MEDINFO 2010
C. Safran et al. (Eds.)
IOS Press, 2010

doi:10.3233/978-1-60750-588-4-605

Ambulatory Orthopaedic Surgery Patients Knowledge with Internet-Based Education

Katja Heikkinen[a], Sanna Salanterä[b], Helena Leino-Kilpi[b]

[a] *University of Turku, Department of Nursing, Turku, Finland*
[b] *University of Turku, Department of Nursing and South-Western Hospital District of Finland, Turku, Finland*

Abstract

There is a growing need for patient education and evaluation of the outcomes of it. The aim of this study was to compare the ambulatory orthopaedic surgery patients' knowledge with Internet-based education and face to face education with a nurse. The following hypothesis was set: Internet-based patient education (experiment) is as effective as face to face education with a nurse (control) in increasing patients' level of knowledge and sufficiency of knowledge. In addition the correlations of demographic variables were tested. The patients were randomised to either the experiment (n=72) or to a control group (n=75). Empirical data were collected with two instruments. Patients in both groups showed improvement in their knowledge during their care. Patients in experiment group improved their knowledge level significantly more in total than those patients in control group. There were no differences in patients' sufficiency of knowledge between the groups. Knowledge was correlated especially with patients' age, gender and earlier ambulatory surgery. As a conclusion, with the Internet-based education could achieve positive results on patients' knowledge. Internet is usable method in ambulatory care.

Keywords:

Patient education, Internet, Outcome assessment

Introduction

There is growing interest on the effectiveness of patient education with Internet. Internet interventions is a concept that encompasses various types of web programs, including behaviorally-based and empirically validated web-based treatment programs as well as patient education sites [1]. There is evidence of the effectiveness of the Internet –based education on patients' health-related behavior [2, 3]. In addition there are reviews about Internet –based education effects on patients' knowledge [3-11]. However, there is scarcity of studies made with surgery patients and especially with ambulatory surgery patients.

In this study wanted to focus on Internet-based intervention studies with ambulatory orthopaedic surgery. This limitation was made because patient education with ambulatory orthopaedic surgery patients is a different than for example long term care patients. The content of education and the knowledge differs with different patients. Ambulatory orthopaedic surgery patients are usually young and health patients. They need a lot of knowledge about their care and they have to handle quite independently in their care. There are some studies about the use of Internet in patients education with ambulatory orthopaedic surgery patients [12,13]. Hering et al. [13] studied the impact of a website on patient knowledge with a randomized controlled trial (n = 164) with a control intervention of nurse based-education (standardized verbal instructions). They found that, the use of a website was more effective in improving patients' knowledge of anaesthesia. However there is no research about the effect of demographic variables on patients' knowledge.

The aim of this study was to compare the ambulatory orthopaedic surgery patients' knowledge with Internet-based education (experiment) and face to face education with a nurse (control). The following hypothesis was set: Internet-based patient education (experiment) is as effective as face to face education with a nurse (control) in increasing patients' level of knowledge and sufficiency of knowledge. In addition the correlations of demographic variables were tested.

Materials and Methods

Study design

Study design was a randomised controlled study. This clinical trial has not been registered, since at the time when we started we did not have a trial register in Finland for this kind of studies. All ambulatory orthopaedic surgery patients (n=173) in one of the five university hospitals in Finland, between July 2005 and September 2006, were eligible for inclusion in this study. The final response rate was 86% (149/173). Patients fulfilling the inclusion criteria got an invitation to participate in our study via a letter of invitation they received for the ambulatory surgery operation. At the same time, they got the first instrument (baseline). The inclusion criteria were that a patient needed to be over 18 years of age, Finnish-speaking, have access to the Internet at home and the capability to use it, have no cognitive disabilities, and have the capability of completing the instruments and informed consent. The exclusion criteria were an ASA-classification over II (ASA). (Figure 1.)

