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# Nurse Counseling for Physical Activity in Patients Undergoing Esophagectomy

## ABSTRACT

Strong evidence exists regarding multiple benefits of physical activity among cancer patients. Patients undergoing esophagectomy received counseling for physical activity by a nurse and instructions to keep a diary of physical activities before surgery, followed by 2 counseling sessions after surgery. Physical activity, body mass index, psychological distress, and quality of life were measured at baseline, 2–4 weeks, and 3 and 6 months after discharge. Of 29 participants (mean age = 65.9 years), 72.5% underwent thoracoscopic esophagectomy in the prone position with 3-field lymphadenectomy. The results of the International Physical Activity Questionnaire indicated that postoperative physical activity returned to nearly preoperative level, and the number of inactive patients gradually decreased by half at 6 months after discharge. Quality of life scores, except those for role function and social function, tended to return to the baseline at 6 months after discharge. Psychological distress measured by the Kessler 6 remained lower than the baseline, whereas the mean score of body mass index gradually declined after discharge. Patients undergoing esophagectomy and receiving nurse counseling can return to preoperative physical activity level in their daily lives after surgery. Nurses should integrate physical activity promotion into cancer care.

Cancer patients often expect to resume their previous activities of life after completing their primary treatment (Fong et al., 2012). Patients with esophageal cancer, however, often suffer from persistent problems, including swallowing and eating issues, appetite loss, shortness of breath, fatigue, and diarrhea after esophagectomy, the mainstay of curative treatment of the disease (Ginex

et al., 2013; Lagergren et al., 2007; Verschuur et al., 2006; Viklund, Wengström, Rouvelas, Lindblad, & Lagergren, 2006). These postoperative complications are associated with long-term emotional impairment (Scarpa et al., 2013). Furthermore, nearly 25% of patients lose more than 15% of their pretreatment body weight at 1 year after surgery (Ouattara et al., 2012). A long recovery time after the extensive

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treatment and patients' disappointment with persisting symptoms may also affect their quality of life (QoL) (Viklund et al., 2006).

## Background

Physical activity promotion in cancer care has become a priority for healthcare professionals, and strong evidence supports the benefits of physical activity for cancer patients (Tyrrell, Keats, & Blanchard, 2014). Physical activity is defined as "any movement of the body that is brought about by the contraction of skeletal muscle that increases energy expenditure above the basal level," in contrast to physical exercise defined as a subcomponent of physical activity aiming at physical fitness (Leitzmann et al., 2015). Physical activity has beneficial effects on body composition, physical fitness, anxiety, self-esteem, and QoL (Leitzmann et al., 2015), as well as on improved survival in patients with breast cancer or colon cancer (Ballard-Barbash et al., 2012). The Physical Activity Guidelines for patients with breast cancer recommend 10 metabolic equivalent task (MET) hours/week for 18–48 months postdiagnosis (Beasley et al., 2012). For esophageal cancer, however, no such guideline exists. Although a recent meta-analysis of observational studies shows that physical activity is associated with a reduced risk of esophageal cancer (Singh, Devanna, Edakkanambeth Varayil, Murad, & Iyer, 2014), the literature regarding physical activity in patients with esophageal cancer after esophagectomy is sparse. The objective of the present study was to describe changes in physical activity, body mass index (BMI), psychological distress, and QoL before and after surgery in patients who underwent esophagectomy and received nurse counseling for physical activity.

## Methods

### Participants

Patients with newly diagnosed esophageal squamous cell carcinoma undergoing esophagectomy were recruited at the National Cancer Center Hospital East outpatient clinic between August 2013 and January 2014. Patients were eligible for the study if they were 20 years or older and were undergoing thoracoscopic esophagectomy in the prone position (TSEP) or right open transthoracic esophagectomy with curative intent. Participants were excluded if they had a history of cancer, had undergone tracheostomy or secondary surgery, or their primary surgeon had determined they were inappropriate for the study.

