-0504
IOS Press

Acceptability of an education computer multimedia on safe use of medication in patients and family members

Lai-Chu See[a,*], Pei-I. Peng[a], Na-Ling Lin[a], Hui-Ju Lai[b], Yi-Hua Chang[a], Wen-Chyi Jean[b] and Chao-Hui Wang[c]

[a]*Department of Public Health, Chang Gung University, Taoyuan, Taiwan*
[b]*Department of Digital Media Design, Ming Chuan University, Taoyuan, Taiwan*
[c]*Department of Nursing, Linkou Chang Gung Memorial Hospital, Taoyuan, Taiwan*

Abstract. *Background:* Programs for improving safety in medication often ignore the patient's perspective although patients are usually the victims of medication errors. Therefore, educating patients or family members to participate in safety prevention on medication use during care delivery is essential. The aim was to develop a computer education multimedia on patient's safe use of medication, and evaluate its acceptability and short-term effect.

Methods: The one group pre- and post-training design was used in outpatient or inpatient setting at Chang Gung Memorial Hospital, where located at northern Taiwan. A questionnaire about the past and future practice of medication use, and their satisfaction towards the multimedia was asked.

Results: One hundred twenty two participants were enrolled. The score of pretest were higher in family members than that in the patients ($p = 0.0152$). After showing the education multimedia, significant increase on the posttest was seen in both the patients (0.43 ± 0.6, $p < 0.0001$) and the family members (0.32 ± 0.6, $p < 0.0001$). Overall satisfaction was 98.2%.

Conclusion: Our education multimedia had short-term effect on raising the participants' awareness towards the safe use of medication. Their satisfaction of the multimedia was very high.

Keywords: Safe use of medication, education multimedia, patients and family members

1. Introduction

The active role of patients and family members in medication safety should be recognized and encouraged. Safety of medication usage is a prerequisite of good quality healthcare [17]. However, medication errors are frequent and are associated with increased costs for treatment [10]. Although the health care industry has redoubled its efforts to improve patient safety in the past decade, patients are usually the victims of medication errors or safety failure and programs for improving safety in medical settings often ignore the patient's perspective. As a matter of fact, patient should take the active responsibility for their own safety, because patients play an important role in helping an accurate diagnosis, in deciding

*Address for correspondence: Lai-Chu See, Ph.D., Department of Public Health, Chang Gung University, 259 Wen Hwan 1st Rd, Kweisan, Taoyuan, Taiwan. Tel.: +886 3 2118800, ext. 5119; Fax: +886 3 2118363; E-mail: lichu@mail.cgu.edu.tw.

appropriate treatment, in ensuring that treatment is appropriately administered, monitored and adhered to and in identifying adverse events and taking appropriate action [18]. When patients are incapable of expressing themselves, such as young children or seriously ill patients, family members become surrogate decision makers.

In the US, a standardized "Drug Facts" label on more than 100,000 over-the-counter (OTC) drugs was required by the FDA in 2002. The label clearly lists active ingredients, uses, warnings, dosage, directions, how to store the medicine, and inactive ingredients [6]. Since 2004 in Taiwan, all prescribed medication were required to be tagged with drug information (active ingredients, trade mark, therapeutic indications, appearance, dosage, uses, side effects, warnings, dispense date, finishing date, how to store the medicine), patient information (name, chart number, date of birth, age, gender), name of the physician and pharmacist, general advice (make sure the match of patient's name, pay attention to the medication name, use, route, means of administering the medication, overdose) and phone number and website of drug consultation [4]. It is important to convey the information about safe use of medication for patients and family members so that they can be essential partners to be involved in drug safety.

The aim of this study was to develop a computer education multimedia on patient's safe use of medication, and evaluate its effectiveness in increasing the attitude of patients and their family members towards their own safe use of medication.

