

A Model to Measure the Success of a Computer-Aided Information System for Prevention of Breast Cancer

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Abstract

The purpose of this study is intended to propose a model to measure the success of a computer-aided information system for prevention of breast cancer. The subjects of this study were 291 patients who had been visited a general hospital which located in the area of metropolitan. The present research showed that practice rate for breast cancer prevention can be increased to 57.4-82.6% by education of a computer-aided information system. In order to maintain the education effect well, it is very important to determine adequate education period and perform various programs in consideration of their circumstances. This study can be used to develop health promotion programs that enhance the health behavior for breast cancer prevention.

Keywords: *Computer-aided information system, Model, Prevention, Breast cancer*

1. Introduction

Breast cancer has a high prevalence especially among women in Korea and is a leading cause of cancer death [1, 2]. Incidence rate of female breast cancer to the Korean population was estimated to be 11.7 (95% CI : 9.2-13.6) per 100,000 persons in 2010. Age-standardized rate to the world population was 10.3 persons, and the truncated rate for ages 3.5-6.4 was 31.7 per 100,000 persons [2, 3]. Validity of these estimates is discussing in comparison with previous methods of incidence estimation in Korea. Epidemics show that the incidence and mortality of breast cancer increasing due to rapidly changes of women's life style and Westernized food, and so on. The risk factors for breast cancer included hormone-related factors such as early menarche, menopause, late birth, hormone replacement therapy and genetic background [4].

The strategies for the prevention and early detection of breast cancer are best for decreasing the mortality rate with a relatively low incidence of breast cancer. Early detection of breast cancer can be achieved by performing mammography or sonography, and so on. Many researchers indicated that this could be detection of early breast cancer as well as decreasing the rate of death from breast cancer among women [5, 6]. Previous research have on one-time screening rather repeat adherence so far and most people are not having the regular screening at recommend intervals. We also don't have any national program at all about it. In order to solve the urgent problem, we should look for the practical plans. However, as a model for prevention of breast cancer has not been dealt with former researches until

present in Korea [7, 8]. To overcome this situation, this study performed effective education based on computer-aided information system.

This study sought to apply the effect of it on the change of practice behavior of subjects for the prevention of breast cancer. The series of information education for the prevention of breast cancer were performed to subjects and the evaluation survey was conducted at the end of this trial to compare the change before and after education based on computer-aided information system for the practice behavior of breast cancer prevention.

Thus, this study is to analyze the model to measure the success of a computer-aided information system for prevention of breast cancer and ultimately to examine the education effect through its application. This will take advantage of basic data for researcher and indicate the direction of their education using a computer-aided information system in the future.

2. Materials and Methods

2.1 Materials

This subjects of this study were 291 patients who had been visited health examination center of a general hospital which located in the area of metropolitan hospital from October 10, 2011 to February 10, 2012.

Training researchers performed to find out the effectiveness of education based on computer-aided information system on practice behavior of subjects for breast cancer prevention. In this paper, framework based on education using a computer-aided information system is designed as follows: The first step is to identify cognitive strategy of the participants. Second step is to identify the health promotion of successful program. In the final step, in order to evaluate the program durability, follow-up test has been done after termination of the program (Figure 1). The education was performed four times for four months using Video, CD-ROM, case study, discussion, and others (Figure 2).

And then the education effect was estimated by the practice rates for the breast cancer prevention after education compared with that before education. In this work, the practice rates after education were plotted as a function of time elapsed after education: 10 days, 40 days, 70 days, and 120 days. The evaluation was performed for the examination of differences in the satisfaction of subjects after the education of a computer-aided information system between two aged groups.

2.2 Methods

Basic information of study subjects was analyzed with descriptive statistics. The pairwise t-test was done to compare the changes of practice rates for the breast cancer prevention before and after education using a computer-aided information system. Average and standard deviate were obtained. On the other hand, the chi-square test was used for the examination of differences in the satisfaction of subjects after the education of a computer-aided information system between two aged groups. The significance level was 0.05 and this data was analyzed with statistical package the SAS software.

