

Original Article

Effectiveness of Multimedia Nursing Instruction in Nasogastric Tube Care by Foreign Caregivers in Taiwan: A randomized control study

Mei-Ju Chen^{1,2}, Yu-Hua, Lu^{1,3}, Chiu-Hsiang, Lee^{1,2}, Ming-Yi, Hsu^{1,2}, Shu-Hsin Lee^{1,2,4}

¹ Department of Nursing, Chung Shan Medical University Hospital, Taichung, Taiwan

² Department of Nursing, Chung Shan Medical University, Taichung, Taiwan

³ Department of Nursing, Chung Shan Medical University Hospital Chung Shing Branch, Taichung, Taiwan

⁴ Institute of Medicine, Chung Shan Medical University, Taichung, Taiwan

Purpose: Since 2010, Taiwan has become an aging society. Some of the elderly and patients with chronic disease rely on foreign caregivers for long-term care. The care-giving skills of these foreign caregivers greatly influences their clients. The purpose of this study is to investigate the effectiveness of multimedia nursing instruction on the knowledge and skill for nasogastric tube (NGT) care by Foreign caregivers.

Methods: This randomized control study was carried out in the rehabilitation wards of a district hospital in Taiwan. Twenty-two cases were recruited for the experimental group and twenty-one for the control group from two rehabilitation wards by cluster sampling. After the pretest for NGT feeding knowledge and skill, the experimental group received multimedia nursing instruction while the control group received routine education. A posttest of NGT feeding knowledge was performed immediately after intervention and skills continued to be evaluated on days 1, 3, and 14. The descriptive and inferential analyses of data were performed by SPSS/PC 22.0.

Results: The demographic data of experimental and control groups were homogeneous. The pretest of knowledge and skill for two groups were no significant. After multimedia nursing instruction, the knowledge of the experimental group for NGT feeding showed more improvement compared to the control group ($p<.01$). Regarding skill of NGT feeding, the posttest results of the experimental group were better than the control group on day 1 ($p<.01$), day 3 ($p<.01$) and day 14 ($p<.01$).

Conclusions: For basic needs of the care technology such as NTG care, applying multimedia nursing instruction could improve the knowledge and skills of foreign caregivers in NGT care. Attention should be paid to the use of multimedia and teaching materials in the native language of foreign caregivers.

Keywords: multimedia nursing instruction, foreign caregiver, nasogastric tube

1. Introduction

The global population is aging quickly. The population aged 60 and older will reach 2.1 billion in 2050.¹ Although Taiwan has only recently become an aging society, it has one of the fastest growing populations of the elderly. The aged population reached 11.75% in 2014 and the population aged 65 and older accounted for 14.05% in 2018. It is estimated that, in 2060, the aging population of

* Correspondence Author: Shu-Hsin Lee

Address: No. 110, Sec. 1, Jianguo N. Rd., Taichung City, 40201, Taiwan

Tel: +886-4-24730022 ext. 12323

E-mail: shl@csmu.edu.tw

Taiwan will be the second highest in the world, reaching 39.27%. At that time, every elderly person will be supported by 1.2 producers aged between 20 and 64. Currently, the disabled population accounts for 5.0% of the total population in Taiwan.²⁻³ Foreign caregivers have become the major source for long-term care assistance. According to Executive Yuan's Accounting and Statistics, there are 258,078 foreign caregivers working in Taiwan. Most of these foreign caregivers are Indonesian with a total of 197,985, accounting for 76.7% of all foreigners.⁴ With the drastic change in social patterns and family structures, more and more of the elderly and disabled population rely on foreign caregivers to relieve the economic load and physical burden of family members and to satisfy the increasing demands of long term care-giving in Taiwan.

Nasogastric tube feeding plays an important role in the management of patients in rehabilitation wards and long term care facilities. It was found that after clinical nursing instruction, foreign caregivers still made errors in their care-giving techniques, which could not be easily corrected even with further instruction.⁵ But very few focus on the effectiveness of instruction for NGT nursing interventions for foreign caregivers.

