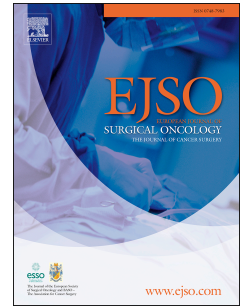


# Accepted Manuscript

The psychological impact of symptoms related to esophagogastric cancer resection presenting in primary care: a national linked database study

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## The psychological impact of symptoms related to esophagogastric cancer resection

### 2 presenting in primary care: a national linked database study

Running head: Symptoms following esophagogastrectomy

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**ABSTRACT****2 Background**

There is growing emphasis on improving functional outcome in cancer surgery. How  
4 postoperative symptoms impact on patients has not previously been evaluated at  
population level. The objective was to evaluate incidence, risk factors and impact of  
6 postoperative symptoms following esophagogastric cancer resection in primary care.

**Methods**

8 Patients undergoing esophagogastric resection for cancer from 1998 to 2010 with linked  
records in Clinical Practice Research Datalink, Hospital Episodes Statistics and Office  
10 of National Statistics databases were studied. The recording of codes for reflux,  
dysphagia, dyspepsia, nausea, vomiting, dumping, diarrhea, steatorrhea, appetite  
12 loss, weight loss, pain and fatigue were identified up to twelve months  
postoperatively. Psychiatric morbidity was also examined and its risk evaluated by  
14 logistic regression analysis.

**Results**

16 Overall, 58.6% (1029/1755) of patients were alive two years after surgery. Of these,  
41.1% had recorded postoperative symptoms. Reflux, dysphagia, dyspepsia and pain  
18 were more frequent following esophagectomy compared with gastrectomy ( $p < 0.05$ ).  
Complications (OR=1.40 95%CI 1.00-1.95) and surgical procedure predicted  
20 postoperative symptoms ( $p < 0.05$ ). When compared with partial gastrectomy,  
esophagectomy (OR=2.03 95%CI 1.26-3.27), total gastrectomy (OR=2.44 95%CI 1.57-  
22 3.79) and esophagogastric resection (OR=2.66 95%CI 1.85-2.86) were associated with  
postoperative symptoms ( $p < 0.05$ ). The majority of patients with postoperative  
24 psychiatric morbidity had depression or anxiety (98%). Predictors of postoperative

depression/anxiety included younger age (OR=0.97 95%CI 0.96-0.99), complications  
2 (OR=2.40 95%CI 1.51-3.83), psychiatric history (OR=6.73 95%CI 4.25-10.64) and  
postoperative symptoms (OR=1.78 95%CI 1.17-2.71) ( $p<0.05$ ).

#### 4 **Conclusions**

Over 40% of patients had symptoms related to esophagogastric cancer resection  
6 recorded in primary care, and were associated with an increase in postoperative  
depression and anxiety.

8 **Word count: 250**

10 **Keywords:** esophageal cancer; gastric cancer; postoperative symptoms; primary care

## INTRODUCTION

2 In long-term survivors of esophagogastric cancer resection, most aspects of health-  
4 related quality of life are substantially worse six months after surgery, with no  
6 improvement up to three years postoperatively.<sup>1</sup> Patients report significantly poor  
8 role and social function, and problems associated with fatigue, diarrhea, appetite  
10 loss, nausea and vomiting when compared with age and sex-matched reference  
12 populations.<sup>2</sup>

14 There is currently no evidence-base to determine best practice for follow-up of  
16 patients after esophagogastric cancer resection. Primary care practitioners are often  
18 the point of contact when postoperative symptoms persist or arise in the community  
20 after hospital discharge. However, the number of patients with postoperative  
22 symptoms treated in primary care is not quantified. Understanding the impact of  
esophagogastric cancer resection and the effects of long-term postoperative  
symptoms is critical for survivorship programs to develop appropriate management  
strategies with the aim of improving patient quality of life and experience.

