

A Randomized Control Study: The Effectiveness of Applying Multimedia on Self-Care and Quality of Life in Patient with Enterostomy

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Abstract

(1)Background: This report was an effective evaluation of using multimedia educational program for self-care and quality of life in patients with a stoma at postoperative and established a simple threshold for enterostomy self-care skills.(2)Methods:108 patients with enterostomy were randomly assigned to receive either the intervention multimedia education program (including information about preparation for enterostomy care, cleaning method, manual bag replacement steps and precautions). The primary outcome was self-care ability and quality of life (defined as overall enterostomy self-care ability and overall quality of life), which was assessed at 2 weeks after intervention via an interview.(3)Results:Compared with those who in the conventional stoma education program, patients received the multimedia education program significantly improved their overall self-care ability and quality of life in statistically. The threshold of the enterostomy self-care skill scale was 20 points, and its corresponding sensitivity was 77.8%, and the specificity was 75.7%.(4)Conclusions:According to our study, the multimedia education program could enhance self-care ability of home care and quality of life in patients with enterostomy.

Keywords: multimedia; self-care; quality of life; enterostomy

1.Introduction

In Taiwan, colon cancer was the third epidemiology of cancer, and colostomy surgery was the ordinary treatment[1]. It usually caused a temporary change in bowel function and further affected the patient in social, physical, and mental health for several months, even caused permanent difficulties in a few people. And if remained untreated, it could seriously affect their quality of life than expected before surgery[2].Recent systematic review of the literature reported that 14 studies were reviewed in total for enterostomy related problems and their impact on quality of life. Most studies among 14 were descriptive cross-sectional studies (n = 12), and the rest ate were longitudinal design (n = 2). The results showed that problems related to quality of life of postoperative Ostomy included gas, constipation, depression, sexual problems, dissatisfaction with appearance, clothes changing and travel difficulties, feeling tired and the noise generated by enterostomy[3].

Due to physical and psychological barriers caused by enterostomy may gradually reduce patient's self-confidence and influence this social relation, it made the patient felled in social isolation. If intestinal stoma care remained unimproved, it would lead to an increase in depression. Therefore, multimedia education provides better self-management effectiveness for beginners [4,5].

Surgical education for patient and family member also a key component of the enterostomy care process. The International Ostomy Guideline recommended that surgical education should include both patient and family members (when possible) and focus on explaining about the enterostomy, the surgical procedure, and an overview of post-operative enterostomy management [6]. The intestinal surgery nursing staff played an important role in patient education for self-care and emotional support after enterostomy. If they helped patient learning effective intestinal self-care in a short time, it would shorten the hospital stay [7]. The related literature on the evidence base for the multimedia educational interventions showed that multimedia education might be considered as an alternative settings where provision of detailed education of a health professional was feasible [8]. In a systematic review, evaluated the effectiveness of multimedia education program (MLEP) and confirmed that MLEP reduced cost significantly and improved patient participation in enterostomy care and self-care ability. However, research was insufficient for whether a multimedia education program (MLEP) interventions can improve patient self-care and quality of life [9].

Enterostomy was from surgical interventions undertaken in the large intestine (colostomy) and small intestine (ileostomy) [2]. Enterostomy was an

artificial surgical opening, created for transfer stool or urine to the surface of the skin [10]. The patient had impacted in physical and psychosocial by enterostomy surgery, and nursing staff played a key role to educate and support patient. One of the domains of nursing practice was the “teaching and coaching” function; it included learning willingness of patient and assisted patient to integrate the implications of illness into their lifestyles [7]. The application of multimedia audio and video discs helped patient to understand, remember, judgement and reasoning, increase knowledge of health care to improve self-care ability and anxiety, and make treatment decisions and solve problem [11]. In particular, strengthen the important but often overlooked area of digital medical professional education [12]. This paper presented our study findings and analyzed the stoma education by comparing multimedia learning education program (MLEP) and conventional education service program (CESP) on the promotion of self-care ability and quality of life in stoma patients in Taiwan. It also discussed the implications of our study for enterostomy care practice and policy.

2. Methods

2.1 Study design and participants

We did a population-based, parallel-group, randomized controlled trial in the study was conducted in a 2000-bed academically based medical center with a surgical ward for stoma patients in south Taiwan. Participants were recruited from the division of colon and rectal surgery patients after visit discharge. The study was approved by the Human Resource Ethics Committee at Chang Gung Medical Foundation (201800061B0C502). The study period was from June 1st, 2018 to March 31st, 2019, and Screening was done with the inclusive and exclusive conditions and patient was voluntary to participate in the research, randomization was based on the computer random number table.

