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ORIGINAL RESEARCH

Multimedia education programme for patients with a stoma: effectiveness evaluation

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Abstract

Aim. This paper is a report of an evaluation of the effectiveness of a multimedia education program in relation to stoma knowledge, self-care attitudes and behaviour with patients with a stoma in the postoperative period.

Background. Multimedia education programmes not only give patients with useful information in the absence of health professionals, but can also augment information given in traditional clinical practice. However, the literature on the effectiveness of different approaches to stoma education is limited.

Method. A randomized experimental study design was used. Participants were recruited from a surgical unit in a large hospital in Taiwan. A total of 102 patients with a stoma were randomly assigned to either the multimedia education programme (n = 46) or a conventional stoma education programme (n = 56) with a follow-up of 1 week. Outcome variables measured were levels of self-care knowledge, attitudes towards self-care and self-care behaviour.

Findings. Patients who received the multimedia education programme improved their overall self-care knowledge, attitudes and behaviour statistically significantly when compared with those who received the conventional stoma education programme.

Conclusion. Although further, longer-term follow-up will be useful, this study demonstrates that multimedia packages can enhance patient involvement in their stoma care and can augment stoma education – particularly in resource challenged healthcare environments.

Keywords: computer assisted learning, effectiveness evaluation, education programme, multimedia, nursing, patient education, stoma, Taiwan

Introduction

At the beginning of the 21st century, cancer is increasing as populations age, people often having greater life expectancy than 40 years ago (Payne *et al.*2004).Colon cancer is the third most prevalent form of cancer, and stoma formation is a common treatment (Department of Health 2008). Surgical formation of a stoma is a major clinical procedure in numerous ways, with patients facing emotional, physical and social challenges that can have important effects on their quality of life (Wu *et al.* 2007). Educating and supporting patients during the postoperative period is a key nursing activity and is essential to help promote patient acceptance of the stoma and encourage them to become involved in their stoma care. However, in many nursing environments, time and staffing pressures mean that this education may not be as extensive as it needs to be (Li & Chi 2008, Fan & Chen 2009).

Background

Impact of stoma

The adverse effects of stoma formation are numerous and typically include challenges that are physical, psychological, and social. The physical symptoms may also be extensive, such as para-stomal hernias, weight loss and constipation (Mäkelä & Niskasaari 2006, Ross *et al.* 2007). Such symptoms can be exacerbated by poor levels of knowledge and inadequate care of the stoma (Kao & Ku 1997, Nugent *et al.* 1999). Emotional problems can also affect stoma care, for instance anxiety related to fear of leakage and/or odour from the stoma due to ineffective management (Ross *et al.* 2007). This anxiety can lead to social isolation and relationship problems, and nurses can play a valuable role in helping to ameliorate these problems by taking a central role in educating patients and ensuring that this education begins as soon as possible after stoma formation (Tseng *et al.* 2004).

Patient education

Educating patients is a vital nursing role in all types of care setting and cultures (Rankin *et al.* 2005, Redman 2007). The concept of self-care is seen as a sequence of developments in which a patient learns to identify and understand basic health information and is then equipped with skills in order to apply this knowledge to improve their health (Nijboer *et al.*2000). Nurses must be skilled in assessing each patient's needs before their discharge from care (Rankin *et al.* 2005). In terms of stoma care, levels of stoma knowledge are important in enhancing self-care knowledge and improving attitudes towards self-care (Su *et al.*2001).

However, there are potential staff-related obstacles to patient education in most healthcare settings, particularly busy postoperative surgical wards (Rankin *et al.* 2005, Wingard 2005). The use of educational computer-based technology for patient education has increased dramatically in the last decade. Multimedia can be used in preparing patients for procedures, providing health information, teaching coping strategies and facilitating self-care behaviours (Wofford *et al.*2005, Malic *et al.*2007). Indeed, the literature demonstrates that such educational approaches can be very effective, leading to improved knowledge about treatment options, increased confidence in self-care, and increased confidence related to communicating with physicians and participating in decision-making (Doupi & van der Lei 2005, Wofford *et al.* 2005, Jerant *et al.* 2007).