The language barrier does put foreign caregivers in a more difficult situation than domestic caregivers.³ Currently, health care instruction in digital format with video and audio content are strongly promoted by domestic hospitals with the hope of achieving training accuracy as well as conserving time, manpower and spending with standardized training materials. At home, foreign caregivers care for the patient's nasogastric tube 24 hours a day, therefore it is essential that the care is done correctly. Although foreign caregivers have been in Taiwan for over twenty-two years, the research on their care-giving quality is still scarce. The purpose of this study was to analyze the effectiveness of multimedia nursing instruction on NG tube feeding by Indonesian caregivers.

Literature Review

1. Current status of foreign caregivers globally and in Taiwan

Most developed countries face the same problem of the shortage of long-term caregivers as mentioned by the OECD (Organization for Economic Co-operation and Development). Introducing overseas workers is the fastest solution. Foreign caregivers account for 33% of the workforce in the US. The percentage in Italy is surprisingly high at 72%, with one million foreign caregivers.⁶⁻⁷ A multinational survey conducted in Canada, the USA, the UK and Ireland found that 24-42% of the interviewees agreed that the quality of foreign care-giving is superior. However, a study in Italy showed that patients with foreign caregivers have a higher chance of re-visiting the hospital.⁸⁻¹⁰ The fact that the quality of foreign care-giving varies drastically in different countries accentuates the importance of studying the quality of foreign care-giving in our own country. Research on foreign caregivers is lacking, domestically and abroad. Currently, there are two hundred and sixty thousand foreign caregivers in Taiwan and 94.9% of them care for patients in their own residence. In Taiwan, 76.7% of foreign caregivers come from Indonesia, 17.3% from Vietnam, and 12.0% from the Philippines.⁴ In clinical practice. In terms of the care taking skills, there is no law mandating that certain training courses must be completed before one can become a caregiver. The foreign caregiver looks after the patient around the clock. Any accident caused by improper care may eventually result in serious complications. If foreign caregivers can receive proper training from the start, their stress may be reduced and the quality of care will improve.¹⁰⁻¹²

2. Care of the NGT and its effects on patient safety

According to statistical data from 2019, provided by the Taiwan Patient Safety Reporting System, adverse events involving nasogastric tubes are the third highest (36.8%) of all events. Comorbidities associated with NGT accidents include secondary injuries to the patient, change in disease progression, extension of hospital stay, patient death, etc, which exemplifies the importance of quality of care. Thus increasing the risk of aspiration if the position of the patient's head is too low, the patient's stomach is not properly emptied or the residual gastric volume is

too high.¹³⁻¹⁴

3. Effectiveness of applying multimedia nursing instruction for foreign caregivers

Previous research has shown that multimedia instruction is the most effective way of learning and can establish long-lasting memories in the brain. Silent pictures are the second most effective way.⁶⁻⁷ Written descriptions require the most amount of time for learning. Therefore, while giving nursing instruction to foreign caregivers, illustrated instruction sheets with bilingual instructions accompanied by oral instructions, followed by bilingual multimedia, which they can watch repeatedly are helpful.¹⁵⁻¹⁶ Multimedia teaching employs sounds, texts, pictures, animated images to trigger the learner's interest, change attitudes, and induce behavior dynamics.⁶ It includes DVD discs, audio tapes, and flash cards. DVD discs, used as a teaching material, can be watched repeatedly to reinforce the learner's memory and visual attention, making learning more effective. Teaching in a multimedia format is also a lot cheaper than a conventional format in terms of labor costs.¹⁷ It has been shown in literature that using a multimedia teaching model in nursing care can reduce the time of nursing instruction and the influence of environmental interferences on learning and, therefore, allows for more time for the nursing personnel to improve nursing quality at higher levels.³

2. Methods

2.1. Study Design

A randomized control design was used for this study. To avoid mutual influences, participants were recruited from rehabilitation wards by cluster sampling in a district hospital in Taiwan. The participants with random allocation sequence. Patients are randomly allocated when they admission. After the pretest for NGT feeding knowledge and skill, the experimental group received multimedia nursing instruction while the control group received routine education. A posttest of NGT feeding knowledge was performed immediately after instruction was given and continued to be evaluated on days 1, 3, and 14.