The inclusion criteria were as follows: (1) Patient with intestinal stoma; (2) Mandarin or Taiwanese speaking; (3) consciousness; (4) no visual or hearing impair; and (5) age over 20 years old. Participants were excluded if they met the following criteria: (1) Unconscious or unstable patients; (2) Dementia, mental illness, and central nervous system diseases in the past medical history; (3) Unable self-care; (4) Visual or hearing impairs. The intervention program was held in a quiet, private room to maintain privacy. The data were collected using self-administered questionnaires completed by the subjects themselves.

2.2. Randomization and masking

Eligibility for the study was informed and assessed consent was obtained by a research assistant (RA). Participants were then randomized using a computer developed a random list that assigned them into either the experimental or the control group. The statistician had no contact with participants before enrolment. An independent coworker not involved in this study randomly assigned participants to one of two study groups in a 1:1 ratio permuted block sizes of four and eight. Allocation was concealed from the recruiting RA. Anonymity was used in the study to safeguard privacy through assigning an identification number rather than other identifiers.

2.3. Intervention Protocol

The MLEP intervention was based on a literature review of prior research on the content and format of self care related multimedia education programmes [13, 14]. In our study, the MLEP had two sections; materials preparation for enterostomy use and nursing care of Ostomy bag; the first section consisted of information about preparation for enterostomy care, it included the related materials selection and usage; and the second section focused on the cleaning method, manual bag replacement steps and precautions and strengthen the information by shooting into a video through actual operation. The content of

the booklet received by the control group was a health education manual produced by the hospital, which included the physiological and anatomical position of the stoma, preparation of cleaning equipment, and cleaning steps, which were presented in text and pictures.

2.4. Outcomes

2.4.1. Instrumentation

Questionnaire content based on the assessment scale of self-care ability after enterostomy [15] and QOL [16]. The questionnaires consisted of three sections, described as below.

2.4.2. Demographic information

This section collected data on age, gender, and marital status, level of education, occupation, and health status.

2.4.3. Enterostomy self-care ability scale

Assessment scale of self-care ability of enterostomy care was a quantitative scale for nursing staff to evaluate self-care skills in patients with enterostomy. It consisted of 7 items related to: Prepare items, removing the pouching system, measuring the enterostomy diameter, adjusting the size of the enterostomy diameter in a new stoma appliance, skin care, fitting a new enterostomy appliance, and emptying procedure. Each skill was rated on a

4-point scale: Likert scale (1: not at all, 2: some, 3: quite a lot, 4: very much).

Higher scores indicated that patient had a higher level of self-care skills for changing enterostomy pouching system; in this study, Cronbach's α was 0.94 for the enterostomy self-care ability scale.

2.4.4. Enterostomy-QOL

The Enterostomy- QOL was comprised of 30 questionnaires, it covered seven domains: relations with family and friends, Sleep, activity, sexual activity, social relationship, physiology and psychology. The responses rated on a 4-point scale Likert scale (1: extremely, 2: quite a lot, 3: somewhat, 4: not at all). The possible scores range was from 37 to 148. Higher scores indicated that patient had a higher level of quality of life; in this study, Cronbach's α was 0.94.

2.5. Statistical analysis

2.5.1. Sample Size

The sample size was calculated by G*Power 3.1 software and two-tailed test was used; the effect size $f = 0.6$, α error probability=0.05 and statistical power was 80%. The required sample number was 88, the 20% wastage rate was considered; therefore, the estimated number of samples was 108, 54 in the experimental group (MLEP) and 54 in the control group (CESP).

2.5.2. Data analysis

Analysis was done by SPSS 22.0 statistical software. Descriptive statistics used for the number of times, the percentage, mean, and interquartile range, etc., to describe the data distribution; Kolmogorov-Smirnov test was used to verify whether the data conforms met the normal distribution. Mann-Whitney U test for enterostomy analysis to compare the continuous variable between the experimental and the control group. Chi-square test or Fisher's exact test for comparing the categorical differences between the experimental and the control group, and Spearman's rank correlation method was used to observe the correlation between factors. Multiple Binary logistic regression and stepwise elimination method were used for multivariate analysis to identify important interpret factors related to multimedia audio and video involved in self-care ability and quality of life. Using the ROC curve and Youden's index to find the optimal cutoff point for important interpret factors and calculate the sensitivity and specificity.