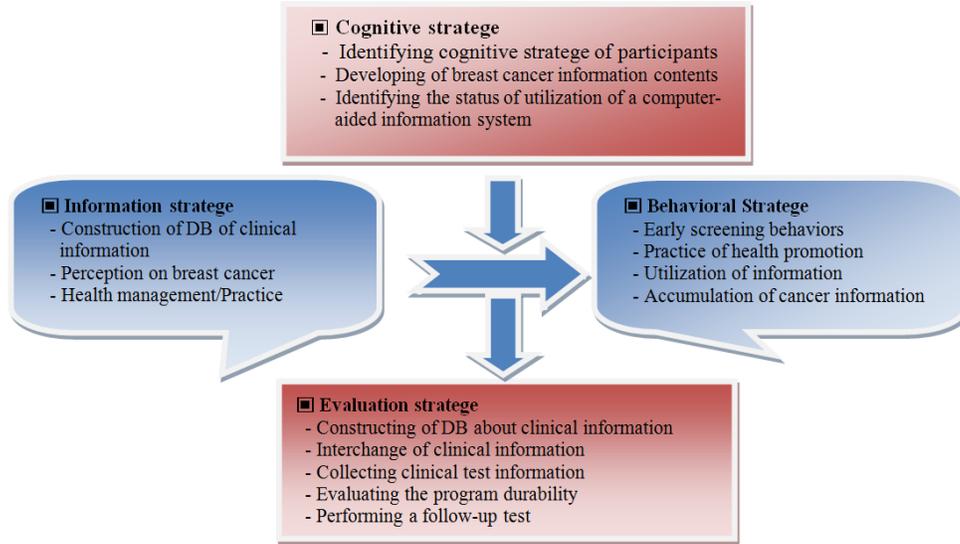


Figure 1. A Model to Measure the Success of a Computer-Aided Information System

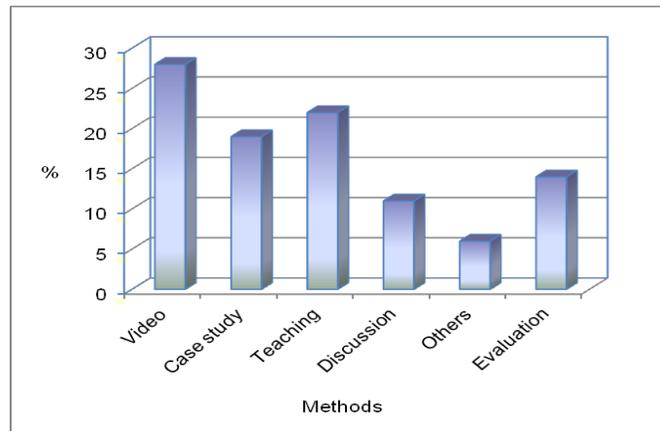


Figure 2. Contents of the Education of a Computer-Aided Information System

3. Result

3.1 General characteristics of Study Subjects

Table 1 presents general characteristics of study subjects. In a marital status, it showed that 83.8% married women higher than 16.2% single women. In the classification of religion, 76.6% subjects who have a religion are higher than 23.4% subjects who do not have religion. In the examination of job, 72.9% subjects who do not a job are higher than 27.1% subjects who have a job. In the examination of experience of delivery, 82.1% subjects who have delivery experience are higher than 17.9% subjects who do not have delivery experience.

Table 1. General Characteristics of Study Subjects

Variables	N(%)	Variables	N(%)
Age/yrs.		Religion	
< 40	48(16.5)	Has a religion	223(76.6)
40-49	136(46.7)	No religion	68(23.4)
50-59	75(25.8)	Job	
≥60	32(11.0)	Has a job	79(27.1)
Marital status		Jobless	212(72.9)
Married	244(83.8)	Menopause	
Single	47(16.2)	Yes	164(56.4)
Education level		No	127(43.6)
Under middle school	54(18.6)	Cancer screening	
High school	141(48.5)	Never	132(45.4)
Over college	96(33.0)	Done	159(54.6)
Income/month.		Experience of delivery	
< 200	83(28.5)	Yes	239(82.1)
≥200	208(71.5)	No	52(17.9)
Menarche		History of breast cancer	
< 14	259(89.0)	Yes	87(29.9)
≥ 14	32(11.0)	No	204(70.1)
Total	291(100.0)	Total	291(100.0)

3.2 Comparison of the Effectiveness of Practice Behavior after Education

Table 2 was compared the changes in the mean scores of application effect about practice behavior for breast cancer prevention before and after information education. As a result, the mean score of the concerns about breast cancer prevention was 11.46 point before education and the mean score of that after education was 14.71 point. There was a statistically significant difference between the two groups($t=-2.95$, $p<.05$). After receiving education(18.59 point), there were significant changes for the body weight than before education(13.74 point) in the mean score of body weight control($t=-15.72$, $p<.01$).