This study was guided by the CONSORT checklist (Schulz, Altman, Moher, & the CONSORT Group, 2010).

Participants and Sample Size

Data were collected from July 1st to December 31st, 2016. Eligibility criteria for participants: 1. The caregiver's nationality had to be Indonesian and his or her main job in Taiwan was care-giving. 2. The caregiver had to be taking care of a patient with a chronic disease with a NGT who required constant care. 3. The actual time spent by the Indonesian caregiver was at least three days. Substitute or replacement Indonesian caregivers were excluded.

The sample size for a one-tailed test was determined with an effect size of .75, $\alpha = .05$, and $1-\beta = .8$. Therefore, the estimated size for the experimental and control groups were 23 each, with a total of 46 cases. There were 3 missing cases. In the experimental group, one patient needed to be transferred to another hospital for treatment on day 10. In the control group, one Indonesian caregiver went back home and one changed employers. Twenty-two cases were recruited for the experimental group and twenty-one for the control group at the end of the study (Fig. 1). The attrition rate was 6.5%.

Multimedia Nursing Instruction

Multimedia nursing instruction for NGT care included a digital film and an instruction sheet. The multimedia nursing instruction disc contained teaching using a training manikin and was narrated in Indonesian. It included key steps such as hand washing, keeping the head of the bed elevated by 30-45°, drawing from the NGT to examine the amount of residual food, injecting 30cc of drinking water before feeding, flushing the tube with 30-60 cc of drinking water, and maintaining the sitting position for 30 minutes after feeding. The total length of the film was 1 minute 30 seconds. The nursing instruction sheet contained images of the key steps and explanations with Chinese and Indonesian bilingual legends. The accuracy of the legends was verified with the help of Chinese Indonesians. Then two Indonesian caregivers fluent in Chinese were asked to read the nursing instruction sheet and execute each step to make sure the

