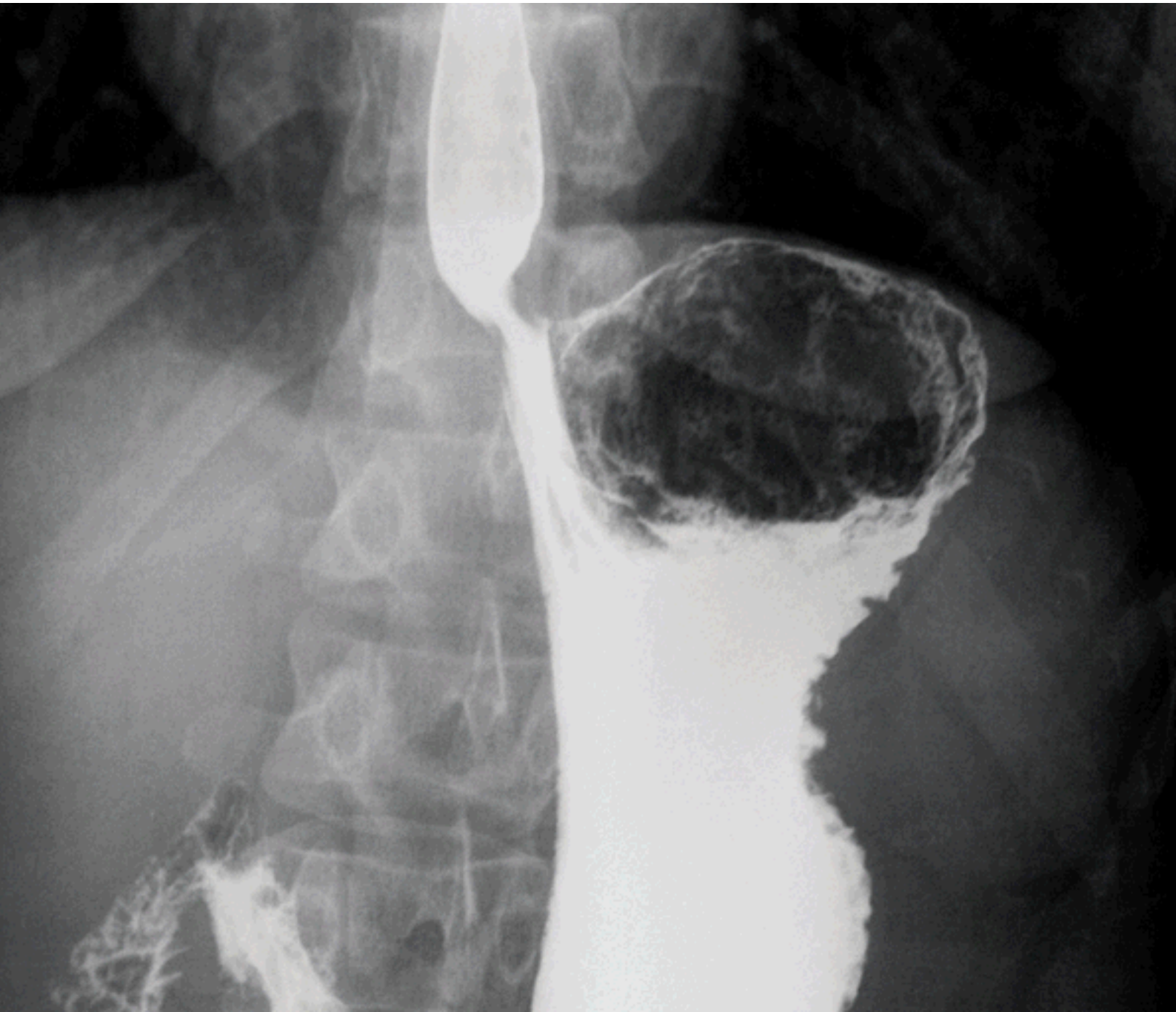
National Oesophago-Gastric Cancer Audit 2010



This report was prepared by:

Clinical Effectiveness Unit, The Royal College of Surgeons of England
David Cromwell, Senior Lecturer
Tom Palser, Clinical Research Fellow
Jan van der Meulen, Director of CEU

The Association of Upper GI Surgeons (AUGIS)
Richard Hardwick, Consultant Surgeon

The British Society of Gastroenterology (BSG)
Stuart Riley, Consultant Gastroenterologist

National Clinical Audit Support Programme (NCASP)
Kimberley Greenaway, Project Manager
Steve Dean, Senior Project Manager

The Royal College of Surgeons of England is an independent professional body committed to enabling surgeons to achieve and maintain the highest standards of surgical practice and patient care. As part of this it supports audit and the evaluation of clinical effectiveness for surgery.

The Association of Upper GI Surgeons is the speciality society that represents upper gastrointestinal surgeons. It is one of the key stakeholders leading the Audit.

The British Society of Gastroenterology is the speciality society of gastroenterologists. It is one of the key stakeholders leading the Audit.

The NHS Information Centre for Health and Social Care (The NHS IC) is England's central, authoritative source of essential data and statistical information for frontline decision makers in health and social care. The NHS IC managed the publication of the 2010 annual report.

The Healthcare Quality Improvement Partnership (HQIP) promotes quality in healthcare. HQIP holds commissioning and funding responsibility for the National Oesophago-gastric Cancer Audit and other national clinical audits.

National Oesophago-Gastric Cancer Audit 2010

An audit of the care received by patients with Oesophago-Gastric Cancer in England and Wales

Third Annual Report

Contents

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Foreword

This is the final Annual Report of the first national audit of oesophago-gastric cancer in England and Wales; with data on over 17,000 patients it is the largest national audit of O-G cancer care and its acknowledged success has only been possible due to the tremendous effort of all those involved.

The Audit findings show that clinicians are providing a high quality of care for patients. In-hospital mortality for patients undergoing curative surgery is lower than the 2002 AUGIS audit and a greater number of curative procedures are being performed with a minimally invasive approach.

The Audit highlights Cancer Network variation and this should be examined in the reported use of EUS and staging laparoscopy, the use of palliative chemo- or radiotherapy and patient access to brachytherapy. Surgeons should monitor their pathology outcomes to ensure lymph node yield is adequate and meets the recommended guidelines.

It is disappointing that seven cancer centres failed to participate fully and submitted data on less than 50 per cent of their patients. Their central role in the organisation of cancer care means that they should take the lead within their Cancer Networks for monitoring outcomes.

Cancer Networks and NHS trusts should use the findings from the Audit to review their outcomes, compare them against the National outcomes and ensure that they are meeting all the recommendations of the Audit, as outlined in the Third Annual Report.

J Rhodes
BSG President

G Poston
AUGIS President

Executive Summary

This is the Third Annual Report of the National Oesophago-Gastric Cancer Audit. The Audit began in October 2006 with the aim of assessing the quality of care received by patients with oesophago-gastric (O-G) cancer in England and Wales. The Audit focused on patients diagnosed between 1 October 2007 and 30 June 2009, and collected information on both the process of care and patient outcomes.

In this report, we describe:

- the diagnosis, the staging, and treatment planning process
- curative treatments and their short-term outcomes
- palliative oncological treatment and endoscopic / radiological palliative therapies and their short-term outcomes.

Results are presented at both a national level and by Cancer Network. We also present outcome data after curative surgery for individual NHS trusts.

Participation by NHS acute trusts and case-ascertainment

Patient information was submitted to the Audit from:

- 152 (99 per cent) of the 154 NHS acute trusts in England that provide O-G cancer services
- all 13 Welsh NHS acute trusts.

English NHS trusts submitted clinical information for 16,264 patients (71 per cent of the 22,870 estimated total). Welsh NHS trusts submitted clinical information for 1015 patients (98 per cent of the 1037 registered patients) via the NHS Wales Central Cancer Information System (CANISC). The Audit received information on 3,803 curative surgical procedures and 3,630 courses of curative oncological therapy, 4,328 courses of palliative oncological therapy, and 3,249 endoscopic / radiological palliative therapies.

Among many English NHS trusts, case-ascertainment and data quality was high. For others, participation was limited either because case-ascertainment was low or because little clinical information was provided. However, seven cancer centres had a low case-ascertainment or submitted minimal data on treatments, a concern given their central role in the delivery of cancer care.

The Audit data was linked to other health datasets. This included the mortality data held by Office for National Statistics, which allowed for accurate calculation of survival after diagnosis and other points along the patient treatment pathway.

Patient characteristics

The median age of the 17,279 patients at diagnosis was 73 years, although 10 per cent were under 55 years, and 1 per cent were under 40 years. 9,090 (52 per cent) had a tumour in the lower third of the oesophagus or in the gastro-oesophageal junction (GOJ). Another 5,307 (31 per cent) had a stomach tumour.

Disease staging

Current guidelines recommend that all patients have a computed tomography (CT) scan of the thorax and abdomen to determine the presence or absence of metastatic disease. Among the 17,279 patients, 15,393 (89 per cent) were reported as having a CT-scan as part of their staging investigations. Except amongst patients possibly too frail to have a surgical resection, the proportion was typically 95 per cent, suggesting that patients who would be suitable for curative care are having this key investigation.

The reported use of endoscopic ultrasound (EUS) and staging laparoscopy was low. Among patients with a curative treatment plan:

- 62 per cent of patients with an oesophageal or Siewert type tumour were recorded as having an EUS investigation
- 49 per cent of patients with a stomach tumour or a Siewert II/III tumour were recorded as having a staging laparoscopy.

There was also significant variation between Cancer Networks. However, 90 per cent of patients with an oesophageal or junctional tumour were recorded as having an EUS investigation or were allocated a T-stage prior to treatment. Accurate T-staging is difficult without performing an EUS, and this suggests higher levels of compliance with recommended staging practice. Nonetheless, there remains uncertainty about whether EUS is being under-utilised or whether its use is under reported. Further investigation locally should be undertaken.

Treatment planning

Overall, 36 per cent of patients had a curative treatment plan. Surgery (with or without chemotherapy) was planned for over 80 per cent of patients with the exception of those with squamous cell carcinoma of the oesophagus. For patients with squamous cell carcinoma, 58 per cent had surgery (alone or with chemotherapy) as their planned treatment modality while 38 per cent had definitive chemo-radiotherapy or radiotherapy.

The proportion of patients with planned curative combined therapy varied between Cancer Networks, ranging from 48 to 95 per cent.

The most common palliative anti-cancer modality was oncological therapy, but there was significant variation across the Cancer Networks. The proportion of palliative patients intended to receive palliative chemo- or radiotherapy ranged from 34 to 54 per cent among Cancer Networks with high-levels of case-ascertainment.

Curative treatment

Data on 2,200 oesophagectomies and 1,412 gastrectomies were submitted to the Audit. 659 oesophagectomies (30 per cent) and 186 gastrectomies (13 per cent) were performed using a minimally invasive ("keyhole") approach. The majority of these operations involved a hybrid approach that combined elements of minimally invasive and open surgery. 95 per cent of the oesophagectomies were performed by the trans-thoracic approach.

The 30-day postoperative mortality rate for oesophagectomy and gastrectomy was 3.8 per cent (95 per cent CI 3.1 to 4.7) and 4.5 per cent (95 per cent CI 3.4 to 5.7), respectively. Around 1 in 10 oesophagectomy patients and 1 in 12 gastrectomy patients had an unplanned return to theatre during their hospital stay.

Overall, 14 per cent of patients were readmitted to critical care after their initial discharge from critical care. The most common reason for readmission was respiratory complications or an anastomotic leak.

96 per cent of oesophagectomies and 75 per cent of gastrectomies yielded the minimum number of lymph nodes required for pathological staging (6 and 15, respectively). Longitudinal resection margins were positive for 6.4 per cent of oesophagectomies and 8.9 per cent of gastrectomies.

The use of minimally-invasive surgery is still in an early phase of adoption. Peri-operative outcomes for open and minimally-invasive procedures were similar. For oesphagectomy, there was a statistically significant difference in the rates of anastomotic leak (7.4 per cent for open and 10.5 per cent for minimally invasive procedures) but this did not translate into worse 30-day or 90-day mortality, rate of reoperation, or other complications (cardiac, respiratory, wound infection, etc). For patients undergoing gastrectomy, there were no statistically significant differences in complication rates between the open and minimally invasive approaches.

Among patients who underwent chemotherapy before surgery, 13 per cent of patients with an oesophageal/GOJ tumour and 19 per cent of patients with a stomach tumour did not complete their chemotherapy course. Approximately, 85 per cent of patients who began neoadjuvant therapy went on to have a surgical resection with curative intent.

Postoperative outcomes for NHS trusts

Selected postoperative outcomes were calculated for individual NHS trusts to support local benchmarking. Figures were produced for:

- 30-day and 90-day mortality,
- unplanned return to theatre, and
- anastomotic leak.

The rates were adjusted for differences in patient characteristics (such as age, sex, tumour site, stage, ASA grade) and funnel plots were used to identify whether organisational rates differed significantly from the average rate for England and Wales. Unfortunately, six NHS trusts were excluded from this comparative analysis due to low case-ascertainment or incomplete data.

The initial analysis identified one NHS trust with higher than expected adjusted rates of unplanned return to theatre. This organisation was notified and given an opportunity to respond because the variation in complication rates could be due to various factors. Additional (written) information was provided, which identified a number of data input errors. Their correction led to all NHS trusts having adjusted complication rates within the expected range.

Palliative treatment

Palliative radiotherapy was well tolerated by the 1,171 patients recorded with this treatment, with 92 per cent completing their prescribed course. Only 53 per cent of the 2,450 patients receiving palliative chemotherapy completed the prescribed course. 16 per cent of these patients suffered acute chemotherapy toxicity and a further 10 per cent of patients chose to stop.

84 per cent of the 2,882 reported episodes of endoscopic / radiological palliative therapy were stent insertions, the majority in patients with oesophageal or junctional tumours. Other types of procedure (such as laser or argon beam coagulation) and brachytherapy were concentrated in particular networks. This may reflect incomplete data submission but it may also hide variation in the availability of endoscopic / radiological palliative therapies.

The overall stent deployment success rate was 98 per cent. The overall complication rate within 3 months was 10.2 per cent (95 per cent CI 9.0 to 11.5), with stent migration and bolus obstruction occurring most frequently (3.4 and 3.0 per cent respectively). 158 patients (6.5 per cent) had an additional unplanned stent procedure subsequently.

Around one third of patients undergoing stent procedures had combined sedation and local anaesthetic throat spray. There was considerable variation between NHS trusts in the degree to which combined sedation / spray was used, with 22 per cent of NHS trusts using it in more than 80 per cent of cases. Our data suggest the risk of complications with combined sedation / LA spray is similar to sedation alone (adjusted odds ratio = 1.38; 95 per cent CI 0.87 to 2.19, P=0.177).

Patient-Reported outcomes study

Eleven cancer centres participated in the patient-reported outcome component of the Audit. 218 baseline quality of life questionnaires were returned. Compared to patients with curative intent, patients with palliative intent reported worse global quality of life, and more severe symptoms of fatigue, nausea and vomiting, dyspnoea and appetite loss. In general, there were no differences between men and women, with the exception that, on average, women reported higher levels of nausea and vomiting, and financial concerns.

Hospitals reported that participating in the patient-reported outcomes component was a challenging aspect of the Audit. They suggested it needed to be implemented locally because it was necessary to judge whether patients are suitable for approaching. However, implementation locally was problematic due to a lack of clinical nurse specialists within O-G cancer services. To achieve high response rates, it was considered important to build such studies into day-to-day practice in a robust way and create a functional system to track patients and give reminders for when to distribute questionnaires. More research is needed on how to implement the measurement of quality of life within the context of a national clinical audit of oesophago-gastric cancer.

Recommendations

1. O-G cancer services should ensure that all patients who are candidates for curative treatment undergo a CT-scan plus an EUS (if oesophageal / upper junctional tumour) or a staging laparoscopy (if gastric / lower junctional tumour) and should improve the monitoring of their use.
2. All patients should be discussed with the specialist MDT to reduce the observed variation in the proportion of patients selected for palliative oncology.
3. Surgeons should monitor their pathology outcomes in order to (1) ensure an adequate lymph node yield is obtained in every patient, and (2) to maintain low rates of positive longitudinal margins.
4. Minimally invasive surgery should continue to be introduced cautiously following the guidance published by the Association of Upper Gastro-Intestinal Surgeons.
5. Cancer Networks should improve access to brachytherapy.
6. Clinicians should use the data on inpatient complications to inform patients about the risks of different curative and palliative treatments.
7. Multidisciplinary teams at NHS trusts should review the outcomes of their own patients and compare them with the national outcomes described in this report. Results of peer-comparisons should be incorporated into Cancer Network annual work plans.
8. More research is needed on how to use patient reported outcome measures (PROMs) such as quality of life within the context of a national clinical audit of oesophago-gastric cancer.

1. Introduction

1.1 Aims of the Audit

The National Oesophago-Gastric Cancer Audit began in October 2006. Its overall aim is to measure the quality of care received by patients with oesophago-gastric cancer in England and Wales.

This is the Third Annual Report of the Audit. It describes how well NHS trusts are performing in relation to various processes and outcomes of care. The results are based primarily on prospectively-collected data from patients diagnosed with invasive epithelial cancer of the oesophagus or stomach between 1 October 2007 and 30 June 2009. These data are complemented by information from other sources.

This report extends and expands on the results published in the Second Annual Report. At that time, data collection was still ongoing. Information on treatments received and outcomes were available for only a sample of patients and consequently that report focused on issues related to referral for diagnosis, disease staging, the time between diagnosis and treatment planning, and how therapeutic and palliative management decisions are associated with patient characteristics. Data collection for the Audit is now complete and this report provides final results on:

- the diagnosis, staging, and treatment planning process
- curative treatment outcomes
- palliative oncological treatment (chemotherapy / radiotherapy) and endoscopic / radiological palliative therapies.

This is the final Annual Report for this phase of the Audit. A tender for a new National Oesophago-Gastric Cancer Audit in England and Wales has been published and a further national audit is expected to start in 2011.

1.2 Treatment of oesophago-gastric cancer

Investigation and treatment

Oesophago-gastric cancer is the fifth most common malignancy (and fourth most common cause of cancer death) in the United Kingdom, affecting approximately 13,500 people each year [Cancer Research UK 2010]. In common with many Western countries, the incidence is increasing, particularly adenocarcinomas of the distal oesophagus and gastro-oesophageal junction (GOJ) [Newham et al 2003]. The prognosis for most patients diagnosed with O-G cancer remains poor, with overall 5-year age-adjusted relative survival rates for oesophageal and gastric cancer being 10 per cent and 15 per cent, respectively [ONS 2010].

As with other cancers, the treatment options and overall survival depend on both the stage of the disease and the patient's general health. Only people diagnosed with localised disease are suitable for treatment with curative intent. One of the main difficulties with O-G cancer is the fact that many of the early symptoms are insidious, and by the time alarm symptoms such as dysphagia (difficulty swallowing) develop, the disease is advanced. Consequently, a high proportion of patients present late with incurable disease.

Almost all patients are diagnosed by an endoscopy and biopsy. If they are fit for curative treatment, patients then have a number of staging investigations. Guidelines at the time of this Audit suggested the following investigations before patients are selected for curative treatment [Allum et al 2002; SIGN 2006]:

- All patients should have a CT-scan to determine if there is metastatic disease (M-stage)
- Patients with oesophageal cancer or GOJ cancer should have an endoscopic ultrasound (EUS) to determine local invasion (T-stage) and local lymph node spread (N-stage)
- Patients with stomach cancer or GOJ cancer should undergo a staging laparoscopy to exclude peritoneal metastases not detected by CT scanning.

Other investigations such as PET / PET-CT may improve the staging accuracy and have become more frequently used as resources have become available. However, PET / PET-CT was not a standard investigation for O-G cancer patients at the start of the Audit.

The surgical removal (resection) of the tumour remains the mainstay of curative treatment. Recent clinical trials have shown that, for patients with locally advanced upper gastro-intestinal cancer, combining surgery with peri-operative chemotherapy can improve rates of 5-year survival [MRC Lancet 2002; Cunningham et al 2006]. Different regimens of chemotherapy are used depending upon the site and histological type of the tumour. Chemotherapy may be given before surgery (neoadjuvant therapy) or after (adjuvant therapy).

The benefit of combining surgery with neoadjuvant chemo-radiotherapy (that is, chemotherapy and radiotherapy given concurrently), and of combining oesophageal surgery with postoperative (adjuvant) chemotherapy or radiotherapy, is less clear and these are recommended only within the setting of a clinical trial at present [SIGN 2006].

For squamous cell carcinoma of the oesophagus, definitive chemo-radiotherapy has been shown to be an effective curative treatment option [Crosby et al 2004]. It is currently recommended for patients who are physiologically unfit for, or who decline, surgery [SIGN 2006]. The effectiveness of definitive chemoradiation in patients with oesophageal carcinoma, either squamous cell or adenocarcinoma, is currently being assessed in the SCOPE 1 trial.

Surgery for O-G cancer is a major undertaking. Previous studies have reported 30-day postoperative mortality rates of up to 12 per cent for resection of the oesophagus and stomach [SAGOC 2002; McCulloch et al 2003; Jamieson et

al 2004]. In addition, it takes between six and nine months before patients regain their quality of life [Blazeby et al 2000]. Given the high risks of surgery, it is only suitable for patients who are relatively fit, and are found to have localised disease on staging investigations. Analysis of a linked Hospital Episode Statistics / Cancer Registries dataset in the Audit's First Annual Report showed that overall, 20 per cent of patients underwent surgery with curative intent in England [Palser et al 2008].

For those patients who are not eligible for radical therapy, a range of palliative treatments exist. The principal aim of palliative care is to achieve the best quality of life for patients and their families by alleviating pain and controlling other symptoms as well as providing psychological and social support. Some oncological treatments may also extend life by a short period but the primary aim is the relief of suffering. Palliative treatments essentially fall into three groups: conservative (best supportive care), oncological (chemotherapy, radiotherapy or a combination of the two) or endoscopic / radiological (stenting, thermal ablation and brachytherapy). For patients with distal stomach cancers that are obstructing the passage of food out of the stomach, palliative surgery may be required to remove or bypass the obstruction.

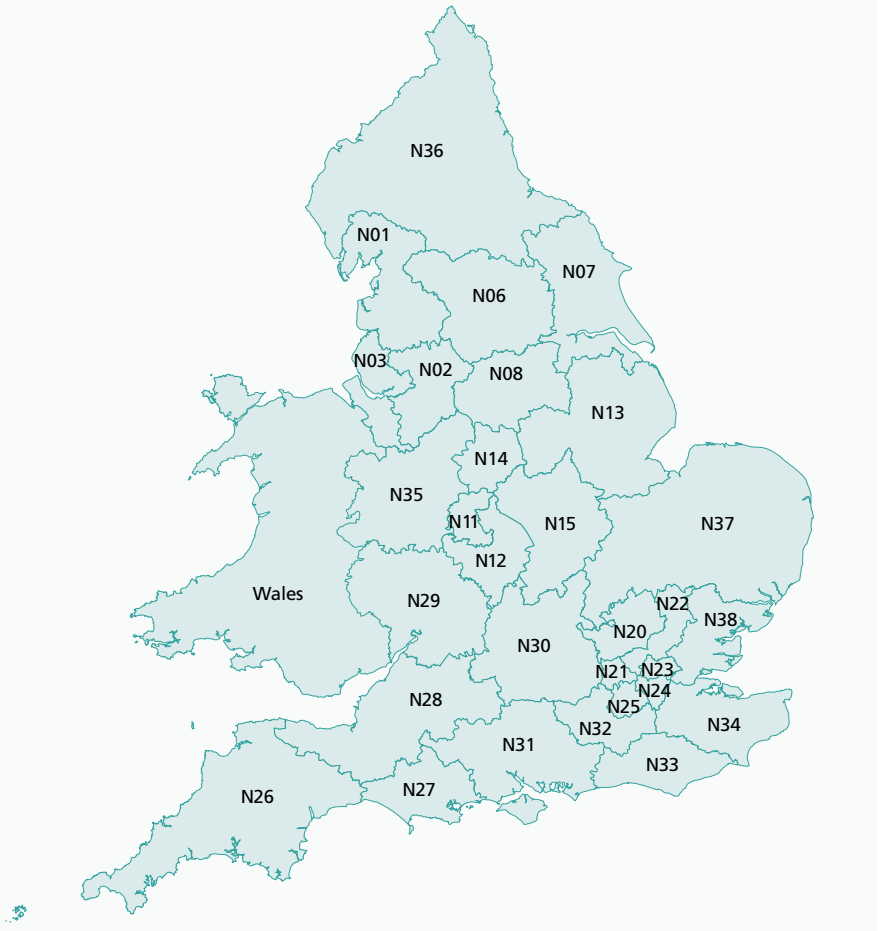
1.3 Service organisation and policy in England and Wales

O-G cancer services within England and Wales are organized into Cancer Networks, which provide an integrated model of care. Each network contains one or more cancer centres that provide curative surgical treatment and specialist radiology, oncology and palliative services to all patients living in the area (see Figure 1.1). Diagnostic services and most palliative services continue to be provided by individual NHS trusts (units) within the network areas.

At the start of the Audit, there were 30 Cancer Networks in England, and we present the regional patterns of care using these areas. However, on 1 October 2008, three Cancer Networks (Leicestershire, Northamptonshire and Rutland, Derby/Burton and Mid Trent) were combined to form East Midlands Cancer Network. We present results for the NHS trusts that were in existence on 1 January 2008.

Figure 1.1
The 30 Cancer Networks in England that existed at the start of the Audit

Code	Name
N01	Lancashire and South Cumbria
N02	Greater Manchester
N03	Merseyside and Cheshire
N06	Yorkshire
N07	Humber and Yorkshire Coast
N08	North Trent
N11	Pan Birmingham
N12	Arden
N13	Mid Trent
N14	Derby / Burton
N15	Leicestershire, Northamptonshire and Rutland
N20	Mount Vernon
N21	West London
N22	North London
N23	North East London
N24	South East London
N25	South West London
N26	Peninsula
N27	Dorset
N28	Avon, Somerset and Wiltshire
N29	3 Countries
N30	Thames Valley
N31	Central South Coast
N32	Surrey, West Sussex and Hampshire
N33	Sussex
N34	Kent and Medway
N35	Greater Midlands
N36	North of England
N37	Anglia
N38	Essex



2. Prospective audit method

2.1 Inclusion criteria and prospective audit period

Patients were eligible for inclusion in the prospective audit if they were diagnosed between 1 October 2007 and 31 June 2009 with invasive epithelial cancer of the oesophagus, gastro-oesophageal junction (GOJ) or stomach (ICD10 codes C15 and C16), and were aged 18 years or over. Patients with high-grade dysplasia, endocrine tumours or gastro-intestinal stromal tumours (GISTs) were not included in the Audit due to the different behaviour and management of these tumours.

Patients were included in the Audit if they were diagnosed or treated in an NHS hospital in England or Wales. A small number of treatments received by patients in independent hospitals were reported to the Audit but, since the management of patients with O-G cancer takes place in the context of an NHS MDT meeting irrespective of whether they were diagnosed in the public or private sector, the majority of patients in the Audit had received treatment in the NHS only.

