

Gastrectomy & Oesophagectomy in Queensland 2012



Queensland
Government

Acknowledgements

The Queensland Oesophago-Gastric Cancer Collaborative (QOGCC) was established in 2008 as a subcommittee of The Queensland Cancer Control Safety and Quality Partnership, a declared quality assurance committee under section 32(1) of the Health Services Act 1991; in response to an evaluation of cancer outcomes for patients receiving surgery for gastric cancer in Queensland.

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Message from the Chair

All states and territories in Australia are examining the results from complex surgical procedures with the aim to ensure the best outcomes for patients. Thus it is timely that we present - "Gastrectomy & Oesophagectomy in Queensland 2012".

This report, for the first time in Queensland, assesses the patterns of surgery for patients with gastric and oesophageal cancer at public and private, teaching and non-teaching, metropolitan and regional hospitals from the year 2000. Gastric and oesophageal cancer are not common cancers but the management of patients with these diseases is complex. Patients require care from a multidisciplinary team to ensure they receive the appropriate treatment that will lead to the best outcomes. There are many factors that influence the clinician and patient's choice of treatment for gastric and oesophageal cancer, including where treatment is best provided. By providing information on the patterns of surgery and outcomes this report should help guide these decisions.

This report reveals differences between hospitals which may not be obvious in daily clinical practice but become clear with this type of analysis. There were better outcomes for patients undergoing a gastrectomy or an oesophagectomy for cancer when they had their surgery in hospitals that perform higher volumes of these operations. The issue of volume of surgery and outcome is complex and not purely about the number of cases. However this information offers insights to guide recommendations and future practice. Preparing this report is an important first step in raising awareness amongst individual hospitals of the link between surgical volume and outcomes in Queensland.

I encourage you to consider how this information will inform just how gastric and oesophageal cancer is managed in your jurisdiction in Queensland. Gastrectomy and oesophagectomy surgery in Queensland will continue to be monitored with a focus on ensuring the best possible outcomes for our patients.

I wish to acknowledge the commitment of the members of QCCAT in providing the information, analysis, statistics and engagement of the clinicians that have led to this report. As well it is important to recognise the input of the many clinicians that have been involved in the discussion and development of the recommendations in the management of these diseases.



Mark Smithers
Chair, Queensland Oesophago Gastric Collaborative
Queensland Cancer Control Safety and Quality Partnership

Highlights

This report provides information on gastric and oesophageal cancer incidence and mortality in Queensland by Hospital and Health Service and presents information on the surgical management of these cancers across the state. It is the first of a series of reports that describe the delivery and outcome of complex and specialised cancer surgery in Queensland.

Queensland Incidence and Mortality

More than 1,000 people are estimated to be living with oesophago-gastric cancers in Queensland in 2012, and around 700 new cases – 500 in males and 200 in females – are expected to be diagnosed in 2013. The total incidence is increasing due to population growth and ageing, but the age-standardised incidence rate of gastric cancer has decreased from 15 per 100,000 in 1982 to 7 per 100,000 in 2009 and increased for oesophageal cancer from 3.8 in 1982 to 5.6 per 100,000 in 2009. Mortality rates follow and have dropped from 9 per 100,000 in 1982 to 5 per 100,000 in 2009 for gastric cancer and increased slightly from 3 per 100,000 in 1982 to 4 per 100,000 in 2009 for oesophageal cancer.

Hospital and Health Service Survival

There is regional variation in survival of oesophago-gastric cancer across the state. Generally residents of Hospital and Health Service outside the south east corner experience lower survival from oesophago-gastric cancer. Central West has the lowest 5 year survival at 13% and Cairns and Hinterland, Metro North, Cape York, Gold Coast and, Metro South have the highest 5 year survival at 22%.

Surgical Overview

Compared to other countries, Queensland has one of the lowest postoperative mortality rates for oesophago-gastric cancer surgery. However, there is significant variation across hospitals in the volume and outcome of oesophago-gastric cancer surgery. Between 2000 and 2007, 50 hospitals across Queensland performed gastrectomy for cancer at rates ranging from 0.1 to 13 cases per year. In the same period, 27 hospitals performed oesophagectomy for cancer at rates ranging from 0.1 to 20 cases per year. Postoperative mortality rates were generally higher among low volume hospitals with this trend persisting when adjusted for case mix.

Part 1

A Surgical Overview 2000 – 2007: Gastrectomy and Oesophagectomy



Introduction

Oesophago-gastric cancer is a low volume cancer in Australia which requires a multidisciplinary approach to its management. Numerous studies have shown that patients undergoing complex surgeries have better outcomes at hospitals that perform such procedures in large volumes.^{1,2} Most of these studies were conducted in the US and UK, where average hospital volumes are larger than in Australia. Results from similar studies in this country have been inconsistent, possibly due to heterogeneity in the range of volumes as well as in the types of surgeries and outcomes examined.

The higher risk of postoperative death in low volume hospitals has led to the centralisation of gastro-intestinal cancer surgery in the UK.^{3,4} This approach is still being debated in the US, where the majority of patients receive care from low-volume hospitals despite evidence of adverse outcomes.⁵ Other approaches have also been considered, including public reporting of hospital mortality data and improving support infrastructures at low-volume hospitals.

Compared to other countries, Queensland has low 30 day postoperative mortality rates for oesophago-gastric cancer surgery (Figure 1). Despite this, there is variation in the outcomes of oesophago-gastric cancer surgery in Queensland, indicating that volume-outcome trends exist for oesophago-gastric cancer surgery in Queensland.

Part one provides an overview of the surgical management of oesophago-gastric cancers in Queensland.

*Figure 1: 30 day Postoperative mortality rates following either gastrectomy or oesophagectomy in Queensland (2000-2007) and other countries**



*Each bar represents the range of 30-day postoperative mortality rates for either gastrectomy or oesophagectomy. Values for the US and the UK were derived from rates reported in the literature^{4,5,6}.

Methods

Surgeon Volume

This report is focused on hospital volume rather than individual surgeon volume. It is acknowledged that many surgeons perform gastrectomy and oesophagectomy across multiple hospitals, both in the public and private sectors.

Patients

Patients were identified from the Queensland Oncology Repository (QOR). The repository houses routine electronic data collected from various systems within Queensland Health. All records in QOR are linked through a rule-based matching and linkage process using demographic and hospital identifiers. Disease and surgical procedure data in QOR are coded following the International Statistical Classification of Diseases and Related Health Problems 10th Revision, Australian Modification (ICD-10-AM).

The patients included in the analysis of surgical outcomes had a primary diagnosis of either oesophageal (C15) or stomach (C16) cancer between 2000 and 2007, were adult (>18 yrs) residents of Queensland at time of diagnosis, and had a record of oesophagectomy or gastrectomy at a public or private Queensland hospital.

Classification of Resection

ICD classification and coding practices currently limit the accuracy of primary site designation for oesophago-gastric cancers, particularly those arising at the junction between the oesophagus and the stomach. In this analysis, resections are classified into oesophagectomy or gastrectomy based on the extent of the resection.

Gastrectomy has been defined as a resection for patients who underwent any of the following procedures:

- Total or radical gastrectomy only,
- Total or radical gastrectomy and partial oesophagectomy , or
- Subtotal or partial (distal or proximal) gastrectomy only

Oesophagectomy has been defined as a resection for patients who underwent either:

- Oesophagectomy only, or
- Oesophagectomy and partial or subtotal gastrectomy

Those who underwent gastrectomy or oesophagectomy for causes other than oesophago-gastric cancer were excluded. In cases of patients undergoing both gastrectomy and oesophagectomy at different periods, patients were assigned to the resection group based on the most recent resection performed.

Hospital Volume

Between 2000 and 2007, 50 hospitals performed gastrectomy and 27 performed oesophagectomy. For each resection, hospitals were ranked according to the average annual number of cases performed over the 8-year period, then divided

into low and high volume groups. For gastrectomy, the median annual volume of 5 cases per year was used to divide the hospitals into two groups with similar numbers of patients in each group. For oesophagectomy, the high volume group consisted of two hospitals that each performed an average of 17 oesophagectomies per year, while the low volume group included 25 hospitals that each performed less than 8 cases per year.

Postoperative Mortality

Postoperative mortality has been defined as any patient who dies within 30 days of undergoing either gastrectomy or oesophagectomy. If two or more hospitals perform a resection on the same patient the death is assigned to the hospital that performed the most recent resection.

2-year Survival

In addition to postoperative mortality, 2-year survival was also analysed for patients who survived the 30-day postoperative period. As with postoperative mortality, death within 2 years of surgery is assigned to the hospital that performed the most recent resection.

Statistical Analysis

The effect of hospital volume on postoperative mortality and 2-year survival for postoperative survivors was estimated through multivariate Cox proportional hazards regression, controlling for case-mix and within-hospital clustering to account for the correlation of outcomes in patients treated by the same hospital.

Oesophago-gastric Resections

One third (34%) of all Queensland patients with oesophago-gastric cancer diagnosed between 2000 and 2007 underwent either gastrectomy or oesophagectomy. The mean age for resection is 67 years, compared to 71 years for those who did not undergo resection (Table 1).

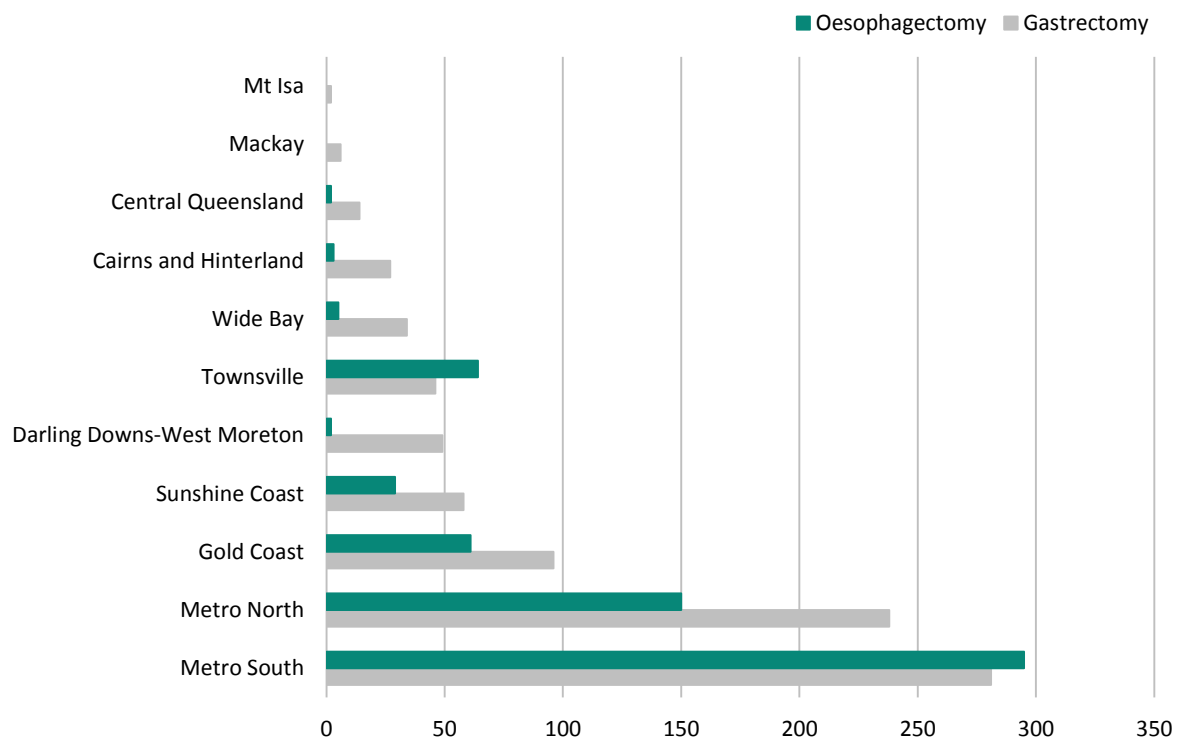
Table 1: Queensland oesophageal and gastric cancer patient characteristics, 2000-2007

	Had resection	No resection	All
Incidence	1,470	2,852	4,322
Male (%)	72	66	68
Mean age (years)	67	71	69

Source: Queensland Cancer Control Analysis Team

The Metro South HHS performed the most number of oesophago-gastric resections between 2000-2007, accounting for 39% of the total, followed by the Metro North HHS with 27% of the total (Figure 2).

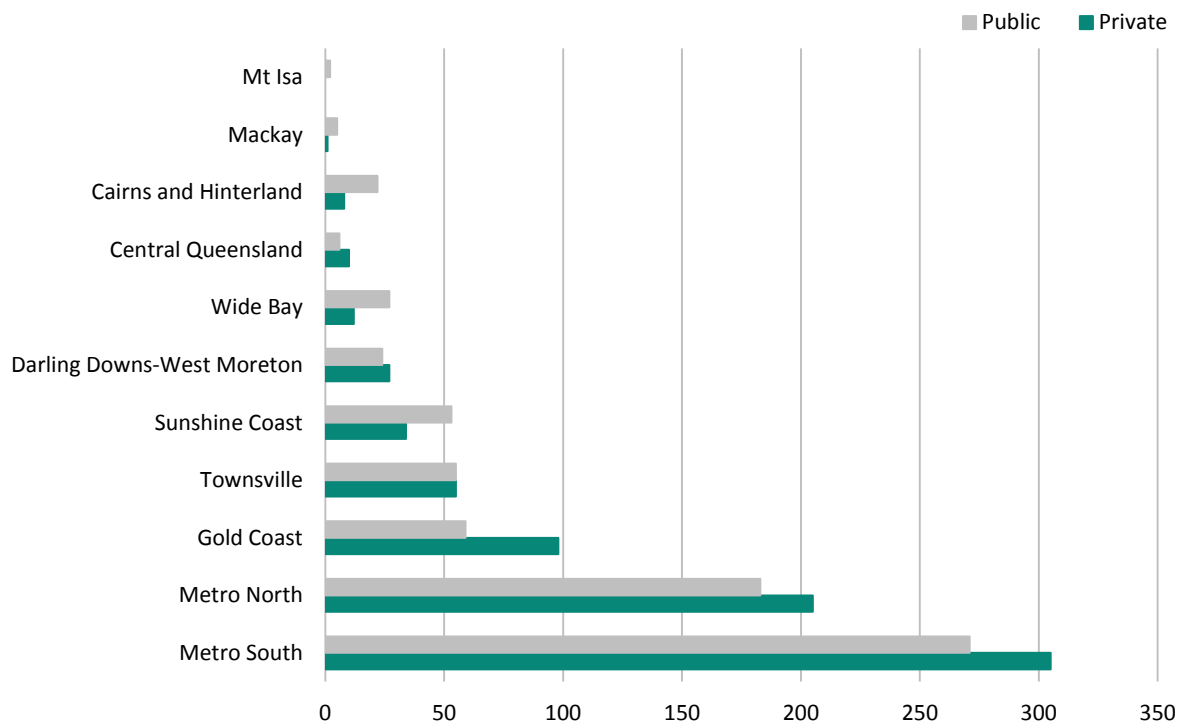
Figure 2: Number of oesophago-gastric cancer resections performed in Queensland for patients with oesophago-gastric cancers diagnosed in 2000-2007



Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

Almost half (48%) of all oesophago-gastric resections were performed in the public health sector, but the proportion varies across health services. In both Metro South and Metro North, more resections were performed in the private sector, while in many rural and regional health services, more resections were performed in the public sector (Figure 3).

Figure 3: Number of oesophago-gastric cancer resections by hospital health sector (public or private) for patients with oesophago-gastric cancers diagnosed in 2000-2007



Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

Gastrectomy 2000-2007

Summary of inclusions

Year diagnosed	2000-2007
Primary site	Stomach (C16) or oesophagus (C15), invasive cancer*
Procedure	Gastrectomy ⁺
Hospital	Public and private
Residence	Queensland only
Age at diagnosis	≥18

*Patients who underwent gastrectomy for non-cancer causes such as gastric ulcer are not included

⁺Includes patients who underwent either a Total or Radical Gastrectomy only; Total or Radical Gastrectomy and Partial Oesophagectomy; or Subtotal or Partial (distal or proximal) Gastrectomy only.