### Study Procedures

After obtaining informed consent from the participants, we abstracted demographic and clinical data from

medical records and measured baseline physical activity, BMI, psychological distress, and QoL. A nurse counseled participants in a 30-minute, face-to-face session before surgery. The nurse outlined the benefits and examples of physical activity (e.g., walking and vacuuming as moderate intensity). The participants were encouraged to increase physical activity in their daily lives to preoperative level and instructed to keep a diary to record physical activity. The follow-up counseling and assessment were conducted at the first postoperative clinic visit (2–4 weeks) and 3 months after the discharge. The nurse helped the participants overcome barriers to physical activity and supported them to continue their efforts. The outcomes were also measured at 6 months after discharge. Counseling nurses were required to have more than 5 years of experience in oncology nursing and have completed a training program initiated by investigators. Training consisted of five 30- to 60-minute sessions about the latest information on esophageal surgery and postoperative complications, theory and practice related to physical activity, and techniques for patient consultation.

## Measurements

### Physical Activity

We used a self-reported questionnaire, the Japanese version of the International Physical Activity Questionnaire (IPAQ-SV), to assess physical activity. The reliability and validity of the Japanese version of IPAQ-SV were established (Murase, Katsumura, Ueda, Inoue, & Shimomitsu, 2002). The IPAQ short form, developed by the International Consensus Group for cross-national assessment, is a seven-item measure of four domains of activity: vigorous-intensity physical activity, moderate-intensity physical activity, walking, and sitting (Craig et al., 2003). Participants reported frequency (during the last 7 days), duration of physical activity (minutes/hours usually spent on one of those days), and total time spent sitting on a weekday during the last 7 days. We also used physical activity to calculate total weekly MET minutes per week (MET min/wk). According to the IPAQ guidelines (IPAQ website, 2005), we calculated total physical activity using the following equation:  $3.3 \times \text{walking} + 4.3 \times \text{moderate-intensity physical activity} + 8.0 \times \text{vigorous-intensity physical activity}$ . The total physical activity was also evaluated as categorical variables (inactive, minimally active, and health-enhancing physically active) according to the IPAQ categorical classification (Saglam et al., 2010).

### Quality of Life

We assessed QoL using the Japanese versions of the European Organization for Research and Treatment of Cancer (EORTC) quality of life-core 30 (QLQ-C30) v3.0

and the EORTC supplemental quality of life-esophageal module 18 (QLQ-OES18). The EORTC QLQ-C30 v3.0 includes 30 items in one global QoL scale: five function scales (physical, role, cognitive, emotional, and social), three symptom scales (fatigue, nausea/vomiting, and pain), and six single items (dyspnea, insomnia, appetite loss, constipation, diarrhea, and financial difficulties) (Aaronson et al., 1993). The QLQ-OES18 has 18 questions categorized into four symptom scales (dysphagia, eating difficulties, reflux, and esophageal pain) and six single items (trouble swallowing saliva, choking when swallowing, dry mouth, trouble with taste, trouble with coughing, and speech difficulties) (Blazeby et al., 2003). The reliability and validity of the Japanese version of QLQ-C30 were established (Kobayashi et al., 1998). The QLQ-OES18 was translated into Japanese by Fujita et al., and its content validity was assessed by a group of bilingual surgeons; however, its reliability has not been established yet.

### Psychological Distress (K6)

We used the Japanese version of the Kessler 6 (K6), with established reliability and validity, to assess psychological distress (Furukawa et al., 2008; Furukawa, Kessler, Slade, & Andrews, 2003). The K6 screens for mental health issues by asking six questions about how frequently during the last 30 days patients felt nervous, hopeless, restless or fidgety, worthless, so depressed that nothing could cheer them up, or that everything was an effort (Kessler et al., 2002). A score of 10 or more on the K6 is used to indicate nonspecific serious psychological distress.

### Body Mass Index

We reviewed medical charts to obtain BMI. According to the World Health Organization (WHO) guidelines, both male and female patients with BMI 30 kg/m<sup>2</sup> or more were classified as obese, those with BMI of 25 kg/m<sup>2</sup> or more as overweight, those with BMI of less than 18.5 kg/m<sup>2</sup> as underweight, and those with BMI between 18.5 and 24.9 kg/m<sup>2</sup> as a normal population (WHO, 1998).

### Ethical Considerations

The study procedures were approved by the institutional review board at Faculty of Nursing and Medical Care, Keio University (No. 206) and National Cancer Center (No. 2012-351). We obtained written informed consent from all participants.