3. Results

3.1. Study flow and patient characteristics

Over a 9-month period, from June 1st, 2018 to March 31st, 2019, total 108 patients were participated the study through eligible screen and randomization.

After informed consent, baseline data were collected from participants before randomization. MLEP were introduced to participants in the experimental group by the research team after randomization. During MLEP introduction, the researcher answered questions about the program; and each introduction took 30 minutes on average. Subject in the control group received only standard enterostomy care brochure and afterwards, researcher arranged a follow-up visit to answer the question. After 2 week intervention, both groups received post-tested. The researcher made an appointment with every participant to complete the final questionnaire; the flow of participants of the research was as showed in Figure 1.

54 in the experimental group and 54 in the control group completed the study. Among them, 68 men and 40 women, 50% under the age of 60, more than 50% were married, education below Junior high school accounted for 40%, 50% unemployed, and 90% lived with my family; 2 groups were in the normal range of physiological indicators. There were no statistical differences between demographic variables between two groups, and the baseline data were presented. The intervention and control groups were comparable at baseline (Table 1)

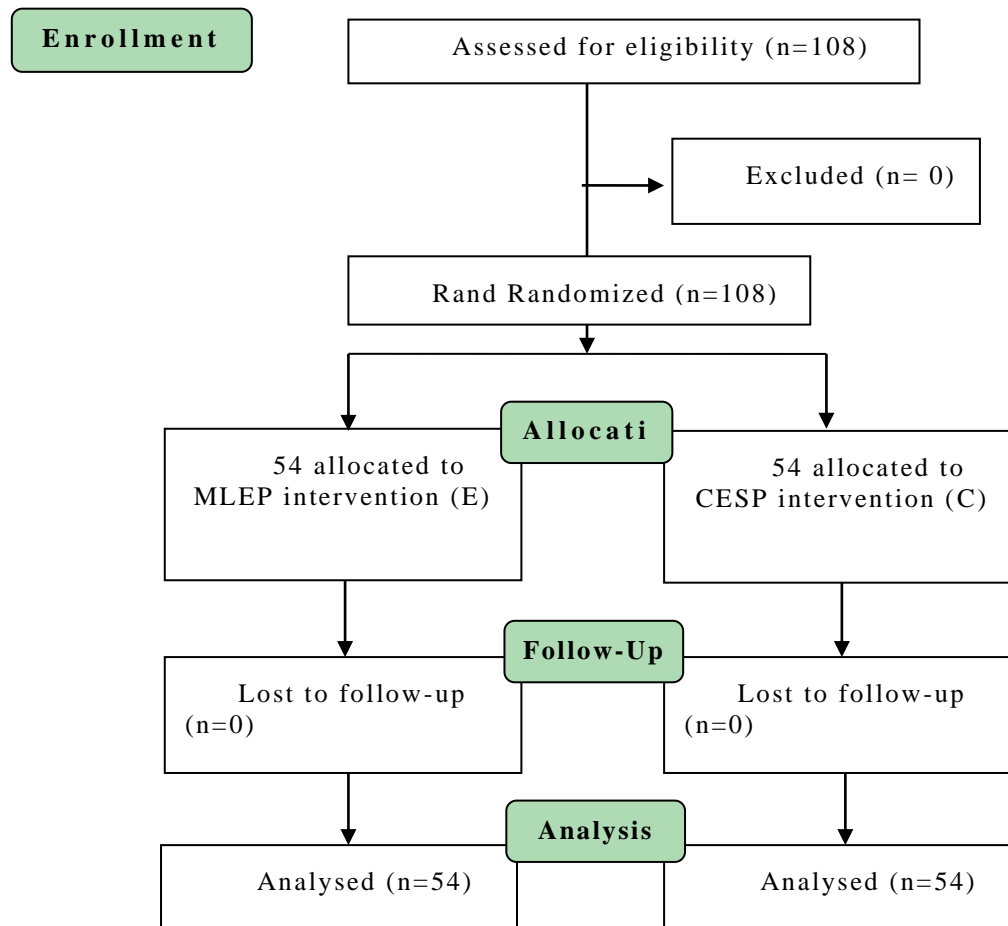


Figure 1 illustrates the flow of participants through the research

Table1 Demographic data of the subjects($N=108$)