Furthermore, Beranova and Sykes (2007), in a systematic review evaluating the effectiveness of computer-based patient education, have demonstrated high levels of patient acceptability, and Jerant *et al.* (2007) found that patients with colorectal cancer reported statistically significant levels of self-efficacy after using a multimedia education programme. Gulbiniene *et al.* (2004), in a survey of, patients with a stoma reported that those who received adequate stoma education had statistically significantly better emotional functioning and fewer gastrointestinal symptoms, whilst Chaudhri *et al.* (2005) reported that the use of audiovisual instruction for patients with a stoma demonstrated statistically significant gains in stoma care proficiency and earlier discharge from the hospital. However, few researchers have empirically tested a multimedia approach to early stoma education in terms of knowledge improvement, attitudes towards stoma care and stoma care behaviours – a gap in the nursing evidence-base that this study was designed to address.

The study

Aim

The aim of the study was to evaluate the effectiveness of a multimedia education program in relation to stoma knowledge, self-care attitudes and behaviour with patients with a stoma in the postoperative period.

Design

A single-blind randomized controlled trial was conducted to test the effectiveness of the multimedia education programme on three outcome variables: self-care knowledge (KSC),

attitudes towards self-care (ASC), and self-care behaviour (BSC). Patients with a stoma were randomly assigned to two groups: Group 1: experimental – patients were shown the multimedia education programme (MEP). Group 2: control – patients were given the standard information brochure on stoma care used by the surgical unit as predischarge information – the CESP. This brochure contained information about stoma formation and management, and included illustrated instructions of self-care of the stoma. It is usually given to patients immediately postoperatively, along with instructions to ask questions. The brochure is also given to family members.

Data were collected between January and December 2007. Images used in the MEP were drawn from those used in the CESP brochure, but some were animated. Information on stoma care was as similar as possible between the MEP and CESP to reduce the effect of different content rather than different delivery.

Participants

Participants were recruited from a surgical unit in a 900-bed medical centre in Taiwan. Recruitment inclusion criteria were as follows (1) any patient with a stoma admitted to the surgical unit; (2) minimum of 18 years of age; and (3) able to speak and read Chinese. Participants were excluded if they met the following criteria: (1) Poor levels of consciousness; (2) Had serious co-existing medical conditions (3); Had other co-morbidity that might interfere with intervention, for example clinical depression and (4) Those with poor pain relief postoperatively.

Power calculation

The sample size was estimated using Power and Precision version 3. For the given effect size (group mean of 21·9 vs. 19·4), SD (2·3 vs. 4·6), the sample size for each group was 45, and α set at 0·05 for a two-tailed independent *t*-test design. As a result, the computed power was 0·897. Allowing for 20% losses, this would require 55 patients in each group.

Intervention

The MEP intervention was based on a literature review of prior research on the content and format of health-related multimedia education programmes (Lin & Hsu 2006, Lo *et al.* 2006). In the present study, the MEP had two sections. The first consisted of information about the process of stoma formation, including anatomy and physiology of stoma and the clinical indications for stoma formation. The second section focused on the various central elements of stoma care and used flash, 2D anime, film and pictures to illustrate and reinforce the information.

Randomization

Eligibility for the study was assessed and informed consent was obtained by a research assistant (RA). Participants were then randomized using a computer-developed random list that assigned them into either the experimental or the control group. Allocation was concealed from the recruiting RA. Anonymity was used in the study to safeguard privacy through assigning identification number rather than other identifiers.

Instrumentation

Questionnaires were adapted from those used in a prior study (Lo *et al.* 2006), with their structure and format based on similar questionnaires to evaluate multimedia health education used by Kao and Ku (1997) and Su *et al.* (2001). The questionnaire consisted of four sections, described below.

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

Self-Care Knowledge Scale
The Self-Care Knowledge Scale (KSCS) was designed to measure patient knowledge of stoma self-care. It consisted of 22 items related to: anatomy of stoma, types of pouching systems, and types of accessories and was rated on a 2-point scale (1: right, 0: wrong). The KSCS has a range of possible scores from 0 to 22. Cronbach's α for the KSCS in this study was 0·75.