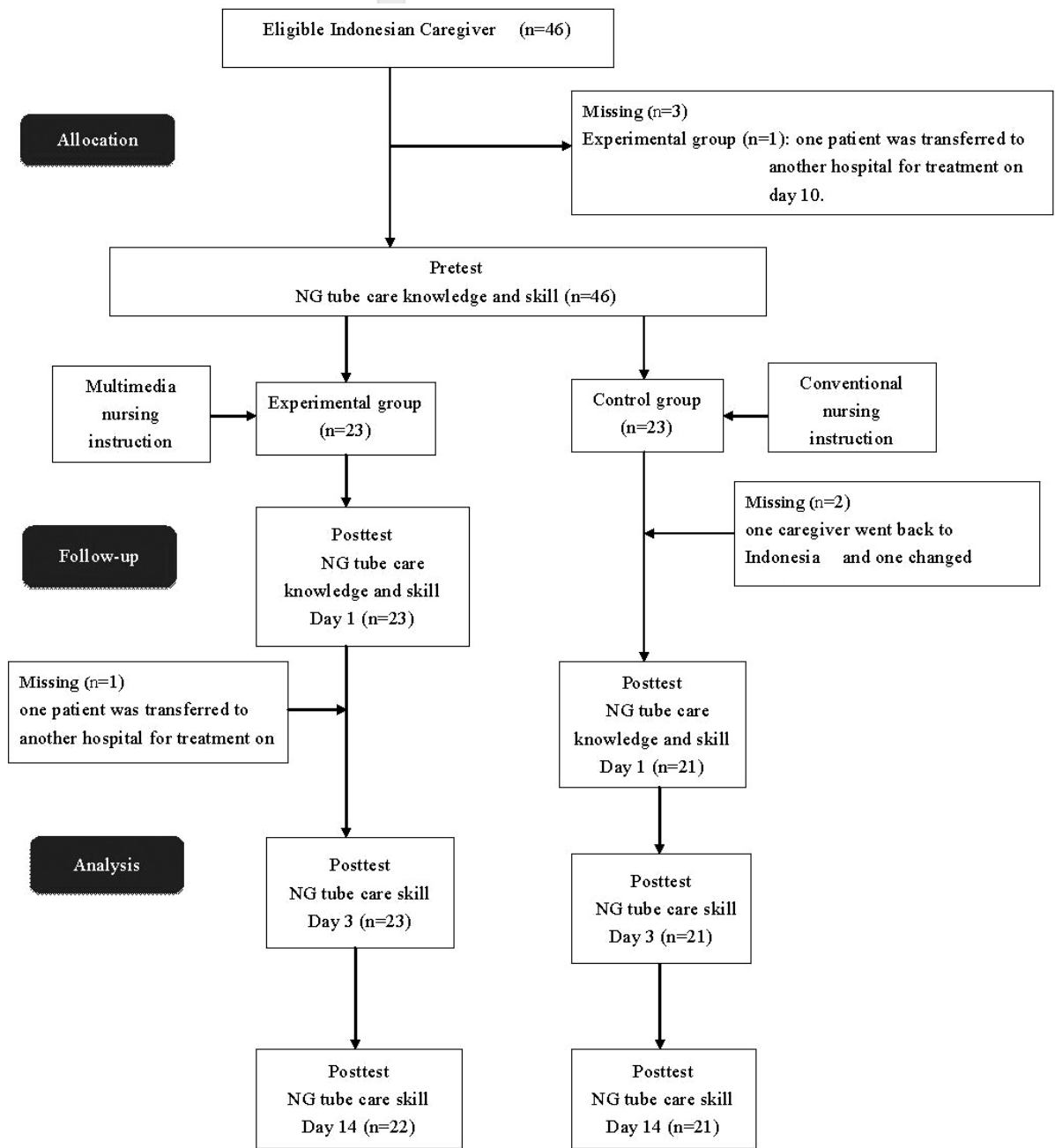


Figure 1. study flow diagram

translation from Chinese to Indonesian was correct. The contents of the instructional film and instruction sheet were modified based on the evaluation and suggestions of the experts. The content validity index (CVI) for the nursing instructional film and sheet were .83 and .91, respectively.

Blinding

Two well-trained qualified advanced practice RNs were recruited as instructor and evaluator. One nurse made multimedia nursing instruction and the other evaluated participants' clinical skills. Both of instructor and evaluator participated in NGT care consensus meeting before study. The foreign caregivers' skill for NG tube care was evaluated under a double-blind setup. Neither the evaluator nor

the evaluated knew which group they belonged to.

Ethical Considerations

This study was approved by the Institutional Review Board ; IRB (No: CSMUH16111). The researcher fully explained the consent to each family of inpatients who had a NGT inserted and who were mostly being taken care of by Indonesian caregivers. The family was given time to consider before signing the consent. Due to ethical concerns, after signing the consent, the Indonesian caregiver was free to stop participating in the study at any time. The control group of Indonesian caregivers still received nursing instruction after the study was completed, so the quality of nursing care was not affected. The data collected were only used for academic research and no personal information was accessible to the public.

Measurements

1. NGT care knowledge questionnaire

Based on the standards of care for a NGT made by the Quality Control Department of the medical center, a NGT care knowledge questionnaire was translated to Indonesian by a Chinese Indonesian who also has a nursing background. The questionnaire was then given to two Indonesian caregivers who have worked in Taiwan for at least 10 years to test the meaning and validate the questionnaire. The questionnaire contained 10 questions with at least 4 choices for each question. Total scores were 100. A higher score indicated the participants had a higher knowledge. Cronbach's α value for the questionnaire was .7.

2. NGT skill evaluation chart

Based on the Objective Structured Clinical Examination (OSCE) of the NGT, the researcher and study group used the form as a NGT skill evaluation chart. The NGT skill was evaluated based on whether the following 7 steps were correctly executed: washing the hands before care-giving, raising the head of the bed by 30-45° while feeding, checking if the NGT was secured, drawing from the tube to examine the amount of residual food before feeding, injecting the tube with 30 cc drinking water

to make sure the tube was unobstructed, flushing the tube with 30-60 cc drinking water to clean the tube, maintaining the patient in a sitting position for 30 minutes after feeding, keeping the total feeding volume below 500 cc each time. The evaluatee received a grade of pass or fail for each evaluation criteria. Total scores were 7. A higher score indicated the participants were more skillful. The Cronbach's α value for this evaluation chart was .89.