Variable	<i>n</i> (%)		χ^2/t	<i>p</i>
	test group ($n=54$)	Control group ($n=54$)		
gender			1.429 ^a	.232
man	37(68.5)	31(57.4)		
female	17(31.5)	23(42.6)		
age			-	.716
60 years old or older	3(5.6)	5(9.3)		
Under 60 years old	51(94.4)	49(90.7)		
marriage			.565 ^a	.754
single	4(7.4)	6(11.1)		
married	40(74.1)	37(68.5)		
orther	10(18.5)	11(20.4)		
education level			.438 ^a	.804
Below the national middle (including)	22(40.7)	23(42.6)		
High school	17(31.5)	14(25.9)		
the University	15(27.8)	17(31.5)		
Employment status			.741 ^a	.389
no	28(51.9)	31(57.4)		
yes	26(48.1)	23(42.6)		

Living condition			-	.363
Family living together	50(92.6)	53(98.1)		
Living alone	4(7.4)	1(1.9)		
Enterostomy			5.178 ^a	.017
Ileum	26(48.1)	14(25.9)		
Liter/transverse colon	28(51.9)	40(74.1)		
Physiological index, median(IQR)				
NA	138.0(136.0-139.0)	137.5(134.2-140.0)	-.156 ^b	.876
K	4.0(3.6-4.3)	4.0(3.6-4.2)	-.009 ^b	.993
CL	106.0(104.0-109.0)	107.0(103.0-108.0)	.011 ^b	.991
Sugar	146.5(116.7-212.0)	147.0(119.0-215.0)	.313 ^b	.755
WBC	7400(4900-10000)	7650(6000-10525)	-1.158 ^b	.250

Note: IQR, inter quartile range;^arepresentative χ^2 verification value;

^brepresentative U(Mann-Whitney U test)

3.2. Effects of the MLEP intervention

Comparison scores of the baseline and post-test the experimental group and control group in the overall enterostomy self-care ability and overall quality of life shown as Table 2. In order to examine the effectiveness of the multimedia education program, the Mann-Whitney U test was used to examine the changes in the overall enterostomy self-care ability and overall quality of life, and quality of life in various categories. In both groups, the statistically significant differences indicated improvement in overall enterostomy self-care ($u = 584.0, p < .001$) and in overall quality of life ($u = 624.0, p < .001$), but there was no significant difference in the intimacy of life quality ($u = 1346, p < .712$); Due to illness, it may be related to the decline in demand for sexual life in the context of life.

Table 2 Baseline score and post-test for ostomy self-care ability scale, stoma-QOL in the control and experimental groups (N=108)

Variable	median(IQR)		U	p
	Test group(n=54)	Control group(n=54)		
<i>Overall stoma Care ability</i>				
<i>baseline</i>	17.0(12.0-26.0)	20.0(12.0-26.0)	1462.5	.764
<i>post-test</i>	24.0(21.0-28.0)	16.0(12.0-20.0)	605.0	<.001***
<i>Overall quality of life</i>				
<i>baseline</i>	73.0(63.0-91.0)	72.0(59.0-91.0)	1390.5	.466
<i>post-test</i>	105.5(87.2-112.0)	74.0(65.7-92.5)	632.0	<.001***
<i>relations tofamily and friends</i>				
<i>baseline</i>	29.0(23.0-34.0)	26.0(19.0-34.0)	1294.5	.192
<i>post-test</i>	35.0 (30.0-36.0)	29.0 (23.3-33.8)	840.0	<.001***
<i>Sleep</i>				
<i>baseline</i>	9.0(6.0-10.0)	7.0(6.0-10.0)	1379.5	.424
<i>post-test</i>	13.0(11.0-15.2)	9.5(6.0-11.7)	572.0	<.001***
<i>activity</i>				
<i>baseline</i>	9.0(7.0-12.0)	8.0(6.0-12.0)	1392.0	.469
<i>post-test</i>	13.0(10.0-15.0)	9.0(7.0-11.0)	716.0	<.001***
<i>Sexualactivity</i>				
<i>baseline</i>	10.0(6.0-11.0)	10.0(7.0-12.0)	1272.0	.143
<i>post-test</i>	7.5(6.0-10.0)	8.0(5.2-9.0)	1402.0	.729
<i>Social relationship</i>				
<i>baseline</i>	6.0(4.0-8.0)	5.0(4.0-9.0)	1445.0	.683
<i>post-test</i>	11.0(8.7-12.0)	6.5(4.0-9.0)	550.5	<.001***
<i>physiological</i>				
<i>baseline</i>	11.0(7.0-13.0)	10.0(8.0-13.0)	1502.5	.952
<i>post-test</i>	15.0(12.0-16.0)	12.0(10.0-13.0)	771.5	<.001***
<i>psychological</i>				
<i>baseline</i>	5.0(4.0-8.0)	5.0(4.0-7.0)	1478.5	.837
<i>post-test</i>	10.5(7.7-12.0)	6.0(4.2-9.0)	670.5	<.001***

