A Design of Efficient Medical Information System to Enhance Health Behaviors after Radical Prostatectomy

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Abstract. This paper is to design an efficient medical information system to enhance health behaviors after radical prostatectomy. The subjects of this paper were a total of 142 patients who had visited a general hospital located in Metropolitan area. The results of this study are as follows. First, for soybean intake, positive change of health behaviors diminished the progression rate of prostate cancer(31.24 ± 0.35, t=-0.57, p=.000). Second, this paper found that the health promotion behavior in prostate cancer patients was increased by 69.2-73.6% compared with the previous status. Therefore, systematic adoption of the medical information system to minimize the damage of prostate cancer will contribute effectively to the rapid disease recovery and prevention.

Keywords: Medical information system, Health behaviors, Radical prostatectomy, Efficiency

1 Introduction

Prostate cancer is the second most prevalent solid tumor diagnosed in Western Europe [1],[2],[3]. Prostate cancer is also the most common type of non-skin cancer diagnosed in American men [4],[5]. One in 6 men will be diagnosed with prostate cancer over the course of his lifetime. Prostate cancer is also the second most common cause of cancer death in men, behind only lung cancer [6],[7]. The National Cancer Institute estimates that there will be 238,720 new cases and 29,720 deaths due to prostate cancer in the United States during the year 2013.

Prostate cancer incidence rates increased by 19.6% per year between 2007 and 2013. It appeared the increase due to detection of early-stage disease. There was no increase in the incidence rate of metastatic cancer. Incidence rates varied widely among the SEER program areas: in 2013 from 352.8 per 100,000 in Connecticut to 719.4 in Seattle. Radical prostatectomy rates tripled between 2007 and 2013 in the SEER areas as a whole. Among men aged 70-79, the rate of prostatectomy increased by nearly 43% per year. There was a five-fold variation among SEER areas in radical prostatectomy rates in 2009, with a low of 74.8 per 100,000 in Connecticut and a high of 362.5 in Seattle[8],[9]. Increases in rates of prostate cancer incidence and prostate

surgery have occurred in the United States without clear evidence that screening and prostectomy are effective in reducing mortality. Moreover, much of the growth in incidence and radical prostatectomy rates have occurred among older men, who appear least likely to benefit from early detection and surgery of occult prostate cancer. However, patients who underwent radical retropubic prostatectomy have increased risk of developing inguinal hernia.

Therefore, the medical information system including prostatectomy is urgently needed to control the increasing prevalence of prostate cancer and produce its related desirable outcomes. This paper is to design an efficient medical information system to enhance health behaviors after radical prostatectomy. That is, this paper attempted to estimate the effect of it on the change of health status for health improvement in prostatectomy patients through development of an efficient medical information system. This study will contribute to reducing prostate cancer patients from prostatitis to prostate cancer in the future.

2 Materials and Methods

2.1 Structure of Database System

This paper is to provide for an efficient medical information system from strategic targets to solution method. In the first stage, this step defines strategic targets and how to achieve them within the organization. In the second stage, it is to identify the functional elements of successful information system and gather the information. In the third stage, implementation stage, where a preliminary program is to be applied and evaluated in the field has been implemented. It also demonstrated the need to separate data from its applications using it. When the health practice has finished its work on processes and data classes, it can explore the functions and effects of the medical information system.

2.2 Study Materials

Study participants were patients who were treated with prostatectomy at least 5 months ago by urology of a general hospital in Metropolitan area. The data were collected by interview and self-administered questionnaire from April 21 through May 23, 2014. This program was totally consisted 142 persons, it has been divided into two parts. The experimental group of 71 patients which was assigned as group with information intervention, while the control group of 71 patients was assigned as group with no information intervention. The two groups are compared to know the difference of changes which affects health behaviors.

2.3 Study Methods

General characteristics of study subjects were measured by percentage and number. The pairwise t-test was done to compare the health behaviors before and after application of medical information system after radical prostatectomy. It was also performed to determine the statistical significant differences between the two groups on the satisfaction of a medical information system for measurement of health behaviors for the prevention of recurrence in prostatectomy patients.

3   Results

3.1 General Characteristics of Study Subjects

Table 1 presents general characteristics of study subjects. The proportion of age was the highest in individuals (35.2%) who were over 70 years old in the experimental group while it was the highest in subjects (32.4%) who were 60-69 years old in the control group. In a marital status, married respondents (85.9%) of the control group were a higher rate than respondents (83.1%) of the experimental group. On the other hand, In terms of infectious disease history, it showed higher in subjects (54.9%) who had suffered from infectious disease in the experimental group than that of control groups (32.4%).