Statistical Analysis

The collected data were coded and statistically analyzed with SPSS 22.0 software package. The analytic methods were: 1. Descriptive statistics: describe the basic information of each group using N(%) and means(SD). 2. Inferential statistics: (1). The Independent Samples t Test was used to compare the difference in scores of knowledge and skills, before and after the intervention in experimental and control groups. (2). The Chi-square test was used to compare the accuracy of feeding techniques between experimental and control groups on days 1, 3, and 14. (3). The α value for the statistical tests of this study was .05.

3. Results

3.1. The demographic data of the two groups of Indonesian caregivers

All the Indonesian caregivers were female. The average age of the participants was 29.86±4.59. Most of the participants were married (81.5%). Nearly 61% of the participants were working in Taiwan for the first time. There was no significant difference in the demographic features and related work experience among experimental and control groups, which indicates homogeneity between these two groups (Table 1).

3.2. The pretest of knowledge and skill of NGT care for experimental and control groups

The average mean scores of the pretest of knowledge of NGT care for experimental and control groups were 36.82±13.93 vs 34.29±12.87, respectively (Table 2). The average mean scores of the pretest of skills of NGT care for experimental and control groups were 3.82±1.01 vs 3.48±10.87,

Table 1. The demographic data of the two groups of Indonesian caregivers

Item	All (N=43)		Experimental (N=22)		Control (N=21)		<i>p</i>
	Mean	SD	Mean	SD	Mean	SD	
Age	29.86	4.59	30.55	4.78	29.14	4.39	.322
	N	%	N	%	N	%	
Marital status							
Unmarried	6	13.9%	4	18%	2	10%	.263
Married	35	81.5%	18	82%	17	81%	
Divorced	2	4.6%	0	0.0%	2	10%	
Education levels							
Junior high school	1	2.3	1	5%	0	0%	.323
Senior high school	42	97.7%	21	96%	21	100%	
Duration of stay in Taiwan							
Within one month	14	32.5%	7	32%	7	33%	.169
1-3 months	20	46.5%	8	36%	12	57%	
>3months	9	21%	7	32%	2	10%	
Frequency of work in Taiwan							
First time	26	60.5%	14	64%	12	57%	.687
Second time	14	32.5%	6	27%	8	38%	
Third time	3	7%	2	9%	1	5%	

Table 2. Effectiveness of multimedia nursing instruction in NG tube care knowledge

Item	Experimental group (N=23)		Control group (N=21)		<i>p</i>
	Mean	SD	Mean	SD	
Total score					
Pretest	36.82	13.93	34.29	12.87	.54
Posttest	71.82	12.59	49.05	14.46	<.01
Difference	35.00	15.66	14.76	8.14	<.001

respectively (Table 3). There was no statistical significance on the pretest between the mean scores of the two groups for both knowledge and skills ($p>.05$).

3.3. The effectiveness of multimedia nursing instruction on NGT care knowledge

After the multimedia nursing instruction on NGT care, the post-nursing instruction scores of the experimental and control groups were 71.82

± 12.59 and 49.05 ± 14.46 , respectively and were significantly different ($p<.01$). The differences in pre- and post-nursing instruction scores were 35 ± 15.66 in the experimental group and 14.7 ± 8.14 in the control group. The difference between the two groups was statistically significant ($p<.01$) as shown in Table 2.

