

# A Meta-Analysis on the Effect of Introducing Novel Information Technology for Preventing Complications After Esophageal Resection

Seong-Ran Lee

**Abstract:** There are many complications depending on the operation. Therefore, the data measured a meta-analysis on the effect of introducing novel information technology for preventing complications after esophageal resection. The respondents are classified into two groups. Basic questions of respondents were observed in  $X^2$ -test. Questions about the causes of esophageal cancer in respondents were investigated by  $X^2$ -test. The symptoms of esophageal cancer were conducted with a  $X^2$ -test. Physical symptoms and system effect over time have been analyzed by  $t$ -test. The  $t$ -test tested significance for new information effects introduction to prevent complications after esophageal resection. The findings obtained are as follows. 1) In the case of family history, 46.0% of case population with family history was significantly higher than 17.5% of comparative population with family history ( $X^2=2.78$ ,  $p<.05$ ). 2) If BMI is  $25\text{kg/m}^2$  or higher, 54.0% of the cases was higher than 47.6% of the controls. 3) 73.0% of case population who frequently drank hot tea was significantly higher than 46.0% of the comparative population ( $X^2=6.95$ ,  $p<.05$ ). 4) 68.3% of case population who frequently ate fatty foods was significantly higher than 41.3% of the comparative population ( $X^2=3.61$ ,  $p<.05$ ). 5) In cases where food was often difficult to swallow, 77.8% of case population was significantly higher than 15.9% of comparative population ( $t=-3.27$ ,  $p<.05$ ). 6) In patients' physical condition, heartburn had decreased since 16 days due to mediation of the information system. However, it started to increase again after 36 days. 7) About the effectiveness of the system, after 10 days, the system was steadily increasing in application. Thus, it has been confirmed that the introduction of a new information system is effective in preventing complications after esophagectomy

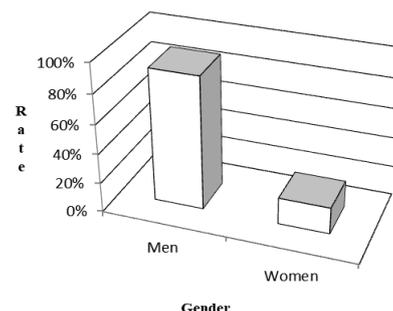
**Key words:** Complications, esophageal resection, hot tea, heartburn

## I. INTRODUCTION

Esophageal cancer continues to grow as a malignant tumor of esophagus. Esophageal cancer is classified according to their location as cervical cancer, chest esophageal cancer, and gastroesophageal connection cancer. Esophageal cancer usually occurs in men over their 60s. The ratio of sex between men and women is nine to one, resulting in more men in Fig. 1. Histologically, out of 2,537 cases of esophageal cancer in 2018, cancer accounted for 95.7% of all cases. Among esophageal cancers, squamous cell carcinoma was the

highest with 88.7%. Following that, adenocarcinoma accounted for 3.1 percent. When patients get esophageal cancer, patients feel uncomfortable swallowing food. If people drink tea over 70 degrees Celsius, the rate of esophageal cancer increases eightfold. There are no symptoms of esophageal cancer until just before it develops [1], [2]. The prognosis of the disease varies depending on the stage of the disease, but the prognosis is poor and the 5 year survival rate is around 5 to 20 percent

Treatment of esophageal cancer involves surgery, radiation, and chemotherapy. Surgical treatment plays a central role in treating esophageal cancer. Esophageal cancer requires surgery on the abdomen, thorax, and cervical areas at the same. Since the surgical site is close to the heart, bronchial tubes, and lungs. There is a high risk of surgery. There are many complications depending on the operation. In about 30 to 70 percent of patients, post-op complications can occur. Occasionally, the area where esophageal and gastrectomy is performed after esophageal resection cannot heal properly and leaks can occur. If there is an internal chest leak, or there is a large area of leakage, the surgery may be performed again.



**Fig. 1. Status of esophageal cancer incidence by gender**

The laryngeal nerve passes between the trachea and the esophagus, so the esophageal cancer surgery may damage you during lymph. In case of occipital nerve paralysis, symptoms such as neck pain, dysphagia, and etc appear. There may also be stenosis after esophageal cancer surgery [3], [4]. If cancer spreads to other organs or cancer spreads to multiple lymph nodes, it is highly likely to recur after surgery. Once the esophageal cancer



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progresses, the treatment rate drops rapidly. Early detection of esophageal cancer is the key to improving treatment performance. Esophageal cancer is important in how people build and manage their body and mind. For this purpose, a new information system is needed to prevent complications of esophageal cancer [5]-[7].

Until now, most studies have been done on the diagnosis of esophageal cancer. There is no study on the application of information system to prevent complications after esophageal cancer surgery. Therefore, the data measures a meta-analysis on the effect of introducing novel information technology for preventing complications after esophageal resection.