16 Patient-level linkage of routinely collected primary care and hospital administrative  
18 data allows for the longitudinal evaluation of morbidity related to hospital treatment  
20 encountered in the community.<sup>3-4</sup> The objectives of this analysis of a large national  
series of patients undergoing esophagogastric cancer resection were to:

- 20 i) Evaluate the number of patients with symptoms related to surgery who  
present to primary care,
- 22 ii) Identify predictors for the development of postoperative symptoms, and

- iii) Study the psychological impact of postoperative symptoms on patients by  
2 assessing their effects on psychiatric morbidity as a surrogate measure within  
the dataset of health-related quality of life.

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## METHODS

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### *Database linkage*

4

We have previously described our method of evaluating outcome from surgery using linked primary care and hospital databases.<sup>5</sup> Briefly, the Clinical Practice Research

6

Datalink (CPRD) contains primary care electronic health records for 8.5% of the UK population. About half of all CPRD practices are linked to in-patient Hospital

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Episodes Statistics (HES) data, the national hospital administrative database for England. Additionally, 95% of practices also have linkage to death certificate

10

information in the Office of National Statistics (ONS) database. Each patient is given a unique identifier, which allows all episodes within CPRD or HES to be captured

12

throughout the study period.

Only practices with patient-level linkage of CPRD, HES and ONS were included in the

14

study. Database coverage was from 1<sup>st</sup> April 1997 to 31<sup>st</sup> March 2012, to allow for the evaluation of esophagogastric cancer resection performed between 1<sup>st</sup> April

16

1998 and 31<sup>st</sup> March 2010, with clinical data available from twelve months preoperatively to identify preoperative comorbidity and 24 months postoperatively

18

to allow for evaluation of patients who were alive at two years after surgery. In this group, postoperative symptoms and psychiatric morbidity were identified up to

20

twelve months after surgery.

22

### *Study population*

Patients who underwent esophagectomy, gastrectomy or a combination of both for

24

primary esophagogastric malignancy were identified in HES as previously described.<sup>6</sup>

Patients over 18 years of age were included if they were coded for surgical resection

by the Classification of Interventions and Procedures from the Office of Population  
2 Census and Surveys (OPCS) version 4.4 (OPCS). Procedures were categorized as  
partial gastrectomy (G28), total gastrectomy (G27), esophagectomy (G02 for total  
4 esophagectomy, G03 for partial esophagectomy) or esophagogastrectomy (G01). The  
latter two procedures (esophagectomy and esophagogastrectomy) were considered  
6 as esophagectomy when comparing esophagectomy with gastrectomy. Additionally,  
only patients in whom the index episode also specified a designated cancer diagnosis  
8 coded for by the International Classification of Diseases version 10 (ICD-10) were  
included in the study (C15 for malignant neoplasms of the esophagus and C16 for  
10 malignant neoplasms of the stomach). All codes were independently verified at a  
local institutional level. National Health Service Health Research Authority (NRES  
12 committee London – Westminster) approval was gained for this study (13/LO/1374).

#### 14 *Patient characteristics*

Age, gender and comorbidities were derived from HES. Socioeconomic status was  
16 derived for each small geographical area from the Index of Multiple Deprivation. The  
Charlson score was used to determine the level of comorbidity and derived from  
18 ICD-10 codes in HES recorded during admission for the index procedure and in  
previous admissions to hospital.<sup>7</sup> Weightings for comorbidities were adopted from  
20 previously published study of standardized mortality ratios in HES.<sup>8</sup>

#### 22 *Postoperative symptoms*

Patients with at least one recording of a symptom in primary care data from the day  
24 after surgery to twelve months after surgery were considered to have postoperative



symptoms. Postoperative symptoms related to the gastrointestinal tract including  
2 reflux, dysphagia, dyspepsia, nausea, vomiting, dumping, steatorrhea, diarrhea,  
weight loss and loss of appetite were coded in CPRD by medcodes (Supplementary  
4 table). Medcodes are codes based on the Read clinical coding system for primary  
care electronic health records developed in the UK, which includes codes for  
6 symptoms.<sup>9</sup> Additionally, general symptoms related to surgery including pain and  
fatigue were measured in primary care data. It was possible to identify pain that was  
8 specifically related to surgery (coded as postoperative) through coding alone. For  
other symptoms, coding did not specify whether symptoms were related to surgery.  
10 The association between surgery and symptoms recorded after the day of surgery  
was therefore assumed through their chronological relationship. The recording of  
12 symptoms signified the presentation of patients to primary care with poor  
postoperative functional status. The longitudinal nature of CPRD data allowed for  
14 the evaluation of the time to presentation of postoperative symptoms in primary  
care.