2.2 Dataset

The Audit collected data on patient characteristics, pre-treatment tumour stage, the staging process and the management plan of all patients. Data on the process and outcomes of surgery, chemotherapy, radiotherapy and endoscopic palliative therapy were collected if appropriate. A copy of the clinical datasheet and the data manual can be downloaded from the Audit website at: www.ic.nhs.uk/og

The dataset was developed by the Project Team in conjunction with the Clinical Reference Group. Where possible, definitions were taken from existing datasets such as:

1. the National Cancer Dataset (version 4.5),
2. the Scottish Upper GI Cancer dataset (July 2005),
3. the All Wales Oesophago-Gastric Cancer Dataset (version 7.4), and
4. the Royal College of Pathologists minimum datasets for reporting oesophageal and gastric cancers.

2.3 Data collection

Data could be submitted to the Audit in two ways. If data were already being collected on a local information system, the relevant data fields could be extracted and uploaded to the Audit's secure database via a "csv" file upload facility. Alternatively, data could be entered manually via a secure web-based data entry form. The Audit provided a helpdesk during working hours to help with problems and answer questions about data submission.

The Audit's data collection system provided online feedback to the hospitals about their data completeness. The quality of the submitted data was also monitored as the Audit progressed and regular newsletters highlighting individual problems with data quality were sent to data managers and lead clinicians. Information was also sent to lead clinicians of Cancer Networks.

2.4 Linkage of Audit data to other datasets

After the final data had been submitted to the Audit, the dataset was linked to a number of other datasets, including

1. the Mortality database from the Office for National Statistics
2. the Hospital Episode Statistics (HES) database from the Information Centre, and
3. the Case Mix Programme Dataset of the Intensive Care National Audit and Research Centre (ICNARC).

Data were linked using a hierarchical deterministic approach, which involved matching patient records using various patient identifiers. For example, the Audit and Hospital Episode Statistics records matched combinations of NHS number, sex, date of birth, and postcode (see appendix 2 for more details).

2.5 Statistical analysis of clinical data

Rates are presented as percentages of O-G cancer patients, being typically grouped by their tumour characteristics or network of treatment. Averages and rates are presented with 95 per cent confidence intervals (CI) using the Binomial Exact method.

Regional differences in England are shown using the 30 Cancer Networks that existed on 1 October 2007. Wales is split into its three Cancer Networks. To show differences between Cancer Networks, their rates and 95 per cent CI are plotted against the overall rate for England and Wales, with networks ordered according to the number of patients on whom data was submitted. Patients were allocated to the Cancer Network based on their NHS trust of treatment and not by region of residence.

Differences between the percentages of two groups are assessed using the chi-squared test. Where necessary, multiple logistic regression was used to adjust for potential confounders such as age and sex. To account for a lack of independence in the data of patients treated in the same NHS trust, the standard errors of the regression coefficients were calculated using a clustered sandwich estimator. All p-values are two-sided and those lower than 0.05 were considered to indicate a statistically significant result. STATA software (version 10) was used for all statistical calculations.

In deriving postoperative complication rates for each NHS trust, multiple logistic regression was used to model the relationship between the rate of each type of complication and measures of patient risk (age, sex, tumour site, pre-treatment stage, comorbidities, performance status, ASA grade, neoadjuvant therapy). Separate regression models were developed for each complication rate. These models were devised using information about strength of association between the complication rate and the individual factors (assessed using a Wald test), the calibration of the model (using the Hosmer-Lemeshow goodness-of-fit test), and its power of discrimination (using the c-statistic / ROC curve).

The logistic regression model was used to estimate the probability of each complication. The probabilities derived for patients treated at the same organisation were summed to give the predicted number of complications. Risk-adjusted rates for each organisation were then produced by dividing the observed number of complications with the predicted number and multiplying this ratio with the national complication rate.

The variation in adjusted complication rates of the NHS trusts was examined using a funnel plot [Speigelhalter, 2005]. This plot tests whether the complication rate of any single NHS trust differs significantly from the national rate. We used two funnel limits that indicate the ranges within which 95 per cent (representing a difference of two standard deviations from the national rate) or 99.8 per cent (representing a difference of three standard deviations) would be expected to fall if variation was due only to sampling error. The funnel plots use exact binomial limits which become narrower as the number of procedures performed increases. Following convention, we use the 99.8 per cent limits to identify "outliers", as it is unlikely for an NHS trust to fall beyond these limits solely because of random variation (a 1 in 500 chance).

2.6 Patient-reported outcomes study

Cancer centres within each Network were invited to take part in a "patient-reported outcomes" study. This component of the Audit was voluntary because it represented a considerable burden on hospital Clinical Nurse Specialists (CNS). Units attached to a participating cancer centre could also participate. We adopted an approach built-around the local CNS because this approach had been demonstrated to be feasible [Blazeby et al 2003].

Participating hospitals were asked to enrol all patients with curative intent and patients with a palliative intent who were expected to live for at least 3 months after diagnosis. There were no limitations for age, co-morbidity or performance status but patients were excluded if:

1. they had a concurrent malignancy
2. they were unable to understand and complete the questionnaire
3. they hade brain metastases with cognitive impairment
4. they were participating in another research study that would interfere with this aspect of the Audit
5. they required treatment for their cancer before they could be asked to participate in this aspect of the Audit.

Quality of life instruments

The study used the European Organisation for Research and Treatment of Cancer (EORTC) general quality of life questionnaire (QLQ-C30) with the combined EORTC QLQ-OG25 site specific questionnaire. Both instruments have been validated in oesophago-gastric cancer patients [Blazeby et al 1995; Lagergren et al 2007].

The QLQ-C30 includes a global quality of life (QoL) scale, five functional scales (physical, emotional, role, cognitive and social), three symptom scales (fatigue, pain, nausea and vomiting) and six single items assessing symptoms or problems (appetite loss, diarrhoea, dyspnoea, insomnia, constipation and financial difficulties).

The QLQ-OG25 measures symptoms specific to patients with oesophago-gastric cancer. There are six symptom scales (dysphagia, eating restriction, reflux, odynophagia, pain and discomfort and anxiety), and 10 single-items (eating with others, dry mouth, trouble with taste, body image, trouble swallowing saliva, choked when swallowing, trouble with coughing, trouble talking, weight loss and hair loss).

Administration of questionnaires

This component of the Audit began on 1 June 2008. Initially, hospitals were asked to collect the baseline QoL questionnaire within 4 weeks of the diagnosis. This was relaxed a few months into the study due to logistical difficulties. Instead, hospitals were asked to complete the baseline questionnaire after a diagnosis of cancer has been confirmed and before treatment has begun.

For patients treated with curative intent, hospitals were asked to give patients the follow-up QoL questionnaire 6 months after surgical resection or 6 months after the completion of radical chemo-radiotherapy. This was considered to fit with routine practice as hospitals typically see their surgical patients 6 months postoperatively. For patients treated with palliative intent, hospitals administered the follow-up QoL instrument three months after diagnosis or after the completion of any palliative oncological treatment.

The questionnaires were administered during a routine hospital visit by a clinical nurse specialist. Patients were given the QOL questionnaire, an information sheet and a stamped addressed envelope to return the questionnaire. Patients were informed that their participation was voluntary.

Statistical analysis of quality of life

Each EORTC question has four possible responses (not at all, a little, quite a bit, very much) with the exception of the global quality of life scale which has seven responses from very poor to excellent. All questionnaire responses were linearly transformed to score from 0 to 100 in accordance with the EORTC scoring manuals [Fayers et al 2001; EORTC 2010]. Missing items were handled according to the approach recommended by the instrument developers.

A high-score on the multi-item function scales and the global QoL scale indicate better levels of function and quality of life, respectively. High scores on the symptom scales and items represent more symptoms. A difference in the mean score of 10 or more points is considered to be clinically meaningful [Rutegård et al 2008].

Mean scores were produced for patients with curative and palliative intent. The difference between these mean scores was assessed for statistical significance using multiple linear regression, the model taking account of age, sex, and performance status.

3. Audit participation and case-ascertainment

3.1 Participation and overall case-ascertainment

Oesophago-gastric services are provided at 154 NHS trusts in England, 44 of which are designated specialist cancer centres. By the deadline for the submission for this report, clinical data had been submitted by 152 individual trusts (99 per cent), including all of the cancer centres. Data on patients treated in Wales was provided by NHS Wales from the Welsh Cancer Information System (CANISC) and covered all 13 Welsh NHS trusts.

In total, English NHS trusts submitted information to the Audit on 19,320 patients. However, information about the tumour characteristics and treatments received was not entered for 1,764 patients and 1,121 patients were diagnosed outside the Audit period. A further 171 were removed because they were either duplicates, or were not within the scope of the Audit. Consequently, the Audit had clinical information on 16,264 patients.

The Audit used Hospital Episode Statistics (HES) to estimate how many of the patients diagnosed between 1 October 2007 and 30 June 2009 were submitted by English NHS trusts. The estimate was based on the activity data from HES that was linked to the Audit dataset. The 16,264 patients corresponded to a case-ascertainment of 71 per cent. This is an increase of 10 per cent from the 61 per cent case-ascertainment in the Second Annual Report.

Information was extracted from CANISC for Welsh patients diagnosed with an O-G tumour between 1 January 2008 and 30 June 2009. There were 1,037 patients in the data supplied. 22 of these patients were found to have a tumour outside the scope of the Audit and were excluded from subsequent analysis. The details of 1,015 Welsh patients were included in the Audit.

Table 3.1
Estimated case-ascertainment for the 30 English Cancer Networks over the Audit period. Estimate based on patients with tumour information

Code	Cancer Network	Expected cases *	Patients with tumour record	Case-ascertainment
N15	Leics, Northants & Rutland	622	581	93.4%
N29	3 Counties	622	557	89.5%
N36	North of England	1,585	1,349	85.1%
N14	Derby/Burton	338	287	84.9%
N13	Mid Trent	862	729	84.6%
N23	North East London	592	495	83.6%
N08	North Trent	902	744	82.5%
N27	Dorset	340	272	80.0%
N26	Peninsula	828	661	79.8%
N31	Central South Coast	891	710	79.7%
N03	Merseyside and Cheshire	1,189	924	77.7%
N37	Anglia	1,203	930	77.4%
N06	Yorkshire	1,218	917	75.3%
N02	Greater Manchester & Cheshire	1,623	1,215	74.9%
N25	South West London	496	355	71.6%
N28	Avon, Somerset and Wiltshire	792	566	71.5%
N33	Sussex	460	328	71.3%
N11	Pan Birmingham	890	625	70.2%
N12	Arden	385	266	69.1%
N01	Lancashire and South Cumbria	781	519	66.5%
N38	Essex	593	392	66.1%
N30	Thames Valley	825	528	64.0%
N34	Kent and Medway	686	439	64.0%
N20	Mount Vernon	410	234	57.1%
N21	West London	531	299	56.3%
N32	Surrey, W Sussex & Hampshire	446	231	51.8%
N24	South East London	617	319	51.7%
N35	Greater West Midlands	1,054	530	50.3%
N07	Humber and Yorkshire Coast	574	170	29.6%
N22	North London	515	92	17.9%
	England	**22,870**	**16,264**	**71.1%**

* Estimate of the number of patients diagnosed in England with O-G cancer and derived from the number of patients whose first record with O-G cancer (ICD code: C15/C16) in HES was within the Audit period

3.2 Case-ascertainment by English Cancer Networks

The majority of the 30 English Cancer Networks (CN) achieved a high level of case-ascertainment (Table 3.1). Over the full 18-month period, 18 networks achieved over 70 per cent case-ascertainment. Only two networks failed to achieve 50 per cent.

Case-ascertainment for each network was determined using the number of patients with at least a tumour record because the Audit could not derive meaningful information about patient care without clinical data. This contributed to some networks having low estimates of case-ascertainment. For instance, South East London CN registered over 90 per cent of the expected number of cases but had a case-ascertainment of 52 per cent.

3.3 Completeness of submitted data

In terms of the O-G cancer treatments performed in England and Wales, the Audit received information on 3,803 curative surgical procedures and 3,630 courses of curative oncological therapy, 4,328 courses of palliative oncological therapy, and 3,249 endoscopic / radiological palliative therapies.

The completeness of data submitted by English NHS trusts could not be judged for oncological or endoscopic / radiological palliative therapies due to the lack of a reliable denominator. For surgical resections, a comparison could be made using HES. We identified 4,290 surgical resections in the HES dataset. Comparing this with the 3,515 surgical resections performed in English trusts gives an estimated case-ascertainment rate of 82 per cent.

The level of completeness for several key data items is summarised in Table 3.2 across the Cancer Networks (figures for NHS trusts are shown in appendix 4). The selected data items were:

1. the percentage of patients with a valid pre-treatment M-stage (either M0 or M1) for patients who underwent a CT-scan
2. the percentage of patients with a known planned treatment intent
3. the percentage of patients with planned treatment modality among patients who were expected to receive curative or active palliative treatment
4. the percentage of patients with treatment data (ie, surgical and/or oncological record) among patients with a curative treatment plan.

Data completeness of treatment intent and treatment modality was consistently high, with valid values for 94 per cent and 93 per cent of patients overall, respectively. The pretreatment M-stage data item had the lowest level of completeness amongst these four items, with only five networks having values for at least 90 per cent of patients. Pretreatment M-stage is an important determinant of whether treatment intent will be curative or palliative, and should be available after a patient has a CT-scan. There is no obvious reason why this value should vary between networks.

Twelve networks uploaded treatment information for at least 90 per cent of patients with a curative treatment plan and only one network had entered treatment information for less than half of its patients. No network had low levels of completeness on all the selected data items.

The level of data completeness across NHS trusts was more variable (appendix 4). Some NHS trusts provided a large number of records and complete records. Others were providing fewer details. In particular, seven cancer centres had a low case-ascertainment or submitted minimal data on treatments, namely:

1. Salford Royal Hospitals NHS Foundation Trust
2. The Cardiothoracic Centre - Liverpool NHS Trust
3. Guy's and St Thomas' NHS Foundation Trust
4. University College London Hospitals NHS Foundation Trust
5. Hull and East Yorkshire Hospitals NHS Trust
6. West Hertfordshire Hospitals NHS Trust
7. North Glamorgan NHS Trust.

3.4 Conclusion

Many NHS trusts have achieved a high level of case-ascertainment in this Audit. We commend their staff for the effort and diligence made during the 21 month Audit duration. For others, participation was limited, either because few patients were registered or because clinical information was incomplete.

A number of cancer centres failed to participate fully. It is unclear whether this was because the data were not available or whether there was a failure to input the data. While cancer units might first see referred patients (and so be responsible for collecting initial patient details), the central role in the organisation of cancer care played by cancer centres means that they should take the lead in the implementation of procedures for monitoring treatment selection and the outcomes of patient care within Cancer Networks. This should include participation in the national Audit. If cancer centres do not participate fully, then their ability to compare themselves to their peers and thus demonstrate high-standards of care is severely limited.

Table 3.2
Overview of data completeness for selected data items in the Audit dataset

Code	Cancer Network	Patients with a tumour record	% Patients w M-stage after CT-scan	% Patients w planned treatment intent	% Patients w planned modality	Treatment entered for patients with modality
N01	Lancashire and South Cumbria	519	76%	81%	74%	81%
N02	Greater Manchester & Cheshire	1,215	77%	95%	92%	53%
N03	Merseyside and Cheshire	924	64%	90%	86%	59%
N06	Yorkshire	917	82%	99%	99%	97%
N07	Humber and Yorkshire Coast	170	54%	99%	100%	63%
N08	North Trent	744	45%	97%	98%	87%
N11	Pan Birmingham	625	77%	95%	96%	70%
N12	Arden	266	31%	88%	93%	91%
N13	Mid Trent	729	90%	99%	99%	95%
N14	Derby/Burton	287	91%	98%	100%	91%
N15	Leics, Northants & Rutland	581	93%	97%	98%	90%
N20	Mount Vernon	234	74%	96%	99%	82%
N21	West London	299	84%	99%	94%	88%
N22	North London	92	57%	98%	91%	97%
N23	North East London	495	84%	97%	96%	86%
N24	South East London	319	26%	72%	93%	31%
N25	South West London	355	91%	99%	98%	97%
N26	Peninsula	661	76%	97%	94%	91%
N27	Dorset	272	77%	99%	100%	85%
N28	Avon, Somerset and Wiltshire	566	66%	85%	84%	91%
N29	3 Counties	557	80%	98%	100%	90%
N30	Thames Valley	528	64%	94%	91%	84%
N31	Central South Coast	710	90%	99%	98%	89%
N32	Surrey, W Sussex & Hampshire	231	32%	84%	84%	88%
N33	Sussex	328	61%	88%	48%	80%
N34	Kent and Medway	439	52%	75%	98%	80%
N35	Greater West Midlands	530	58%	87%	86%	60%
N36	North of England	1,349	84%	98%	98%	95%
N37	Anglia	930	86%	100%	100%	88%
N38	Essex	392	40%	96%	95%	69%
	North Wales	268	69%	97%	86%	98%
	South East Wales	433	64%	85%	89%	86%
	South West Wales	314	36%	91%	80%	89%
	England and Wales	**17,279**	**72%**	**94%**	**93%**	**82%**

4. Patient characteristics

This brief chapter provides a summary of the 17,279 patients enrolled in the Audit and who were diagnosed between 1 October 2007 and 30 June 2009. While the final cohort contained an additional 5,053 patients compared to the 12,226 patients described in the Second Annual Report, the patient characteristics of both samples are very similar.

Approximately half of the patients had a tumour of the distal oesophagus or GOJ, while one in three patients had tumours located in the stomach (Table 4.1). The majority of the stomach tumours were located proximally (in the body or fundus). Approximately two thirds of the oesophageal tumours were adenocarcinomas, while most others were squamous cell carcinomas (28 per cent). Almost all of the stomach cancers were adenocarcinomas (96 per cent). These findings are consistent with other recent studies that have highlighted the increasing incidence of tumours situated around the GOJ as well as a decrease in the incidence of stomach tumours.

As in the Second Annual Report, patients were classified into five groups according to the site and histology of their tumour, and correspond to:

- squamous cell carcinomas of the oesophagus
- adenocarcinomas of the upper and middle oesophagus
- adenocarcinomas of the lower third of the oesophagus and Siewert type I tumours
- Siewert types II and type III tumours
- tumours of the stomach.

The disease affected a broad range of age groups. The median age of the patients was 73 years but 10 per cent of patients were aged under 55 years, and 1 per cent were under 40 years. The cancer was more common in men than women, with 2 men being diagnosed for every 1 women overall. There were some differences in the age and sex distributions of the five tumour groups (Table 4.2 and Figure 4.1).

A substantial proportion of the 17,279 patients were frail. 1 in 9 patients had a performance status of 3 or more, indicating that they were confined to bed for more than 50 per cent of the time. In addition, 40 per cent of patients had at least one comorbidity.

Table 4.1
Distribution of O-G cancer tumours across the various sites

Site	Sub-site	No. of patients	%sub-site of tumour site
Oesophagus	Upper third	673	8
	Middle third	2,209	25
	Lower third	5,944	67
G-O junction[1]	Siewert I	1,299	41
	Siewert II	860	27
	Siewert III	987	31
Stomach	Fundus	694	13
	Body	2,670	50
	Antrum	1,329	25
	Pylorus	614	12
Total		**17,279**	

1 Tumours of the G-O junction are described using the 3 category Siewert classification [Siewert et al 1996]:

I. Adenocarcinoma of the distal oesophagus, the centre of which is within 2-5cm proximal to the anatomical cardia. It may infiltrate the gastro-oesophageal junction from above.

II. True junctional adenocarcinoma, the centre of which is within 2cm above or below of the anatomical cardia.

III. Subcardial gastric adenocarcinoma the centre of which is within the 5cm distal to the anatomical cardia. It may infiltrate the gastro-oesophageal junction from below.

Table 4.2
Summary of patient characteristics by type of tumour

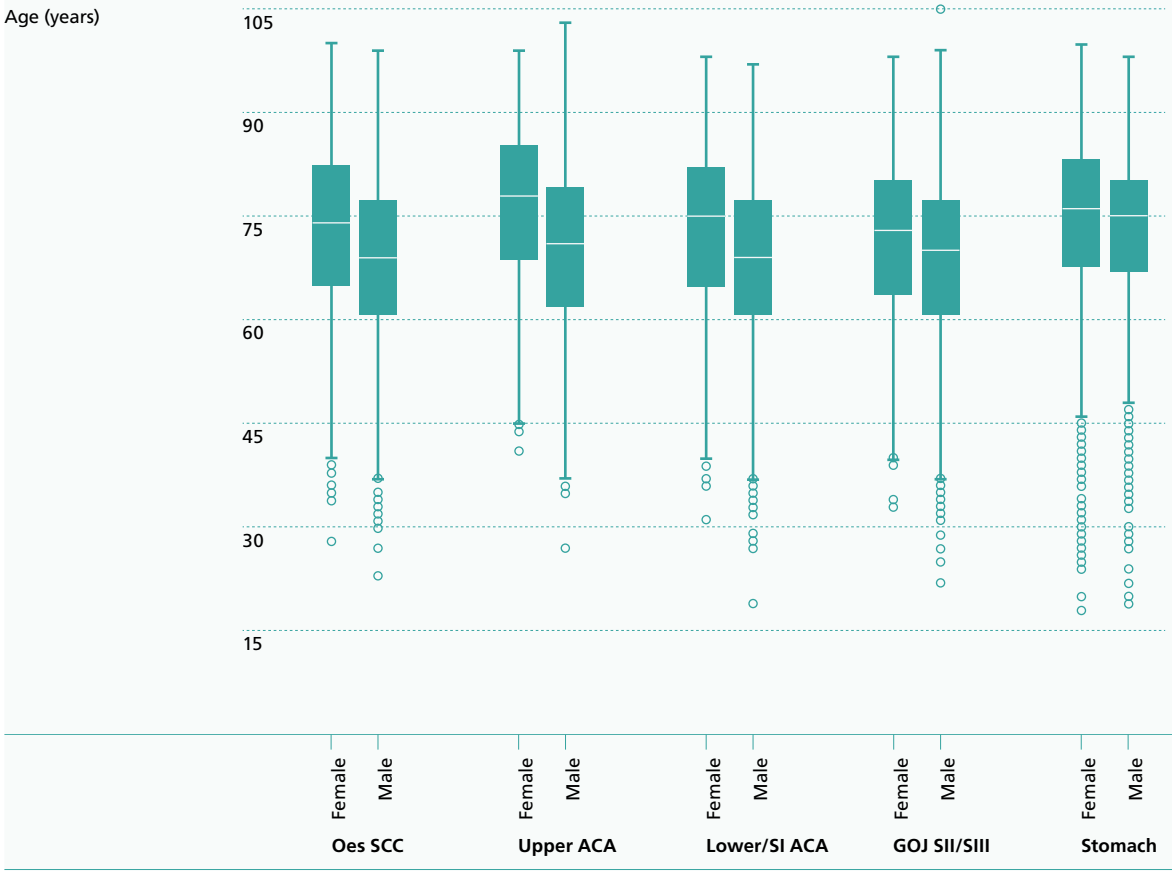
		Oesoph. SCC	Oeso ACA Upper / Mid	Oeso ACA Lower / SI	GOJ SII / SIII	Stomach
Number of patients	Total	3,512	995	5,618	1,847	5,307
	Women	1,803	322	1,133	420	1,989
	Men	1,709	673	4,485	1,427	3,318
	Ratio women to men	1:0.95	1:2.1	1:4.0	1:3.4	1:1.67
Median age (years)	Women	74	78	75	73	76
	Men	69	71	69	70	75
Performance status[1] >3 (%)	18%	17%	13%	13%	23%	
Patients with >1 comorbidity (%)	37%	40%	42%	38%	41%	

NB: SCC = squamous cell carcinomas; ACA = adenocarcinoma; SI, SII, SIII = Siewert I, II, III

1. Eastern Cooperative Oncology Group (ECOG) score for performance status in cancer patients. 0 denotes perfect health and 4 a patient who is bed-bound, completely disabled and unable to carry out any self-care. Patients scoring 3 or more cannot perform light / office work.

Figure 4.1
Distribution of patient ages at diagnosis, grouped by type of tumour and patient sex

Key: F = female, M = male. The limits of the box shows 25th, 50th (median) and 75th percentiles. The outer limits show the minimum or maximum age unless the patient ages are high or low compared to the spread of the interquartile range. These distant values are shown as circles (o).



5. Staging and treatment planning

In this chapter, we provide information on the use of staging investigations and treatment decisions. The main focus of the chapter is the use of endoscopic ultrasound (EUS) and staging laparoscopy. At the time of the Second Annual Report, the data on EUS and staging laparoscopy appeared incomplete and we were unable to reach a conclusion about whether these two investigations were being used appropriately. The Audit recommended that:

"O-G cancer services should ensure that all patients undergo a CT-scan plus an EUS (if oesophageal / upper junctional tumour) or a staging laparoscopy (if gastric / lower junctional tumour) before undergoing curative treatment and should improve the monitoring of their use".

The information on the use of CT-scans for staging and treatment decision making is included to update the figures contained in the Second Annual Report and so provide a complete picture of this part of the care pathway.

5.1 Use of CT-scan in disease staging

If patients are sufficiently fit, they will undergo a number of staging investigations. These aim to establish how far the disease has spread (its stage) and thereby determine if patients are candidates for curative treatment.

All guidelines recommend that initial staging assessment should include a computed tomography (CT) scan of the thorax and abdomen to determine the presence or absence of metastatic disease [DH 2001; Allum et al 2002; SIGN 2006].

Among all 17,279 patients, 15,393 (89 per cent) underwent a CT-scan as part of their staging investigations. The proportion of patients who had a CT-scan was typically around 95 per cent except among those who might be increasingly too frail to have curative surgery (Table 5.1). This suggests that patients who would be suitable for curative treatment are having this key investigation. The use of CT-scan did not differ statistically among the five tumour groups after adjusting for age, sex and performance status.