## II. MATERIALS AND METHODS

### A. Composition of the Information System

Below indicates the composition of the novel system for esophageal cancer patients. Six types of information system are as follows. There are efficiency, usefulness, speed, cost savings, reliability, and persistence in Fig. 2.

### B. Materials

The data was conducted on 126 people who visited the division of gastroenterology at K general hospital from March 21 to June 8, 2018. The respondents are classified into two parts. The test people is 63 who apply the novel system and the comparative people is 63 people who do not apply the novel system.

### C. Methods

Basic questions of respondents were observed in  $X^2$ -test. Questions about the causes of esophageal cancer in respondents were investigated by  $X^2$ -test. The comparison of symptoms of esophageal cancer was conducted with a  $X^2$ -test. Physical symptoms and system effect as time goes by have been analyzed by t-test.

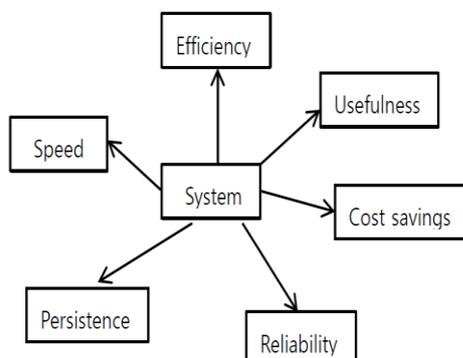


Fig. 2. Six elements for the introduction of novel system

## III. RESULTS AND DISCUSSION

### A. Basic Questions of Respondents

Table 1 reveals basic questions of respondents. In the case of family history, 46.0% of case population with family history was significantly higher than 17.5% of comparative population with family history ( $X^2=2.78$ ,  $p<.05$ ). If BMI is  $25\text{kg/m}^2$  or higher, 54.0% of the cases was higher than 47.6% of the controls.

41.3% of the comparative populations who regularly examined the gastroscopy was higher than 30.2% of the test population ( $X^2=9.02$ ,  $p<.05$ ). This is the same as the results for gastric cancer patients in the preceding studies [8]-[10]. Since esophageal cancer is difficult to detect early, the best way to prevent esophageal cancer should take good care of it. People who smoke and drink alcohol have a high incidence of esophageal cancer. Drinking and smoking are the most common forms of complication after esophagectomy. Thus, if people enjoy smoking and drinking, they should have an endoscopy at least once a year after the age of 50 or esophageal resection. Also, if people eat salty foods frequently or have a family history, they should check their esophagus for cancer. Early detection of esophageal cancer is very important. Because esophageal cancer did not show symptoms in the early stages and when it appeared, the cancer progressed.

Table 1. Basic questions of respondents

Variables	Exp g	Con. G	$X^2$
	N(%)	N(%)	
Gender			
Gentlemen	33(52.4)	29(46.0)	5.26
Women	30(47.6)	34(54.0)	
Family history			
Yes	29(46.0)	11(17.5)	2.78*
No	34(54.0)	52(82.5)	
BMI ( $\text{kg/m}^2$ )			
<18.5	17(27.0)	19(30.2)	11.64
18.5-24.9	12(19.0)	14(22.2)	
$\geq 25$	34(54.0)	30(47.6)	
Gastroscopy			
Yes	19(30.2)	26(41.3)	9.02*
No	44(69.8)	37(58.7)	
Total	63(100.0)	63(100.0)	

\* $P<.05$

### B. Questions about the causes of esophageal cancer in respondents

Table 2 reveals the questions about the causes of esophageal cancer in respondents. 73.0% of case population who frequently drank hot tea was significantly higher than 46.0% of the comparative



population( $X^2=6.95, p<.05$ ). 68.3% of case population who frequently ate fatty foods was significantly higher than 41.3% of the comparative population( $X^2=3.61, p<.05$ ). 60.3% of case population who frequently consumed salt was significantly higher than 38.1% of the comparative population who ingested greasy food.

The case population who frequently drink hot tea was significantly higher than the comparative population. This is similar to the fact that hot food causes laryngeal cancer in prior studies. Therefore, people shouldn't drink hot drinks with a straw. Because if people drink with a straw, they drink the hottest part. If people drink it while stirring with a spoon, it can cool to a moderate temperature. Eating at a moderate temperature does not damage the larynx, esophagus and stomach. People can also feel the unique taste of food.

