Queensland Oesophagogastric Surgery Quality Index

Indicators of
safe, quality cancer care

Cancer surgery in public and
private hospitals

2004 - 2013

qccat queensland cancer control analysis team
the Partnership queensland cancer control safety and quality partnership
Queensland Government

Queensland Oesophagogastric Surgery Quality Index has been developed under the auspices of the Queensland Cancer Control Safety and Quality Partnership (The Partnership). The members of The Partnership include: Professor David E Theile AO (Chair), Professor Joanne Aitken, Dr Marie-France Burke, Aniko Cooper, Professor Kwun Fong, Adjunct Professor Liz Kenny AO, Shoni Philpot, Professor Mark Smithers, Associate Professor Euan Walpole and Associate Professor David Wyld.

The report was prepared by Shoni Philpot, Tracey Guan, Danica Cossio, Gary Francois, Nathan Dunn, Neal Rawson and the Queensland Cancer Control Analysis Team (QCCAT).

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Contents

Message from the Chair

Across Australia all states are examining the results from complex surgical procedures with the aim to ensure the best outcomes for patients. We present the latest - "Queensland Oesophagogastric Surgery Quality Index: Indicators of safe, quality cancer care. Cancer surgery in public and private hospital 2004-2013". This new look report, continues to monitor the patterns of surgery for patients with gastric and oesophageal cancer at public and private, teaching and non-teaching, metropolitan and regional hospitals between 2004 - 2013. Gastric and oesophageal cancer are not common cancers and 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 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. Patients undergoing a gastrectomy or an oesophagectomy for cancer when they had their surgery in hospitals that perform higher volumes of these operations continue to have better outcomes. 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.

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 Cancer Collaborative
Queensland Cancer Control Safety and Quality Partnership

What is the Oesophagogastric Surgery Quality Index?

The Oesophagogastric Surgery Quality Index has been developed for public and private cancer services in Queensland. It is an initiative of the Queensland Cancer Control Safety and Quality Partnership (The Partnership) (https://qccat.health.qld.gov.au). The report tracks Queensland's progress delivering safe, quality cancer care and will be provided to all public and private hospitals that perform oesophagogastric surgery. The Oesophagogastric Surgery Quality Index highlights areas for improvement and identifies the areas where cancer services are performing well. At present the Oesophagogastric Surgery Quality Index has five dimensions and 16 indicators.

Quality Dimension	
Effective	Achieving the best outcomes for Queenslanders with cancer.
Efficient	Optimally using resources to achieve desired outcomes.
Safe	Avoiding and preventing adverse outcomes or injuries by healthcare management.
Accessible	Making health services available in the most suitable setting in a reasonable time.
Equitable	Providing care and ensuring health status does not vary in quality because of personal characteristics (age, socioeconomic status and rurality).

The Oesophagogastric Surgery Quality Index reports on ten years of data from 2004-2013, however there may have been changes more recently that are not captured by the time periods reported. Regardless, the Oesophagogastric Surgery Quality Index provides an important baseline for monitoring current investments in cancer care and changes in clinical practice. It also enables us to reflect on past surgery improvement programs and identify areas where a renewed effort or new approach may be required.

This report uses the Australian Institute of Health and Welfare (AIHW) hospital peer groupings to aggregate and present hospital results. Appendix 1 provides a description of each hospital peer grouping.

Why develop The Oesophagogastric Surgery Quality Index?

Performance indicators linked to clinical outcomes that align with national benchmarking is a key service action in the Cancer Care State-wide Health Service Strategy, 2014. The Oesophagogastric Surgery Quality Index has been developed by the Queensland Cancer Control Analysis Team (QCCAT) and the Queensland Oesophago-Gastric Cancer Collaborative members and participants under the auspices of the Queensland Cancer Control Safety and Quality Partnership (The Partnership). Together, they support a clinician-led, safety and quality program for cancer across Queensland. The Partnership was gazetted as a quality assurance committee under Part 6, Division 1 of the Hospital and Health Boards Act 2011 in 2004. A key role of The Partnership is to provide cancer clinicians, Hospital and Health Services (HHS), Hospitals and Queensland Health with cancer information and tools to deliver the best patient care.

The Oesophagogastric Surgery Quality Index is a tool for reviewing and, comparing information on the safety and quality of cancer surgery and outcomes. The Partnership has prepared the Oesophagogastric Surgery Quality Index to assist cancer clinicians and administrators to improve patient care. In some cases it may prompt a change in the delivery and organisation of cancer services to improve health outcomes and performance. The Oesophagogastric Surgery Quality Index includes public and private cancer care services.

Where has the data come from?

Since 2004 QCCAT have compiled and analysed a vast amount of information about cancer incidence, mortality, surgical survival and surgery. Key to QCCAT's program of work is the ability to match and link population based cancer information on an individual patient basis. This matched and linked data is housed in the Queensland Oncology Repository (QOR), a resource managed by QCCAT. This centralised repository compiles and collates data from a range of source systems including the Queensland Cancer Registry, hospital admissions data, death data, treatment systems, public and private pathology, hospital clinical data systems and Queensland Oncology On-Line (QOOL). QOR contains approximately 40 million records between 1982 – 2013. Our matching and linking processes provide the 350,000+ matched and linked records of cancer patients between 2004 – 2013 which provide the data for the Oesophagogastric Surgery Quality Index.

The Oesophagogastric Surgery Quality Index should be interpreted in the context of following previous publications by The Partnership; Surgery for Oesophagogastric Cancer in Qld: Infocus – access and flows 2013 and the Gastrectomy, Oesophagectomy in QLD 2012.These publications provide information on cancer incidence, mortality and surgical survival, surgery rates and patient flows which is important information for understanding the indicators reported in The Oesophagogastric Surgery Index. To access these reports go to https://qccat.health.qld.gov.au/reports.

The following annual summaries were provided to each hospital for Oesophagectomy and Gastrectomy for the following periods; 2000 – 2007, 2001 - 2010 and 2002 – 2011

What indicators are included?

Quality Dimension	Indicator	Definition
1 | Effective		
1.1	Population Survival	What percentage of people with oesophageal and gastric cancer are living 5 years after their diagnosis?
1.3	Surgery	How many Queenslanders with oesophageal and gastric cancer receive a major resection?
2 | Efficient		
2.1	Hospital stay	How long do people with oesophageal and gastric cancer stay in hospital after a major resection?
3 | Safe		
3.1	In-hospital mortality	What percentage of people with oesophageal and gastric cancer die in hospital after a major resection?
3.2	30 day mortality	What percentage of people with oesophageal and gastric cancer die within 30 days of a major resection?
3.3	90 day mortality	What percentage of people with oesophageal and gastric cancer die within 90 days of a major resection?
3.4	1-yr surgical survival	What percentage of patients are alive one year after a major resection?
3.5	2-yr surgical survival	What percentage of patients are alive two years after a major resection?
3.6	Postoperative mortality	What is the likelihood of postoperative mortality in a low or very low volume hospital?
4 | Accessible		
4.1	Timeliness **(where surgery is first treatment received)**	What percentage of public compared to private patients received a major resection within 30, 31-90 or 91+ days of diagnosis?
4.2	Remoteness	What percentage of patients living outside a metropolitan area received a major resection within 30 days of diagnosis?
5 | Equitable		
5.1	Over 70 years	What percentage of patients aged ≥70 receive oesophagogastric surgery within 30 days from diagnosis?
5.2	Socio-economically disadvantaged	What percentage of socio-economically disadvantaged patients receive oesophagogastric surgery within 30 days from diagnosis?
5.3	In-flows by remoteness	What percentage of patients reside outside a metropolitan area?
5.4	Remoteness	What percentage of oesophagogastric surgery patients reside outside my HHS?
5.5	Out-flows	What percentage of patients underwent oesophagogastric surgery outside of the HHS that they reside in?

1 | Effective

Achieving the best outcomes for Queenslanders with cancer.

1.1 | Survival

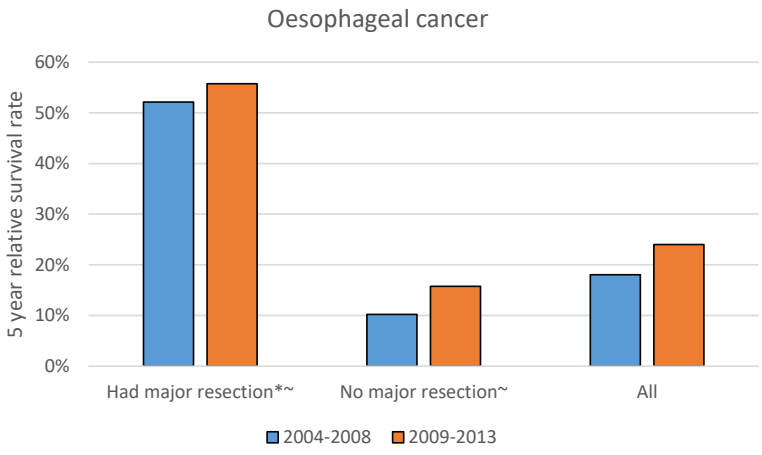
Oesophageal and Gastric cancer

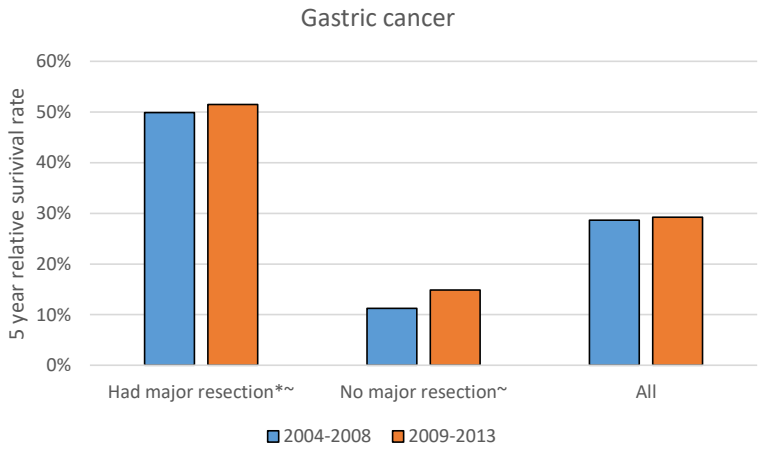
Diagnosis year 2004 – 2008 and 2009 – 2013

1.1.1 | What percentage of people with oesophageal and gastric cancer are living 5 years after their diagnosis?

Relative Survival *(% of people who would have survived if cancer was the only cause of death)*	**Diagnosis Years** **2004 -2008**	**2009 - 2013**	**Diagnosis Years** **2004 -2008**	**2009 - 2013**
	Oesophageal cancer		Gastric cancer	
Had major resection*~	52%	56%	50%	51%
No major resection~	10%	16%	11%	15%
All	18%	24%	29%	29%

1.1.2 | 5 year relative survival by surgery type





*Had major resection: either gastrectomy or oesophagectomy

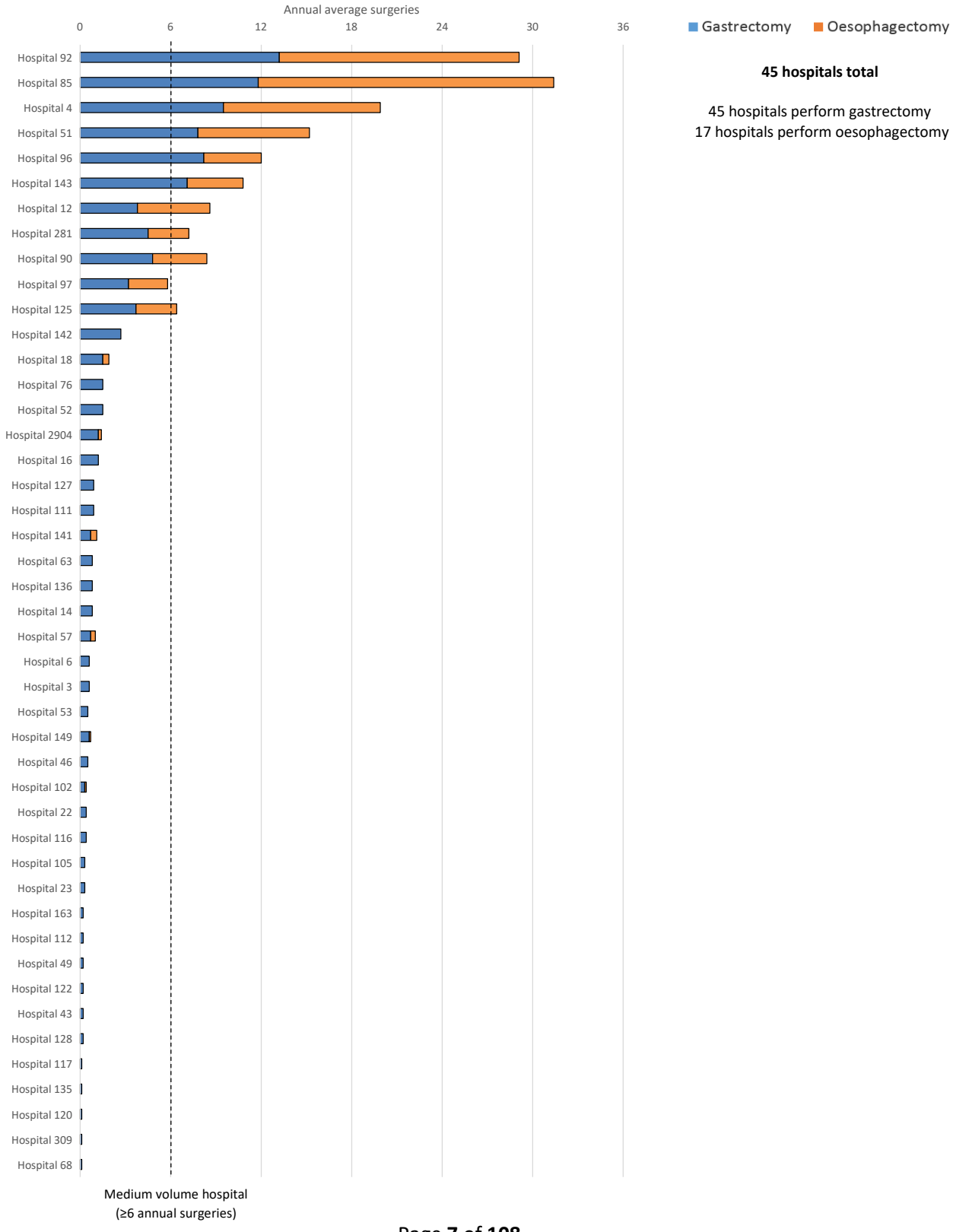
~Patients could have had either radiotherapy, systemic therapy, both treatments or neither

1.2 | Hospitals performing oesophagogastric surgeries

Oesophageal and Gastric cancer

Diagnosis year 2004 – 2013

1.2.1 | Which hospitals perform oesophagectomies, gastrectomies or both?



45 hospitals total

45 hospitals perform gastrectomy
17 hospitals perform oesophagectomy

1.3 | Queenslanders receiving cancer surgery

Diagnosis year 2004 – 2008

1.3.1 | How many Queenslanders with oesophageal or gastric cancer receive surgery by HHS of residence?

HHS of residence	Cancer incidence	Oesophagectomies	Gastrectomies	Surgery number (rate*)
Cairns and Hinterland	161	20	23	43 27%
Central Queensland	125	20	15	35 28%
Central West	9	0	0	
Darling Downs	177	34	25	59 33%
Gold Coast	333	35	62	97 29%
Mackay	93	17	9	26 28%
Metro North	533	71	124	195 37%
Metro South	603	73	132	205 34%
North West	11	1	2	3 27%
South West	16	1	0	1 6%
Sunshine Coast	252	45	47	92 37%
Torres and Cape	16	1	1	2 13%
Townsville	156	17	30	47 30%
West Moreton	123	15	24	39 32%
Wide Bay	190	26	38	64 34%
Queensland	**2798**	**376**	**532**	**908** **32%**

*Percentage of cancer patients receiving cancer surgery
Tables with blank results indicate that no surgery occurred

Diagnosis year 2009 – 2013

1.3.2 | How many Queenslanders with oesophageal or gastric cancer receive surgery by HHS of residence?

HHS of residence	Cancer incidence	Oesophagectomies	Gastrectomies	Surgery number (rate*)
Cairns and Hinterland	157	22	16	38 24%
Central Queensland	137	13	17	30 22%
Central West	6		2	2 33%
Darling Downs	203	21	24	45 22%
Gold Coast	356	43	54	97 27%
Mackay	92	15	14	29 32%
Metro North	545	64	109	173 32%
Metro South	665	113	101	214 32%
North West	13	1	2	3 23%
South West	13	2	0	2 15%
Sunshine Coast	303	46	42	88 29%
Torres and Cape	18	0	1	1 6%
Townsville	161	25	26	51 32%
West Moreton	148	13	24	37 25%
Wide Bay	210	33	26	59 28%
Queensland	**3027**	**411**	**458**	**869** **29%**

*Percentage of cancer patients receiving cancer surgery
Tables with blank results indicate that no surgery occurred

Part 1
Oesophagectomy Quality Index

Queensland hospitals quality index overview

Oesophagectomy

Diagnosis year 2009 – 2013

Crude indicator rate comparison

ID	Indicators	Principal referral hospitals	Group A hospitals	Group B hospitals	Public	Private	**Qld**
2.1.1	Length of stay (days)	15	15	16	15	15	**15**
3.1.1	In-hospital mortality	2.2% (4/183)	0.5% (1/215)	0% (0/13)	2% (4/199)	0.5% (1/212)	**1.2% (5/411)**
3.2.1	30 day mortality	2.2% (4/183)	0.5% (1/215)	0% (0/13)	2% (4/199)	0.5% (1/212)	**1.2% (5/411)**
3.3.1	90 day mortality	5.5% (10/183)	2.8% (6/215)	0% (0/13)	5% (10/199)	2.8% (6/212)	**3.9% (16/411)**
3.4.1	1 year surgical survival	77%	83%	92%	78%	83%	**81%**
3.5.1	2 year surgical survival	65%	69%	77%	64%	71%	**67%**
4.1.1	Received surgery* ≤ 30 days	11% (7/61)	35% (18/51)	33% (1/3)	16% (11/67)	31% (15/48)	**23% (26/115)**
4.1.4	Received surgery* between 31 - 90 days	61% (30/49)	45% (23/51)	33% (1/3)	48% (32/67)	46% (22/48)	**47% (54/115)**
4.1.7	Received surgery* > 90 days	39% (24/61)	20% (10/51)	33% (1/3)	36% (24/67)	23% (11/48)	**30% (35/115)**
5.3.1	In-flows of rural & remote patients	16% (30/183)	9% (19/215)	31% (4/13)	12% (24/199)	14% (29/212)	**13% (53/411)**

*Patients where oesophagectomy was first treatment received, refer to page 37 to see patient breakdown

1 | Effective

Achieving the best outcomes for Queenslanders with cancer.

1.4 | Patient characteristics

Oesophagectomy

Diagnosis year 2004 – 2008

1.4.1 | What are the characteristics of patients with cancer who receive oesophagectomy?

Characteristics	Principal referral hospitals	Group A hospitals	Group B hospitals	Other hospitals	Queensland
Median Age at Diagnosis	65 yrs	65 yrs	66 yrs	59 yrs	**65 yrs**
% Male	81%	81%	79%	83%	**81%**
% Age 70+	27%	28%	36%	0%	**28%**
% Rural & Remote	20%	8%	86%	0%	**16%**
% Disadvantaged	33%	18%	57%	0%	**26%**
% Indigenous	1%	0%	0%	0%	**1%**

Oesophagectomy

Diagnosis year 2009– 2013

1.4.2 | What are the characteristics of patients with cancer who receive oesophagectomy?

Characteristics	Principal referral hospitals	Group A hospitals	Group B hospitals	Other hospitals	Queensland
Median Age at Diagnosis	62 yrs	63 yrs	64 yrs		**63 yrs**
% Male	85%	83%	100%		**84%**
% Age 70+	17%	25%	8%		**21%**
% Rural & Remote	22%	10%	92%		**18%**
% Disadvantaged	32%	17%	15%		**24%**
% Indigenous	1%	0%	0%		**1%**

For hospital peer group descriptions - refer to Appendix 1
Tables with blank results indicate that no surgery occurred

1.5 | Queenslanders receiving oesophagectomy

Oesophagectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

1.5.1 | How many Queenslanders receive oesophagectomy for cancer by hospital peer group?

Surgery Number	**2004-2008**	**2009-2013**
	Diagnosis year	**Diagnosis year**
(Number of cancer patients receiving an oesophagectomy	Surgery number	Surgery number
Principal referral hospitals	159	183
Group A hospitals	197	215
Group B hospitals	14	13
Other hospitals	6	
Queensland	**376**	**411**

1.5.2 | How many Queenslanders receive oesophagectomy for cancer by hospital volume group~?

Surgery Number	**2004-2008**	**2009-2013**
	Diagnosis year	**Diagnosis year**
(Number of cancer patients receiving an oesophagectomy	Surgery number	Surgery number
Very low volume (<3)	51	13
Low volume (3-5)	71	119
Medium volume (≥6)	254	279
Queensland	**376**	**411**

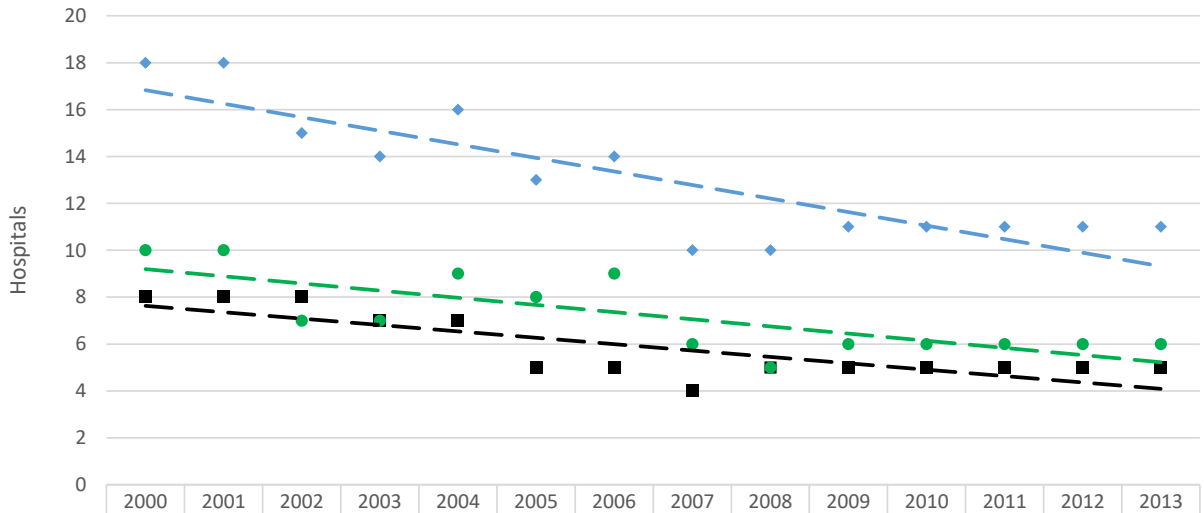
~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)
For hospital peer group descriptions - refer to Appendix 1
Tables with blank results indicate that no surgery occurred

1.6 | Hospitals performing oesophagectomy

Oesophagectomy

Diagnosis year 2000 – 2013

1.6.1 | Number of hospitals performing oesophagectomy by year



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
All	18	18	15	14	16	13	14	10	10	11	11	11	11	11
Public	8	8	8	7	7	5	5	4	5	5	5	5	5	5
Private	10	10	7	7	9	8	9	6	5	6	6	6	6	6

Linear trend lines have been used to approximate the slope and direction of hospital numbers over time

- Total unique facilities = 25
- Total unique public facilities = 13
- Total unique private facilities = 12

1.6.2 – Annual average oesophagectomy by hospital volume group

2 | Efficient

Optimally using resources to achieve desired outcomes.

2.1 | Hospital stay

Oesophagectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

2.1.1 | How long do people having oesophagectomy stay in hospital?

Length of stay (days) *(Median time between the admission and discharge date of cancer surgery)*	**2004-2008** **Diagnosis year** Median (IQR) (17 hospitals)	**2009-2013** **Diagnosis year** Median (IQR) (11 hospitals)
Principal referral hospitals	17 (13 - 24)	15 (12 - 22)
Group A hospitals	15 (13 - 22)	15 (13 - 22)
Group B hospitals	14 (12 - 20)	16 (13 - 40)
Other hospitals	14 (12 - 16)	
Queensland	**15** **(13 - 22)**	**15** **(13 - 22)**

2.1.2 | How long do people having oesophagectomy stay in hospital by the hospital volume group~?

Length of stay (days) *(Median time between the admission and discharge date of cancer surgery)*	**2004 - 2008** **Diagnosis year** Median (IQR)	**2009 - 2014** **Diagnosis year** Median (IQR)
Very low volume (<3)	15 (13 - 20)	16 (13 - 40)
Low volume (3-5)	15 (12 - 21)	14 (11 - 22)
Medium volume (≥6)	16 (13 - 23)	16 (13 - 22)
Queensland	**15** **(13 - 22)**	**15** **(13 - 22)**

~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)
For hospital peer group descriptions - refer to Appendix 1
For a description on Interquartile range (IQR) - refer to definitions
Tables with blank results indicate that no surgery occurred

3 | Safe

Avoiding and preventing adverse outcomes or injuries caused by healthcare management.

3.1 | In-hospital mortality

Oesophagectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

3.1.1 | What percentage of patients die in hospital after oesophagectomy?