16

#### *Psychiatric morbidity*

18 Psychiatric morbidity before and after surgery was measured by identifying diagnosis  
codes for psychiatric illness in CPRD and HES, and by prescription codes for  
20 treatment for psychiatric illness as previously described.<sup>5</sup> Patients were considered  
to have pre- or postoperative psychiatric morbidity if they had a recording of  
22 psychiatric morbidity within twelve months before or up to twelve months after  
surgery. Psychiatric illness was broadly categorized into three; depression, psychosis  
24 and anxiety. Personality disorders were not included in this analysis. Diagnosis and

prescription codes were searched for in CPRD and HES to identify psychiatric morbidity. In CPRD, diagnosis codes for depression, bipolar disorder, schizophrenia and anxiety were identified. Similarly, codes for depression, mania, bipolar affective disorder, delusional disorder and neurotic disorder were identified in HES when recorded as the main reason for hospital admission. Recordings of commonly used psychiatric medications in prescription data including Fluoxetine, Paroxetine, Sertraline, Citalopram, Es-Citalopram, Mirtazapine, and Venlafaxine, Quetiapine, Risperidone, Olanzapine, Lithium, Diazepam and Lorazepam were also considered to signify psychiatric morbidity.

10

#### *Mortality*

12 Death and date of death were determined from ONS data. Patients who were not alive at 24 months after surgery were excluded before evaluating symptoms and psychiatric morbidity (at twelve months after surgery), to negate potential confounding with disease recurrence for which data were not available.

16

#### *Statistical analysis*

18 SPSS version 22.0 (SPSS for Windows, Chicago, Illinois) was used for all analyses. The Chi-squared test was used for all bivariate analyses. Multivariate logistic regression explored the effects of patient demographics, preoperative psychiatric morbidity, year of surgery, comorbidity, emergency surgery, surgical complications and type of surgery on the development of postoperative symptoms. Then, the effect of postoperative symptoms on psychiatric morbidity was evaluated by firstly considering all symptoms together. In a separate regression model, different

24

symptoms were evaluated separately so that their individual effects on psychiatric  
2 morbidity could be assessed, as well as the effect of the recording of multiple  
symptoms. For regression models, age, socioeconomic status, Charlson score and  
4 year of surgery were incorporated as continuous variables, while all other variables  
were categorical. Trends in the proportion of patients who did not present to  
6 primary care with postoperative symptoms were evaluated by the Kaplan-Meier  
method. The distribution of patients who did not present to primary care between  
8 groups of procedures was evaluated by the log-rank test. A  $p < 0.05$  was statistically  
significant for all tests.

10

## RESULTS

2

### *Study cohort:*

4 Data from 366 practices with patient-level linkage of CPRD, HES and ONS were  
studied. From 1<sup>st</sup> April 1998 to 31<sup>st</sup> March 2010, 1755 primary resections for  
6 esophageal and gastric cancer were undertaken in the same number of patients. The  
majority of patients were male (71.5% - 1255/1755). The median age of patients was  
8 68 years (interquartile range (IQR)=59-74). The mean Charlson score was 14.68  
(standard deviation=8.0) and 12.2% (126/1029) of patients had preoperative  
10 psychiatric morbidity recorded within twelve months before surgery. Surgery was  
performed during emergency admission in 7.5% (132/1755) of patients. Of the  
12 gastric resections, 61.2% (454/742) were partial gastrectomies and 38.8% (288/742)  
were total gastrectomies. Of the esophageal resections, 24.4% (247/1013) were  
14 esophagectomy alone (either partial or total esophagectomy), while 75.6%  
(766/1013) involved resecting part of the stomach as well (esophagogastrectomy).