2. Methods

2.1. Content and design of the education multimedia

The education multimedia on safe use of medication was in Chinese and was designed based on the Kinzie's five-stage framework for instructional design strategies for health behavior change except for the last stage [8]. The stages were:

(1) Gain attention: A hypothetical story about a motorcycle accident due to overdose of anti-itching medication was made up to convey health threats of non-adherence of medication.
(2) Present stimulus material: The multimedia started at a front page with a title, an objective and brief description of the main character, Mr. Wang, in the hypothetical story. The hypothetical story followed (Fig. 1) afterward. Mr. Wang was hospitalized due to a motorcycle accident. He recalled that he felt to sleep while riding a motorcycle. The drowsiness was possibly caused by having 2 anti-itching capsules instead of the prescribed one because he felt an itchy skin and had forgotten to take a capsule the previous night.
(3) Provide learning guidance: Information about safe use of medication was displayed afterward (Fig. 2).
(4) Elicit performance and provide feedback: The research assistant asked relevant questions about the multimedia (what cause the motor-cycle accident and what action should be taken when taking a medicine) and a gift certificate (NT$100) was given to the participants who first gave the correct answers.

After the story script was made, the project manager and animators communicated the detailed story, duologue, and art style carefully in order to reduce numbers of modification. Macromedia Flash MX 2004 was used to make the multimedia. Photoshop CS was used to edit the Flash program components (working

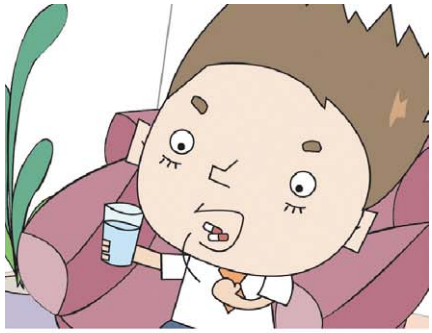
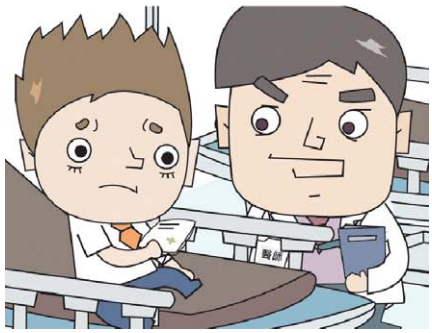
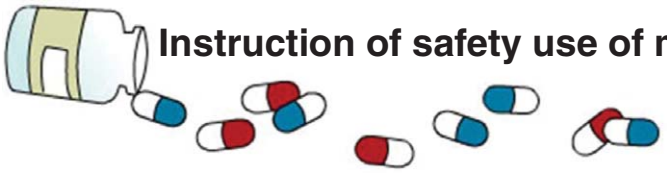
(1)		I felt so itchy and it must be due to I forgot to take the medicine last night. How about take two capsules instead of one.
(2)		Bang!
(3)		Ao-E-Ao-E
(4)		Dr: It's very dangerous to take too much dose. Wherever taking any medicine, be sure to find out the amount needed each time, and things to be aware of.

Fig. 1. Abbreviated hypothetical story (cartoon) of safe use of medicine.



Instruction of safety use of medicine

Using medications safely

To use medication safely, follow these guidelines:

When seeking treatments:

1. Take the initiative to tell your medical doctor any medications you are taking.

After picking up your medication:

1. Verify the name on the container is yours.
2. Read the directions and suggestions on the container.

Be sure to:

1. Avoid keeping your medication in a hot or humid environment.
2. Record whether you have any discomfort after taking the medication, if so tell your doctor on your next visit.

Do not:

1. Stop taking the medication or reduce the dosage without doctor authorization.
2. Engage in activities you may be advised to avoid (i.e. vigorous activity, operating a motor vehicle) for certain prescribed medication.

Fig. 2. Abbreviated instruction of safe use of medicine.

with character design, model building, texture mapping, lighting effect, scene building, rendering, and sound effects).

The multimedia was a short movie which can be displayed in TV and computer. The duration of the multimedia is 3.5 minutes long. During the study period, to allow more people to see and hear the multimedia, a portable screen (180 cm × 180 cm), notebook and amplifier were used to show the multimedia.