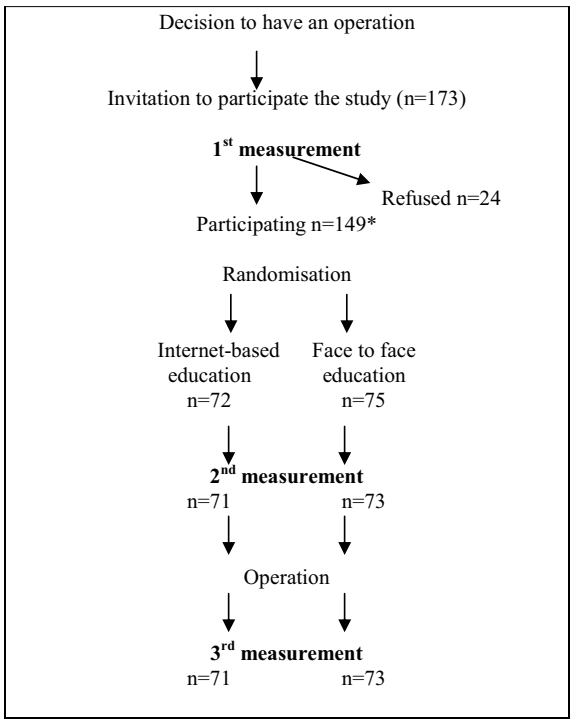

*Figure 1- Study design and flow of patients; *two patients of these were randomised to control group, but they were excluded from the study because they did not come to patient education*

Randomisation and stratification

The patients were randomly assigned (based on: gender, age, and the location of the operation) to either the experiment group (n=72) that received patient education through Internet-based education or to a control group receiving oral education by nurses (n=77). Two patients in the control group were excluded from the study because they did not come to the patient education sessions. Neither the patients nor the study coordinator were aware of the educational assignment until after everyone had been randomly assigned to their groups.

Patients in the experiment group participated in the Internet-based patient education designed for this study. The educational programme was structured based on six areas of knowledge: bio-physiological, functional, experiential, ethical, social and financial [14, 15], which are defined as being important in the cognitive empowerment process [16]. The website consisted of knowledge about nine topics on surgery (i.e. instructions for preparing for the operation, the schedule of events on the operation day, follow-up care, financial aspects, and frequently asked questions by patients). Patients visited the website 1–121 days (mean=14, SD 19.1) before the operation. Patients were asked about their usage and the application time on the website. Patients used the website four to six times (mean 2.3). The application time for the website ranged from 10-300 minutes (mean=81, SD 66.7).

Patients in the control group participated individually in face-to-face patient education with a nurse (in total eight nurses) in a separate room in the ambulatory surgery unit. The theoretical base for the patient education with a nurse is the same as the Internet-based education. Patients were given a leaflet about the content of the session. Nurses were trained for this study and they knew the content of the website (Internet–based education) and they had the printed version of the website available. The face-to-face education session took place on average 9 days before the operation (range 1–55 days, s.d. 7.1) and lasted on average 22 min (range 10–40 min, s.d. 7.0).

Instruments and data collection

The data were collected using two structured instruments: the Knowledge Test (KT) and the Sufficiency of Knowledge (SoK). These two instruments were used before the preoperative education session (baseline), after preoperative education (2nd measurement) and two weeks after the operation (3rd measurement).

KT has 27 items and six subscales: the bio-physiological (8 items; e.g. knowledge about symptoms, treatment, complications), functional (4; e.g. mobility, rest, nutrition, body hygiene), experiential (3; e.g. emotions, hospital experiences), ethical (5; e.g. rights, duties, participation in decision-making, confidentiality), social (3; e.g. families, other patients, patient unions) and financial (4; e.g. costs, financial benefits) dimensions of knowledge. The KT-instrument has a three point scale: correct, incorrect and do not know. The patients were asked, for example, if it is correct or incorrect that they can eat before the operation that they can drive home after operation or that they can see all their care documents. The proportion of the patients' correct answers in each dimension and in total was calculated. The respondent received a score in each dimension and in total calculated by adding the correct answers (max 27) and calculating the mean. For example, the bio-physiological dimension consisted of eight items, so the correct answers were proportioned to eight items. Thus the maximum score was 1 (correct answer) and the minimum was zero (incorrect or do not know answer) in all dimensions and in total.