Self-Care Attitudes Scale
The Self-Care Attitudes Scale (ASCS) was comprised of 11 self-care attitude items requiring responses rated on a 5-point Likert scale (1: not at all, 2: a little, 3: somewhat, 4: quite a lot, 5: very much). The ASCS had a range of possible scores from 11 to 55. Lower score demonstrates poorer level of self-care confidence. Cronbach's α was 0·77 for the ASCS in this study.

Self-Care Behaviour Scale
The Self-Care Behaviour Scale (BSCS) consisted of 12 items measuring self-care behaviour. Participants answered each of the statements with a 4-point Likert rating scale, ranging from 1 to 4 (1: not at all, 2: a little bit3: moderately, 4:

extremely). Possible scores range from 12 to 48. Cronbach's α was 0·70 in this study.

Data collection

Baseline data were collected with both groups prior to the MEP or CESP. Experimental participants were then introduced to the MEP by a member of the research team 1 day postoperatively. After the MEP, the researcher answered any questions on the programme. On average, each session took 30–45 minutes. Each person in the control group received only the stoma care brochure constituting standard care and a subsequent follow-up visit by the researcher to answer any questions. Each group was followed up after 1 week. One week after the initial contact, the researcher made an appointment with each participant to complete the final questionnaire. Figure 1 illustrates the flow of participants through the research.

Ethical considerations

The study was approved by the appropriate ethics committee.

Data analysis

Data analysis was performed using SPSS software, version 15.0 (SPSS Inc., Chicago, IL, USA) and data were double-entered to ensure accuracy. The statistical methods used were the Chi-square test or Fisher's exact test, and two independent sample *t*-tests to determine the significance of differences between the control and intervention groups. *T*-tests were used to determine differences between the groups in gain scores and baseline scores on the KSCS, ASCS, BSCS. Analysis of covariance (ANCOVAR) was used to determine post-test differences between the groups. All values are reported as mean ± SD, with a *P*-value $< 0{\cdot}05$ being considered statistically significant.

Findings

Baseline data

Over an 11-month period, from January 2007 to December 2007, 111 patients underwent study eligibility screening. Four were ineligible for the following reasons: cognitive impairment ($n = 2$) and refused to join the study ($n = 2$).The remaining 107 agreed to participate and were randomized. Five patients (four experimental, one control) were excluded from analyses because of loss to follow-up (Figure 1). Forty-six people in the experimental group and 56 in the control group completed the study. The intervention and control groups were comparable at baseline (Table 1). Their ages ranged from 18 to 90 years, with a mean of 60·94 years (SD = 16·58). Fifty percent were married and 69·6% had received only elementary school or less education. Fifty-seven percent were male and 75·5% were not employed. The most common physical status was 'acceptable or good' (50·0%).

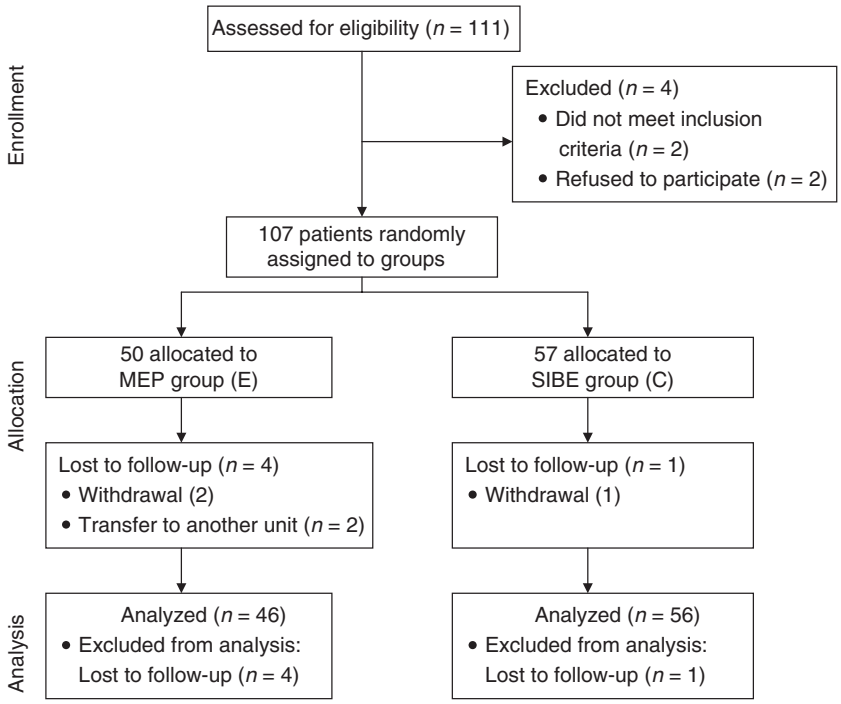

Figure 1 Flow diagram of participants' progress through the phases of the trial.