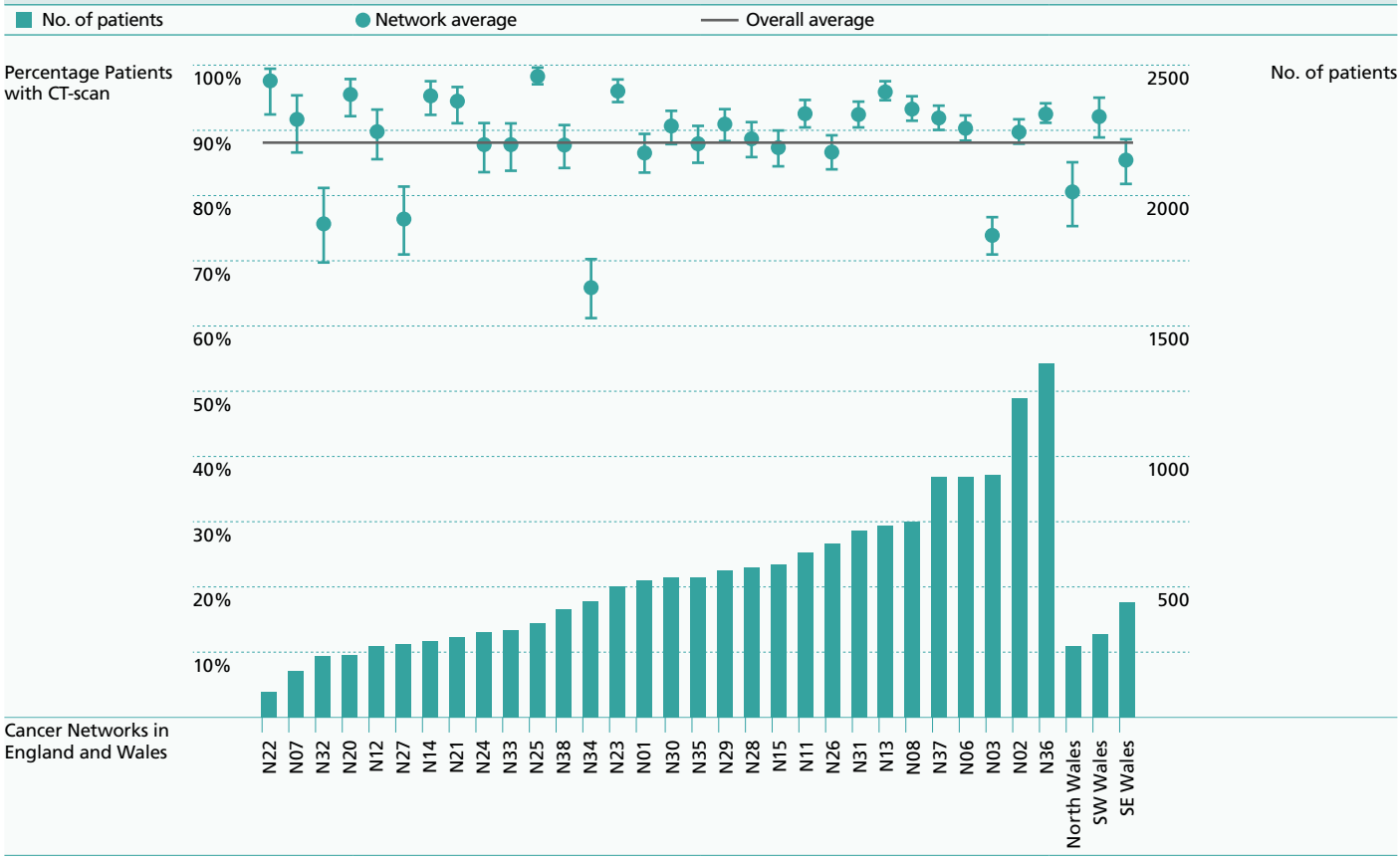
The proportion of patients who underwent CT-scans varied between Cancer Networks with four Cancer Networks reporting that fewer than 80 per cent of patients had this investigation (Figure 5.1). Inspection of the data suggested that these low network rates were influenced by a few hospitals that had not submitted any information about staging investigations. The lower rates were not explained by differences in patient characteristics within the Cancer Networks, and there was no evidence of another type of investigation like PET being substituted for CT-scans. Thus, the low values appear to be due to incomplete submission of data rather than differences in clinical practice.

Table 5.1
Proportion of patients who had a CT-scan, by age and performance status[1]

Age group (years)	Performance status				
	0	1	2	3	4
Under 60	96%	97%	96%	95%	91%
60 to 70	97%	97%	96%	94%	85%
70 to 80	97%	97%	97%	91%	85%
80 plus	91%	94%	88%	75%	72%

1 Eastern Cooperative Oncology Group (ECOG) score for performance status in cancer patients. 0 denotes perfect health and 4 a patient who is bed-bound, completely disabled and unable to carry out any self-care. The table is based on the 11,117 patients with a known performance status.

Figure 5.1
Proportion of patients who had a CT-scan by English and Welsh Cancer Networks



5.2 Use of endoscopic ultrasound and staging laparoscopy

The combination of CT and EUS has been shown to have high levels of accuracy for staging oesophageal and junctional tumours. Endoscopic ultrasound is recommended to estimate the depth of tumour penetration if a patient is sufficiently fit to undergo curative treatment and there is no evidence of widespread or metastatic disease on the CT-scan [DH 2001; Allum 2002; SIGN 2006]. For patients with stomach and Siewert II/III tumours, staging laparoscopy should also be used as this can detect small metastatic deposits within the abdominal cavity that are too small to be detected by a CT-scan.

In the Second Annual Report, we noted that the use of EUS and staging laparoscopy investigations were lower than expected. The proportion of patients reported as having these investigations has remained low. Overall, among patients with a curative treatment plan:

- 62 per cent of patients with an oesophageal or Siewert type tumour were recorded as having an EUS investigation
- 49 per cent of patients with a stomach tumour or a Siewert II/III tumour were recorded as having a staging laparoscopy.

Figure 5.2 summarises the reported use of EUS within the Cancer Networks and Wales. The variation raises questions about whether it reflects actual differences in practice or differences in reporting. One possible reason for the variation is the addition of PET-CT to the standard set of staging investigations. This has been shown to provide greater accuracy in determining nodal involvement (N-stage) and the presence of distant metastases than CT-scan alone and is increasingly used for staging patients with potentially resectable oesophageal and junctional tumours. The lower graph of Figure 5.2 shows that most patients within networks are receiving EUS or PET-CT (or both).

While PET-CT helps distinguish between patients who are potentially curative and palliative, it provides no information on the T-stage which can only be reliably determined with EUS. Consequently, we combined information on EUS use with whether or not a patient had a T-stage to estimate overall levels of EUS use to assess whether there had been differences in reporting. Overall, this suggested that 90 per cent of patients with an oesophageal or junctional tumour were recorded as having an EUS investigation.

A similar sensitivity analysis cannot be applied to staging laparoscopy as this investigation (together with CT-scanning) determines the presence of metastases (M-stage) not the depth of tumour invasion (T-stage). PET-CT has been shown to be less effective in the investigation of stomach tumours compared to oesophageal or junctional tumours.

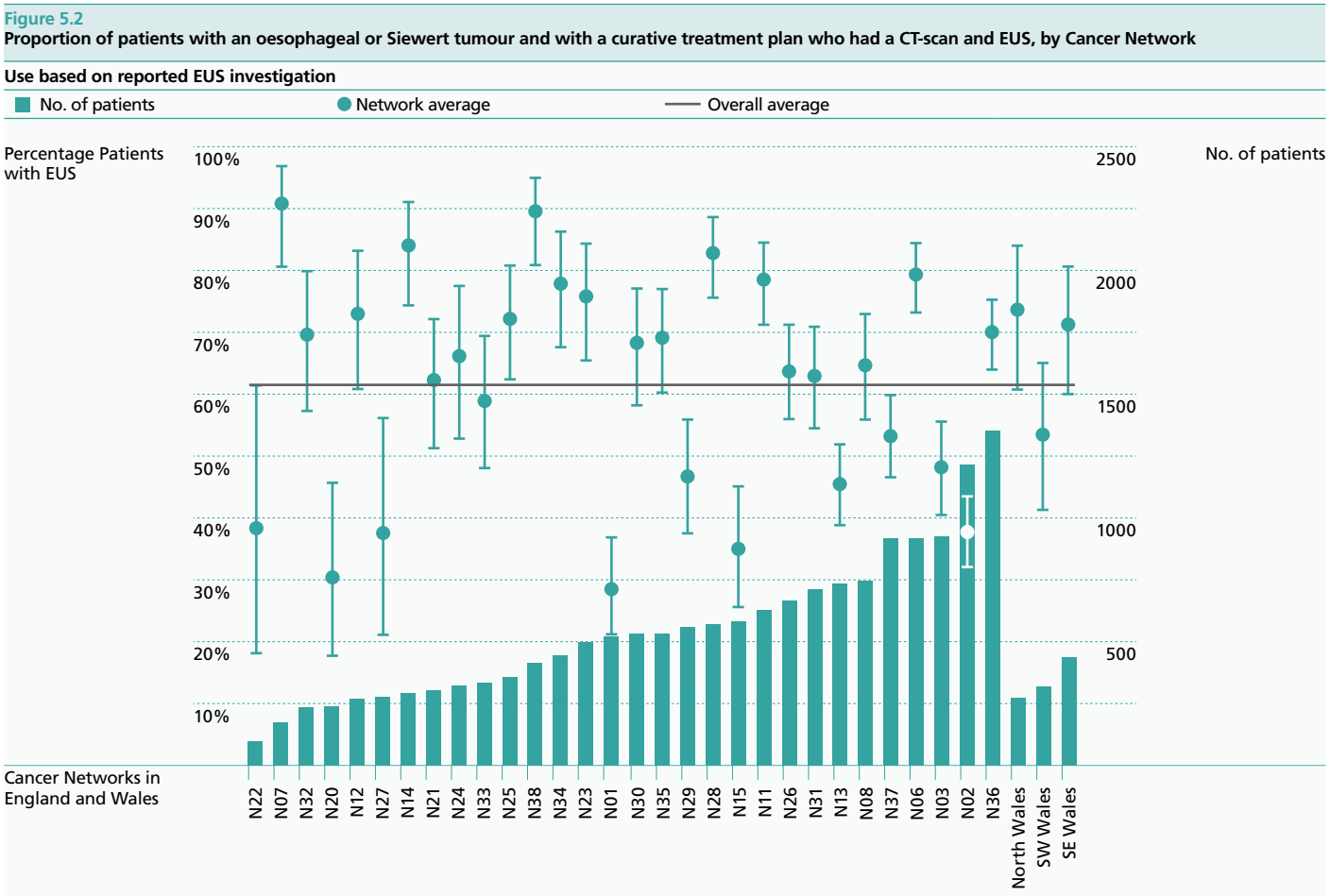
5.3 Treatment decisions

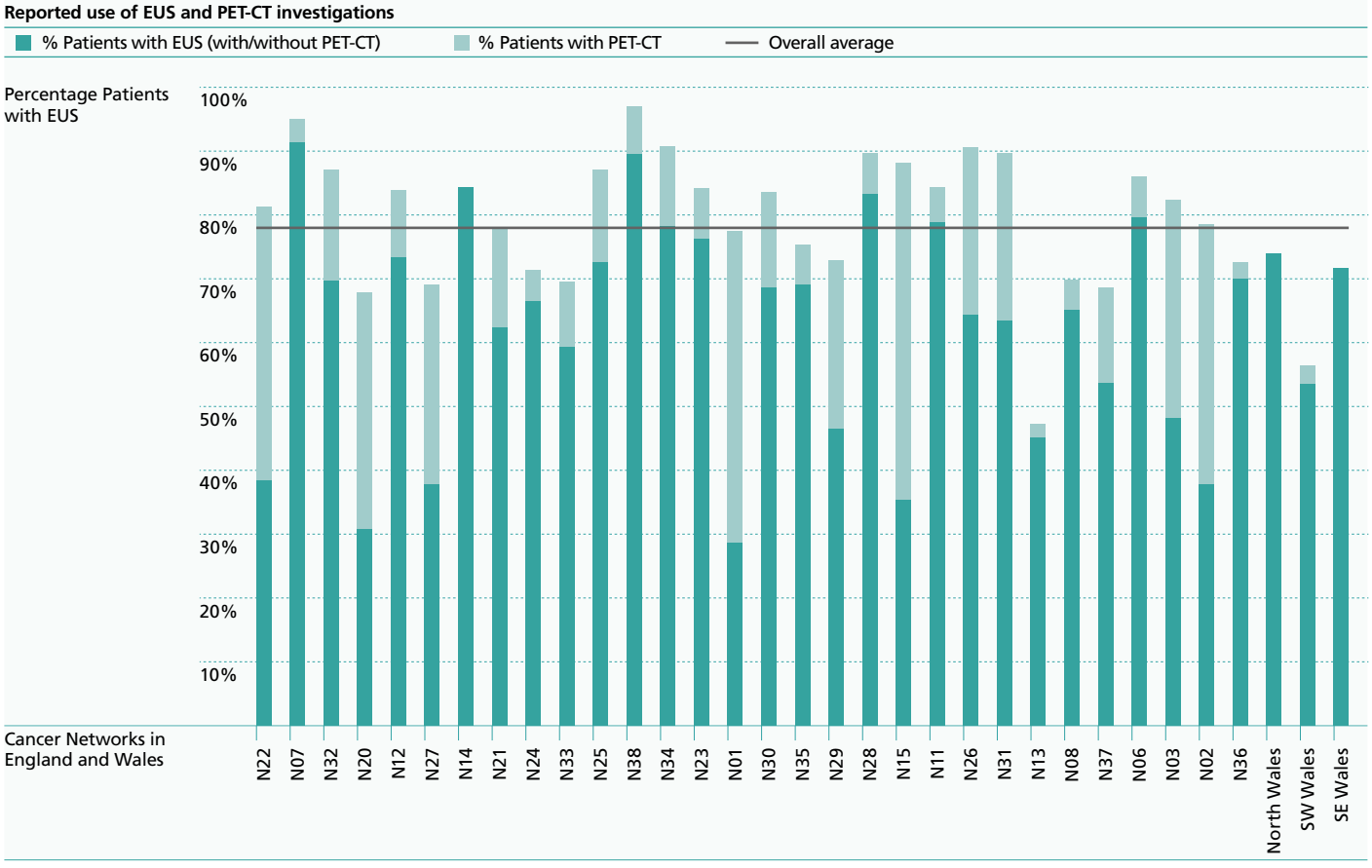
The planned treatment intent was completed for 94 per cent of all patients in the Audit. Among the 16,232 patients with treatment intent, 36% of patients had a curative treatment plan. The rate was slightly higher among patients with lower oesophageal / junctional tumours compared to patients with other types of tumour (Table 5.2).

Table 5.2
Treatment intent among Audit patients, by type of tumour

	Oesoph. SCC	Oeso ACA Upper / Mid	Oeso ACA Lower / SI	GOJ SII / SIII	Stomach
Curative	31%	28%	40%	42%	34%
Palliative	69%	72%	60%	58%	66%
Total	**3,266**	**921**	**5,316**	**1,759**	**4,970**
Missing	246	74	302	88	337

Figure 5.2
Proportion of patients with an oesophageal or Siewert tumour and with a curative treatment plan who had a CT-scan and EUS, by Cancer Network





The distribution of planned treatments among patients undergoing curative or palliative treatment is summarised in Table 5.3. Among curative patients, resectional surgery with or without chemotherapy was the dominant therapy for most types of tumour. Patients with squamous cell carcinoma of the oesophagus were the exception with 31 per cent having definitive chemo-radiotherapy. 143 patients were planned to have endoscopic mucosal resection for early cancer (13 of whom subsequently underwent a full resection).

Clinical trials have demonstrated improved survival when peri-operative chemotherapy is given for locally advanced adenocarcinoma of the oesophagus, GOJ or stomach (stage 2 or 3 disease). For oesophageal and junctional tumours, services seem to be responding to this evidence, with a high proportion of patients having a treatment plan that combines surgery and peri-operative chemotherapy (Table 5.4).

The proportion of patients with stomach cancers planned to have combined therapy is much lower. There are various possible reasons for this. First, patients with stomach cancers are older, on average, than patients with the oesophageal / junctional tumours (see chapter 6), and the difference could reflect increased levels of frailty within this patient group. Second, the main evidence for the effectiveness of combined therapy for oesophageal / junctional tumours was published in 2002, whereas the evidence for stomach cancer was published in 2005. Thus, the difference may reflect the speed of uptake.

There was some variation between Cancer Networks in the proportion of patients with planned curative combined therapy, with 80 per cent of the networks (10th and 90th percentiles) having values between 54 per cent and 76 per cent. A multiple logistic regression model of the relationship between combined therapy and tumour site, age, sex, pre-treatment stage, performance status and number of comorbidities had good discrimination (C-statistic = 0.81). However, using this model to adjust the network-level proportions did not reduce the between-network variation ($P<0.001$).

Among 9,844 palliative patients with a known planned modality, the most common invasive modality was palliative oncology. For patients with an oesophageal or junctional tumour, 53 per cent of patients with palliative intent were considered for either chemotherapy or radiotherapy. The proportion for patients with stomach cancer was 37 per cent. This difference, together with fewer patients with stomach cancer receiving endoscopic / radiological palliative therapies, meant that around one-half of patients with stomach cancer were planned to have "best supportive care".

Table 5.3
Treatment modalities among curative and palliative patients

Planned treatment	Oesoph. SCC	Oeso ACA Upper / Mid	Oeso ACA Lower / SI	GOJ SII / SIII	Stomach
Curative patients					
Surgery alone	17%	24%	22%	24%	55%
Radiotherapy alone	7%	4%	3%	1%	0%
Chemotherapy & surgery	41%	57%	65%	68%	41%
Definitive chemo-radiotherapy	31%	9%	6%	4%	1%
Chemo-radiotherapy & surgery	2%	3%	1%	1%	1%
Endoscopic mucosal resection	2%	3%	3%	2%	2%
Total	**927**	**233**	**2,009**	**710**	**1,576**
Missing	101	25	137	36	92
Palliative patients					
Palliative surgery	3%	2%	2%	2%	5%
Palliative oncology	53%	49%	52%	56%	37%
Endoscopic/radiologic palliation	22%	23%	22%	14%	6%
Best supportive care	22%	26%	24%	28%	52%
Total	**2,095**	**619**	**3,021**	**949**	**3,160**
Missing	143	44	149	64	142

Table 5.4
Percentage of patients with stage 2 or 3 disease undergoing surgery alone or combined surgery and peri-operative chemotherapy

Tumour site	No. of patients	Surgery alone	Surgery + peri-operative chemotherapy
Upper / Middle ACA	107	21%	79%
Lower ACA / Siewert I	1032	17%	83%
Siewert II / III	376	18%	82%

There was some evidence of differences in the planned use of palliative oncology between Cancer Networks, though the interpretation of the statistics was hampered by variable levels of case-ascertainment and possible under-reporting of patients receiving palliative care. Figure 5.3 shows the unadjusted figures for all Cancer Networks. There is a distinct split between English and Welsh Cancer Networks in planned modality. This seems to reflect the practice of referral to an oncologist for assessment rather than treatment. There was less difference in the actual proportion of patients with palliative intent who received palliative oncology. In England, the proportion was 38 per cent; in Wales, it was 46 per cent. (The proportion in England may be an under-estimate because of under-reporting of palliative oncology episodes.) The values for Cancer Networks N24 and N34 are thought to reflect their comparatively low case-ascertainment.

The variation in Figure 5.3 also reflects differences in the patient populations of Cancer Networks. The likelihood of a patient with palliative treatment intent having "palliative oncology" as their modality was strongly associated with patient age and performance status (Table 5.5). The differences between networks were reduced slightly but were still statistically significant (P<0.001) after adjustment for age, sex, tumour group, performance status and number of comorbidities.

Figure 5.3
Proportion of patients with palliative treatment intent who were planned to receive palliative oncology, by Cancer Network

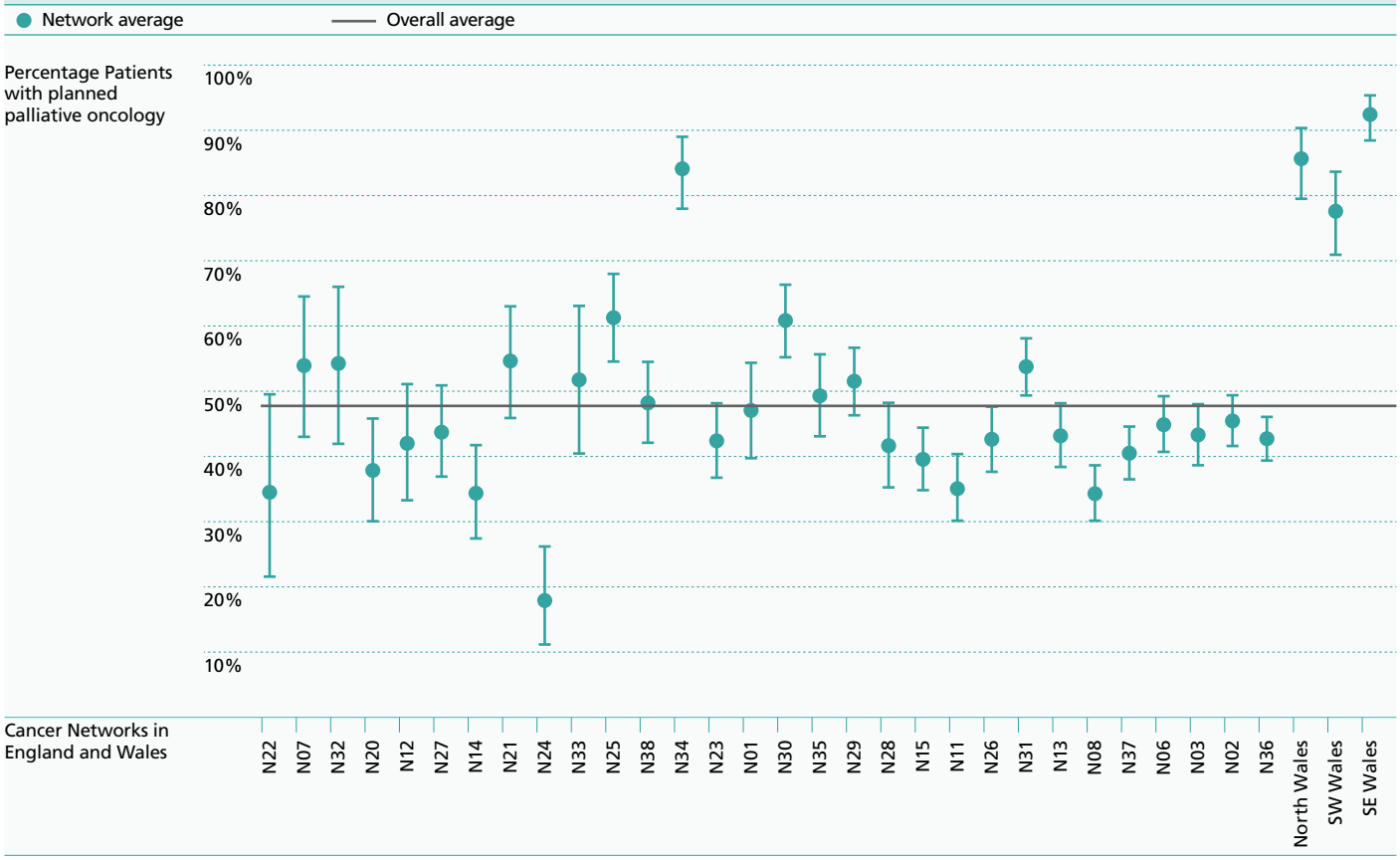


Table 5.5
Proportion of patients with palliative intent who had "palliative oncology" as their treatment modality, by age and performance status

Age group (years)	Performance status				
	0	1	2	3	4
Under 60	82%	78%	62%	47%	27%
60 to 70	83%	75%	57%	27%	12%
70 to 80	72%	60%	46%	16%	8%
80 plus	45%	35%	21%	8%	6%

6. Curative treatment patterns

The Second Annual Report provided a preliminary description of the curative treatments received by patients, being limited to only those patients diagnosed in the first year of the data collection period. In this report, we are able to present information on all patients who received curative surgery and non-surgical oncology treatment with a curative intent. The chapter also describes the comparability of surgical information in the Audit and Hospital Episode Statistics database.

6.1 Curative resection surgery

In total, the Audit received information on 3,803 surgical procedures undergone by patients with a curative treatment plan. Of these, 2,200 were oesophagectomies, 1,412 were gastrectomies and 191 were open-and-shut / bypass procedures. This is almost double the 2,031 surgical procedures analysed in the Second Annual Report.

We examined the quality of the curative surgical data submitted by English NHS trusts by comparing the level of agreement between the Audit and HES datasets in terms of patients undergoing either an oesophagectomy or gastrectomy. Resections in the HES records were defined using OPCS procedure codes G01, G02, G03, G27 and G28. Among the Audit-HES linked records, there were 3,441 surgical resections performed by English NHS trusts and 3,308 (98 per cent) of these matched with resection procedures in the linked HES records. This was an excellent level of agreement. The remaining 133 patients had a surgical resection recorded in their Audit record but did not have a resection in HES.

Patients having a curative resection were younger and fitter than the overall patient group (Table 6.1). However, curative surgery was performed on a broad range of patients, with 2 per cent of oesphagectomies and 11 per cent of gastrectomies being performed on patients aged 80 years or over.

Table 6.1
Characteristics of patients undergoing curative surgery

		Type of operation	
		Oesophagectomy	Gastrectomy
No. of procedures		2,200	1,412
	Open approach	1,541	1,226
	Minimally invasive	659	186
Patient characteristics: surgery only			
No. of patients		603	819
Patient age (years)	Median	67	74
	IQR	60 to 75	69 to 79
Sex (% male)		74%	65%
Performance status:	0 or 1	91%	83%
ASA grade:	I or II	78%	70%
Patient characteristics: surgery and chemotherapy			
No. of patients		1597	593
Patient age (years)	Median	63	66.5
	IQR	58 to 69	58 to 72
Sex (% male)		79%	68%
Performance status:	0 or 1	96%	92%
ASA grade[1]:	I or II	83%	82%

1 American Society of Anaesthesiologists (ASA) five category physical status classification system for assessing patients before surgery. Grades I to V are defined by the presence and severity of systemic disease. Grade I represents a normal healthy patient; while Grade II is a patient with mild systemic disease

Table 6.2
Curative surgical procedures, by type and site of tumour

Type of operation	Oesoph. SCC	Oeso ACA Upper / Mid	Oeso ACA Lower / SI	GOJ SII / SIII	Stomach	Total
Oesophagectomy						
Left thoraco-abdominal	56	19	187	47	0	309
2-Phase (Ivor-Lewis)	257	100	1,010	261	0	1,628
3-Phase (McKeown)	50	17	83	13	0	163
Transhiatal	8	4	78	10	0	100
Gastrectomy						
Total	0	0	14	132	477	623
Extended Total	0	0	6	51	26	83
Proximal	0	0	0	0	50	50
Distal	0	0	0	0	614	614
Other	0	0	0	0	42	42
Other procedures:						
("open and shut" / "bypass")	21	7	64	29	70	191
Total	**392**	**147**	**1,442**	**543**	**1,279**	**3,803**

Seventy-two per cent of patients with oesophageal / GOJ tumours had neoadjuvant chemotherapy prior to surgery compared to 39 per cent of patients with stomach tumours. Patients who had a combination of surgery and chemotherapy were on average younger and fitter than those having surgery only, which was expected given that patient selection is based on their ability to cope with the physiological impact of both the chemotherapy and the surgery.

Of the 2,220 oesophagectomies, 95 per cent were performed by the transthoracic approach (Table 6.2). The transhiatal approach was rarely used. Most resections of the stomach were either performed using a total gastrectomy (39 per cent) or a distal gastrectomy (51 per cent). Five per cent of patients had an "open-and-shut" procedure, which compares favourably to the rate of 10 per cent reported by SAGOC [SAGOC, 2002]. There was no difference in the pattern of staging investigations undergone by patients who had a surgical resection and those who had an "open-and-shut" procedure.

An increasing number of surgical resections are performed using minimally invasive (MI) techniques [Gemmill et al 2007; Parameswaran et al 2009]. These operations are performed using laparoscopic instruments under the guidance of a camera inserted through several small (1-2cm) incisions rather than using a large incision characteristic of an open surgical approach. By reducing the injury associated with an open approach, MI operations are postulated to reduce patient morbidity. However, to date, there has been no clear evidence that MI techniques improve outcomes in O-G cancer surgery.

Fully minimally invasive oesophagectomies involve thoracoscopy for the chest-phase of the operation and laparoscopy for the abdominal phase. However, oesophagectomies can be performed using minimally invasive techniques for only the abdominal or chest phase. These are commonly referred to as hybrid operations.

Approximately 30 per cent of oesophagectomies and 13 per cent of gastrectomies were performed by a minimally invasive (MI) approach (Table 6.3). Of the MI oesophagectomies, just over half used a hybrid technique, being laparoscopically assisted operations rather than fully minimally invasive [Hardwick et al 2008]. The conversion rate[1] was modest, being 8 per cent for MI oesophagectomies and 18 per cent for MI gastrectomies.