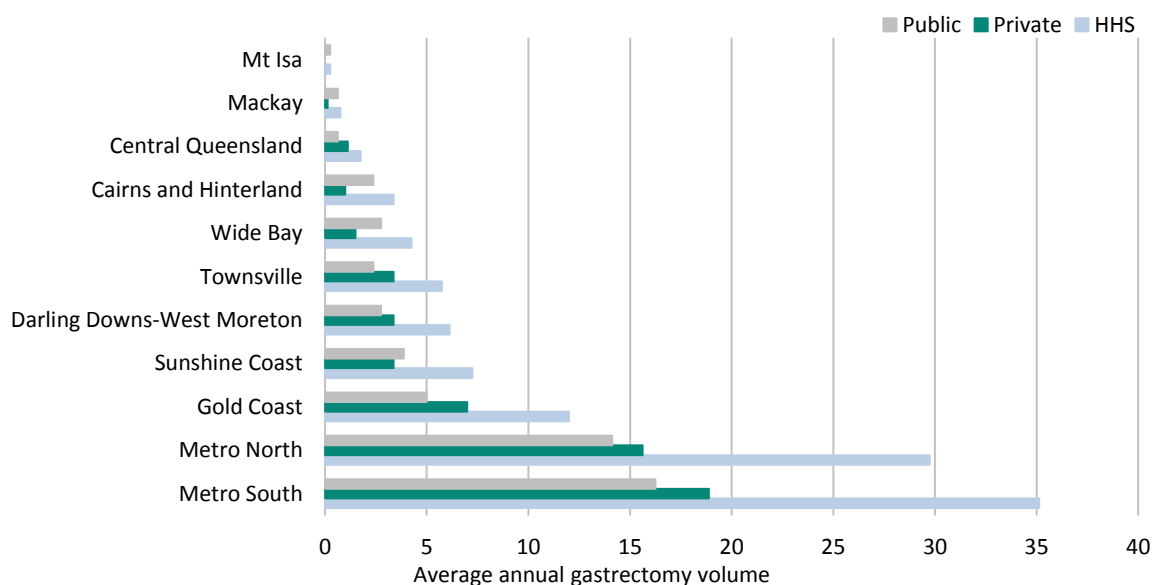
Patient Characteristics

A total of 851 patients underwent a gastrectomy between 2000-2007. Males accounted for 67%, while the mean age was 69 years.

Hospital and Health Services Volumes

Hospitals located in the Metro South HHS performed the majority of gastrectomy (33%) followed by Metro North Hospital and Health Service (28%). Almost half (48%) were performed in public hospitals (Figure 4).

Figure 4: Annual average gastrectomy volume, by Hospital and Health Service, Queensland, 2000-2007



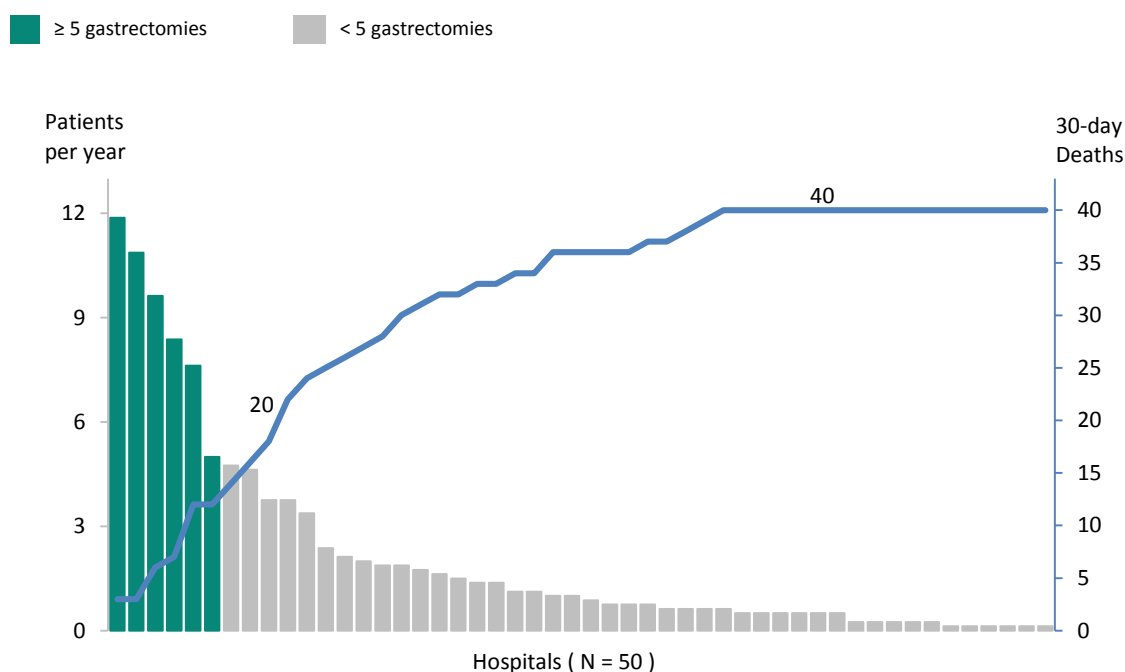
Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

Hospital Volumes

A total of 851 gastrectomies were performed on oesophago-gastric cancer patients between 2000 and 2007, across 50 Queensland hospitals. On average, individual hospital gastrectomy volumes ranged from 0.1 to 11.9 cases per year. Six hospitals performed more than 5 gastrectomies per year and accounted for half of all gastric cancer resections in the state. The majority of the other hospitals were regional hospitals that performed one or fewer gastrectomies on cancer patients per year (Figure 5).

On average 29 hospitals performed gastrectomies each year between 2000 and 2007. This trend continued with 26 hospitals continuing to perform gastrectomies in 2009.

Figure 5: Annual average gastrectomy volume in Queensland hospitals, 2000-2007



Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

Table 2: Annual volume and postoperative mortality of gastrectomy for oesophago-gastric patients in Queensland hospitals, 2000-2007

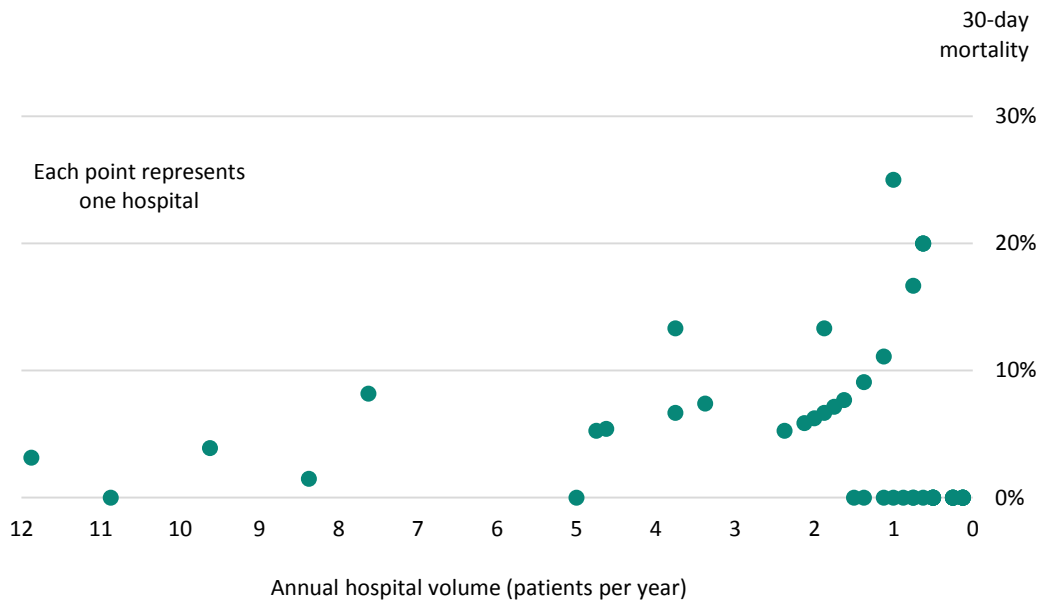
Gastrectomy volume	Low	High	Total
Number of patients	424	427	851
Number of hospitals	44	6	50
Number of 30-day deaths	28	12	40
30-day mortality	6.6%	2.8%	4.7%
Annual volume	<5	≥5	<1 - 12

Source: Queensland Cancer Control Analysis Team

Postoperative Mortality

Forty patients (4.7%) died within 30 days of surgery, 73% of which occurred in low-volume centres that performed less than five surgeries per year (Figure 6).

Figure 6: Postoperative (30-day) mortality rates following gastrectomy in Queensland hospitals, 2000-2007



Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

Risk Groups

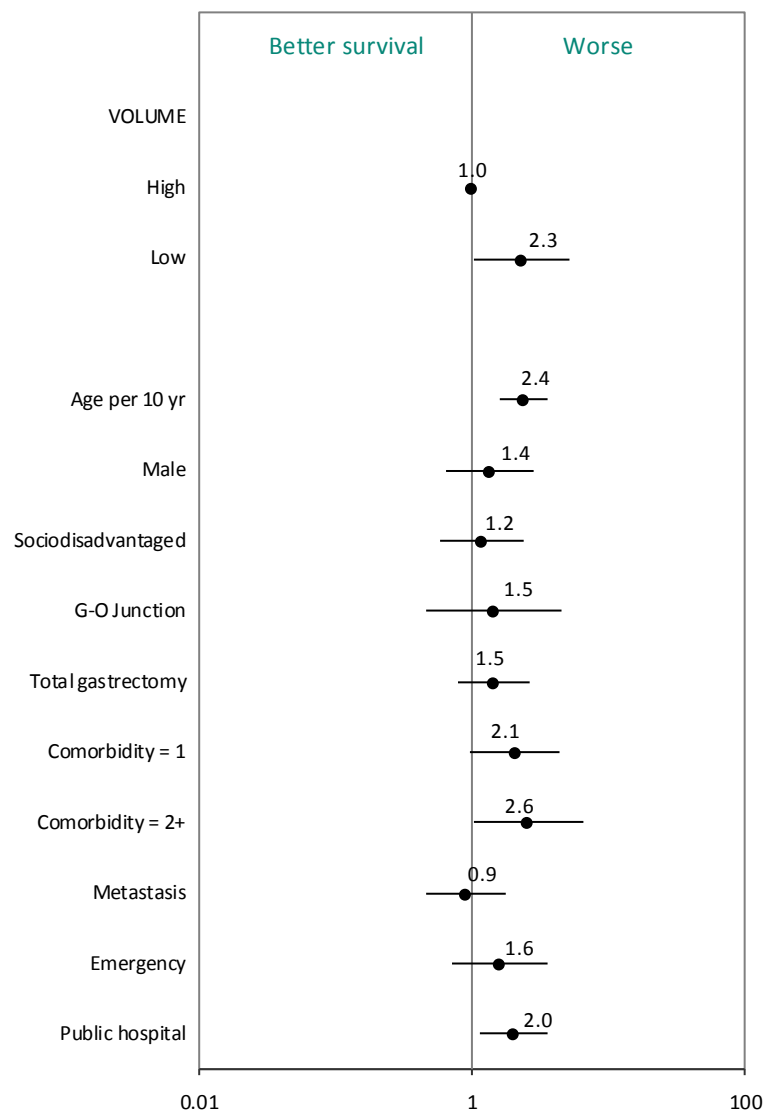
The risk of 30 day postoperative mortality was 2.3 times higher in low volume hospitals than in high volume hospitals.

In subgroup analysis, the risk was highest in patients of low volume hospitals who were older than 71 and had one or more comorbidities at the time of surgery. Postoperative deaths among these patients accounted for more than half of all surgical mortality.

Factors Affecting Postoperative Mortality

In multivariate analysis, the risk of postoperative death increased with age and was greater in patients with comorbidity as well as in those treated in public hospitals. Socioeconomic status, emergency admission, location of tumour, and complexity of procedure were not significant determinants of surgical mortality. When adjusted for emergency admission rates, comorbidity and case-mix the risk of postoperative mortality was 2.3 times higher in low volume hospitals (Figure 7).

Figure 7: Relative risk of 30-day mortality after gastrectomy; low volume refers to average hospital volumes of less than 5 gastrectomies per year



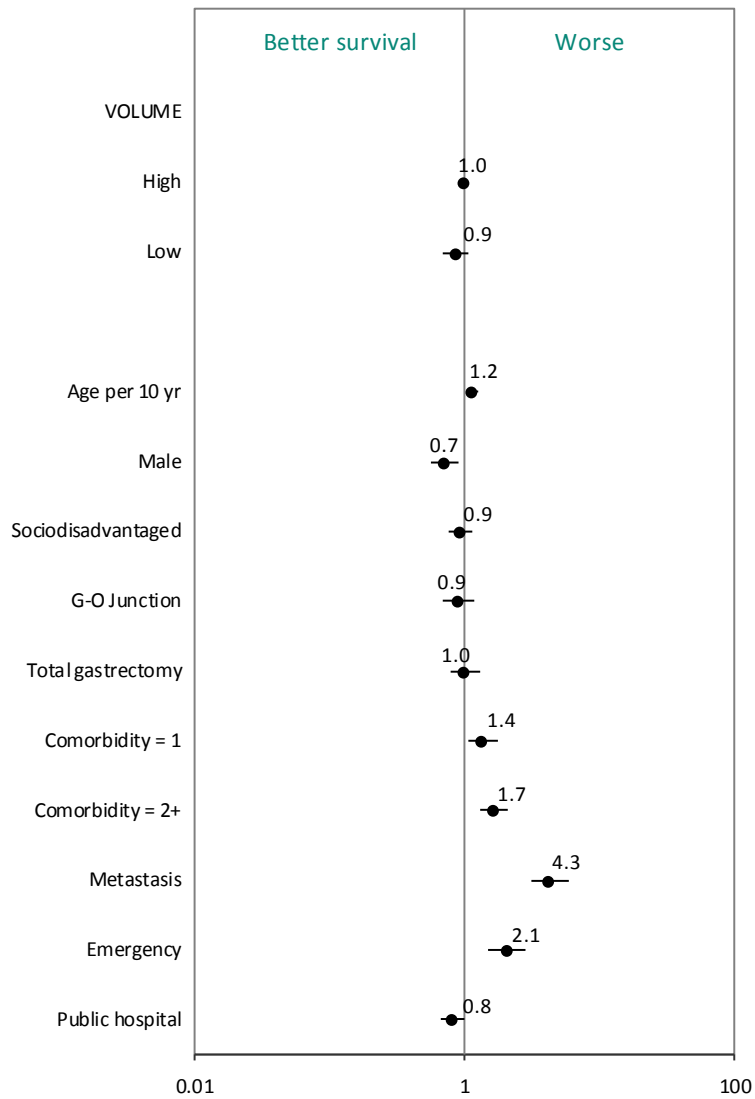
Source: Queensland Cancer Control Analysis Team

*Values are hazard ratios (HR) from multivariate Cox proportional hazards model; bars represent 95% confidence intervals.

Survival

There was no difference in the 2-year overall survival rate between low and high volume hospitals, even when adjusted for case-mix (Figure 8). Among patients who survived the 30-day postoperative period, public hospital patients had slightly better survival than private hospitals.

Figure 8: Relative risk of 2-year mortality among gastrectomy patients who survived the 30-day postoperative period after gastrectomy; low volume refers to average hospital volumes of less than 5 gastrectomies per year



Source: Queensland Cancer Control Analysis Team
 Values are hazard ratios (HR) from multivariate Cox proportional hazards model; bars represent 95% confidence intervals.

Very-low Volume Hospitals

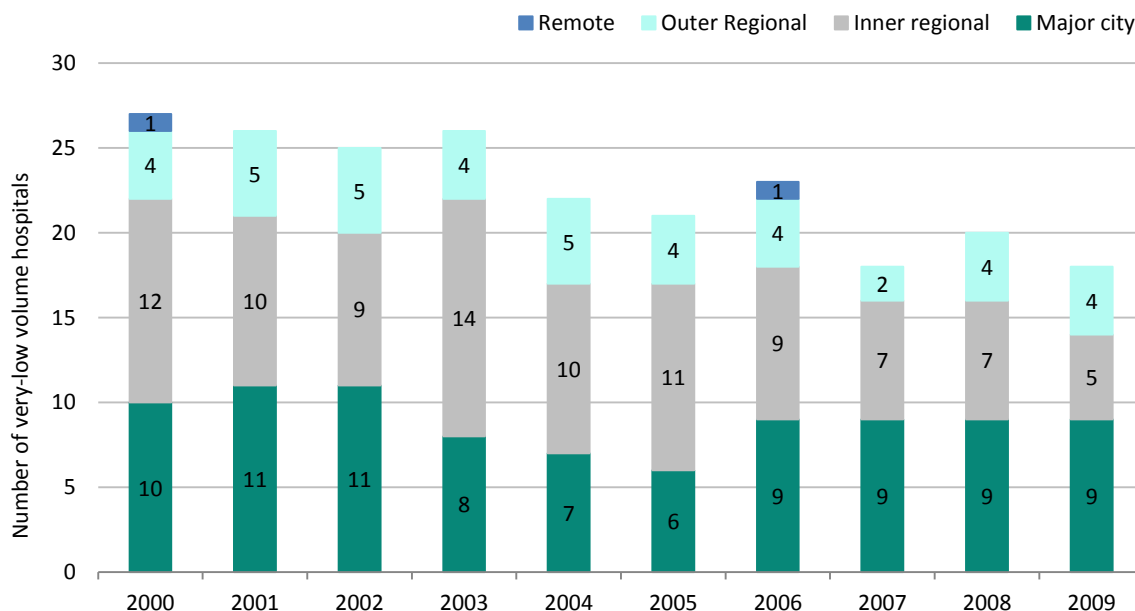
Thirty nine of the 44 low volume hospitals performed two or fewer gastrectomies per year. These very-low volume hospitals accounted for one third of all patients (262 out of 851), many of whom were treated at 25 centres that had average volumes of less than one gastrectomy per year.

Of the 40 postoperative deaths following gastrectomy, 16 (40%) occurred in very-low volume hospitals. Although the combined 30-day mortality rate at these hospitals is 6.1%, the individual hospital mortality rate ranged from 5% to 17% at nine hospitals and from 20% to 25% at four hospitals (Figure 6).