Table 1 Demographic data of the subjects (n = 102)

Variables	Total (n = 102)		Multimedia education programme groups (n = 46)		Control groups (n = 56)		χ^2/t	P value
	n	%	n	%	n	%		
Age (years) (Mean ± SD)	60·94 ± 16·58		59·65 ± 17·57		62 ± 15·79		0·372	0·545
Sex								
Male	58	56·9	26	56·5	32	57·1	0·682	0·409
Female	44	43·1	20	43·5	24	42·9		
Education								
None	36	35·3	18	39·1	18	32·1	4·421	0·110
Sixth grade or below	35	34·3	4	8·7	31	55·4		
Junior high school	17	16·7	11	23·9	6	10·7		
Senior high school	10	9·8	9	19·6	1	1·8		
College and above	4	3·9	4	8·7				
Living status								
Living with parents	17	16·7	2	4·3	15	26·8	5·250	0·121
Living with spouse	22	21·6	18	39·1	4	7·1		
Living with child	48	47·1	18	39·1	30	53·6		
Living with friends	5	4·9	5	10·9				
Living alone	10	9·8	3	6·5	7	12·5		
Marital Status								
Single	23	22·5	13	28·3	10	17·9	9·599	0·087
Married	51	50·0	31	67·4	20	35·7		
Others	28	27·5	2	4·3	26	46·4		
Occupation								
None	77	75·5	29	63·0	48	85·7	2·564	0·287
Retired	23	22·5	16	34·8	12·5	12·5		
Employed	2	2·0	1	2·2	1·8	1·8		
Physical status								
Very poor	14	13·7	7	15·2	7	12·5	1·603	0·659
Unwell	37	36·3	19	41·3	18	32·1		
Acceptable	49	48·0	20	43·5	29	51·8		
Good	2	2·0			2	3·6		

There were no statistically significant differences in demographic variables between the groups ($P > 0·05$) and Table 2 presents the baseline data.

Effects of the MEP intervention

Self-Care Knowledge Scale

The mean pretest score for perceived KSCS was 5·46 (SD = 3·84). Scores for the KSCS at pre-test and post-test are presented in Table 3. To examine the effect of the MEP, a paired t-test was used to examine the change in KSCS from pretest to post-test in each group. Statistically significant differences representing an improvement in self-care knowledge ($t = 23·58$, $P < 0·001$) were demonstrated in the experimental group and the control group ($t = 26·72$, $P < 0·001$). Analysis of covariate (ANCOVA) was used to analyze the effectiveness of the MEP. Age, physical status and the pretest scores for KSCS were entered as covariance. The

Table 2 Baseline score for KSCS, ASCS, BSCS in the control and experimental groups

Variables	Total (n = 102)			Experimental (n = 46)			Control (n = 56)			t	P value
	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range		
KSCS	5·46	3·84	0·0–14	7·52	3·82	0·0–14	3·77	2·95	1–11	3·50	0·064
ASCS	24·57	5·66	15–36	24·54	6·38	15–36	24·59	5·05	17–35	3·36	0·070
BSCS	20·06	3·71	13–33	20·80	3·54	13–24	19·45	3·78	16–33	0·03	0·861

KSCS, Self-Care Knowledge Score; ASCS, Self-Care Attitude Score; BSCS, Self-Care Behaviour Score.