2.2. *Evaluation of the multimedia*

Experts: (2 pharmacists, 3 head nurses, 1 surgeon, 1 anesthetist, 2 academic professors) reviewed the multimedia content throughout development to ensure the correctness, logic, and reality. A beta-version of the multimedia was shown in a meeting with the Director of the Taoyuan Public Health Bureau, 3 members of Patient Safety Committee of Chang Gung Memorial Hospital (CGMH), 3 head nurses of

local public health offices. Formative feedback from that group was incorporated into the design of the final version.

2.3. Study design

A one-group pre- and post-training design was used. Patients or family members who were aged 18 or above, and sought treatment in outpatient or inpatient setting at CGMH were invited for the study. Participants first filled out the questionnaire about their demographic information and past practice of safe use of medication (pre-training score). The education multimedia of safe use of medication was then displayed by the trained research assistant. After finishing the multimedia, participants wrote their anticipated future practice of safe use of medication (post-training score) and satisfaction of the multimedia.

This research was approved by the Institutional Ethic Review Board of CGMH (94-617B), and all participants signed the informed consent.

2.4. Measurements

Practice of safe use of medication in the past or in the future was assessed using a 7-item investigator-developed tool (Table 2). Item 1 is related to the compliance of taking the medication. Item 2 is related to knowing and observing the effects, side-effects, reactions of the medication being taken. Item 3-4 are related to communicating with health care workers with regard to the medication. Item 5 is related to checking the information of the medication, patient's name. Item 6-7 are related to storing medication and not taking others' medication. Four options (1 = never, 2 = occasionally, 3 = often, 4 = always) in each item could be chosen. The higher the score represented better practice of safe use of medication. To maintain such consistence, the score in questions with reverse meaning (item 7) were converted by 4 minus the obtained score.

After the questionnaire was developed, content validity of the questionnaire was also assessed by having the same experts (2 pharmacists, 3 head nurses, 1 surgeon, 1 anesthetist, 2 academic professors) rated its appropriateness, clarity and feasibility on a 5-point scale. With two exceptions (3.9 points), the average score for all individual questions over 4 points. Therefore, with the exception of some changes of wording, no major revisions were made on the questionnaire [16].

Satisfaction of the multimedia (6-items) was asked to assess the acceptability of the multimedia, including sufficient material, understanding, helpful content, matches the instructional theme, pace, and overall satisfaction (Table 3). One open-ended question was included to obtain individual preference and suggestion.

2.5. Sample size and statistical analysis

A sample size of 50 pairs with a correlation of 0.4 achieves 90% statistical power to detect a difference of 0.5 from the null hypothesis mean difference of 0.0 at the 0.05 significance level using a two-sided paired *t*-test. Wilcoxon signed rank test or paired *t*-test was made to compare the change between pre-training and post-training score within the same group, where appropriate. Chi-square test, Fisher's exact test, independent t or Wilcoxon rank sum test was made to compare the data between the patients and the family members where appropriate. Significant level was 0.05.

3. Results

3.1. Demographic characteristics

Between October and December 2005, 21 displays of the multimedia were made. A total of 147 study subjects participated and 122 (83%) filled out the questionnaire properly. Fifty-eight were patients and 64 were family members. Many participants (59.4%) were from outpatient clinics. Surgical, internal medicine or pediatrics were the common departments where participants were recruited. No patients from the pediatrics department participated in the study.

Female participants (62%) were outnumbered male participants (38%). Their average age was 40 (SD = 12.3). Most participants had an educational level of secondary school or above. Half of the participants were unskilled employees, followed by store owners, staffs (22%). About one-third of the participants did not have a personal income, followed by 32.7% of participants who earn a monthly income between NT$30,000 and NT$59,999. Gender, age, education, occupation, and monthly personal income did not differ significantly between the patients and family members (Table 1).

3.2. Past practice of safe use of medicine (pre-training)

Among 7 items about the safe use of medicine, "not increasing or decreasing the amount of medicine intake, or stopping the intake of medicine without the medical doctor's consent (item 1)", "knowing the effects and side-effects, reactions of the medicine being taken, and observing and recording any side-effects or adverse reaction after each intake of the medicine (item 2)" had the two lowest scores. The items with the highest scores were "correctly placing medicine (in a properly labeled container, in the fridge as instructed, or in place to avoid heat or humidity) (item 6)" and "not taking others' prescribed medicine or any unknown manufacture-made medicine (item 7)".