In-Hospital mortality *(% patients who die in hospital following oesophagectomy)*	**2004-2008** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	1.3% (2/159) [1.2%, 0-6, 0.725]	2.2% (4/183) [2.2%, 1-8, 0.378]
Group A hospitals	1.5% (3/197) [1.6%, 0-6, 0.99]	0.5% (1/215) [0.5%, 0-4, 0.388]
Group B hospitals	7.1% (1/14) [7.6%, 1-63, 0.148]	0% (0/13) [0%, 0-100, 1]
Other hospitals	0% (0/6) [0%, 0-100, 1]	
Queensland	**1.6% (6/376)**	**1.2% (5/411)**
National and international rates	**UK 4.5%[1]**	**UK 1.9%[1]**

[1] Appendix 2 contains national and international reference rates

3.1.2 | What percentage of patients die in hospital after oesophagectomy by hospital volume group~?

In-Hospital mortality *(% patients who die in hospital following oesophagectomy)*	**2004-2008** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)	3.9% (2/51) [4%, 1-20, 0.259]	0% (0/13) [0%, 0-100, 1]
Low volume (3-5)	2.8% (2/71) [2.6%, 1-13, 0.565]	3.4% (4/119) [3.1%, 1-12, 0.165]
Medium volume (≥6)	0.8% (2/254) [0.8%, 0-4, 0.404]	0.4% (1/279) [0.4%, 0-3, 0.287]
Queensland	**1.6% (6/376)**	**1.2% (5/411)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

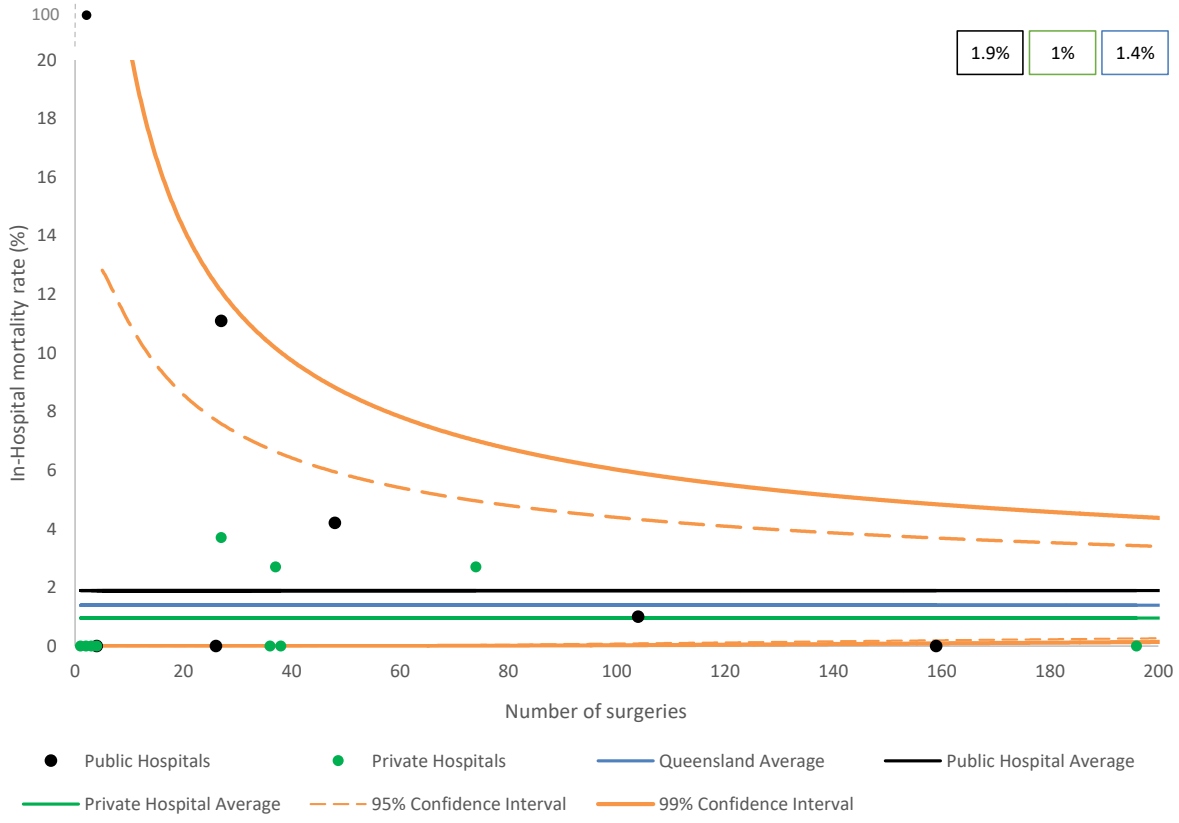
~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)
For hospital peer group descriptions - refer to Appendix 1
Tables with blank results indicate that no surgery occurred

Oesophagectomy

Diagnosis year 2004 – 2013

Crude rates, 10 years combined

3.1.3 | In-hospital mortality following oesophagectomy by hospital volume

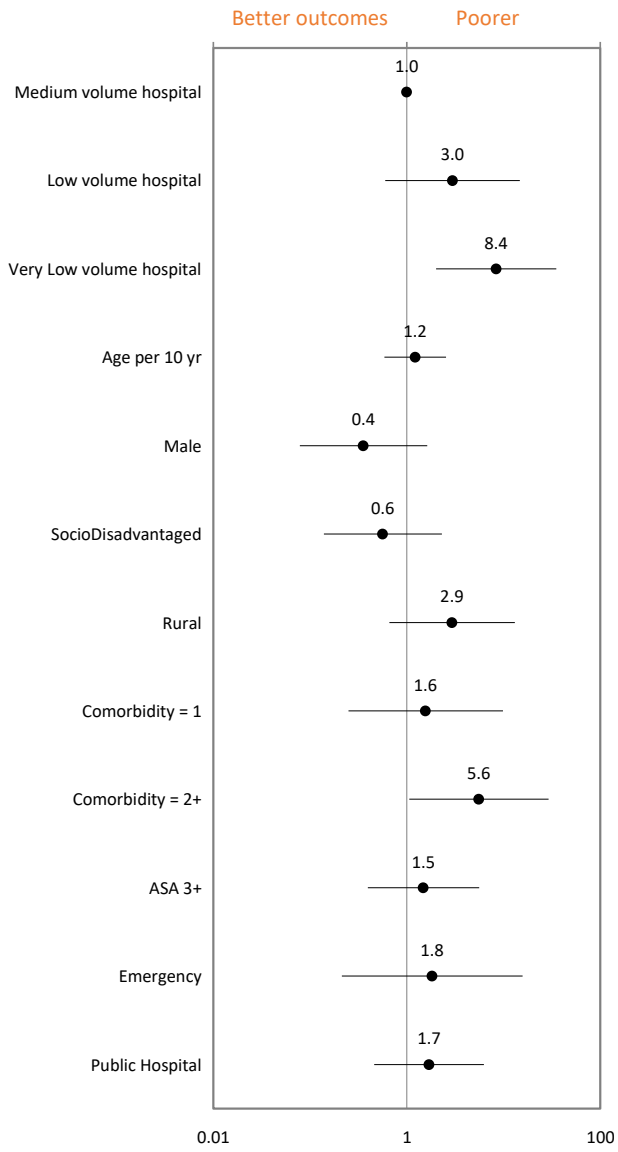


Oesophagectomy

Diagnosis year 2004 – 2013

10 years combined

3.1.4 | Relative risk of in-hospital mortality following oesophagectomy



Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)

The above graph (forest plot) is a graphical display of the hazard ratios for each covariate in the analysis. The dot represents the estimate of the hazard ratio with the confidence interval of the estimate represented by a horizontal line. The central vertical line represents no effect, if the confidence intervals for an estimate cross this central vertical line then the effect is considered not to be statistically significant.

3.2 | 30 day mortality

Oesophagectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

3.2.1 | What percentage of patients die within 30 days of oesophagectomy?

30 day mortality *(% patients who die ≤ 30 days following oesophagectomy)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	0.6% (1/159) [0.6%, 0-6, 0.802]	2.2% (4/183) [2.1%, 0-9, 0.494]
Group A hospitals	1% (2/197) [1.1%, 0-6, 0.753]	0.5% (1/215) [0.6%, 0-5, 0.521]
Group B hospitals	0% (0/14) [0%, 0-100, 1]	0% (0/13) [0%, 0-100, 1]
Other hospitals	0% (0/6) [0%, 0-100, 1]	
Queensland	**0.8% (3/376)**	**1.2% (5/411)**
National and international rates	**NSW & Int. 1.9% - 4.6%[1,2,3,4]**	**UK 1.6%[1]**

[1,2,3,4] Appendix 2 contains national and international reference rates

3.2.2 | What percentage of patients die within 30 days of oesophagectomy by hospital volume group~?

30 day mortality *(% patients who die ≤ 30 days following oesophagectomy)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)	2% (1/51) [2%, 0-19, 0.437]	0% (0/13) [0%, 0-100, 1]
Low volume (3-5)	2.8% (2/71) [2.5%, 0-15, 0.203]	3.4% (4/119) [2.9%, 1-13, 0.261]
Medium volume (≥6)	0% (0/254) [0%, 0-100, 1]	0.4% (1/279) [0.5%, 0-4, 0.401]
Queensland	**0.8% (3/376)**	**1.2% (5/411)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

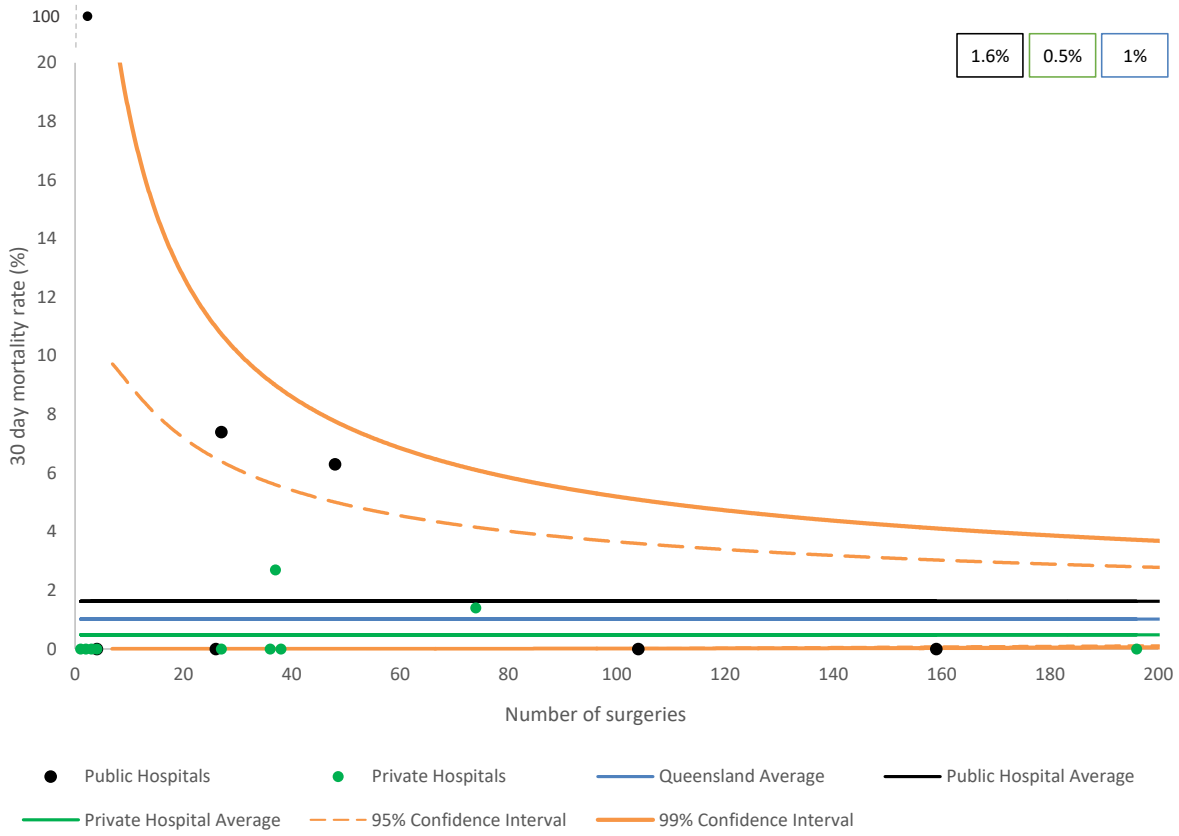
~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)
For hospital peer group descriptions - refer to Appendix 1
Tables with blank results indicate that no surgery occurred

Oesophagectomy

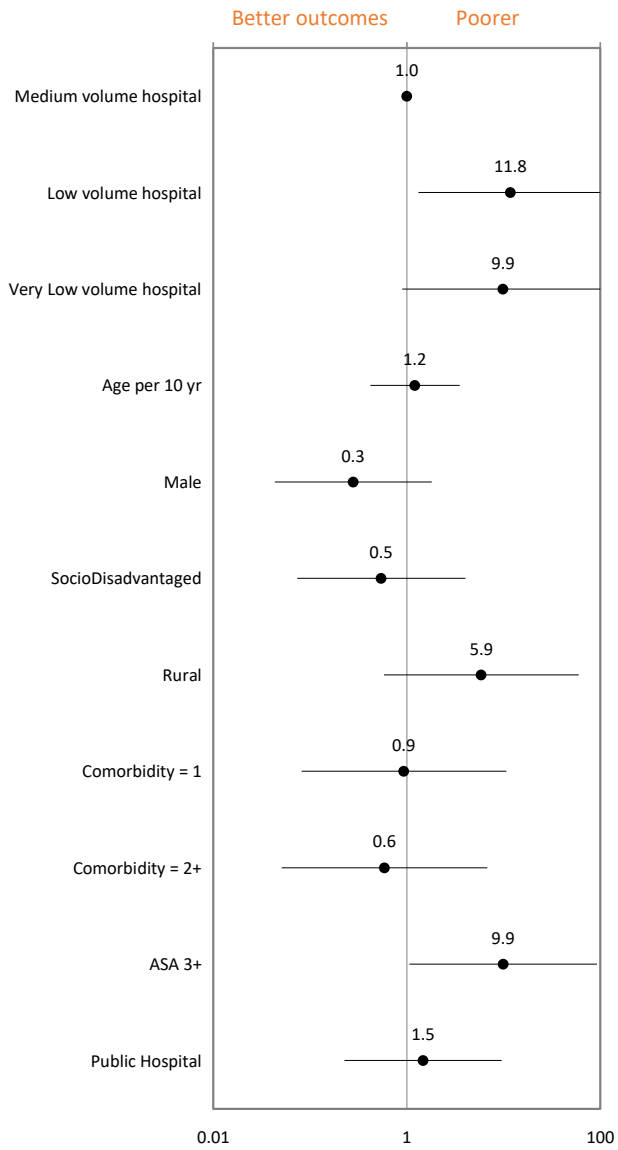
Diagnosis year 2004 – 2013

Crude rates, 10 years combined

3.2.3 | 30 day mortality following oesophagectomy by hospital volume



3.2.4 | Relative risk of 30 day mortality following oesophagectomy



Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)

The above graph (forest plot) is a graphical display of the hazard ratios for each covariate in the analysis. The dot represents the estimate of the hazard ratio with the confidence interval of the estimate represented by a horizontal line. The central vertical line represents no effect, if the confidence intervals for an estimate cross this central vertical line then the effect is considered not to be statistically significant.

3.3 | 90 day mortality

Oesophagectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

3.3.1 | What percentage of patients die within 90 days of oesophagectomy?

90 day mortality *(% patients who die ≤ 90 days following oesophagectomy)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	1.9% (3/159) [1.8%, 0-7, 0.798]	5.5% (10/183) [5.3%, 2-12, 0.456]
Group A hospitals	1.5% (3/197) [1.6%, 0-6, 0.667]	2.8% (6/215) [3%, 1-8, 0.592]
Group B hospitals	14.3% (2/14) [15%*, 3-71, 0.014]	0% (0/13) [0%, 0-100, 1]
Other hospitals	0% (0/6) [0%, 0-100, 1]	
Queensland	**2.1% (8/376)**	**3.9% (16/411)**
National and international rates	**NSW & Int. 5.7% - 13.3%[1,3,4]**	**UK 3.2% [1]**

[1,3,4] Appendix 2 contains national and international reference rates

3.3.2 | What percentage of patients die within 90 days of oesophagectomy by hospital volume group~?

90 day mortality *(% patients who die ≤ 90 days following oesophagectomy)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)	5.9% (3/51) [6%, 2-22, 0.128]	0% (0/13) [0%, 0-100, 1]
Low volume (3-5)	2.8% (2/71) [2.6%, 1-12, 0.809]	7.6% (9/119) [6.7%, 3-16, 0.212]
Medium volume (≥6)	1.2% (3/254) [1.2%, 0-5, 0.404]	2.5% (7/279) [2.8%, 1-7, 0.475]
Queensland	**2.1% (8/376)**	**3.9% (16/411)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

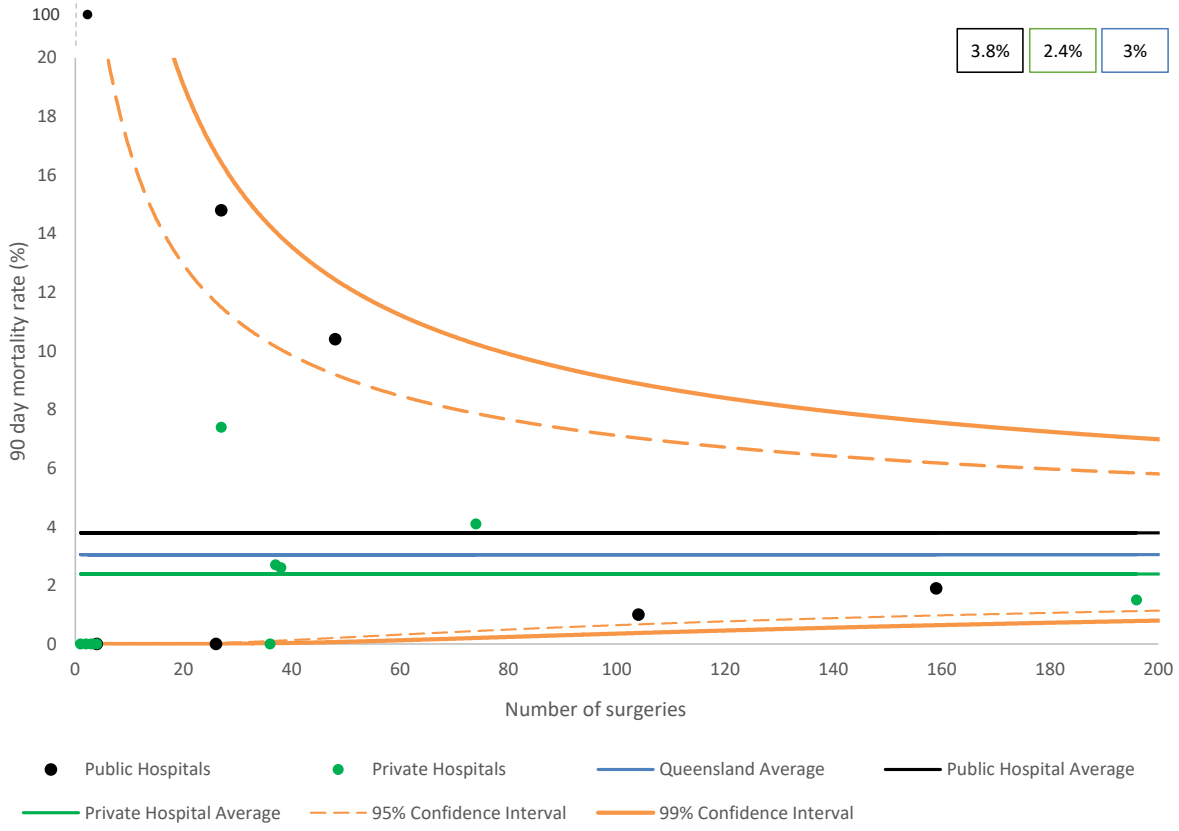
~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)
For hospital peer group descriptions - refer to Appendix 1
Tables with blank results indicate that no surgery occurred

Oesophagectomy

Diagnosis year 2004 – 2013

Crude rates, 10 years combined

3.3.3 | 90 day mortality following oesophagectomy by hospital volume

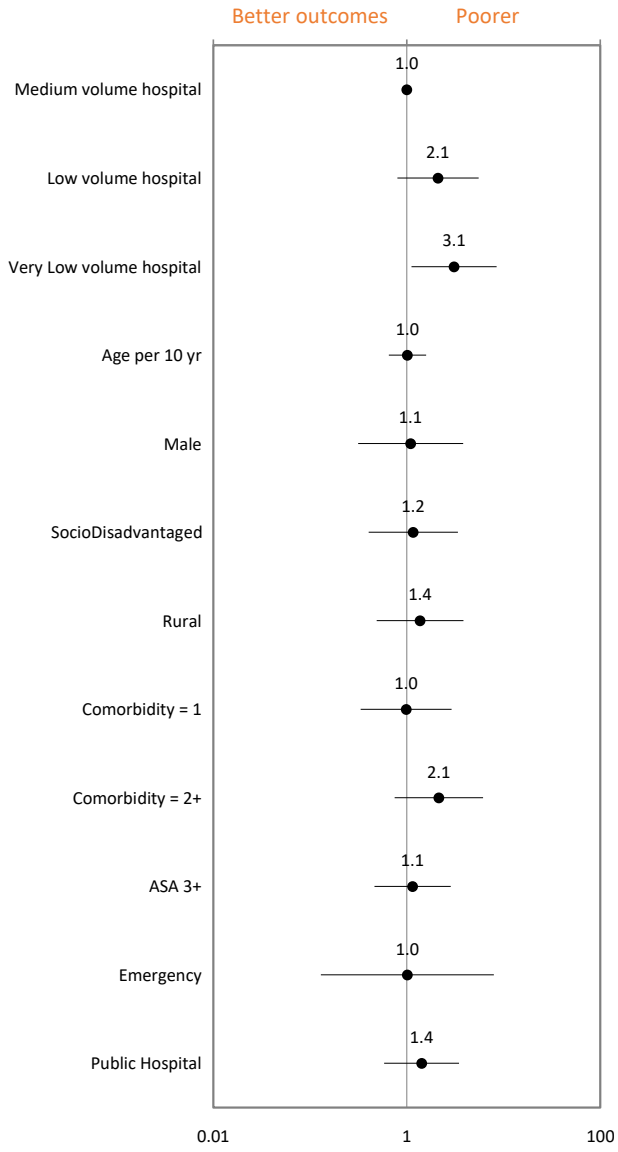


Oesophagectomy

Diagnosis year 2004 – 2013

10 years combined

3.3.4 | Relative risk of 90 day mortality following oesophagectomy



Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)

The above graph (forest plot) is a graphical display of the hazard ratios for each covariate in the analysis. The dot represents the estimate of the hazard ratio with the confidence interval of the estimate represented by a horizontal line. The central vertical line represents no effect, if the confidence intervals for an estimate cross this central vertical line then the effect is considered not to be statistically significant.

3.4 | 1 year surgical survival

Oesophagectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

3.4.1 | What percentage of patients are alive one year after oesophagectomy?

1 year surgical survival *(% patients alive 1 year after oesophagectomy)*	**2004-2008 Diagnosis year** Crude rates [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates [Adjusted rates, CI%, P value]
Principal referral hospitals	82% [83%, 73-89, 0.807]	77% [75%, 64-83, 0.196]
Group A hospitals	87% [87%, 80-92, 0.294]	83% [84%, 76-89, 0.442]
Group B hospitals	57% [36%**, 0-72, 0.001]	92% [95%, 66-99, 0.167]
Other hospitals	67% [65%, 0-91, 0.287]	
Queensland	**84%**	**81%**

3.4.2 | What percentage of patients are alive one year after oesophagectomy by hospital volume group~?

