Workload and resource implications of upper gastrointestinal cancer surgical centralisation in South East Wales

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ABSTRACT

INTRODUCTION The aim of this study was to determine whether one specialist unit could manage all patients diagnosed with oesophagogastric cancer in Gwent and Cardiff and Vale NHS Trusts over a 6-month period with regard to workload, resource and training opportunities.

PATIENTS AND METHODS All patients diagnosed with oesophagogastric (OG) cancer in Gwent and Cardiff and Vale NHS Trusts and referred to the regional South East Wales Upper GI multidisciplinary team over the 6-month period from 1 July to 31 December 2005 were studied prospectively and compared with the previous 6-month caseload at Cardiff and Vale.

RESULTS Out-patient workload increased from 160 new (33 OG cancers) and 533 follow-up patients (161 OG cancers) between 1 January and 30 June 2005, to 290 new (68 OG cancers, 106% increase) and 865 follow-up patients (230 OG cancers, 43% increase) between 1 July, and 31 December 2005. The number of patients undergoing radical surgery increased from 14 to 23 (D2 gastrectomy 8 versus 13; oesophagectomy 6 versus 10). Cancer-related workload in the latter period generated 118 intermediate equivalents (IEs) of operative work for two specialist surgeons and one SpR occupying 38% of the total time available on 104 scheduled operating lists, compared with 64 IEs in the previous 6 months, representing an 84% increase in cancer-related operative training opportunities.

CONCLUSIONS Centralisation of oesophagogastric cancer surgery is feasible and desirable if national guidelines are to be satisfied, and this strategy has significant positive implications for surgical training and audit.

KEYWORDS

Oesophagogastric cancer – Training – Surgery

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Upper gastrointestinal surgery has, by tradition, been within the domain of the general surgeon and, historically, a notional district general hospital might expect to deal with fewer than 25 people with oesophageal cancer and 40 with gastric cancer per year.¹ The last decade, however, has witnessed significant changes in practice in general surgery in many geographical areas, and sub-specialisation for major oncological work is now the accepted routine. These developments are in keeping with the published guidance on commissioning cancer services,¹ one of whose key recommendations was that specialist teams be established, serving populations of greater than 1 million people. Such specialist multidisciplinary team expertise has improved outcomes for patients with oesophagogastric cancer and, arguably, also resulted in more efficient use of resources.^{2–6}

Compliance with these guidelines for the commissioning of cancer services, supported strongly and largely achieved in England, has received lesser resource in Wales. Indeed, the recent Welsh regional audit of oesophagogastric cancer management demonstrated that many individual surgeons' case-loads remained small, staging strategies were idiosyncratic, open and closed operations were performed in 23% of cases, operative mortality was 12%, and 2-year survival was 42% following oesophagectomy and 43% following gastrectomy.⁷ Case volume per surgeon or per unit has been reported to be an important factor determining outcome of treatment of malignant disease.^{2,8,9} Moreover, variable workloads arguably have a negative impact on training specialist registrars with an interest in upper gastrointestinal oncology.

The aim of this study, therefore, was to assess the feasibility, volume of work and training opportunities generated by a single centralised unit (service equivalent value [SEV] of 3.25), undertaking all the oesophagogastric cancer work in the Cardiff and Vale and Gwent geographical areas of South East Wales region and serving a population of approximately of 1 million people.

Patients and Methods

The geographical region of South East Wales has a population of approximately 1.2 million and is served by three NHS Trusts (Gwent Healthcare NHS Trust, catchment population 560,000; Pontypridd and Rhondda NHS Trust, catchment population 140,000; and Cardiff and Vale NHS Trust, catchment population 500,000), four district general hospitals (Royal Gwent, Nevill Hall, Merthyr Tydfil, Royal Glamorgan Hospitals) and two teaching hospitals (University Hospital of Wales and Llandough Hospital). At the time of the audit, there were three consultant upper GI surgeons working out of three, and subsequently two, hospital bases in South East Wales. After an executive decision by Cardiff and Vale NHS Trust to increase their consultant staff and a provisional management agreement to attempt centralisation of oesophagogastric cancer services, one surgeon (WGL) took up a new appointment at the University Hospital of Wales while keeping an out-patient sessional commitment at the Royal Gwent Hospital. This effectively increased the oesophagogastric cancer catchment area of University Hospital of Wales to 1,060,000. The patient case-load diagnosed with oesophageal and gastric cancer in Gwent and Cardiff and Vale NHS Trusts (Royal Gwent, Nevill Hall, University Hospital of Wales and Llandough) and referred to the regional South East Wales Upper GI multidisciplinary team over the 6-month period from 1 July to 31 December 2005 and managed by two consultant upper GI surgeons (WGL and GWBC) with a specialist interest in upper gastrointestinal oncology were studied prospectively. This cohort was compared with the previous 6-month caseload at the University Hospital of Wales and Llandough with a single specialist surgeon working independently (GWBC). The staffing of the team during the initial 6 months at University Hospital of Wales consisted of one specialist consultant upper gastrointestinal surgeon, a specialist registrar (SpR) with an interest in upper gastrointestinal surgery, a senior house officer (SHO), and a house officer (HO). Following centralisation of the upper gastrointestinal surgical services, the team consisted of two specialist consultant upper gastrointestinal surgeons, a specialist registrar with an interest in upper gastrointestinal surgery, a supernumerary research fellow, a senior house officer and a foundation year 1 trainee (HO equivalent). The job plans of each consultant were similar

with three theatre sessions (1 day-case session and 2 all-day theatre sessions with potential for team operating on these days), one endoscopy session each and a joint out-patient session. One surgeon (WGL), continued to provide an outreach out-patient cancer clinic at the Royal Gwent Hospital. Primary measures of outcome were numbers of new patients diagnosed with oesophagogastric cancer related to the global general surgery workload, diagnostic and therapeutic gastroscopy workload, staging investigations including laparoscopy, details of the surgery, operating theatre utilisation, operative morbidity and mortality, critical care bed occupancy, and out-patient workload. Cancer workload was measured in terms of intermediate (hernia) equivalents of work (IEs), which is a uniformed scale allowing comparison between operations with different levels of complexity. A D2 gastrectomy is equivalent to 4 IEs and an oesophagectomy 6 IEs.