The majority of the very-low volume centres are situated in rural and regional Queensland, however 13 belong to, or are in the same geographic catchment as, a HHS that includes at least one high volume hospital. Of the 25 hospitals that performed less than one gastrectomy per year, six belong to the same HHS as a high volume hospital and the rest belong to the same health service as hospitals with annual volumes of 2 to 4 cases per year.

Recent data indicate that the number of very-low volume hospitals performing gastrectomy in any given year has dropped from 27 in 2000 to 18 in 2009 (Figure 9). The number of very-low volume hospitals located in inner regional Queensland has decreased from 12 in 2000 to 5 in 2009, but the number located in a major city area has not changed over time, with 10 hospitals in 2000 and 9 in 2009.

Figure 9: Number of very low-volume hospitals performing gastrectomy by hospital location, Queensland, 2000-2009



Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

Oesophagectomy 2000-2007

Background

This section describes the historical pattern of oesophagectomy volumes between 2000 and 2007. To determine whether outcome was related to hospital volume the statistical modelling created two groups: a high volume group consisting of patients at two hospitals that each performed an average of 17 oesophagectomies per year and a low volume group of patients at 25 hospitals that each performed less than 8 cases per year. The model was adjusted for clinical risk factors to describe the impact of hospital volume on 30 day postoperative mortality.

Because it is known that there are fewer hospitals performing this operation in recent times, a summary of more recent data is provided in the section titled 'Oesophagectomy 2008 - 2009'.

Summary of inclusions

Year diagnosed	2000-2007
Primary site	Oesophagus (C15) or stomach (C16), invasive cancer*
Procedure	Oesophagectomy+
Hospital	Public and private
Residence	Queensland only
Age at diagnosis	≥18

**Patients who underwent oesophagectomy for non-cancer causes are not included in this report*

+Includes patients who underwent either an oesophagectomy only or oesophagectomy and partial or subtotal gastrectomy

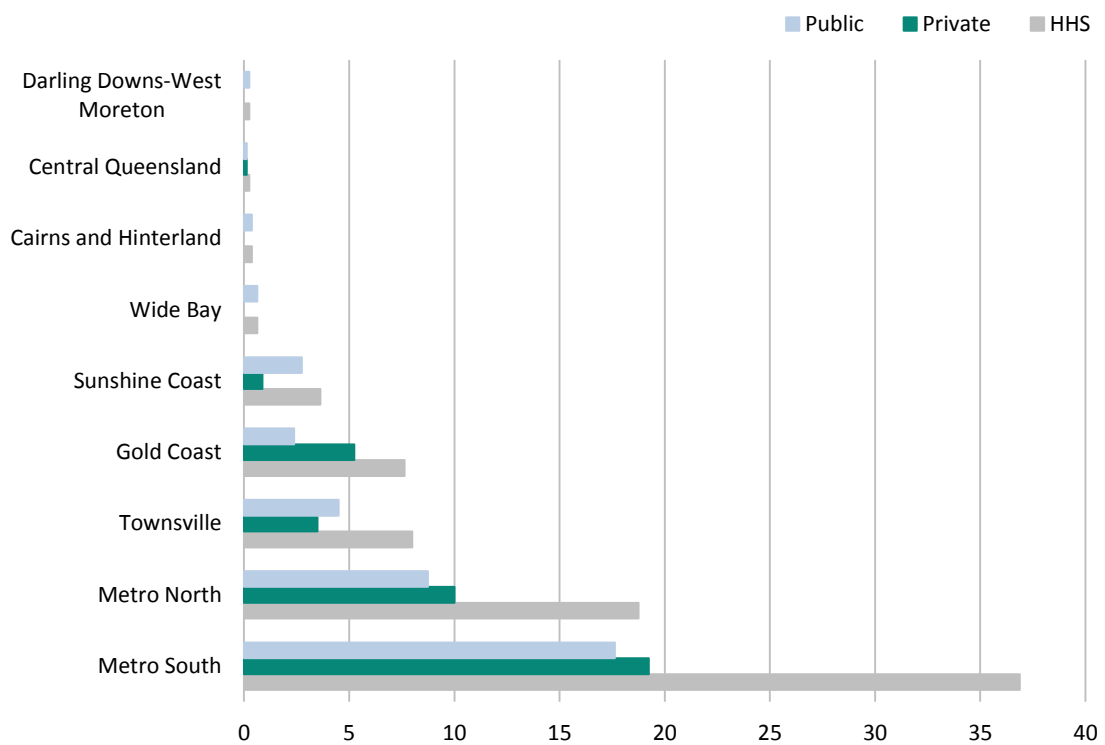
Patient Characteristics

A total of 611 patients underwent an oesophagectomy between 2000 -2007. Of these 67 underwent an oesophagectomy and total or partial gastrectomy. Males accounted for 72%. The mean age for oesophagectomy was 67.

Hospital and Health Service Volumes

Hospitals located in the Metro South HHS performed the majority of the oesophagectomies (48%), followed by Metro North HHS (25%). Between 2000 – 2007 49% of Queensland oesophagectomies were performed in public hospitals (Figure 10).

Figure 10: Annual oesophagectomy volume, Queensland oesophago-gastric cancer patients by Hospital and Health Services, 2000-2009



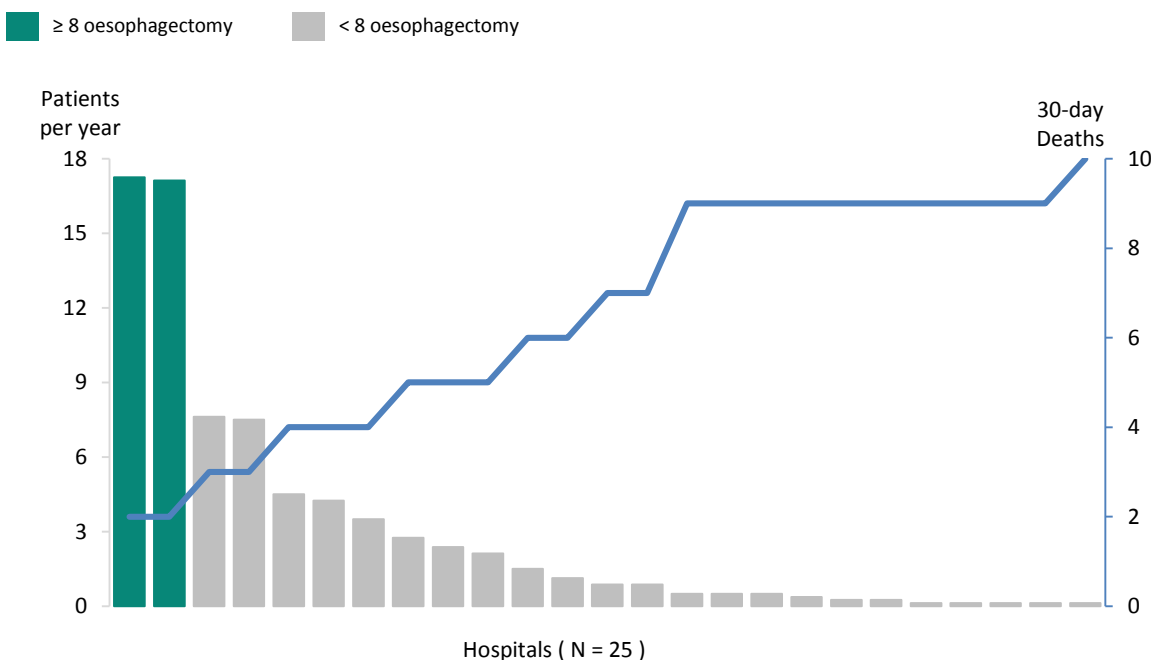
Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

Hospital Volumes

Between 2000 and 2007, 611 oesophagectomies were performed on oesophago-gastric cancer patients in 25 hospitals across Queensland. The average annual hospital volume ranged from 0.1 to 17.3 cases per year.

A total of 25 hospitals performed oesophagectomies between 2000 and 2007. Two hospitals performed more than 17 oesophagectomies per year and accounted for 45% of all oesophagectomies in the state. More than half of all hospitals performed one or fewer oesophagectomies per year during this time (Figure 11). In 2009, only 12 hospitals continued to perform oesophagectomies.

Figure 11: Average annual volume of oesophagectomies performed on oesophago-gastric cancer patients in Queensland hospitals, 2000-2007



Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

Table 3: Annual volume and postoperative mortality of oesophagectomy for oesophago-gastric patients in Queensland hospitals, 2000-2007

Oesophagectomy volume	Low	High	Total
Number of patients	179	432	611
Number of hospitals	23	2	25
Number of 30-day deaths	7	3	10
30-day mortality	3.9%	0.7%	1.6%
Annual volume	<8	≥8	<1 - 17

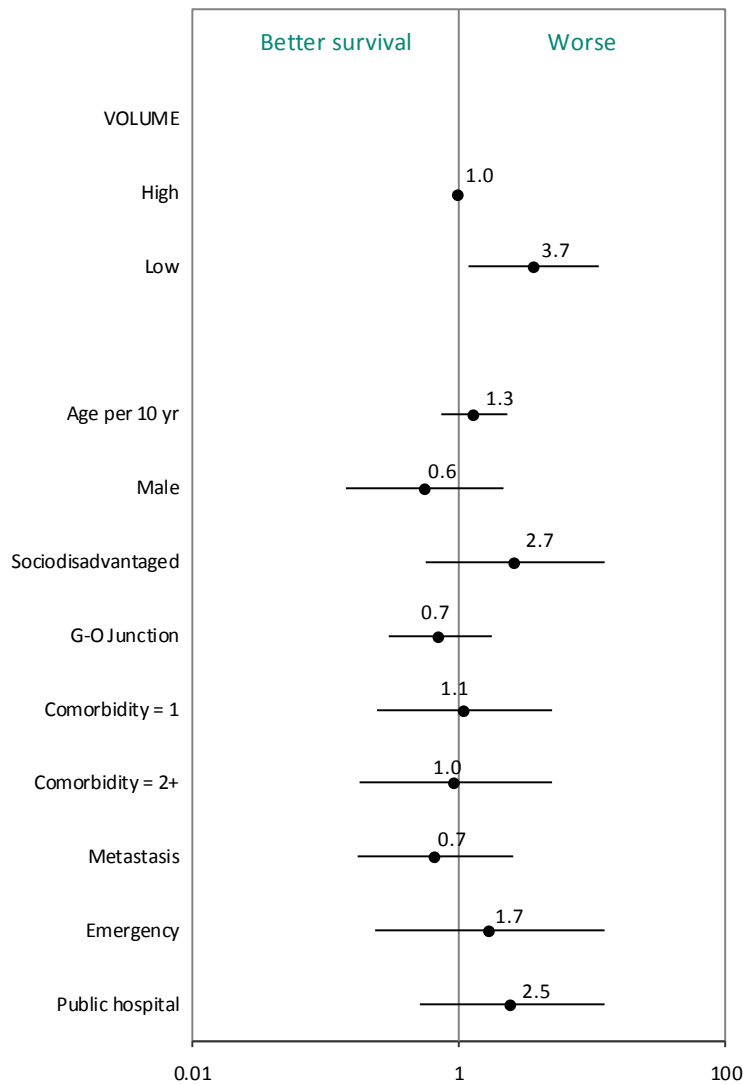
Source: Queensland Cancer Control Analysis Team

Factors Affecting Postoperative Mortality

In multivariate analysis, the risk of postoperative death was greater among socially disadvantaged patients as well as in those treated in public hospitals. Age, co-morbidity, location of tumour, and complexity of procedure were not significant determinants of surgical mortality.

When adjusted for emergency admission rates, comorbidity, and case-mix, the risk of postoperative mortality was 3.7 times higher in low volume hospitals (Figure 13).

Figure 13: Relative risk of 30-day mortality after oesophagectomy; low volume refers to average hospital volumes of less than 8 oesophagectomies per year

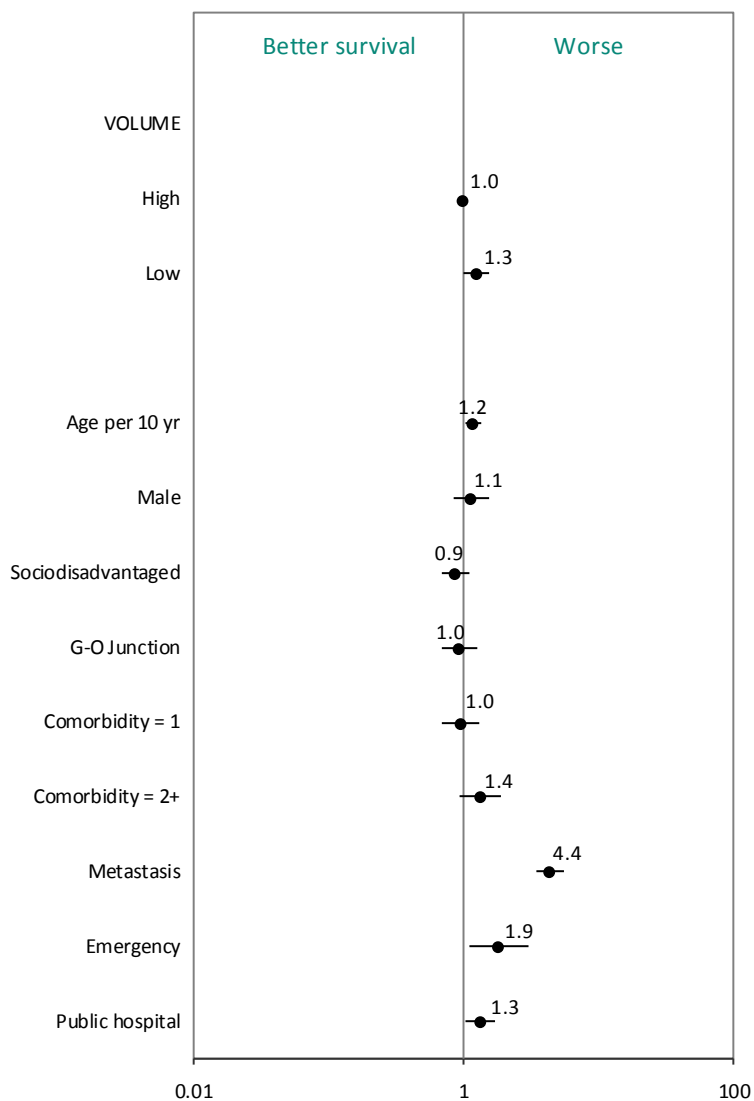


Source: Queensland Cancer Control Analysis Team
 Values are hazard ratios (HR) from multivariate Cox proportional hazards model; bars represent 95% confidence intervals.

Survival

There was no difference in the 2-year overall survival rate between low and high volume hospitals, even when adjusted for case-mix (Figure 14). Among patients who survived the 30-day postoperative period, private hospital patients had slightly better survival than public hospitals.

Figure 14: Relative risk of 2-year mortality among oesophagectomy patients who survived the 30-day postoperative period after oesophagectomy; low volume refers to average hospital volumes of less than 10 oesophagectomies per year



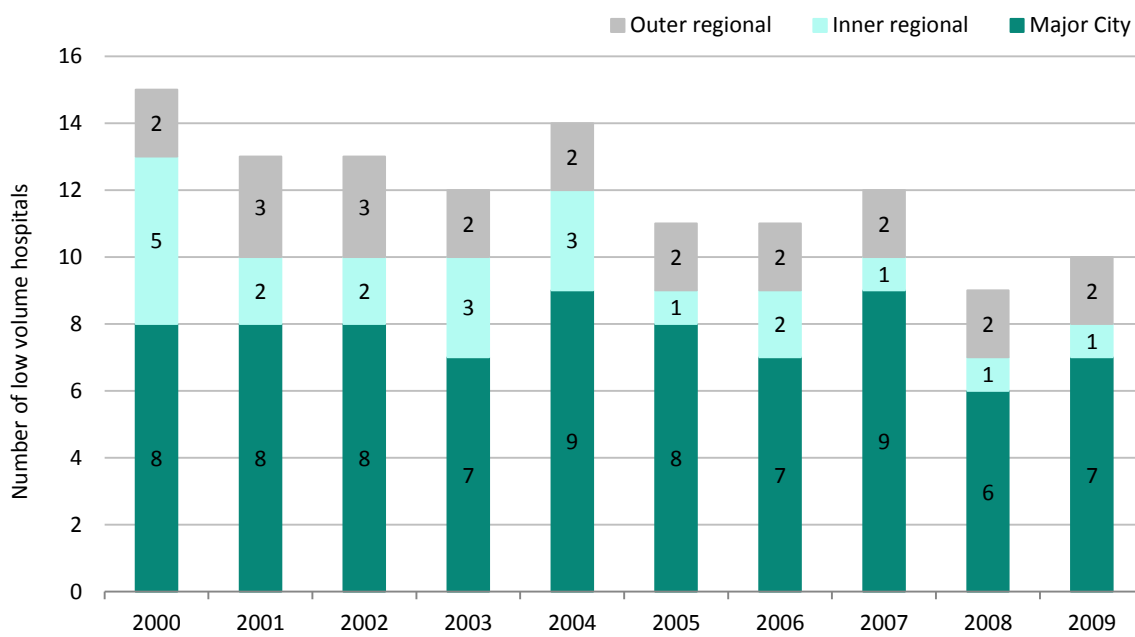
Source: Queensland Cancer Control Analysis Team
 Risk of 2-year mortality is limited to patients who survived the 30-day postoperative period
 Values are hazard ratios (HR) from multivariate Cox proportional hazards model; bars represent 95% confidence intervals.