1 year surgical survival *(% patients alive 1 year after oesophagectomy)*	**2004-2008 Diagnosis year** Crude rates [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates [Adjusted rates, CI%, P value]
Very low volume	75% [71%, 48-84, 0.065]	92% [95%, 66-99, 0.167]
Low volume	89% [90%, 80-95, 0.179]	73% [75%, 62-83, 0.209]
Medium volume	84% [84%, 76-89, 0.967]	84% [82%, 75-88, 0.635]
Queensland	**84%**	**81%**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

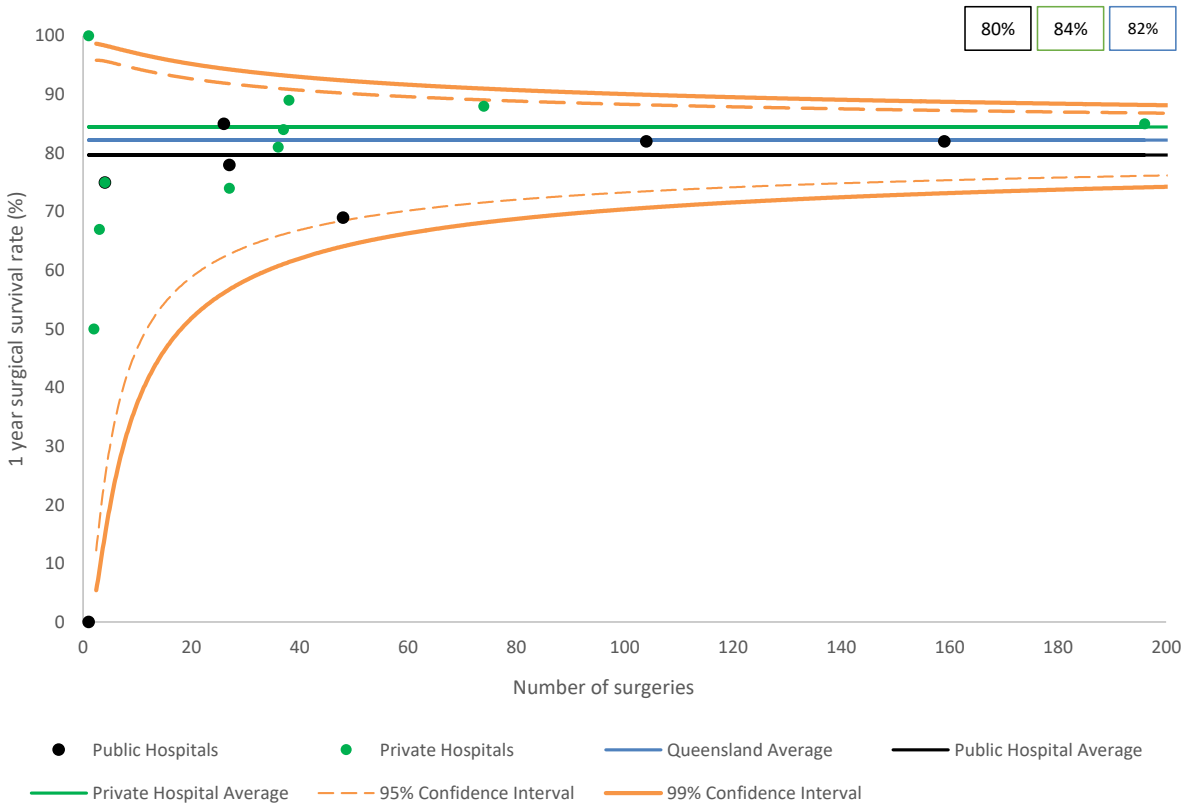
~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)
For hospital peer group descriptions - refer to Appendix 1
Tables with blank results indicate that no surgery occurred

Oesophagectomy

Diagnosis year 2004 – 2013

Crude rates, 10 years combined

3.4.3 | 1 year surgical survival following oesophagectomy by hospital volume

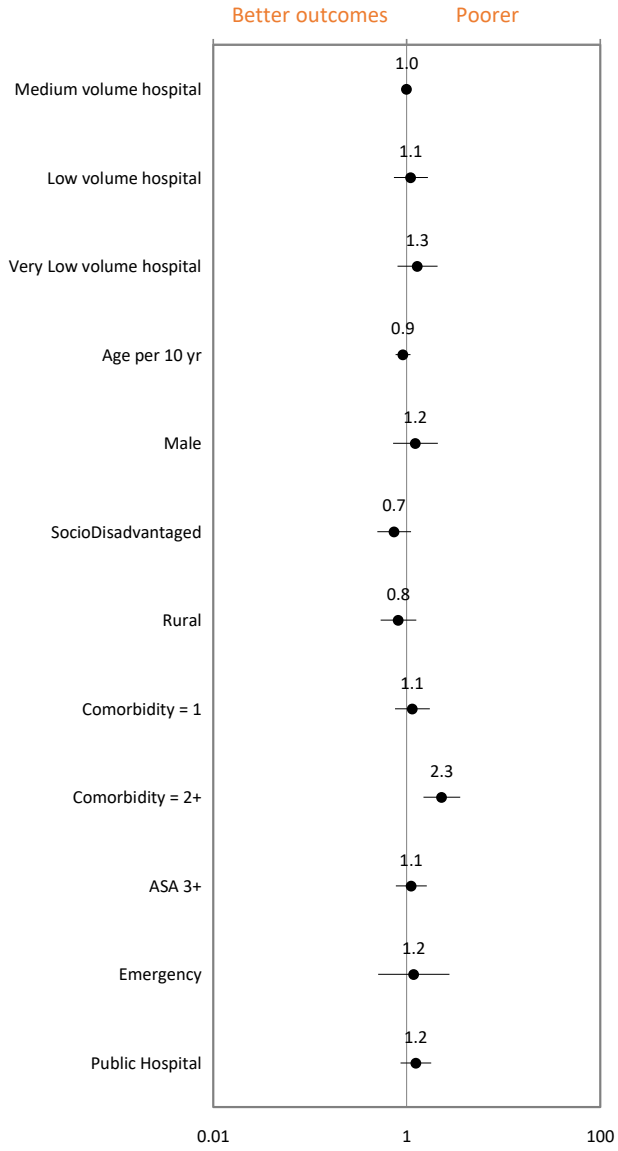


Oesophagectomy

Diagnosis year 2004 – 2013

10 years combined

3.4.4 | 1 year surgical survival following oesophagectomy



Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)

The above graph (forest plot) is a graphical display of the hazard ratios for each covariate in the analysis. The dot represents the estimate of the hazard ratio with the confidence interval of the estimate represented by a horizontal line. The central vertical line represents no effect, if the confidence intervals for an estimate cross this central vertical line then the effect is considered not to be statistically significant.

3.5 | 2 year surgical survival

Oesophagectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

3.5.1 | What percentage of patients are alive two years after oesophagectomy?

2 year surgical survival *(% patients alive 2 year after oesophagectomy)*	**2004-2008 Diagnosis year** Crude rates [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates [Adjusted rates, CI%, P value]
Principal referral hospitals	66% [66%, 56-74, 0.732]	65% [65%, 55-73, 0.569]
Group A hospitals	72% [72%, 62-80, 0.35]	69% [69%, 60-76, 0.715]
Group B hospitals	43% [43%*, 8-65, 0.02]	77% [77%, 37-92, 0.499]
Other hospitals	33% [13%, 0-68, 0.052]	
Queensland	**68%**	**67%**
National and international rates	**EUR 57% - 61%[2]**	

[2] Appendix 2 contains national and international reference rates

3.5.2 | What percentage of patients are alive two years after oesophagectomy by hospital volume group~?

2 year surgical survival *(% patients alive 2 year after oesophagectomy)*	**2004-2008 Diagnosis year** Crude rates [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates [Adjusted rates, CI%, P value]
Very low volume (<3)	59% [51%, 23-69, 0.087]	77% [88%, 64-96, 0.076]
Low volume (3-5)	62% [68%, 51-79, 0.956]	61% [60%, 44-71, 0.239]
Medium volume (≥6)	71% [70%, 60-78, 0.558]	70% [68%, 59-76, 0.805]
Queensland	**68%**	**67%**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

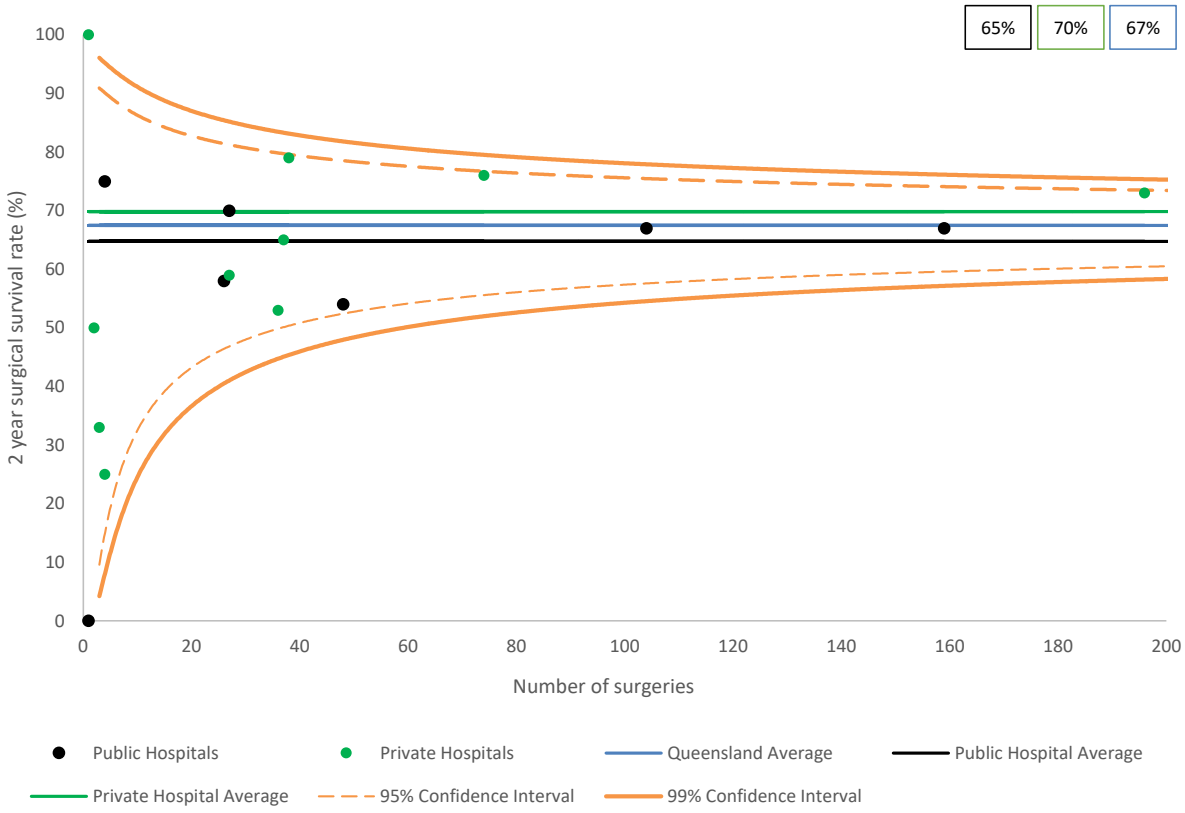
~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)
For hospital peer group descriptions - refer to Appendix 1
Tables with blank results indicate that no surgery occurred

Oesophagectomy

Diagnosis year 2004 – 2013

Crude rates, 10 years combined

3.5.3 | 2 year surgical survival following oesophagectomy by hospital volume



[1] National Oesophago-gastric Cancer Audit 2016, Healthcare Quality Improvement Partnership Ltd. (HQIP) [Accessed Dec 2016]; Available from: http://content.digital.nhs.uk/catalogue/PUB21561

[2] J. L. Dikken, J. W. van Sandick, W. H. Allum, et al. Differences in outcomes of oesophageal and gastric cancer surgery across Europe, British Journal of Surgery 2013; 100: 83–94

[3] D. M. Walters, T. L. McMurry, J. M. Isbell, et al. Understanding Mortality as a Quality Indicator After Esophagectomy, Ann Thorac Surg 2014;98:506–12

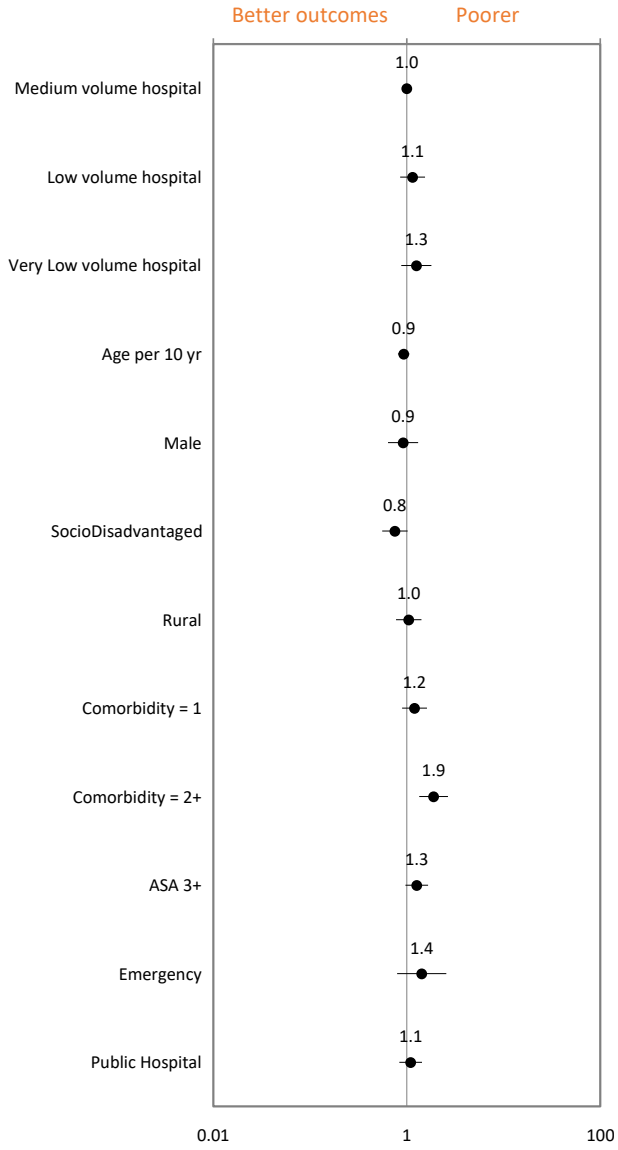
[4] R.C. Smith, N. Creighton, R. V. Lord, et al. Survival, mortality and morbidity outcomes after oesophagogastric cancer surgery in New South Wales, 2001–2008, MJA 2014; 200: 408–413 doi: 10.5694/mja13.11182

Oesophagectomy

Diagnosis year 2004 – 2013

10 years combined

3.5.4 | 2 year surgical survival following oesophagectomy



Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)

The above graph (forest plot) is a graphical display of the hazard ratios for each covariate in the analysis. The dot represents the estimate of the hazard ratio with the confidence interval of the estimate represented by a horizontal line. The central vertical line represents no effect, if the confidence intervals for an estimate cross this central vertical line then the effect is considered not to be statistically significant.

3.6 | Postoperative mortality

Oesophagectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

3.6.1 | What is the likelihood of postoperative mortality in a low or very low volume hospital?

Volume outcome association *(Likelihood of postoperative mortality in a low or very low volume hospital)*	**2004-2008 Diagnosis Year** Hazard Ratio (n/N) [CI%, P value]	**2009-2013 Diagnosis Year** Hazard Ratio (n/N) [CI%, P value]
In hospital mortality		
Very low volume	9.6 (2/51) [0.9-100, 0.06]	++ (0/13)
Low volume	2.9 (2/71) [0.3-26.9, 0.36]	8.9 (3/120) [0.8-97.2, 0.073]
Medium volume	1 (2/253) [Reference]	1 (1/278) [Reference]
30-day mortality		
Very low volume	Unable to be calculated+ (1/51)	++ (0/13)
Low volume	Unable to be calculated+ (2/71)	13.8* (4/120) [1.1-100, 0.04]
Medium volume	1 (0/253) [Reference]	1 (1/278) [Reference]
90-day mortality		
Very low volume	5.8* (3/51) [1-33.4, 0.047]	++ (0/13)
Low volume	2.2 (2/71) [0.3-14.6, 0.42]	2.8 (8/120) [1-8.3, 0.061]
Medium volume	1 (3/253) [Reference]	1 (7/278) [Reference]
1 year mortality		
Very low volume	1.9 (13/51) [1-3.8, 0.053]	0.5 (1/13) [0.1-3.4, 0.443]
Low volume	0.7 (8/71) [0.3-1.5, 0.303]	1.8* (30/120) [1.1-3, 0.016]
Medium volume	1 (40/253) [Reference]	1 (44/278) [Reference]

+ Unable to be calculated due to no deaths occurring at medium volume facilities

++ No deaths occurred in this volume group during this period

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked. The effect of hospital volume on postoperative mortality and 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. For further explanation on volume outcome associations refer to definitions

4 | Accessible

Making health services available in the most suitable setting in a reasonable time.

Timeliness – cohort definition

Oesophagectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

How many patients received oesophagectomy as their first treatment following diagnosis?

Cancer incidence	**Diagnosis year**	
by treatment first received	2004 - 2008	2009 - 2013
Oesophagectomy as first treatment	196 (52%)	115 (28%)
Other* as first treatment	180 (48%)	296 (72%)
Total oesophagectomies	**376**	**411**

*Other includes systemic therapy, radiotherapy or both

All subsequent tables in section 4 include patients where oesophagectomy was first treatment received.

4.1 | Timeliness

Oesophagectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

4.1.1 | What percentage of patients receive oesophagectomy within 30 days of diagnosis?

Patients where oesophagectomy was first treatment received.

Received surgery within 30 days *(% patients whose time from diagnosis to oesophagectomy is ≤30 days)*	**2004 - 2008** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009 - 2013** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	38% (33/88) [38%*, 28-51, 0.033]	11% (7/61) [16%, 7-34, 0.087]
Group A hospitals	63% (60/96) [51%, 41-63, 0.855]	35% (18/51) [35%, 21-58, 0.083]
Group B hospitals	67% (4/6) [67%, 37-100, 0.404]	33% (1/3) [33%, 6-100, 0.939]
Other hospitals	83% (5/6) [83%*, 57-100, 0.016]	
Queensland	**52% (102/196)**	**23% (26/115)**

4.1.2 | What percentage of patients receive oesophagectomy within 30 days of diagnosis by hospital volume group~?

Patients where oesophagectomy was first treatment received.

Received surgery within 30 days *(% patients whose time from diagnosis to oesophagectomy is ≤30 days)*	**2004 - 2008** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009 - 2013** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)	63% (25/40) [62%, 47-82, 0.193]	33% (1/3) [33%, 6-100, 0.939]
Low volume (3-5)	63% (20/32) [62%, 46-84, 0.232]	36% (14/39) [36%, 21-62, 0.093]
Medium volume (≥6)	46% (57/124) [51%, 34-76, 0.914]	15% (11/73) [21%, 11-40, 0.216]
Queensland	**52% (102/196)**	**23% (26/115)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

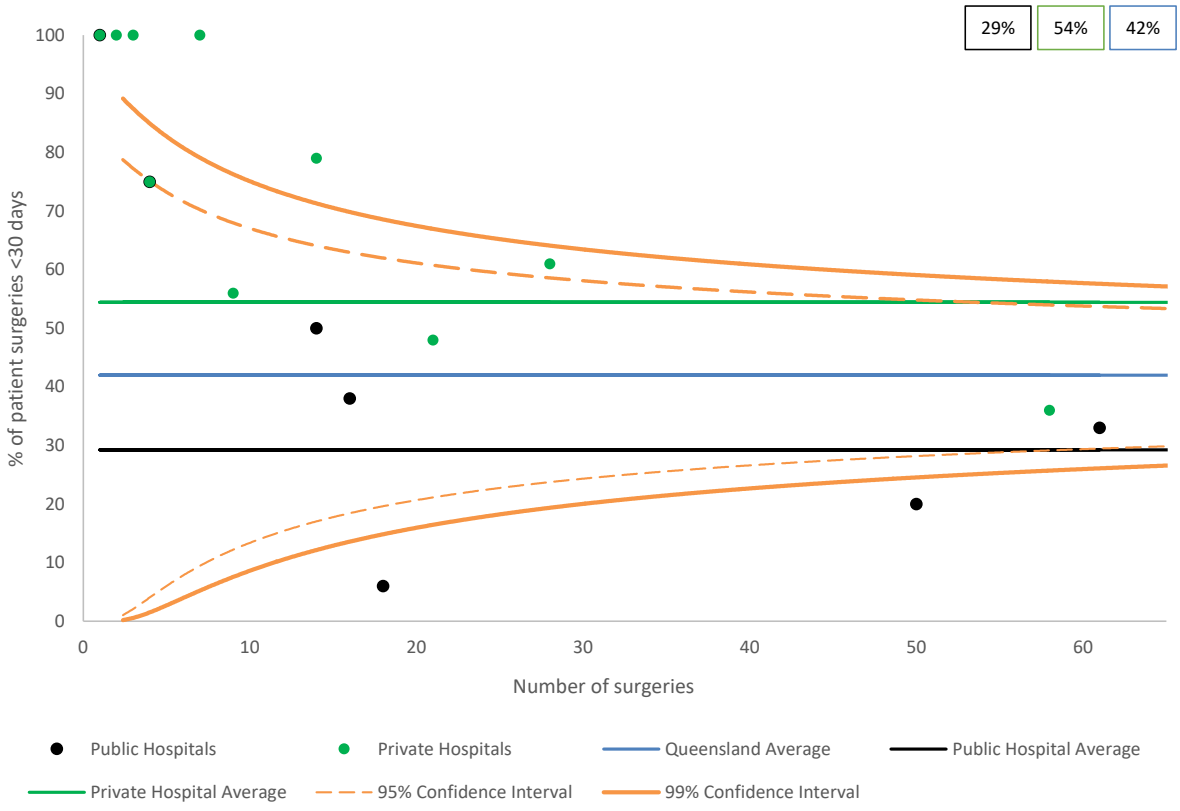
~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)
For hospital peer group descriptions - refer to Appendix 1
Tables with blank results indicate that no surgery occurred

Oesophagectomy

Diagnosis year 2004 – 2013

Crude rates, 10 years combined

4.1.3 | Patients receiving oesophagectomy within 30 days of diagnosis by hospital volume



Oesophagectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

4.1.4 | What percentage of patients receive oesophagectomy between 31 and 90 days from diagnosis?

Patients where oesophagectomy was first treatment received.

Received surgery between 31 and 90 days *(% patients whose time from diagnosis to oesophagectomy is between 31 and 90 days)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	47% (41/88) [47%, 35-62, 0.178]	49% (30/61) [49%, 36-68, 0.778]
Group A hospitals	32% (31/96) [32%, 23-45, 0.328]	45% (23/51) [45%, 31-65, 0.826]
Group B hospitals	33% (2/6) [33%, 11-100, 0.814]	33% (1/3) [33%, 7-100, 0.678]
Other hospitals	17% (1/6) [17%, 3-100, 0.366]	
Queensland	**38% (75/196)**	**47% (54/115)**

4.1.5 | What percentage of patients receive oesophagectomy between 31 and 90 days from diagnosis by hospital volume group~?

Patients where oesophagectomy was first treatment received.

Received surgery between 31 and 90 days *(% patients whose time from diagnosis to oesophagectomy is between 31 and 90 days)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)	33% (13/40) [32%, 20-53, 0.506]	33% (1/3) [33%, 7-100, 0.678]
Low volume (3-5)	19% (6/32) [19%, 9-39, 0.06]	33% (13/39) [33%, 21-54, 0.167]
Medium volume (≥6)	45% (56/124) [45%, 35-59, 0.218]	55% (40/73) [55%, 41-73, 0.289]
Queensland	**38% (75/196)**	**47% (54/115)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

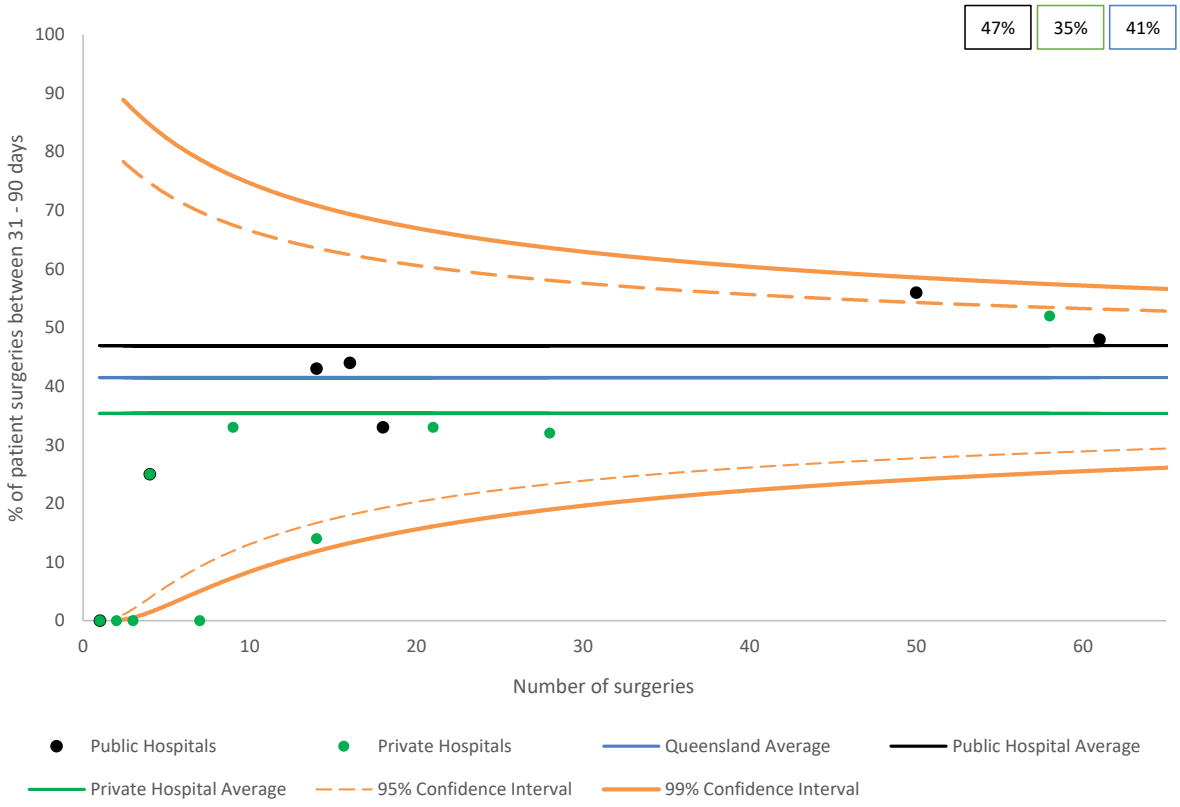
~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)
For hospital peer group descriptions - refer to Appendix 1
Tables with blank results indicate that no surgery occurred

Oesophagectomy

Diagnosis year 2004 – 2013

Crude rates, 10 years combined

4.1.6 | Patients receiving oesophagectomy between 31 and 90 days from diagnosis by hospital volume



Oesophagectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

4.1.7 | What percentage of patients receive oesophagectomy more than 90 days from diagnosis?

Patients where oesophagectomy was first treatment received.

Received surgery more than 90 days *(% patients whose time from diagnosis to oesophagectomy is more than 90 days)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	16% (14/88) [16%, 8-30, 0.132]	39% (24/61) [39%, 26-60, 0.228]
Group A hospitals	5% (5/96) [5%, 2-14, 0.203]	20% (10/51) [20%, 11-37, 0.166]
Group B hospitals	0% (0/6) [0%**, 0-0, 0]	33% (1/3) [33%, 7-100, 0.913]
Other hospitals	0% (0/6) [0%**, 0-0, 0]	
Queensland	**10% (19/196)**	**30% (35/115)**

4.1.8 | What percentage of patients receive oesophagectomy more than 90 days from diagnosis by hospital volume group~?

Patients where oesophagectomy was first treatment received.