Skills

The overall scores of the experimental and

Table 3. Effectiveness of multimedia nursing instruction in NG tube care skills

Item	Pretest			Posttest Day 1			Posttest Day3			Posttest Day 14										
	Experimental Control (N=23)		p	Experimental Control (N=23)		p	Experimental Control (N=23)		p	Experimental Control (N=23)		p								
	Mean	SD		Mean	SD		Mean	SD		Mean	SD									
Mean total score of posttest skill	3.82	1.01	3.48	0.87	.242	5.68	1.13	3.9	0.83	<.01	6.68	0.57	5.43	0.98	<.01	6.86	0.35	6.24	0.77	<.01
Hand washing	11	47.8	7	30.4	.268	15	65.2	14	66.7	.916	19	82.6	17	81	.698	21	95.5	17	81	.185
Assist the patient to a semi-reclining position	7	30.4	4	17.3	.488	16	69.5	4	19	<.01	21	91.3	13	61.9	<.01	22	100	19	90.5	.233
Withdraw gastric liquid to ensure the nasogastric tube still reaches the stomach and measure the amount of residual food	5	21.7	4	17.3	1	18	78.2	4	19	<.01	22	95.6	10	47.6	<.01	21	95.5	16	76.2	.095
Inject the tube with drinking water before feeding	14	60.8	15	65.2	.586	21	91.3	16	76.2	.095	23	100	21	100	1	22	100	21	100	1
Keep total time under 15-20 min and the total feeding volume below 500 cc each time	18	78.2	19	82.6	.664	20	86.9	20	95.2	1	21	95.5	21	100	1	22	100	21	100	1
Inject the tube with drinking water after feeding	21	91.5	21	91.3	1	22	95.6	21	100	1	23	100	21	100	1	22	100	21	100	1
After feeding, maintain the patient in the semi-reclining position for 20-30 minutes	8	34.7	3	13.0	.162	13	56.5	3	14.3	<.01	21	91.3	11	52.4	<.01	21	95.5	16	76.2	.095

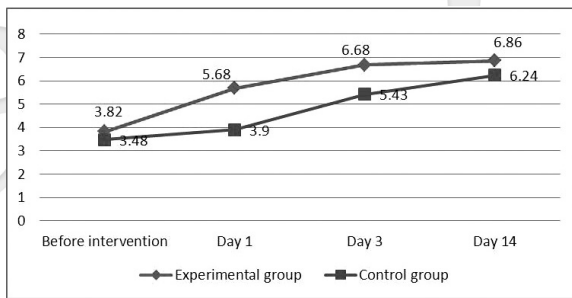


Figure 2. Effectiveness of intervention on nasogastric tube caring skill over time

control groups on day 1 post-intervention were 5.68 ± 1.13 vs. 3.9 ± 0.83 ($p < .01$). The overall scores of the experimental and control groups on day 3 post-intervention were 6.68 ± 0.57 vs. 5.43 ± 0.98 ($p < .01$). The overall scores of the experimental and control groups on day 14 post-intervention were 6.86 ± 0.35 vs. 6.24 ± 0.77 ($p < .01$) (Fig. 2) as shown in Table 3.

The accuracy of NGT care for experimental groups was better than control groups on procedure, including “Assist the patient to a semi-reclining position”, “Withdraw the gastric liquid to ensure the NGT still reaches the stomach and measure the amount of residual food” and “After feeding, maintain the patient in the semi-reclining position for 20-30 minutes” as shown in Table 3.

4. Discussion

Foreign caregivers play an important role in caring for patients who have left the hospital and returned home in Taiwan. It is worth exploring an effective method of nursing intervention that can help foreign caregivers learn correct knowledge and skills and, therefore, improve patient safety. In this study, the knowledge and skill of nasogastric tube care of Indonesian caregivers after multimedia nursing instruction was tested. The experimental group showed significant effectiveness compared to the control group. Regarding the knowledge aspect, the difference average scores after the intervention for experimental and control groups were 35 and 14.76, respectively. The experimental group doubled that of the control group. The results were in accordance with previous studies which show that the experimental group performs better

regarding the knowledge aspect after receiving multimedia nursing instruction, compared to the control group.²⁹⁻³⁰ Regarding the skills aspect, the experimental group showed significant effectiveness compared to the control group on days 1, 3, and 14 post intervention (Fig. 2). Concerning the accuracy of skills of NGT care, experimental groups performed better than control groups on procedure. The procedures are related to complications of NGT feeding, such as pneumonia, Improved NGT care skills could reduce related complications.²⁰