### Data Analysis

Data were analyzed with the use of SAS software, Version 9.2 (SAS Institute), statistical packet software for Windows. Data were interpreted using descriptive statistics, and the normality of data was checked for all numeric variables using the Kolmogorov-Smirnov test. We calculated the median and range for non-normal distribution, and the mean and standard deviation

with 95% confidence intervals for normal distribution. The level of significance was set at  $p < .05$ .

## Results

### Patients

Of 34 patients who met the inclusion criteria, five patients were excluded for hospital transfer (one patient), treatment change (one patient), contact lost (one patient), and refusal to participate (two patients). A total of 29 patients participated in the study (Figure 1). During the follow-up period, seven patients dropped out of the study. Table 1 shows baseline demographics and clinical characteristics. Most participants were male (mean age = 65.9 years), and 69.0% were employed. Of the participants, 65.5% received neoadjuvant chemotherapy. Twenty-one patients (72.5%) underwent TSEP with three-field lymphadenectomy, whereas eight patients (27.5%) underwent right open transthoracic esophagectomy.

### Physical Activity

Table 2 shows the levels of physical activity before and after surgery. Median physical activity slightly declined at 3 months after discharge (1,287.0 MET min/wk) from the baseline (1,382.5 MET min/wk) but returned to the baseline level at 6 months (1,386.5 MET min/wk). The number of patients in the inactive category decreased to four (18.2%) at 6 months after discharge.

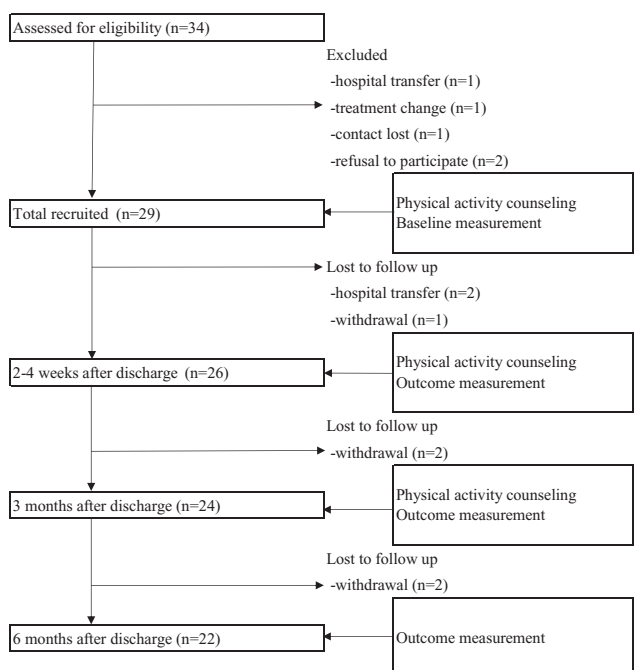


FIGURE 1. Flow diagram of recruitment and follow-up.

**TABLE 1. Baseline Demographics and Clinical Characteristics of Participants**

Male gender, <i>n</i> (%)	27 (93.1)
Age at time of surgery, median [range] (years)	65.9 [44.9–78.7]
Cohabitation status, <i>n</i> (%)	
Living alone	5 (17.2)
Living with family	24 (82.8)
Employment status, <i>n</i> (%)	
Employed	20 (69.0)
Nonemployed	9 (31.0)
Smoking, <i>n</i> (%)	26 (89.7)
Brinkman Index, median [range]	785 [100–1,750]
Neoadjuvant chemotherapy, <i>n</i> (%)	19 (65.5)
Surgery, <i>n</i> (%)	
TSEP with three-field lymphadenectomy	21 (72.4)
Right open transthoracic esophagectomy	8 (27.6)
pTNM stage, <i>n</i> (%)	
IA	7 (24.1)
IB	2 (6.9)
IIA	1 (3.4)
IIB	6 (20.7)
IIIA	9 (31.0)
IIIB	4 (13.8)
In-hospital stay, median [range], (days)	20 [10–51]
<i>Note.</i> pTNM = TNM Classification of Malignant Tumors, 7th edition; TSEP = thoracoscopic esophagectomy in the prone position.	