### *Outcome*

16 Of the patients who underwent surgery, 58.6% (1029/1755) were alive at two years  
18 after surgery. The recording of postoperative symptoms up to twelve months after  
surgery was evaluated in surviving patients. In this group, the 30-day complication  
20 rate was 20.2% (208/1029) and the rate of postoperative psychiatric morbidity  
recorded within twelve months of surgery was 12.5% (129/1029). The median time  
22 to recording of postoperative psychiatric morbidity was 91 days (IQR=31-207) in  
CPRD, 77 days (IQR=27-194) in HES and 114 days (IQR=30-225) in prescription data.  
24 Most patients with postoperative psychiatric morbidity had depression or anxiety  
(98% - 127/129) (Supplementary table).

## 2 *Postoperative symptoms*

4 The overall proportion of patients with at least one recording of a postoperative  
6 symptom in primary care was 41.1% (423/1029). The number of procedures  
8 associated with postoperative symptoms was significantly higher in esophagectomy  
10 compared with gastrectomy (Table 1). Rates of reflux, dysphagia, dyspepsia and pain  
12 were significantly higher for esophagectomy compared with gastrectomy. Fatigue  
14 was significantly more frequent following gastrectomy compared with  
16 esophagectomy. There were no significant differences between esophagectomy and  
18 gastrectomy in rates of nausea, vomiting, dumping, steatorrhea, diarrhea, loss of  
20 appetite and weight loss.

12 The median number of days to the earliest time that patients sought treatment for  
14 postoperative symptoms in primary care was 79 days (IQR=38-167). Early  
16 presentation of postoperative symptoms with a median time less than 90 days was  
18 observed for vomiting, nausea, diarrhea and pain; delayed presentations at more  
20 than 90 days were observed for reflux, dysphagia, dyspepsia, dumping, steatorrhea,  
loss of appetite, weight loss and fatigue (Table 2). Patients with postoperative  
symptoms presented to primary care at a median rate of twice within a year for  
reflux, dysphagia, dyspepsia, nausea, vomiting, diarrhea and fatigue, and once for  
dumping, steatorrhea, loss of appetite and weight loss.

Evaluation of the number of surviving patients over twelve months who did not seek  
treatment for postoperative symptoms in primary care revealed that symptoms  
accumulated rapidly in the initial months after surgery (Supplementary figure 1). A  
significant difference in the distribution of patients with symptoms presenting to

primary care between partial gastrectomy and the other procedures was demonstrated by the log-rank test. Regression analysis showed that none of the demographic factors or preoperative psychiatric morbidity predicted postoperative symptoms (Table 3). However, the type of surgical procedure significantly influenced the occurrence of postoperative symptoms. When compared with the reference procedure of partial gastrectomy, esophagectomy (odds ratio(OR)=2.03), total gastrectomy (OR=2.44), and esophagogastrectomy (OR=2.66) were all significantly associated with increased risk of symptoms. The risk of postoperative symptoms was also significantly increased following short-term complications (OR=1.40).

#### 10 *The effect of postoperative symptoms on psychiatric morbidity*

As the time to recording of symptoms was generally less than the time to recording of psychiatric morbidity, the ability of postoperative symptoms to predict postoperative psychiatric morbidity was tested. Due to the small number of patients identified with psychosis, this diagnosis was excluded for the evaluation of postoperative psychiatric morbidity. Logistic regression analysis revealed that younger age, preoperative psychiatric morbidity and 30-day complications increased the risk of postoperative anxiety or depression (Table 4). There was no association between type of surgery and postoperative anxiety or depression. When adjusted for these covariates, the occurrence of at least one postoperative symptom was independently associated with postoperative anxiety or depression (OR 1.78).

When different postoperative symptoms were considered individually, in patients suffering only one type of postoperative symptom, it was not possible to evaluate the risk incurred by weight loss as no postoperative anxiety or depression was recorded in these patients (Table 5). This regression revealed that patients with

multiple symptoms had the greatest risk of postoperative anxiety or depression,  
2 suggesting the cumulative association of symptoms on psychological well-being. Pain  
(OR=4.42), dumping (OR=3.38) and loss of appetite (OR=2.66) had the highest odds  
4 ratio for isolated symptoms impacting on postoperative anxiety or depression but  
failed to reach statistical significance.

