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Hospital volume and survival in oesophagectomy and gastrectomy for cancer

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ABSTRACT

Background: High volume upper gastrointestinal cancer hospitals demonstrate improved postoperative mortality rates, but the impact on survival is unclear. This population-based cohort study explores the effect of hospital volume on survival following upper gastrointestinal cancer surgery.

Patients and methods: This study used a population-based cohort of 3866 patients who underwent surgery for oesophageal or gastric cancer between 1998 and 2008 with follow-up until December 2008.

Results: Hospital volume ranged from 1 to 68 cases/year. Overall, 5-year survival was 27%. Increasing age and advanced stage of disease were independently correlated with shorter survival. High hospital volume was significantly and independently correlated with improved 30-day mortality postoperatively ($P < 0.001$), but not with survival beyond 30 days.

Conclusion: The correlation between hospital volume and improved 30-day mortality following oesophageal and gastric cancer surgery supports the centralisation of upper gastrointestinal cancer surgery services. The low survival in both high and low volume hospitals beyond 30 days highlights the need for increasing earlier diagnosis and optimising approaches to radical treatment.

1. Introduction

Centralisation of upper gastrointestinal cancer services aims to increase hospital volume and improve the outcome of oesophageal and gastric cancer surgery. In 2001, the Improving Outcomes Guidance for upper gastrointestinal cancers recommended that upper gastrointestinal cancer centres should perform at least 40 oesophagectomies and 60 gastrectomies for cancer each year.[1] The process of centralising upper gastrointestinal cancer services began in 2001 and was complete in the majority of networks by 2007.[2] Published reports in the United Kingdom (UK) have not shown that high hospital volume improved survival from upper gastrointestinal cancer surgery.[3,4] However, these studies used data from before 2000 and subsequent centralisation has not been assessed in relation to survival. Reports from the United States of America,[5,6] Japan,[7] Netherlands[8,9] and Sweden[10,11] have shown conflicting results. The aim of this

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study was to examine the relationship between hospital volume and survival from upper gastrointestinal cancer surgery using recent data from a population-based cancer registration.

2. Patients and methods

A population-based cohort of 3870 patients resident in South East England (London, Kent, Surrey and Sussex Counties; population approximately 10 million in 2001),[12] diagnosed with oesophageal or gastric cancer and treated operatively over an 11-year period (1998–2008) was identified by the Thames Cancer Registry using ICD-10 coded diagnoses (International Statistical Classification of Diseases and Related Health Problems 10th Revision) and OPCS-4 coded operations (Office of Population, Censuses and Surveys Classification of Surgical Operations and Procedures 4th Revision). In addition to demographic information, socio-economic deprivation, tumour stage, tumour topography, tumour morphology and chemotherapy treatment data were retrieved from the Thames Cancer Registry that obtains this information from the clinical records. The tumour was staged according to the World Health Organization classification system that is used in cancer registries worldwide (1 = local, 2 = extension to adjacent tissues, 3 = regional lymph nodes and 4 = metastases).[13] Information regarding neo-adjuvant therapy was derived from the recorded dates of chemotherapy and surgery. The Thames Cancer Registry receives death register data from the Office for National Statistics via the National Health Service Central Care Records Service. Survival was calculated from the date of operation to the date of death from any cause. Censoring of follow up occurred on 31st December 2008.

Hospital volume was calculated for each patient's record as the number of oesophagectomies and gastrectomies for cancer that were carried out in that patient's hospital in the same calendar year as their operation. Hospital volume was split into 10 cases/year groups; 1–10, 11–20, 21–30 and >30.

The data were prepared by the Thames Cancer Registry and anonymised before being analysed so that this exercise could be undertaken blind to the identity of the hospitals and the patients.

Table 1 – Demographic and clinical characteristics of patients undergoing oesophagectomy and gastrectomy for cancer, diagnosed 1998–2008, South East England.

Hospital volume (cases/year)	1–10	11–20	21–30	>30
n	1790	1211	588	277
Year of diagnosis (median)	2001	2001	2001	2005
Tumour topography				
Oesophageal	411 (23)	388 (32)	190 (32)	119 (43)
Gastric	1379 (77)	823 (68)	398 (68)	158 (57)
Median age (years)	69	69	68	64
Sex (Male:Female ratio)	7:3	7:3	7:3	7:3
Socio-economic deprivation				
1 (most affluent)	303 (17)	150 (12)	91 (15)	43 (16)
2	285 (16)	198 (16)	107 (18)	48 (17)
3	331 (18)	243 (20)	123 (21)	45 (16)
4	414 (23)	296 (24)	145 (25)	76 (27)
5 (least affluent)	457 (26)	324 (27)	122 (21)	65 (23)
Stage				
1 (local)	422 (24)	274 (23)	167 (28)	86 (31)
2 (extension to adjacent tissues)	130 (7)	108 (9)	43 (7)	14 (5)
3 (regional lymph nodes)	698 (39)	441 (36)	229 (39)	115 (42)
4 (metastases)	228 (13)	173 (14)	63 (11)	22 (8)
Unknown	312 (17)	215 (18)	86 (15)	40 (14)
Neo-adjuvant therapy				
No	1572 (88)	1007 (83)	464 (79)	150 (54)
Yes	218 (12)	204 (17)	124 (21)	127 (46)
Tumour morphology				
Adenocarcinoma	1521 (85)	1012 (84)	502 (85)	229 (83)
Squamous carcinoma	101 (6)	111 (9)	45 (8)	24 (9)
Other	166 (9)	88 (7)	41 (7)	24 (9)
Unknown	2 (0)	0	0	0
Operation				
Oesophagectomy	588 (33)	552 (46)	290 (49)	154 (56)
Gastrectomy	1202 (67)	659 (54)	298 (51)	123 (44)
Median survival (days)	668	703	730	1215

Numbers in table are frequencies, percentages in brackets.