Low Volume Hospital Characteristics

On average from 2000 – 2009, 36% of the low volume hospitals were situated in regional or remote areas of Queensland. The number of hospitals in the low volume group has decreased steadily from 15 in 2000 to 10 in 2009. On average between 2000 – 2009, 12 low volume hospitals performed oesophagectomies each year (Figure 15).

Fourteen of the 23 low volume hospitals performing 5 or less oesophagectomies annually between 2000 and 2007 have not performed the resection since 2007.

Figure 15: Number of low-volume hospitals performing oesophagectomy, Queensland, 2000-2009



Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

Oesophagectomy 2008 - 2009

Hospital Volumes

In 2008 and 2009, 166 oesophagectomies were performed for oesophago-gastric cancer in Queensland. The number of hospitals performing oesophagectomy has decreased from 25 in 2000 – 2007, to 12 in 2008 - 2009. The average annual hospital volume ranged from 0.5 to 20 cases per year between 2008 - 2009.

Although there was a relationship between volume and operative mortality, this analysis does not allow an assessment of a threshold for a change in the outcome. However, when assessing lower volumes between 2000 - 2007, 18 hospitals performed three or fewer oesophagectomies annually. In 2008 and 2009 five hospitals continued to perform three or fewer oesophagectomies per year.

The 30-day mortality rate for hospitals performing ≤ 3 oesophagectomies per year between 2000 - 2007 was 5.08%. There have been no deaths for hospitals performing ≤ 3 oesophagectomies per year in the period 2008 – 2009. However a single death among the hospitals performing ≤ 3 oesophagectomies per year would increase the overall mortality rate to 14%.

As surgery is the single most important modality in the treatment of oesophago-gastric cancer, it is important that those patients who are fit and eligible should receive a resection in an environment where the risks of a poor outcome have been minimised. When deciding whether to perform oesophagectomy there are important considerations aside from surgical expertise, such as the service capability of the hospital and the appropriate expertise in offering care and support for the patient. Surgeons involved with this surgery should have specialist training and continue to submit surgical cases and outcomes related to this surgery for regular audit.

Part 2

Gastric Cancer Recommendations





Gastric Cancer Summary

Hospital Volume and Postoperative Mortality

2000-2007 Incidence

1763 Male
878 Females
Median age at diagnosis 71 yrs.

Gastrectomy

Of the 2641 cases between 2000 – 2007:
1790 No surgery
851 Had gastrectomy

High and Low volume hospitals

Of the 851 gastrectomies:
424 in low volume (<5 per yr)
427 in high volume (≥5 per yr)

Postoperative Mortality

6 high volume hospitals (≥5)

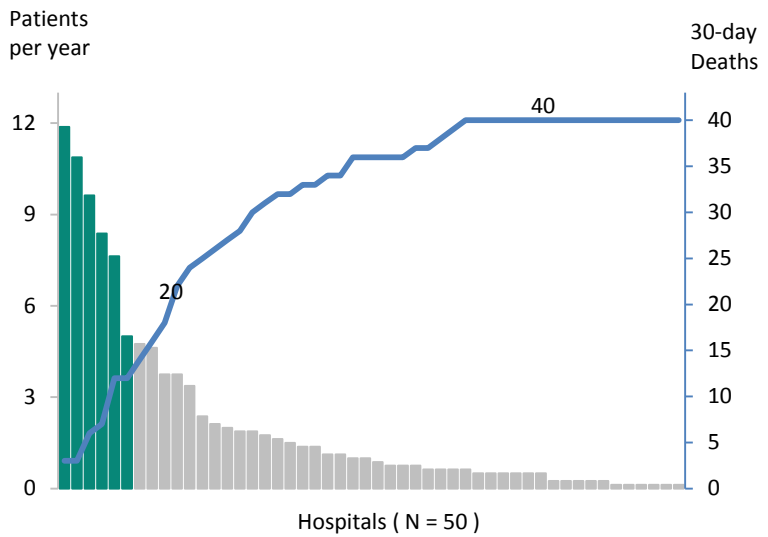
44 low volume hospitals (<5)

Surgical mortality risk is 2.3 times higher in low volume hospitals

73% of all postoperative deaths occur in low-volume hospitals

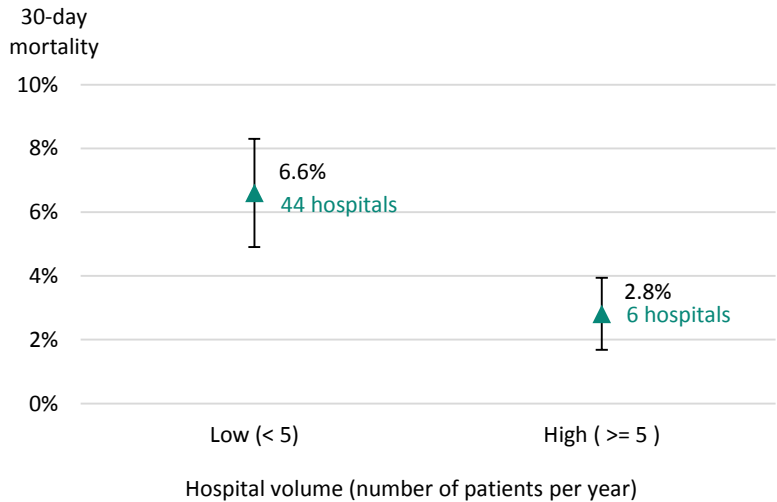
Hospital Volume

Gastrectomies on Queensland oesophago-gastric patients diagnosed 2000-2007



Postoperative Mortality

30 day mortality post gastrectomy, Queensland patients, 2000-2007



Guiding Practice Statements Summary

Cancer Centres of Choice

Consideration should be given to surgical treatment of oesophago-gastric (O-G) cancer patients in a 'cancer centre of choice'.

Multidisciplinary Team (MDT) Meetings

Following a diagnosis of gastric cancer, all patients should be referred to a multidisciplinary team meeting for management recommendations.

Staging

Patients with gastric cancer should undergo careful preoperative staging to enable targeting of potentially curable treatment to those likely to benefit.

Surgery

Resection: The D2 resection is the gold standard for patients with gastric cancer where treatment is aimed at cure, and is the recommended surgical approach in these patients.

Extent of gastric resection: Patients with a distal or lower gastric cancer where a proximal margin of 5cm is available, should have a subtotal gastrectomy; otherwise patients should have a total gastrectomy.

Gastro-oesophageal junction cancer: The management of patients with adenocarcinoma of the O-G junction needs to be discussed in a multidisciplinary clinic. The resection of these cancers needs to be in a major centre with level 5 and 6 services according to the QLD CSCF, by surgeons trained in O-G resection.

Curative resection: Elective gastric cancer surgery should be performed by surgeons with specialised training in a major centre with level 5 and 6 services according to the QLD CSCF.

Palliative surgery: Palliative resection may be required and is assessed on an individual patient basis.

Neoadjuvant and adjuvant therapy

Radiation therapy: Patients unable to have preoperative therapy may be considered for postoperative chemoradiation especially if there is a question in relation to adequacy of the resection.

Chemotherapy: For patients treated with curative intent that are considered suitable to receive chemotherapy pre-operatively the MAGIC trial protocol is the standard of care. If the patients are unable to tolerate Epirubicin then the combination of cisplatin and 5 fluorouracil (or capecitabine) is an alternative.

Audit

Routine prospective audit be undertaken to evaluate the process of care and the outcomes of treatment for all O-G cancer patients, both curative and palliative, and to examine the extent to which practices produce variation in patient outcomes.

Improving Care

The QOGCC have identified some areas for improvement in the quality of care for gastric cancer patients in Queensland. These include:

- High proportion of gastric cancer patients underwent resection with surgeons who performed relatively few operations for gastric cancer
- High proportion of surgery for gastric cancer having been undertaken by generalists rather than specialist surgical oncologists
- High proportion of surgery for gastric cancer occurring in centres where multidisciplinary team review and management and audit are not common practice

As a consequence, the QOGCC propose that the following *guiding practice* statements be considered to reduce unwanted variation in practice.

The statements are a guide to the optimal care and management of patients with gastric cancer. They are intended to improve patient outcomes by facilitating consistent care based on evidence and best practice across the state. They set out the key requirements for the provision of optimal care which need to be considered at points of the care pathway.

The population distribution and geographic barriers in Queensland require innovative approaches to the management of Gastric cancer to ensure rural and remote patients are offered equitable access to cancer services. The outcomes described in this report reflect the surgery only and not the overall management of this disease.

These statements are not rules and do not carry a sense of prescription. They represent the 'what', rather than seeking to prescribe the 'how'. Recognising that services should be responsive to the needs of different patients at different phases, the guiding practice statements draw on Queensland evidence, best practice and encourage local solutions. For example, while multidisciplinary care is an essential part of treatment planning, how it is organised depends on the local situation.

Guiding Practice Statements

Cancer Centres of Choice (or integrated cancer care)

Consideration should be given to surgical treatment of oesophago-gastric (O-G) cancer patients in a 'cancer centre of choice' (or integrated cancer care setting)

There is a compelling body of evidence showing that survival following complex cancer surgery is worse in hospitals that carry out these procedures with low frequency.^{1,2} In the UK, the high mortality rate of upper gastrointestinal cancer patients in low-volume hospitals has led to the establishment of oesophago-gastric and pancreatic cancer centres with target catchment populations of 1 to 4 million.^{3,4} Similar volume-outcome associations in the US have prompted recommendations for the selective referral of oesophageal and pancreatic cancer patients to high-volume hospitals.⁵

Patients with gastric cancer should receive cancer care in a 'centre of choice' where:

- Specialist surgical teams are established
- Surgical treatment of oesophago-gastric (O-G) patients is performed by surgeons with expertise in oesophageal resection
- Patients are reviewed and managed by multi-disciplinary teams (MDTs)
- Specialist surgical teams routinely participate in audit and feedback
- Patients have access to computed tomography (CT) scanning, endoscopic ultrasound (EUS) and laparoscopy for rapid staging
- Palliative care is an integral part of patient management and patients have access to specialist palliative interventions when required

Multidisciplinary Team (MDT) Meeting

Following a diagnosis of gastric cancer, all patients should be referred to a multidisciplinary team meeting for management recommendations

Although gastric resection is the gold standard in treating this disease, there is now clear evidence that the oncology outcomes from gastric cancer are enhanced by the addition of either chemotherapy or radiation or both in patients with more advanced disease. These modalities become an integral part of the management of patients with metastatic disease but surgery may still play a role.

Multidisciplinary care is recognised as the gold standard for patients with cancer and was identified as a key objective in the Queensland Cancer Control Strategic Directions 2005–2010.⁷ Queensland Health has committed to the provision of multidisciplinary care for all patients with cancer with the development of the Queensland Oncology Online system (QOOL) to support multidisciplinary meetings, administration and prospective collection of an agreed minimum dataset for all cancers (see Appendix 3 QOOL Upper GI cancer dataset), and the development of an Oncology Analysis System (OASys). These resources are available to *all* hospitals, both public and private, and to *all* clinicians across Queensland. The *Treating cancer in Queensland public hospitals* report (Queensland Health, 2006) found that patients with documented evidence of a MDT review were more likely to receive a wider range of treatment options including radiotherapy and chemotherapy. MDT review also increased the likelihood of patients receiving a documented cancer stage.

The opportunity exists to establish prospective data collection through the multidisciplinary team using an agreed dataset, for all newly diagnosed cases of upper GI cancer in Queensland.

Upper GI cancer multidisciplinary meetings are established in a number of hospitals in Queensland (see Appendix 4).

Staging

Patients with gastric cancer should undergo careful preoperative staging to enable targeting of potentially curable treatment to those likely to benefit.

The stage of cancer determines the treatment plan for most patients. The *Treating cancer patients in Queensland public hospitals: Service improvement starts here...* report found that MDT review increased the likelihood of patients receiving a documented cancer stage.⁸ The majority of patients (71%) reviewed by a MDT had a documented stage, compared to only 48% of patients who were not reviewed by a MDT.

Aside from endoscopic diagnosis with histopathologic confirmation of the disease, patients will require staging, which may include CT scanning, endoscopic ultrasound, FDG-PET scanning and laparoscopy as deemed suitable by the managing specialists. A formal pre-treatment stage is required before deciding upon the appropriate management of the individual patient.

Curative resection

Elective gastric cancer surgery should be performed by surgeons with specialised training in a 'cancer centre of choice'.

Gastrectomy and the management of gastric cancer require post fellowship training and continued exposure to the disease. In Queensland, it is unlikely that a D2 resection is performed outside of the major centres and notably in those centres performing less than five cases per year. The operative mortality is higher in the centres performing less than five resections per year. For patients with potential curative disease the gastrectomy for cancer should be performed in major centres.

Resection

D2 resection is the gold standard for patients with gastric cancer where treatment is aimed at cure and is the recommended surgical approach in these patients.

The gold standard for a patient with gastric cancer is an appropriate resection. Although there is evidence for other modalities in the patient's management there will be occasions when a patient presents urgently with bleeding or obstruction and urgent surgery may be required.

There will be occasions when the patient is not fit for the appropriate chemotherapy or it would be inappropriate to consider treatment other than resection. In the interests of optimal patient care these issues are best considered in the multidisciplinary clinic.

Extent of gastric resection

Patients with a distal or lower gastric cancer where a proximal margin of 5cm is available should have a subtotal gastrectomy, otherwise patients should have a total gastrectomy.

A large Italian trial comparing subtotal with total gastrectomy (D2 node dissection recommended in both groups) found no difference in survival with tumours at least 6cm from the cardia.⁹ A Japanese trial evaluated management of gastric cancers with oesophageal involvement of 3cm or less. A thoracoabdominal approach with lower mediastinal node dissection did not improve survival over an abdominal-transhiatal approach (all patients had total gastrectomy and D2 dissection).

A gastric margin of more than 6cm from the macroscopic tumour is not supported by evidence. Diffusely infiltrating tumours possibly need wider excision. Closer proximal margins are justified in patients with cardia or oesophageal involvement if they are poor candidates for thoracotomy.

The extent of the lymphadenectomy performed with a gastric resection is controversial in Western countries. In the East, notably Japan and Korea, where the incidence of gastric cancer is very high, a D2 resection is the standard of care.⁹ These countries report better survival figures from surgery alone, stage for stage when compared with the resection outcomes in the West. Randomised trials from Britain and the Netherlands published in the 1990s found a higher mortality and morbidity rate for D2 resection compared with a lesser dissection of the regional lymph nodes (D1) and they reported no survival advantage.^{10,11,12} Individual surgeon volumes in these trials were low and the operative mortality in these studies were much higher than those reported in the two randomised trials from the West.

An Italian trial comparing a D1 versus D2 resection performed in centres specialising in the management of gastric cancer has recently reported low and equivalent mortality rates.¹³ In Taiwan, a trial of D1 versus a more extensive node dissection (D3) in a high volume Taiwanese centre found a 5.9% absolute difference in survival in favour of the D3 dissection after 5 years.¹⁴ Previously, a Japanese study had reported no difference in cancer related survival when a D2 resection was compared with the more extensive D3 resection. In the Taiwanese study, the survival of the D1 resection group was better than that seen in trials involving western patients regardless of surgical or adjuvant treatments. This may relate to the patient factors such as obesity and comorbidities or possibly the biology of gastric cancer in a high incidence area. Thus there is evidence that there may be benefits in cancer survival from a D2 resection but there is the potential for a higher postoperative complication rate.

The benefit of a D2 resection in Queensland patients is unclear and likely to be associated with greater risk in low volume centres. Internationally in Europe and major cancer centres in the USA, the D2 resection is considered the gold standard procedure. Patients who are considered fit to receive neoadjuvant or adjuvant therapy for gastric cancer should have a D2 resection. In some patients the D2 gastrectomy may be considered inappropriate. This should be a clinical decision. The D2 resection requires expertise with outcomes improved by continuous experience in performing the procedure

Gastro-oesophageal junction cancer

The management of patients with adenocarcinoma of the oesophago-gastric junction needs to be discussed in multidisciplinary clinic. The resection of these cancers needs to be in a 'cancer centre of choice' by surgeons trained in oesophago-gastric resection.

The optimal peri-operative treatment of patients with cancers in the upper stomach or gastro-oesophageal junction is not clear. These cancers are treated as gastric cancer where a significant oesophageal resection is not required. Where the lower oesophagus is required the optimal approach may require a thoracotomy as well as the abdominal approach. There is evidence that this group may be managed as for lower oesophageal adenocarcinoma of the oesophagus with preoperative chemotherapy, preoperative chemoradiation or peri-operative chemotherapy as per the MAGIC protocol.