Significantly worse scores were seen in the patient group when compared to the family member group on item 3 ($p = 0.0376$), item 4 ($p = 0.0016$), and item 5 ($p = 0.0401$). The overall average score of past practice of safe use of medication was significantly higher in the family member group than that in the patient group ($p = 0.0152$) (Table 2).

3.3. Future practice of safe use of medicine (post-training)

In the patient group, significantly increase in 4 items was seen after the education multimedia was shown. The average score for future practice of safe use of medication was 3.41. This was a significant increase of 0.43 ± 0.6 when comparing with the pre-training score ($p < 0.0001$) (Fig. 3). In the family member group, 3 items had significantly higher post-training score than the pre-training score. The average score for future practice of safe use of medication was 3.57 and was significantly higher than that of the pre-training score (0.32 ± 0.6, $p < 0.0001$) (Fig. 4). There was no significant difference in the increase (= post-training − pre-training) between the two study groups ($p = 0.4632$).

3.4. Satisfaction of the animation

Most participants were satisfied on our education multimedia in regards to information sufficiency, easy understanding, helpful material, matching the theme, pace and overall satisfaction. No significant difference in the items of satisfaction was seen between the two study groups (Table 3).

Table 1
Comparing the demographic characteristics between patients and family members

	Total ($n=122$)	Patient ($n=58$)	Family members ($n=64$)	p
Patient type				0.0502*
Outpatient	73 (59.4%)	40 (69.0%)	33 (51.6%)	
Inpatient	49 (40.2%)	18 (31.0%)	31 (48.4%)	
Department§				<0.0001†
Surgical	40 (33.1%)	20 (34.5%)	20 (31.8%)	
Internal medical	34 (28.1%)	17 (29.3%)	17 (27.0%)	
Pediatric	16 (13.2%)	0 (0.0%)	16 (25.0%)	
Obstetric and gynecologic	15 (12.4%)	10 (17.2%)	5 (7.9%)	
Chinese medicine (obstetric)	9 (7.4%)	8 (13.8%)	1 (1.6%)	
Other	7 (5.6%)	3 (5.2%)	4 (6.4%)	
Gender				0.7452*
Female	76 (62.3%)	37 (63.8%)	39 (60.9%)	
Male	47 (37.7%)	21 (36.2%)	25 (39.1%)	
Age				0.4511‡
Mean ± SD	40.1 ± 12.3	39.2 ± 12.9	41.0 ± 11.7	
Min.–Max.	18–73	18–71	19–73	
Education§				0.6578†
Illiteracy	2 (1.7%)	1 (1.7%)	1 (1.6%)	
Elementary	14 (11.7%)	7 (12.1%)	7 (11.5%)	
Junior high	16 (13.3%)	7 (12.1%)	9 (14.8%)	
Senior high	38 (32.5%)	17 (29.3%)	21 (34.4%)	
College	27 (22.5%)	12 (20.7%)	15 (24.6%)	
University	17 (14.1%)	12 (20.7%)	5 (8.2%)	
Master or over	5 (4.2%)	2 (3.5%)	3 (4.9%)	
Occupations§,II				0.2002†
6	54 (49.5%)	31 (58.5%)	23 (41.1%)	
5	13 (11.9%)	4 (7.6%)	9 (16.1%)	
4	12 (11.0%)	7 (13.2%)	5 (8.9%)	
3	24 (22.0%)	10 (18.9%)	14 (25.0%)	
2	3 (2.8%)	1 (1.9%)	2 (3.6%)	
1	3 (2.8%)	0 (0.0%)	3 (4.9%)	
Personal income per month (NT$)§				0.6037†
None	36 (32.7%)	20 (37.7%)	16 (28.1%)	
<30,000	28 (25.5%)	13 (24.5%)	15 (26.3%)	
30,000–59,999	36 (32.7%)	15 (28.3%)	21 (36.8%)	
60,000–99,999	8 (7.3%)	5 (9.4%)	3 (5.3%)	
100,000–149,999	1 (0.9%)	0 (0.0%)	1 (1.8%)	
>150,000	1 (0.9%)	0 (0.0%)	1 (1.8%)	