Table 1. General Characteristics of Study Subjects

Variables	Experimental group N(%)	Control group N(%)	Variables	Experimental group N(%)	Control group N(%)
Age/yrs.			Education level		
≤49	6(8.5)	11(15.5)	Under middle school	14(19.7)	18(25.4)
50-59	21(29.6)	19(26.8)	High school	30(42.3)	22(31.0)
60-69	19(26.8)	23(32.4)	Over college	27(38.0)	31(43.7)
≥70	25(35.2)	18(25.4)	Vasectomy		
Marital status			Yes	33(46.5)	27(38.0)
Single	12(16.9)	10(14.1)	No	38(53.5)	44(62.0)
Married	59(83.1)	61(85.9)	Infectious disease history		
Monthly income			Yes	39(54.9)	23(32.4)
<200	16(22.5)	22(31.0)	No	32(45.1)	48(67.6)
200-399	31(43.7)	28(39.4)	Cancer family history		
≥400	24(33.8)	21(29.6)	Yes	28(39.4)	20(28.2)
BMI(Kg/m²) †			No	43(60.6)	51(71.8)
<18.5	22(31.0)	19(26.8)	Voiding difficulty		
18.5-22.9	19(26.8)	25(35.2)	Yes	62(87.3)	28(39.4)
≥23.0	30(42.3)	27(38.0)	No	9(12.7)	43(60.6)
Total	71(100.0)	71(100.0)	Total	71(100.0)	71(100.0)

† BMI : Body Mass Index

3. 2 Health Behaviors after Application of Medical Information System

Table 2 represents health behaviors before and after application of medical information system. In terms of voiding difficulty, subjects' score(41.75±1.62) after application significantly decreased than subjects(69.31±1.28) before application(t=1.93, p=.000). On the other hand, for dietary factors, there was a significant difference in practicing the healthy lifestyle of tomato intake after application of medical information system (t=-3.82, p=.000).

Table 2 Health Behaviors after Application of Medical Information System

Items	Before Mean±S.D	After Mean±S.D	t	p
Physical factors				
Voiding difficulty	69.31±1.28	41.75±1.62	1.93	.000
Sexual life	31.79±1.65	36.18±1.39	-0.57	.316
Urinary frequency	67.54±0.83	52.93±0.51	2.62	.059
Stress	72.36±1.59	56.37±2.83	1.39	.000
Obesity control	61.82±0.17	47.82±0.75	0.88	.024
Exercise	35.17±1.39	69.15±1.92	-1.47	.000
Dietary factors				
Tomato intake	39.45±1.72	65.40±1.69	-3.82	.000
Soybean intake	31.24±0.35	62.72±0.85	-0.57	.000
Vegetable intake	45.96±1.84	73.58±1.27	-1.74	.000
Smoking	58.16±1.57	31.62±2.69	4.92	.000
Alcohol drinking	64.72±0.96	47.59±1.55	0.58	.001
Clinical factors				
Diabetes mellitus	42.17±1.48	39.52±1.53	3.76	.629
Hypertension	62.52±0.73	54.29±0.81	1.54	.317
Cholesterol	57.11±0.52	51.84±0.20	0.82	.543
PSA level†	64.26±0.37	45.19±0.72	3.61	.007

† PSA : Prostate-specific antigen

4   Discussion

The purpose of this study was to investigate the effects of medical information system application to enhance health behaviors after prostatectomy.

As a result of this study, there were statistically significantly positive changes of health status such as voiding difficulty, tomato intake, and obesity control. It diminished the progression rate of prostatectomy patients. The findings were similar to the previous studies on the other operation patients[6],[10]. This study suggests that individuals with prostatectomy patients should be targeted for specific health behaviors to prevent the recurrence of prostate cancer. Based on the results obtained by the study, it is anticipated that this paper may be used as basic data for developing

and interventing health promotion behavior for the prostate cancer patients. However, in order to maintain desirable food behaviors, convergence educational program for prostatectomy patients focused on health promoting behavior is more successful than single program.

The results of this paper, after receiving intervention, there was a positive change for physical factors after intervention than before intervention in the mean score of stress status. The finding was consistent with the result of earlier researches[11],[12]. Therefore, it needs to perform systematic stress management. The result of laboratory after apply medical information system, there has been a significant decrease at PSA level. The finding is similar to previous studies on the prostate cancer[6],[13]. Prostate-specific antigen(PSA) is a glycoprotein derived from prostatic ductal and acinar epithelial cells and the most commonly used tumor marker for prostate cancer, in the monitoring of recurrence as well as in diagnosis.

This study showed a positive change in experimental groups who underwent radical prostatectomy. It revealed positive tumor cells for PSA and PAP (prostate acid phosphatase). After hormonal therapy including anti-androgen and gonadotropin releasing hormone agonist, the multiple metastatic nodules showed nearly complete regression. However, several studies have reported that metastases of prostate adenocarcinoma can occur despite normal serum PSA level, and if clinically warranted, the immunohistochemical staining or other serologic marker for the prostate adenocarcinoma should be considered in the evaluation of metastatic carcinoma of unknown primary in male although the serum PSA is not elevated.

After the experiment, the experimental group which experienced patients' information application level on medical information system showed the effectiveness of improvement of health behaviors in prostatectomy patients. Therefore, a comprehensive and systematic adoption of the medical information system to minimize the damage of prostate cancer will contribute effectively to the rapid disease recovery and prevention.

5   Conclusion

This paper is to design an efficient medical information system to enhance health behaviors after radical prostatectomy. As a result, this paper found that the health promotion behavior in prostate cancer patients was increased by 69.2-73.6% compared with the previous status. In conclusion, this paper conducted a positive effect on health enhancement of prostatectomy patients.

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