Palliative surgery

Palliative resection may be required and is assessed on an individual patient basis.

Philosophy regarding resection in patients with metastatic disease varies in different countries. There are no prospective trials examining survival and quality of life though they are underway in Japan and Korea. Except for emergency presentation with perforation and possible major GI bleeding it is probably inappropriate for most patients.

Options including chemotherapy, radiotherapy, stenting, repeated transfusions and supportive care should be explored.

Stents for gastric outlet obstruction are associated with lower complication rates and hospital stay compared with gastroenterostomy; although in patients with prolonged life survival have a higher failure rate requiring revision.

Neoadjuvant and adjuvant chemotherapy

For patients treated with curative intent that are considered suitable to receive chemotherapy preoperatively, the MAGIC trial protocol is the standard of care. If the patients are unable to tolerate Epirubicin then the combination of cisplatin and 5 fluorouracil (or capecitabine) is an alternative.

Multimodality therapy is the goal and is now considered standard care. There are three randomised controlled trials that have shown a survival benefit for patients receiving perioperative chemotherapy, postoperative chemotherapy or postoperative chemoradiation.

Postoperative therapy has been assessed in Japan and the USA. The Japanese study reports excellent survival figures in their surgery alone arm but there was a survival benefit by treating patients with the 5 Fluoro-uracil analogue, S1, post resection.¹⁵ This drug is more toxic when used in western patients and is not considered in our patient population.

The US study, Intergroup reported a survival benefit for the use of postoperative chemoradiation.¹⁶ The regimen is quite toxic and there is evidence that the quality of the surgery influenced the results. Only a small percentage of the patient population had a D2 resection. The major impact on survival from the postoperative therapy was in patients with inadequate local resection of lymph nodes that is less than D1 resection and to a lesser extent those patients who had a D1 resection.

There are two trials reporting a benefit for perioperative chemotherapy, one published from the UK and the other reported and published in abstract form from France. Both these trials use three cycles of chemotherapy preoperatively. The UK trial (MAGIC trial) use Epirubicin, cisplatin and 5 Fluoro-uracil and the French trial cisplatin and 5 Fluoro-uracil. In the UK trial patients were to have three cycles of the same regimen post resection. A total of 46% of patients received the extra therapy. In the French trial, those patients who had a response received three cycles of their regimen post resection. They treated 49% patients post resection.¹⁷

In the UK a trial is being conducted comparing Epirubicin, cisplatin and Capecitabine (oral form of 5 Fluoro-uracil) with that regimen plus a biological therapy Bevacizumab (VEGF inhibitor). It is considered appropriate to replace 5 Fluoro-uracil with capecitabine were the latter is available.

Neoadjuvant and adjuvant radiation therapy

Patients unable to have preoperative therapy may be considered for postoperative chemoradiation, especially if there is a question in relation to adequacy of the resection.

In Australasia there is an ongoing trial where the MAGIC regimen is being compared to a preoperative chemoradiation regimen and the MAGIC protocol therapy postoperatively (TOP GEAR trial).

Audit

Routine prospective audit should be undertaken to evaluate the process of care and the outcomes of treatment for all O-G cancer patients, both curative and palliative, and examine the extent to which practices produce variation in patient outcomes.

The prospective audit will collect information on the diagnosis, staging and planned treatment of all patients. The collection of additional information will depend on the nature of the treatment subsequently received by the patient.

Audit may be routinely conducted with the use of the QOOL application suite developed by The Partnership, specifically for this purpose.

Part 3

Epidemiology of Oesophago-gastric Cancer in Queensland



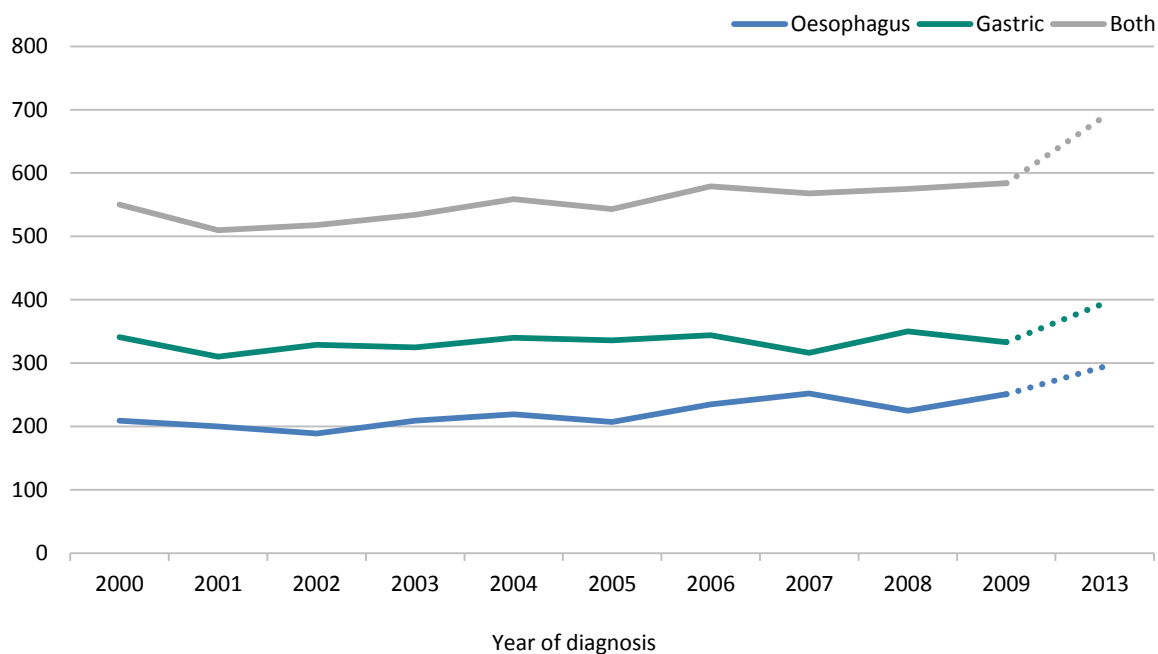
Queensland oesophago-gastric cancer data is presented in this report. The International Classification of Diseases for Oncology (ICD-10-AM) has been applied to distinguish between gastric and oesophageal cancer. Gastric cancer is defined as those with a primary site of C16; and oesophageal cancer C15. Patients with a primary site of small intestine and those who reside outside Queensland have been excluded.

Projections Queensland 2013

It is estimated in 2013 that 690 new cases of invasive oesophago-gastric cancers will be diagnosed among Queensland residents (Figure 15), and that 490 Queenslanders will die of the disease (Figure 16).

Oesophago-gastric cancer is expected to continue to be more common in males (485 new cases,) than in females (210 cases). Projected incidence for 2013 shows an 18% increase from the 2009 incidence of 584 cases (Figure 15).

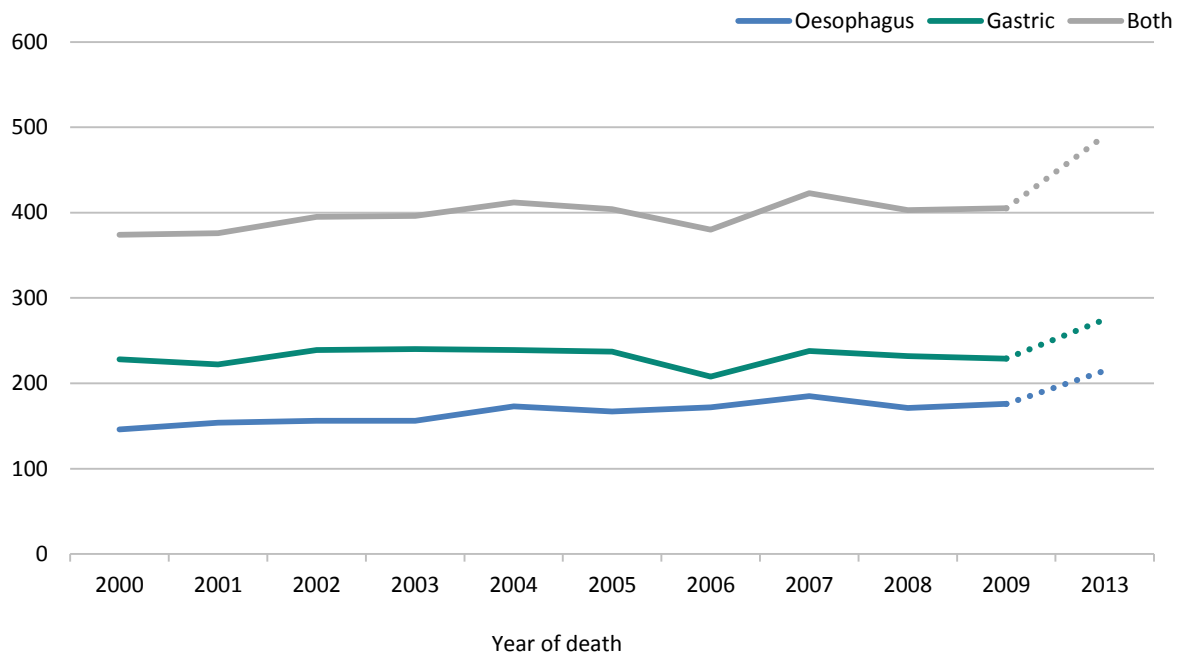
Figure 15: Oesophago-gastric actual and projected cancer incidence, Queensland, 2000 – 2013



Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

229 gastric and 176 oesophageal cancer deaths were recorded in 2009 with an expected increase of 17% for gastric and 18% for oesophageal cancer by 2013 (Figure 16).

Figure 16: Oesophago-gastric actual and expected cancer mortality, Queensland, 2000 – 2012

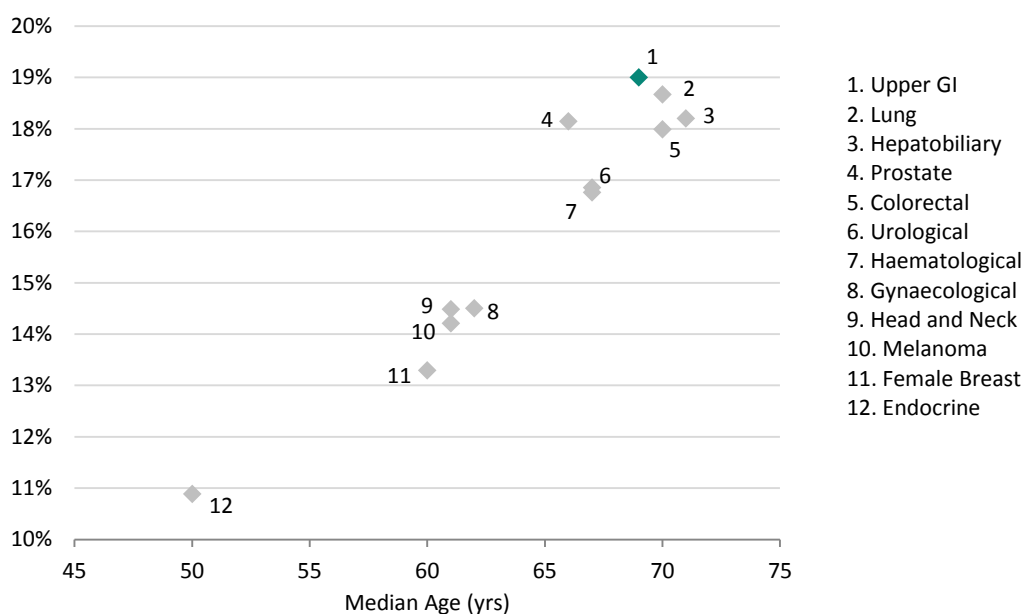


Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

The percentage change in cancer incidence between 2009 and 2013 is shown in Figure 17. Assuming no change in incidence rates during this period oesophago-gastric cancer, which is common in older people, is projected to show a relatively larger increase from (584 new cases in 2009 to 695 in 2013 - 19%) than cancers common in younger people.

These trends are a direct consequence of projected changes in the age distribution of Queensland residents, as the number of people aged 65 years and older is expected to grow at a much faster rate than the rest of the population. These projections provide an indication of the likely burden of oesophago-gastric cancer and the demand for cancer services in 2013.

Figure 17: Projected percentage change from 2009 to 2013 in cancer incidence for common cancers by median age of diagnosis, Queensland



Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

Incidence and Mortality

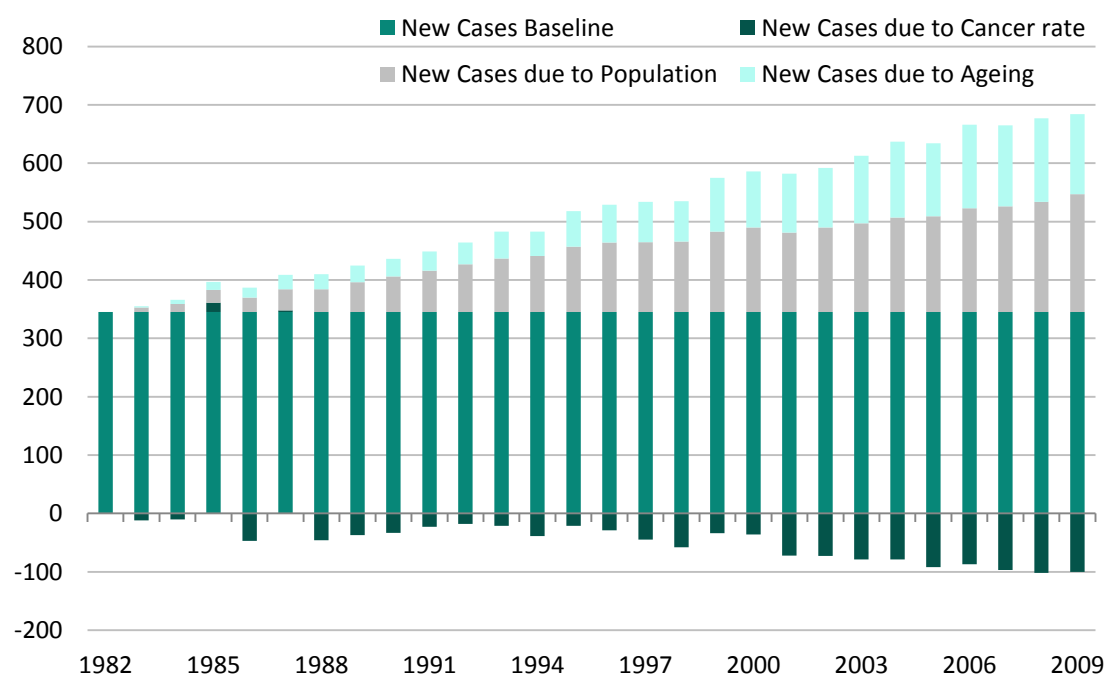
Table 4: Oesophago-gastric cancer incidence, Queensland, Annual average 2000-2009

Cancer	Annual Average Incidence	Annual Average Mortality
Gastric	332	231
Oesophageal	220	166
Total	552	397

The number of new cases of oesophago-gastric cancer among Queensland residents has increased by 69% between 1982 and 2009. For males, the number of new cases increased from 234 in 1982 to 405 (73%) in 2009; for females, the number of new cases increased from 111 to 179 (61%). These increases were due to population growth and ageing. The oesophago-gastric cancer rate, unlike many other cancers, has consistently decreased since 2000 (Figure 18).

Queensland's population increased from 2.4 million in 1982 to 4.4 million in 2009, an increase of 83%, making Queensland the fastest growing state in Australia and one of the fastest among developed countries. The proportion of people 65 years and older also increased, from 9% in 1982 to 12% in 2009.