Received surgery more than 90 days *(% patients whose time from diagnosis to oesophagectomy is more than 90 days)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)	5% (2/40) [5%, 1-21, 0.36]	33% (1/3) [33%, 7-100, 0.913]
Low volume (3-5)	19% (6/32) [19%, 8-43, 0.123]	31% (12/39) [31%, 18-53, 0.969]
Medium volume (≥6)	9% (11/124) [9%, 4-18, 0.806]	30% (22/73) [30%, 19-47, 0.966]
Queensland	**10% (19/196)**	**30% (35/115)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

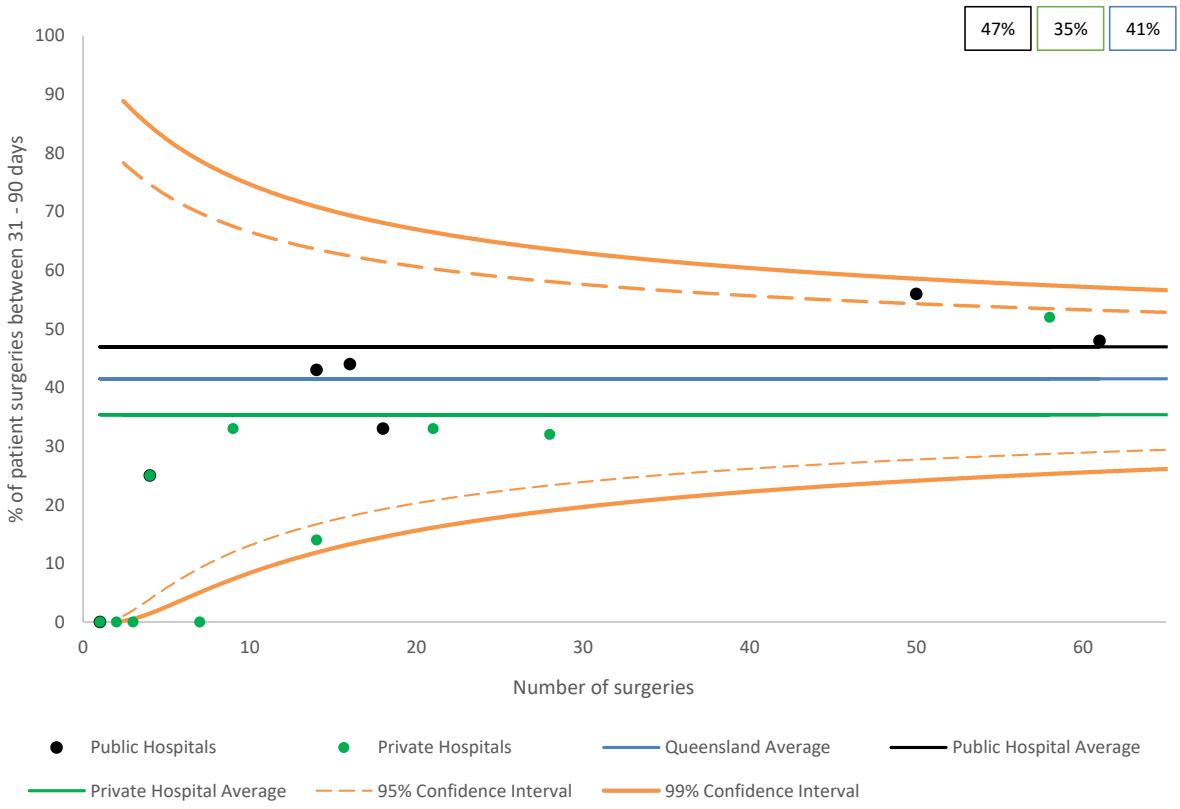
~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)
For hospital peer group descriptions - refer to Appendix 1
Tables with blank results indicate that no surgery occurred

Oesophagectomy

Diagnosis year 2004 – 2013

Crude rates, 10 years combined

4.1.9 | Patients receiving oesophagectomy more than 90 days from diagnosis by hospital volume



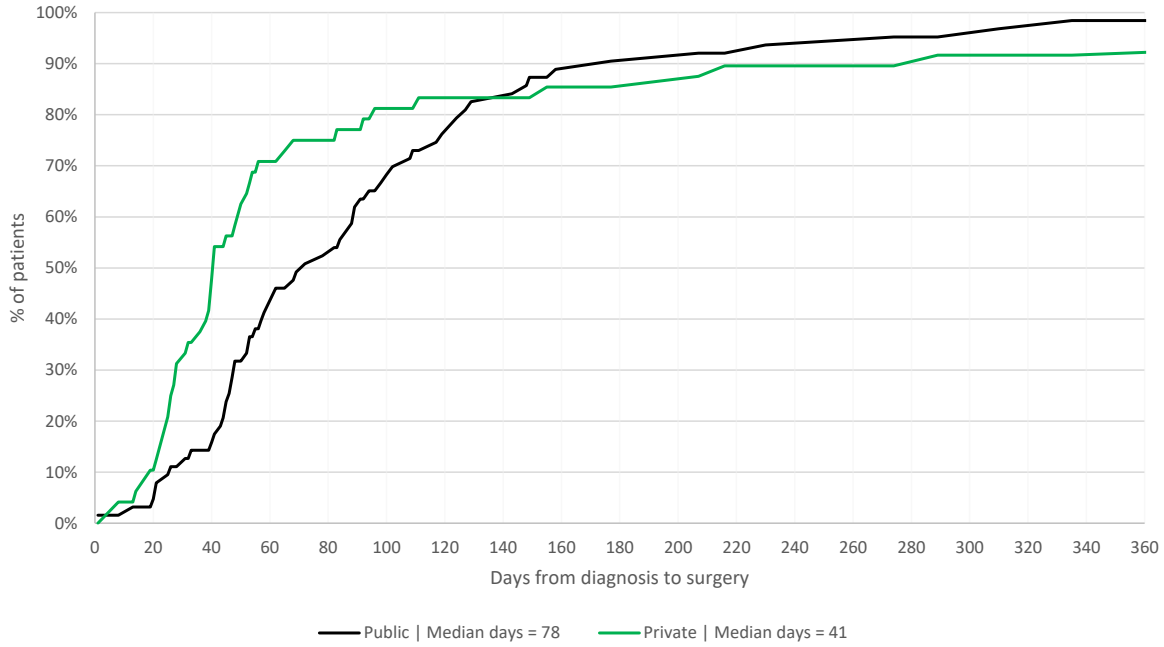
Oesophagectomy

Diagnosis year 2009 – 2013

Crude rates, 5 years combined

4.1.10 | Distribution of days from diagnosis to oesophagectomy by facility type

Patients where oesophagectomy was first treatment received.



4.2 | Remoteness

Oesophagectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

4.2.1 | What percentage of patients living outside a metropolitan area received oesophagectomy within 30 days of diagnosis?

Patients where oesophagectomy was first treatment received.

Received surgery within 30 days *(% patients whose time from diagnosis to cancer surgery is ≤30 days)*	**2004 - 2008** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009 - 2013** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Rural & Remote	57% (30/53) [57%, 43-74, 0.544]	27% (6/22) [27%, 13-59, 0.63]
Regional	41% (9/22) [41%, 24-69, 0.365]	17% (2/12) [17%, 4-62, 0.649]
Metropolitan	52% (63/121) [52%, 42-65, 0.997]	22% (18/81) [22%, 13-38, 0.949]
Queensland	**52% (102/196)**	**23% (26/115)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

5 | Equitable

Providing care and ensuring health status does not vary in quality because of personal characteristics (age, socioeconomic status and remoteness).

5.1 | Over 70 years

Oesophagectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

5.1.1 | What percentage of patients aged ≥70 receive oesophagectomy within 30 days from diagnosis?

Patients where oesophagectomy was first treatment received.

Received surgery within 30 days *(% of patients aged ≥70 whose time from diagnosis to cancer surgery is ≤30 days)*	**2004 - 2008** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009 - 2013** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	37% (11/30) [37%, 22-61, 0.107]	8% (1/13) [8%, 1-57, 0.279]
Group A hospitals	69% (31/45) [69%, 52-91, 0.142]	35% (6/17) [35%, 14-89, 0.379]
Group B hospitals	50% (1/2) [50%, 12-100, 0.877]	
Other hospitals		
Queensland	**56% (43/77)**	**23% (7/30)**

5.1.2 | What percentage of patients aged ≥70 receive oesophagectomy within 30 days from diagnosis by hospital volume group~?

Patients where oesophagectomy was first treatment received.

Received surgery within 30 days *(% of patients aged ≥70 whose time from diagnosis to cancer surgery is ≤30 days)*	**2004 - 2008** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009 - 2013** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)	69% (9/13) [69%, 46-100, 0.31]	
Low volume (3-5)	60% (9/15) [60%, 38-95, 0.76]	36% (4/11) [36%, 13-100, 0.396]
Medium volume (≥6)	51% (25/49) [51%, 36-72, 0.602]	16% (3/19) [16%, 5-54, 0.535]
Queensland	**56% (43/77)**	**23% (7/30)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year) For hospital peer group descriptions - refer to Appendix 1. Tables with blank results indicate that no surgery occurred

5.2 | Socio-economically disadvantaged

Oesophagectomy

Diagnosis year 2004 – 2008

5.2.1 | What percentage of socio-economically disadvantaged patients receive oesophagectomy within 30 days from diagnosis?

Patients where oesophagectomy was first treatment received.

Received surgery within 30 days	**Diagnosis year: 2004 - 2008**		
	Disadvantaged	**Middle**	**Affluent**
(% of socio-economically disadvantaged patients whose time from diagnosis to cancer surgery is ≤30 days)	Crude rates (n/N) [Adjusted rates, CI%, P value]	Crude rates (n/N) [Adjusted rates, CI%, P value]	Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	61% (14/23) [61%, 41-89, 0.567]	30% (17/57) [30%, 19-46, 0.059]	25% (2/8) [25%, 7-89, 0.23]
Group A hospitals	80% (16/20) [80%, 60-100, 0.285]	55% (34/62) [55%, 41-74, 0.225]	71% (10/14) [71%, 43-100, 0.301]
Group B hospitals	50% (2/4) [50%, 18-100, 0.547]	100% (2/2) [100%**, 83-100, 0]	
Other hospitals		83% (5/6) [83%**, 56-100, 0.004]	
Queensland	**68% (32/47)**	**46% (58/127)**	**55% (12/22)**

5.2.2 | What percentage of socio-economically disadvantaged patients receive oesophagectomy within 30 days from diagnosis by hospital volume group~?

Patients where oesophagectomy was first treatment received.

Received surgery within 30 days	**Diagnosis year: 2004 - 2008**		
	Disadvantaged	**Middle**	**Affluent**
(% of socio-economically disadvantaged patients whose time from diagnosis to cancer surgery is ≤30 days)	Crude rates (n/N) [Adjusted rates, CI%, P value]	Crude rates (n/N) [Adjusted rates, CI%, P value]	Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)	67% (4/6) [100%, 0-100, 1]	61% (20/33) [61%, 43-85, 0.098]	100% (1/1) [100%**, 68-100, 0.002]
Low volume (3-5)	100% (3/3) [100%**, 68-100, 0]	56% (14/25) [56%, 38-83, 0.314]	75% (3/4) [75%, 38-100, 0.366]
Medium volume (≥6)	66% (25/38) [66%, 48-100, 0.824]	35% (24/69) [35%, 24-51, 0.155]	47% (8/17) [47%, 25-89, 0.651]
Queensland	**68% (32/47)**	**46% (58/127)**	**55% (12/22)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)
For hospital peer group descriptions - refer to Appendix 1
Tables with blank results indicate that no surgery occurred

Oesophagectomy

Diagnosis year 2009 – 2013

5.2.3 | What percentage of socio-economically disadvantaged patients receive oesophagectomy within 30 days from diagnosis?

Patients where oesophagectomy was first treatment received.

Received surgery within 30 days	**Diagnosis year: 2009 - 2013**		
	Disadvantaged	**Middle**	**Affluent**
(% of socio-economically disadvantaged patients whose time from diagnosis to cancer surgery is ≤30 days)	Crude rates (n/N) [Adjusted rates, CI%, P value]	Crude rates (n/N) [Adjusted rates, CI%, P value]	Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	6% (1/17) [6%, 1-61, 0.771]	14% (5/37) [14%, 5-33, 0.156]	14% (1/7) [14%, 2-100, 0.512]
Group A hospitals	14% (1/7) [14%, 1-100, 0.642]	39% (13/33) [39%, 22-70, 0.158]	36% (4/11) [36%, 12-100, 0.63]
Group B hospitals		33% (1/3) [33%, 6-100, 0.769]	
Other hospitals			
Queensland	**8% (2/24)**	**26% (19/73)**	**28% (5/18)**

5.2.4 | What percentage of socio-economically disadvantaged patients receive oesophagectomy within 30 days from diagnosis by hospital volume group~?

Patients where oesophagectomy was first treatment received.

Received surgery within 30 days	**Diagnosis year: 2009 - 2013**		
	Disadvantaged	**Middle**	**Affluent**
(% of socio-economically disadvantaged patients whose time from diagnosis to cancer surgery is ≤30 days)	Crude rates (n/N) [Adjusted rates, CI%, P value]	Crude rates (n/N) [Adjusted rates, CI%, P value]	Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)		33% (1/3) [33%, 6-100, 0.769]	
Low volume (3-5)	20% (1/5) [20%, 2-100, 0.44]	37% (10/27) [37%, 20-69, 0.271]	43% (3/7) [43%, 14-100, 0.46]
Medium volume (≥6)	5% (1/19) [5%, 1-55, 0.701]	19% (8/43) [19%, 9-39, 0.372]	18% (2/11) [18%, 4-80, 0.574]
Queensland	**8% (2/24)**	**26% (19/73)**	**28% (5/18)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)
For hospital peer group descriptions - refer to Appendix 1
Tables with blank results indicate that no surgery occurred

5.3 | In-flows by remoteness (hospital)

Oesophagectomy

Diagnosis year: 2004 – 2008

5.3.1 | What percentage of patients who received oesophagectomy live outside a metropolitan area?

In-flows *(% of patients travelling for surgery)*	**Diagnosis Year: 2004-2008**		
	Rural & Remote Rates (n/N)	**Regional** Rates (n/N)	**Metropolitan** Rates (n/N)
Principal referral hospitals	16% (25/159)	27% (43/159)	57% (91/159)
Group A hospitals	8% (16/197)	31% (62/197)	60% (119/197)
Group B hospitals	50% (7/14)	14% (2/14)	36% (5/14)
Other hospitals	0% (0/6)	0% (0/6)	100% (6/6)
Queensland	**13%** (48/376)	**28%** (107/376)	**59%** (221/376)

Oesophagectomy

Diagnosis year: 2009 – 2013

5.3.2 | What percentage of patients who received oesophagectomy live outside a metropolitan area?

In-flows *(% of patients travelling for surgery)*	**Diagnosis Year: 2009-2013**		
	Rural & Remote Rates (n/N)	**Regional** Rates (n/N)	**Metropolitan** Rates (n/N)
Principal referral hospitals	16% (30/183)	27% (49/183)	57% (104/183)
Group A hospitals	9% (19/215)	20% (44/215)	71% (152/215)
Group B hospitals	31% (4/13)	8% (1/13)	62% (8/13)
Other hospitals	0% (0/0)	0% (0/0)	0% (0/0)
Queensland	**13%** (53/411)	**23%** (94/411)	**64%** (264/411)

For hospital peer group descriptions - refer to Appendix 1
Crude percentage rates may not add to 100% due to rounding

5.4 | In-flows by remoteness (HHS)

Oesophagectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

5.4.1 | What percentage of oesophagectomy patients reside outside my HHS?

In-flows *(% of patients travelling for surgery)*	**2004-2008 Diagnosis year** Hospital count	Rates (n/N)	**2009-2013 Diagnosis year** Hospital count	Rates (n/N)
Gold Coast	4	0% (0/30)	2	6% (2/36)
Metro North	5	53% (59/111)	3	53% (59/111)
Metro South	3	64% (117/184)	3	50% (105/209)
Sunshine Coast	2	0% (0/14)	1	0% (0/16)
Townsville	2	53% (19/36)	2	44% (17/39)
Wide Bay	1	0% (0/1)		
Queensland	**17**	**52% (195/376)**	**11**	**45%** (183/411)

Tables with blank results indicate that no surgery occurred

5.5 | Out-flows

Oesophagectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

5.5.1 | What percentage of patients underwent oesophagectomy outside the HHS that they reside in?

Out-flows *(% of patients receiving surgery outside of their HHS of residence)*	**2004-2008 Diagnosis year** Rates (n/N) Outside HHS	**2009-2013 Diagnosis year** Rates (n/N) Outside HHS
Cairns and Hinterland	100% (20/20)	100% (22/22)
Central Queensland	100% (20/20)	100% (13/13)
Central West		
Darling Downs	100% (34/34)	100% (21/21)
Gold Coast	14% (5/35)	21% (9/43)
Mackay	100% (17/17)	100% (15/15)
Metro North	27% (19/71)	19% (12/64)
Metro South	8% (6/73)	8% (9/113)
North West	100% (1/1)	100% (1/1)
South West	100% (1/1)	100% (2/2)
Sunshine Coast	69% (31/45)	65% (30/46)
Townsville	0% (0/17)	12% (3/25)
West Moreton	100% (15/15)	100% (13/13)
Wide Bay	96% (25/26)	100% (33/33)
Queensland	**52%** **(195/376)**	**45%** **(183/411)**

Tables with blank results indicate that no surgery occurred

Part 2
Gastrectomy Quality Index

Queensland Hospital quality index overview

Gastrectomy

Diagnosis year 2009 – 2013

Crude indicator rate comparison

ID	Indicators	Principal referral hospitals	Group A hospitals	Group B hospitals	Other hospitals	Public	Private	**Qld**
2.1.1	Length of stay (days)	12	12	14	12	13	12	**12**
3.1.1	In-hospital mortality	3.5% (6/173)	4.6% (11/238)	3.1% (1/32)	0% (0/15)	3.6% (8/225)	4.3% (10/233)	**3.9% (18/458)**
3.2.1	30 day mortality	4% (7/173)	5% (12/238)	3.1% (1/32)	0% (0/15)	4% (9/225)	4.7% (11/233)	**4.4% (20/458)**
3.3.1	90 day mortality	6.9% (12/173)	6.3% (15/238)	3.1% (1/32)	0% (0/15)	6.7% (15/225)	5.6% (13/233)	**6.1% (28/458)**
3.4.1	1 year surgical survival	77%	79%	88%	73%	77%	80%	**79%**
3.5.1	2 year surgical survival	62%	67%	75%	53%	64%	66%	**65%**
4.1.1	Received surgery* ≤ 30 days	39% (49/127)	59% (93/158)	68% (13/19)	62% (8/13)	40% (70/174)	65% (93/143)	**51% (163/317)**
4.1.4	Received surgery* between 31 - 90 days	42% (53/127)	33% (52/158)	32% (6/19)	38% (5/13)	43% (74/174)	29% (42/143)	**37% (116/317)**
4.1.7	Received surgery* > 90 days	20% (25/127)	8% (13/158)	0% (0/19)	0% (0/13)	17% (30/174)	6% (8/143)	**12% (38/317)**
5.3.1	In-flows of rural & remote patients	13% (22/173)	6% (14/238)	28% (9/32)	0% (0/15)	11% (25/225)	9% (20/233)	**10% (45/458)**

*Patients where gastrectomy was first treatment received, refer to page 81 to see patient breakdown

1 | Effective

Achieving the best outcomes for Queenslanders with cancer.

1.4 | Patient characteristics

Gastrectomy

Diagnosis year 2004 – 2008

1.4.1 | What are the characteristics of patients with cancer who receive gastrectomy?

Characteristics	Principal referral hospitals	Group A hospitals	Group B hospitals	Other hospitals	Queensland
Median Age at Diagnosis	69 yrs	72 yrs	70 yrs	74 yrs	**71 yrs**
% Male	69%	62%	70%	71%	**65%**
% Age 70+	49%	47%	50%	73%	**49%**
% Rural & Remote	18%	8%	43%	13%	**14%**
% Disadvantaged	19%	20%	32%	13%	**20%**
% Indigenous	3%	1%	0%	0%	**2%**

Gastrectomy

Diagnosis year 2009 – 2013

1.4.2 | What are the characteristics of patients with cancer who receive gastrectomy?

Characteristics	Principal referral hospitals	Group A hospitals	Group B hospitals	Other hospitals	Queensland
Median Age at Diagnosis	69 yrs	69 yrs	69 yrs	79 yrs	**69 yrs**
% Male	62%	64%	63%	73%	**64%**
% Age 70+	49%	47%	50%	73%	**49%**
% Rural & Remote	15%	7%	63%	0%	**14%**
% Disadvantaged	27%	18%	19%	7%	**21%**
% Indigenous	4%	1%	0%	0%	**2%**

Refer to Appendix 1 for hospital peer group description

1.5 | Queenslanders receiving gastrectomy

Gastrectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

1.5.1 | How many Queenslanders receive gastrectomy for cancer by hospital peer group?

Surgery Number	**2004-2008**	**2009-2013**
	Diagnosis year	**Diagnosis year**
(Number of cancer patients receiving a gastrectomy)	Surgery number	Surgery number
Principal referral hospitals	152	173
Group A hospitals	312	238
Group B hospitals	44	32
Other hospitals	24	15
Queensland	**532**	**458**

1.5.2 | How many Queenslanders receive gastrectomy for cancer by hospital volume group~?

Surgery Number	**2004-2008**	**2009-2013**
	Diagnosis year	**Diagnosis year**
(Number of cancer patients receiving a gastrectomy)	Surgery number	Surgery number
Very low volume (<3)	111	101
Low volume (3-5)	118	84
Medium volume (≥6)	303	273
Queensland	**532**	**458**

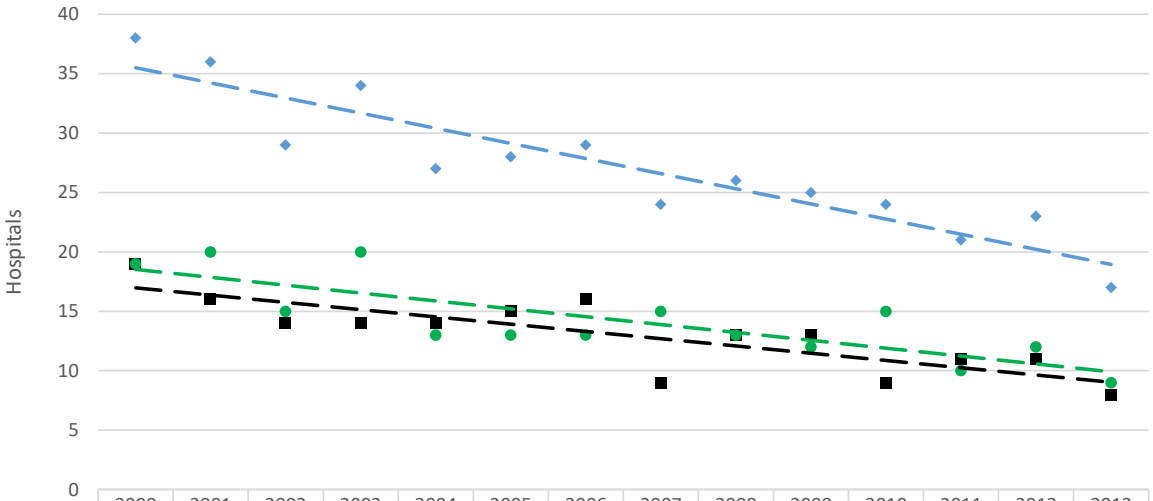
~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)
Refer to Appendix 1 for hospital peer group description

1.6 | Hospitals performing gastrectomy

Gastrectomy

Diagnosis year 2000 – 2013

1.6.1 | Number of hospitals performing gastrectomies by year



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
All	38	36	29	34	27	28	29	24	26	25	24	21	23	17
Public	19	16	14	14	14	15	16	9	13	13	9	11	11	8
Private	19	20	15	20	13	13	13	15	13	12	15	10	12	9

Linear trend lines have been used to approximate the slope and direction of hospital numbers over time