*: Chi square test; †: Fisher's exact test; ‡: Independent t test; §:1, 3, 13, 12 missing for department, education, occupation, personal income per month (NT$); II: Occupations: 1 = higher executives of large concerns, proprietors, and major professionals; 2 = business managers, proprietors of medium-sized businesses, and lesser professionals; 3 = administrative personnel, owners of small businesses, minor professionals, clerical and sales workers, technicians, and owners of little businesses; 4 = skilled manual employees; 5 = machine operators and semiskilled employees; 6 = unskilled employees.

Table 2
Past practice on safe use of medicine (pre-training)

Item	Patient ($n=58$) Mean ± SD	Family member ($n=64$) Mean ± SD	p*
1. Not increasing or decreasing the amount of medicine intake, or stopping the intake of medicine without the medical doctor's consent.	2.53 ± 1.2	2.83 ± 1.2	0.1589
2. Knowing the effects and side-effects, and reactions of the medicine being taken, and observing and recording any side-effects or adverse reaction after each intake of the medicine.	2.59 ± 1.1	2.69 ± 1.2	0.6155
3. Asking health care workers regarding the function, side-effects, how often medication is to be taken, the amount of medication needed to be consumed each time, and things to be aware of after obtaining your medicine.	2.73 ± 1.0	3.11 ± 1.0	0.0376†
4. Taking the initiative and honestly telling your medical doctor about the Chinese medicine, western medicine, health care nutriments, history of allergic reactions, special conditions (i.e. pregnancy, chronic illness) that you have.	2.84 ± 1.1	3.43 ± 0.9	0.0016†
5. Carefully checking the patient's name, name of medication, methods of use, dosage, route, administer means, etc. on the bag to make sure all information is correct after obtaining your medicine.	3.19 ± 1.0	3.53 ± 0.8	0.0401†
6. Correctly placing medicine (in a properly labeled container, in the fridge as instructed, or in place to avoid heat or humidity).	3.45 ± 0.9	3.50 ± 0.9	0.6773
7. Taking others' prescribed medicine or any unknown manufacture-made medicine. (Reversed the score value to create consistent value.)	3.70 ± 0.6	3.69 ± 0.6	0.8759
Average	2.99 ± 0.6	3.25 ± 0.6	0.0152†

*: Wilcoxon signed rank test; †: $p < .05$.

4. Discussion

Patients or family members have a key role to pay in ensuring the safe use of medication and should be encouraged to become an active member of their health care team. The purpose of our computer education multimedia on safe use of medication was to raise the awareness or increase the future safety practice of medication use in patients and their family members. Participants reacted positively to our multimedia and a significant increase of post-training scores was seen in both the patients' and family members' responses.

4.1. Practice on safe use of medication

4.1.1. Medication errors

Medication errors may stem from lack of patient understanding about a drug's directions [13]. In Taiwan, although the therapeutic indications and drug information are available in the drug bag, the