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## DISCUSSION

2 This large national study offers a comprehensive overview of postoperative  
symptoms that present to healthcare, and has identified that 45.3% and 35.7% of  
4 patients seek treatment for symptoms in the primary care setting within twelve  
months of esophagectomy and gastrectomy respectively. About one in ten patients  
6 pursued treatment in primary care for reflux, dysphagia, nausea and diarrhea  
following esophagectomy; and diarrhea following gastrectomy. Nausea, vomiting,  
8 pain and diarrhea were seen early. The main determinants of postoperative  
symptoms were complications and surgical procedure. Thirty-day complications  
10 increased the risk of postoperative symptoms by 40%. The extent of surgical  
resection, specifically, the excision of part or all of the esophagus or resecting the  
12 entire stomach seemed to increase the risk of symptoms. While it is difficult to  
modify the extent of surgical resection required for oncological adequacy, these data  
14 suggest that reducing short-term complication rates may lead to better longer-term  
functional outcome. Postoperative symptoms were recorded earlier than  
16 postoperative psychiatric morbidity in the majority of patients. Patients who  
developed postoperative symptoms showed a 78% increase in associated risk of  
18 anxiety or depression. Cumulative effects of symptoms meant that patients who  
sought treatment for three separate symptoms were almost five times more likely to  
20 develop postoperative psychiatric morbidity compared with those who had no  
recorded symptoms.

22 This is the first study to explore postoperative symptoms from nationally-linked data.  
The study relies on patients to present to primary care for postoperative symptoms  
24 to be recorded. Symptoms recorded in primary care are likely to be severe as



patients sought treatment in the community. The rates of recorded symptoms were therefore lower than in prospective studies that screened patients by questioning.<sup>11</sup> This study provides evidence in a non-research setting of the incidence and burden of symptoms to primary care physicians caring in the community for patients following esophago-gastrectomy. For instance, the prevalence of reflux symptoms after esophagectomy in prospective studies ranged from 20–80% with documented endoscopic evidence of reflux esophagitis in 23–72%, compared with 10.7% in our study.<sup>12-17</sup> Dumping after esophagectomy was reported in prospective studies at a rate of 78% compared with 6% recorded in primary care.<sup>18</sup> Steatorrhea was recorded in primary care in 0.2% of patients while in other series it was as high as 70%.<sup>19</sup> In our study, both dumping and steatorrhea were found to be uncommon presentations in primary care, making diagnosis and management in the community challenging. Although dumping tends to occur early postoperatively, it presented late in primary care representing either delayed diagnosis or severe and persistent symptoms.<sup>17</sup> While reflux, dysphagia, dyspepsia and pain were more common in esophagectomy, most other symptoms were recorded at similar rates in both esophagectomy and gastrectomy. Fatigue was the only symptom that was more common after gastrectomy, which may be a manifestation of poor absorption of nutrients.

Previous studies have used primary care data to evaluate the impact of psychiatric morbidity in England. Haroon et al demonstrated rates of psychosis in the community to be broadly comparable to other epidemiological studies.<sup>20</sup> John et al demonstrated that anxiety and depression can be diagnosed accurately using primary care data.<sup>21</sup> These data have also been used to check adherence to national

treatment guidelines for psychiatric prescriptions.<sup>22</sup> The present analysis uses this validated method to detect a measurable adverse psychological impact of postoperative symptoms. All symptoms except for dysphagia showed a non-significant but positive association with postoperative anxiety or depression. This problem is heightened because of the impact of postoperative psychiatric morbidity on one-year mortality in gastrointestinal surgery as previously demonstrated using a similar dataset.<sup>5</sup> These findings highlight the need for routine evaluation and focused assessment of postoperative functional status. Careful consideration of the psychological impact of functional outcome upon individual patients is needed when counseling patients for surgery and guiding recuperation. While the Clavien-Dindo classification categorizes complications of surgery according to the need of treatment, there is currently no recognition of symptoms for which patients seek help.<sup>23</sup> The presented data suggests an association between abnormal symptomatology, as determined by the extent of surgical resection, complications, and the psychological well being of patients. Based on these findings, good understanding and appropriate evaluation of functional outcome should be incorporated as informative utilities when evaluating the effectiveness of current and new treatments.