Note: IQR, inter quartile range; *** $p < .001$

3.3. Prediction of overall enterostomy self-care ability and quality of life

The total scores of sleep category in overall enterostomy self-care ability and quality of life and social category of quality of life were positively correlated with two groups, and the regression coefficient was significant ($p=.035$; $p=.052$; $p=.050$). In experimental group, the total scores of sleep

category in overall enterostomy self-care ability and quality of life and social category of quality of life were higher than control group, it showed that the multimedia education program could improve sleep category in the overall enterostomy self-care ability and quality of life, and social category in quality of life (Table 3).

Table 3 Multivariate logistic regression analysis ($N=108$)

Variable	OR	95% CI of OR	<i>p</i>
Overall enterostomy Care ability	1.102	1.007-1.207	.035
Quality of life - sleep	1.196	0.998-1.433	.052
Quality of life - social	1.242	1.000-1.543	.050

3.4. ROC curve

The best cut-off point for overall enterostomy self-care ability was 20 points, AUC=78.9%, sensitivity was 77.8%, and specificity was 75.7%; the best cut-off point of sleep category in life quality was 11 points, AUC = 80.0%, sensitivity was 71.6%, specificity was 88.4%. The best cut-off point of social category in quality of life was 9 points, AUC = 80.7%, sensitivity was 63.0%, and specificity was 86.8%.