### Quality of Life

As shown in Table 3, the mean score of the Global QoL of the EORTC QLQ-C30 declined at 2–4 weeks (55.7) from the baseline (67.5), but improved close to the baseline level at 3 and 6 months after discharge (64.3). Of the subscale scores of QLQ-C30, those of physical, cognitive, and emotional functions declined at 2–4 weeks after discharge, but improved to be close to the baseline level

**TABLE 2. IPAQ**

	Baseline	2–4 Weeks	3 Months	6 Months
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
MET min/wk, Median [Range]	1,382.5 [0–16,065]	1,386.0 [0–12,558]	1,287.0 [0–16,170]	1,386.0 [0–31,038]
Inactive	9 (34.6)	7 (28.0)	5 (21.7)	4 (18.2)
Minimally active	12 (46.2)	15 (60.0)	12 (52.2)	14 (63.6)
Health-enhancing physically active	5 (19.2)	3 (12.0)	6 (26.1)	4 (18.2)

*Note.* MET min/wk = metabolic equivalent task minutes per week.

at 3 and 6 months after discharge. Subscale scores of role and social functions improved at 3 months after discharge, but declined again at 6 months. Compared with the baseline level, all QLQ-OES18 symptom scores except esophageal pain showed the worst scores at 2–4 weeks after discharge and subsequently improved, but did not return to the baseline level.

### Psychological Distress

Mean score of the K6 increased at 2–4 weeks after discharge from the baseline, but it remained lower than the baseline as 1.7 at 3 months and 2.2 at 6 months after discharge (Table 3).

### Body Mass Index

The mean score of patients' BMI gradually declined after discharge (Table 3).

### Discussion

In the present study, postoperative physical activity level returned to nearly preoperative level and the number of inactive patients gradually decreased to nearly half at 6 months after discharge among patients who had undergone esophagectomy and received the intervention of nurse counseling about physical activity. Patients with esophageal cancer often suffer multiple, prolonged symptoms following surgery and therefore these results are encouraging.

In the present study, QoL scores tended to return to the baseline levels at 6 months after discharge. This finding is consistent with other studies that have shown that most QoL functions significantly deteriorated following surgery, with patients suffering various severe symptoms within 6 months, yet QoL functions often returned to baseline levels 6–12 months later (Chang, Tsai, Chao, & Wu, 2016; Viklund et al., 2006). Subscale scores of role function and social function improved at 3 months but declined again at 6 months after discharge. Expanded roles and social activities during that time may affect the reduction in QoL. Patients who underwent esophagectomy reported poorer role and social functions in the long term (Djäv, Lagergren, Blazeb, & Lagergren, 2008); therefore, future counseling programs should encourage