Total unique facilities = 52

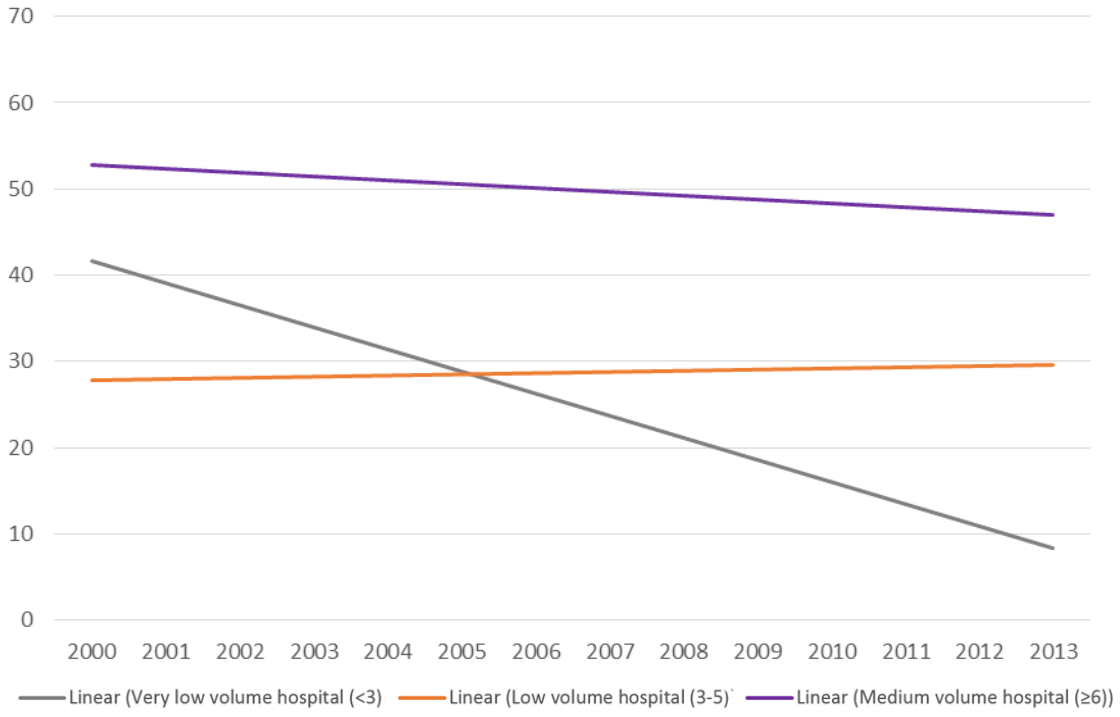
Total unique public facilities = 23

Total unique private facilities = 29

Gastrectomy

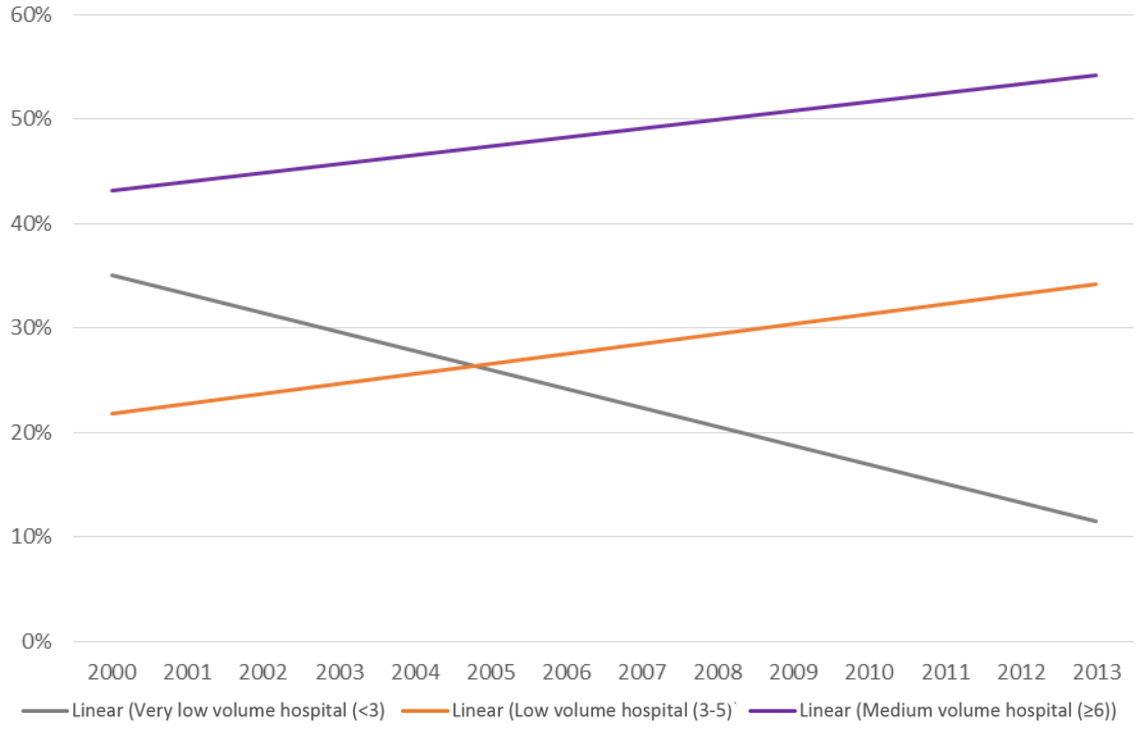
Diagnosis year 2000 – 2013

1.6.2 | Number of all gastrectomies performed by very low, low and medium volume hospitals



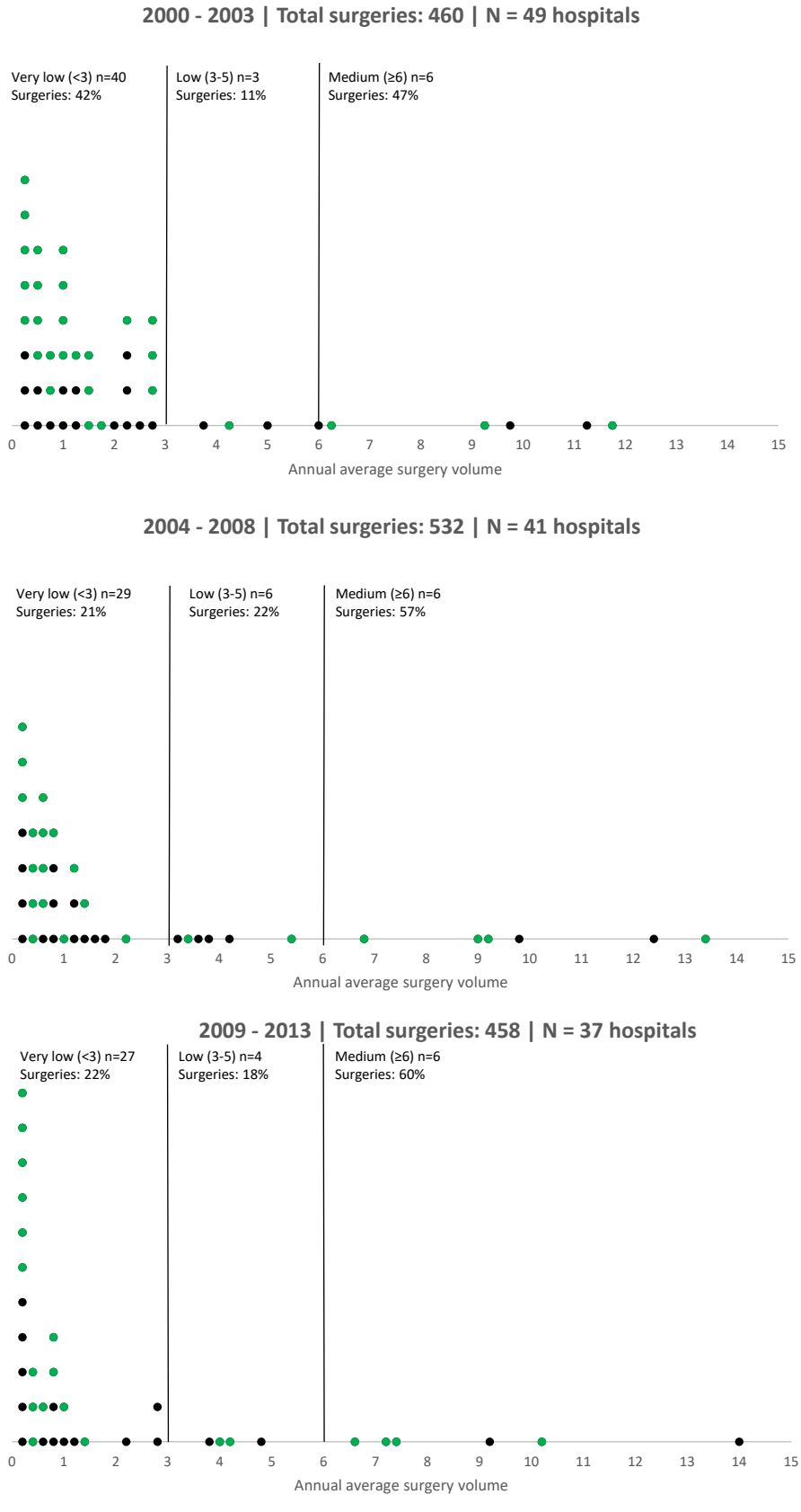
Diagnosis year 2000 – 2013

1.6.3 | Percentage of all gastrectomies performed by very low, low and medium volume hospital



Linear trend lines have been used to approximate the slope and direction of surgery data over time

1.6.4 | Annual average gastrectomy by hospital volume group



2 | Efficient

Optimally using resources to achieve desired outcomes.

2.1 | Hospital stay

Gastrectomy

Diagnosis year 2004 – 2013

2.1.1 | How long do people having gastrectomy stay in hospital?

Length of stay (days) *(Median time between the admission and discharge date of cancer surgery)*	**2004-2008** **Diagnosis year** Median (IQR) (41 hospitals)	**2009-2013** **Diagnosis year** Median (IQR) (37 hospitals)
Principal referral hospitals	14 (10 - 23)	12 (8 - 19)
Group A hospitals	12 (9 - 17)	12 (9 - 17)
Group B hospitals	14 (10 - 17)	14 (11 - 20)
Other hospitals	10 (8 - 15)	12 (9 - 18)
Queensland	**12** (9 - 19)	**12** (9 - 18)

Gastrectomy

Diagnosis year 2004 – 2013

2.1.2 | How long do people having gastrectomy stay in hospital by the hospital volume group~?

Hospital stay (days) *(Median time between the admission and discharge date of cancer surgery)*	**2004 - 2008** **Diagnosis year** Median **(IQR)**	**2009 - 2014** **Diagnosis year** Median **(IQR)**
Very low volume (<3)	13 (9 - 17)	12 (9 - 19)
Low volume (3-5)	12 (9 - 18)	12 (9 - 19)
Medium volume (≥6)	12 (9 - 21)	13 (9 - 18)
Queensland	**12** **(9 - 19)**	**12** **(9 - 18)**

~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)
For hospital peer group descriptions - refer to Appendix 1
For a description on Interquartile range (IQR) - refer to definitions

3 | Safe

Avoiding and preventing adverse outcomes or injuries caused by healthcare management.

3.1 | In-hospital mortality

Gastrectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

3.1.1 | What percentage of patients die in hospital after gastrectomy?

In-Hospital mortality *(% patients who die in hospital following gastrectomy)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	5.3% (8/152) [5.5%, 2-12, 0.642]	3.5% (6/173) [3.2%, 1-8, 0.682]
Group A hospitals	3.8% (12/312) [3.9%, 2-8, 0.669]	4.6% (11/238) [4.7%, 2-10, 0.638]
Group B hospitals	9.1% (4/44) [8.6%, 3-25, 0.232]	3.1% (1/32) [4%, 1-30, 0.993]
Other hospitals	0% (0/24) [0%, 0-100, 1]	0% (0/15) [0%, 0-100, 1]
Queensland	**4.5% (24/532)**	**3.9% (18/458)**
National and international rates	**UK 6%[1]**	**UK 2.2%[1]**

[1] Appendix 2 contains national and international reference rates

3.1.2 | What percentage of patients die in hospital after a gastrectomy by hospital volume group~?

In-Hospital mortality *(% patients who die in hospital following gastrectomy)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)	3.6% (4/111) [3.3%, 1-10, 0.577]	4% (4/101) [4%, 1-12, 0.975]
Low volume (3-5)	5.9% (7/118) [5.8%, 3-14, 0.549]	2.4% (2/84) [2.5%, 1-11, 0.534]
Medium volume (≥6)	4.3% (13/303) [4.4%, 2-9, 0.968]	4.4% (12/273) [4.3%, 2-9, 0.794]
Queensland	**4.5% (24/532)**	**3.9% (18/458)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

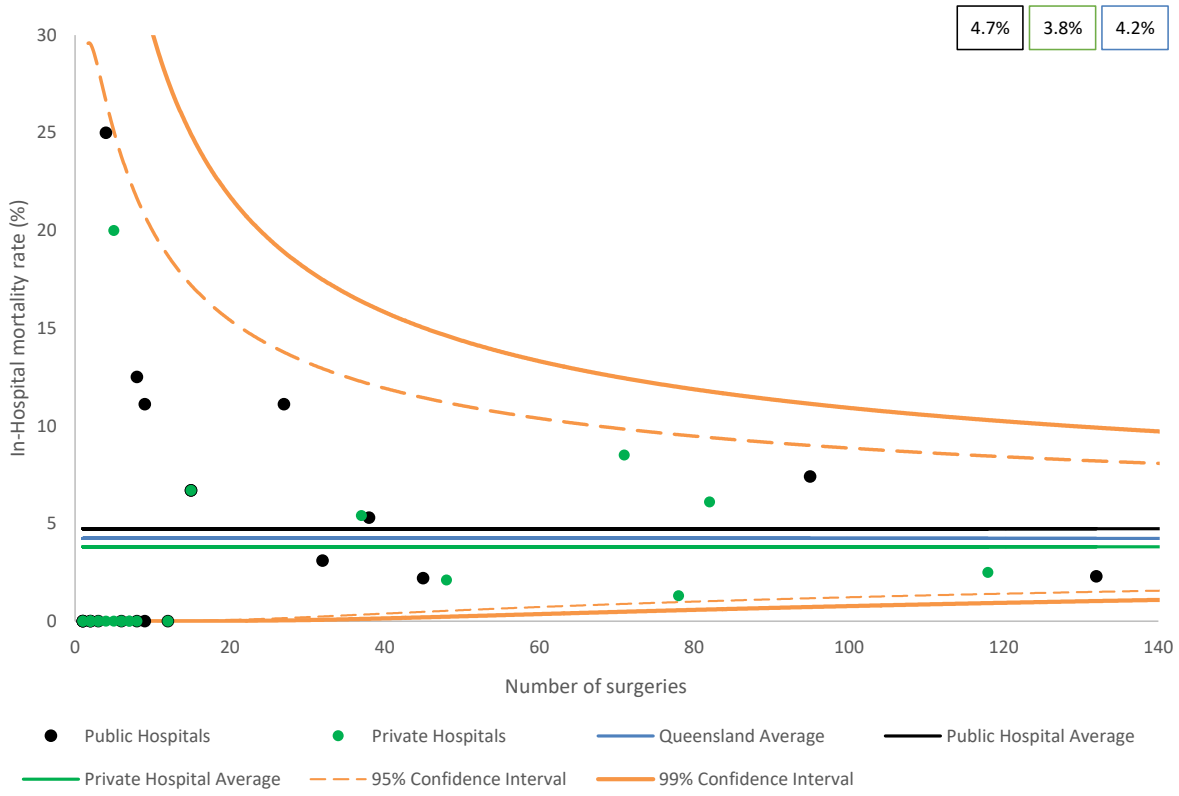
~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year) Refer to Appendix 1 for hospital peer group description

Gastrectomy

Diagnosis year 2004 – 2013

Crude rates, 10 years combined

3.1.3 | In-hospital mortality following gastrectomy by hospital volume

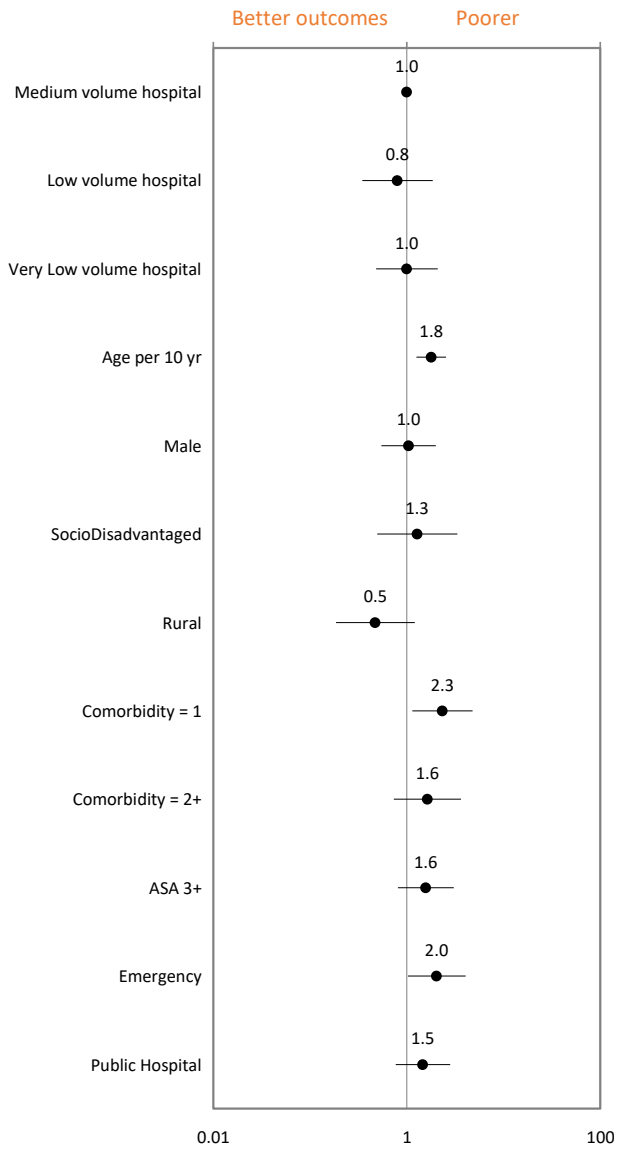


Gastrectomy

Diagnosis year 2004 – 2013

10 years combined

3.1.4 | Relative risk of in-hospital mortality following gastrectomy



Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)

The above graph (forest plot) is a graphical display of the hazard ratios for each covariate in the analysis. The dot represents the estimate of the hazard ratio with the confidence interval of the estimate represented by a horizontal line. The central vertical line represents no effect, if the confidence intervals for an estimate cross this central vertical line then the effect is considered not to be statistically significant.

3.2 | 30 day mortality

Gastrectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

3.2.1 | What percentage of patients die within 30 days of gastrectomy?

30 day mortality *(% patients who die ≤ 30 days following gastrectomy)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	3.3% (5/152) [3.4%, 1-9, 0.845]	4% (7/173) [3.8%, 2-9, 0.741]
Group A hospitals	3.5% (11/312) [3.6%, 2-7, 0.884]	5% (12/238) [5.1%, 3-11, 0.657]
Group B hospitals	9.1% (4/44) [8.5%, 3-25, 0.136]	3.1% (1/32) [4%, 1-30, 0.927]
Other hospitals	0% (0/24) [0%, 0-100, 1]	0% (0/15) [0%, 0-100, 1]
Queensland	**3.8% (20/532)**	**4.4% (20/458)**
National and international rates	**NSW & Int. 3.5% - 6.9%[1, 2, 4]**	**UK 1.9%[1]**

[1,2,4] Appendix 2 contains national and international reference rates

3.2.2 | What percentage of patients die within 30 days of a gastrectomy by hospital volume group~?

30 day mortality *(% patients who die ≤ 30 days following gastrectomy)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)	4.5% (5/111) [4.2%, 2-11, 0.83]	4% (4/101) [4%, 1-12, 0.875]
Low volume (3-5)	5.1% (6/118) [5%, 2-12, 0.543]	3.6% (3/84) [3.7%, 1-12, 0.787]
Medium volume (≥6)	3% (9/303) [3.1%, 1-7, 0.619]	4.8% (13/273) [4.7%, 2-9, 0.839]
Queensland	**3.8% (20/532)**	**4.4% (20/458)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

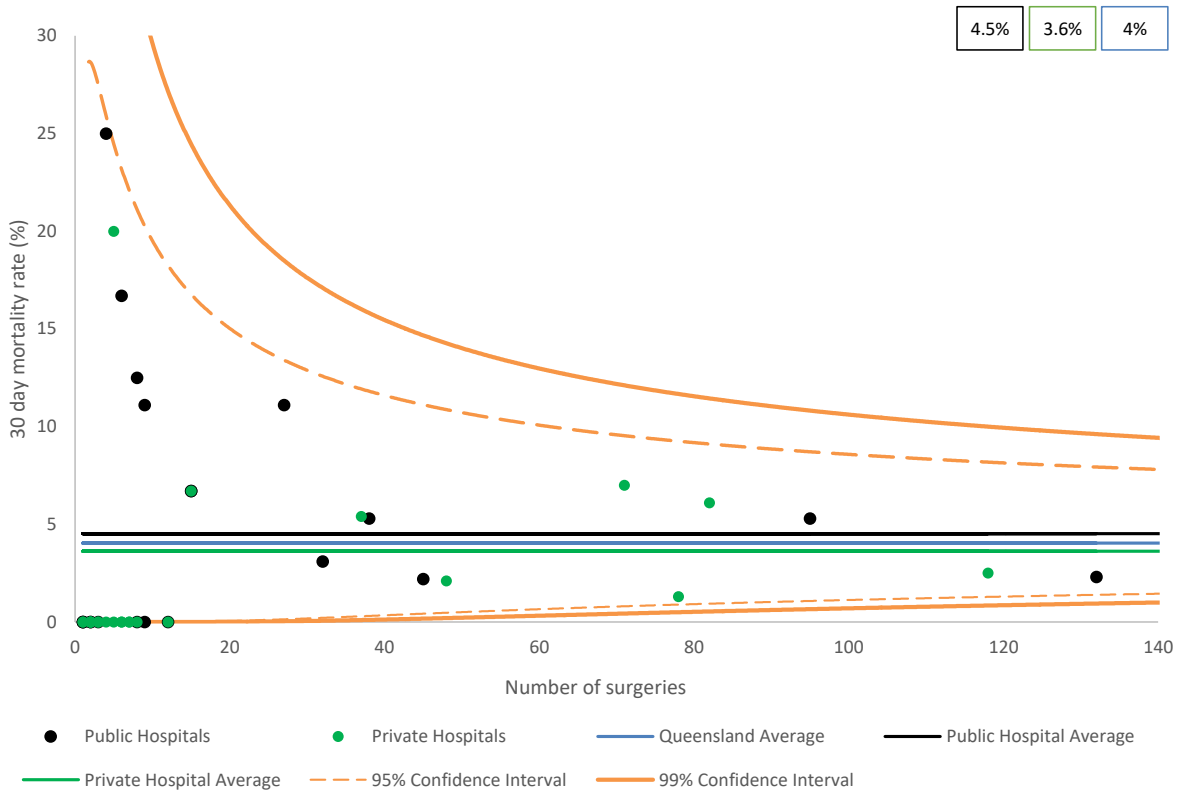
~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year) Refer to Appendix 1 for hospital peer group description

Gastrectomy

Diagnosis year 2004 – 2013

Crude rates, 10 years combined

3.2.3 | 30 day mortality following gastrectomy by hospital volume

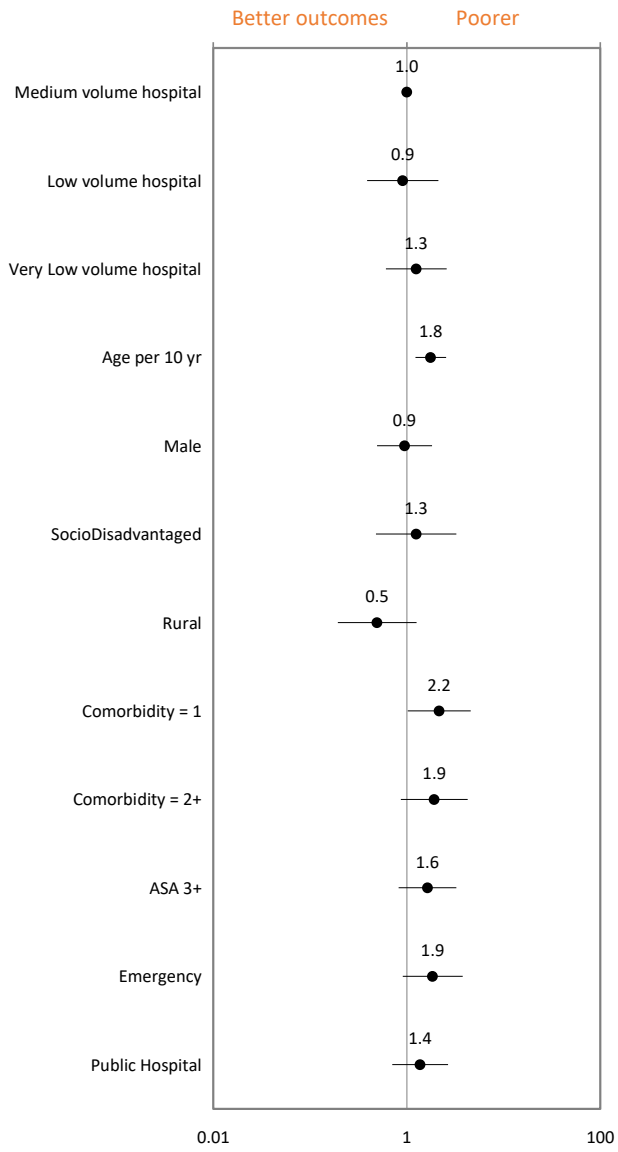


Gastrectomy

Diagnosis year 2004 – 2013

10 years combined

3.2.4 | Relative risk of 30 day mortality following gastrectomy



Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)

The above graph (forest plot) is a graphical display of the hazard ratios for each covariate in the analysis. The dot represents the estimate of the hazard ratio with the confidence interval of the estimate represented by a horizontal line. The central vertical line represents no effect, if the confidence intervals for an estimate cross this central vertical line then the effect is considered not to be statistically significant.

3.3 | 90 day mortality

Gastrectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

3.3.1 | What percentage of patients die within 90 days of gastrectomy?

90 day mortality *(% patients who die ≤ 90 days following gastrectomy)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	7.9% (12/152) [8.2%, 4-16, 0.673]	6.9% (12/173) [6.5%, 3-13, 0.865]
Group A hospitals	5.8% (18/312) [5.8%, 3-10, 0.468]	6.3% (15/238) [6.4%, 3-12, 0.879]
Group B hospitals	13.6% (6/44) [13%, 6-31, 0.171]	3.1% (1/32) [4%, 1-29, 0.672]
Other hospitals	8.3% (2/24) [6.7%, 2-28, 0.936]	0% (0/15) [0%, 0-100, 1]
Queensland	**7.1% (38/532)**	**6.1% (28/458)**
National and international rates	**NSW & UK 6.9% - 9.1%[1, 4]**	**UK 4.1%[1]**

[1, 4] Appendix 2 contains national and international reference rates

3.3.2 | What percentage of patients die within 90 days of gastrectomy by hospital volume group~?