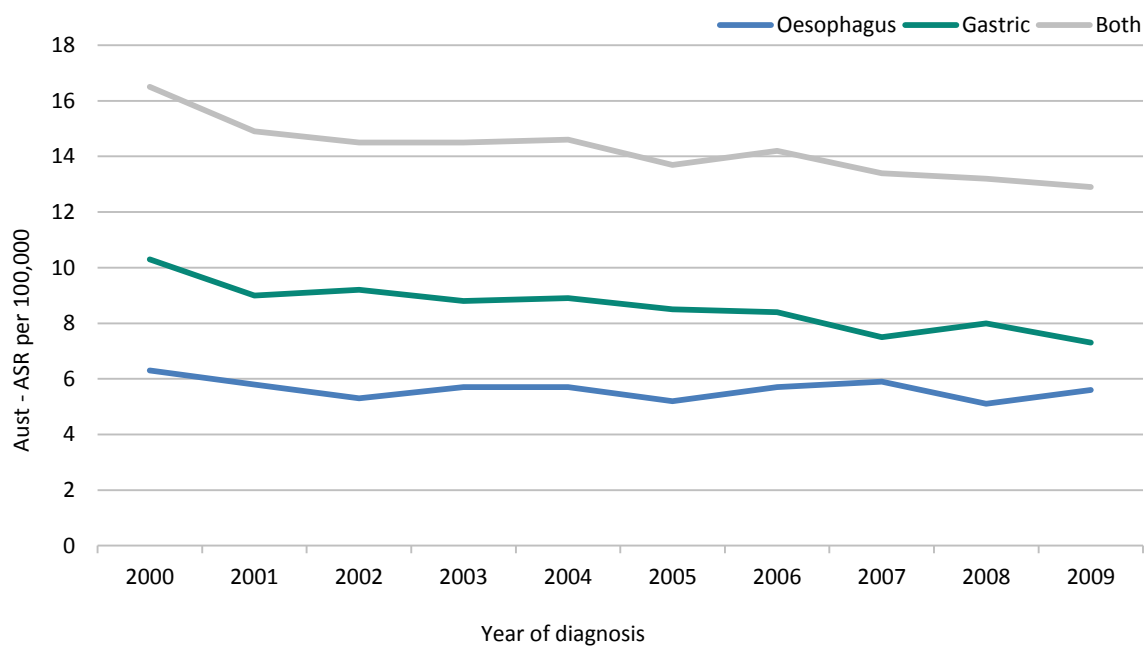
Figure 18: Growth in Oesophago-gastric cancer, Queensland, 1982 - 2009



Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

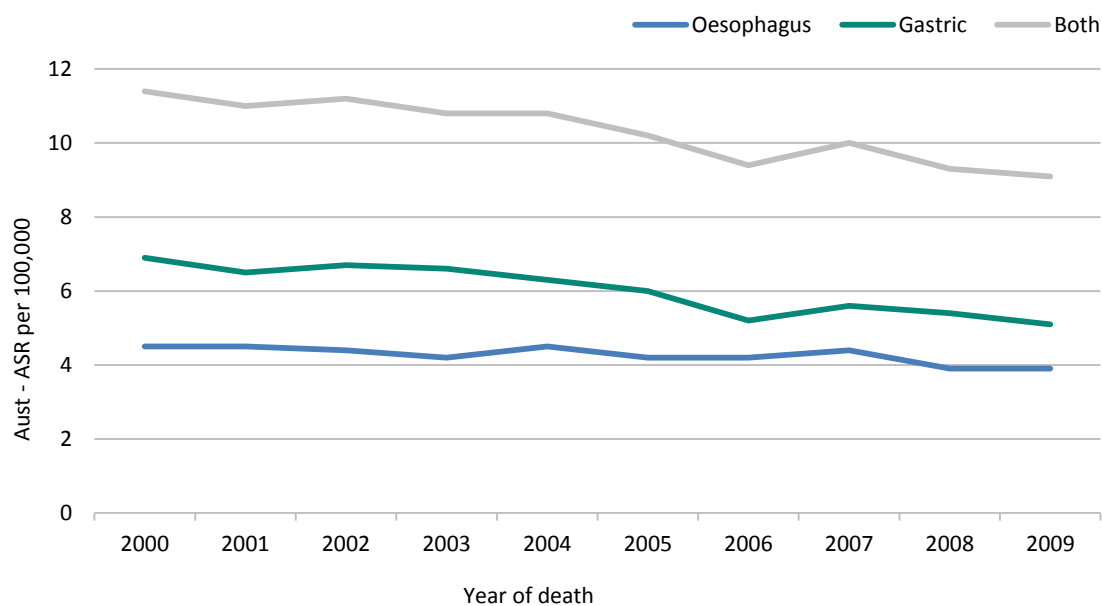
The age-standardised incidence rate of gastric cancer decreased from 15 per 100,000 in 1982 to 7 per 100,000 in 2009 and increased for oesophageal cancer from 3.8 in 1982 to 5.6 per 100,000 in 2009 (Figure 19). Mortality rates followed and dropped from 9 per 100,000 in 1982 to 5 per 100,000 in 2009 for gastric cancer and increased slightly from 3 per 100,000 in 1982 to 4 per 100,000 in 2009 for oesophageal cancer (Figure 20).

Figure 19: Oesophago-gastric cancer age-standardised incidence rates per 100,000, Queensland, 2000 – 2009



Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

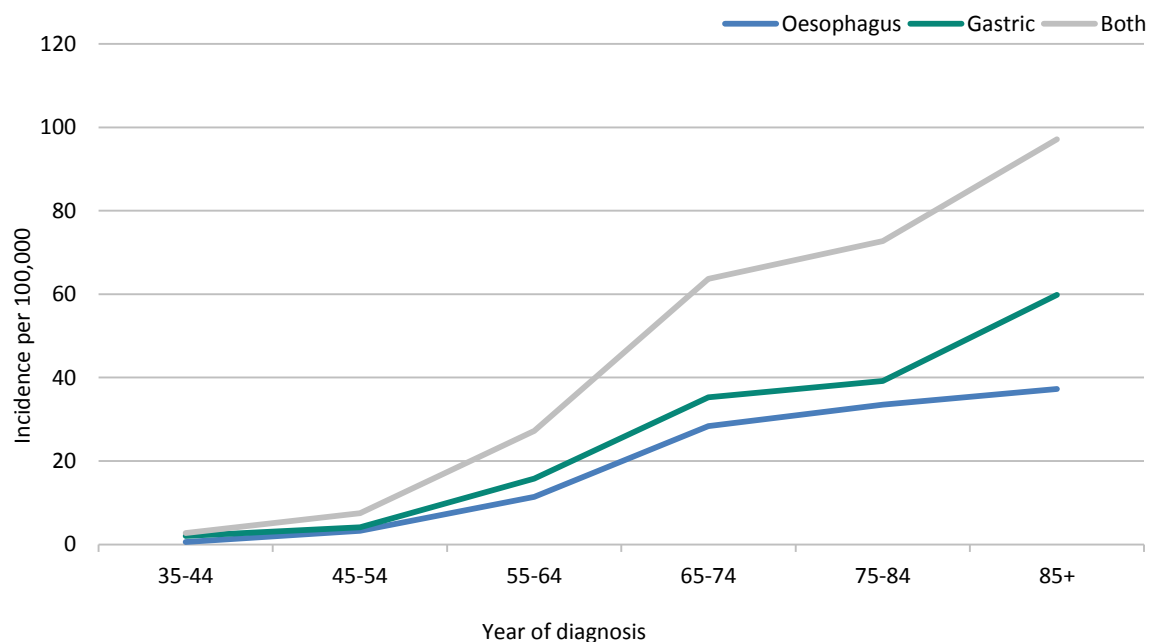
Figure 20: Oesophago-gastric cancer age-standardised mortality rates per 100,000, Queensland, 2000 – 2009



Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

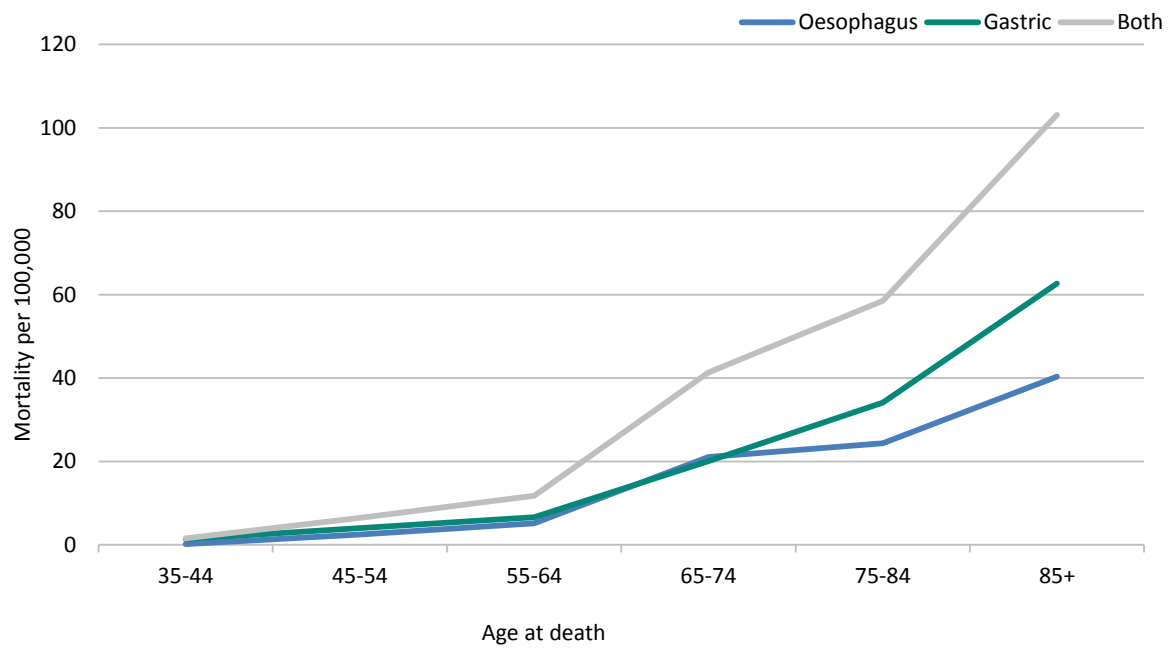
Oesophago-gastric cancer incidence and mortality rates increased with age. For every 100,000 people aged 85 and older 97 were diagnosed with, and 103 died from oesophago-gastric cancer. Very few cases of oesophago-gastric were recorded for persons under the age of 54 (<10 cases per 100,000) (Figure 21).

Figure 21: Gastric and oesophageal cancer incidence per 100K, by age at diagnosis, Queensland, 2009



Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

Figure 22: Gastric and oesophageal cancer mortality per 100K, by age at diagnosis, Queensland, 2009

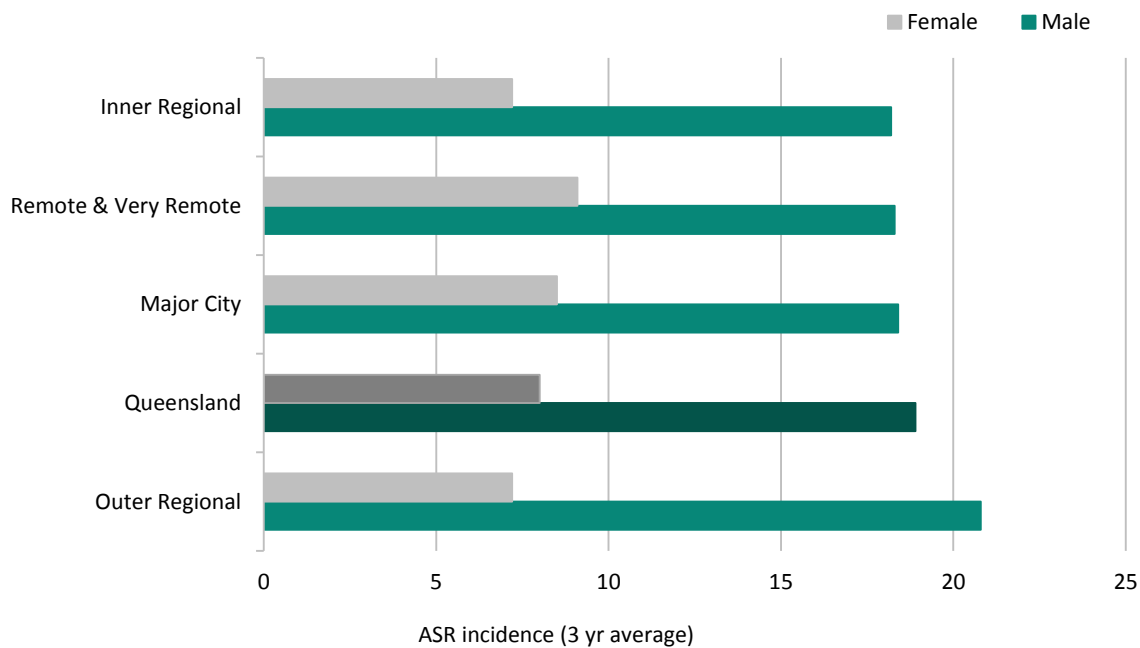


Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

Variation in Incidence and Mortality

On average, incidence for oesophago-gastric cancer varied by remoteness of residence for both males and females from 2007-2009 (Figure 23). The highest average rate was seen in males who lived in outer regional Queensland (21 per 100,000), for females the rate was 9 per 100,000 in remote and very remote Queensland.

Figure 23: Oesophago-gastric cancer age-standardised incidence rates by remoteness of residence, Queensland, 2007-2009

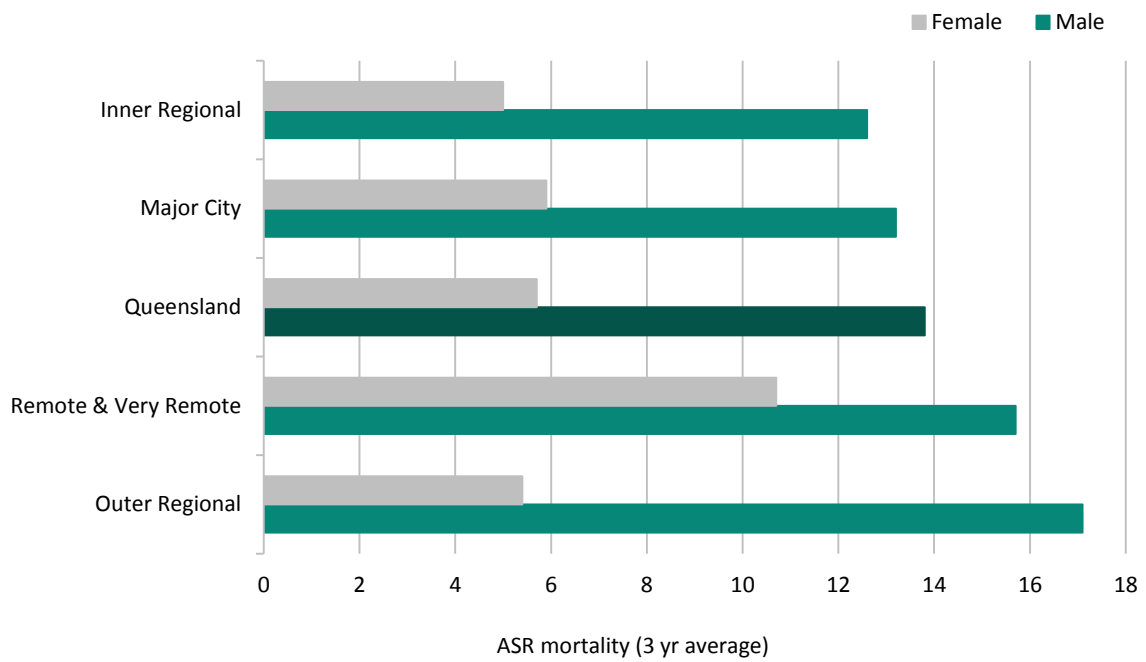


Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

In the interest of completeness, incidence and mortality rates have been included for all Hospital and Health Services including those with fewer than 16 cases. Incidence and mortality rates based on small numbers of cases should be interpreted with caution due to the poor reliability of rate calculations based on small numbers. For example, the relative standard error (RSE) will be equal or greater than 25% when incidence rates are based on fewer than 16 cases. For more information, refer to the technical notes available at: http://www.cdc.gov/cancer/npcr/uscs/2007/technical_notes/stat_methods/suppression.htm

Mortality rates for oesophago-gastric cancers varied by remoteness for both males and females (Figure 24). Oesophago-gastric cancer mortality rates were almost double for females residing in remote and very remote areas. Rates for males were similar between the regions.

Figure 24: Oesophago-gastric cancer age-standardised mortality rates by remoteness of residence, Queensland, 2007-2009



Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

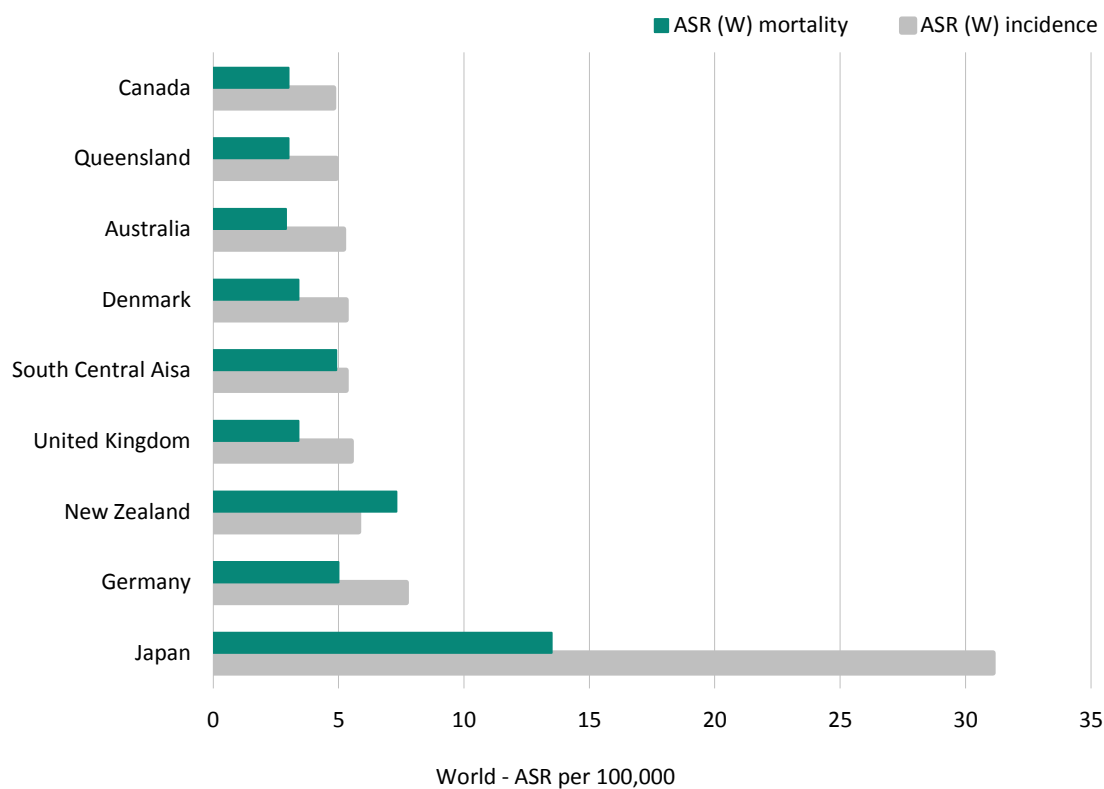
Note: Mortality rates with fewer than 16 cases should be treated with caution

Gastric Cancer

In 2008 gastric cancer was the second most frequent cause of cancer death worldwide, affecting approximately one million people annually.¹⁸ Large differences in incidence existed internationally with Japan amongst the highest recorded incidence (31 cases per 100,000 people per year).¹⁹ Australia and Canada were amongst the low-incidence regions, with rates of approximately 5 cases per 100,000 people (Figure 25).