The SoK has 32-items (plus 13 sub items =45 in total). It includes the same six subscales as "KT": bio-physiological (7items + 13 sub items), functional (7 items), experiential (3 items), ethical (9 items), social (2 items) and financial (4 items). The patients were asked, for example, if the patients had enough knowledge about pain, symptoms and costs of care. The SoK has a four-point scale (1 = strongly disagree to 4 = strongly agree), with a higher score indicating higher levels of sufficiency of knowledge. The SoK was constructed on six dimensions of knowledge by calculating the means for the sum variables. The sum variable was accepted if the patient had answered at least 50% of the items. The total indexes of sufficiency of knowledge were calculated by using the means of the six sum variables.

The following demographic characteristics were asked from the patients at baseline: gender, age, basic and vocational education, and the amount of ambulatory surgery operations.

Statistical analysis

The data were analyzed statistically using SPSS for Windows (version 16.0). Results are shown in frequencies, percentages, means and standard deviations. The Pearson Chi-Square test was used for the comparison of the sample demographic characteristics between the groups.

The effect of sociodemographic variables (age, gender, basic education, professional education and earlier ambulatory surgery) from the pre- to postoperative phases on knowledge level and sufficiency of knowledge was tested using one way analysis of variance.

Ethical considerations

Ethical approval for the study was obtained from the ethical research committee of the hospital district. Patients were informed and they agreed to participate in the study on a voluntary basis and gave written informed consent.

Results

Demographic variables

A total of 147 (=n) ambulatory orthopaedic surgery patients were enrolled: 72 in the experiment group and 75 in the control group. There was no statistically significant differences between the groups in the demographic variables (p = 0.189-0.976). The average age of participants in the Internet –based education group was 44.2 years (range 18-69, SD = 12.73) and 43.5 years (range 18-67, SD = 12.74) in the face to face education group. (Table 1)

Table 1- Patients' demographic variables

Variables	Experiment group (n=72)	Control group (n=75)
Gender		
*male	46	44
*female	54	56
Basic education		
*six years schooling	20	16
*nine years schooling	41	55
*twelve years schooling	39	29
Professional education		
*no education	16	18
*secondary level	29	36
*upper secondary/college	32	29
*polytechnic/university	22	17
Earlier ambulatory surgery		
*yes	58	57
*no	42	43

Results

Knowledge level and sufficiency of knowledge

Patients in both groups showed improvement in their knowledge during their care (Table 2). Patients who received Internet-based education improved their knowledge level significantly more (p = 0.033) than those patients who underwent face to face education with a nurse. There were no differences in patients' sufficiency of knowledge (p>0.05) between the experiment and control group.

Table 2-Patients knowledge level and sufficiency of knowledge in three different phases of care (A=experiment group; B=control group)

Knowledge	Before education mean A/B	After education mean A/B	Two weeks after operation mean A/B
Knowledge level	0.48 / 0.48	0.63 / 0.57	0.65 / 0.62
Sufficiency of knowledge	2.73 / 2.73	3.29 / 3.05	3.40 / 3.22

Relationship between knowledge level and sufficiency of knowledge and demographic variables

Knowledge level was related to the patients' professional education in the experiment group. After education patients who had no professional education evaluated their knowledge level lower (0.53) than those who had secondary (0.59) or upper secondary (0.66) or polytechnic or university (0.70) education. The age, gender, basic education and earlier ambulatory surgery were not related to the patient's knowledge level

In the control group age and earlier ambulatory surgery experience were related to patients' knowledge level. Two weeks after operation youngest (18-34 years old) experienced their knowledge level lower than the older ones (0.53-0.63). Knowledge level was related to the patients' experience of earlier ambulatory surgery in the control group. Patients' who had had earlier ambulatory surgery, experienced higher knowledge level than those who had not (0.55-0.39) before education, (0.62-051) after education before operation and two weeks after operation (0.66-0.56). The gender, or basic and professional education were not related to knowledge **level** in the control group. (Table 3)