90 day mortality *(% patients who die ≤ 90 days following gastrectomy)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)	8.1% (9/111) [7.5%, 4-15, 0.906]	5% (5/101) [5%, 2-13, 0.682]
Low volume (3-5)	8.5% (10/118) [8.4%, 4-17, 0.66]	6% (5/84) [6.1%, 2-16, 0.993]
Medium volume (≥6)	6.3% (19/303) [6.5%, 4-11, 0.743]	6.6% (18/273) [6.5%, 4-12, 0.838]
Queensland	**7.1% (38/532)**	**6.1% (28/458)**

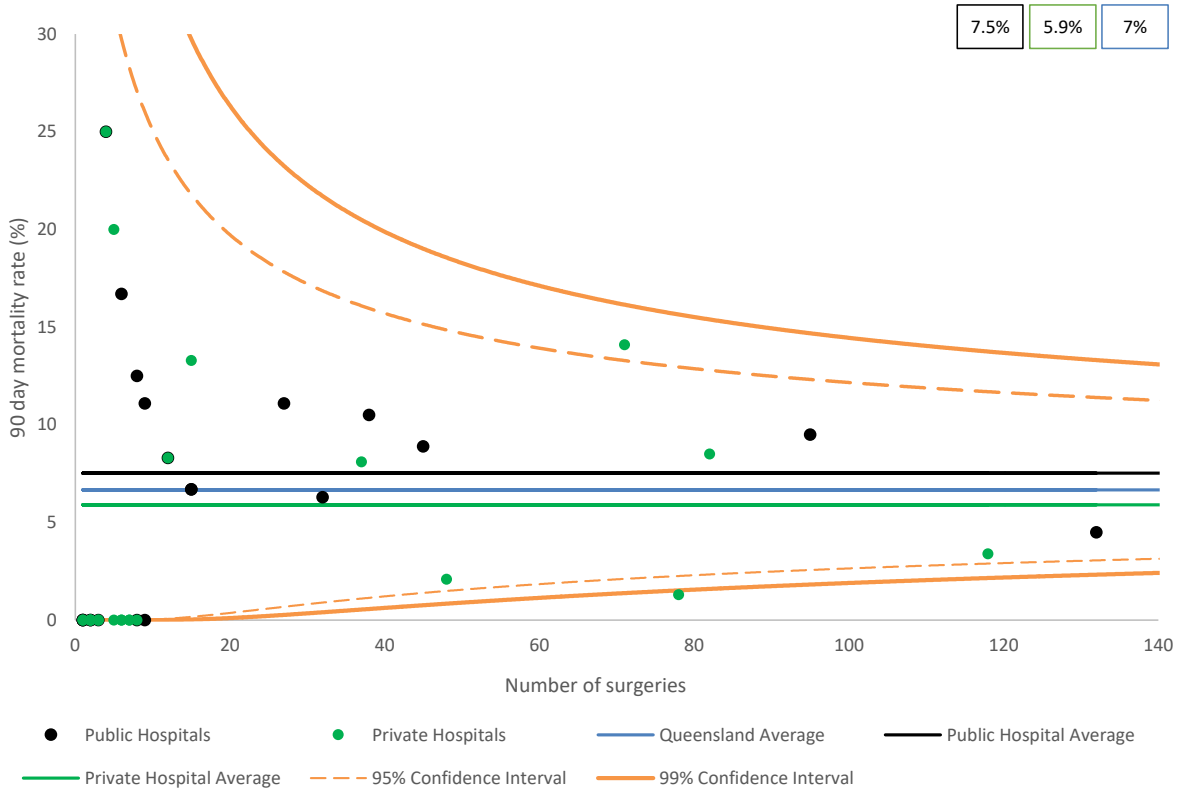
Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year) Refer to Appendix 1 for hospital peer group description

Gastrectomy

Diagnosis year 2004 – 2013

3.3.3 | 90 day mortality following gastrectomy by hospital volume

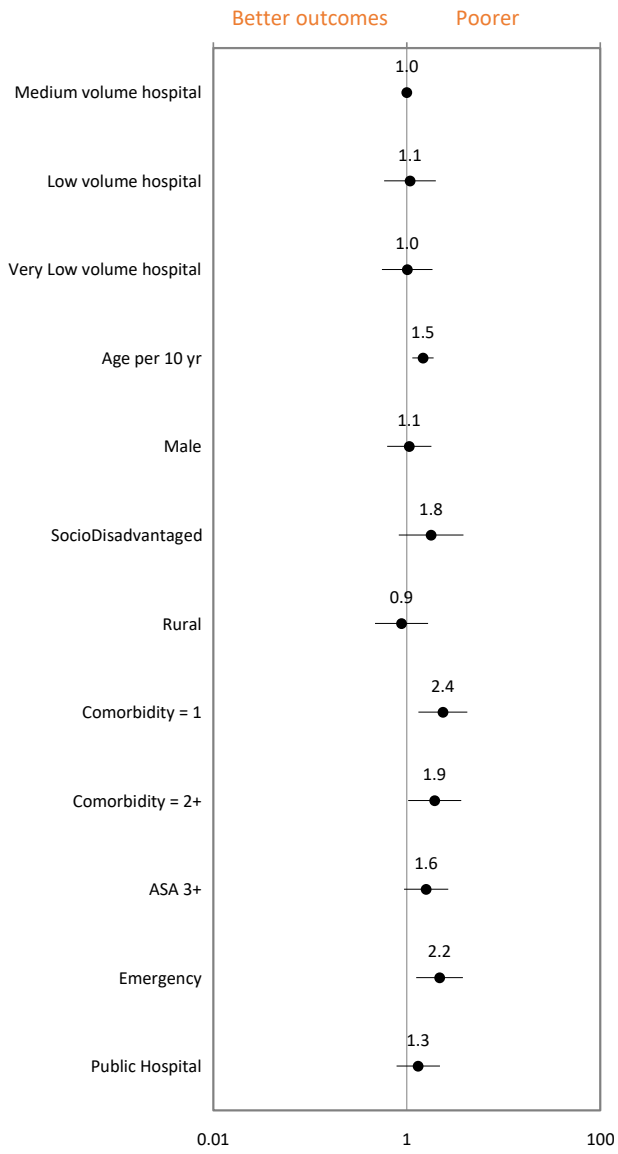


Gastrectomy

Diagnosis year 2004 – 2013

10 years combined

3.3.4 | Relative risk of 90 day mortality following gastrectomy



Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)

The above graph (forest plot) is a graphical display of the hazard ratios for each covariate in the analysis. The dot represents the estimate of the hazard ratio with the confidence interval of the estimate represented by a horizontal line. The central vertical line represents no effect, if the confidence intervals for an estimate cross this central vertical line then the effect is considered not to be statistically significant.

3.4 | 1 year surgical survival

Gastrectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

3.4.1 | What percentage of patients are alive one year after gastrectomy?

1 year surgical survival *(% patients alive 1 year after gastrectomy)*	**2004-2008 Diagnosis year** Crude rates [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates [Adjusted rates, CI%, P value]
Principal referral hospitals	72% [70%, 57-79, 0.259]	77% [78%, 68-85, 0.915]
Group A hospitals	78% [78%, 71-84, 0.399]	79% [79%, 70-85, 0.981]
Group B hospitals	68% [68%, 45-82, 0.393]	88% [85%, 60-95, 0.475]
Other hospitals	75% [80%, 54-91, 0.636]	73% [70%, 18-89, 0.494]
Queensland	**75%**	**79%**

3.4.2 | What percentage of patients are alive one year after gastrectomy by hospital volume group~?

1 year surgical survival *(% patients alive 1 year after gastrectomy)*	**2004-2008 Diagnosis year** Crude rates [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates [Adjusted rates, CI%, P value]
Very low volume	71% [74%, 61-82, 0.779]	79% [79%, 67-87, 0.894]
Low volume	78% [79%, 68-86, 0.475]	82% [81%, 68-89, 0.604]
Medium volume	76% [74%, 66-81, 0.807]	77% [78%, 69-84, 0.76]
Queensland	**75%**	**79%**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

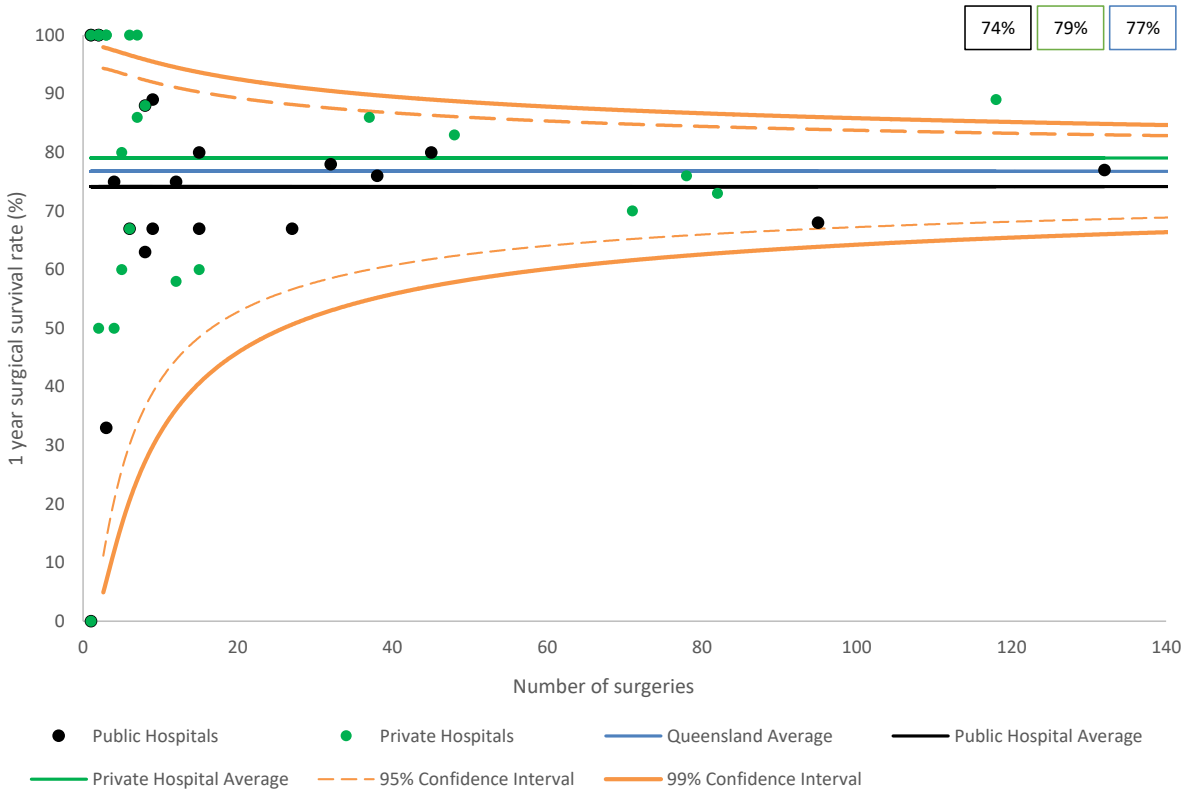
~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year) Refer to Appendix 1 for hospital peer group description

Gastrectomy

Diagnosis year 2004 – 2013

Crude rates, 10 years combined

3.4.3 | 1 year surgical survival following gastrectomy by hospital volume

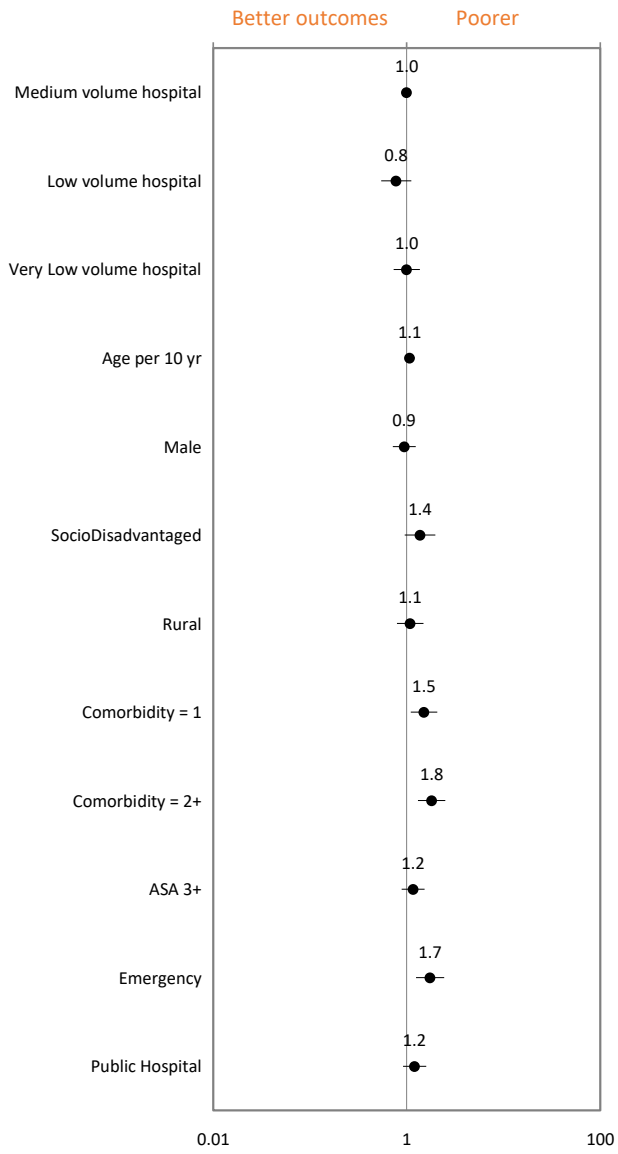


Gastrectomy

Diagnosis year 2004 – 2013

10 years combined

3.4.4 | 1 year surgical survival following gastrectomy



Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)

The above graph (forest plot) is a graphical display of the hazard ratios for each covariate in the analysis. The dot represents the estimate of the hazard ratio with the confidence interval of the estimate represented by a horizontal line. The central vertical line represents no effect, if the confidence intervals for an estimate cross this central vertical line then the effect is considered not to be statistically significant.

3.5 | 2 year surgical survival

Gastrectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

3.5.1 | What percentage of patients are alive two years after gastrectomy?

2 year surgical survival *(% patients alive 2 year after gastrectomy)*	**2004-2008 Diagnosis year** Crude rates [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates [Adjusted rates, CI%, P value]
Principal referral hospitals	59% [59%, 49-67, 0.853]	62% [62%, 52-70, 0.448]
Group A hospitals	57% [58%, 48-66, 0.926]	67% [67%, 57-75, 0.644]
Group B hospitals	61% [63%, 40-78, 0.561]	75% [70%, 38-85, 0.707]
Other hospitals	50% [59%, 27-77, 0.904]	53% [53%, 19-73, 0.307]
Queensland	**58%**	**65%**
National and international rates	**EUR 59% - 63%[2]**	

[2] Appendix 2 contains national and international reference rates

3.5.2 | What percentage of patients are alive two years after gastrectomy by hospital volume group~?

2 year surgical survival *(% patients alive 2 year after gastrectomy)*	**2004-2008 Diagnosis year** Crude rates [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates [Adjusted rates, CI%, P value]
Very low volume (<3)	57% [60%, 46-71, 0.693]	67% [68%, 54-78, 0.624]
Low volume (3-5)	62% [64%, 51-74, 0.301]	68% [68%, 51-78, 0.716]
Medium volume (≥6)	56% [54%, 43-63, 0.41]	63% [63%, 53-71, 0.665]
Queensland	**58%**	**65%**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

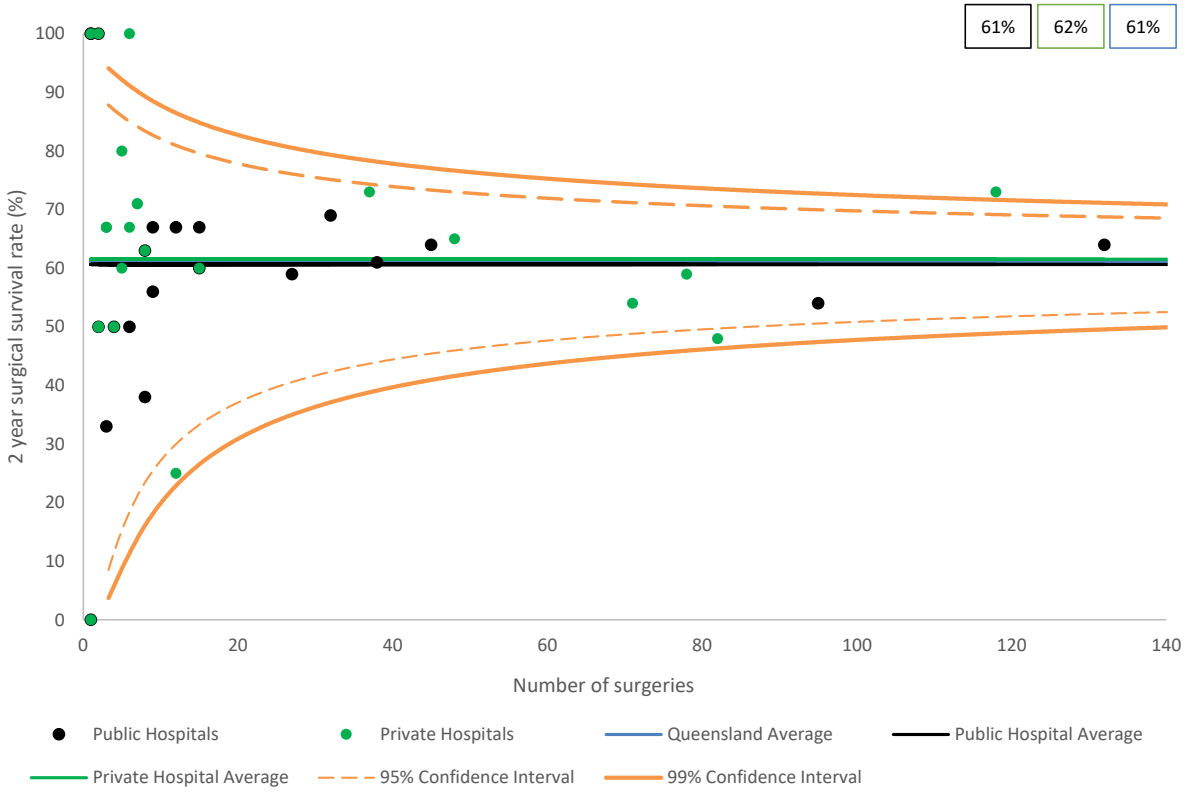
~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year) Refer to Appendix 1 for hospital peer group description

Gastrectomy

Diagnosis year 2004 – 2013

Crude rates, 10 years combined

3.5.3 | 2 year surgical survival following gastrectomy by hospital volume



[1] National Oesophago-gastric Cancer Audit 2016, Healthcare Quality Improvement Partnership Ltd. (HQIP) [Accessed Dec 2016]; Available from: http://content.digital.nhs.uk/catalogue/PUB21561

[2] J. L. Dikken, J. W. van Sandick, W. H. Allum, et al. Differences in outcomes of oesophageal and gastric cancer surgery across Europe, British Journal of Surgery 2013; 100: 83–94

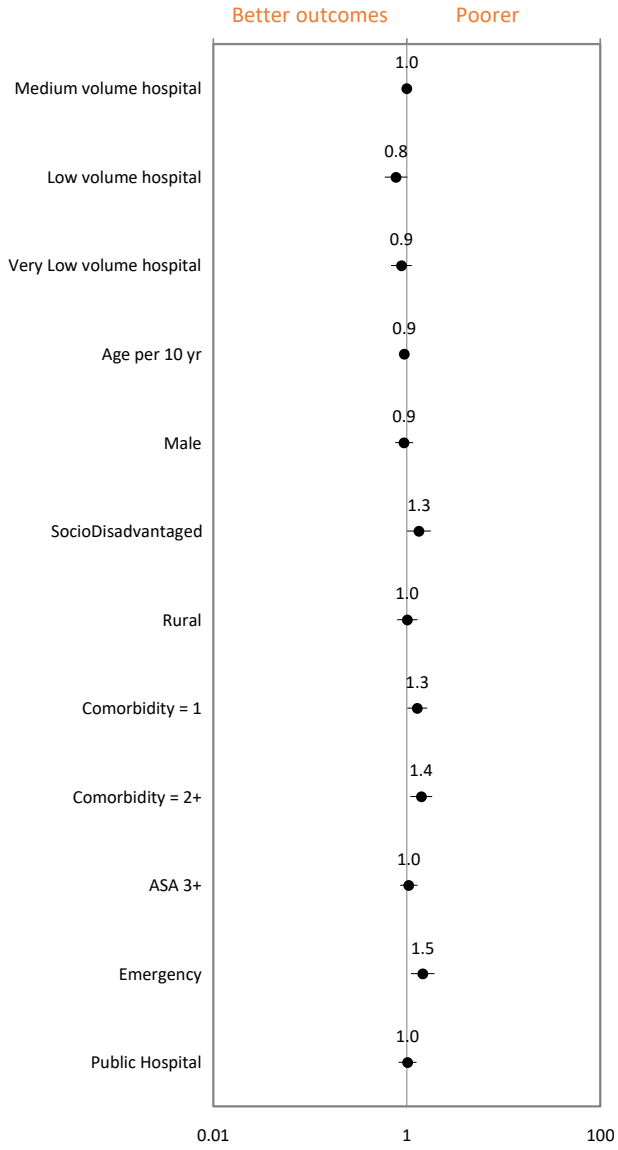
[4] R.C. Smith, N. Creighton, R. V. Lord, et al. Survival, mortality and morbidity outcomes after oesophagogastric cancer surgery in New South Wales, 2001–2008, MJA 2014; 200: 408–413 doi: 10.5694/mja13.11182

Gastrectomy

Diagnosis year 2004 – 2013

10 years combined

3.5.4 | 2 year surgical survival following gastrectomy



Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)

The above graph (forest plot) is a graphical display of the hazard ratios for each covariate in the analysis. The dot represents the estimate of the hazard ratio with the confidence interval of the estimate represented by a horizontal line. The central vertical line represents no effect, if the confidence intervals for an estimate cross this central vertical line then the effect is considered not to be statistically significant.

3.6 | Postoperative mortality

Gastrectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

3.6.1 | What is the likelihood of postoperative mortality in a low or very low volume hospital?

Volume outcome association *(Likelihood of postoperative mortality in a low or very low volume hospital)*	**2004-2008 Diagnosis Year** Hazard Ratio (n/N) [CI%, P value]	**2009-2013 Diagnosis Year** Hazard Ratio (n/N) [CI%, P value]
In hospital mortality		
Very low volume	0.6 (4/112) [0.2-2.1, 0.41]	0.9 (4/101) [0.3-3.1, 0.918]
Low volume	0.8 (7/116) [0.3-2.3, 0.727]	0.7 (2/84) [0.1-3.2, 0.638]
Medium volume	1 (13/302) [Reference]	1 (10/273) [Reference]
30-day mortality		
Very low volume	1.2 (5/112) [0.3-4, 0.799]	0.7 (4/101) [0.2-2.2, 0.532]
Low volume	1.2 (6/116) [0.4-3.5, 0.8]	0.8 (3/84) [0.2-2.9, 0.741]
Medium volume	1 (9/302) [Reference]	1 (13/273) [Reference]
90-day mortality		
Very low volume	1 (9/112) [0.4-2.4, 0.979]	0.6 (6/101) [0.2-1.6, 0.337]
Low volume	1 (10/116) [0.5-2.4, 0.922]	0.9 (5/84) [0.3-2.5, 0.836]
Medium volume	1 (19/302) [Reference]	1 (18/273) [Reference]
1 year mortality		
Very low volume	1 (32/112) [0.6-1.5, 0.924]	0.7 (21/101) [0.4-1.2, 0.191]
Low volume	0.8 (26/116) [0.5-1.3, 0.369]	0.8 (15/84) [0.4-1.4, 0.357]
Medium volume	1 (74/302) [Reference]	1 (61/273) [Reference]

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked. The effect of hospital volume on postoperative mortality and 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. For further explanation on volume outcome associations refer to definitions

4 | Accessible

Making health services available in the most suitable setting in a reasonable time.

Timeliness – cohort definition

Gastrectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

How many patients received gastrectomy as their first treatment following diagnosis?

Cancer incidence	**Diagnosis year**	
by treatment first received	2004 - 2008	2009 - 2013
Gastrectomy as first treatment	479 (90%)	317 (69%)
Other* as first treatment	53 (10%)	141 (31%)
Total gastrectomies	**532**	**458**

*Other includes systemic therapy, radiotherapy or both

All subsequent tables in section 4 include patients where gastrectomy was first treatment received.

4.1 | Timeliness

Gastrectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

4.1.1 | What percentage of patients receive a gastrectomy within 30 days of diagnosis?

Patients where gastrectomy was first treatment received.

Received surgery within 30 days *(% patients whose time from diagnosis to cancer surgery is ≤30 days)*	**2004 - 2008** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009 - 2013** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	46% (62/134) [53%**, 44-64, 0]	39% (49/127) [49%*, 38-62, 0.021]
Group A hospitals	73% (204/279) [73%, 66-80, 0.055]	59% (93/158) [59%, 50-70, 0.117]
Group B hospitals	74% (31/42) [85%, 70-100, 0.292]	68% (13/19) [87%, 63-100, 0.084]
Other hospitals	92% (22/24) [92%*, 80-100, 0.01]	62% (8/13) [62%, 39-96, 0.809]
Queensland	**67% (319/479)**	**51% (163/317)**

4.1.2 | What percentage of patients receive a gastrectomy within 30 days of diagnosis by hospital volume group~?

Patients where gastrectomy was first treatment received.