Feeding adjuncts were more commonly used among patients undergoing an oesophagectomy. Overall, 68 per cent of these patients had a feeding jejunostomy inserted, while 26 per cent had no feeding adjunct. In patients having a gastrectomy, 33 per cent of patients had a feeding jejunostomy inserted, while 56 per cent had no feeding adjunct. The proportion of procedures using a feeding jejunostomy varied greatly between NHS cancer centres, ranging from under 25 per cent to over 75 per cent.

Few patients had another organ removed during their primary resection. A splenectomy was performed for 35 patients (1.6 per cent) who had an oesophagectomy and 55 patients (3.9 per cent) who had a gastrectomy; 7 of these procedures were minimally invasive. There also were 17 pancreas resections and 4 liver resections.

6.2 Non-surgical oncology treatment with a curative intent

Neoadjuvant / adjuvant therapy

Clinical trials have shown that neoadjuvant and peri-operative chemotherapy offers a survival benefit in locally advanced oesophageal, gastric and junctional cancer [MRC 2002; Cunningham et al 2006]. The evidence for chemo-radiotherapy is less strong and its use is recommended only within clinical trials. Individual clinical trials of adjuvant chemotherapy after surgical resection have been inconclusive about its benefits but a recent meta-analysis suggests there is a modest improvement in survival for patients with gastric cancer [GASTRIC 2010].

Table 6.3
Surgical approach used for curative surgical resection by type of procedure

Oesophagectomy	**Procedure**			
Approach	**Left thor-abdominal**	**2 - Phase**	**3 - Phase**	**Transhiatal**
Open	287	1118	48	88
Minimally invasive / hybrid (includes converted)	22	510	115	12
Total	**309**	**1628**	**163**	**100**
Percentage MI	7%	31%	71%	12%

Gastrectomy	**Procedure**			
Approach		**Total / extended total**		**Sub-total / partial**
Open		635		591
Fully minimally invasive (includes converted)		71		115
Total		**706**		**706**
Percentage MI		10%		16%

1 An operation was begun using a minimally invasive technique but is converted to an open approach intra operatively.

Almost all patients undergoing oncological treatment received neoadjuvant chemotherapy (Table 6.4). The "chemotherapy procotol" data item was reported in 90 per cent of cases but half of these values were entered as "other" rather than trial-evaluated "OEO2" or "MAGIC" protocols.

Around 1 in 7 patients with an oesophageal / junctional tumour and 1 in 5 patients with a gastric tumour did not complete their neoadjuvant treatment (Table 6.5). The main reasons for incomplete treatment were acute chemotherapy toxicity and progressive disease.

Hospitals were asked to indicate whether or not a patient proceeded to curative resection by entering a surgical record with a specified set of dummy data but it was not always clear whether this had been followed. By counting the number of surgical resections in the Audit dataset and the resections in HES among those patients with linked data, we estimate that 85 per cent of patients who began neoadjuvant chemotherapy went on to have a surgical resection.

Definitive oncological therapy

There is evidence that definitive chemo-radiotherapy may be curative in patients with squamous cell cancer of the oesophagus and recent guidelines have recommended it for patients who are too frail to undergo surgery or who decline surgery [Crosby et al 2004]. Radiotherapy alone is an option in patients considered unsuitable for combination therapy but is rarely curative for oesophageal cancer.

The Audit received records on 334 patients who had definitive chemo-radiotherapy, and another 142 had definitive radiotherapy. Both were most commonly used in patients with squamous cell tumours (Table 6.6). Patients having chemo-radiotherapy were typically younger than patients having only radiotherapy, the median (IQR) ages being 68 years (60-74) and 77 years (73-80), respectively.

Overall, 85 per cent of patients completed definitive chemo-radiotherapy. The most common reason for incomplete therapy was acute chemotherapy toxicity; there were no cases of radiotherapy toxicity (Table 6.7). Radiotherapy was tolerated better, with 97 per cent of patients completing their therapy.

6.3 Surgical information in the Audit and HES datasets

Surgical procedures are described in HES using the UK Office for Population Censuses and Surveys classification (OPCS), version 4.3. This classification defines the procedure in terms of the anatomical areas that are joined after the tumour is removed. In comparison, the Audit has defined the procedure by the surgical technique. These are two complementary classification systems but it means that there are no individual OPCS codes that correspond to the resection procedures recorded in the Audit database. Table 6.8 describes the OPCS codes (at 3-digit procedure group level) that appear most frequently in the HES data, grouped by surgical technique. It illustrates that each procedure, while performed by the same technique,

Table 6.4
Summary of oncological treatment undergone by patients planned to have curative surgery

Treatment intent	Oesoph. SCC	Oeso ACA Upper / Mid	Oeso ACA Lower / SI	GOJ SII / SIII	Stomach
Number of patients	411	128	1231	466	594
Neoadjuvant	96%	93%	92%	88%	80%
Adjuvant	2%	3%	3%	3%	10%
Neoadj. + Adjuvant	2%	4%	5%	9%	10%

Table 6.5
Outcomes of neoadjuvant chemotherapy treatment by tumour site

Outcome	Oesophageal / Junctional tumours	Stomach tumours
Treatment completed as prescribed	87.0%	80.7%
Patient died during treatment	1.2%	1.4%
Progressive disease during chemotherapy	3.0%	4.7%
Acute chemotherapy toxicity	6.9%	8.9%
Technical or organisational problems	0.2%	0.0%
Stopped due to patient choice	1.7%	4.4%
Number of patients	2100	532
Missing outcome	470	103

Table 6.6
Use of definitive oncological treatment by tumour site

Treatment modality	Oesoph. SCC	Oeso ACA Upper / Mid	Oeso ACA Lower / SI	GOJ SII / SIII
Number of patients	282	31	141	22
Radiotherapy	24%	32%	40%	36%
Chemo-radiotherapy	76%	68%	60%	64%

is typically attached to the same OPCS code because it involves the anastomosis of different organs. This pattern continues at the 4-digit OPCS procedure level. For example, at least 50 per cent of the oesophagectomies by each transthoracic approach had OPCS code "G011", indicating an anastomosis between the oesophagus to stomach.

Another limitation of the HES data is that, within each 3-digit procedure group, the OPCS classification includes broad "catch-all" categories such as "G019 Excision of oesophagus and stomach – unspecified" and "G279 Total excision of stomach – unspecified". Around 10 per cent of procedures are coded using these broad categories. This means, for analytical purposes, the procedures often need to be aggregated at the level of the 3-digit OPCS categories (G01, G02, etc), which unfortunately means the anatomical information is discarded.

Since April 2006, OPCS codes have been available to indicate whether or not the surgical approach was minimally invasive, namely, Y74 (minimal access to thoracic cavity) and Y75 (minimal access to abdominal cavity). This information could be useful to the Audit as a means of validation because an important objective is to monitor if outcomes are associated with the type of approach. However, these OPCS codes were significantly under-represented when compared to minimally invasive procedures coded in the Audit:

1. Y74 codes were entered for 89 (37 per cent) of the 239 linked oesophagectomies that were performed with minimal access in the thoracic phase
2. Y75 codes were entered for 377 (65 per cent) of the 582 linked oesophagectomies that were performed with minimal access in the abdominal phase
3. Y75 codes were entered for 89 (61 per cent) of the 145 linked gastrectomies performed with minimal access to the abdominal cavity.

The issue of coding completeness also affects the identification of nodal dissection procedures in the HES database. OPCS codes indicating the excision of lymph nodes (T85, T86, T87) were entered for 335 (21 per cent) of 1,560 linked oesophagectomies performed with nodal dissection and for 236 (22 per cent) of the 996 linked gastrectomies performed with nodal dissection.

In conclusion, while the HES database is a valuable resource for supporting clinical audit, it is currently not a substitute for prospective data collection by local NHS trusts. It is best viewed as a complementary data source that enables data validation and provides some additional information for secondary analyses.

There is an urgent need for clear guidance to clinicians and coders on which codes to use for common operations so that the quality of HES coding can be improved.

Table 6.7
Outcomes of definitive oncological treatment for patients with oesophageal / junctional tumours, by treatment modality

Outcome	Chemo-radiotherapy	Radiotherapy
Treatment completed as prescribed	85.0%	97%
Patient died during treatment	1.7%	2%
Progressive disease during chemotherapy	0.9%	1%
Acute chemotherapy / radiotherapy toxicity	11.1%	0%
Technical or organisational problems	0.0%	0
Stopped due to patient choice	1.3%	0
Number of patients	334	142
Missing outcome	100	35

Table 6.8
Correspondence between the OPCS code used in HES to describe the surgical resection and the common procedures recorded in the Audit database amongst Audit-HES linked records

OPCS code	OPCS Code Description	Left thoraco-abdominal oesophagectomy	2-Phase (Ivor-Lewis) oesophagectomy	3-Phase (McKeown) oesophagectomy	Transhiatal oesophagectomy
G01	Oesophago-gastrectomy	65%	78%	60%	41%
G02	Total oesophagectomy	6%	4%	27%	21%
G03	Partial oesophagectomy	28%	17%	13%	36%
	Other procedure code	2%	1%	0%	2%
	Number of linked procedures	295	1491	141	96

OPCS code	OPCS Code Description	Total gastrectomy	Extended gastrectomy	Proximal gastrectomy	Distal gastrectomy
G01	Oesophago-gastrectomy	6%	24%	6%	0%
G27	Total gastrectomy	81%	66%	12%	6%
G28	Partial gastrectomy	12%	6%	80%	93%
	Other procedure code	1%	4%	2%	1%
	Linked procedures	572	79	51	558

7. Outcomes after curative surgery

In this chapter, we provide information on short-term outcomes after oesophagectomy and gastrectomy. We report 30-day and 90-day mortality. We also report the rate of re-operation, and the frequency of particular complications including anastomotic leak, cardiac and respiratory complications.

Hospitals were asked to record any postoperative complication that required intervention (ie, alteration in the patient's management plan) during a patient's inpatient stay. Re-operation was not required for a condition to qualify as a complication. The average duration of a patient's inpatient stay was slightly longer after oesophagectomy compared to gastrectomy. After oesophagectomy, patients stayed for a median of 14 days (IQR: 11 to 21); after gastrectomy, patients stayed for a median of 11 days (IQR: 8 to 17).

7.1 Postoperative mortality

Postoperative mortality remains a significant risk for both these major procedures. We linked the Audit data to ONS date of death information to derive the mortality rates at particular time intervals. We also asked hospitals to report in-hospital mortality.

Overall levels of mortality are described in Table 7.1. 30-day mortality was lower than the mortality rates after curative surgery reported by the Scottish Audit using data from 1999 [SAGOC 2002] and is consistent with evidence that the safety of these procedures has increased over the last decade.

We estimate that the Audit captured 84 per cent of surgical resections. While this represents a very high proportion, it is possible that the Audit figures were influenced by selection bias. The HES data allowed us to assess whether there was a systematic difference in the in-hospital postoperative mortality rates of patients identified as being within and outside the Audit for English patients. There were 3,098 linked records of patients undergoing a resection which also had information on in-hospital mortality. Among these records, there was excellent agreement between the Audit and HES estimates of in-hospital mortality (respectively, 4.7 per cent and 4.8 per cent; Kappa = 0.91).

The good agreement between the matched records provides support for comparing the inpatient mortality for all HES and Audit records. Among the 4016 procedures identified in HES, the overall in-hospital mortality was 5.2 per cent. The overall Audit figure was 5.1 per cent. This slight underestimate suggests that the Audit has not missed a disproportionate number of patients with poor outcomes.

7.2 Inpatient postoperative complications

Specific complication rates for oesophagectomy are described in Table 7.2. Overall, three in every 10 patients experienced at least one postoperative complication. The most prevalent were respiratory complications. Around 1 in 10 patients required a further operation.

For gastrectomy, two in every 10 patients experienced at least one postoperative complication and approximately 1 in 12 patients required a reoperation (Table 7.2). Patients undergoing gastrectomy had lower rates for the specific complications compared to patients undergoing oesophagectomy, with the exception of wound infection and cardiac complications.

Table 7.1
Postoperative mortality for curative surgery, by type of procedure

Complication	Oesophagectomy (n = 2200)		Gastrectomy (n = 1412)	
	Rate (%)	(95% CI)	Rate (%)	(95% CI)
In-hospital mortality	4.5	3.7 – 5.5	6.0	4.8 – 7.4
30-day mortality	3.8	3.1 – 4.7	4.5	3.4 – 5.7
90-day mortality	5.7	4.8 – 6.8	6.9	5.6 – 8.3

Table 7.2
Rates of inpatient complications after surgical resection, by type of procedure

Complication	Oesophagectomy (n = 2200)		Gastrectomy (n = 1412)	
	Rate (%)	(95% CI)	Rate (%)	(95% CI)
Re-operation	10.2	8.9 – 11.6	7.4	6.0 – 8.9
Any complication	29.8	27.9 – 31.8	19.4	17.4 – 21.6
Anastomotic leak	8.3	7.2 – 9.6	5.9	4.7 – 7.2
Chyle leak	3.1	2.4 – 4.0	0.4	0.1 – 0.8
Cardiac	5.2	4.3 – 6.2	3.8	2.9 – 5.0
Wound infection	3.9	3.1 – 4.8	3.3	2.4 – 4.3
Respiratory	12.9	11.5 – 14.4	7.3	6.0 – 8.8

As expected, the occurrence of a complication increased length of stay after accounting for patient characteristics (Table 7.3). The effect of an anastomotic leak was particularly large. It is also worth noting that patients who suffered an anastomotic leak had a significantly higher risk of in-hospital and 30-day mortality, re-operation, as well as respiratory complications and wound infections than those who did not (Table 7.4).

The use of minimally invasive surgery is still in an early phase of adoption. Evidence on short-term outcomes using this technique compared to open-procedures is limited and mainly consists of observational studies that used data from a single surgical centre. In the Second Annual Report, we reported unadjusted complication rates for open and minimally invasive techniques. In this report, we give a more in-depth analysis and provide adjusted odds-ratios as estimates of the relative risk of specific complications for resections performed using a minimally invasive approach compared to an open approach.

Table 7.3
Differences in median postoperative length of stay (days) for patients with and without various inpatient complications[1]

	Oesophagectomy			Gastrectomy		
Complication	**Patients**	**Median**	**IQR**	**Patients**	**Median**	**IQR**
None	1,472	13	10 – 16	1,066	11	11 – 15
Anastomotic leak	169	37	25 – 55	74	43	25 – 69
Any other complication	463	19	14 – 29	185	15	10 – 23

1 183 patients missing postoperative length of stay

Table 7.4
Rates of complications in patients who suffered an anastomotic leak with those that did not. The increased risk is described as an adjusted odds ratio[1]

Complication	% patients without leak	% patients with leak	Adjusted odds ratio	95% CI	P value
30-day mortality	3.7	9.1	2.82	1.59 – 5.01	<0.001
90-day mortality	5.5	15.0	3.51	2.31 – 5.35	<0.001
Re-operation	5.5	51.9	18.10	12.72 – 25.75	<0.001
Respiratory	9.6	24.4	2.85	2.11 – 3.88	<0.001
Cardiac	4.5	6.4	0.98	0.54 – 1.78	0.950
Wound infection	3.2	9.0	2.36	1.41 – 3.96	0.001

1 Odds ratio adjusted for age, sex, ASA grade, performance status, and number of co-morbidities

Complication rates for oesophagectomy by surgical approach are described in Table 7.5. In the Second Annual Report, we reported that patients undergoing a minimally invasive procedure had significantly fewer respiratory complications than an open oesophagectomy (10.2 v 19.7 per cent, p<0.001). The difference in the unadjusted rates has now decreased, and the adjusted odds ratio demonstrates that risk of respiratory complications is similar for the two surgical approaches. Only for anastomotic leak is there a statistically significant difference in the rates for the two approaches, being slightly higher among minimally invasive oesophagectomy. However, the slightly higher risk does not translate into worse 30-day or 90-day mortality, rate of reoperation, or other complication.

For patients undergoing gastrectomy, there were no statistically significant differences in complication rates between the open and minimally invasive approaches (Table 7.5).

These figures on the complication rates of open and minimally invasive surgical resections should be interpreted with caution. They represent a snapshot of performance at a time when the minimally invasive approach is being slowly introduced within England and Wales. Our figures suggest that minimally invasive surgical techniques should be introduced cautiously, with surgeons following the recent AUGIS recommendations [Hardwick et al 2008]. Minimally invasive surgery should only be undertaken in recognised cancer centres by surgical teams confident in the performance of the open equivalent of the proposed minimal access approach. It is important that teams monitor their outcomes prospectively.

Our findings should not be interpreted as comparative evaluation of the two techniques because the Audit lacked information on the details of the technique as well as surgeon training. Moreover, there would be greater standardisation of practice in an evaluation of the effectiveness of the two approaches. There is still a requirement for a full-evaluation of minimally invasive curative surgery for O-G cancer patients.

Table 7.5
Relationship between postoperative complications and surgical approach for curative surgical resection. The risk associated with surgical approach is described as an adjusted odds ratio[1]

Oesophagectomy

	Complication rate (%)				
Complication	**Open (n=1541)**	**Minimally invasive (n=659)**	**Adjusted odds ratio**	**95% CI**	**P value**
30-day mortality	4.1	3.2	0.81	0.44 – 1.46	0.48
90-day mortality	5.8	5.5	0.98	0.65 – 1.45	0.91
Re-operation	9.9	11.1	1.17	0.79 – 1.74	0.44
Anastomotic leak	7.4	10.5	1.55	1.11 – 2.18	0.01
Respiratory	13.8	10.8	0.85	0.56 – 1.30	0.45
Cardiac	5.9	3.6	0.68	0.36 – 1.29	0.24
Wound infection	4.5	2.4	0.55	0.29 – 1.06	0.08

Gastrectomy

	Complication rate (%)				
Complication	**Open (n=1226)**	**Minimally invasive (n=186)**	**Adjusted odds ratio**	**95% CI**	**P value**
30-day mortality	4.7	3.2	0.71	0.31 – 1.59	0.40
90-day mortality	7.0	5.9	0.86	0.43 – 1.72	0.67
Re-operation	7.3	7.7	1.23	0.60 – 2.51	0.57
Anastomotic leak	5.7	7.0	1.25	0.53 – 2.98	0.61
Respiratory	6.9	9.7	1.63	0.84 – 3.14	0.15
Cardiac	3.9	3.2	0.84	0.30 – 2.34	0.73
Wound infection	3.2	3.8	1.09	0.42 – 2.81	0.87

1 Odds ratio adjusted for age, sex, ASA grade, performance status, and number of co-morbidities

In chapter 6, it was noted that the proportion of procedures using a feeding jejunostomy varied between NHS trusts. Peri-operative enteral nutrition via a jejunostomy has been advocated in patients undergoing surgical resection because it may reduce peri-operative morbidity, particularly infective complications. However, evidence for its effectiveness is conflicting.

Table 7.6 compares the complication rates of patients who underwent a surgical resection by whether or not they had a feeding jejunostomy inserted. There was no difference in mortality rates, leak rates, cardiac complications or wound infections. However, among patients with a jejunostomy, the rates of respiratory infection and unplanned reoperation were higher.

These findings should be interpreted cautiously. The Audit did not have information on all the patient characteristics (such as nutritional status) that could influence the decision of whether or not to insert a jejunostomy. Consequently, the results may be influenced by residual confounding. Nonetheless, they flag an issue for further investigation.

7.3 Postoperative pathology results

The lymph node yield for oesophagectomies and gastrectomies is shown in Table 7.7. 96 per cent of oesophagectomies yielded at least 6 lymph nodes, the minimum number required for staging the disease according to the UICC staging system. For gastric cancer, at least 15 nodes are required, and the yield met or exceeded this threshold for 75 per cent of gastrectomies. Of those 718 gastrectomies where the recorded intention was to perform a D2 dissection (a more radical form of resection), 52 per cent achieved the recommended minimum lymph node yield of 25 nodes. The yield of lymph nodes in open and minimally invasive D2 gastrectomies did not differ by a statistically significant amount.

Guidelines recommend monitoring whether the resected tissue from curative O-G cancer operations has tumour free (R0) margins. This is particularly relevant for the longitudinal margins (proximal and distal) because these are to a large extent under the control of the surgeon and are less subject to differences in pathological interpretation. Patients are rarely cured if their resection specimen has tumour at the longitudinal margins. Assessment of the circumferential margin (CRM) is more difficult: false positive CRM results can occur if lymph nodes are removed from the resection specimen prior to fixation and surgeons are less able to influence the CRM result than they are the longitudinal margin.

Table 7.6
Relationship between postoperative complications and the insertion of a feeding jejunostomy during a surgical resection. The risk associated with a jejunostomy is described as an adjusted odds ratio[1]

	Complication rate (%)				
Complication	**no jejunostomy**	**with jejunostomy**	**Adjusted odds ratio**	**95% CI**	**P value**
30-day mortality	4.2	3.9	0.95	0.60 – 1.51	0.842
90-day mortality	6.3	6.0	0.97	0.66 – 1.42	0.860
Re-operation	6.4	11.7	1.79	1.32 – 2.43	<0.001
Anastomotic leak	6.4	8.3	1.19	0.85 – 1.67	0.310
Respiratory	6.3	15.1	2.44	1.74 – 3.43	<0.001
Cardiac	5.4	3.9	0.75	0.46 – 1.21	0.232
Wound infection	2.7	4.7	1.67	0.92 – 3.04	0.091

1 Odds ratio adjusted for age, sex, ASA grade, performance status, number of co-morbidities

Table 7.7
Proportion of procedures with a given nodal yield, by operative approach

Oesophagectomy

	Number of nodes examined				
Approach	**1 – 5**	**6 – 14**	**≥ 15**	**Total**	**Missing**
Open	4.5%	26.1%	69.4%	1,541	121
Minimally invasive	2.1%	18.8%	79.1%	659	42

Gastrectomy

	Number of nodes examined				
Approach	**1 – 14**	**15 – 24**	**≥ 25**	**Total**	**Missing**
Open	25.5%	30.8%	43.8%	1,226	170
Minimally invasive	25.7%	38.5%	35.8%	186	38

Around 1 in 15 patients have a positive longitudinal resection margin overall (Table 7.8). There was no statistically significant difference in margin positivity among the various types of procedure (2-phase, 3-phase, etc.). There were also no statistically significant differences between tumour types, tumour sites or histology in the rates of circumferential margin positivity.

7.4 Admission to critical care and outcomes

In this section, we report patterns of care and outcomes while patients were admitted to critical care. The results are derived from the Audit data linked to the data from the ICNARC Case Mix Programme dataset (CMPD). The CMPD contained 1,708 patients who had a curative resection. Out of the 87 NHS trusts who performed O-G resection surgery, 22 had no surgery records linked to CMPD records. The remaining 65 trusts (including 39 cancer centres) performed 3,144 procedures.

There were 1,250 CMPD records for 1,904 oesophagectomy procedures (65.7 per cent) and 458 CMPD records for 1,240 gastrectomy procedures (37 per cent). The median proportion of linked Audit-CMPD records within the NHS trusts was 88 per cent (IQR: 40 per cent to 98 per cent). There are various reasons for this variation: (1) some trusts did not participate in the Case Mix Programme for all or part of the Audit period; (2) some patients were not admitted to critical care postoperatively, and (3) the linkage algorithm may have not matched records from the same patient. However, there were no statistically significant differences in the proportion of resection records linked to the CMPD records among patients of different age, or sex, or known performance status. This suggests any selection bias in the following results is small but the results should nonetheless be treated with caution.

Table 7.8
Proportion of patients with positive resection margins after surgery

	Oesophagectomy (n = 1907), %	95% CI	Gastrectomy (n = 1140), %	95% CI
Positive overall longitudinal resection margin	6.4	5.3 to 7.6	8.9	7.4 to 10.8
Positive circumferential resection margin	29.0	26.9 to 31.2	NA	NA

The characteristics of patients on admission to critical care (ie, to Intensive Care Units or Intensive Care / High Dependency Units) and the treatment they received is summarised in Table 7.9. The proportion of patients admitted direct from theatre was 96 per cent for oesophagectomy and 90 per cent for gastrectomy.

As noted in chapter 6, patients undergoing a gastrectomy were slightly older and more frail on average than those undergoing an oesophagectomy. However, on admission to critical care, there was a broad range of illness severity as measured using the APACHE II Acute Physiology Score (APS). The mean APS for patients having an oesophagectomy or gastrectomy were similar (8.54 v 8.42, respectively) but, overall, patients undergoing an oesophagectomy received a higher level of treatment (eg, mechanical ventilation) and stayed in critical care for an extra day on average.

While admitted to critical care, 55 patients (3.2 per cent) died during their initial stay. Another 232 (13.6 per cent) were readmitted after being initially discharged. Neither critical care mortality nor readmission rate were associated with the type of procedure (Table 7.10).

The most common reasons for readmission were: respiratory complications (93 patients; 40 per cent of 232), and anastomotic leaks (38 patients; 16 per cent). Other reasons included: cardiac complications (15 patients; 6 per cent) and severe sepsis (7 patients; 3 per cent). This patient group had substantially worse APS on readmission (mean =11.82, SD = 5.71) compared to their score on first admission (mean=8.96, SD= 3.87). The proportion of readmitted patients who died during their stay was also higher (n=34; 14.7 per cent).

Table 7.9
Patient characteristics and treatment profile of patients admitted to critical care after a surgical resection

Patient characteristics		Oesophagectomy	Gastrectomy
No. of patients		1,250	458
Patient age (years)	Median	64	70
	IQR	58 to 71	63 to 76
Sex (% male)		78%	71%
Performance status:	0 or 1	94%	84%
ASA grade:	I or II	80%	69%
% Neoadjuvant chemotherapy:		74%	45%
APACHE II Acute Physiology Score			
Under 4		6%	9%
4, 5		14%	13%
6, 7		23%	21%
8, 9		22%	23%
10, 11		16%	16%
12 & over		19%	18%
Treatment		**Oesophagectomy**	**Gastrectomy**
Length of stay (days):	Median	4	3
	IQR	3 to 7	2 to 5
Basic cardiovascular support (days) : Median		3	3
Proportion of patients who received Mechanical ventilation during first 24 hours		40%	14%
Proportion of patients who received 1 or more days			
Advanced cardiovascular support		23%	11%
Basic respiratory support		63%	42%
Advanced respiratory support		50%	19%
Renal support		3%	4%

Table 7.10
Selected outcomes for patients admitted to critical care after a surgical resection. Rate given with 95% confidence interval

	Oesophagectomy		Gastrectomy	
	Rate (%)	95% CI	Rate (%)	95% CI
Critical care mortality during the initial admission	2.7	1.9 to 3.8	4.6	2.9 to 6.9
Readmission to critical care	13.2	11.4 to 15.2	14.6	11.5 to 18.2

8. Palliative treatment patterns and outcomes

8.1 Palliative non-surgical oncology

Among the 4,705 patients with planned palliative oncology, 3,889 patients (83 per cent) had a corresponding treatment record submitted. There were an additional 106 records of oncological treatment records for patients whose planned modality was surgery or endoscopic / radiological palliation.

Among these 3,995 patients, palliative chemotherapy was the most common course of treatment, with 2,450 patients receiving this treatment. There were 1,171 courses of palliative radiotherapy and 374 courses of palliative chemo-radiotherapy. The use of palliative non-surgical oncology therapy across the tumour groups is summarised in Table 8.1. The use of radiotherapy and chemo-radiotherapy as a palliative modality decreased as the tumour site descended the gastro-intestinal tract.

Patients undergoing palliative chemotherapy were younger on average than patients undergoing palliative radiotherapy, with a mean age of 65 years for palliative chemotherapy compared to 76 years for palliative radiotherapy.

The mean age of patients undergoing palliative chemo-radiotherapy was 66 years. These differences in average ages were the same across all five tumour groups.