A survey conducted by the Bureau of Employment and Vocational Training, Council of Labor Affairs, Executive Yuan in 2018 showed that language barrier and difficulty in communication were the problems that troubled employers the most, 67.59% of interviewees agreed on this point. Therefore, providing proper teaching materials with descriptions in native languages to assist nursing instruction will effectively enhance the care-giving skills of the foreign caregivers. Elimination of the language barrier and instructor inconsistency can improve nursing instruction effectiveness and reduce unnecessary waste of manpower and time in repeating the same instruction.²¹

Multimedia nursing instruction vividly present the nursing instruction in various formats such as text, film, image, animation, music sound, and conversation is an effective method for teaching and learning.^{6,21-22} It is advantageous for the learner to absorb and acquire knowledge quicker. Compared to conventional, written or descriptive text, it can better attract the learner’s attention, improve the patient’s learning effectiveness and information retention, as well as reduce mistakes.²³⁻²⁴ Because the content of the course is standardized, mistakes or misunderstandings in instruction due to differences in instructors or ways of interpretation can be avoided. Previous studies have shown that application of multimedia and individualized teaching to enrich the content and bring learning closer to life can improve learning effectiveness.^{11,23} Therefore, the multimedia teaching model for nursing instruction has become a time-saving, mainstream teaching style.¹⁶ Hospitals now also provide services for long-term care and community health care which makes the health care structure more complete and advanced and also

extends sustained care.²³ Combining multimedia and nursing guidance is a very effective choice for nursing instruction, attesting to the similar results reported in studies conducted domestically or abroad and in previous literature. The practical contributions of this study are: 1. providing a nursing instruction strategy for foreign caregivers, 2. providing multimedia nursing instruction content that can be used in clinical practice to train Indonesian caregivers to cut down communication difficulties, 3. providing nursing instruction that the employer, patient and Indonesian caregivers can all understand which can improve the learning effectiveness of the Indonesian caregiver and, therefore, put the minds of the patient and family at ease, and maintain the safety of the patients.

Limitations

There were several limitations in this study. First, although we used cluster sampling to determine each group, we might not be able to avoid Indonesian caregivers learning skills of NGT care from the other group. Second, the effectiveness of intervention might be due to a maturation effect, researchers should be cautious in this conclusion. Third, this study was conducted in a regional hospital in a metropolitan city, the generalizability might be limited.

Conclusions

For the era of globalization, a variety of health education materials as effective guidance should be developed for foreign caregivers. This study showed the effectiveness of multimedia nursing instruction intervention in the improvement of knowledge and skills of Indonesian caregivers in caring for patients with for nasogastric tubes. Attention should be given to the use of multimedia and teaching materials using the native language of foreign caregivers. Nursing care is not just a direct care of patients; it is also an important function of nursing for the guidance of caregiver. Multimedia nursing instruction intervention can be used for foreign caregivers to improve the quality of patient care.

Acknowledgement

The author would like to thank the support from Chung Shan Medical University Hospital (Grant No.: CSH-2017-A-003).

References

1. Mapp S, Gabel SG: Addressing the Human Rights of Older Persons and Vulnerable Populations. *Journal of Human Rights and Social Work*. 2017; 2: 107-109.
2. National Development Council. Population Projections Report in Taiwan. Taipei: *Department of Human Resources Development, National Development Council* 2018:2014-2061. Available at <https://www.ndc.gov.tw/en/> Accessed June 22, 2019
3. Yen CJ, Ho CC, Wung H, et al.: Improving Recognition Accuracy Rate of Chemotherapy by Applying Multimedia Health Education to Lung Cancer Patients'. *The Kaohsiung Journal of Nursing*. 2018; 35: 42-56.
4. Workforce development agency ministry of labor, Taiwan, ROC. *Statistical Report*. Available at <https://www.mol.gov.tw/statistics/2452/> Accessed August 19, 2019
5. Chen MJ, Lu YU, Chen CC, et al.: A Project to Reduce the Incidence of Intubation Care Errors among Foreign Health Aides. *The Journal of Nursing*. 2014; 61: 66-73.
6. Demircelik MB, Cakmak M, Nazli Y, et al.: Effects of multimedia nursing education on disease-related depression and anxiety in patients staying in a coronary intensive care unit. *Applied Nursing Research*. 2016; 29: 5-8.
7. Liao WJ, Yu WH, Chen SC: Improving Oral Cavity Self Care after Head and Neck Tumor Surgery. *Journal of the Formosan Medical Association*. 2020; 24: 84-91.
8. Fusco S, Corsonello A, Chiatti C, et al.: Migrant care workers and rehospitalization among older patients discharged from acute care hospitals. *Geriatrics & Gerontology International*. 2015; 15: 196-203.
9. Ranci C, Pavolini E: Not all that glitters is gold: Long-term care reforms in the last two decades in Europe. *Journal of European Social Policy*. 2015; 25: 270-85.