**TABLE 3. Health-Related Quality of Life, K6, and BMI**

	Baseline	2–4 Weeks	3 Months	6 Months
<b>QLQ-C30</b>				
Global quality of life	67.5 [59.0, 76.1]	55.7 [45.0, 66.3]	64.1 [55.5, 72.8]	64.3 [54.0, 74.5]
Physical function	91.7 [88.4, 95.0]	83.5 [78.1, 88.9]	89.6 [85.6, 93.5]	89.4 [85.5, 93.3]
Role function	93.7 [89.7, 97.6]	73.3 [64.2, 82.4]	85.5 [78.5, 92.5]	81.1 [73.1, 89.1]
Emotional function	82.5 [74.5, 90.4]	81.6 [73.4, 89.7]	90.2 [85.4, 95.0]	86.1 [80.1, 92.1]
Cognitive function	86.2 [80.1, 92.3]	83.3 [75.9, 90.8]	85.5 [78.2, 92.8]	85.7 [79.7, 91.7]
Social function	87.9 [80.6, 95.3]	76.7 [67.6, 85.8]	89.1 [81.7, 96.5]	81 [70.4, 91.5]
<b>QLQ-OES18</b>				
Dysphagia	10.7 [4.1, 17.4]	19.1 [12.6, 25.7]	19.3 [12.3, 26.3]	17.2 [9.3, 25.0]
Eating restriction	14.9 [7.1, 22.8]	38.0 [29.6, 46.4]	25.7 [18.9, 32.6]	31.2 [21.5, 40.9]
Reflux	6.9 [2.9, 10.9]	17.3 [11.2, 23.4]	13.0 [7.7, 18.3]	12.9 [6.5, 19.3]
Esophageal pain	7.7 [1.3, 14.1]	8.9 [4.1, 13.7]	10.1 [5.1, 15.1]	3.0 [0.3, 5.7]
Saliva	1.1 [−1.2, 3.5]	10.7 [1.2, 20.2]	5.8 [0.2, 11.4]	4.5 [−0.6, 9.7]
Choking	8.0 [2.5, 13.6]	22.7 [12.4, 33.0]	15.9 [7.4, 24.5]	10.6 [3.6, 17.7]
Dry mouth	19.5 [12.3, 26.7]	29.3 [18.6, 40.1]	14.5 [4.9, 24.0]	27.3 [18.6, 36.0]
Taste problems	13.8 [3.9, 23.7]	25.3 [15.4, 35.3]	10.1 [3.4, 16.9]	12.1 [3.5, 20.7]
Cough	9.2 [0.3, 18.1]	28.0 [17.0, 39.0]	20.3 [11.9, 28.7]	15.2 [6.3, 24.0]
Speech problems	13.8 [3.9, 23.7]	32.0 [21.9, 42.1]	13.0 [5.9, 20.2]	15.2 [6.3, 24.0]
K6	2.5 [1.3, 3.7]	3.8 [1.7, 5.8]	1.7 [0.7, 2.6]	2.2 [1.0, 3.5]
BMI	21.7 [20.7, 22.8]	20.3 [19.2, 21.4]	19.4 [18.4, 20.3]	18.8 [17.8, 19.8]

*Note.* The values given are mean [95% confidence interval]. BMI = body mass index; K6 = Kessler 6; QLQ-C30 = quality of life-core 30; QLQ-OES18 = quality of life-esophageal module 18.

patients to increase their physical activity even more to improve physical fitness and psychological well-being at 6 months after discharge.

The participants suffered from persistent psychological distress, especially in the early days after discharge. One plausible explanation is that patients have to cope with physical changes after surgery by themselves at home, which may affect their psychological state. Although the K6 score improved over the course of recovery, it remained lower than the baseline, suggesting the need for psychological support after surgery.

Postoperative malnutrition remains a severe problem after esophagectomy among patients with esophageal cancer including long-term disease-free survivors (Ouattara et al., 2012). In the present study, however, the change of BMI was within the normal range according to the WHO classification (WHO, 1998). More subjects should be monitored for a longer follow-up period in the future to determine the effect of physical activity on BMI.

Preoperative nurse counseling helps motivate patients and facilitate initiation of physical activity among patients undergoing esophagectomy. The follow-up counseling supports patients in overcoming

barriers to physical activity and reinforcing adherence. Cancer patients show interest in receiving physical activity counseling to become more active, and nurses can play an important role in such counseling (Bélanger, Plotnikoff, Clark, & Courneya, 2012). The nurse should consider the individual's needs, preferences, and postoperative conditions when determining types and intensity of physical activity to enhance motivation, adherence, and health outcomes (Bélanger et al., 2012; McGowan et al., 2013). Providing learning and training opportunities to nurses regarding physical activity helps improve the patterns of physical activity for patients with cancer (Tyrrell et al., 2014).

## Limitations

This study had several limitations. It has the bias inherent in all nonrandomized studies. The study was conducted on a Japanese population in a single institution that may limit the generalizability of the results. A relatively high proportion of the participants underwent minimally invasive esophagectomy. A randomized control study with an equal percentage of patients undergoing minimally invasive esophagectomy and open esophagectomy needs to be considered.

## Conclusion

Integrating physical activity promotion into cancer care is important. Given the lack of evidence of physical activity in patients undergoing esophagectomy, the present study provides insight for future nursing care. Patients undergoing esophagectomy and receiving nurse counseling can return to preoperative physical activity levels in their daily lives after surgery. Nurses should integrate physical activity promotion into cancer care to improve physical and psychological functions and provide a better QoL foundation among patients with esophageal cancer. 🌟

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