Palliative radiotherapy was well tolerated by patients, with 92 per cent of them completing their prescribed treatment course (Table 8.2). Chemotherapy was tolerated much less well. 10 per cent of patients suffered acute chemotherapy toxicity and a further 7 per cent of patients chose not to complete the prescribed course. The likelihood of a patient completing their palliative chemotherapy was lower among patients of greater age at diagnosis and lower levels of fitness (performance status) (Table 8.3). It was not associated with the type of tumour or patient sex. There was no statistical association between the outcome of palliative radiotherapy and patient age at diagnosis, sex, tumour group or level of fitness.

A similar pattern of outcomes was observed among 374 patients undergoing palliative chemo-radiotherapy. 67 per cent of patients completed both courses of therapy. Among those that did not complete it, 8 per cent patients stopped chemotherapy because of disease progression and 14 per cent stopped chemotherapy because of acute chemotherapy toxicity.

Table 8.1
Treatment modalities for patients undergoing palliative oncological therapy

Modality	Oesoph. SCC	Oeso ACA Upper / Mid	Oeso ACA Lower / SI	GOJ SII / SIII	Stomach
Chemotherapy (%)	43%	46%	60%	74%	82%
Chemo-radiotherapy (%)	16%	12%	9%	6%	4%
Radiotherapy (%)	42%	41%	31%	21%	14%
Number of patients	**975**	**268**	**1388**	**477**	**887**

Table 8.2
Proportion of patients with a specific outcome after palliative oncological treatment

Treatment outcome	Chemotherapy	Radiotherapy
Treatment completed as prescribed	53.1%	92.1%
Patient died during treatment	13.9%	4.0%
Progressive disease during treatment	15.5%	1.3%
Acute chemo-/radio-therapy toxicity	10.0%	0.5%
Technical or organisational problems	0.2%	0.0%
Stopped due to patient choice	7.4%	2.0%
Number of patients	**2,450**	**1,171**
Missing values	677	183

Table 8.3
Proportion of patients who completed palliative chemotherapy, by age and performance status[1]

Age group (years)	Performance status		
	0	1	2 plus
Under 60	60%	59%	41%
60 to 70	61%	53%	26%
70 to 80	59%	50%	29%
80 plus	43%	38%	32%

1 Eastern Cooperative Oncology Group (ECOG) score for performance status in cancer patients. The table is based on the 1,772 patients with a known age and performance status

8.2 Endoscopic and radiological palliative therapy

Overall patterns of endoscopic / radiological palliative treatment

There were 2,782 patients who were recorded as having endoscopic / radiological palliative treatment (ERPT). Data were submitted by 141 NHS trusts (compared to data from 58 trusts in the Second Annual Report).

Overall, 87 per cent of patients had a stent insertion, the majority of which were for oesophageal or junctional tumours (Table 8.4). Very few ablative procedures such as laser or argon beam coagulation were recorded, and these were concentrated in particular networks (2 networks accounted for 70 per cent of the laser ablation procedures, while argon beam coagulation was performed in 16 networks).

There are few firm standards on the use of ERPT. One exception concerns the use of "dilatation alone" as a palliative treatment. The SIGN guideline [2006] recommends that this "should be avoided due to the transient nature of the symptom improvement it provides." (Recommendation 8.1). The 123 "dilatation" procedures were performed at 36 NHS trusts, with five NHS trusts accounting for 52 per cent of these procedures. Around one half of the 123 procedures were performed around the date of diagnosis. This suggests that the full extent of the cancer may not have been known at the time of the procedure.

The lack of brachytherapy is of concern because it has been shown to be superior to stenting in patients who survive more than 3 months [Homs et al 2004]. In the organisational audit [Palser et al 2008], 16 networks stated that brachytherapy was available to their patients but only six networks have recorded its use in the prospective study (Networks N03, N13, N26, N30, N36 and North Wales). In the second report, we requested NHS trusts to ensure their data on this item was complete. The fact that we observe no increase in the reported use of brachytherapy suggests that the availability of this treatment modality is limited and variable across networks.

Table 8.4
Number of endoscopic palliative therapeutic procedures, by tumour type

Procedure Type	Oesoph. SCC	Oeso ACA Upper / Mid	Oeso ACA Lower / SI	GOJ SII / SIII	Stomach	Total
Stent insertion	732	213	1008	208	253	**2414**
Laser ablation	6	*	19	*	5	**37**
Argon beam coagulation	6	*	19	*	18	**49**
Photodynamic Therapy	*	*	*	*	*	**2**
Brachytherapy	19	*	34	*	*	**61**
Dilatation alone	39	11	50	9	14	**123**
Gastrostomy	11	*	5	*	*	**22**
Other	24	*	26	*	35	**100**

* omitted to prevent potential patient identification due to small numbers.

Table 8.5
Characteristics of stent procedures and rate of successful placement

	Oesoph. SCC	Oeso ACA Upper / Mid	Oeso ACA Lower / SI	GOJ SII / SIII	Stomach
Anaesthetic used (%)					
Sedation alone	54.5	50.3	55.3	57.8	55.5
Local anaesthetic (LA) spray	5.0	5.1	5.9	4.0	2.6
Sedation & LA combined	37.5	42.4	35.8	35.8	36.6
General anaesthetic	3.0	2.3	2.9	2.3	5.2
Operator grade (%)					
Consultant	83.2	82.1	86.0	81.2	90.8
Registrar	8.0	8.5	7.8	8.9	5.7
Other	8.8	9.5	6.2	9.9	3.5
Stent type (%)					
Plastic	3.6	2.2	3.2	2.3	4.0
Metal: covered	81.7	84.1	81.5	76.9	64.6
Metal: uncovered	8.4	8.2	9.7	15.0	24.7
Metal: anti-reflux	6.2	5.5	5.6	5.8	6.6
Method of stent placement (%)					
Floroscopic control alone	37.1	36.7	34.0	28.0	41.4
Endoscopic control alone	29.5	27.9	31.8	35.7	22.5
Endoscopy and floroscopy	33.4	35.4	34.2	36.3	36.1
Stent deployed successfully (%)	**98.2**	**97.3**	**97.9**	**97.8**	**97.2**

Stent procedure details

The details of the stent procedures are shown in Table 8.5. Many of the patients undergoing stent insertion were old and frail. Their median age was 77 years and 55 per cent had a performance status of 2 or more (full self-care but unable to carry out any work). 72 per cent of patients had a dysphagia score of 3 or 4 (liquid diet only / complete dysphagia) at the time of the procedure.

Most procedures were performed by consultants or registrars, which is consistent with a recommendation in the National Confidential Enquiry into Perioperative Outcomes and Death (NCEPOD) report "Scoping Our Practice" [NCEPOD 2004]. 80 per cent of the stents inserted were covered metal stents, although uncovered stents were comparatively more frequently used for patients with stomach cancer. Plastic and anti-reflux stents were used infrequently.

There was a very high success rate for stent deployment (97.8 per cent), which did not differ significantly across the various tumour sites. The technical success of stent deployment was unrelated to method of stent placement, anaesthetic technique, or grade of operator.

NHS trusts were asked to record complications within 3 months of the first stent procedure. A complication was defined as "a development of clinical significance that requires intervention (ie, alteration in the patient's management plan)." 246 patients had one or more complications reported, giving an overall complication rate of 10.2 per cent (95 per cent CI 9.0 to 11.5). Stent migration and bolus obstruction were the most common types of complication that occurred (Table 8.6). In addition, 158 patients had an additional unplanned stent procedure within 3 months of the first procedure; 99 of these patients had experienced a complication (typically, stent migration or tumour overgrowth). These results are similar to previous outcomes reported by the Registry of Oesophageal Stenting (ROST) [BSIR 2004]. It found an early complication rate of 14 per cent based on 442 patients from 17 centres in a two-year period ending in December 2003.

In the Second Annual Report, we noted variation in the use of anaesthesia among NHS trusts who supplied information on the anaesthetic used during stent insertions. For this report, there was anaesthetic information from a greater number of NHS trusts but we restricted our analysis to 67 NHS trusts who had at least 10 procedures with anaesthetic information (1,677 of 1,889 procedures).

Variation in practice patterns was again observed. Among the 67 trusts, 31 NHS trusts (46 per cent) used combined sedation / LA spray in less than 20 per cent of patients, whereas 15 NHS trusts (22 per cent) used this combination in more than 80 per cent of cases. It was possible that the use of combined sedation / LA spray was influenced by patient characteristics. However, using multiple logistic regression, we found no association between the use of combined sedation / LA spray and patient age at diagnosis, sex, tumour type, performance status, or dysphagia score. This suggests that the observed variation between NHS trusts is due to differences in practice rather than the characteristics of the patients.

Variation in anaesthetic practice is a concern because the NCEPOD report "Scoping our practice" [NCEPOD 2004] noted that "combined sedation with oropharyngeal local anaesthetic might have contributed to aspiration pneumonia in some patients", and advised caution. There was a slight difference in the proportion of patients who experienced a post-stent complication between procedures performed with "sedation alone" and with combined sedation / LA spray, respectively 10.9 per cent and 14.6 per cent (chi-square test, P=0.02). However, the increased risk associated with combined sedation / LA spray was not statistically significant after adjusting for patient age, sex and dysphagia score (adjusted odds ratio = 1.38; 95 per cent CI 0.87 to 2.19, P=0.177).

Table 8.6
Complications within 3 months of a stent procedure among O-G cancer patients with a palliative treatment intent

Type of complication	Frequency	Rate (%)	95% CI
Perforation or haemorrhage	9	0.4	0.2 to 0.7
Stent migration	85	3.5	2.8 to 4.3
Tumour overgrowth	73	3.0	2.4 to 3.8
Bolus obstruction	36	1.5	1.0 to 2.1
Other unspecified complication	33	1.4	0.9 to 1.9
Death in hospital	45	1.9	1.4 to 2.5
Number of patients	2,414		

Overall, there was no dominant approach used to guide stent placement, with a similar proportion of procedures using endoscopy alone, fluoroscopy alone and a combination of the two (Table 8.5). The BSG guidelines recommend that radiographic screening is helpful when the stricture is tortuous or complex or associated with a large hiatus hernia or diverticula, and when difficulty is encountered passing the guidewire [Riley et al 2004]. In addition, the NCEPOD "Scoping Our Practice" report [2004] concluded that "X-ray control was thought to be highly desirable for placement of a tubal prosthesis, and that not to use it is unwise".

However, there is a lack of firm standards on the method of stent placement. Perhaps because of this, we observed significant variation between NHS trusts in the method used to monitor stent placement. In the 63 NHS trusts that submitted data on the stent placement method for at least 10 procedures:

- 15 Trusts (24 per cent) used both endoscopic and radiologic control in more than 80 per cent of cases
- 11 Trusts (17 per cent) used radiologic control in more than 80 per cent of cases
- 10 Trusts (16 per cent) used only endoscopic control in over 80 per cent of cases.

The remaining 27 (43 per cent) trusts did not exhibit a strong preference for one type of approach.

Using multiple logistic regression, we found no association between the use of both endoscopic and radiologic control and patient age at diagnosis, sex, tumour type, performance status, or dysphagia score. Again, this suggests that the observed variation between trusts is due to differences in practice rather than patient characteristics.

There was no association between the proportion of patients who experienced a post-stent complication and the method of stent placement.

Although survival rates for palliative patients are often low, it is worth noting that 1 in 25 patients died within a week of the procedure, while 1 in 12 died within a fortnight (Table 8.7). While prognosis is difficult to judge, the benefit of the stent for these patients would have been minimal and suggests some patients who underwent this procedure were unsuitable for this mode of therapy.

Table 8.7
Short-term mortality following palliative stent insertion in 2,414 patients

Time after stent insertion	Mortality (%)	95% CI
7 days	4.1	3.3 – 4.9
14 days	8.2	7.1 – 9.3
30 days	18.6	17.0 – 20.2

9. NHS trust inpatient complication rates among curative patients

9.1 Reporting complication rates by organisations

In this chapter, we report organisational-level outcome indicators for patients with O-G cancer. The analysis focuses on short-term outcomes following a surgical resection, and we report postoperative mortality at 30- and 90-days, rates of unplanned reoperation and anastomotic leak rates. Mortality rates are derived using the ONS date of death. Rates of unplanned reoperation and anastomotic leak are derived from the complication data submitted by NHS trusts.

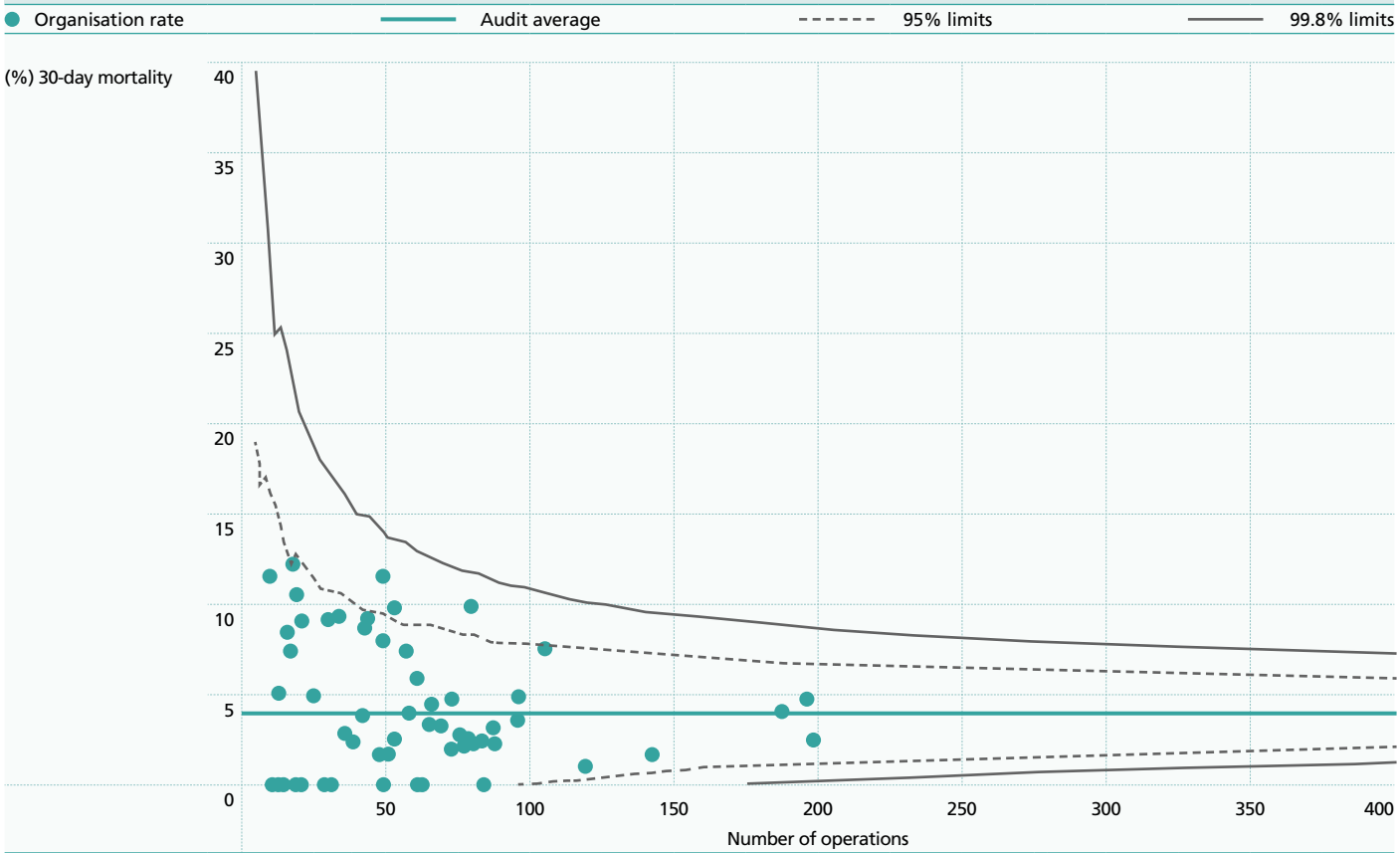
NHS trusts that perform curative surgery for O-G cancer may differ in their rates of postoperative complications for a number of reasons. Variation can arise from:

1. the influence of random fluctuations
2. differences in the completeness of the data submitted
3. differences in the interpretation of the data item by hospitals
4. differences in the mix of patients seen at hospitals
5. differences in the clinical protocols adopted by hospitals
6. differences in the quality of care provided.

Conclusions about quality of care can only be reasonably drawn from the comparison of postoperative complication rates after differences due to factors (1) to (5) are excluded. Some of these factors were addressed directly during the analysis of the Audit data. First, funnel plots identified how much of the difference would be expected from random fluctuations. Second, NHS trusts were excluded from the analysis if their case-ascertainment was low or their complication data was insufficiently complete. Third, the NHS trust figures were adjusted to take account of patients' morbidity and treatment history and so remove any variation due to differences in their patient population. Finally, we contacted NHS trusts identified as having higher than expected rates. Organisations had two weeks to respond in writing if they wanted to provide an explanation.

Despite this, the published complication rates can only be interpreted as markers for further investigation and should not be treated as direct indicators of surgical performance. If an NHS trust has an unexpectedly high rate of complications, this might be due to issues of data quality or differences in local clinical protocols rather than differences in the quality of care delivered. For example, a high intervention rate may reflect different monitoring protocols or a lower threshold for preventive action. Consequently, we caution against the over-interpretation of outliers. It is the responsibility of local organisations to examine the causes of their complication rates and ensure patient care is of high quality.

Figure 9.1
Risk-adjusted 30-day mortality after surgical resection for English and Welsh NHS trusts



9.2 Organisation-level complication rates

Complication rates were calculated for NHS trusts who submitted records that described surgical resection procedures. The rates were adjusted for differences in patient characteristics and individual risk models were developed for each outcome.

Low levels of case-ascertainment increases the potential risk of selection bias. To minimise this risk, we excluded five NHS trusts with low estimated case-ascertainment for their surgical resections (less than 50 per cent). These organisations are listed in appendix 5 and include four cancer centres. One other NHS trust was excluded from the analysis when it became clear that its mortality and complication rates were biased due to incomplete information about the patient characteristics and the surgical care received.

A number of NHS trusts (all local cancer units) also reported performing few curative resections. In these cases, the discriminatory power of the funnel plot to determine whether a difference in complication rates is due to factors other than random variation is greatly reduced. We excluded 26 NHS trusts who performed fewer than 10 resection procedures because the estimated rates would not be sufficiently robust (high statistical uncertainty). These organisations participated fully in the Audit and were only excluded from the comparative analyses to ensure adequate precision.

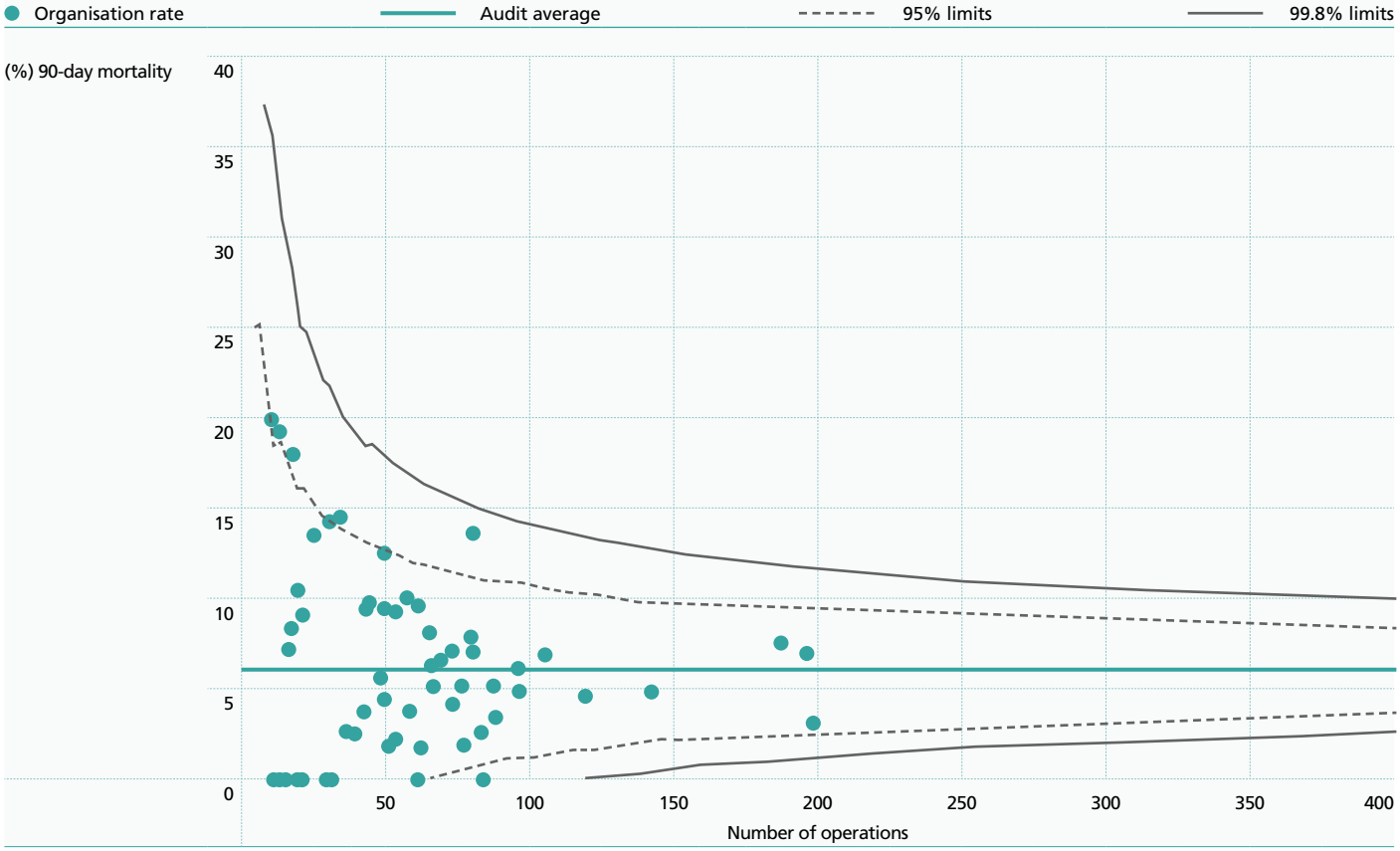
Overall, 57 of the 88 NHS trusts who submitted surgical resections were included in the comparative analysis of postoperative mortality, and anastomotic leak rates.

One further quality criterion was included for the unplanned reoperation complication rate. NHS trusts were also excluded from the analysis if the data on unplanned reoperations were missing in more than 15 per cent of the patients. This resulted in a further 13 NHS trusts being excluded, six of whom provided no data on unplanned reoperations.

30-day and 90-day postoperative mortality

For the organisations included in this analysis, overall 30-day and 90-day mortality was 4.0 per cent and 6.1 per cent respectively. Based on the unadjusted complication rates, there was one organisation that had values above the outer 99.8 per cent control limit, although it did not exceed the outer control limit for 90-day mortality. Adjusting for patient characteristics resulted in the NHS trust moving back within the control limits (Figure 9.1 and 9.2).

Figure 9.2
Risk-adjusted 90-day mortality after surgical resection for English and Welsh NHS trusts



Rates of unplanned reoperation

Return to theatre following a surgical resection is a common proxy indicator for a significant postoperative complication. For the organisations included in this analysis, the overall rate of unplanned return to theatre was 8.9 per cent.

The unadjusted complication rates fell within the control limits with the exception of three NHS trusts. One of these trusts reported no reoperations. The risk-adjustment model brought one of the high outliers within the outer control limits. After reviewing their data, the other high outlier trust reported that some of the reoperations related to the erroneous inclusion of diagnostic endoscopic procedures, which were not included in the definition of this complication. Correcting these errors meant that the rate of unplanned reoperation for the NHS trust fell within the expected range (Figure 9.3).

Rates of postoperative anastomotic leak

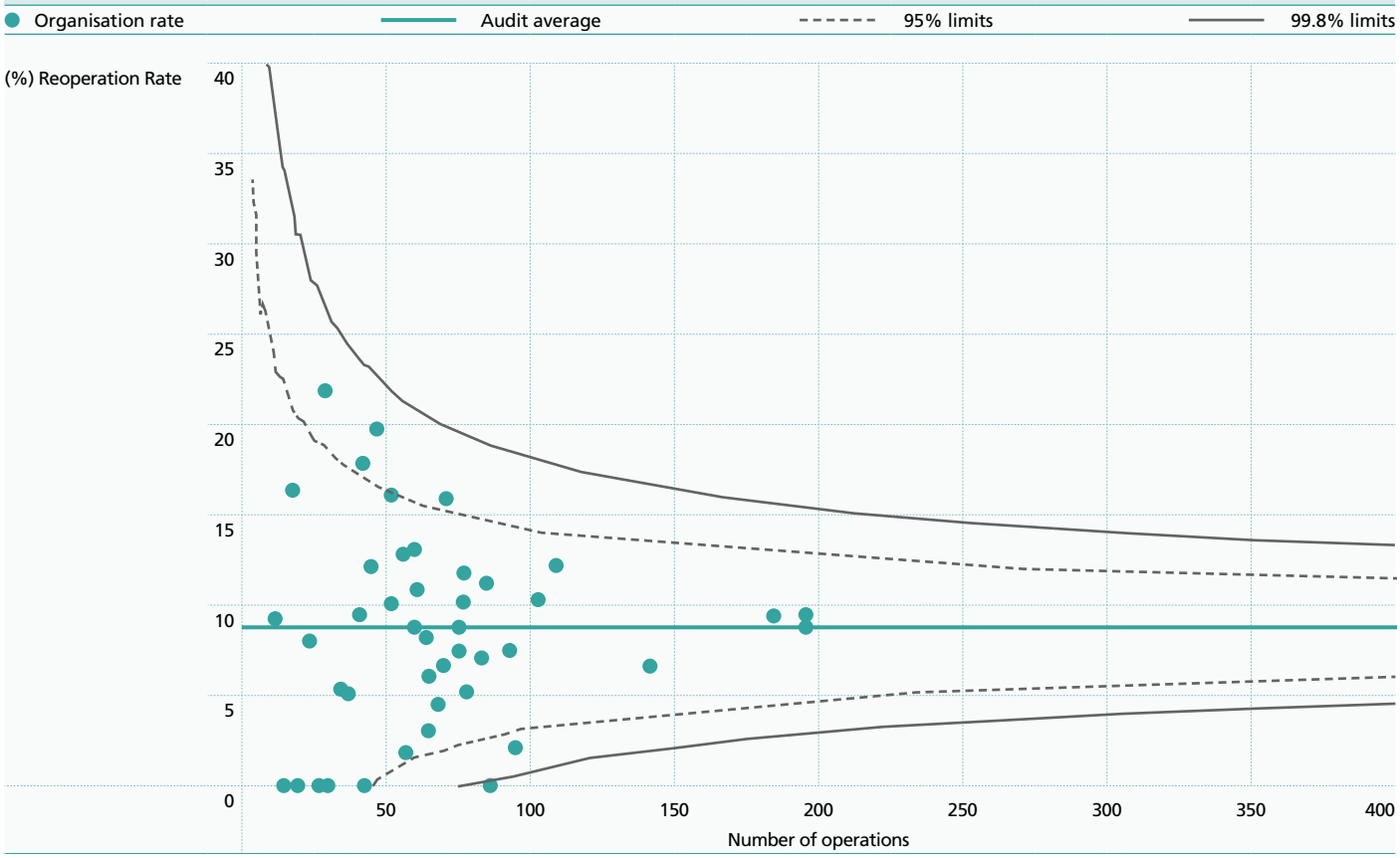
An anastomotic leak after a curative resection is a serious postoperative complication, that is associated with an increased risk of mortality and other complications (see chapter 7). For the organisations included in this analysis, the overall rate of anastomotic leak was 7.5 per cent.