Table 3
Satisfaction on the computer animation of safe use of medicine

	Total ($n=122$)	Patient ($n=58$)	Family members ($n=64$)	p*
Sufficiency of content†				0.6585
Too little	12 (10.5%)	7 (12.7%)	5 (8.5%)	
Just right	99 (86.8%)	47 (85.5%)	52 (88.1%)	
Too much	3 (2.6%)	1 (1.8%)	2 (3.4%)	
Understanding†				0.1750
Very difficult	3 (2.6%)	2 (3.6%)	1 (1.7%)	
Difficult	2 (1.7%)	2 (3.6%)	0 (0.0%)	
Easy	50 (43.1%)	28 (48.2%)	24 (38.3%)	
Very easy	61 (52.6%)	25 (44.6%)	37 (60.0%)	
Helpful†				0.8053
No at all	0 (0.0%)	0 (0.0%)	0 (0.0%)	
No	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Yes	67 (57.8%)	33 (58.9%)	34 (56.7%)	
Very helpful	49 (42.2%)	23 (41.1%)	26 (43.3%)	
Matches the Theme†				0.7388
Yes	111 (98.2%)	54 (98.2%)	57 (98.3%)	
No	1 (0.9%)	1 (1.8%)	0 (0.0%)	
No comment	1 (0.9%)	0 (0.0%)	1 (1.7%)	
Pace†				0.1724
Too slow	2 (1.7%)	2 (3.6%)	0 (0.0%)	
Moderate	109 (94.8%)	51 (91.1%)	58 (98.3%)	
Too fast	4 (3.5%)	3 (5.4%)	1 (1.7%)	
Overall satisfaction†				0.2710
Very unsatisfied	2 (1.8%)	2 (3.6%)	0 (0.0%)	
Unsatisfied	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Satisfied	80 (70.8%)	41 (73.2%)	39 (68.4%)	
Very satisfied	31 (27.4%)	13 (23.2%)	18 (31.6%)	

*: Fisher's exact test; †: 8, 6, 6, 9, 7, 9 missing for sufficiency of content, understanding, helpful, matches the theme, pace, overall satisfaction.

pre-training scores of non-compliance of prescribed medication use (item 1) and not knowing the effects, side effects, reaction of the medication (item 2) received the lowest rating in our study. As a matter of fact, these two safety practices of medication are related. When patients do not know very well about the benefit and the risk of medication, it is more likely that they would not follow the physician's order.

Unfortunately, after our education multimedia intervention, only item 2 had a significant improvement in both groups. In fact, the non-compliance with physician's order to complete the entire medication is quite common in Taiwan, according to a study conducted by a random telephone survey [11]. Nearly 60% (= 904/1507) of adults self-reported that they were not compliant the entire medical course [11]. People were found to accept their medicines either passively or actively, or to reject them. Some were coerced into taking medicines. Active accepters might modify their regimens by taking medicines symptomatically or strategically, or by adjusting doses to minimize unwanted consequences, or to make the regimen more acceptable [15]. Many modifications appeared to reflect a desire to minimize the intake of medicines.

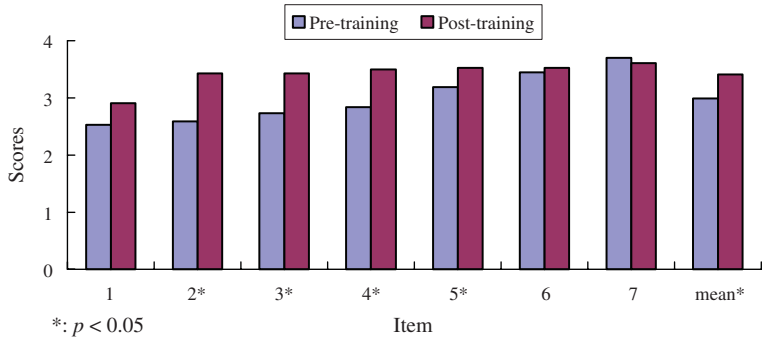


Fig. 3. Comparing the past and future practice on safe use of medicine for the patient group. Please refer to Table 2 for explanation about each item ($n = 58$).

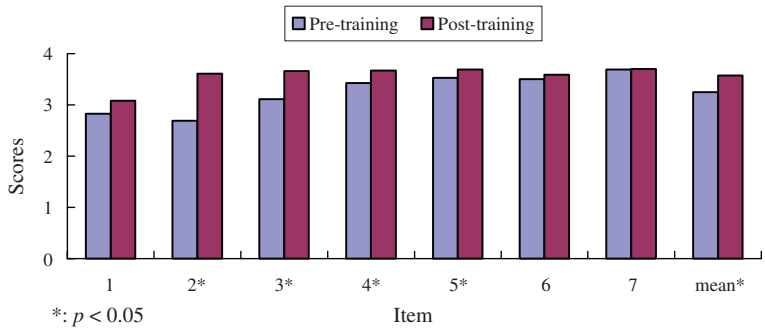


Fig. 4. Comparing the past and future practice on safe use of medicine for the family member group. Please refer to Table 2 for explanation about each item ($n = 64$).