Other factors associated with increased postoperative depression and anxiety included younger patient age and 30-day postoperative complications. Younger patients may be more likely to seek primary care consultation for and declare postoperative psychiatric morbidity when compared to elderly patients. These findings also suggest that complications from surgery may have adverse

psychological effects associated with increased psychiatric morbidity up to 12  
2 months following surgery.

The main limitation of this study is that the overall incidence of postoperative  
4 symptoms recoded in primary care is less than in prospective studies. This is likely to  
be because some patients are treated for adverse symptoms in hospital outpatient  
6 clinics and not in primary care. However, hospital consultations have a tendency to  
focus on recurrence and technical complications instead of the type and severity of  
8 postoperative symptoms.

In conclusion, over 40% of patients had symptoms related to esophagogastrectomy  
10 recorded in primary care. Postoperative symptoms were associated with an  
increased the risk of depression and anxiety. These findings suggest the need to for  
12 integrated health systems to offer wider psychosocial support for patients suffering  
with postoperative symptoms following esophagogastrectomy.

**CONFLICTS OF INTEREST**

2 None

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**Legend for figures**

- 2 Supplementary figure. Kaplan-Meier analysis of patients without presentation of  
postoperative symptoms to primary care who underwent esophagogastrectomy  
4 from 1 April 1998 to 31 March 2010 and survived for two years  
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Table 1. Postoperative symptoms recorded up to twelve months after surgery in patients who underwent esophagogastrrectomy from 1 April 1998 to 31 March 2010 and survived for two years

	Esophagectomy n=578	Gastrectomy n=451	p value for comparison
Diarrhea	84 (14.5)	56 (12.4)	0.326
Reflux	62 (10.7)	22 (4.9)	0.001
Nausea	57 (9.9)	39 (8.6)	0.506
Dysphagia	56 (9.7)	13 (2.9)	<0.001
Vomiting	39 (6.7)	34 (7.5)	0.624
Dyspepsia	38 (6.6)	16 (3.5)	0.031
Weight loss	18 (3.1)	17 (3.8)	0.565
Fatigue	17 (2.9)	26 (5.8)	0.025
Loss of appetite	13 (2.2)	12 (2.7)	0.670
Pain	10 (1.7)	1 (0.2)	0.028
Dumping	6 (1.0)	10 (2.2)	0.129
Steatorrhea	1 (0.2)	0 (0.0)	0.377
Two recorded symptoms	50 (8.7)	21 (4.7)	0.012
Three recorded symptoms	7 (1.2)	7 (1.6)	0.639
Total with at least one recorded symptom	262 (45.3)	161 (35.7)	0.002

\*The sum of individual symptoms is not equal to the total number of affected patients as some patients had more than one recorded symptom

Table 2. Median number of days to presentation and median number of presentations of postoperative symptoms in primary care in patients who underwent esophagogastric resection from 1 April 1998 to 31 March 2010 and survived for two years

	Median days to symptom (IQR)	Median number of presentations in primary care (range)
Pain	15 (13-21)	1 (1-6)
Nausea	58 (34-131)	2 (1-8)
Vomiting	76 (32-142)	2 (1-11)
Diarrhea	81 (42-188)	2 (1-10)
Loss of appetite	105 (39-236)	1 (1-5)
Reflux	112 (38-214)	2 (1-8)
Dysphagia	113 (60-182)	2 (1-7)
Dyspepsia	126 (67-241)	2 (1-6)
Dumping	135 (51-192)	1 (1-3)
Fatigue	138 (83-283)	2 (1-4)
Weight loss	176 (104-235)	1 (1-4)
Steatorrhea	232 (-)	1 (-)
Any symptom	79 (38-167)	3 (1-17)

IQR = Interquartile range

Table 3. Multivariate logistic regression analysis of the effect of patient and surgery characteristics on postoperative symptoms in patients who underwent esophagogastrectomy from 1 April 1998 to 31 March 2010 and survived for two years