All but one of unadjusted anastomotic leak rates fell within the control limits. The risk-adjustment model brought this NHS trust within the control limits. No NHS trust had unexpectedly high or low adjusted anastomotic leak rates.

9.3 Interpretation of trust-level findings

As noted earlier, NHS trusts that perform curative surgery for O-G cancer may differ in their rates of postoperative complications for a number of reasons, and these need to be taken into account before reaching conclusions about the quality of care.

Figure 9.3
Risk-adjusted rates of unplanned reoperation for English and Welsh NHS trusts



An important issue is the influence of random variation. Presenting the data using funnel plots reduces the risk of an NHS trust being identified as an outlier when the complication rate differs because of random fluctuations alone. If this was the only cause of the differences, the probability of being outside the upper limit is 1 in 1000.

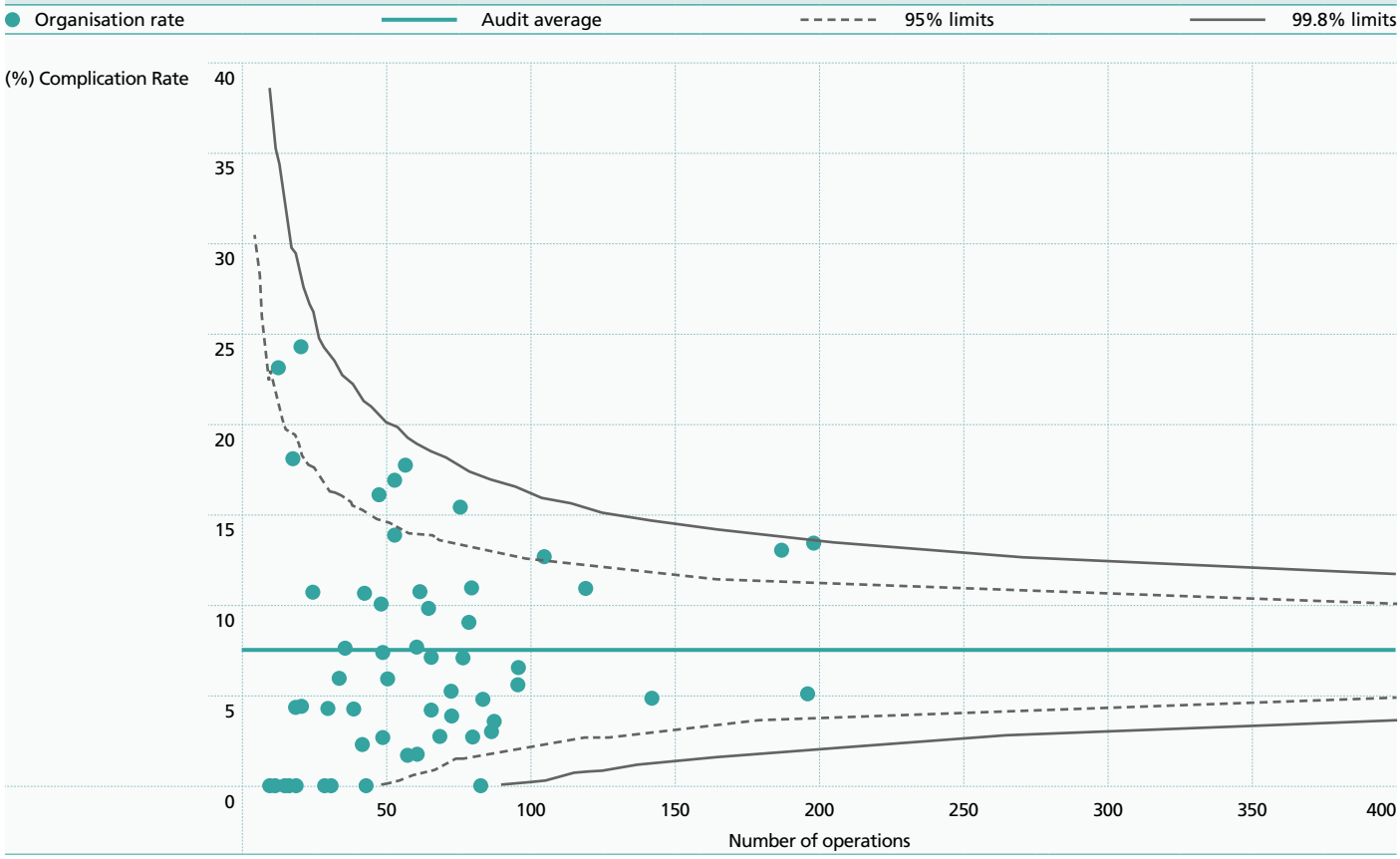
It is possible that some of the variation may reflect selection bias. However, we have reduced the risk of this by excluding units with low ascertainment (under 50 per cent) and by excluding organisations with incomplete data. This means that the influence of any bias is probably small in comparison to the observed differences in NHS trust rates.

Another potential cause of differences between organisations is that they treat different populations of patients, and undertake different procedures. Risk adjustment reduced the variation between NHS trusts on each of the four outcome measures, and this demonstrates the importance of presenting risk-adjusted rather than crude rates. We adjusted the rates for various patient characteristics including age, sex, tumour site, pre-treatment stage, co-morbidities, ASA grade and prior neoadjuvant therapy. However, we note that the risk-adjustment models had only moderate levels of discrimination, with c-statistics ranging from 0.59 to 0.69. It is possible that some differences could still be due to residual confounding.

We acknowledge that different thresholds for intervention may have affected the measures used in this analysis. For example, for unplanned reoperation, there may be differences between surgical teams in deciding when to take a patient back to theatre. It was not possible to account for these differences in clinical practice and protocols. However, their effects seem to be small given that the majority of the observed variation in adjusted rates falls within the range expected from random fluctuations alone.

In summary, NHS trusts had complication rates that were within the expected range of values, after taking account of random variation and patient characteristics. This is re-assuring. However, it is disappointing that the analysis could not include the data on all NHS trusts performing curative surgery. It is important that clinicians and management teams take this opportunity to review and further audit their practice to ensure that there are no systematic deficiencies in the surgical care provided.

Figure 9.4
Risk-adjusted anastomotic leak rates after surgical resection for English and Welsh NHS trusts



10. Patient survival after diagnosis

The prognosis for most patients diagnosed with O-G cancer is poor, predominantly because patients present with advanced disease. Estimates of relative survival for patients with oesophago-gastric cancer are published by the Office for National Statistics, and are based on cancer registrations to ensure there is minimal selection bias. The most recent figures (for patients diagnosed between 2001 and 2006) show that, while the relative survival for oesophago-gastric patients has increased in the last decade, the 5-year survival of patients with oesophageal and gastric cancer is 10 per cent and 15 per cent respectively [ONS 2010].

Only patients with localised disease and a reasonable level of fitness are suitable for treatment with curative intent. Consequently, survival among patients with O-G cancer is strongly associated with treatment intent. In this chapter, we provide descriptive estimates of survival based on treatment intent, as this is not available from national statistics, but is of relevance to patients. However, while the case-ascertainment for the Audit is high, at over 70 per cent, it is likely that there is selection bias due to incomplete coverage. Caution is therefore needed in the interpretation of these survival times. In particular, patients with palliative intent who have palliative oncology are less frail than those who do not, and so differences in survival reflect both the patient characteristics and the effect of treatment.

Survival from the time of diagnosis was calculated using Kaplan-Meier estimates and did not take account of background mortality. The analysis excluded 64 patients for having a date of death prior to, or the same as, the date of diagnosis.

Figures 10.1 and 10.2 show Kaplan-Meier survival curves by treatment intent for oesophageal / junctional tumours and stomach tumours, respectively. 1-year survival is summarised in

Figure 10.1
Patient survival stratified by treatment intent: curative, palliative oncology, palliative surgery or ERPT, and palliative best supporting care (BSC). Type of tumour is defined using pre-treatment site. Numbers in brackets give sample size

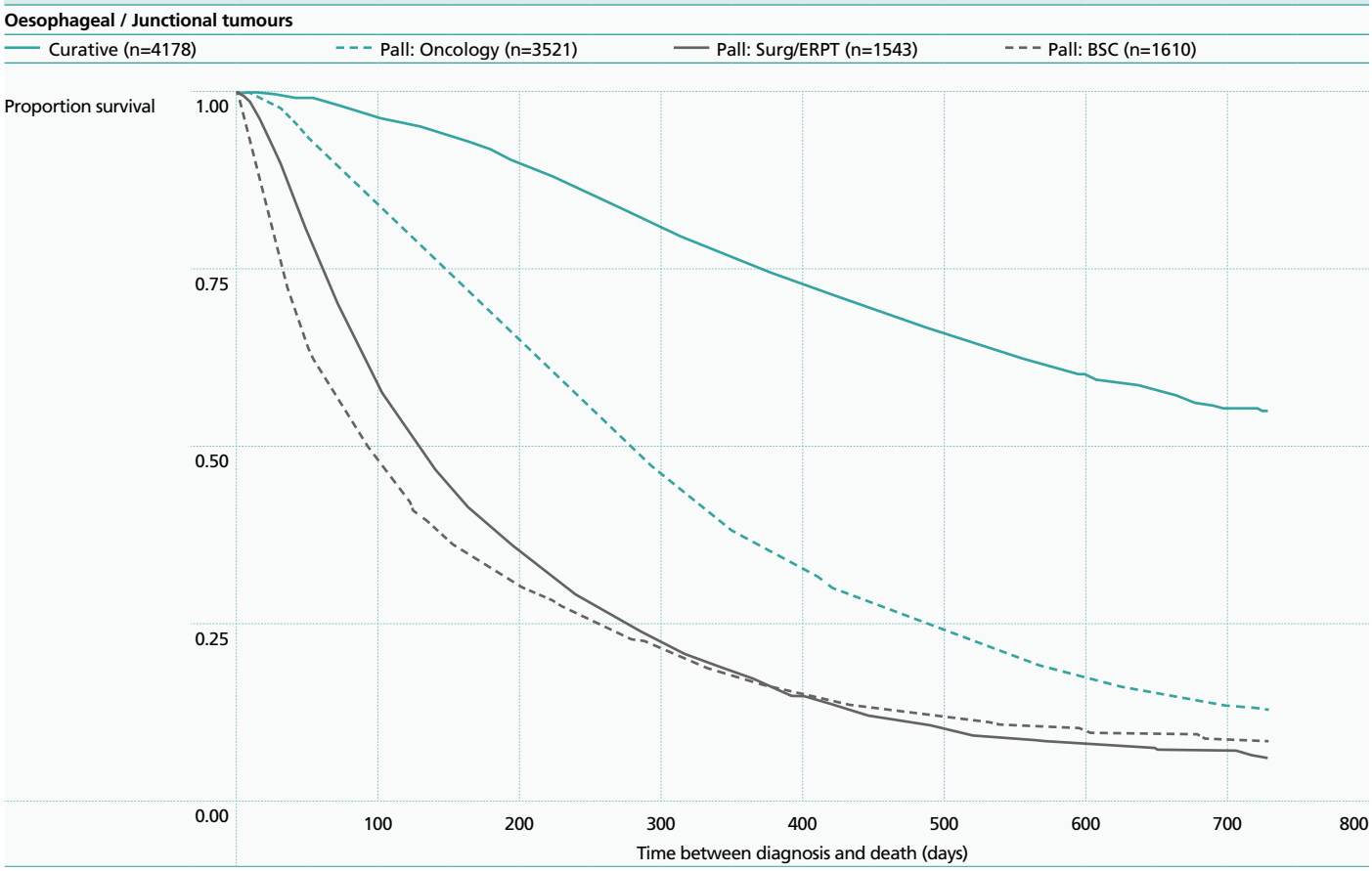


Table 10.1. Both demonstrate the clear difference between patients whose treatment intent is curative or palliative, and between patients whose planned palliative modality is either palliative oncology or another modality.

The survival curve of patients whose treatment intent is missing (not shown in Figures 10.1 and 10.2) lies within the curves of the different palliative modalities and suggests that the majority of these patients had a palliative treatment intent.

Figure 10.2
Patient survival stratified by treatment intent: curative, palliative oncology, palliative surgery or ERPT, and palliative best supporting care (BSC). Type of tumour is defined using pre-treatment site. Numbers in brackets give sample size

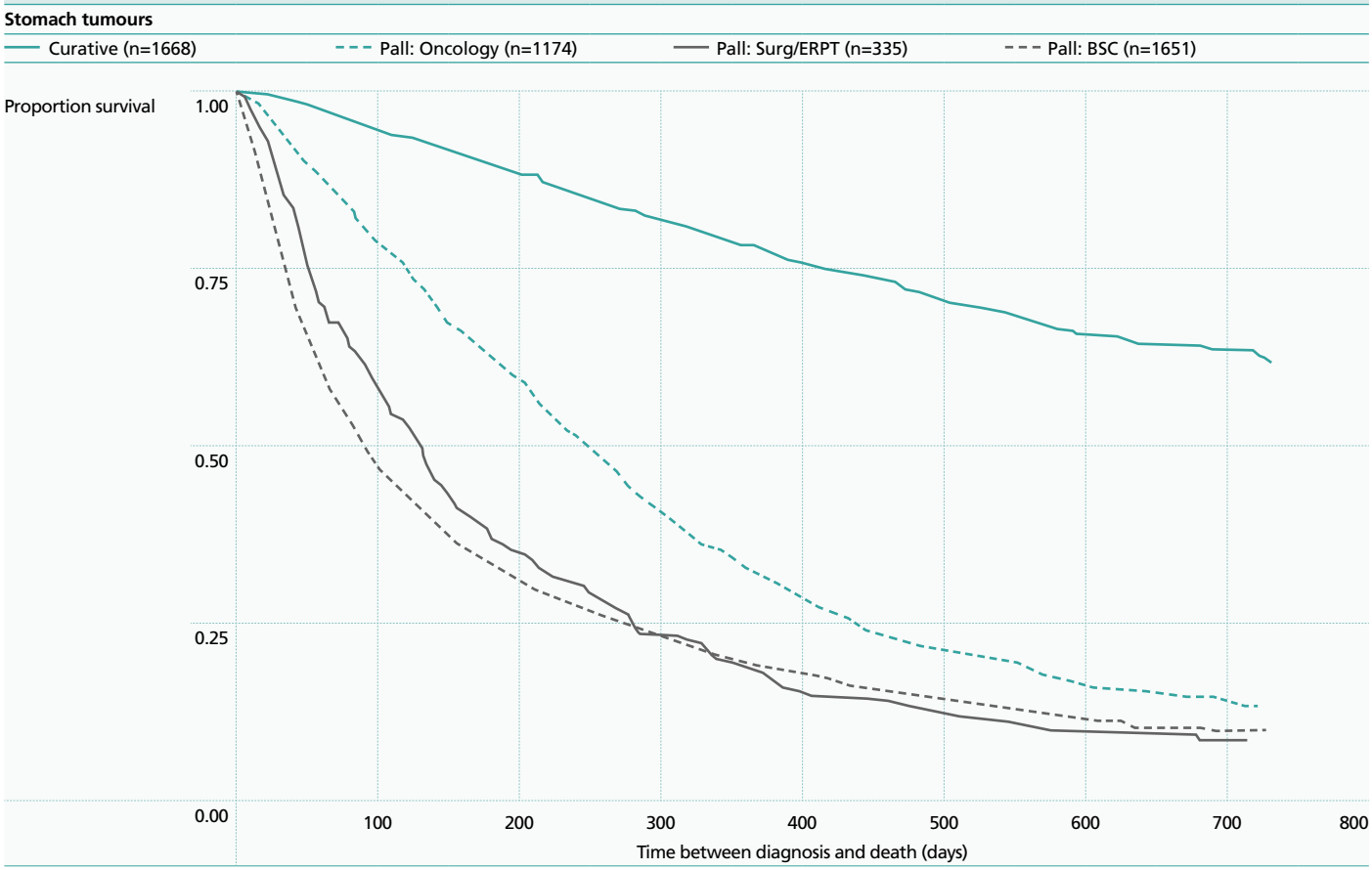


Table 10.1
Proportion of patients estimated to survive 1-year from diagnosis by planned treatment intent and selected modality

Planned treatment intent / modality	Oesophageal / Junctional tumour		Stomach tumour	
	% Survived	95% CI	%Survived	95% CI
Curative intent	76.1	74.5 – 77.3	78.0	76.9 – 79.9
Palliative oncology	36.4	34.8 – 38.1	32.2	29.5 – 35.1
Palliative surgery or ERPT	17.1	15.2 – 19.1	18.5	14.4 – 23.0
Palliative: Best supporting care	16.7	14.8 – 18.7	19.3	17.4 – 21.3

11. Patient-reported outcomes

11.1 Introduction

An increasing number of research studies on the effectiveness of treatments for oesophago-gastric cancer have included patient-reported outcome measures. This reflects a greater emphasis on evaluating how a therapy affects a person's quality of life as well as their survival. This is important among O-G cancer patients because treatments such as curative surgical resection may adversely affect a patient's quality of life in the months immediately after surgery.

The NHS Executive recommended in its "Improving Outcomes Guidance" for oesophago-gastric (O-G) cancer [DH 2001] that the quality of life of patients should be audited as an outcome measure, in addition to survival and morbidity. However, while being included into research studies, the routine measurement of patient quality of life has not been widely implemented in England and Wales. This is the first national audit of oesophago-gastric cancer to include patient reported outcomes.

As described earlier, our aim was to describe the quality of life (QoL) in a sample of O-G cancer patients who live in England and Wales. Specific objectives were to describe QoL after diagnosis of O-G cancer, and the change in QoL at 3 months after the start of treatment for patients with palliative intent, and 6 months after curative surgery or definitive oncological treatment in patients with curative intent. By collecting this information, the Audit primarily aimed to provide data that can be incorporated into patient information, so that patients can better understand the consequences of their illness and the effects of treatment.

Fifteen cancer centres volunteered for the QoL. Four centres withdrew fairly quickly because they lost their clinical nurse specialist (CNS) or were short-staffed. Lack of CNS capacity at four other centres resulted in them participating for less than 3 months; each returned fewer than 5 baseline questionnaires.

Among the patients with tumour details, 218 baseline quality of life questionnaires were returned. 204 of these were from the 11 cancer centres; the remaining 14 were from the three associated cancer units. Overall, 22 per cent of patients with tumour records in these NHS trusts had baseline QoL measurements. There was a higher proportion of baseline measurements among patients with curative intent compared to both types of palliative intent but case-ascertainment varied between cancer centres (Table 11.1).

Apart from planned intent, there were two other patient characteristics associated with whether or not a patient had a baseline QoL measurement. The proportion of patients with a QoL measurement was lower among older patients and those with worse performance status but these differences were only statistically significant among palliative patients. The proportion of patients with a QoL measurement was not associated with sex, pre-treatment stage, tumour group or number of co-morbidities.

The proportion of the patients who were able to complete a follow-up questionnaire was low; only 37 were returned. The reasons for this are described in section 11.3. We therefore concentrate on the baseline quality of life reported by patients.

Table 11.1
Number of baseline QoL questionnaires returned by seven cancer centres who participated for at least 3 months

Participating NHS trusts	Months active	Patients diagnosed in active period	No. of baseline QoL forms	% of cases with tumour records		
				Curative	Palliative: anti-cancer	Palliative: supportive
United Bristol Healthcare NHS Trust	6	60	25	48%	42%	50%
Cambridge University Hospitals NHS Foundation Trust	11	161	39	41%	17%	7%
Sheffield Teaching Hospitals NHS Foundation Trust	10	168	33	34%	14%	0%
Norfolk and Norwich University Hospital NHS Trust	3	39	13	44%	38%	0%
University Hospital Birmingham NHS Foundation Trust	10	146	19	12%	10%	21%
The Newcastle Upon Tyne Hospitals NHS Trust	10	193	40	21%	24%	10%
South Tees Hospitals NHS Trust	6	81	25	39%	22%	20%
All NHS trusts[1]	n/a	980	218	28%	21%	9%

1 Other participating NHS trusts: Royal Surrey County Hospital NHS Trust, Nottingham University Hospitals NHS Trust, South Manchester University Hospitals NHS Trust, Heart of England NHS Foundation Trust, The Queen Elizabeth Hospital King's Lynn NHS Trust, James Paget University Hospitals NHS Foundation Trust, Sandwell and West Birmingham Hospitals NHS Trust.

11.2 Quality of life among O-G cancer patients at the time of diagnosis

Table 11.2 describes the quality of life and general symptoms experienced by patients with curative and palliative intent, as represented by the mean scores from the QLQ-C30 questionnaire. The analysis excluded 14 patients because they either did not complete the full questionnaire (n=9) or were missing treatment intent (n=5).

Compared to patients with curative intent, patients with palliative intent reported worse global quality of life by a clinically important amount (10 points). The difference in physical function was also close to being a clinically relevant difference. Palliative patients reported more severe symptoms of fatigue, nausea and vomiting, dyspnoea and appetite loss. These differences partly reflect the characteristics among the patients within these two groups as well as being associated with treatment intent. In general, there were no differences between men and women, with the exception that, on average, women reported higher levels of nausea and vomiting, and financial concerns.

On the global quality of life scale, mean scores tended to be worse among younger patients and among the more frail. These relationships did not explain the differences between curative and palliative patients. Mean scores for physical and role function were also worse among the more frail, and this accounted for much of the difference observed between the two patient groups.

Mean scores for physical and role function did not differ across age groups. However, younger patients reported worse mean scores for emotional and social function. Younger patients also tended to report worse (higher) symptom scores for the symptom scales and items, with the exception of dyspnoea, constipation and diarrhoea. Apart from nausea and vomiting, the mean scores on the symptom scales were not associated with performance status.

The differences in the patient characteristics of the curative and palliative patient groups accounted for the observed differences in the mean scores on the fatigue and nausea & vomiting scale, but not the dyspnoea or appetite loss items.`

Table 11.3 describes the mean scores for the O-G cancer specific symptoms experienced by patients with curative and palliative intent. The analysis excluded 8 patients because they either did not fully complete the QLQ-OG25 questionnaire (n=3) or were missing treatment intent (n=5).

As before, there was a general tendency for patients with a palliative intent to have worse quality of life than patients with curative intent. For both patient groups, anxiety was the worst symptom score, and was the one scale on which curative patients have a higher average score. Levels of anxiety were greater among younger patients but this did not explain the differences between the two patient groups.

The mean scores for eating restriction were the second highest among the specific symptoms and there was a clinically important difference between the groups. As with anxiety, symptoms were greater among younger patients but this did not explain the differences between the two patient groups. Younger patients also tended to report higher mean scores for dysphagia, odynophagia, and pain and discomfort.

Among the single symptom items, clinically important differences between the two patient groups were eating with others, dry mouth, and trouble with taste. None of the

Table 11.2
Mean (95% CI) scores for general quality of life and symptoms (QLQ-C30) among curative and palliative patients

	Curative (n=123)		Palliative (n=81)		Difference
	Mean	95% CI	Mean	95% CI	
Global Quality of Life *	67	63 - 71	55	50 - 60	-12
Functioning scales *					
Physical	86	83 - 89	77	71 - 82	-9
Role	80	75 - 85	75	68 - 82	-5
Emotional	66	61 - 70	67	62 - 73	2
Cognitive	80	76 - 84	78	72 - 84	-2
Social	78	74 - 83	76	70 - 83	-2
Symptom scales **					
Fatigue	28	23 - 32	37	31 - 43	10
Nausia & vomiting	14	10 - 18	23	17 - 29	10
Pain	19	14 - 24	24	17 - 30	4
Symptom items **					
Dyspnoea	14	9 - 18	25	19 - 32	12
Insommnia	31	25 - 37	30	23 - 38	0
Appetite loss	27	22 - 33	45	38 - 53	18
Constipation	21	16 - 26	27	20 - 34	6
Diarrhoea	8	5 - 12	9	5 - 14	1
Financial	16	10 - 21	16	10 - 22	0

* scores range from 0 to 100. Higher scores represent better quality of life or function
** scores range from 0 to 100. Higher scores represent more severe symptoms

mean scores on these items was associated with age and only weight loss was associated with performance status. More frail patients reported higher mean scores on the item weight loss. There were no statistically significant differences between men and women on any OG25 scale or item.

11.3 Lessons for incorporating PROMS into a national audit of O-G cancer care

Various research studies of O-G cancer care have incorporated measures of quality of life. Most studies have been conducted at a single hospital; the only previous population-based studies have been undertaken in Sweden [Viklund et al 2006]. How these studies have administered the quality of life questionnaires has been varied:

- some have been restricted to patients with oesophageal cancer, while others included both oesophageal and stomach cancers
- some have restricted the study to patients undergoing curative treatment, while others have included all patients
- the number and timing of measurements has been diverse: single measurement prior to treatment, or a single measurement at 6 month after surgery, or a sequence of measurements from baseline to 12 months.

Blazeby et al [2003] had earlier examined the feasibility of introducing EORTC QoL questionnaires using a nurse-led administration. She noted that 128 of 140 patients completed a baseline QoL assessments and follow-up completion was good with 114 patients completing all but one of the expected assessments. However, 49 per cent of palliative patients and 18 per cent of curative patients required a lot of help to complete the baseline questionnaires. Moreover, patients who had required help continued to receive this during the follow-up assessments. While we followed this nurse-based approach, we were not able to provide resources to local trusts that enabled this level of patient help.

We asked the Clinical Nurse Specialists at the volunteer centres to participate in a qualitative study on the feasibility of administrating QoL questionnaires during the Audit. The study consisted of a semi-structured interview in which the CNS were asked about their experience of enrolling patients, their experience of administering the baseline questionnaire, and their approach to keeping track of enrolled patients and distributing follow-up questionnaires. Six clinical nurse specialists were interviewed.

Local or central administration

Clinical nurse specialists were viewed as the best person to distribute QoL questionnaires. It was considered important for this patient group that the request to participate was from someone the patient knew and that the questionnaire was also distributed locally. As patients could deteriorate quickly, it was important to know if it was appropriate to give a patient a questionnaire.

Central administration was not seen as feasible. It was suggested that the Audit could help hospitals with reminders for follow-up but this would require continuous data submission from hospitals and hospitals did not do this in general, uploading data in batches some months apart. The other role for a national audit team was to provide local training.

Table 11.3
Mean (95% CI) scores* for O-G cancer specific symptoms (QLQ-OG25) among curative and palliative patients

	Patients with curative intent (n=121)		Patients with palliative intent (n=84)		Difference
	Mean	95% CI	Mean	95% CI	
Symptom scales					
Dysphagia	25	20 - 29	29	24 - 34	5
Eating restriction	35	30 - 41	50	44 - 57	15
Reflux	18	14 - 22	29	23 - 35	11
Odynophagia	29	24 - 35	35	28 - 41	5
Pain and discomfort	23	18 - 28	25	19 - 30	2
Anxiety	65	60 - 70	55	48 - 61	-10
Single symptom items					
Eating with others	16	10 - 21	30	21 - 38	14
Dry mouth	21	16 - 27	35	27 - 43	13
Trouble with taste	12	8 - 16	24	17 - 31	12
Body image	14	10 - 19	23	16 - 30	8
Trouble swallowing saliva	12	7 - 17	15	9 - 20	3
Choked when swallowing	10	7 - 14	13	8 - 19	3
Trouble with coughing	26	21 - 30	30	24 - 36	5
Trouble talking	6	4 - 9	8	3 - 12	2
Weight loss	20	15 - 26	28	20 - 36	8
Hair loss **	0	0 - 0	3	0 - 8	3

* For all scales and items, a high score represents worse quality of life or more problems.
** Hair loss scores were provided by 14 curative patients and 13 palliative patients.