Australian age-standardised mortality rates for gastric cancer were also low (3 cases per 100,000) and were in line with rates in Denmark, Canada and the United Kingdom. Similar to incidence, mortality rates were higher in Asian countries with over 13 in every 100,000 dying from the disease in Japan (Figure 25).

Figure 25: Gastric cancer incidence and mortality age-standardised rate for selected international regions and Queensland, 2008



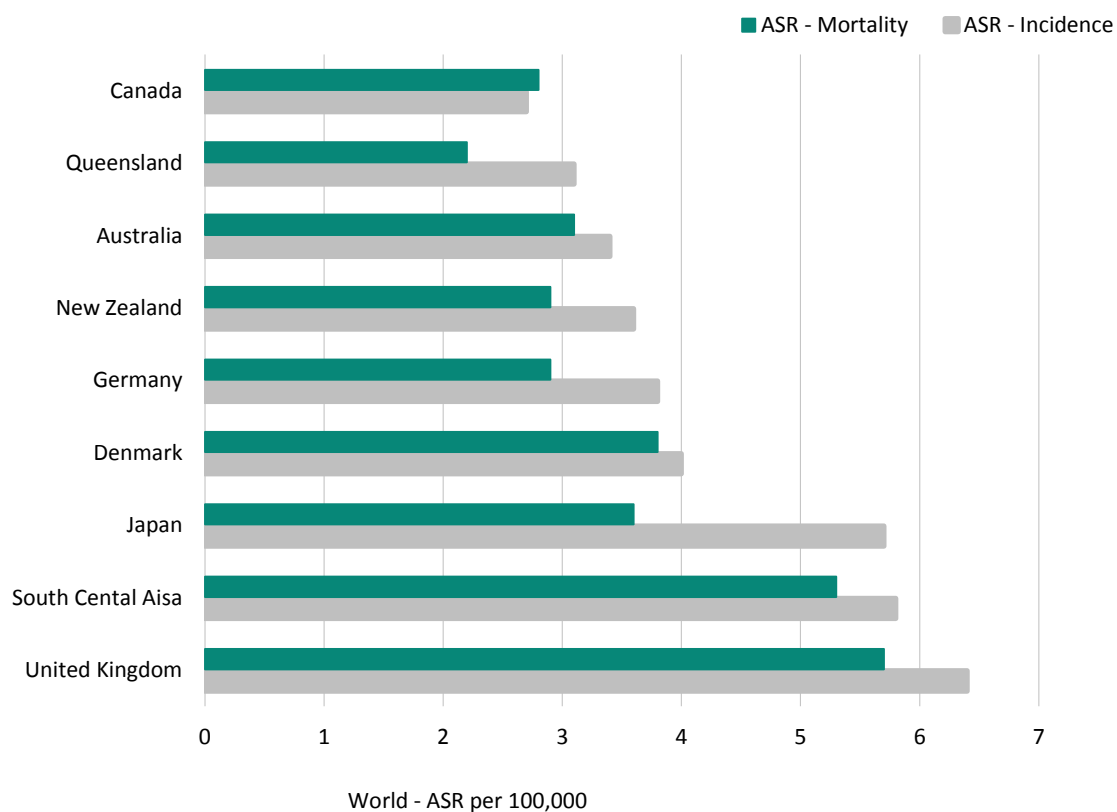
Note: Cancer incidence estimated by the International Agency for Research on Cancer (IARC) for 2008 (GLOBOCAN 2008) except for Queensland which sourced from Oncology Analysis System, Queensland Cancer Control Analysis Team

Oesophageal Cancer

It is estimated that in 2008 the world wide incidence of oesophageal cancer was over 480,000.¹⁸ Oesophageal cancer was the 8th most common cancer in the world. Overall incidence rates were two-fold higher in less-developed geographic regions with the highest occurring in Asia². Incidence and mortality rates were two to three-fold higher in males than females. For every 100,000 Australians three were diagnosed with oesophageal cancer (Figure 26).

The age-standardised mortality rate for oesophageal cancer in Australia was consistent with many other countries including Canada and Germany (2-3 cases per 100,000). Mortality rates were higher in the United Kingdom with over 6 in every 100,000 dying from the disease (Figure 26).

Figure 26: Oesophageal cancer incidence and mortality age-standardised rate for selected international regions and Queensland, 2008

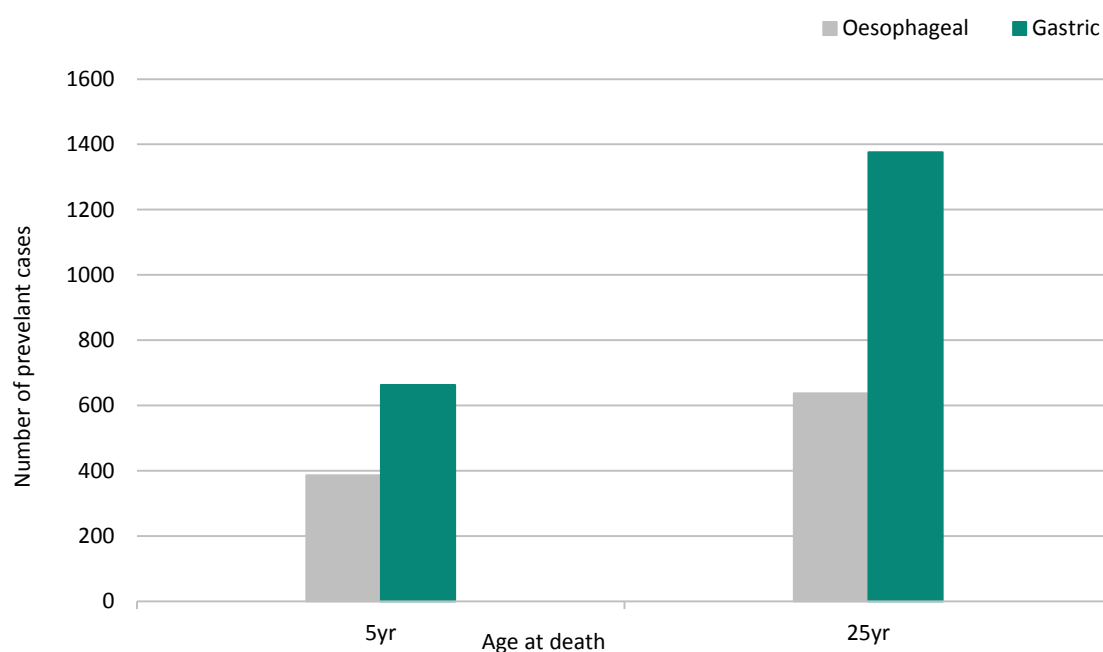


Note: Cancer incidence estimated by the International Agency for Research on Cancer (IARC) for 2008 (GLOBOCAN 2008) except for Queensland which is sourced from Oncology Analysis System, Queensland Cancer Control Analysis Team

Prevalence

Prevalence represents the number of people living with a cancer and is a measure of the burden of the disease for the individual, families and society. Oesophago-gastric cancer prevalence is increasing as more people are diagnosed and survival improves. At the end of 2009, more than 800 people were living with a diagnosis of oesophago-gastric cancer in the previous five years (Figure 27).

Figure 27: Prevalence of oesophageal and gastric cancer, by time since diagnosis, Queensland, 2009



Source: Cancer in Queensland 1982-2009. Incidence, mortality, survival and prevalence. Queensland Cancer Registry, Cancer Council Queensland: Brisbane

Table 5: Prevalence of oesophageal and gastric cancer, by time since diagnosis, Queensland, 2009

	Gastric		Oesophageal	
	Male	Female	Male	Female
5 yr.	448	215	270	116
25 yr.	892	484	441	196

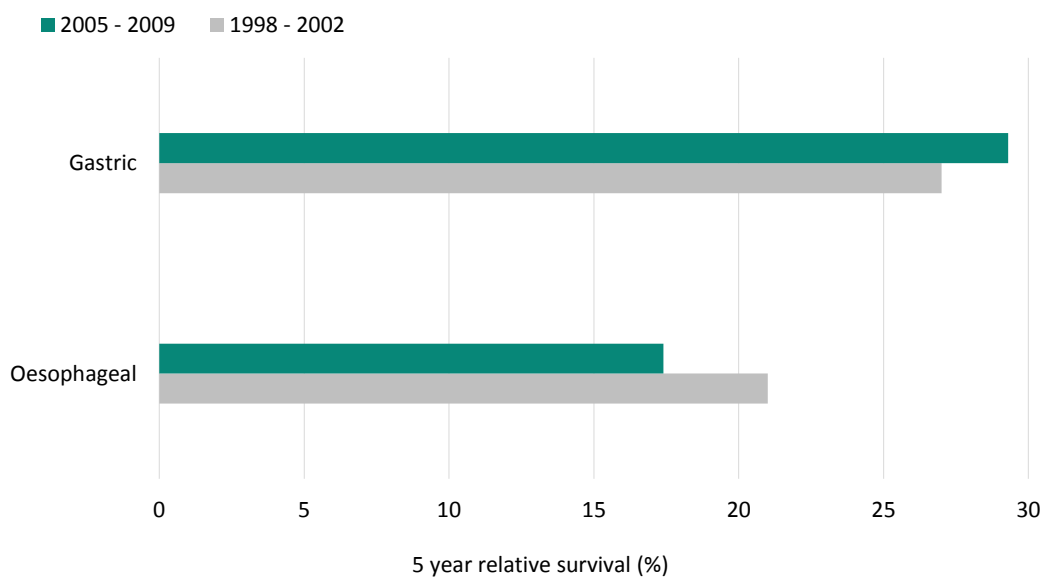
Source: Cancer in Queensland 1982-2009. Incidence, mortality, survival and prevalence. Queensland Cancer Registry, Cancer Council Queensland: Brisbane

Survival

Relative survival is a measure of the survival of a group of people with a condition, such as cancer, relative to a comparable group from the general population without the condition. For cancer, five-year relative survival represents the proportion of patients alive five years after diagnosis, taking into account age, gender and year of diagnosis.

The average five-year relative survival for gastric cancer between 2005–2009 was 29%, a slight improvement from 27% between 1998–2002. For oesophageal cancer survival was 21% for 1998–2008 compared to 17% between 2005–2009 (Figure 28).

Figure 28: Five-year relative survival, oesophago-gastric, Queensland, 1998-2002 vs. 2005-2009



Source: *Cancer in Queensland 1982-2009. Incidence, mortality, survival and prevalence. Queensland Cancer Registry, Cancer Council Queensland: Brisbane*

Part 4

Oesophago-gastric Cancer Overview by Hospital and Health Service



Patient Characteristics

In this section an overview of incidence and mortality is presented for the sixteen Hospital and Health Services (HHS) in Queensland for the time period 2007-2009.

The median age for oesophago-gastric patients in Queensland was 71 with a range of 62-72 years across HHS (Table 6). Oesophago-gastric cancer was more common in males representing between 64-79% of incidence across the state. The majority of oesophago-gastric cancer patients resided in Metro South and Metro North who contributed 41% of the total incidence. Socioeconomic status, as represented in table 6, varied across Queensland.

Table 6: Queensland oesophageal and gastric cancer patients by Hospital and Health Services, 2007 – 2009

HHS	Incidence Annual Avg.	Median Age	% Male	Socioeconomic status		
				% Affluent	% Middle	% Disadvantaged
Metro South	129	71	65	20	65	15
Metro North	107	72	64	36	58	7
Gold Coast	64	71	68	9	92	
Sunshine Coast	50	72	69		94	6
Darling Downs	39	72	68	3	72	26
Wide Bay	44	71	69		43	57
Cairns and Hinterland	30	68	71	0	90	10
Townsville	29	70	67	7	72	21
Central Queensland	25	69	71		96	4
West Moreton	25	69	68	4	80	16
Mackay	19	67	70		84	16
South West	3	70	73		67	
Mount Isa	2	63	79		50	
Central West	1	72	71		100	
Torres Strait-Northern Pen.	1	65	77		0	100
Cape York	2	62	66		50	50
Queensland	576	71	67	13	72	15

Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

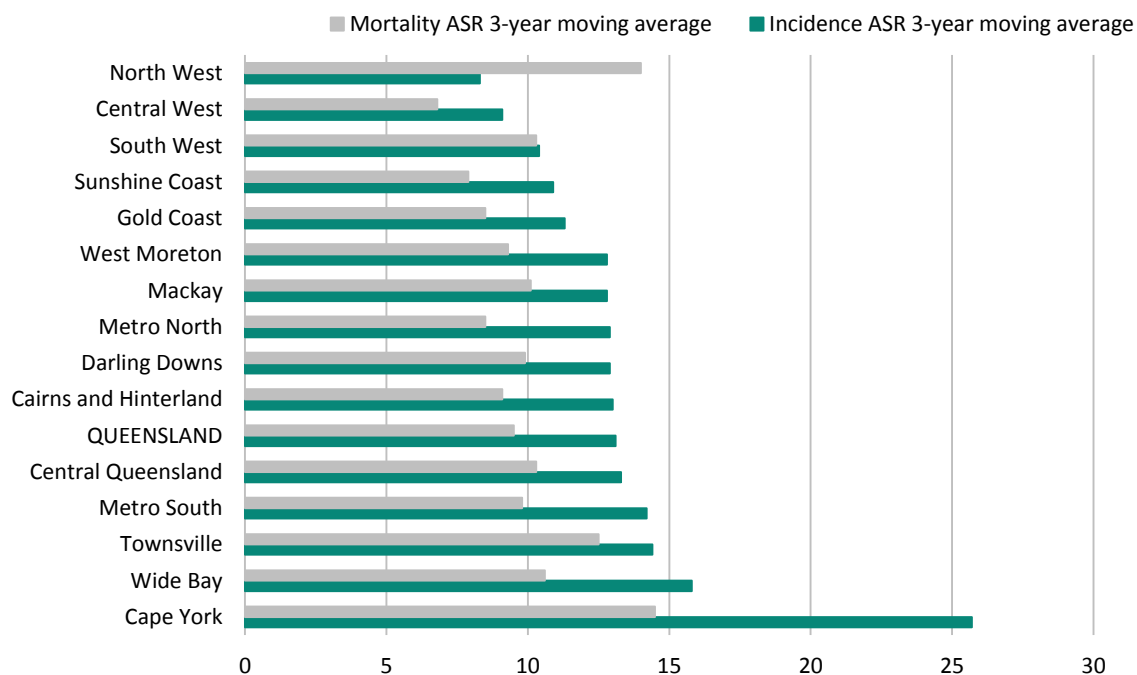
*Shading represents those who have more than 20% disadvantaged (Australian standard).

Incidence and Mortality

At the Hospital and Health Service level age-standardised incidence and mortality rates vary across the state (Figure 29). Reasons for the variations are diverse and complex and include exposure to environmental factors, socioeconomic status, access to health services and chance. It should be noted that remote Hospital and Health Services have small populations and estimates of mortality rates based on such small numbers may not be as accurate as those for areas with larger populations.

Oesophago-gastric cancer age-standardised incidence and mortality rates are highest in Cape York Hospital and Health Services with 26 per 100,000 diagnosed and 15 per 100,000 deaths (Figure 29). Central West Hospital and Health Service experiences the lowest age-standardised incidence and mortality rates in the state.