4.1.2. Communication errors

Communication errors are responsible for 16% of fetal medication error [13], but it can be avoided if communication between patients and physicians was encouraged. Patients who are given full information about what the medicine is for and its effects, including side effects, are more likely to compliance and lead to better health outcomes [18]. Our low pre-training scores in item 3 and 4 reflected infrequent communication about medication use in patients/family members and health care professional, which is consistent with Coulter's finding [2]. In our study, we saw significant improvement in the post-training score in item 4–5 were seen in the both groups after showing the education multimedia.

Furthermore, the pre-training score in these two items (item 3–4) for patients (2.7 and 2.8, respectively) was lower than those for the family member (3.1 and 3.4, respectively). We suspect that family members recruited in our study were major care givers and were the ones who communicated with health care professional in regards to medication use. This situation can be seen the same in item 5, which family members put more attention on making sure all information on the drug bag was correct.

4.1.3. Instruction about mediation use

In our study, both the patients and family members received a high pre-training score on item 6–7, with no significant difference between the two study groups. It implies that most people in our study already have a good practice of these two actions. As our study has already shown good instruction

about medication use, it leads to non-significant improvement of these items after seeing our education multimedia in both the patients and the family members.

4.2. Effect of the education multimedia

In our education multimedia, we convey the threat about the car accident due to overdose of medicine. Significant improvement of post-training score in the two study groups was seen.

Multimedia can be effective, innovative and overcomes barriers of limited local access to educational and support services. The advantages of education animation media for health care issues are: It takes up little space, it is easy to share, it delivers high quality information to large numbers of patients, it is suitable for low literacy receivers [12], it has relatively low cost, it gives learners more time and chance to repeat the film, it can be widely used in a variety of primary care settings [3, 5, 7, 9, 14, 19]. The Lehigh group in Pennsylvania, USA in 2002, reported that patients felt more comfortable talking with their health care workers about questions or concerns after viewing the video of patient safety [1]. In our study, participants reported a high level of satisfaction with regards to sufficiency of instructional content, ease of understanding, helpfulness of information, theme matching, appropriateness of pace and overall satisfaction.

5. Limitations

The findings of this study must be interpreted with caution because of the lack of a control group. Long-term effects of the educational multimedia instruction cannot be determined because the data on intentional safety practice of medicine was obtained right after showing the education multimedia. Our sample was not representative because participants were recruited from one hospital only. Further studies employing a randomized controlled trial are suggested to determine both efficacy and long-term effects of using educational media instruction on patient's safe use of medication in the public.

6. Conclusion

In conclusion, non-compliance of prescribed medication use, or not knowing the effects, side effects, and reaction of the medication are quite common in the patients and family members in Taiwan. Family members, who are the care givers of the patients, were the ones who communicated with health care professionals in regards to medication use. Thus, communication about medication use between patients and health care professional should be encouraged. Our data also show that patients and family members had a good practice about storing the medicine and not taking others' medicine. Our education multimedia had short-term effect on raising the patient and their family's awareness towards the safe use of medication by conveying the threat about overdose of medicine and providing learning guidance. Satisfaction of our education multimedia from both the patients and family members was very high.

7. Practice implication

The education material, Mandarin version of the multimedia and a handbook, about safe use of medication in this study is available in a website [4]. The Holo, Hakka, and English version are available upon request from the first author of the study. We welcome health institutes, health professionals, patients,

family members or the public download the material and learn the material at their own pace. It is hoped that patients and family members play an active role in safe use of medication so that medication error can be reduced.

Acknowledgements

Advices on the questionnaire, the script and beta version of the education multimedia provided by experts are highly appreciated. Identifiers for patients or family members have been removed in this study. This study was supported by Department of Health (grant # PMRPD3012). We also thank for the grant from Ministry of Education (grant # EMRPD150051) for patient safety of research assistants and the protection of Holo, Hakka and English version of the education multimedia.