Table 3 Difference between pre-test and post-test results in KSCS, ASCS and BSCS

Variables	Experimental (n = 46) Mean	SD	Control (n = 56) Mean	SD	t	P value	95%CI for difference
KSCS							
Pre-test	7·52	3·82	3·77	2·95	20·42	0·000	−7·18 to −5·89
Post-test	20·78	1·88	14·25	1·34			
ASCS							
Pre-test	24·54	6·38	24·59	5·05	21·11	0·000	−10·38 to −8·60
Post-test	51·26	2·59	41·77	1·94			
BSCS							
Pre-test	20·80	3·54	19·45	3·78	8·34	0·000	−8·19 to −0·5·04
Post-test	47·24	0·97	40·63	5·30			

t: comparison means between pre-test and post-test scores with group.

assumption of homogeneity of the regression slope (F = 0·821, P = 0·443) was not violated. Excluding the influence of age, physical status and baseline KSC, perceived KSCS in the two groups revealed a statistically significant difference with scores being higher in the experimental group (F = 6·92, P < 0·001).

Self-Care Attitudes Scale

The mean pretest score for the ASCS was 24·57 (SD = 5·66). The scores for ASCS at pre-test and post-test are presented in Table 3. To examine the effect of the MEP, a paired t-test was used to examine change in ASCS from pretest to post-test in each group. Significant statistical differences (t = 26·97, P < 0·001) were demonstrated in the experimental group and in the control group (t = 23·46, P < 0·001) revealing higher scores in the experimental group. Analysis of covariate (ANCOVA) was used to analyze the effectiveness of the MEP. Age, physical status and the pretest scores for ASCS were entered as covariants. The assumption of homogeneity of the regression slope (F = 10·48, P = 0·367) was not violated. Excluding the influence of age, physical status and baseline ASCS, ASCS in the two groups revealed statistically significantly higher scores in the experimental group (F = 8·91, P < 0·001).

Self-Care Behaviour Scale

The mean pretest score for perceived BSCS was 20·06 (SD = 3·71). BSCS scores at pre-test and post-test are presented in Table 3. To examine the effect of the MEP, a paired t-test was used to examine change in ASC from pretest to post-test in each group. Significant statistical differences (t = 46·70, P < 0·001) were demonstrated in the experimental group and in the control group (t = 23·82, P < 0·001) showing a higher score for self-care behaviour in the experimental group. Using Age, physical status and baseline scores for attitude as a covariate in the ANCOVA analysis, the assumption of the homogeneity of regression slope (F = 40·64, P = 0·286) was met for the analysis. Excluding the influences of age, physical status and baseline anxiety, there was a statistically significant difference (F = 9·48, P < 0·001) between the groups resulting in an overall higher score for the experimental group.

Discussion

Study limitations

The main limitation of this study was that the MEP, although using images and information very similar to those in the CESP, also employed animated and slightly modified images, thereby presenting slightly different information from the CESP. Therefore, it is possible that some of the improvements in experimental group scores were related to the different images and information. However, the MEP did improve scores unequivocally over the CESP. Other limitations were, first, that participants were only followed up for 1 week. Given that stoma complications may arise after discharge from hospital, future studies with 1-, 6- and 12-month follow-up might prove informative. Second, participants were recruited from only one medical centre and the results from multi-centre trials would be more generalizable. Third, the outcome indicators were self-reported, making it impossible to ascertain correlations between actual stoma self-care and self-reported behaviours. Consequently, further research is recommended, using measures that involve directly-observed stoma self-care behaviour.

Effect of the intervention

Our results clearly demonstrated that the MEP intervention statistically significantly improved the knowledge levels of patients with a stoma, and that this knowledge seemed to be

What is already known about this topic

- Multimedia education programmes can be effective tools to enhance patients' understanding of their health.
- There is some evidence that multimedia approaches are more effective than written information for encouraging self-care.
- The evidence base for measuring the effectiveness of multimedia education programmes is limited generally and in stoma care specifically.

What this paper adds

- The multimedia education programme was more effective than standard stoma education in the early postoperative period in improving self-care knowledge, attitudes and behaviour.
- Improving stoma knowledge by multimedia education was linked to improvements in self-care attitudes and reported behaviour.