Comments on inclusion criteria

Centres were asked to include both curative and palliative patients. The nurse specialists was asked to use their judgement on whether or not it would be appropriate to include them, either because the patients were not expected to survive 3 months, or the patient was to too frail or unwell.

Two respondents mentioned that including palliative patients was important because they represent a high proportion of patients. It also simplified the identification of patients. However, all interviewees commented on the difficulty of enrolling palliative patients, because it was not seen as appropriate to ask someone who was performing poorly.

Timing of recruitment

The protocol originally requested that patients were asked to participate within four weeks of diagnosis. Several centres reported that they are missing both curative and palliative patients because this period was too short. Some reasons were associated with patient characteristics.

- For curative patients, some were referred from peripheral hospitals and then undergo extensive staging investigations. This often takes them past the 4 week period before they are then seen again in the hospital clinic
- For palliative patients, they are often too distressed and unwell at the first clinic appointment, and the second (treatment planning) appointment was after the 4-week interval
- Patients diagnosed following an emergency admission were usually too unwell to participate. They were also difficult for the Clinical Nurse Specialist to track.

Part of the problem of recruiting patients at the time of diagnosis was the amount of information patients received at this time – adding the questionnaire could feel like information overload. To address these issues, the timing of the baseline measurement was changed to be within four weeks of treatment beginning.

Administration of baseline questionnaire

Five of the six centres had incorporated the administration of the baseline QoL questionnaire into the normal set of patient visits. At the other unit, all QoL questionnaires were sent out by post. Posting the forms was estimated to take a couple of hours a week.

Hospitals were fairly flexible in how patients completed the baseline questionnaire. Some patients completed it in the clinic. Others took it away with them to fill in. A problem with allowing patients to take it away for staff was knowing whether or not the patient had completed it.

Two other contextual issues emerged. Some hospitals were involved in clinical trials or research that involved the completion of quality of life questionnaires by enrolled patients. This generated two issues: First, staff felt that "patients were being bombarded with forms". Second, the audit and research inclusion criteria differed, which made administration more complex.

The staging process in some networks occurred at different locations, which made administration more complicated compared to the networks where it was performed at a single location.

Administration of the follow-up QoL questionnaires

All interviewees highlighted the difficulty of tracking people for the follow-up questionnaires. Various issues made the process complicated. The first was keeping track of when to send the questionnaire. The timing was easier for palliative patients because it was a fixed point after the diagnosis. For curative patients undergoing surgery, it was designated as 6 months postoperatively. This was a variable time after diagnosis dependent upon whether or not a patient had neoadjuvant therapy, the type of neoadjuvant therapy, and the patients' reaction to treatment.

A second issue was whether the treatment intent remained constant. Some patients had an initial curative intent change to palliative.

A third issue was ensuring patients were still alive or sufficiently well to complete a follow-up QoL questionnaire. This was particularly problematic for palliative patients because they could be being treated within the community and not present to hospital clinics.

How the follow-up questionnaire was given to patients was variable. Some centres gave it to patients at a clinic unless the patient was treated in the community. Others posted it out. Before a questionnaire was posted out, the nurses would contact either the patient, their carer or their GP to ensure that the patient had not died or was not too unfit to complete the questionnaire.

All interviewees kept a paper folder or database / spreadsheet of patients to contact. One interviewee noted that just marking a patient record was not enough. The functionality of the databases varied. One centre crossed referenced patients with MDT records to create reminders for the follow-up dates (this also required identifying the care received by patients on the hospital PAS). Other trusts did not have this facility, and commented that they did not have a robust system to track questionnaires.

11.4 Conclusion

The inclusion of patient reported outcomes was a challenging aspect of the Audit. The nature of the patient condition meant that it was judged to be feasible if implemented locally; this view has not changed and has been endorsed by hospitals that participated in the study. However, it has a number of consequences. There is a lack of clinical nurse specialists within O-G cancer services, and adding the measurement of patient-reported outcomes to their daily tasks is likely to limit this type of study to a few volunteer units.

Nonetheless, there are challenges even within units with capacity. It was considered important to build it into day-to-day practice in a robust way. A functional system to track patients, and give reminders, was also seen as essential for high response rates.

We recommend that more research is needed on how to implement the measurement of quality of life within the context of a national clinical audit of oesophago-gastric cancer.

12. Conclusion and recommendations

The Audit is the first national audit of oesophago-gastric cancer in England and Wales. It provides a snapshot of current practice and clinical outcomes after a period of considerable investment and reorganisation of NHS O-G cancer services. With data on over 17,000 patients, this is the largest national audit of oesophago-gastric cancer care performed anywhere in the world. We have only been able to achieve this due to the tremendous support from NHS trusts and Cancer Networks, the professional bodies and patient groups involved in O-G cancer care, and because of funding provided by the Healthcare Quality Improvement Partnership.

Our findings show that, overall, clinicians are providing a high quality of care for patients.

For patients undergoing curative surgery, in-hospital mortality was lower than the 2002 AUGIS audit (5.1 per cent vs 8.9 per cent). During the Audit period, a greater number of curative procedures are being performed with a minimally invasive approach. There was some evidence that MI procedures had a slightly increased risk of anastomotic leak. However, in terms of peri-operative mortality and a range of other postoperative complications, MI procedures and open operations had comparable outcomes. O-G cancer services should ensure that the AUGIS guidelines on the safe introduction of minimally invasive O-G cancer surgery are followed.

Among patients receiving palliative care, self-expanding stents were a widely reported method of endoscopic / radiological palliation and were successfully deployed in 98 per cent of procedures. One in 10 patients having a stent were reported to have one or more complications, with stent migration and tumour overgrowth being the most common. The method of stent insertion differed between NHS trusts but endoscopic and radiological placement appeared equally successful.

We would highlight a number of areas where Cancer Networks and NHS trusts should examine their practice. First, we observed variation in the reported use of EUS and staging laparoscopy within the Cancer Networks. Excellent treatment planning is based on accurate staging information, which requires the appropriate use of staging investigations. The variation raises questions about whether staging is equally effective across all Networks. Combining information on reported EUS use with other Audit data suggested some of the variation could be due to reporting patterns but the lack of consistency remains a concern.

Second, there was considerable variation in the proportion of patients who were planned to have palliative chemo- or radiotherapy. This variation persisted despite correcting for potential confounding factors such as age, sex, pre-treatment stage and co-morbidity. This suggests that some patients who would potentially benefit from chemo- or radiotherapy are not being offered it. It is important that O-G services ensure all patients are discussed with the specialist MDT so patients obtain the benefit of expert experience.

Third, reported lymph node yield for 25 per cent of gastrectomies did not meet the minimum number required for staging the disease according to the UICC staging system. In addition, only 52 per cent of D2 gastrectomies achieved the recommended minimum lymph node yield of 25 nodes. Surgeons should monitor their pathology outcomes to ensure lymph node yield is adequate. Longitudinal margin positivity should also be monitored to ensure it is within acceptable levels.

Finally, the reported use of brachytherapy was low among palliative care patients overall and was variable across networks. This is of concern because it has been shown to be superior to stenting in patients who survive more than three months. Cancer Networks should ensure appropriate patients have access to brachytherapy.

Quality improvement is first and foremost a local process. While helped and facilitated by national Audits, it is put into action by local clinicians who can change the necessary practices that lead to better patient care. We hope that local clinicians will take the findings of this Audit and use them to improve the services within their Cancer Network.

Recommendations

1. O-G cancer services should ensure that all patients who are candidates for curative treatment undergo a CT-scan plus an EUS (if oesophageal / upper junctional tumour) or a staging laparoscopy (if gastric / lower junctional tumour) and should improve the monitoring of their use.

2. All patients should be discussed with the specialist MDT to reduce the observed variation in the proportion of patients selected for palliative oncology.

3. Surgeons should monitor their pathology outcomes in order to (1) ensure an adequate lymph node yield is obtained in every patient, and (2) to maintain low rates of positive longitudinal margins.

4. Minimally invasive surgery should continue to be introduced cautiously following the guidance published by the Association of Upper Gastro-Intestinal Surgeons.

5. Cancer Networks should improve access to brachytherapy.

6. Clinicians should use the data on inpatient complications to inform patients about the risks of different curative and palliative treatments.

7. Multidisciplinary teams at NHS trusts should review the outcomes of their own patients and compare them with the national outcomes described in this report. Results of peer-comparisons should be incorporated into Cancer Network annual work plans.

8. More research is needed on how to use patient reported outcome measures (PROMs) such as quality of life within the context of a national clinical audit of oesophago-gastric cancer.

Appendix 1: Organisation of the Audit

The Audit is funded by the Healthcare Quality Improvement Program (HQIP) and is a collaboration between four organisations:

- The Association of Upper Gastro-Intestinal Surgeons (AUGIS)
- The British Society of Gastroenterology (BSG)
- The National Clinical Audit Support Program (NCASP) of the NHS Information Centre for health and social care (IC), and
- The Clinical Effectiveness Unit of The Royal College of Surgeons of England.

The project is assisted by a Clinical Reference Group (CRG), the membership of which is drawn from all of the clinical groups involved in the management of oesophago-gastric cancer and overseen by a Project Board, which has senior representatives from the four participating organisations and the funding body.

The National Oesophago-Gastric Cancer Audit Project Team consists of:

- Richard Hardwick, AUGIS
- Stuart Riley, BSG
- Kimberley Greenaway, Rose Napper, and Steve Dean, NCASP
- Tom Palser, David Cromwell, and Jan van der Meulen, CEU.

Members of Clinical Reference Group		
Mike Hallisey	Consultant Surgeon Birmingham	Association of Cancer Surgeons
Geoff Clark	Consultant Surgeon	Association of Upper Gastrointestinal Surgeons of Great Britain & Ireland
Stuart Cairns	Consultant Gastroenterologist	British Society of Gastroenterologists
Martin Richardson	Consultant Surgeon	Cancer Networks
Tom Crosby	Consultant Clinical Oncologist	Cancer Services Co-ordinating Group, Wales
Phil Hill	Information Strategy Lead	Department of Health, Cancer Policy Unit
Nick Carroll	Consultant Radiologist	EUS Users Group
Helen Laing	Clinical Audit Commissioning Manager	Healthcare Quality Improvement Partnership (HQIP)
Jan van der Meulen (chair)	Professor of Clinical Epidemiology	London School of Hygiene and Tropical Medicine
Bill Allum	National O-G Cancer Lead (joint)	National Cancer Action Team
Chris Carrigan	National Co-ordinator for Cancer Registration	National Cancer Action Team
David Kirby OBE	Chairman	Oesophageal Patients Association
Andrea Burgess	Specialist Nurse	Royal College of Nursing
Suzanne Ball	Nurse Specialist for Surgery	Royal College of Nursing
Geraint Williams	Professor of Histopathology	Royal College of Pathologists
Hans-Ulrich Laasch	Consultant Radiologist	Royal College of Radiologists
Sam Ahmedzai	Professor of Supportive Care Medicine	Palliative Care Representative
Jane Blazeby	Professor of Surgery	University of Bristol

Members of Project Board		
Julie Henderson*	Project Board Executive	The NHS Information Centre for health and social care
Helen Laing	Commissioner	Healthcare Quality Improvement Partnership (HQIP)
Mike Griffin	Past President	Association of Upper Gastrointestinal Surgeons of Great Britain & Ireland
David Sanders**	Chair of the BSG Audit and Clinical Services Committees	British Society of Gastroenterology

* replaced Martin Old, formerly of The NHS Information Centre for health and social care
** replaced Mark Denyer, Chair of the BSG Audit and Clinical Services Committees

Appendix 2: Summary of linkage process

The Office for National Statistics provided date of death information for an extract of the data that contained only patient identifiers (NHS number, date of birth, postcode). ONS performed the linkage between the extract and their mortality data.

The linkage of the Audit data with the data from HES and ICNARC datasets was performed by the IC Data Linkage team. In each case, a similar hierarchical algorithm was used. For the HES data, the algorithm used NHS number, date of birth, sex and postcode, following the rules described below:

The extract from the HES database contained all episodes of care between 1 April 2004 and 28 February 2010 with an ICD-10 code for oesophageal (C15) or gastric (C16) cancer or had undergone a surgical resection of the oesophagus or stomach (G01, G02, G03, G27 and G28).

The HES extract was linked to the 19,320 patient records submitted by English NHS trusts (regardless of whether or not the records contained clinical information). A match between the HES and the Audit datasets was found for 17412 of the 19320 patients (90 per cent). Among these 17412 patients, 82 per cent were matched completely on all four indicators (match rank 1). Another 9 per cent were matched on date of birth, sex, and postcode (match rank 6).

There was a difference in the proportion of linked records among patient with and without clinical information (tumour details). HES records were found for only 58 per cent of the 1764 patients without clinical data. Among the 16424 patients with clinical data and valid diagnosis dates, HES records were found for 15,456 patients (95 per cent).

There was a small difference between the proportion of linked patients among those whose planned treatment intent was curative (97 per cent), palliative: anti-cancer care (96 per cent) and palliative: supportive care only (90 per cent).

Sequence	Process
Match Rank 1	Exact match of date of birth, sex, NHS number and postcode
Match Rank 2	Exact match of date of birth, sex, NHS number
Match Rank 3	Partial match of date of birth, and exact match of sex, NHS number and postcode
Match Rank 4	Partial match of date of birth, and exact match of sex, NHS number
Match Rank 5	Exact match of postcode and NHS number
Match Rank 6	Exact match of date of birth, sex, and postcode where NHS number does not contradict the match and date of birth is not 1st January and the postcode is not on the "ignore" list
Match Rank 7	Exact match of date of birth, sex, and postcode where NHS number does not contradict the match and date of birth is not 1st January
Match Rank 8	Exact match of date of birth, sex, and postcode where date of birth is not 1st January

Appendix 3: EORTC QLQ-C30 and OG25 questionnaires

For specimens of the questionnaires, please use the following links:

http://groups.eortc.be/qol/downloads/modules/specimen_20qlq_c30.pdf

http://groups.eortc.be/qol/downloads/modules/specimen_20qlq_og25.pdf

Appendix 4: Levels of case-ascertainment and data completeness by NHS trust

Case-ascertainment was based on the expected number of patients diagnosed at each NHS trust. Consequently, figures for case-ascertainment and data completeness were derived by the NHS trust of diagnosis rather than the trust that uploaded the data.

The Christie Hospital NHS Foundation Trust and Clatterbridge Centre for Oncology NHS Foundation Trust are tertiary cancer centres that mainly provide oncological treatment for O-G cancer patients and were excluded from the calculations. There were 141 and 444 patients in the dataset that had information on chemotherapy or radiotherapy given at these NHS trusts, respectively.

Key:	
*	(Surgical) Cancer Centre; FD Trust = foundation trust.
●	Values in green indicate an estimated case-ascertainment above 70%
▲	Values in red indicate a low case-ascertainment

English NHS trusts

Code		Network / NHS trust name	Expected cases over 21 month period	Patients with a tumour record	%Patients w M-stage after CT	%Patients w planned Intent	%Patients w planned modality	Treatment entered for patients with modality
N01		**Lancashire and South Cumbria Cancer Network**						
RXN	*	Lancashire Teaching Hospitals NHS FD Trust	>200	182 ●	79%	60%	59%	78%
RXL		Blackpool, Fylde and Wyre Hospitals NHS FD Trust	100 to 200	140 ●	58%	96%	99%	89%
RXR		East Lancashire Hospitals NHS Trust	>200	43 ▲	69%	93%	62%	75%
RTX		University Hospitals of Morecambe Bay NHS Trust	100 to 200	154 ●	91%	90%	71%	77%
N02		**Greater Manchester and Cheshire Cancer Network**						
RW6	*	Pennine Acute Hospitals NHS Trust	>200	278 ●	90%	99%	99%	71%
RM3	*	Salford Royal NHS FD Trust	>200	186 ●	83%	99%	98%	13%
RM2	*	University Hospitals of South Manchester NHS FD Trust	100 to 200	143 ●	100%	99%	93%	81%
RMC		Bolton Hospitals NHS Trust	<100	81 ●	92%	99%	96%	15%
RW3		Central Manchester University Hospitals NHS FD Trust	100 to 200	67	100%	91%	47%	83%
RBV		Christie Hospital NHS FD Trust	n/a	n/a				
RJN		East Cheshire NHS Trust	<100	76 ●	85%	100%	100%	26%
RWJ		Stockport NHS FD Trust	100 to 200	130 ●	42%	92%	97%	82%
RMP		Tameside and Glossop Acute Services NHS Trust	100 to 200	87 ●	87%	92%	100%	95%
RBT		The Mid Cheshire Hospitals NHS Trust	100 to 200	16 ▲	75%	94%	93%	29%
RM4		Trafford Healthcare NHS Trust	<100	37 ●	76%	97%	100%	33%
RRF		Wrightington, Wigan and Leigh NHS Trust	100 to 200	111 ●	18%	77%	50%	18%
N03		**Merseyside and Cheshire Cancer Network**						
REM	*	Aintree University Hospitals NHS FD Trust	>200	155 ●	74%	97%	95%	84%
RBQ	*	The Cardiothoracic Centre - Liverpool NHS Trust	100 to 200	73 ●	42%	99%	96%	24%
REN		Clatterbridge Centre for Oncology NHS FD Trust	n/a	n/a				
RJR		Countess of Chester Hospital NHS FD Trust	100 to 200	91 ●	0%	92%	88%	58%
RWW		Warrington and Halton Hospitals NHS FD Trust	100 to 200	53	0%	79%	76%	45%
RQ6		Royal Liverpool and Broadgreen University Hospitals NHS Trust	>200	193 ●	88%	97%	94%	52%
RVY		Southport and Ormskirk Hospital NHS Trust	<100	76 ●	67%	70%	67%	80%
RBN		St Helens and Knowsley Hospitals NHS Trust	100 to 200	91 ●	65%	78%	61%	68%
RBL		Wirral University Teaching Hospital NHS FD Trust	100 to 200	161 ●	63%	91%	90%	95%
N06		**Yorkshire Cancer Network**						
RAE	*	Bradford Teaching Hospitals NHS FD Trust	100 to 200	119	64%	100%	100%	100%
RR8	*	Leeds Teaching Hospitals NHS Trust	>200	481 ●	98%	100%	100%	99%
RCF		Airedale NHS Trust	<100	66 ●	33%	98%	98%	77%
RWY		Calderdale and Huddersfield NHS FD Trust	100 to 200	15 ▲	33%	100%	93%	91%
RCD		Harrogate and District NHS FD Trust	<100	54 ●	73%	100%	98%	100%
RXF		Mid Yorkshire Hospitals NHS Trust	<100	63	98%	90%	100%	100%
RCB		York Hospitals NHS FD Trust	100 to 200	119 ●	58%	99%	99%	89%

English NHS trusts continued

Code		Network / NHS trust name	Expected cases over 21 month period	Patients with a tumour record	%Patients w M-stage after CT	%Patients w planned Intent	%Patients w planned modality	Treatment entered for patients with modality
N07		**Humber and Yorkshire Coast Cancer Network**						
RWA	*	Hull and East Yorkshire Hospitals NHS Trust	>200	75 ▲	88%	100%	100%	63%
RJL		Northern Lincolnshire and Goole Hospitals NHS FD Trust	100 to 200	78	20%	99%	100%	64%
RCC		Scarborough and North East Yorkshire Health Care NHS Trust	<100	17 ▲	54%	94%	100%	50%
N08		**North Trent Cancer Network**						
RP5	*	Doncaster and Bassetlaw Hospitals NHS FD Trust	>200	207 ●	13%	93%	99%	79%
RHQ	*	Sheffield Teaching Hospitals NHS FD Trust	>200	311 ●	72%	99%	100%	95%
RFF		Barnsley Hospital NHS FD Trust	<100	73 ●	10%	92%	100%	83%
RFS		Chesterfield Royal Hospital NHS FD Trust	100 to 200	96 ●	68%	99%	92%	86%
RFR		The Rotherham NHS FD Trust	<100	57 ●	20%	98%	90%	50%
N11		**Pan Birmingham Cancer Network**						
RR1	*	Heart of England NHS FD Trust	>200	262	86%	98%	100%	95%
RRK	*	University Hospital Birmingham NHS FD Trust	>200	245 ●	96%	100%	95%	63%
RXK		Sandwell and West Birmingham Hospitals NHS Trust	100 to 200	93	3%	72%	82%	41%
RBK		Walsall Hospitals NHS Trust	<100	25	15%	100%	93%	9%
N12		**Arden Cancer Network**						
RKB	*	University Hospitals Coventry and Warwickshire NHS Trust	>200	170	27%	96%	98%	94%
RLT		George Eliot Hospital NHS Trust	<100	55	8%	67%	75%	50%
RJC		South Warwickshire General Hospitals NHS Trust	<100	41 ●	88%	83%	68%	100%
N13		**Mid Trent Cancer Network**						
RX1	*	Nottingham University Hospitals NHS Trust	>200	330 ●	93%	99%	99%	96%
RK5		Sherwood Forest Hospitals NHS FD Trust	100 to 200	112 ●	98%	100%	99%	82%
RWD		United Lincolnshire Hospitals NHS Trust	>200	287 ●	85%	99%	99%	98%
N14		**Derby/Burton Cancer Network**						
RTG	*	Derby Hospitals NHS FD Trust	>200	215 ●	96%	98%	100%	90%
RJF		Burton Hospitals NHS Trust	<100	72 ●	75%	97%	98%	95%
N15		**Leicestershire, Northamptonshire and Rutland Cancer Network**						
RNS	*	Northampton General Hospital NHS Trust	100 to 200	148 ●	89%	91%	100%	93%
RWE	*	University Hospitals of Leicester NHS Trust	>200	332 ●	98%	99%	100%	99%
RNQ		Kettering General Hospital NHS Trust	100 to 200	101 ●	78%	100%	91%	50%
N20		**Mount Vernon Cancer Network**						
RWH	*	East and North Hertfordshire NHS Trust	100 to 200	136 ●	98%	100%	100%	98%
RWG	*	West Hertfordshire Hospitals NHS Trust	100 to 200	7 ▲	29%	100%	100%	100%
RC9		Luton and Dunstable Hospital NHS FD Trust	100 to 200	91 ●	43%	90%	97%	48%
N21		**West London Cancer Network**						
RYJ	*	Imperial College Healthcare NHS Trust	>200	132	84%	100%	99%	92%
RQM		Chelsea and Westminster Hospital NHS FD Trust	<100	39 ●	100%	100%	100%	100%
RC3		Ealing Hospital NHS Trust	<100	7 ▲	100%	100%	100%	100%
RV8		North West London Hospitals NHS Trust	<100	52	55%	92%	83%	56%
RAS		The Hillingdon Hospital NHS Trust	<100	27	100%	100%	88%	75%
RFW		West Middlesex University Hospital NHS Trust	<100	42 ●	90%	100%	84%	100%
N22		**North London Cancer Network**						
RRV	*	University College London Hospitals NHS FD Trust	100 to 200	28 ▲	64%	100%	96%	100%
RVL		Barnet and Chase Farm Hospitals NHS Trust	<100	16 ▲	25%	100%	88%	
RAP		North Middlesex University Hospital NHS Trust	<100	0 ▲				
RAL		Royal Free Hampstead NHS Trust	<100	28	96%	96%	100%	100%
RQW		The Princess Alexandra Hospital NHS Trust	<100	11 ▲	0%	91%	33%	0%
RKE		The Whittington Hospital NHS Trust	<100	9 ▲	22%	100%	100%	
N23		**North East London Cancer Network**						
RF4	*	Barking, Havering & Redbridge Hospitals NHS Trust	>200	205 ●	81%	93%	92%	64%
RNJ	*	Barts and The London NHS Trust	100 to 200	148 ●	99%	99%	100%	97%
RQX		Homerton University Hospital NHS FD Trust	<100	28	70%	100%	100%	86%
RNH		Newham University Hospital NHS Trust	<100	35	22%	94%	96%	67%
RGC		Whipps Cross University Hospital NHS Trust	<100	79 ●	99%	100%	94%	91%
N24		**South East London Cancer Network**						
RJ1	*	Guy's and St Thomas' NHS FD Trust	>200	97	49%	65%	98%	21%
RG3		Bromley Hospitals NHS Trust	<100	36	6%	100%	95%	93%

English NHS trusts continued

Code		Network / NHS trust name	Expected cases over 21 month period	Patients with a tumour record	%Patients w M-stage after CT	%Patients w planned Intent	%Patients w planned modality	Treatment entered for patients with modality
RJZ		King's College Hospital NHS FD Trust	<100	8 ▲	25%	50%	100%	0%
RG2		Queen Elizabeth Hospital NHS Trust	<100	73 ●	23%	86%	91%	67%
RGZ		Queen Mary's Sidcup NHS Trust	<100	48 ●	35%	79%	94%	6%
RJ2		The Lewisham Hospital NHS Trust	<100	57 ●	4%	44%	72%	0%
N25		**South West London Cancer Network**						
RPY	*	The Royal Marsden NHS FD Trust	100 to 200	103 ●	98%	100%	100%	98%
RVR		Epsom and St Helier University Hospitals NHS Trust	100 to 200	60	79%	95%	95%	91%
RAX		Kingston Hospital NHS Trust	<100	56 ●	100%	98%	100%	100%
RJ6		Mayday Healthcare NHS Trust	<100	74 ●	84%	100%	96%	95%
RJ7		St George's Healthcare NHS Trust	<100	62 ●	89%	100%	98%	100%
N26		**Peninsula Cancer Network**						
RK9	*	Plymouth Hospitals NHS Trust	100 to 200	159 ●	36%	93%	84%	76%
RBZ		Northern Devon Healthcare NHS Trust	<100	49	25%	90%	85%	88%
REF		Royal Cornwall Hospitals NHS Trust	>200	170 ●	85%	100%	99%	97%
RH8		Royal Devon and Exeter NHS FD Trust	>200	178 ●	96%	99%	100%	97%
RA9		South Devon Health Care NHS FD Trust	100 to 200	105 ●	100%	99%	99%	100%
N27		**Dorset Cancer Network**						
RDZ	*	Royal Bournemouth and Christchurch Hospitals NHS FD Trust	<100	97 ●	96%	100%	100%	97%
RBD		Dorset County Hospitals NHS FD Trust	<100	78 ●	55%	97%	100%	50%
RD3		Poole Hospital NHS FD Trust	100 to 200	97 ●	82%	100%	100%	100%
N28		**Avon, Somerset and Wiltshire Cancer Network**						
RA7	*	University Hospitals Bristol NHS FD Trust	>200	141 ●	70%	82%	93%	92%
RVJ		North Bristol NHS Trust	100 to 200	125	64%	83%	86%	100%
RD1		Royal United Hospital Bath NHS Trust	100 to 200	78	33%	86%	71%	75%
RBA		Taunton and Somerset NHS FD Trust	100 to 200	107 ●	79%	78%	84%	90%
RA3		Weston Area Health NHS Trust	<100	58 ●	89%	95%	100%	94%
RA4		Yeovil District Hospital NHS FD Trust	<100	57 ●	57%	96%	60%	100%
N29		**3 Counties Cancer Network**						
RTE	*	Gloucestershire Hospitals NHS FD Trust	>200	271 ●	75%	100%	100%	100%
RLQ		Hereford Hospitals NHS Trust	<100	76 ●	68%	99%	100%	100%
RWP		Worcestershire Acute Hospitals NHS Trust	>200	210 ●	93%	96%	99%	65%
N30		**Thames Valley Cancer Network**						
RTH	*	Oxford Radcliffe Hospitals NHS Trust	>200	193	93%	99%	85%	95%
RHW	*	Royal Berkshire NHS FD Trust	100 to 200	120 ●	96%	100%	100%	100%
RXQ		Buckinghamshire Hospitals NHS Trust	100 to 200	78 ●	0%	94%	95%	8%
RD7		Heatherwood and Wexham Park Hospitals NHS FD Trust	<100	62	30%	98%	100%	92%
RD8		Milton Keynes Hospital NHS FD Trust	<100	16	0%	100%	50%	0%
RN3		Great Western Hospitals NHS FD Trust	100 to 200	59	11%	63%	80%	29%
N31		**Central South Coast Cancer Network**						
RHU	*	Portsmouth Hospitals NHS Trust	>200	239 ●	91%	99%	100%	98%
RHM	*	Southampton University Hospitals NHS Trust	>200	182 ●	94%	100%	99%	95%
RN5		Basingstoke and North Hampshire NHS FD Trust	<100	31	100%	100%	100%	75%
RR2		Isle of Wight Healthcare NHS Trust	<100	58 ●	95%	100%	100%	92%
RPR		Royal West Sussex NHS Trust	<100	88 ●	99%	99%	100%	88%
RNZ		Salisbury NHS FD Trust	<100	80 ●	64%	96%	92%	41%
RN1		Winchester and Eastleigh Healthcare NHS Trust	<100	32	71%	100%	89%	100%
N32		**Surrey, West Sussex and Hampshire Cancer Network**						
RA2	*	Royal Surrey County Hospital NHS Trust	100 to 200	127 ●	34%	87%	92%	87%
RTK		Ashford and St Peter's Hospitals NHS Trust	<100	23	25%	78%	79%	80%
RDU		Frimley Park Hospital NHS FD Trust	100 to 200	37	26%	78%	79%	87%
RTP		Surrey and Sussex Healthcare NHS Trust	<100	44	35%	80%	61%	100%
N33		**Sussex Cancer Network**						
RXH	*	Brighton and Sussex University Hospitals NHS Trust	100 to 200	81	0%	93%	36%	89%
RXC		East Sussex Hospitals NHS Trust	100 to 200	153 ●	86%	83%	67%	77%
RPL		Worthing and Southlands Hospitals NHS Trust	100 to 200	94 ●	67%	94%	30%	75%
N34		**Kent and Medway Cancer Network**						
RWF	*	Maidstone and Tunbridge Wells NHS Trust	>200	281 ●	57%	90%	98%	81%
RN7		Dartford and Gravesham NHS Trust	<100	65 ●	38%	100%	100%	74%