Received surgery within 30 days *(% patients whose time from diagnosis to cancer surgery is ≤30 days)*	**2004 - 2008** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009 - 2013** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)	82% (88/107) [83%, 73-96, 0.218]	52% (46/89) [52%, 41-65, 0.965]
Low volume (3-5)	56% (59/106) [61%, 47-80, 0.538]	54% (29/54) [54%, 41-70, 0.752]
Medium volume (≥6)	65% (172/266) [61%, 47-79, 0.081]	51% (88/174) [51%, 42-61, 0.858]
Queensland	**67% (319/479)**	**51% (163/317)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

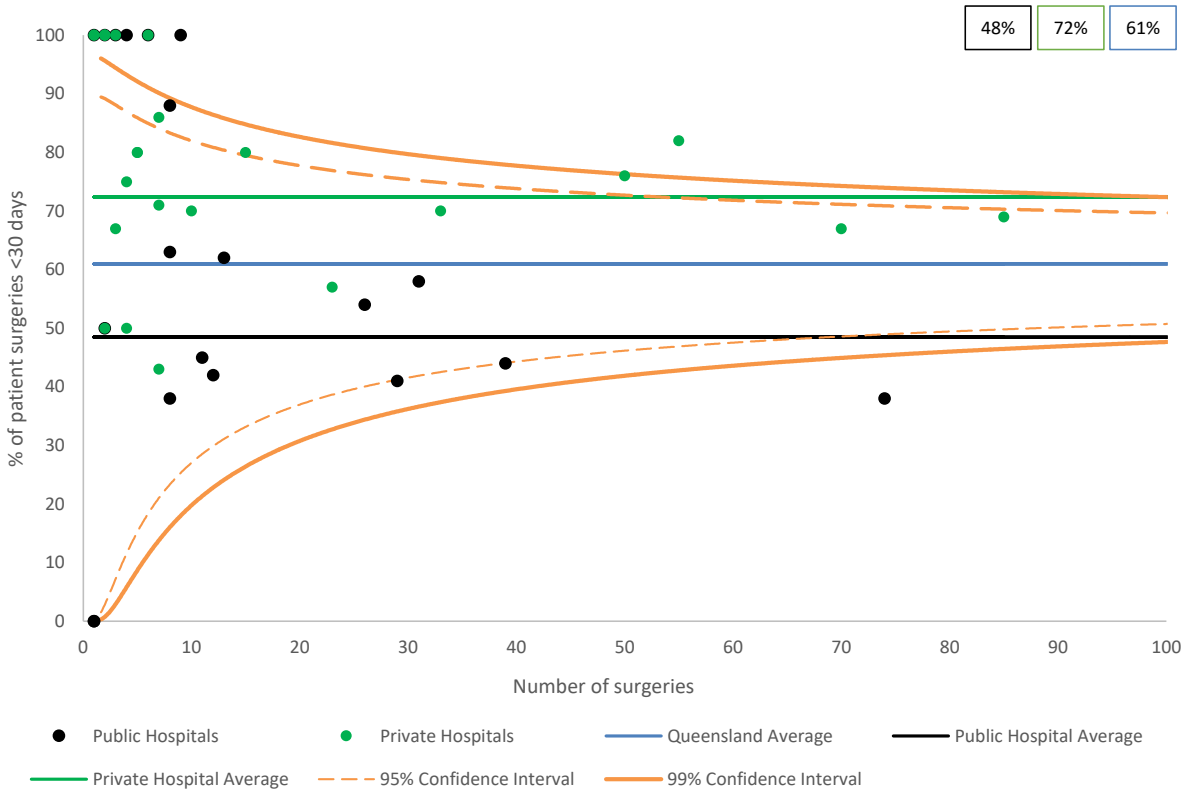
~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year) Refer to Appendix 1 for hospital peer group description

Gastrectomy

Diagnosis year 2004 – 2013

Crude rates, 10 years combined

4.1.3 | Patients receiving gastrectomy within 30 days of diagnosis by hospital volume



Gastrectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

4.1.4 | What percentage of patients receive a gastrectomy between 31 and 90 days from diagnosis?

Patients where gastrectomy was first treatment received.

Received surgery between 31 and 90 days *(% patients whose time from diagnosis to gastrectomy is between 31 and 90 days)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	42% (56/134) [42%**, 33-54, 0.001]	42% (53/127) [42%, 32-54, 0.306]
Group A hospitals	23% (65/279) [23%, 18-30, 0.224]	33% (52/158) [33%, 25-43, 0.434]
Group B hospitals	19% (8/42) [19%, 10-36, 0.268]	32% (6/19) [32%, 16-62, 0.67]
Other hospitals	8% (2/24) [8%, 2-32, 0.081]	38% (5/13) [38%, 19-78, 0.89]
Queensland	**27% (131/479)**	**37% (116/317)**

4.1.5 | What percentage of patients receive a gastrectomy between 31 and 90 days from diagnosis by hospital volume group~?

Patients where gastrectomy was first treatment received.

Received surgery between 31 and 90 days *(% patients whose time from diagnosis to gastrectomy is between 31 and 90 days)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)	14% (15/107) [14%**, 9-23, 0.008]	39% (35/89) [39%, 29-53, 0.634]
Low volume (3-5)	37% (39/106) [37%*, 28-49, 0.044]	37% (20/54) [37%, 25-54, 0.95]
Medium volume (≥6)	29% (77/266) [29%, 23-37, 0.64]	35% (61/174) [35%, 27-45, 0.736]
Queensland	**27% (131/479)**	**37% (116/317)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

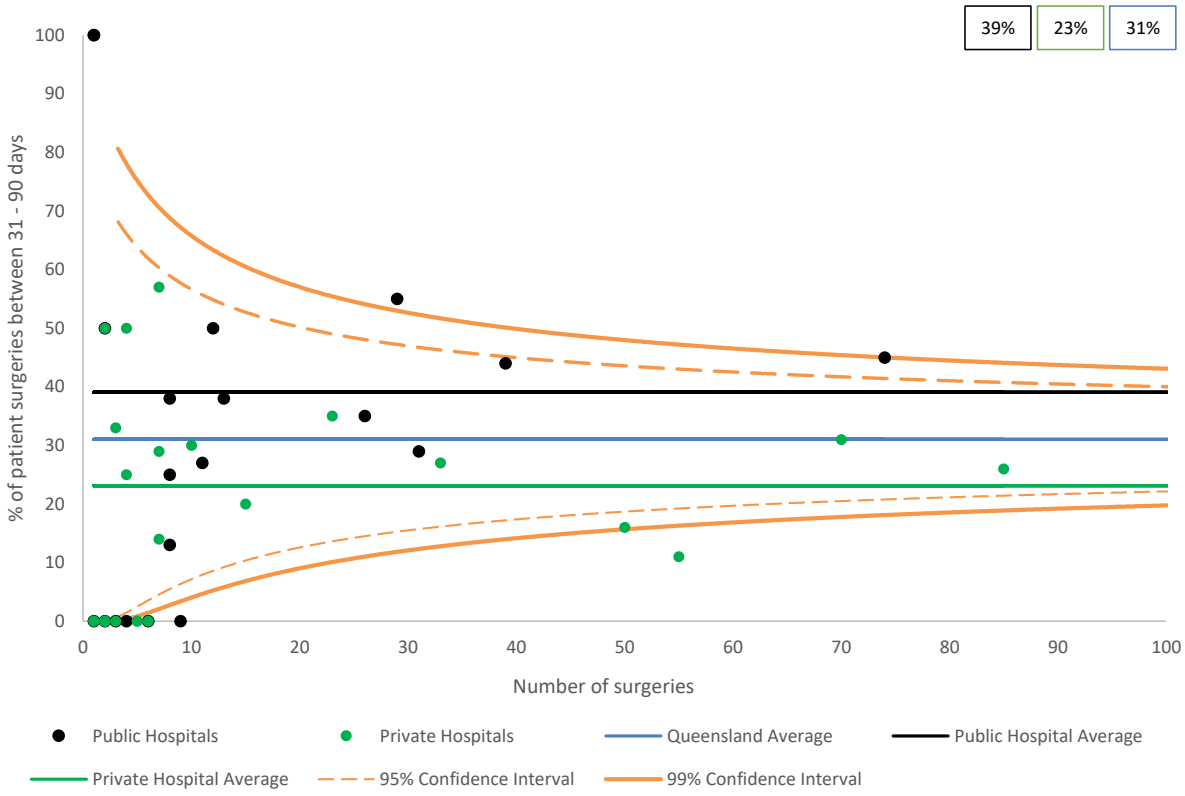
~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year) Refer to Appendix 1 for hospital peer group description

Gastrectomy

Diagnosis year 2004 – 2013

Crude rates, 10 years combined

4.1.6 | Patients receiving gastrectomy between 31 and 90 days from diagnosis by hospital volume



Gastrectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

4.1.7 | What percentage of patients receive a gastrectomy more than 90 days from diagnosis?

Patients where gastrectomy was first treatment received.

Received surgery more than 90 days *(% patients whose time from diagnosis to gastrectomy is more than 90 days)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	12% (16/134) [12%*, 7-21, 0.022]	20% (25/127) [20%*, 12-31, 0.035]
Group A hospitals	4% (10/279) [4%, 2-7, 0.144]	8% (13/158) [8%, 5-15, 0.219]
Group B hospitals	7% (3/42) [7%, 2-22, 0.778]	0% (0/19) [0%**, 0-0, 0]
Other hospitals	0% (0/24) [0%**, 0-0, 0]	0% (0/13) [0%**, 0-0, 0]
Queensland	**6% (29/479)**	**12% (38/317)**

4.1.8 | What percentage of patients receive a gastrectomy more than 90 days from diagnosis by hospital volume group~?

Patients where gastrectomy was first treatment received.

Received surgery more than 90 days *(% patients whose time from diagnosis to gastrectomy is more than 90 days)*	**2004-2008 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009-2013 Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)	4% (4/107) [4%, 1-10, 0.356]	9% (8/89) [9%, 4-19, 0.437]
Low volume (3-5)	8% (8/106) [8%, 4-16, 0.567]	9% (5/54) [9%, 4-22, 0.568]
Medium volume (≥6)	6% (17/266) [6%, 4-11, 0.855]	14% (25/174) [14%, 9-23, 0.45]
Queensland	**6% (29/479)**	**12% (38/317)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

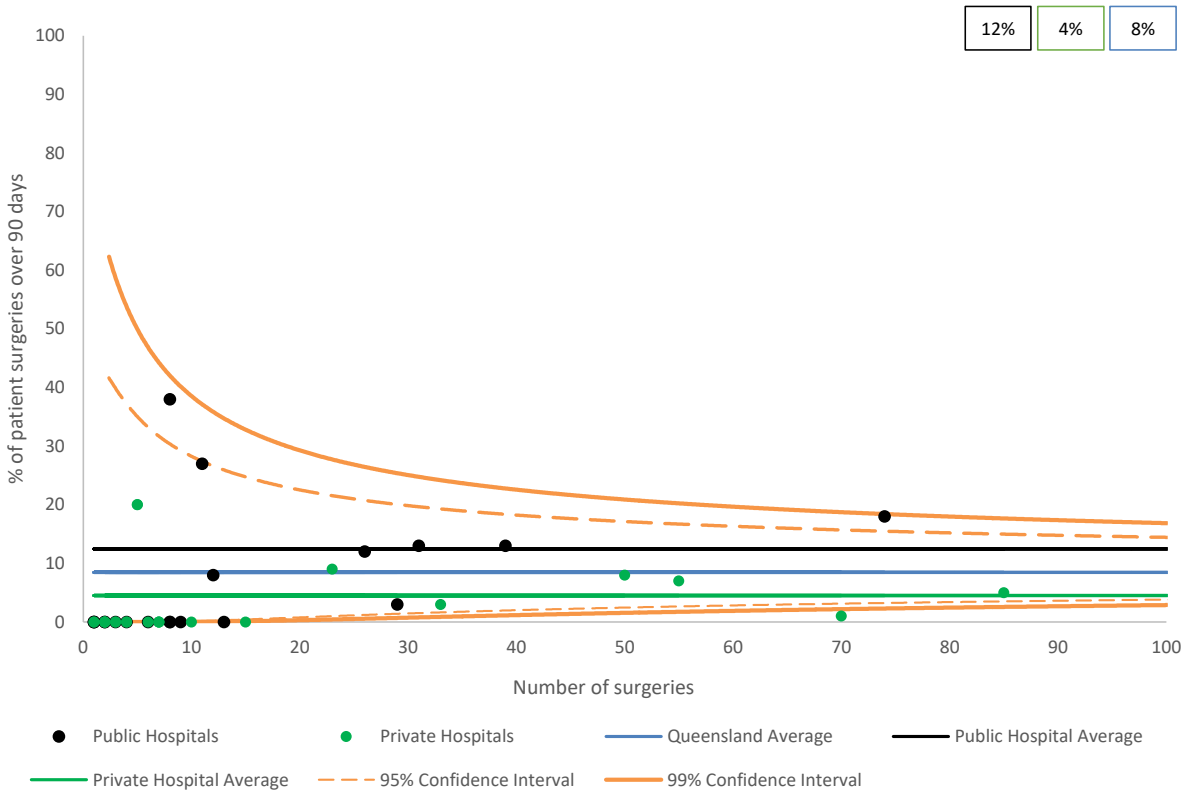
~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year) Refer to Appendix 1 for hospital peer group description

Gastrectomy

Diagnosis year 2004 – 2013

Crude rates, 10 years combined

4.1.9 | Patients receiving gastrectomy more than 90 days from diagnosis by hospital volume



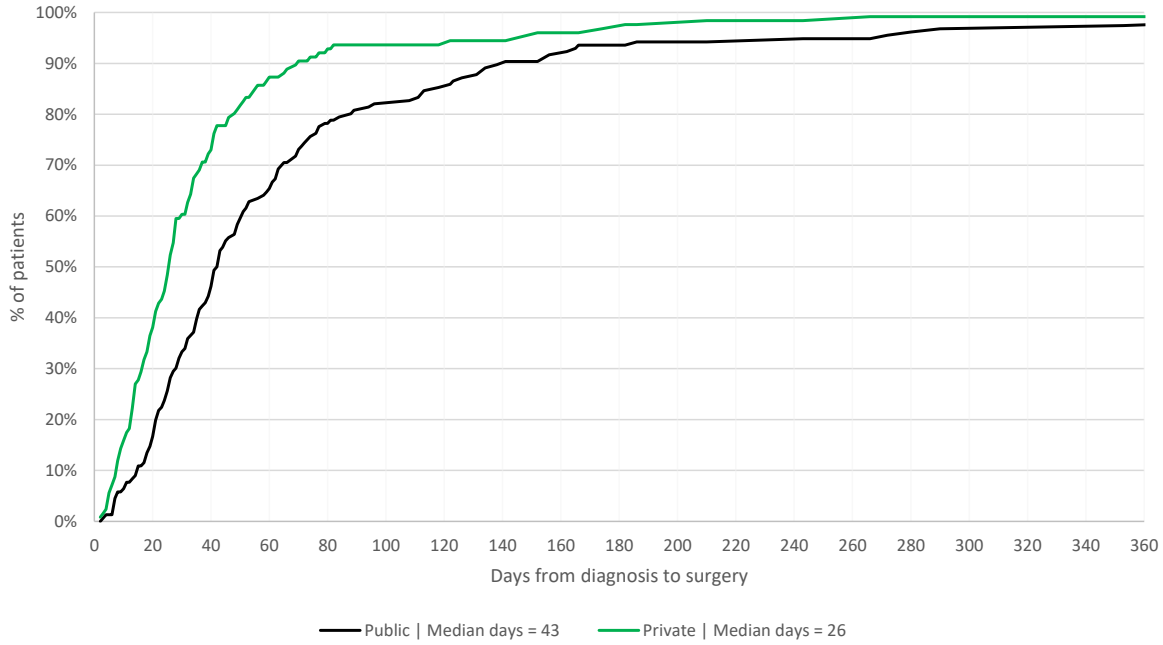
Gastrectomy

Diagnosis year 2009 – 2013

Crude rates, 5 years combined

4.1.10 | Distribution of days from diagnosis to gastrectomy by facility type

Patients where gastrectomy was first treatment received.



4.2 | Remoteness

Gastrectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

4.2.2 | What percentage of patients living outside a metropolitan area received gastrectomy within 30 days of diagnosis?

Patients where gastrectomy was first treatment received.

Received surgery within 30 days *(% patients whose time from diagnosis to cancer surgery is ≤30 days)*	**2004 - 2008** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009 - 2013** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Rural & Remote	62% (53/86) [62%, 52-74, 0.395]	49% (33/68) [49%, 37-63, 0.672]
Regional	68% (32/47) [68%, 55-84, 0.833]	63% (19/30) [63%, 47-85, 0.163]
Metropolitan	68% (234/346) [68%, 61-74, 0.755]	51% (111/219) [51%, 43-60, 0.867]
Queensland	**67% (319/479)**	**51% (163/317)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

5 | Equitable

Providing care and ensuring health status does not vary in quality because of personal characteristics (age, socioeconomic status and remoteness)

5.1 | Over 70 years

Gastrectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

5.1.1 | What percentage of patients aged ≥70 receive gastrectomy within 30 days from diagnosis?

Patients where gastrectomy was first treatment received.

Received surgery within 30 days *(% of patients aged ≥70 whose time from diagnosis to cancer surgery is ≤30 days)*	**2004 - 2008** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009 - 2013** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	49% (33/68) [49%*, 37-63, 0.016]	39% (28/72) [39%*, 28-53, 0.03]
Group A hospitals	71% (122/171) [71%, 63-81, 0.293]	65% (64/98) [65%, 54-79, 0.085]
Group B hospitals	70% (16/23) [70%, 52-92, 0.768]	71% (10/14) [71%, 50-100, 0.154]
Other hospitals	93% (13/14) [93%**, 79-100, 0]	50% (5/10) [50%, 27-94, 0.761]
Queensland	**67% (184/276)**	**55% (107/194)**

5.1.2 | What percentage of patients aged ≥70 receive gastrectomy within 30 days from diagnosis by hospital volume group~?

Patients where gastrectomy was first treatment received.

Received surgery within 30 days *(% of patients aged ≥70 whose time from diagnosis to cancer surgery is ≤30 days)*	**2004 - 2008** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]	**2009 - 2013** **Diagnosis year** Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)	81% (47/58) [81%*, 70-94, 0.011]	56% (28/50) [56%, 42-74, 0.914]
Low volume (3-5)	53% (34/64) [53%, 42-68, 0.069]	49% (18/37) [49%, 34-69, 0.488]
Medium volume (≥6)	67% (103/154) [67%, 58-77, 0.964]	57% (61/107) [57%, 46-70, 0.755]
Queensland	**67% (184/276)**	**55% (107/194)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year) Refer to Appendix 1 for hospital peer group description

5.2 | Socio-economically disadvantaged

Gastrectomy

Diagnosis year 2004 – 2008

5.2.1 | What percentage of socio-economically disadvantaged patients receive gastrectomy within 30 days from diagnosis?

Patients where gastrectomy was first treatment received.

Received surgery within 30 days	**Diagnosis year: 2004 - 2008**		
	Disadvantaged	**Middle**	**Affluent**
(% of socio-economically disadvantaged patients whose time from diagnosis to cancer surgery is ≤30 days)	Crude rates (n/N) [Adjusted rates, CI%, P value]	Crude rates (n/N) [Adjusted rates, CI%, P value]	Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	28% (7/25) [28%**, 15-53, 0.008]	47% (43/92) [47%**, 37-59, 0.005]	71% (12/17) [71%, 50-99, 0.906]
Group A hospitals	83% (48/58) [83%*, 69-99, 0.02]	70% (119/170) [70%, 62-80, 0.294]	73% (37/51) [73%, 58-91, 0.953]
Group B hospitals	62% (8/13) [62%, 39-97, 0.729]	79% (23/29) [79%, 65-97, 0.062]	
Other hospitals	100% (3/3) [100%**, 87-100, 0]	90% (19/21) [90%**, 77-100, 0]	
Queensland	**67% (66/99)**	**65% (204/312)**	**72% (49/68)**

5.2.2 | What percentage of socio-economically disadvantaged patients receive gastrectomy within 30 days from diagnosis by hospital volume group~?

Patients where gastrectomy was first treatment received.

Received surgery within 30 days	**Diagnosis year: 2004 - 2008**		
	Disadvantaged	**Middle**	**Affluent**
(% of socio-economically disadvantaged patients whose time from diagnosis to cancer surgery is ≤30 days)	Crude rates (n/N) [Adjusted rates, CI%, P value]	Crude rates (n/N) [Adjusted rates, CI%, P value]	Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)	85% (34/40) [85%*, 67-100, 0.013]	83% (53/64) [83%**, 72-95, 0.001]	33% (1/3) [33%, 7-100, 0.349]
Low volume (3-5)	45% (5/11) [45%, 20-100, 0.258]	57% (53/93) [57%, 47-69, 0.166]	50% (1/2) [50%, 12-100, 0.609]
Medium volume (≥6)	56% (27/48) [56%, 40-100, 0.245]	63% (98/155) [63%, 55-73, 0.65]	75% (47/63) [75%, 61-92, 0.743]
Queensland	**67% (66/99)**	**65% (204/312)**	**72% (49/68)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year) Refer to Appendix 1 for hospital peer group description. Tables with blank results indicate that no surgery occurred

Gastrectomy

Diagnosis year 2009 – 2013

5.2.3 | What percentage of socio-economically disadvantaged patients receive gastrectomy within 30 days from diagnosis?

Patients where gastrectomy was first treatment received.

Received surgery within 30 days *(% of socio-economically disadvantaged patients whose time from diagnosis to cancer surgery is ≤30 days)*	**Diagnosis year: 2009 - 2013**		
	Disadvantaged	**Middle**	**Affluent**
	Crude rates (n/N) [Adjusted rates, CI%, P value]	Crude rates (n/N) [Adjusted rates, CI%, P value]	Crude rates (n/N) [Adjusted rates, CI%, P value]
Principal referral hospitals	28% (7/25) [28%**, 15-53, 0.008]	47% (43/92) [47%**, 37-59, 0.005]	71% (12/17) [71%, 50-99, 0.906]
Group A hospitals	83% (48/58) [83%*, 69-99, 0.02]	70% (119/170) [70%, 62-80, 0.294]	73% (37/51) [73%, 58-91, 0.953]
Group B hospitals	62% (8/13) [62%, 39-97, 0.729]	79% (23/29) [79%, 65-97, 0.062]	
Other hospitals	100% (3/3) [100%**, 87-100, 0]	90% (19/21) [90%**, 77-100, 0]	
Queensland	**67% (66/99)**	**65% (204/312)**	**72% (49/68)**

5.2.4 | What percentage of socio-economically disadvantaged patients receive gastrectomy within 30 days from diagnosis by hospital volume group~?

Patients where gastrectomy was first treatment received.

Received surgery within 30 days *(% of socio-economically disadvantaged patients whose time from diagnosis to cancer surgery is ≤30 days)*	**Diagnosis year: 2009 - 2013**		
	Disadvantaged	**Middle**	**Affluent**
	Crude rates (n/N) [Adjusted rates, CI%, P value]	Crude rates (n/N) [Adjusted rates, CI%, P value]	Crude rates (n/N) [Adjusted rates, CI%, P value]
Very low volume (<3)	85% (34/40) [85%*, 67-100, 0.013]	83% (53/64) [83%**, 72-95, 0.001]	33% (1/3) [33%, 7-100, 0.349]
Low volume (3-5)	45% (5/11) [45%, 20-100, 0.258]	57% (53/93) [57%, 47-69, 0.166]	50% (1/2) [50%, 12-100, 0.609]
Medium volume (≥6)	56% (27/48) [56%, 40-100, 0.245]	63% (98/155) [63%, 55-73, 0.65]	75% (47/63) [75%, 61-92, 0.743]
Queensland	**67% (66/99)**	**65% (204/312)**	**72% (49/68)**

Adjusted by age, sex, socioeconomic status, rurality, comorbidity, ASA, emergency and indigenous status. Adjusted results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1% for those marked ** and less than 5% for those marked.

~Annual average hospital volume groups – Medium (≥ 6 surgeries per year), Low (3-5 surgeries per year), Very low (< 3 surgeries per year)
Refer to Appendix 1 for hospital peer group description
Tables with blank results indicate that no surgery occurred

5.3 | In-flows by remoteness (hospital)

Gastrectomy

Diagnosis year: 2004 – 2008

5.3.1 | What percentage of patients who received gastrectomy live outside a metropolitan area?

In-flows *(% of patients travelling for surgery)*	**Diagnosis Year: 2004-2008**		
	Rural & Remote Rates (n/N)	**Regional** Rates (n/N)	**Metropolitan** Rates (n/N)
Principal referral hospitals	11% (17/152)	20% (30/152)	69% (105/152)
Group A hospitals	8% (25/312)	15% (48/312)	77% (239/312)
Group B hospitals	20% (9/44)	25% (11/44)	55% (24/44)
Other hospitals	13% (3/24)	33% (8/24)	54% (13/24)
Queensland	**10%** (54/532)	**18%** (97/532)	**72%** (381/532)

Gastrectomy

Diagnosis year: 2009 – 2013

5.3.2 | What percentage of patients who received gastrectomy live outside a metropolitan area?

In-flows *(% of patients travelling for surgery)*	**Diagnosis Year: 2009-2013**		
	Rural & Remote Rates (n/N)	**Regional** Rates (n/N)	**Metropolitan** Rates (n/N)
Principal referral hospitals	13% (22/173)	20% (35/173)	67% (116/173)
Group A hospitals	6% (14/238)	24% (56/238)	71% (168/238)
Group B hospitals	28% (9/32)	22% (7/32)	50% (16/32)
Other hospitals	0% (0/15)	27% (4/15)	73% (11/15)
Queensland	**10%** (45/458)	**22%** (102/458)	**68%** (311/458)

Refer to Appendix 1 for hospital peer group description
Crude percentage rates may not add to 100% due to rounding

5.4 | In-flows by remoteness (HHS)

Gastrectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

5.4.1 | What percentage of gastrectomy patients reside outside my HHS?

In-flows (*% of patients travelling for surgery)*	**2004-2008 Diagnosis year** Hospital count	Rates (n/N)	**2009-2013 Diagnosis year** Hospital count	Rates (n/N)
Cairns and Hinterland	2	0% (0/11)	1	17% (1/6)
Central Queensland	1	0% (0/3)	2	0% (0/2)
Darling Downs	3	9% (1/11)	3	13% (1/8)
Gold Coast	4	3% (2/60)	5	4% (2/52)
Mackay	2	0% (0/3)	2	0% (0/2)
Metro North	7	34% (51/150)	7	36% (54/150)
Metro South	7	40% (78/194)	7	46% (77/166)
North West	1	0% (0/1)	1	0% (0/1)
Sunshine Coast	6	5% (2/40)	4	0% (0/24)
Townsville	2	25% (9/36)	2	41% (16/39)
West Moreton	2	0% (0/9)	2	0% (0/6)
Wide Bay	4	0% (0/14)	1	0% (0/2)
Queensland	**41**	**27% (143/532)**	**37**	**33% (151/458)**

5.5 | Out-flows

Gastrectomy

Diagnosis year 2004 – 2008 and 2009 – 2013

5.5.1 | What percentage of patients underwent a gastrectomy outside the HHS that they reside in?