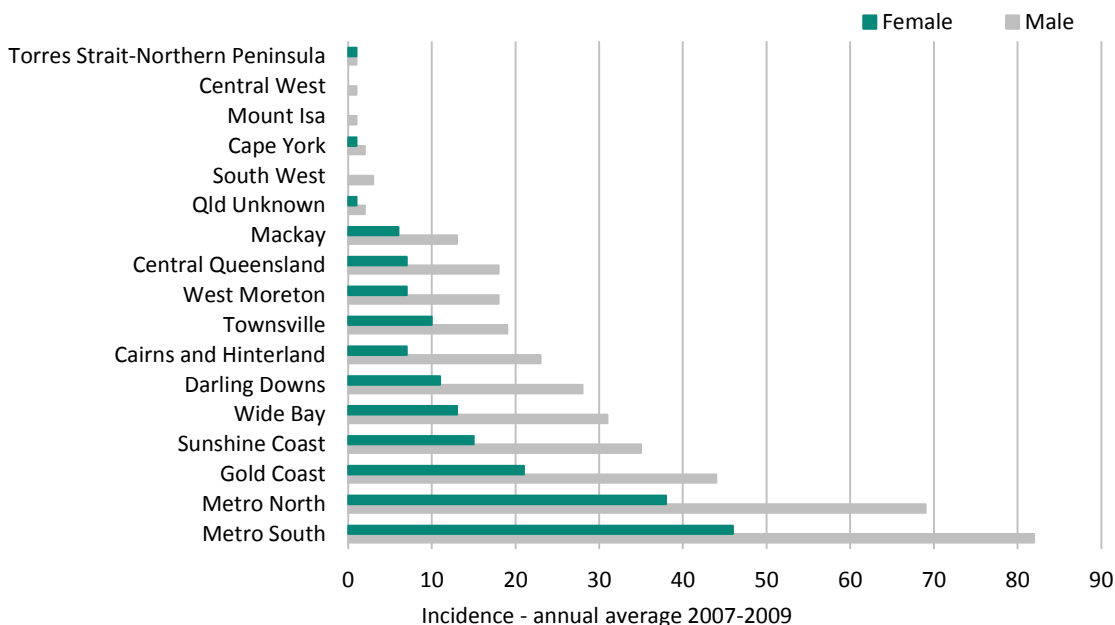
Figure 29: Oesophago-gastric cancer ASR 3-yr incidence and mortality by Hospital and Health Services, Queensland, 2007-2009



Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

Gastric and oesophageal cancer average annual incidence (2007-2009) is highest in Metro South and Metro North Hospital and Health Services accounting for 43% and 38% for the state’s incidence respectively (Figure 30).

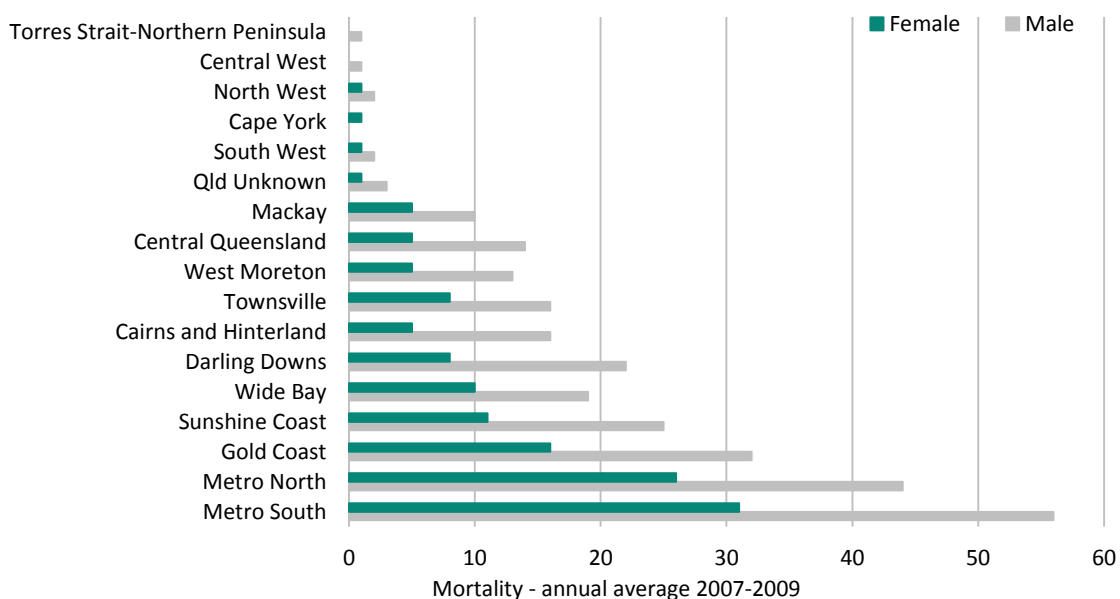
Figure 30: Oesophago-gastric cancer incidence, Hospital and Health Services, annual average, Queensland, 2007 – 2009



Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

Similar to incidence, the average annual mortality (2007-2009) is highest in Metro South and Metro North Hospital and Health Services accounting for 21% and 17% of the state’s mortality respectively (Figure 31).

Figure 31: Oesophago-gastric cancer mortality, Hospital and Health Services, annual average, Queensland, 2007 – 2009

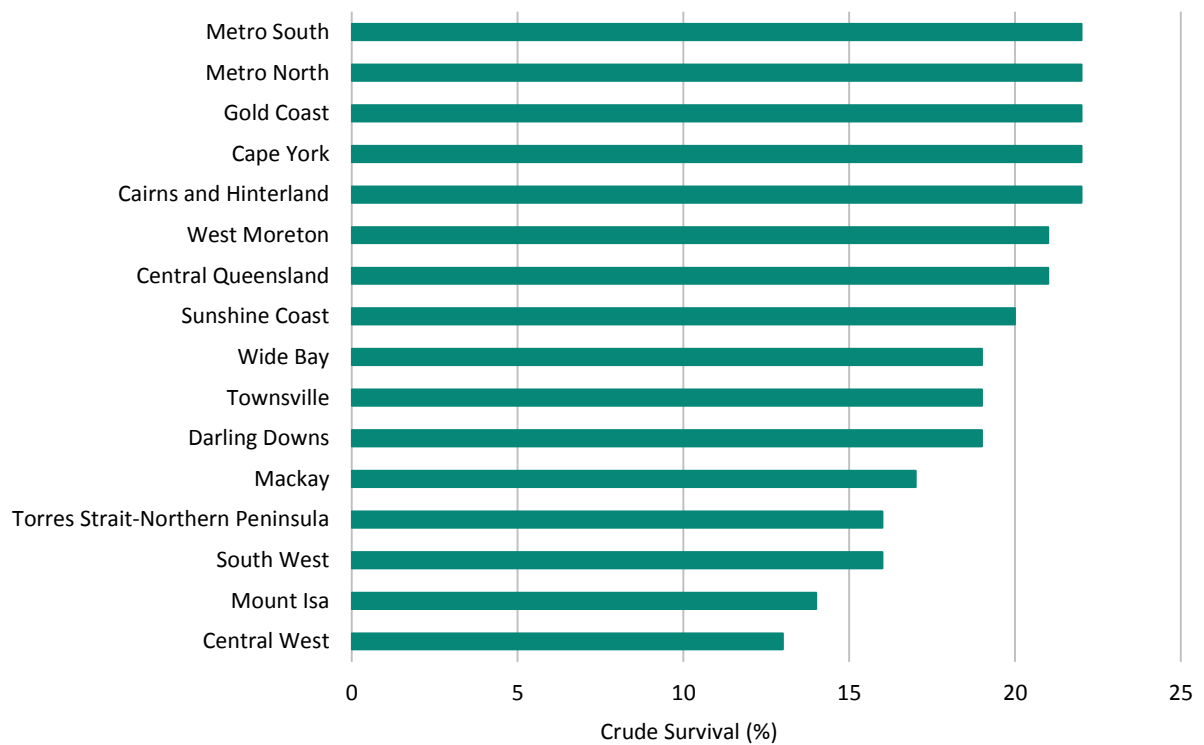


Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

Survival

There is significant regional variation in crude survival of Queensland oesophago-gastric cancer across the state. Hospital and Health Services outside the South East corner experience lower survival than metropolitan Hospital and Health Services with Central West representing the lowest 5 year survival percentage of 13% and Metro South, Metro North, Gold Coast, Cairns and Hinterland and Cape York the highest at 22%.

Figure 32: Oesophago-gastric crude survival by Hospital and Health Services, Queensland, 1982 – 2009



Source: Oncology Analysis System, Queensland Cancer Control Analysis Team

Appendix



Appendix 1 - Sources of Data

Oncology Analysis System

Oncology Analysis System (OASys) is a state-wide clinical cancer database with diagnostic, treatment, and outcome data on registry-notifiable invasive cancers diagnosed among Queensland residents of all ages (including children) from 1982 to 2009. The database includes inpatient data for public and private admissions and information systems for radiation oncology, pharmacy and pathology. Benign (non-invasive) cancers are excluded. New cancer cases are counted following the rules for counting multiple primary cancers as defined by the International Association for Research on Cancer (IARC).

The data collection, linking and reporting of OASys data is performed under the auspices of Queensland Cancer Control Safety and Quality Partnership, a Quality Assurance Committee gazetted under Section 31, The Health Services Act 1991.

Queensland Oncology Repository

The Queensland Oncology Repository (QOR) is a cancer patient database developed and maintained by the Queensland Cancer Control Analysis Team (QCCAT; Queensland Health) to support Queensland's cancer control, safety, and quality assurance initiatives. QOR consolidates cancer patient information for the state and contains data on cancer diagnoses and deaths, surgery, chemotherapy, and radiotherapy. QOR also includes data collected by clinicians at multidisciplinary team (MDT) meetings across the state. For more information, visit <https://qccat.health.qld.gov.au/QOR>

Queensland Oncology On-Line

Queensland Oncology On-line (QOOL) is an innovative web based system that integrates existing "data silos" and makes available just in time clinical information for multidisciplinary case conferencing, service improvement, monitoring safety and quality, and research.

QOOL has been developed to support clinicians to participate in multidisciplinary care and support the information needs of clinical networks and cancer services. This state-wide clinical registry aims to link patient information from multiple systems and facilitates the sharing of information between clinicians and hospitals, producing a single patient summary view across the state.

QOOL provides the following functionality to cancer providers:

- Auto-population of demographic, pathology and death data from routine electronic sources, combined with additional clinical data, to provide an online clinical summary.
- Secure web access to the clinical summary for online scheduling, case conferencing, cancer care coordination and updating of clinical summary.
- Auto-generated GP/Specialist letter and case notes summary.
- Enables clinicians to record the critical information for each cancer episode, building a profile of the patient's journey, which is accessible by the multidisciplinary clinical team, independent of location of care.

As a result of collecting this information, clinicians are able to more effectively participate in audit and peer review activities as part of routine clinical practice. QCCAT in collaboration with partners and teams applies a strong multidisciplinary approach to cancer service activities that includes primary care, community, allied health, clinicians and consumers. There is further hope that a strong partnership between public and private providers of oncology services will allow a greater focus on service improvement and safety.

In 2012 QOOL is being utilised by 23 hospitals across Queensland supporting 51 individual multidisciplinary meetings.

Appendix 2 - Glossary and Common Abbreviations

Age-standardised incidence/mortality rate (ASR)

The number of new cases or deaths per 100,000 that would have occurred in a given population if the age distribution of that population was the same as that of the Australian population in 2001 and if the age-specific rates observed in the population of interest had prevailed. In international comparisons, the World Standard Population was used as the reference population.

Age-standardised rates are independent of the age-structure of the population of interest and are therefore useful in making comparisons between different populations and time periods.

Except where noted, incidence and mortality rates are standardised to the Australian age-specific population in 2001.

All-cause crude survival

All-cause crude survival: the percentage of cancer cases still alive after a specified period of time from diagnosis.

Hospital and Health Services (HHS)

For residence considerations, a Hospital and Health Service is a geographic area defined by a collection of Statistical Local Areas (SLA). For public hospitals and health service hospitals, the term Hospital and Health Service is synonymous with a group of Queensland Health hospitals and staff responsible for providing and delivering health resources and services to an area which may consist of one or more residential districts.

Incidence (new cases)

The number of new cases of cancer diagnosed in a defined population during a specified time period. For example, 2009 incidence is the number of cancers which were first diagnosed between 1 January 2009 and 31 December 2009.

Mortality (deaths)

The number of deaths attributed to cancer in a defined population during a specified time period regardless of when the diagnosis of cancer was made.

Prevalence

The number of Queenslanders with a diagnosis of cancer who were alive on 31 December 2009.

Relative Survival

The rate of survival of persons diagnosed with cancer relative to the expected survival rate of the general population. Five-year relative survival represents the proportion of patients alive five years after diagnosis, taking into account age, gender and year of diagnosis.

Remoteness

The relative remoteness of residence at time of diagnosis, based on the Australian Standard Geographical Classification (ASGC). In this report, remoteness is classified into four groups: Major City, Inner Regional, Outer Regional, and Remote & Very Remote.

Oesophagectomy

ICD Code	Description
821312	Oesophagectomy by abdominal and transthoracic mobilisation, with thoracic oesophagogastric anastomosis
821313	Oesophagectomy by abdominal and transthoracic mobilisation, with cervical oesophagogastric anastomosis
537633	Oesophagectomy by abdominal and transthoracic mobilisation, with cervical oesophagostomy
1027392	Trans-hiatal oesophagectomy by abdominal and cervical mobilisation, with oesophagogastric anastomosis
1027393	Trans-hiatal oesophagectomy by abdominal and cervical mobilisation, with oesophagojejunal anastomosis
537636	Oesophagectomy by abdominal and thoracic mobilisation with thoracic anastomosis, large intestine interposition and anastomosis
537637	Oesophagectomy by abdominal and thoracic mobilisation with thoracic anastomosis using Roux-en-Y reconstruction
537638	Oesophagectomy by abdominal and thoracic mobilisation with cervical anastomosis, large intestine interposition and anastomosis
537639	Oesophagectomy by abdominal and thoracic mobilisation with cervical anastomosis using Roux-en-Y reconstruction

Gastrectomy

ICD Code	Description
1027388	Partial distal gastrectomy with gastroduodenal anastomosis
1027389	Partial distal gastrectomy with gastrojejunal anastomosis
1027390	Partial proximal gastrectomy with oesophago-gastric anastomosis
537607	Total gastrectomy
537608	Subtotal gastrectomy
537609	Radical gastrectomy

Appendix 3 - Queensland Oesophago-Gastric Collaborative Data Set

Demographics

Diagnosis

Date and basis
 Primary site
 Morphology
 Histopathological grade
 Synchronous primary sites
 Barrett's
 Intestinalisation
 Dysplasia

Staging

Clinical TNM
 Pathological TNM
 Tumour size at imaging (mm)
 Tumour size from pathology (length, diameter mm)
 Metastatic sites at diagnosis Nodal site examined
 Number nodes examined
 Number nodes positive

Cancer History

Prior cancer diagnosis date
 Prior cancer site
 Immediate family history of
 History of H.Pylori
 Cancer History
 Prior cancer diagnosis date
 Prior cancer site
 Immediate family history of
 History of H.Pylori

Clinical Data

Tumour signs & symptoms
 Active significant comorbidities
 Smoking status
 Alcohol consumption
 Exposure
 Height / weight / weight loss
 Performance status (ECOG)
 Investigations
 Respiratory function
 Pathology
 Radiology

Treatment

Recommended treatment plan
 Intent
 Hospital
 Name of specialist
 Clinical trial information

Surgery

Procedure Date
 Admission / Discharge date
 Procedure performed
 Margins
 Histopathological features

Radiotherapy

Intent
 Priority
 Planning date
 Start and completion date
 Type (i.e. External beam)
 Site
 Total dose prescribed (Gy / fractions)
 Total dose received (Gy / fractions)

Chemotherapy

Intent of chemotherapy
 Regimen
 Number cycles planned
 Number cycles of administered
 Start and completion date

Recurrence

Date
 Detection method
 Region / site
 Intended treatment plan
 Intent of treatment

Outcome

Date of death
 Primary cause of death
 Place of death

*All elements detailed in the above dataset are able to be collected in the Queensland Oncology Online (QOOL) on-line application.

Appendix 4 - Multidisciplinary Upper GI Team Meetings in Queensland

The NHS Gastric Cancer Guidance recommends that the specialist oesophago-gastric cancer teams should be involved in the management of all patients, even if formal referral is not appropriate because of metastatic disease or extensive co-morbidity.

Six Queensland Health hospitals report that specialist MDTs are established for the review, treatment planning and management of oesophago-gastric cancer patients. The individual MDTs are shown in the table below:

Hospital	Multidisciplinary Meeting [^]	2011 OG cases reviewed [*]
Princess Alexandra Hospital	Upper GI MDM	186
Royal Brisbane Hospital	Upper GI Cancer MDM	50
Gold Coast Hospital	Hepatobiliary & Upper GI MDT	38
Nambour General Hospital	GIT MDT meeting	29
Redcliffe Hospital	General Oncology	4
Townsville Hospital	Upper GI Cancer MDM	Unknown
TOTAL		307

* Data sourced from QOOL

[^] See QLD Directory of Cancer Services (QDOCS) for dates, times and referral information for each team
www.qccat.health.qld.gov.au/qdocs

Oesophago-gastric cancers defined as cardia / gastro-oesophageal junction, stomach, and pylorus, oesophagus (lower, middle, and upper thirds)

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