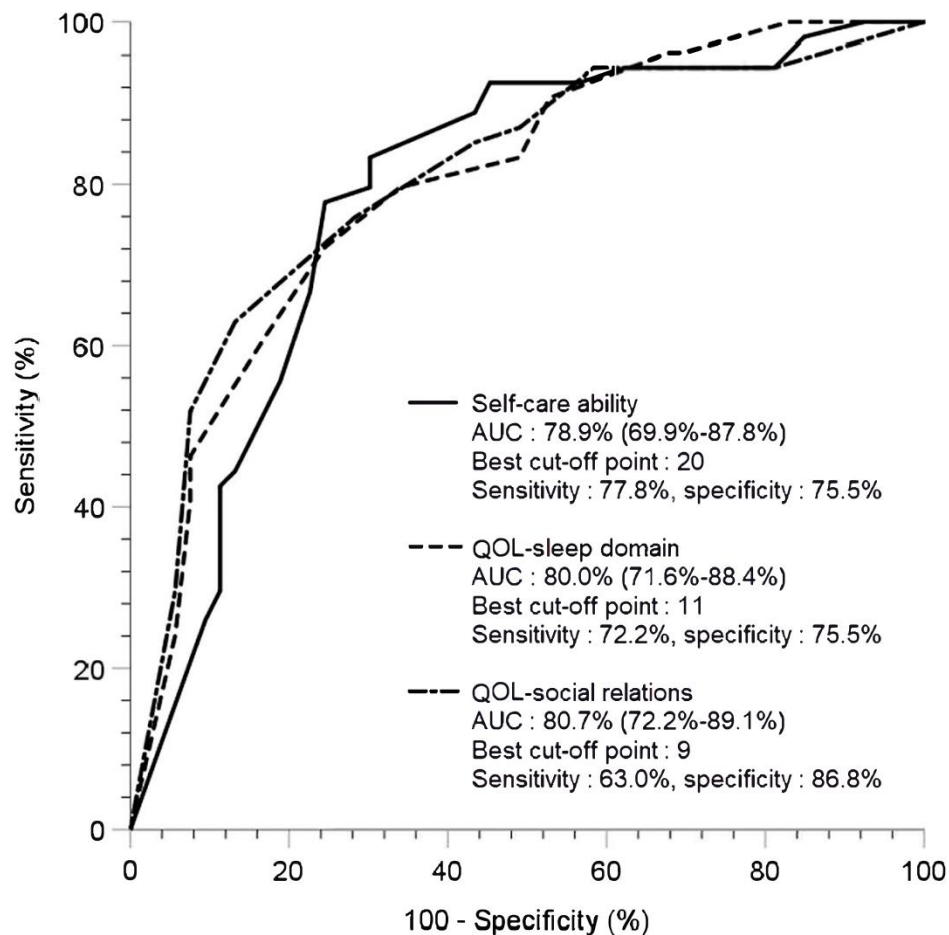


Figure 2 ROC curves of overall self-care and quality of life

4. Discussion and conclusion

4.1 Discussion

Our results showed clearly that multimedia education programs had statistically significant increased the self-care ability and improved the quality of life in enterostomy patients. Our findings were consistent with results of Lo et al., [14]; they used multimedia education to promote awareness of enterostomy care and post-operative colostomy care skills in enterostomy patients. Our results also similar to the study held by Hsueh et al.

[11], who used multimedia CD-ROM of health information to provide information about the colonoscopy procedure; it could alleviate anxiety and examination-related pain of patient. According to social learning theory of Bandura (Bandura), enhance self- confidence and self-efficacy of learner could lead the change of expected health behavior and maintain the expected behavior [17]. In our study, providing early education of enterostomy care seemed to have obvious advantage; it could promote the knowledge of stoma, improve self-care activities and quality of life to patients. But, as many studies of health behavior change showed, it is hard to predict whether such behavior will be held as time gone by, and it is an interesting challenge for researchers. Our study provided clear evidence that at this critical post-operative period, multimedia educational methods could effectively improve self-care of enterostomy. It also showed that the patient was able to absorb information and form the sense of self-care during confusing and complex period after surgery; it provided a theoretical basis for other forms about starting education as soon as possible after surgery. This study provided more evidences about multimedia education programs could play an important role in health education; it might exert the effect of multimedia education program by providing intervention in traditional care or resources shortened

medical institutions. At the same time, a short-term intervention had a useful contribution in early nursing care in patients with stoma, especially to promote their self-care ability. This study found that when the best cut-off point of self-care ability was 20 points, the best cut-off point of sleep category in quality of life was 11 points, and the best cut-off point of social category of quality of life was at 9, there was a significant difference in the intervention outcome between the experimental group and the control group.

The major limitation of this study was that although the images and information used in multimedia education program were very similar to routine care, but they used slightly modified motion graphics to present a little bit different information from regular care. Therefore, some improvements in the experimental group may be related to different images and information. However, multimedia education programs do significantly promote the improvement score over regular care. The other the improvements core over regular care. First, due to it may occur the enterostomy complications after discharge, therefore, participants took post-tested only after the 2 week intervention; we suggest that performing follow-up next to study 1, 6 and 12-month may provide more reference. Secondly, participants were recruited only in a medical center, it was not

enough for a conclusion; a multi-center trial will be more universal and reliable.

Third, outcome indicators were self-reported, it could not determine the actual enterostomy correlation between self-care and self-reported behavior.

Therefore, we recommended that direct observation of stoma self-care behaviors is needed for further study.

4.2. Conclusions

Our findings not only filled the gap with Taiwan-related documents, and may apply to Chinese society other than Taiwan, it's impact on decision-makers, researchers and practice nursing staffs. Those findings also confirmed that using multimedia education in the early stage of postoperative care could influence the promotion of self-care ability and promote the quality of life. In view of these findings, decision-makers should consider using more detailed multimedia education to replace written information, take it as a part of education for postoperatively in patients with enterostomy; and make multimedia education program plays an important role in early education of postoperative care for patients with enterostomy.

4.3. Practice implications

Multimedia education should be considered as part of enterostomy care. And in area with poor medical resources, multimedia education program

could promote self-care ability for patient with enterostomy.

Author contributions

Conceptualization, H-F, Ko., M-F. Wu., T-H,Tung and J-Z, Lu.; Methodology, H-F, Ko. and M-F. Wu.; Formal Analysis, H-F, Ko.; Investigation, M-F. Wu.; Writing—Original Draft Preparation, H-F, Ko. and M-F. Wu.; Writing—Review & Editing, H-F, Ko. and T-H,Tung. ; Visualization, T-H,Tung.; Supervision, J-Z, Lu. All authors have read and agreed to the published version of the manuscript.

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Data sharing

Requests for anonymized individual participant data and study documents will be considered on a case by case basis and on scientific merit by principal investigators and approved by the relevant institutional review boards.

Informed consent and patient details

We confirm all personal identifiers have been removed or disguised so the persons described are not identifiable and cannot be identified through the details of their stories.

Conflicts of Interest

No potential conflict of interest was reported by the authors.

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