Table 2. Comparison of the Effectiveness of Practice Behavior after Education

Variables	Before	After	T
	Mean±SD	Mean±SD	
Concerns about breast cancer Prevention	11.46±3.82	14.71±3.62.	-2.95*
Practicing breast self-examination	4.72±1.49	6.96±0.95	-7.03*
Attitude towards breast cancer Screening	5.63±1.27	8.24±1.19	-5.27*
Exercise	10.28±3.51	11.47±3.57	-2.49
Stress control	5.95±0.83	4.62±0.84	6.81
Body weight control	13.74±5.06	18.59±4.50	-15.72**
Participation of education program	4.86±0.79	5.19±0.81	-6.24
Control of food intake	4.69±0.45	9.12±0.52	-7.06**
Control of favorite food intake †	8.25±1.62	9.74±0.79	-5.87
Importance of cancer education	4.91±0.71	5.34±0.61	-6.39

* $p<.05$ ** $p<.01$

† Cigarette smoking, alcohol drinking, etc.

3.3 Durability of Education Effect of Two Aged Groups

Figure 2 was done to compare the durability of education effect as a function of time elapsed after information education of a computer-aided information system for two groups of women aged under 50s and over 50s. The education effect was estimated to be higher at the women aged under 50s old than women aged over 50s for the breast cancer prevention, regardless of time elapsed of 40 days after the education. In particular, the education effect was estimated to decrease more rapidly with time elapsed of 70 days after the education at the women aged over 50s compared to the women aged under 50s.

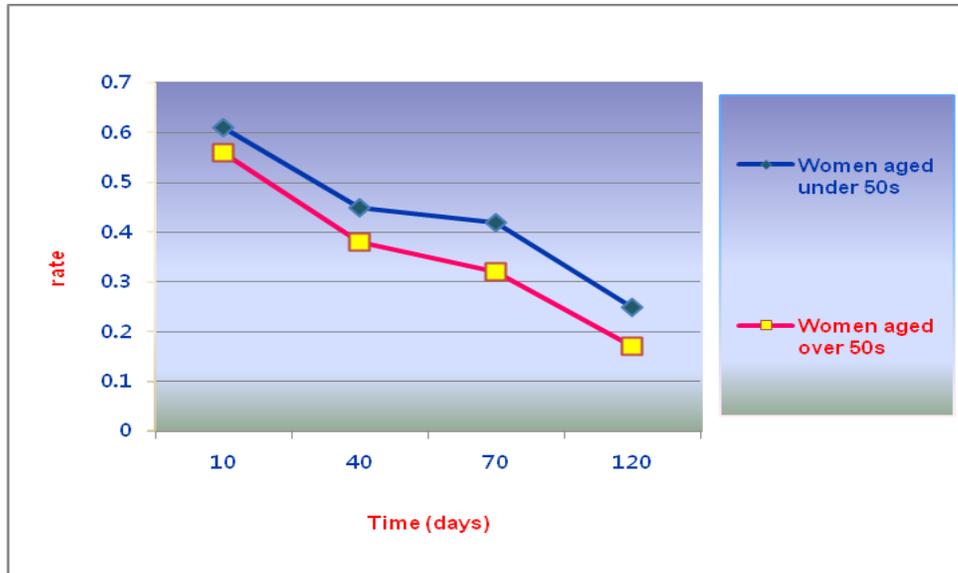


Figure 3. Durability after the Education of a Computer-Aided Information System

$$*Slope = \frac{\Delta Y}{\Delta X} \quad \text{Where } \Delta X : \text{time interval} \quad (1)$$

$$\Delta Y : \text{variation of education effect}$$

$$*Ratio = \frac{\Delta Y_a}{\Delta Y_b} \quad \text{Where } \Delta Y_b : \text{practice rate before education}$$

$$\Delta Y_a : \text{practice rate after education}$$

3.4 Evaluation of the Satisfaction After Education

Table 3 presents the evaluation of the satisfaction after information education using computer by two aged groups. 33.6% of women aged under 50s and 42.1% of women aged over 50s answered that they was very sufficient for time assigned for education. On the other hand, 43.0% of women aged under 50s and 63.6% women aged over 50s answered the most the emphasis on practice of breast cancer screening as methods for the breast cancer prevention. There was a significant difference between two aged groups ($X^2=10.72, p<.05$).