Out-flows *(% of patients receiving surgery outside of their HHS of residence)*	**2004-2008** **Diagnosis year** Rates (n/N) Outside HHS	**2009-2013** **Diagnosis year** Rates (n/N) Outside HHS
Cairns and Hinterland	52% (12/23)	69% (11/16)
Central Queensland	80% (12/15)	88% (15/17)
Central West		100% (2/2)
Darling Downs	60% (15/25)	71% (17/24)
Gold Coast	6% (4/62)	7% (4/54)
Mackay	67% (6/9)	86% (12/14)
Metro North	20% (25/124)	12% (13/109)
Metro South	12% (16/132)	12% (12/101)
North West	50% (1/2)	50% (1/2)
South West		
Sunshine Coast	19% (9/47)	43% (18/42)
Townsville	10% (3/30)	12% (3/26)
West Moreton	63% (15/24)	75% (18/24)
Wide Bay	63% (24/38)	92% (24/26)
Queensland	**27%** **(143/532)**	**33%** **(151/458)**

Tables with blank results indicate that no surgery occurred

Appendix

Appendix 1: AIHW Hospital Peer Groups*

Principal referral hospitals
Principal referral hospitals are public acute hospitals that provide a very broad range of services, have a range of highly specialised service units, and have very large patient volumes. The term 'referral' recognises that these hospitals have specialist facilities not typically found in smaller hospitals.

Public acute group A hospitals (Group A hospitals)
Public acute group A hospitals are public acute hospitals that provide a wide range of services typically including a 24-hour emergency department, intensive care unit, coronary care unit and oncology unit, but do not provide the breadth of services provided by *Principal referral hospitals.*

Private acute group A hospitals (Group A hospitals)
Private acute group A hospitals are private acute hospitals that have a 24-hour emergency department and an intensive care unit, and provide a number of other specialised services such as coronary care, special care nursery, cardiac surgery and neurosurgery.

Public acute group B hospitals (Group B hospitals)
Public acute group B hospitals are those public acute hospitals that do not have the service profile of the *Principal referral hospitals and Group A hospitals,* but do have 24-hour emergency department; they typically provide elective surgery and have specialised service units such as obstetric, paediatric and psychiatric units.

Private acute group B hospitals (Group B hospitals)
Private acute group B hospitals are private acute hospitals that do not have a 24-hour emergency department, but do have an intensive care unit and a number of other specialised services including coronary care, special care nursery, cardiac surgery and neurosurgery.

Public acute group C hospitals (Other hospitals)
Public acute group C hospitals include those public acute hospitals that provide a more limited range of services than *Principal referral hospitals* or *Public acute group A* and *B hospitals*, but do have an obstetric unit, provide surgical services and/or some form of emergency facility (emergency department, or accident and emergency service).

Private acute group C hospitals (Other hospitals)
Private acute group C hospitals are those private acute hospitals that do not provide emergency department services or have an intensive care unit, but do provide specialised services in a range of clinical specialities.

Public acute group D hospitals (Other hospitals)
Public acute group D hospitals are acute public hospitals that offer a smaller range of services relative to other public acute hospitals, and provide 200 or more separations per year. They are mostly situated in regional and remote areas.

Private acute group D hospitals (Other hospitals)
Private acute group D hospitals are those private acute hospitals that do not provide emergency department services or have an intensive care unit, do not provide specialised services in a range of clinical specialities, but had 200 or more separations

*Sourced from the Australian Institute of Health and Welfare 2015. Australian hospital peer groups. Health services series no. 66. Cat. no. HSE 170. Canberra: AIHW. http://www.aihw.gov.au

Appendix 2: National and International rates

Oesophagectomy

Country	Time period	In-hospital mortality rate	30 day mortality rate	90 day mortality rate	2 year surgical survival
England[1]	2007 - 2009	4.5%	3.8%	5.7%	
England[1]	2013 - 2015	1.9%	1.6%	3.2%	
The Netherlands[2]	2005 - 2009		4.6%		56.8%
Sweden[2]	2006 - 2009		1.9%		61%
Denmark[2]	2004 - 2009		4.6%		58.2%
USA[3]	2006 - 2009		6%	13.3%	
NSW[4]	2001 - 2008		4.1%	7.5%	
Queensland	**2004 - 2008**	**1.6%**	**0.8%**	**2.1%**	**68%**
Queensland	**2009 - 2013**	**1.2%**	**1.2%**	**3.9%**	**67%**

Gastrectomy

Country	Time period	In-hospital mortality rate	30 day mortality rate	90 day mortality rate	2 year surgical survival
England[1]	2007 - 2009	6.0%	4.5%	6.9%	
England[1]	2013 - 2015	2.2%	1.9%	4.1%	
The Netherlands[2]	2005 - 2009		6.9%		59%
Sweden[2]	2006 - 2009		3.5%		59%
Denmark[2]	2004 - 2009		4.3%		62.8%
NSW[4]	2001 - 2008		4.4%	9.1%	
Queensland	**2004 - 2008**	**4.5%**	**3.8%**	**7.1%**	**58%**
Queensland	**2009 - 2013**	**3.9%**	**4.4%**	**6.1%**	**65%**

[1] National Oesophago-gastric Cancer Audit 2016, Healthcare Quality Improvement Partnership Ltd. (HQIP) [Accessed Dec 2016]; Available from: http://content.digital.nhs.uk/catalogue/PUB21561

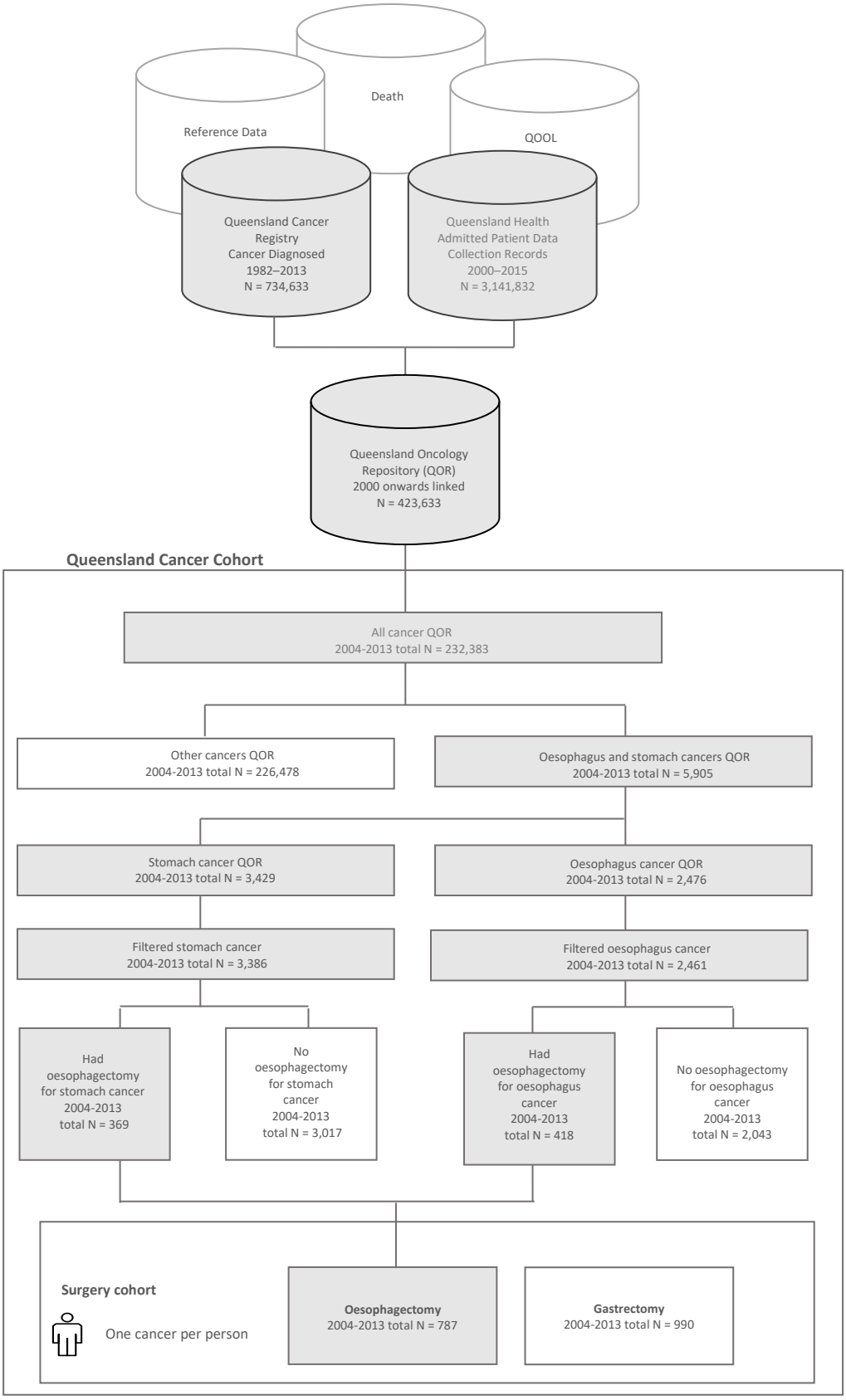
[2] J. L. Dikken, J. W. van Sandick, W. H. Allum, et al. Differences in outcomes of oesophageal and gastric cancer surgery across Europe, British Journal of Surgery 2013; 100: 83–94

[3] D. M. Walters, T. L. McMurry, J. M. Isbell, et al. Understanding Mortality as a Quality Indicator After Esophagectomy, Ann Thorac Surg 2014;98:506–12

[4] R.C. Smith, N. Creighton, R. V. Lord, et al. Survival, mortality and morbidity outcomes after oesophagogastric cancer surgery in New South Wales, 2001–2008, MJA 2014; 200: 408–413 doi: 10.5694/mja13.11182

Appendix 3a: How the cohorts were defined for oesophagectomy

2004–2013: PUBLIC & PRIVATE HOSPITAL PATIENTS



Queensland Oncology Repository
QOR consolidates patient information for Queensland and contains data on invasive, benign and uncertain cancers, patient demographics, surgery, systemic therapy, radiotherapy and death. QOR also contains data collected by clinicians at MDT meetings

Sophisticated matching and linking is performed to identify all persons with cancer who had surgery

Queensland Cancer Cohort
Includes: Queensland Invasive Cancer incidence
Discharged patients from public or private hospitals
Queensland residents
All ages

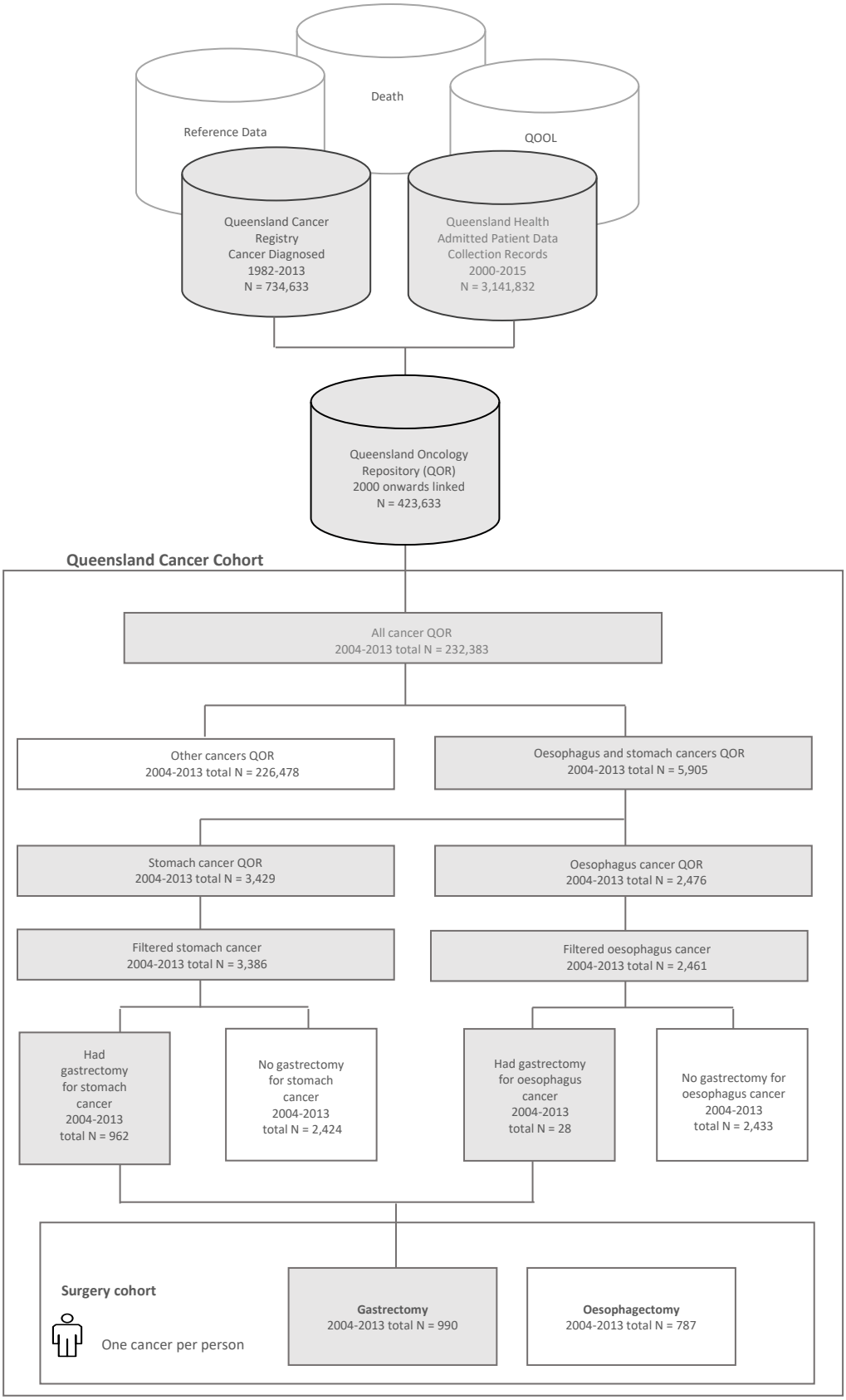
Surgery Cohort
Filtered cases
Potential duplicate records

Rules
If the surgery happened > 1 month before the date of diagnosis then the surgery is excluded

No Surgery Cohort
Includes Qld residents of all ages diagnosed with oesophagus and stomach cancer who did not undergo a gastrectomy in the surgical cohort time period

Appendix 3b: How the cohorts were defined for gastrectomy

2004-2013: PUBLIC & PRIVATE HOSPITAL PATIENTS



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Includes: Queensland Invasive Cancer incidence
Discharged patients from public or private hospitals
Queensland residents
All ages

Surgery Cohort
Filtered cases
Potential duplicate records

Rules
If the surgery happened > 1 month before the date of diagnosis then the surgery is excluded

No Surgery Cohort
Includes Qld residents of all ages diagnosed with oesophagus and stomach cancer who did not undergo a gastrectomy in the surgical cohort time period

Method

Adjusted rates

The following indicators report both crude and adjusted rates. Adjusting is used to remove the effect of differences in composition of the various populations.

- Inpatient mortality rate
- 30 day mortality rate
- 90 day mortality rate
- 1-yr surgical survival
- 2-yr surgical survival
- Time from diagnosis to surgery ≤ 30 days, 31-90 days and > 90 days

The indicators have been adjusted by age, sex, socioeconomic status (disadvantaged Y/N), rurality (urban/rural) – refer to page 106 for rurality classification)), comorbidity (Y/N), ASA, emergency status (Y/N) and indigenous status (Y/N).

Results highlighted with * and ** are deemed to be statistically significantly different to the whole of Queensland result. The likelihood the observed difference is due to chance alone is less than 1 for those marked ** and less than 5 for those marked *.

Statistical significance is determined from the results of Poisson regression. The displayed confidence intervals are intended to show the level of precision of the adjusted rate estimate and on occasion may not accurately reflect significance.

Assigning a surgery record to a person

To assign a surgery record to a person with cancer the earliest diagnosis in the cancer group is used. For example, a person was diagnosed with cancer in the oesophagus in 2005 and in the stomach in 2008. The surgery record linked to the oesophageal cancer diagnosed in 2005 will be reported.

Diagnosis year

This report is structured around diagnosis years as reported by the Queensland Cancer Registry, the latest incident year being 2013. Only patients diagnosed between 2004 and 2013 will be included in this report. Patients that had surgery in 2004 but were diagnosed in an earlier year are excluded from the report.

Definitions

ASA score

American Society of Anaesthetic (ASA) physical status classification system for assessing the fitness of a patient prior to surgery.

Hierarchies by ASA Group

Normal/Mild Disease: ASA 1-2

Severe Disease: ASA 3-6

When two or more different ASA scores are coded on the same date in the admissions data, only one ASA score is chosen. The choice of the ASA score is based on the type of anaesthesia in the following order of selection: General > Sedation > Neuraxial > Regional > Intravenous Regional > Infiltration > Local. For example, if General Anaesthesia ASA 2 and Sedation ASA 3, are coded on the same date, the General Anaesthesia score of 2 is chosen.

Comorbidity

A clinical condition that has the potential to significantly affect a cancer patient's prognosis.

Comorbidity is derived from hospital admissions data following the Quan algorithm for classifying ICD-10 coded conditions, modified to exclude metastasis, which is represented by a separate and distinct metastasis dimension.

Comorbidity is limited to conditions coded in any admission episode between 12 months before and 12 months after the date of cancer diagnosis.

For any given cancer diagnosis, comorbidity is restricted to conditions other than the primary cancer. E.g. A rectum cancer can be a comorbidity to a colon cancer diagnosis and vice versa, if they are diagnosed within 12 months of each other.

Benign tumours are not considered comorbidities.

Co-morbidity list:

AIDS	Acute myocardial	Cancer
Cerebrovascular disease	Congestive heart failure	Chronic obstructive pulmonary disease
Dementia	Diabetes	Diabetes + complications
Hemiplegia or Paraplegia	Mild liver disease	Moderate/severe liver disease
Peptic ulcer	Peripheral vascular disease	Renal disease
Rheumatoid disease		

Confidence interval (CI)

The confidence interval represents the probability that a population parameter will fall between two set values. A very wide interval may indicate that more data should be collected before anything very definite can be said about the parameter.

Emergency

A patient admitted to a hospital at short notice because of clinical need or if alternative care is not available.

Flows

In-flows

In-flows show the distribution of residence for the total group of patients who were operated on by a hospital, group of hospitals or HHS.

Out-flows

Out-flows shows the proportion of patients residing in a given HHS who receive their surgery in a different HHS.

Forest plots

The forest plot is a graphical display of the results from a regression model, illustrating the hazard ratios for each covariate included in the regression model. The dot represents the estimate of the hazard ratio with the confidence interval of the estimate represented by a horizontal line. A central vertical line representing no effect is also plotted, and if the confidence intervals for an estimate cross this line then the effect is considered not to be statistically significant.

Funnel plots

Funnel plots have been created by plotting the observed result for each hospital result against the surgical volume of the hospital. Confidence limit intervals of 95% (~2 standard deviations) and 99% (~3 standard deviations) have been superimposed around the overall Queensland result.

Hazard Ratio

Describes the ratio of the hazard rates corresponding to post-operative mortality for the different hospital volume groups, where medium volume hospitals are the control group. For example, a hazard ratio of 3 for very low volume hospitals would indicate that deaths occurred three times more frequently in these hospitals than in medium volume hospitals.

Hospital peer groups

The Australian Institute of Health and Welfare (AIHW) have published The Australian hospital peer groups report that groups public and private hospitals that share similar characteristics, providing a basis for meaningful comparisons. There are thirty peer groups, nine of which are relevant to this report. Peer group definitions and groupings used in this report are defined in Appendix 1.

Indigenous status

A measure of whether a person identifies as being of Aboriginal or Torres Strait Islander origin.

Interquartile range (IQR)

The interquartile range is a measure of variability, based on dividing a data set into quartiles. Quartiles divide a rank-ordered data set into four equal parts. The values that separate these parts are called the first, second, and third quartiles; and they are denoted by Q_1, Q_2 (median), and Q_3, respectively. The IQR is the distance between the 75^{th} and 25^{th} percentiles, $IQR=Q_3 – Q_1$.

Median age (yrs)

The age that divides a population into two halves: one older than the median, the other younger than the median.

Mortality

Inpatient mortality

The percentage of patients that die in hospital following their surgery.

30 day mortality

The percentage of patients that die within 30 days following their surgery.

90 day mortality

The percentage of patients that die within 90 days following their surgery.

Number of surgeries

Includes Queensland residents of all ages diagnosed with invasive cancer in the surgical cohort time period who underwent oesophagogastric surgery.

Oesophagogastric surgical procedures

ICD-10-AM	Procedure/Grouping
Gastrectomy	
30518-00	Partial distal gastrectomy with gastroduodenal anastomosis
30518-01	Partial distal gastrectomy with gastrojejunal anastomosis
30518-02	Partial proximal gastrectomy with oesophago-gastric anastomosis
30521-00	Total gastrectomy
30523-00	Subtotal gastrectomy
30524-00	Radical gastrectomy
Oesophagectomy	
30535-00	Oesophagectomy by abdominal and transthoracic mobilisation, with thoracic oesophagogastric anastomosis
30536-00	Oesophagectomy by abdominal and transthoracic mobilisation, with cervical oesophagogastric anastomosis
30536-01	Oesophagectomy by abdominal and transthoracic mobilisation, with cervical oesophagostomy
30541-00	Trans-hiatal oesophagectomy by abdominal and cervical mobilisation, with oesophagogastric anastomosis
30541-01	Trans-hiatal oesophagectomy by abdominal and cervical mobilisation, with oesophagojejunal anastomosis
30545-00	Oesophagectomy by abdominal and thoracic mobilisation with thoracic anastomosis, large intestine interposition and anastomosis
30545-01	Oesophagectomy by abdominal and thoracic mobilisation with thoracic anastomosis using Roux-en-Y reconstruction
30550-00	Oesophagectomy by abdominal and thoracic mobilisation with cervical anastomosis, large intestine interposition and anastomosis
30550-01	Oesophagectomy by abdominal and thoracic mobilisation with cervical anastomosis using Roux-en-Y reconstruction

Private hospital

All hospitals that are not Queensland Health hospitals.

Public hospital

Queensland Health hospitals.

Relative survival (5 year)

Relative survival is a net survival measure representing cancer survival in the absence of other causes of death. Relative survival is defined as the ratio of the proportion of observed survivors in a cohort of cancer patients to the proportion of expected survivors in a comparable set of cancer free individuals.

Remoteness

The relative remoteness of residence at time of diagnosis, derived from the Australian Standard Geographical Classification (ASGC). In this report, remoteness is classified into three groups based on the original ASGC grouping.

ASGC classifications	Modified ASGC classification	Rurality classification
Major City	Metropolitan	Urban
Inner Regional	Regional	Rural
Outer Regional		
Remote	Rural and Remote	
Very Remote		

An exception to this grouping is the metropolitan area of Townsville (originally classified as Rural). Townsville has been classified as Metropolitan because of the availability of tertiary level cancer services.

Sex

Refers to the biological and physiological characteristics that define men and women.

Socioeconomic status

Socioeconomic status is based on the Socio-Economic Indexes for Areas (SEIFA), a census-based measure of social and economic well-being developed by the Australian Bureau of Statistics (ABS) and aggregated at the level of Statistical Local Areas (SLA).

The ABS uses SEIFA scores to rank regions into ten groups or deciles numbered one to ten, with one being the most disadvantaged and ten being the most affluent group. This ranking is useful at the national level, but the number of people in each decile often becomes too small for meaningful comparisons when applied to a subset of the population. For this reason, this document further aggregates SEIFA deciles into 3 socioeconomic groups.

SEIFA Group	*Decile*	*Percentage of population (approximate)*
Disadvantaged	1-2	20%
Middle	3-8	60%
Affluent	9-10	20%

Surgical survival

One Year Surgical Survival

All-cause crude survival: the percentage of cases still alive one year after surgery.

Two Year Surgical Survival

All-cause crude survival: the percentage of cases still alive two years after surgery.

Time to surgery from histological diagnosis

Time from histological diagnosis to surgery was measured for patients whose first treatment was oesophagogastric surgery (no neo-adjuvant therapy). Time periods were reported as being ≤ 30 days, 31-90 days or >90 days.

Volume grouping

Volume group cut-offs were chosen by calculating the annual average volumes of each hospital over the ten-year period and dividing the hospitals into groups (tertiles) at the 33rd and 67th percentile according to annual volume. Post-hoc inspection and re-allocation was undertaken in a small number of cases to avoid heterogeneity in annual volumes within each tertile.

Medium volume hospital

A hospital that performed ≥ 6 surgeries per year on patients diagnosed between 2004 and 2013.

Low volume hospital

A hospital that performed between 3 and 5 surgeries per year on patients diagnosed between 2004 and 2013.

Very low volume hospital

A hospital that performed < 3 surgeries per year on patients diagnosed between 2004 and 2013.

Volume outcome association

Previous reports have shown that hospitals performing low numbers of oesophagogastric surgeries annually have reported higher postoperative mortality rates. In regression analysis, annual hospital volume (as shown in the volume grouping above) was included in the models to determine the effect of volume on 30-day, 90-day and in-hospital mortality. For further information about hospital volume outcomes refer to 'Gastrectomy and Oesophagectomy in Queensland 2012' available at: https://qccat.health.qld.gov.au/documents/Upper-GI_2012.pdf

FOR MORE INFORMATION

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