References

[1] R. Anthony, F. Miranda, Z. Mawji, R. Cerimele, R. Davis and S. Lawrence John M. Eisenberg. Patient Safety Awards, The LVHHN patient safety video: Patients as partners in safe care delivery, *Joint Commission Journal on Quality and Safety* **29** (2003), 640–645.
[2] A. Coulter, Quality of hospital care: Measuring patients' experiences, *Proc R Coll Phys Edinb* **31** (2001), 34–36.
[3] M.A. Diefenbach and B.P. Butz, A multimedia interactive education system for prostate cancer patients: Development and preliminary evaluation, *Journal of Medical Internet Research* **6** (2004), 25–31.
[4] DOH: Education multimedia for patient safety. Available at: http://www.health99.doh.gov.tw/educZone/edu_detail.aspx?Catid=50145&Type=N, Accessed December 30 2009.
[5] S. Evrard, S. Mathoulin-Pelissier, C. Larrue, P. Lapouge, E. Bussieres and C.T.D. Lara, Evaluation of a preoperative multimedia information program in surgical oncology, *European Journal of Surgical Oncology* **31** (2005), 106–110.
[6] R.E. Ferner and J.K. Aronson, Clarification of terminology in medication errors: Definitions and classification, *Drug Safety* **29** (2006), 1011–1022.
[7] C.T. Furstenberg, J.A. Carter, J.V. Henderson and T.A. Ahles, Formative evaluation of a multimedia program for patients about the side effects of cancer treatment, *Patient Education and Counseling* **47** (2002), 57–62.
[8] M.B. Kinzie, Instructional design strategies for health behavior change, *Patient Education and Counseling* **56** (2005), 3–15.
[9] S. Klima, W. Hein, A. Hube and R. Hube, Multimedia preoperative patient information, *Chirurg* **76** (2005), 398–403.
[10] A. Krahenbuhl-Melcher, R. Schlienger, M. Lampert, M. Haschke, J. Drewe and S. Krahenbuhl, Drug-related problems in hospitals: A review of the recent literature, *Drug Safety* **30** (2007), 379–407.
[11] C.C. Liao, Y.K. Chang, H.H. Chen, C.Y. Lu, L.Y. Huang and F.C. Sung, Knowledge and use of antibiotics among people in Taiwan, *Taiwan J of Public Health* **25** (2006), 135–142. [Chinese]
[12] A. McPherson and C. Glazebrook, Double click for health: The role of multimedia in asthma education, *Archives of Disease in Childhood* **85** (2001), 447–449.
[13] M. Meadows, Strategies to reduce medication errors, How the FDA is working to improve medication safety and what you can do to help, *FDA Consumer* **37** (2003), 20–27.
[14] Z. Mercer and M.A. Sweeney, Developing patient education programs with multimedia technology incorporating patient feedback into program design, *Medinfo* **8 Pt 2** (1995), 1186–1189.
[15] P. Pound, N. Britten, M. Morgan, L. Yardley, C. Pope, G. Daker-White and R. Campbell, Resisting medicines: A synthesis of qualitative studies of medicine taking, *Soc Sci Med* **61** (2005), 133–55.
[16] L.C. See, P.I. Peng, L.H. Tsai, Y.M. Shen, N.L. Lin, K.L. Chuang, C.J. Peng and C.H. Wang, Design and assessment of validity and reliability of a questionnaire about patient-based practice of patient safety, *Journal of Healthcare Quality* **3** (2009), 44–52. [Chinese]
[17] G. Velo and B. Hugman, The erice manifesto: For global reform of the safety of medicines in patient care, *Drug Safety* **30** (2007), 187–190.
[18] C.A. Vincent and A. Coulter, Patient safety: What about the patient? *Quality and Safety in Health Care* **11** (2002), 76–80.
[19] D. Wiljer and P. Catton, Multimedia formats for patient education and health communication: Does user preference matter? *Journal of Medical Internet Research* **5** (2003), 1–7.