Table 3- The relationship between patients knowledge level and demographic variables (A=experiment group; B=control group)

Object	Before education A/B	After education A/B	Two weeks after operation A/B
Age	0.080/0.172	0.570/0.157	0.927/**0.028**
Gender	0.643/0.374	0.654/0.079	0.079/0.500
Basic education	0.902/0.668	0.155/0.786	0.574/0.764
Professional education	0.472/0.612	**0.007**/0.865	0.130/0.641
Earlier ambulatory surgery	0.116/**0.001**	0.953/**0.002**	0.919/**0.006**

Sufficiency of knowledge was related to the patients' age, gender and earlier ambulatory surgery experience in the experiment group. Before education youngest (18-34 years old) experienced their sufficiency of knowledge lower than the older one (2.43-2.90). Women's sufficiency of knowledge was higher than men's after education (3.39-3.03) and two weeks postoperatively (3.53-3.28). In addition before education the patients who had had earlier ambulatory surgery experienced their sufficiency of knowledge higher than those who had not had (2.90-2.50).

In the control group patients' sufficiency of knowledge was related to the patients' earlier ambulatory surgery experience. Two weeks after operation patients who have had earlier ambulatory surgery experienced their sufficiency of knowledge higher than those who have not had (3.34-3.07). The other demographic variables did not differ significantly. (Table 4)

Table 4-The relationship between patients sufficiency of knowledge and demographic variables (A=experiment group; B=control group)

Object	Before education A/B	After education A/B	Two weeks after operation A/B
Age	**0.045**/0.399	0.293/0.369	0.118/0.711
Gender	0.566/0.296	**0.001**/0.806	**0.010**/0.694
Basic education	0.914/0.829	0.728/0.331	0.368/0.432
Professional education	0.974/0.815	0.371/0.943	0.272/0.868
Earlier ambulatory surgery	**0.006**/0.117	0.961/0.074	0.938/**0.030**

Discussion

We hypothesized that Internet-based patient education (experiment) is as effective as face to face education with a nurse (control) in increasing patients' level of knowledge and sufficiency of knowledge. In addition the correlations of demographic variables, level of knowledge and sufficiency of knowledge were tested. The hypothesis was confirmed Patients having Internet –based education had higher knowledge levels than patients receiving face-to face education with a nurse. However there were no differences between educations in patients' experience of sufficiency of knowledge. In addition some correlations between patients' knowledge and demographic variables were found.

There are only a few earlier studies about the cognitive outcomes of Internet –based education [3-11]. This is surprising because it is known that the use of Internet is growing and more and more people are also searching the knowledge from the Internet for their health problems. According to this thus [see also 13] the Internet is usable method in patients' education.

Patients' demographic variables were slightly related with patients' knowledge. However the related variables were different in experiment and control group. It seems that in the experiment group patients who had no professional education experienced their knowledge level lower than those who had. This difference was not significant in the control group. It might be that the more educated patients are also more used to use the internet. In the control group the youngest patients experienced their knowledge level lower than the older ones (two weeks after operation). The earlier ambulatory surgery experience was related to the patients' knowledge level in the control group in all phases of care. There were not similar differences in the knowledge level of the experiment group. It seems that face to face education can not improve patients' knowledge level equally if the patient has had earlier ambulatory surgery. Could it be that nurse assumes too much about the patients' knowledge level and the content of the education is not sufficient. This problem is avoided in the internet education since the content of education is the same for all.

Patients' sufficiency of knowledge was related to the patients' age, gender and earlier ambulatory surgery experience in the experiment group. Internet-based education improved especially the sufficiency of knowledge of the youngest patients' and patients with no earlier ambulatory surgery experience. These patients might also benefit most from Internet –based education. In addition sufficiency of knowledge was highest among women after the education in the experiment group. In the control group, only earlier ambulatory surgery experience was related to the patients' higher sufficiency of knowledge two weeks after surgery.