Implications for practice and/or policy

- Multimedia education should be considered as part of postoperative stoma care in order to develop self-care knowledge and skills early.
- Policymakers in resource-poor settings should explore the use of multimedia programmes to enhance postoperative education for patients with a stoma.

linked to better self-care attitudes and increased self-care activity. These findings are consistent with those of Makoul *et al.* (2009), who used a multimedia information package to increase treatment compliance. They are also similar to the results of Jerant *et al.*(2007), who use an interactive multimedia computer program to educate patients on the benefits of colorectal cancer screening, and found that the intervention increased reports of self-efficacy and fewer reports of perceived barriers to screening.

According Bandura's Social Learning Theory, the enhancement of self-confidence and self-efficacy can lead to desired health behaviour changes and maintenance of desired behaviour (Rankin *et al.* 2005, Redman 2007). The development of knowledge to support such behaviour change is also essential. Without supporting knowledge, patients cannot have the prerequisites to put self-care beliefs into practice. In our study, there seemed to be a clear benefit to providing early stoma education that was aimed at improving patients' knowledge about stoma, but also at improving beliefs in terms of self-care activities and attitudes. However, as in many studies of health behaviour change, it is difficult to predict whether this behaviour will be sustained over time, and this presents an interesting challenge to researchers. Nevertheless, it does seem important that stoma education should begin as soon as possible postoperatively (Tseng *et al.* 2004), and it would be very interesting to compare the effects of an early intervention such as that in this study with longer-term stoma care interventions by specialist nurses, for example.

Our findings seem to concur with those of others who have looked at multimedia education. Andrewes *et al.* (1996) used a computer-based health education package to increase knowledge and develop positive attitudes in patients with eating disorders, and similar work by Wofford *et al.* (2005) showed a clear trend towards increased positive health attitudes in patients exposed to computer-based health education interventions. Our findings also complement the work of Wydra (2001), who used a multimedia patient education programme to improve self-care ability among patients with cancer, and those of Yeh *et al.* (2005), who used interactive multimedia to enhance self-efficacy and activities in an orthopaedic setting.

One thing is very clear – patients with stoma undergo physical and psychological adjustments following surgery. Therefore, early promotion of stoma care skills can enhance psychological adjustment (O'Connor 2005). Our study presents clear evidence that the MEP approach is effective in improving stoma self-care in this crucial postoperative period. It also demonstrates that patients are able to absorb information and form self-care beliefs in the often confusing and complex period immediately after surgery, thus providing a rationale for other forms of postoperative education to begin as soon as practicable. The study adds to the growing evidence that computer-assisted multimedia educational programs can play a major role in health education. They may have a role in either augmenting traditional care or providing an educational intervention that can be used in resource-challenged healthcare settings. The study also demonstrates that a short intervention early in the care of patients with a stoma makes a useful contribution to the care of patients, particularly by achieving better self-efficacy attitudes, improving knowledge and enhancing attitudes towards self-care – a vital element of stoma management.

Conclusion

The findings not only fill the literature gap in relation to Taiwan, but may also be applicable in other Chinese societies. They have implications for policymakers, nursing practice and researchers. They demonstrate that an educational intervention employing a multimedia approach, early

in the postoperative period can have a positive effect on knowledge levels and also promote self-care attitudes and behaviour. Given these results, policymakers should consider replacing written information with more detailed multimedia programmes as part of postoperative education with stoma patients. For instance, multimedia programmes have a place in the early education of patients following surgery.

To achieve better self-care outcomes, nursing practice with patients with a stoma should also address perceived self-care barriers and identify possible resources to confront these in order to increase the impact of educational programmes. Further research is also recommended to evaluate how MEP may be used in community settings, and how home care experience and social support contribute to patients with a stomas' responses to educational interventions. Finally, qualitative evaluation of multimedia interventions should be incorporated into study designs to evaluate patient satisfaction and improvements in quality of life.

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Conflict of interest

No conflict of interest has been declared by the authors.

Author contributions

LYW, SCC, SFL, YTW & MH were responsible for the study conception and design. MCC performed the data collection. LYW, SCC, MCL & SFH performed the data analysis. SCC, SFL & MH were responsible for the drafting of the manuscript. LYW, MCL, SFL & MH made critical revisions to the paper for important intellectual content. LYW & SCC gave statistical expertize. SFL obtained funding. LYW supervised the study.

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