Dependent variable = Postoperative symptoms	Odds ratio (95% CI)	p value for comparison
Age (per year)	1.01 (0.99-1.02)	0.300
Female gender	1.25 (0.93-1.68)	0.135
Socioeconomic status	0.91 (0.82-1.01)	0.064
Charlson comorbidity score	0.99 (0.97-1.01)	0.382
Preoperative psychiatric morbidity	1.22 (0.83-1.79)	0.320
Procedure year	1.00 (0.96-1.04)	0.886
Emergency surgery	0.81 (0.40-1.62)	0.548
Complications	1.40 (1.00-1.95)	0.048
<b>SURGERY TYPE</b>		
Partial gastrectomy	Reference	
Esophagectomy	2.03 (1.26-3.27)	0.004
Total gastrectomy	2.44 (1.57-3.79)	<0.001
Esophagogastrectomy	2.66 (1.85-3.83)	<0.001

Table 4. Logistic regression analysis for postoperative depression or anxiety adjusted for at least one recording of postoperative symptoms in patients who underwent oesophagogastrectomy from 1 April 1998 to 31 March 2010 and survived for two years.

Dependent variable = Postoperative depression and anxiety	Odds ratio (95% CI)	p value for comparison
Age (per year)	0.97 (0.96-0.99)	0.005
Female gender	1.35 (0.87-2.09)	0.176
Socioeconomic status	1.02 (0.88-1.19)	0.764
Charlson comorbidity score	1.03 (1.00-1.05)	0.076
Preoperative depression or anxiety	6.73 (4.25-10.64)	<0.001
Procedure year	0.96 (0.90-1.02)	0.224
Emergency surgery	1.73 (0.69-4.29)	0.240
Complications	2.40 (1.51-3.83)	<0.001
SURGERY TYPE		
Partial gastrectomy	Reference	
Total gastrectomy	0.68 (0.30-1.52)	0.349
Oesophagectomy	1.23 (0.62-2.46)	0.550
Oesophagogastrectomy	1.40 (0.81-2.41)	0.226
At least one postoperative symptom	1.78 (1.17-2.71)	0.008

Table 5. Logistic regression analysis for postoperative depression or anxiety adjusted for different types of postoperative symptoms in patients who underwent oesophagogastrectomy from 1 April 1998 to 31 March 2010 and survived for two years

Dependent variable =Postoperative depression and anxiety	Odds ratio (95% CI)	p value for comparison
Age (per year)	0.97 (0.96-0.99)	0.002
Female gender	1.34 (0.86-2.10)	0.196
Socioeconomic status	1.03 (0.88-1.20)	0.703
Charlson comorbidity score	1.03 (1.00-1.06)	0.058
Preoperative psychiatric morbidity	6.93 (4.31-11.15)	<0.001
Procedure year	0.96 (0.90-1.02)	0.197
Emergency surgery	1.74 (0.68-4.43)	0.248
All complications	2.37 (1.47-3.83)	<0.001
<b>SURGERY TYPE</b>		
Partial gastrectomy	Reference	
Total gastrectomy	0.71 (0.31-1.63)	0.419
Oesophagectomy	1.10 (0.54-2.26)	0.786
Oesophagogastrectomy	1.41 (0.81-2.47)	0.227
<b>POSTOPERATIVE SYMPTOMS</b>		
No symptoms	Reference	
<i>One symptom only</i>		
Reflux	1.30 (0.40-4.20)	0.662
Dysphagia	0.51 (0.10-2.52)	0.407
Dyspepsia	1.62 (0.20-13.08)	0.651
Nausea	2.01 (0.70-5.80)	0.194
Vomiting	2.11 (0.73-6.11)	0.169
Dumping	3.38 (0.39-29.59)	0.271
Diarrhoea	1.04 (0.42-2.59)	0.930
Loss of appetite	2.66 (0.28-25.26)	0.394
Pain	4.42 (0.20-97.66)	0.347
Fatigue	1.33 (0.39-4.57)	0.654
<i>Multiple symptoms</i>		
Two symptoms	2.20 (1.20-4.02)	0.012
Three symptoms	4.94 (2.24-10.88)	<0.001