10. Huang YC, Wu CH, Chang SH, et al.: Differences between foreign care workers and family caregivers in risk of hospitalization and mortality among home care elders in Taiwan. *Taiwan Gong Gong Wei Sheng Za Zhi*. 2016; 35: 304-15.
11. Oyama Y, Tamiya N, Kashiwagi M, et al.: Factors that allow elderly individuals to stay at home with their families using the Japanese long-term care insurance system. *Geriatrics & Gerontology International*. 2013; 13: 764-73.
12. Sarafis P, Rousaki E, Tsounis A, et al.: The impact of occupational stress on nurses' caring behaviors and their health related quality of life. *BioMed Central Nursing*. 2016; 15: 56.
13. Liao YC, Lu SH: Preventing nasogastric tube feeding caused aspiration pneumonia: An evidence-based approach. *The Journal of Long-term Care*. 2014; 18: 201-04.
14. Parabhakaran S, Doraiswamy VA, Nagarja V, Cipolla J, Ofurum U, Evans DE, et al.: Nasoenteric tube Complications. *Scandinavian Journal of Surgery*. 2012; 101: 147-55.
15. Chung KC, Chang YC, Lin HM, et al.: Exploring the Effectiveness of Multimedia Videos on the Knowledge of Patients and Anxiety Receiving Cardiac Catheterization. *Yuan-Yuan Nursing*. 2017; 11: 35-43.
16. Chu TL, Wang J, Lin HL, et al.: Multimedia-assisted instruction on pain assessment learning of new nurses: a quasi-experimental study. *BMC medical education*. 2019; 19: 68.
17. Hsieh HW, Liang HF, Lou ML: The Effects of the Combination of Multimedia Videos and Health Pamphlet on Neonate Care Among New Immigrant Mothers. *Ditmanson Medical Foundation Chiayi Christian Hospital Journal of Nursing*, 2019; 19: 1-14.
18. Shao SC, Tsai MH, Tsay PK, et al.: The effects of video education combined with nursing instruction on the knowledge, attitude, and self-care behaviors of patients diagnosed with the first onset of coronary heart disease. *Journal of Nursing and Healthcare Research*. 2015; 11: 175-86.
19. Winston K, Grendarova P, Rabi D: Video-based patient decision aids: a scoping review. *Patient education and counseling*. 2018; 101: 558-78.
20. Blumenstein I, Shastri Y M, Stein J: Gastroenteric tube feeding: techniques, problems and solutions. *World journal of gastroenterology*. 2014; 20: 85-95.
21. Chan SH, Chan KH, Wang J J, et al.: The Efficacy of Using a Multimedia CD-ROM in Pen Insulin Injection Education: An Example of a Medical Center in Southern Taiwan. *Journal of Nursing & Healthcare Research*. 2014; 10: 123-33.
22. Trudeau K J, Hildebrand C, Garg P, et al.: a randomized controlled trial of the effects of online pain management education on primary care providers. *Pain Medicine*. 2017; 18: 680-92.
23. Miles JM, Larson K L, Swanson M: Team-based learning in a community health nursing course: improving academic outcomes. *Journal of Nursing Education*. 2018; 56: 425-29.
24. Liaw SY, Wong L F, Chan S W, Ho J T, Mordiffi SZ, Ang SB: Designing and evaluating an interactive multimedia web-based simulation for developing nurses' competencies in acute nursing care: randomized controlled trial. *Journal of Medical Internet Research*. 2015; 17: 1-5.