English NHS trusts continued

Code		Network / NHS trust name	Expected cases over 21 month period	Patients with a tumour record	%Patients w M-stage after CT	%Patients w planned Intent	%Patients w planned modality	Treatment entered for patients with modality
RVV		East Kent Hospitals NHS Trust	100 to 200	93	20%	10%	67%	100%
RPA		Medway NHS FD Trust	<100	0 ▲				
N35		**Greater Midlands Cancer Network**						
RJE	*	University Hospital of North Staffordshire NHS Trust	>200	130	46%	83%	84%	69%
RNA	*	Dudley Group of Hospitals NHS Trust	>200	79	23%	66%	83%	42%
RJD		Mid Staffordshire General Hospitals NHS Trust	100 to 200	108 ●	88%	100%	100%	85%
RXW		Shrewsbury and Telford Hospital NHS Trust	>200	87	41%	99%	97%	76%
RL4		The Royal Wolverhampton Hospitals NHS Trust	>200	126	72%	84%	72%	12%
N36		**North of England Cancer Network**						
RTD	*	The Newcastle Upon Tyne Hospitals NHS FD Trust	>200	350 ●	90%	100%	99%	98%
RTR	*	South Tees Hospitals NHS Trust	>200	176 ●	57%	98%	95%	92%
RLN		City Hospitals Sunderland NHS FD Trust	100 to 200	109 ●	90%	100%	97%	100%
RXP		County Durham and Darlington NHS FD Trust	100 to 200	175 ●	95%	98%	99%	85%
RR7		Gateshead Health NHS FD Trust	<100	63 ●	69%	98%	100%	75%
RNL		North Cumbria Acute Hospitals NHS Trust	>200	162 ●	91%	95%	98%	95%
RVW		North Tees and Hartlepool NHS Trust	100 to 200	134 ●	82%	99%	100%	96%
RTF		Northumbria Health Care NHS FD Trust	100 to 200	112 ●	86%	98%	97%	83%
RE9		South Tyneside NHS FD Trust	<100	68 ●	82%	100%	100%	95%
N37		**Anglia Cancer Network**						
RGT	*	Cambridge University Hospitals NHS FD Trust	>200	251 ●	94%	100%	99%	92%
RM1	*	Norfolk and Norwich University Hospital NHS Trust	>200	217 ●	94%	100%	99%	98%
RC1		Bedford Hospital NHS Trust	<100	68 ●	93%	100%	98%	94%
RQQ		Hinchingbrooke Healthcare NHS Trust	<100	40 ●	84%	100%	100%	92%
RGP		James Paget Healthcare NHS FD Trust	100 to 200	111 ●	86%	100%	100%	95%
RGN		Peterborough & Stamford Hospitals NHS FD Trust	100 to 200	96 ●	92%	100%	100%	96%
RCX		The Queen Elizabeth Hosp. King's Lynn NHS Trust	100 to 200	71	17%	100%	100%	24%
RGR		West Suffolk Hospitals NHS Trust	<100	60 ●	85%	100%	100%	100%
N38		**Essex Cancer Network**						
RQ8	*	Mid Essex Hospital Services NHS Trust	100 to 200	69	97%	86%	100%	47%
RDD		Basildon & Thurrock Univ. Hospitals NHS FD Trust	100 to 200	87	46%	100%	94%	91%
RDE		Essex Rivers Healthcare NHS Trust	100 to 200	129 ●	2%	96%	90%	100%
RGQ		Ipswich Hospital NHS Trust	<100	16 ▲	81%	100%	100%	100%
RAJ		Southend Hospital NHS Trust	100 to 200	107 ●	35%	98%	98%	95%

Welsh NHS trusts

Code		Network / NHS trust name	Patients with a tumour record	%Patients w M-stage after CT	%Patients w planned Intent	%Patients w planned modality	Treatment entered for patients with modality
		North Wales					
RT8		Conwy and Denbighshire NHS Trust	61	69%	93%	72%	100%
RT9		North East Wales NHS Trust	102	77%	100%	92%	94%
RT7		North West Wales NHS Trust	105	60%	97%	87%	100%
		South East Wales					
RWM	*	Cardiff and Vale NHS Trust	106	56%	78%	90%	81%
RRS	*	North Glamorgan NHS Trust	56	40%	89%	83%	0%
RVF		Gwent Healthcare NHS Trust	187	71%	86%	92%	95%
RVE		Pontypridd and Rhondda NHS Trust	82	68%	93%	86%	83%
RQF		Velindre NHS Trust	2	.	.	.	.
		South West Wales					
RVD		Bro Morgannwg NHS Trust	68	34%	81%	78%	92%
RVA		Carmarthenshire NHS Trust	77	49%	100%	85%	89%
RKU		Ceredigion and Mid Wales NHS Trust	31	7%	90%	82%	71%
RR6		Pembrokeshire and Derwen NHS trust	39	84%	92%	85%	100%
RVC		Swansea NHS Trust	99	17%	92%	72%	91%

Appendix 5: Comparative analysis of NHS trust impatient complication rates after curative surgery

Estimated case-ascertainment was derived by dividing the number of surgical resections reported to the Audit by the number of surgical resections recorded in Hospital Episode Statistics.

Key:

* (Surgical) Cancer Centre; FD Trust = foundation trust.

NHS trusts excluded from comparative analysis of complication rates

Code		Organisation Name	Patients in Audit who had curative surgery	Estimated case-ascertainment	Reason in not included in comparative analysis
RNS	*	Northampton General Hospital NHS Trust	40	89%	Poor completeness of data
RWA	*	Hull and East Yorkshire Hospitals NHS Trust	39	44%	Low case-ascertainment
RRV	*	University College London Hospitals NHS FD Trust	24	42%	Low case-ascertainment
RWG	*	West Hertfordshire Hospitals NHS Trust	13	35%	Low case-ascertainment
RNA	*	Dudley Group of Hospitals NHS Trust	13	28%	Low case-ascertainment
RXR		East Lancashire Hospitals NHS Trust	6	18%	Low case-ascertainment

NHS trusts in comparative analysis of complication rates

Code		NHS Trust name	No. of patients	30-day mortality		90-day mortality		Reoperation		Anastomotic leak	
				Crude	Adjusted	Crude	Adjusted	Crude	Adjusted	Crude	Adjusted
REM	*	Aintree University Hospitals NHS FD Trust	53	7.5%	9.7%	7.5%	9.3%	9.4%	10.1%	13.2%	13.8%
RF4	*	Barking, Havering and Redbridge Hospitals NHS Trust	61	4.9%	5.9%	8.2%	9.6%	13.1%	13.1%	8.2%	7.7%
RNJ	*	Barts and The London NHS Trust	96	3.1%	3.6%	4.2%	4.8%	2.1%	2.2%	7.3%	6.5%
RXL		Blackpool, Fylde and Wyre Hospitals NHS Trust	30	10.0%	9.1%	16.7%	14.2%	20.0%	21.8%	3.3%	4.3%
RAE	*	Bradford Teaching Hospitals NHS FD Trust	61	0.0%	0.0%	0.0%	0.0%	8.2%	8.8%	1.6%	1.7%
RXH	*	Brighton and Sussex University Hospitals NHS Trust	31	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
RVD		Bro Morgannwg NHS Trust	10	10.0%	11.5%	20.0%	19.9%	.	.	0.0%	0.0%
RGT	*	Cambridge University Hospitals NHS FD Trust	142	1.4%	1.7%	4.2%	4.8%	6.3%	6.6%	4.2%	4.8%
RWM	*	Cardiff and Vale NHS Trust	11	0.0%	0.0%	0.0%	0.0%	.	.	0.0%	0.0%
RVA		Carmarthenshire NHS Trust	12	0.0%	0.0%	0.0%	0.0%	.	.	0.0%	0.0%
RTG	*	Derby Hospitals NHS FD Trust	65	3.1%	3.3%	7.7%	8.1%	9.2%	8.2%	10.8%	9.9%
RP5	*	Doncaster and Bassetlaw Hospitals NHS FD Trust	49	14.3%	11.5%	14.3%	12.5%	.	.	10.2%	10.0%
RWH	*	East and North Hertfordshire NHS Trust	25	4.0%	4.9%	12.0%	13.5%	8.0%	8.0%	12.0%	10.7%
RTE	*	Gloucestershire Hospitals NHS FD Trust	76	2.6%	2.7%	5.3%	5.2%	6.6%	7.4%	15.8%	15.4%
RJ1	*	Guy's and St Thomas' NHS FD Trust	73	2.7%	2.0%	5.5%	4.1%	7.0%	6.7%	4.1%	3.9%
RVF		Gwent Healthcare NHS Trust	15	0.0%	0.0%	0.0%	0.0%	.	.	0.0%	0.0%
RR1	*	Heart of England NHS FD Trust	53	1.9%	2.5%	1.9%	2.2%	17.0%	16.1%	18.9%	16.9%
RWA	*	Hull and East Yorkshire Hospitals NHS Trust	39	2.6%	2.4%	2.6%	2.5%	5.3%	5.1%	5.1%	4.3%
RYJ	*	Imperial College Healthcare NHS Trust	88	2.3%	2.3%	3.4%	3.4%	10.5%	11.2%	3.4%	3.5%
RXN	*	Lancashire Teaching Hospitals NHS FD Trust	29	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
RR8	*	Leeds Teaching Hospitals NHS Trust	187	3.7%	4.1%	7.0%	7.5%	9.7%	9.3%	13.9%	13.1%
RWF	*	Maidstone and Tunbridge Wells NHS Trust	80	2.5%	2.3%	7.5%	7.1%	9.0%	10.2%	8.8%	11.0%
RQ8	*	Mid Essex Hospital Services NHS Trust	51	2.0%	1.7%	2.0%	1.9%	.	.	5.9%	5.9%
RM1	*	Norfolk and Norwich University Hospital NHS Trust	105	6.7%	7.5%	6.7%	6.9%	10.6%	10.3%	14.3%	12.7%
RNL		North Cumbria Acute Hospitals NHS Trust	49	0.0%	0.0%	4.1%	4.4%	13.0%	12.1%	8.2%	7.3%
RT9		North East Wales NHS Trust	49	6.1%	7.9%	8.2%	9.4%	.	.	2.0%	2.6%
RJL		Northern Lincolnshire and Goole Hospitals NHS FD Trust	13	7.7%	5.1%	30.8%	19.2%	7.7%	9.1%	23.1%	23.1%
RX1	*	Nottingham University Hospitals NHS Trust	196	6.1%	4.7%	9.2%	7.0%	9.7%	8.8%	5.6%	5.1%
RTH	*	Oxford Radcliffe Hospitals NHS Trust	66	3.0%	4.5%	4.5%	6.3%	6.1%	6.0%	7.6%	7.1%
RW6	*	Pennine Acute Hospitals NHS Trust	69	2.9%	3.2%	5.8%	6.6%	4.3%	4.5%	2.9%	2.7%
RK9	*	Plymouth Hospitals NHS Trust	66	6.1%	4.3%	7.6%	5.1%	3.0%	3.0%	4.5%	4.2%
RHU	*	Portsmouth Hospitals NHS Trust	57	5.3%	7.4%	7.0%	10.0%	12.3%	12.8%	14.0%	17.6%
RHW	*	Royal Berkshire NHS FD Trust	19	10.5%	10.5%	10.5%	10.4%	15.8%	16.3%	5.3%	4.3%
RDZ	*	Royal Bournemouth and Christchurch Hospitals NHS FD Trust	44	6.8%	9.1%	9.1%	9.7%	0.0%	0.0%	0.0%	0.0%
REF		Royal Cornwall Hospitals NHS Trust	36	2.8%	2.8%	2.8%	2.7%	5.6%	5.3%	8.3%	7.6%

NHS trusts in comparative analysis of complication rates continued

Code		NHS Trust name	No. of patients	30-day mortality		90-day mortality		Reoperation		Anastomotic leak	
				Crude	Adjusted	Crude	Adjusted	Crude	Adjusted	Crude	Adjusted
RH8		Royal Devon and Exeter NHS FD Trust	62	0.0%	0.0%	1.6%	1.8%	11.3%	10.9%	12.9%	10.7%
RA2	*	Royal Surrey County Hospital NHS Trust	87	3.4%	3.1%	5.7%	5.1%	0.0%	0.0%	2.3%	3.0%
RM3	*	Salford Royal Hospitals NHS FD Trust	73	6.8%	4.8%	9.6%	7.2%	16.7%	15.9%	5.5%	5.2%
RHQ	*	Sheffield Teaching Hospitals NHS FD Trust	96	5.2%	4.8%	6.3%	6.1%	7.4%	7.5%	6.3%	5.6%
RM2	*	South Manchester University Hospitals NHS Trust	42	2.4%	3.8%	2.4%	3.7%	9.5%	9.5%	2.4%	2.3%
RTR	*	South Tees Hospitals NHS Trust	83	2.4%	2.4%	2.4%	2.6%	5.1%	5.2%	0.0%	0.0%
RHM	*	Southampton University Hospitals NHS Trust	77	1.3%	2.1%	1.3%	1.9%	9.2%	8.8%	7.8%	7.1%
RWJ		Stockport NHS FD Trust	21	9.5%	9.1%	9.5%	9.1%	.	.	23.8%	24.3%
RVC		Swansea NHS Trust	19	0.0%	0.0%	0.0%	0.0%	.	.	0.0%	0.0%
RMP		Tameside Hospital NHS FD Trust	34	8.8%	9.3%	14.7%	14.5%	.	.	5.9%	5.9%
RBQ	*	The Cardiothoracic Centre - Liverpool NHS Trust	58	3.4%	3.9%	3.4%	3.8%	1.7%	1.8%	1.7%	1.7%
RTD	*	The Newcastle Upon Tyne Hospitals NHS Trust	198	2.5%	2.5%	3.0%	3.0%	9.2%	9.3%	13.1%	13.4%
RPY	*	The Royal Marsden NHS FD Trust	84	0.0%	0.0%	0.0%	0.0%	7.1%	7.0%	4.8%	4.8%
RA7	*	United Bristol Healthcare NHS Trust	119	0.8%	1.0%	4.2%	4.6%	11.8%	12.1%	9.2%	10.9%
RWD		United Lincolnshire Hospitals NHS Trust	16	6.3%	8.3%	6.3%	7.2%	0.0%	0.0%	0.0%	0.0%
RRV	*	University College London Hospitals NHS FD Trust	21	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.8%	4.4%
RRK	*	University Hospital Birmingham NHS FD Trust	48	2.1%	1.7%	6.3%	5.6%	22.9%	19.7%	12.5%	16.1%
RJE	*	University Hospital of North Staffordshire NHS Trust	79	2.5%	2.5%	7.6%	7.8%	11.5%	11.8%	8.9%	9.0%
RKB	*	University Hospitals Coventry and Warwickshire NHS Trust	80	10.0%	9.8%	13.8%	13.6%	.	.	2.5%	2.7%
RWE	*	University Hospitals of Leicester NHS Trust	43	9.3%	8.7%	9.3%	9.5%	18.6%	17.8%	11.6%	10.6%
RTX		University Hospitals of Morecambe Bay NHS Trust	17	11.8%	7.4%	11.8%	8.3%	.	.	0.0%	0.0%
RCB		York Hospitals NHS Trust	18	11.1%	12.2%	16.7%	18.0%	.	.	16.7%	18.0%

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Glossary

Adjuvant treatment
An additional therapy (eg chemotherapy or radiotherapy) provided to improve the effectiveness of the primary treatment (eg surgery). This may aim to reduce the chance of local recurrence of the cancer or to improve the patient's overall chance of survival.

Ablation
A palliative technique (performed by laser or argon beam coagulation) that aims to reduce symptoms by destroying the surface of the tumour, thereby shrinking it in size.

AUGIS
Association of Upper GI Surgeons

BSG
British Society of Gastroenterology

BASO
British Association of Surgical Oncology

Brachytherapy
Brachytherapy is a palliative treatment that involves inserting radioactive beads into the tumour. The radiation from these beads then slowly shrinks the tumour over time.

Cancer Registry
The Cancer Registries (eight in England, and one each for Wales, Scotland and Northern Ireland) collect, analyse and report data on cancers in their area, and submit a standard dataset on these registrations to the Office for National Statistics.

CASU
The Clinical Audit Support Unit, formally known as NCASP, is part of the NHS Information Centre for Health and Social Care, and manages a number of national clinical audits in the areas of cancer, diabetes and heart disease. It is one of the key stakeholders leading the Audit.

Chemotherapy
Drug therapy used to treat cancer. It may be used alone, or in conjunction with other types of treatment (eg surgery or radiotherapy).

CRG
The Audit's Clinical Reference Group is comprised of representatives of the key stakeholders in oesophago-gastric cancer care. They advise the Project Team on particular aspects of the project and provide input from the wider clinical and patient community.

CEU
The Clinical Effectiveness Unit is an academic collaboration between The Royal College of Surgeons of England and the London School of Hygiene and Tropical Medicine, and undertakes national surgical audit and research. It is one of the key stakeholders leading the Audit.

Clinical Nurse Specialists (CNS)
These are experienced, senior nurses who have undergone specialist training. They play an essential role in improving communication with a cancer patient, being a first point of contact for the patient and coordinating the patient's treatment.

CT-scan
(Computer Tomography) An imaging modality that uses X-ray radiation to build up a 3-dimensional image of the body. It is used to detect distant abnormalities (such as metastases) but has a limited resolution, so is less useful for detecting smaller abnormalities (such as in lymph nodes).

Curative care
This is where the aim of the treatment is to cure the patient of the disease. It is not possible to do this in many patients with O-G cancer and is dependent on how far the disease has spread and the patient's general health and physical condition.

Dysphagia
A symptom where the patient experiences difficulty swallowing. They often complain that the food sticks in their throat. It is the commonest presenting symptom of oesophageal cancer

Endoscopy
An investigation whereby a telescopic camera is used to examine the inside of the digestive tract. It can be used to guide treatments such as stents (see below).

Endoscopic ultrasound (EUS)
An investigation that uses an ultrasound probe on the end of a telescope. It is used to determine how deep into the surrounding tissues a cancer has invaded and to what extent it has spread to local lymph nodes.

Endoscopic palliative therapies
These are treatments that aim to relieve symptoms, such as vomiting or swallowing difficulties, by using a telescopic camera to guide instruments that can relieve the blockage. Examples include stents, laser therapy and brachytherapy.

Gastric
An adjective used to describe something that is related to or involves the stomach, eg gastric cancer is another way of saying stomach cancer.

Gastrectomy
A surgical procedure to remove either a section (a partial gastrectomy) or all (a total gastrectomy) of the stomach. In a total gastrectomy, the oesophagus is connected to the small intestine.

HES
Hospital Episode Statistics is a database which contains data on all in-patients treated within NHS Trusts in England. This includes details of admissions, diagnoses and those treatments undergone.

ICD10
International Statistical Classification of Diseases and Related Health Problems 10th Revision.

The Information Centre
The NHS Information Centre is a special health authority that provides facts and figures to help the NHS and social services run effectively. The National Clinical Audit Support Programme (NCASP) is one of its key components.

Laparoscopy
This is often called "keyhole surgery" and involves inserting a small camera into the belly through a small cut, so as to either guide the operation or to look at the surface of the abdominal organs and so accurately stage the disease.

Laser therapy
This is a technique that uses a laser to destroy the surface of the tumour and thereby relieve any blockage. It is a palliative technique only.

Lymph nodes
Lymph nodes are small oval bits of tissue that form part of the immune system. They are distributed throughout the body and are usually the first place to which cancers spread.

Metastases
Metastases are deposits of cancer that occur when the cancer has spread from the place in which it started to other parts of the body. These are commonly called secondary cancers. Disease in which this has occurred is known as metastatic disease.

MDT
The multi-disciplinary team is a group of professionals from diverse specialties that works to optimise diagnosis and treatment throughout the patient pathway.

Minimally invasive surgery
A procedure performed through the skin or anatomical opening using a laparoscopic instrument rather than through an opening. Full minimally invasive oesophagectomies involve thoracoscopy for the chest-phase of the operation and laparoscopy for the abdominal phase. Oesophagectomies using minimally invasive techniques for only the abdominal or chest phase are commonly referred to as hybrid operations.

Neoadjuvant chemotherapy
Chemotherapy given before another treatment, usually surgery. This is usually given to reduce the size, grade or stage of the cancer and therefore improve the effectiveness of the surgery performed.

NCEPOD
National Confidential Enquiry into Patient Outcome and Death. NCEPOD is an independent, government-funded body whose remit is to examine medical and surgical care, often by undertaking confidential surveys and research.

Neoplasm
A neoplasm or tumour is an abnormal mass of tissue that results when cells divide more than they should or do not die when they should. Neoplasms may be benign (not cancerous), or malignant (cancerous).

NICE
The National Institute of Health and Clinical Excellence is an independent organisation responsible for providing national guidance on the promotion of good health and the prevention and treatment of ill health.

Oesophagus
The portion of the digestive tract that carries food from the bottom of the throat to the top of the stomach. It is also known as the gullet or the foodpipe.

Oesophagectomy
The surgical removal of all or part of the oesophagus. The procedure can be performed by opening the thorax (a trans-thoracic oesophagectomy) or through openings in the neck and abdomen (a trans-hiatal oesophagectomy).

Oncology
The branch of medicine which deals with the non-surgical treatment of cancer, such as chemotherapy and radiotherapy.

ONS
The Office for National Statistics (ONS) is the government department responsible for collecting and publishing official statistics about the UK's society and economy. This includes cancer registration data.

Pathology
The branch of medicine that deals with tissue specimens under a microscope to determine the type of disease and how far a cancer has spread within the specimen (ie, whether a tumour has spread to the edges of the specimen or lymph nodes).

Palliative care
Palliative care is the care given to patients whose disease cannot be cured. It aims to improve quality of life rather than extend survival and concentrates on relieving physical and psychological distress.

PET
A new imaging technique that detects cancer spread or metastases by looking at how fast radioactive sugar molecules are used by different parts of the body. Cancer cells use sugar at a very high rate so show up brightly on this test.

Radiology
The branch of medicine that involves the use of imaging techniques (such as X-rays, CT Scans and PET scans) to diagnose and stage clinical problems.

Radiotherapy
A treatment that uses radiation to kill tumour cells and so shrink the tumour. In most cases, it is a palliative treatment but it can be used together with surgery or chemotherapy in a small number of patients as part of an attempt at cure.

RCS
The Royal College of Surgeons of England is an independent professional body committed to enabling surgeons to achieve and maintain the highest standards of surgical practice and patient care. As part of this it supports audit and the evaluation of clinical effectiveness for surgery.

Stage
The extent to which the primary tumour has spread. Stage is usually classified using the TNM system. This captures: the size and spread of the tumour (T), whether cancer cells have spread to lymph nodes (N), and whether the cancer has spread to another part of the body (M). The levels of T, N and M can also be combined to give a number from 0 to IV (see table below) for oesophageal and stomach cancer. For more information, visit www.cancerhelp.org.uk.

Staging
The process by which the stage (or extent of spread) of the tumour is determined through the use of various investigations.

Stent
A device used to alleviate swallowing difficulties or vomiting in patients with incurable O-G cancer. It is a collapsible tube that is inserted into the area of narrowing (under either endoscopic or radiological control) that then expands and relieves the blockage.

Surgical resection
An operation whose aim is to completely remove the tumour.

Ultrasound
An imaging modality that uses high frequency sound waves to create an image of tissues or organs in the body.

Urgent (fast-track) referral
This is a referral mechanism used by General Practitioners (GPs) when they suspect the patient may have cancer. It ensures that the patient will be seen faster than would otherwise be the case.

Stage	Oesophageal carcinomas	Stomach carcinomas
0 (carcinoma in situ)	cancer is found only in the mucosal (innermost) layer of the oesophagus.	cancer is found only in the mucosal (innermost) of the four layers of the stomach wall.
I	cancer spread beyond the innermost layer of cells to the next layer of tissue in the wall of the oesophagus	cancer spread through the mucosal layer, and is found in nearby lymph nodes (1-6) or in the second layer of the stomach.
II	cancer spread to any of the first three layers of the oesophagus and to nearby lymph nodes.	cancer spread to the second layer and more distant lymph nodes, or the third layer and only nearby lymph nodes, or all four layers but not the lymph nodes.
III	cancer spread to the outer wall of the oesophagus and may have spread to tissues or lymph nodes near the oesophagus.	cancer spread to the third layer and more distant lymph nodes, or to the fourth layer and either nearby tissues or lymph nodes
IV	cancer spread to distant lymph nodes, or other parts of the body.	cancer has spread to nearby tissues and more distant lymph nodes, or other parts of the body

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Need to know more?

T. 0845 300 6016
E. enquiries@ic.nhs.uk
www.ic.nhs.uk

The NHS Information Centre
for health and social care
1 Trevelyan Square
Boar Lane
Leeds
LS1 6AE