Table 3. Evaluation of the Satisfaction after Education

Variables	Under 50s †	Over 50s ‡	X ²
	N(%)	N(%)	
Time assigned for education			
Very sufficient	36(33.6)	45(42.1)	14.09
Sufficient	48(44.9)	34(31.8)	
Fair	14(13.1)	19(17.8)	
Insufficient	7(6.5)	8(7.5)	
Very insufficient	2(1.9)	1(0.9)	
Understanding of education contents			
Very high	51(47.7)	49(45.8)	9.14
High	36(33.6)	34(31.8)	
Fair	12(11.2)	11(10.3)	
Low	5(4.7)	8(7.5)	
Very low	3(2.8)	5(4.7)	
Methods for the breast cancer prevention			
Emphasis on practice of breast cancer screening	46(43.0)	68(63.6)	10.72*
Appropriate education for each subject	29(27.1)	24(22.4)	
Adoption of evaluation system	15(14.0)	10(9.3)	
Others	17(15.9)	5(4.7)	
Total	107(100.0)	107(100.0)	

* p<.05

† Women aged under 50 years old ‡ aged over 50 years old

4. Discussion

This paper is to evaluate the model to measure the success of a computer-aided information system for prevention of breast cancer. To evaluate the impacts of the practice behavior before and after education, the target subjects were allocated randomly to experimental groups. They were divided into two groups which were women aged under and over 50s.

The information education through computer for the breast cancer prevention was more effective in encouraging the practice of breast cancer screening. This intervention did not increase smoking, alcohol drinking rate significantly, and then multi-disciplinary approach is required to reduce the smoking prevalence. Based on the results obtained by the study, it is anticipated that this paper may be used as basic data for developing and intervening for the breast cancer prevention with integration of individual and contextual associated factors.

The result of this paper, after receiving education, there were significant changes for the body weight than before education in the mean score of body weight control. The finding was consistent with the result of earlier research [9]. Therefore, it needs to perform systematic information education. There is a need for a separate program to be implemented on the groups who characterize having lower levels of health knowledge and health promotion behavior. The education effect was estimated to be higher in the group under the age of fifty than group over the age of fifty in the rate of practice for breast cancer prevention, regardless of time elapsed of 40 days after the education. In particular, the education effect was estimated to decrease more rapidly with time elapsed of 70 days after the education at the

women over the age of fifty as compared to the women under age of fifty. Thus, year-based education should be performed more often women over the age of fifty than women under the age of fifty. The present research showed that practice rate for the breast cancer prevention can be increased to 57.4-82.6% by the education, which is similar to data reported in the previous studies [10, 11]. However, it should be noted that the education effect does not maintain for so long. Therefore, in order to maintain the education effect well, it is very important to determine adequate education period and perform various programs in consideration of their circumstances.

The present work elucidated throughout the statistical analysis how effectively the synthetic and systematic education contributes to practice behavior for the prevention and early detection of breast cancer. The future work should focus on the study of the education effect as a classification of patient throughout more prolonged research based on a larger data base. Methods for the breast cancer prevention on the evaluation in formation education revealed the significantly the highest at the emphasis on breast cancer screening practice. This is similar with previous studies on the clinical education [6, 12, 13]. This paper presented the satisfaction over 80.0% in evaluation after information education, the result of this would be the enhancement of practice behavior for the prevention of breast cancer.

Concerning the education methods, most of the domestic programs imposed the knowledge on the life habit through the lecture or through watching video so far [14]. In order to get out such a stagnant reality, however, this paper was performed the advanced methods which consist of the education of a computer-aided information system, discussion, and evaluation.

The objective measurement on the changes of the behaviors of the subjects would be more valuable than mere abstract testimonies that are only responses to the questions provided by the programs. Therefore, this paper was proposed important data such as education of a computer-aided information system. These may also be used for the planning report for the prevention and early detection of breast cancer in the future. Thus, this paper indicated that systematic education of a computer-aided information system showed significant positive effects on the life of subjects and health behavior.

5. Conclusion

This paper identified positive effects of the education of a computer-aided information system for prevention of breast cancer. The information education can be used as an effective method to improve the knowledge of breast cancer information and to enhance the practice rate of breast cancer screening. This paper, therefore, resulted in significant improvement in the quality of life of women and its implications could be used as the basic data for developing further systematic materials on computer-aided health education of breast cancer patients.

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