Table 2. Questions about the causes of esophageal cancer in respondents

Variables	Exp. g. N(%)	Con. g. N(%)	X <sup>2</sup>
Hot tea intake			
Frequently	46(73.0)	29(46.0)	6.95*
Seldom	17(27.0)	34(54.0)	
Greasy food			
Frequently	43(68.3)	26(41.3)	3.61*
Seldom	20(31.7)	37(58.7)	
Salt intake			
Frequently	38(60.3)	24(38.1)	9.46*
Seldom	25(39.7)	39(61.9)	
Drinking			
Frequently	41(65.1)	28(44.4)	5.18*
Seldom	22(34.9)	35(55.6)	
Smoking			
Frequently	25(39.7)	16(25.4)	2.96*
Seldom	38(60.3)	47(74.6)	
Total	63(100.0)	63(100.0)	

\*p<.05

### C. Comparison of physical symptoms of esophageal cancer

Table 3 indicates physical symptoms of esophageal cancer in respondents. In cases where food was often difficult to swallow, 77.8% of case people was significantly higher than 15.9% of comparative people( $t=-3.27, p<.05$ ).

Table 3. Comparison of physical symptoms of esophageal cancer

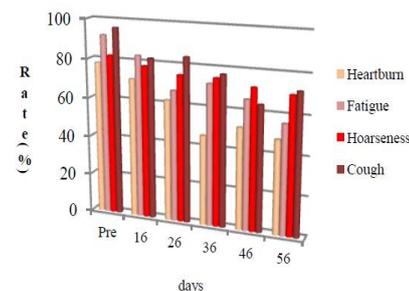
Variables	Exp. g. N(%)	Contr. g. N(%)	t
Difficulty in swallowing			
Seldom	14(22.2)	53(84.1)	-3.27*
Frequently	49(77.8)	10(15.9)	
Persistent heartburn			
Seldom	18(28.6)	42(66.7)	-1.84*

Frequently	45(71.4)	21(33.3)	
Chest pain			
Seldom	20(31.7)	54(85.7)	-5.91**
Frequently	43(68.3)	9(14.3)	
Cough			
Seldom	11(17.5)	26(41.3)	-2.66*
Frequently	52(82.5)	37(58.7)	
Hoarseness			
Seldom	19(30.2)	48(76.2)	-7.08**
Frequently	44(69.8)	15(23.8)	
Neck pain			
Seldom	21(33.3)	43(68.3)	3.91*
Frequently	42(66.7)	20(31.7)	
Total	63(100.0)	63(100.0)	

\* p<.05 \*\* p<.01

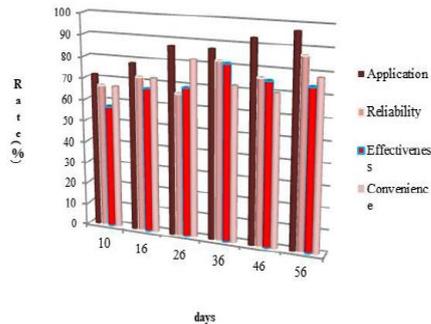
### D. Physical symptoms as time goes by

Below indicates physical symptoms as time goes by. In patients' physical condition, heartburn had decreased since 16 days due to mediation of the information system. However, it started to increase again after 36 days. This is because patients who frequently have the accessibility to information have many chances to get health information. This is similar to the results of previous studies which show a high probability of performing health activities through media in patients with stomach cancer [11], [12]. It is thought that an education on dietary habits of esophageal cancer, including health group with no other disease history will be required. Thus, this information system has been found to be effective in alleviating physical symptoms after esophagectomy. About the effectiveness of the system, after 10 days, the system was steadily increasing in application. System reliability declined after 26 days and then tended to increase after 46 days in Fig. 3.



(a) Physical condition

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(b) Effects of system

**Fig. 3. Physical condition and system effect as time goes by**

## IV. CONCLUSION

The data measured a meta-analysis on the effect of introducing novel information technology for preventing complications after esophageal resection. The findings obtained are as follows. 1) In the case of family history, 46.0% of case people with family history was significantly higher than 17.5% of comparative people with family history ( $X^2=2.78$ ,  $p<.05$ ). 2) 68.3% of case people who frequently ate fatty foods was significantly higher than 41.3% of the comparative people ( $X^2=3.61$ ,  $p<.05$ ). 3) In cases where food was often difficult to swallow, 77.8% of case people was significantly higher than 15.9% of comparative people ( $t=-3.27$ ,  $p<.05$ ). 4) About the effectiveness of the system, after 10 days, the system was steadily increasing in application. Thus, it has been confirmed that the introduction of a novel system is effective in preventing complications after esophagectomy

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**Seong-Ran Lee** received the B.S. degree in consumer science from Seoul National University, Korea. She received the M.S. degree in health science from Seoul National University, Korea and her Ph.D. in the same major from Catholic Medical College in Seoul, Korea. Her present research interest is medical information, public health and medical engineering. Currently, she is a professor in the department of medical information at Kongju National University in Korea.