Conclusion

Internet–based education could be used with the ambulatory orthopaedic surgery patients. Internet is a successful method in

patients' education and it improved patients' knowledge even more than face to face education.

The relation of patients' demographic variables on patients' knowledge varied. It seems that Internet is a successful method especially with young people, women and patients with no earlier ambulatory surgery experience. Face to face education could not improve patients' knowledge level equally, well if the patient had had a previous ambulatory surgery. This issue calls further research.

Acknowledgments

This study was supported by the South-Western Hospital District of Finland.

References

[1] Ritterband L M, Thorndike F. 2006. Internet interventions or Patient Education Web sites? J Med Internet Res 2006; 8(3): e18.

[2] Webb T L, Joseph J, Yardley L, Michie S. Using the Internet to Promote Health Behavior Change: A Systematic Review and Meta-analysis of the Impact of Theoretical Basis, Use of Behavior Change Techniques, and Mode of Delivery on Efficacy. J Med Internet Res 2010; 12(1): e4.

[3] Wantland D J, Portillo C J, Holzemer W L, Slaughter R, McGhee E M. The Effectiveness of Web-Based vs. Non-Web-Based Interventions: A Meta-Analysis of Behavioral Change Outcomes. J Med Interent Res 2004; 6(4): e40

[4] Lewis D. Computer-based approaches to patient education: a review of the literature. J Am Med Inform Assoc 1999;6:272–82.

[5] Bessell TL, McDonald S, Silagy CA, Anderson JN, Hiller JE, Sansom LN. Do internet interventions for consumers cause more harm than good? A systematic review. Health Expect 2002;5:28–37.

[6] Lewis D. Computers in patient education. Comput Inform Nurs 2003;21:88–96.

[7] Kirsch SE, Lewis FM. Using the world wide web in health-related intervention research. A review of controlled trials. Comput Inform Nurs 2004;22:8–18.

[8] Wantland DJ, Portillo CJ, Holzemer WL, Slaughter R, McGhee EM. The effectiveness of web-based vs. non-web-based interventions: a meta-analysis of behavioral change outcomes. J Med Internet Res 2004;6:e40.

[9] Wofford JL, Smith ED, Miller DP. The multimedia computer for office-based patient education: a systematic review. Patient Educ Couns 2005;59:148–57.

[10] Griffiths F, Lindenmeyer A, Powell J, Lowe P, Thorogood M. Why are health care interventions delivered over the internet? A systematic review of the published literature. J Med Internet Res 2006;8:e10. 23.

[11] Beranova E, Sykes C. A systematic review of computer-based softwares for educating patients with coronary heart disease. Patient Educ Couns 2007;66:21–8.

[12] Goldsmith DM, Safran C. Using the web to reduce post-operative pain following ambulatory surgery. Proc AMIA Symp 1999;780–4.

[13] Hering K, Harvan J, Dangelo M, Jasinski D. The use of a computer website prior to scheduled surgery (a pilot study): impact on patient information, acquisition, anxiety level, and overall satisfaction with anesthesia care. AANA J 2005;73:29–33.

[14] Leino-Kilpi H, Luoto E, & Katajisto J. Elements of empowerment and MS patients. J Neurosci Nurs 1998;18: 116–123.

[15] Leino-Kilpi H, Mäenpää I, & Katajisto J.. Nursing study of the significance of rheumatoid arthritis as perceived by patients using the concept of empowerment. J Orthop Nurs 1999;3:138–145.

[16] Heikkinen K, Leino-Kilpi H, Nummela T, Kaljonen A, Salanterä S. A comparison of two educational interventions for the cognitive empowerment of ambulatory orthopaedic surgery patients. Patient Educ Cousel 2008;73: 272–279.

Address for correspondence

Katja Heikkinen; University of Turku, Department of Nursing Science, FIN-20014 Turku, Finland; katja.heikkinen@utu.fi