Staffing levels

According to Collins' concept of service equivalent value (SEV),¹⁰ the manpower value of the team during the first 6-month period, in terms of consultant equivalents, was:

$$1 (\text{consultants}) + 0.75 (\text{SpR}) + 0.5 (\text{SHO}) = 2.25$$

compared to the manpower value of the team following centralisation of:

$$2 (\text{consultants}) + 0.75 (\text{SpR}) + 0.5 (\text{SHO}) = 3.25$$

Prior to July 2005, the specialist registrar took part in a 1 in 11 European Working Time Directive (EWTD) compliant on-call acute rota with a fully staffed CEPOD theatre available 24 hours a day. The training opportunities prior to July 2005 included two sessions on one all-day operating list, one ambulatory care session, and one endoscopy session. After July 2005, the specialist registrar continued on a 1 in 11 acute rota, but was responsible for the after-care of patients admitted as emergencies from a 2 in 11 acute take. The training opportunities for the specialist registrar included four sessions on two full-day operating lists, one ambulatory care session, two endoscopy sessions and a regular weekly teaching session. Training, audit and academic output was measured in terms of communications to learned societies, published abstracts and scientific papers by the teams of both consultants both before and after 1 July 2005.

Surgical treatment

All tumours were staged in accordance with the UICC TNM Classification of Malignant Tumors.^{11,12} Pre-operative staging involved computed tomography (CT), endoluminal ultrasonography (EUS) and laparoscopy, if considered appropriate. Patients requiring gastrectomy underwent a modified D2 gastrectomy (preserving pancreas and spleen),

the procedure of choice for the surgeons operating in this department.^{15,14} Most patients requiring oesophageal resection underwent standard subtotal oesophagectomy as described by Lewis¹⁵ and Tanner.¹⁶ Transhiatal resection, as described by Orringer,¹⁷ was employed selectively for patients with adenocarcinoma of the lower third of the oesophagus who had significant associated cardiorespiratory co-morbidity (American Society of Anesthesiologists [ASA] grade III).

Statistical analysis

Statistical analysis appropriate for non-parametric data was used. Grouped data were expressed as median (range).¹⁸ Data analysis was carried out using the Statistical Package for the Social Sciences (SPSS®) v.12.0 (SPSS, Chicago, IL, USA).

Results

Out-patient workload

During the period of the study, a total of 101 new patients were diagnosed with upper gastrointestinal cancers in both trusts. Out-patient workload increased from 160 new (33 oesophagogastric cancer) and 535 follow-up patients (161 oesophagogastric cancer) between 1 January 1 and 30 June 2005 to 290 new (68 oesophagogastric cancer) and 865 follow-up patients (230 oesophagogastric cancer) between 1 July and 31 December 2005. Thus, the total number of new cancers increased from 33 to 68 patients, a 106% increase. Similarly, the number of out-patient follow-up cancer consultations increased from 161 patient episodes to 230 patients episodes, a 43% increase. There was an increase of both new gastric cancers (16 versus 30) and oesophageal cancers (17 versus 38). The total number of gastroscopies performed increased from 241 to 511. There was an increase in diagnostic endoscopy (214 versus 451), therapeutic dilatation (20 versus 51) and staging endoscopic ultrasonography (EUS; 43 versus 60). There was no change in the rate of palliative stent insertion (7 versus 8).

In-patient workload

Staging laparoscopy increased from 8 to 22 procedures. There was an increase in major oesophagogastric resections and reconstruction following centralisation (D2 gastrectomy, 8 versus 13; oesophagectomy, 6 versus 10; colonic interposition, 0 versus 1). This resulted in a concomitant increase in theatre utilisation for upper gastrointestinal cancer cases, generating 118 IE values of operative work, occupying 38% of the total time available on 104 scheduled operating lists following centralisation, compared with 64 IE values in the preceding 6 months (Table 1). This represents a 64 IEV or an 84% increase in operative training opportunities for the specialist registrar over a 6-month period. Bed occupancy for patients undergoing elective oesophagogastric cancer surgery increased 62% from 353 to 572 days; for patients receiving palliative care, this increased 110% from 214 to 449 days. Despite the increase in major operative work, there was a decrease in intensive-care bed utilisation with a concurrent increase in the utilisation of high-dependency beds following centralisation (Table 1). There was no operative mortality within 30 days of surgery.

Training, audit and research activity

The numbers of communications by SHOs, SpRs and research fellows to national and international learned societies related to academic work before and after 1 July 2005 were 6 and 12 compared with 6 and 22, respectively. Similarly, the number of published abstracts and scientific papers related to academic work before and after 1 July 2005 were 13 and 9 compared with 19 and 11, respectively.

Discussion

The concept of the ideal surgical service and centralisation is a significant topic of medical and political controversy if not conflict. In England, oesophagogastric cancer surgery is increasingly being performed in centralised units; a recent

Table 1 Theatre and intensive care utilisation

	January–June 2005	July–December 2005
Cancer list IE values BUPA	64 (28)	118 (38)
Cancer lists IE values revised	116 (28)	188 (38)
ITU days	50	30
HDU days	15	27
Values in parentheses are the percentage of operating theatre lists utilised for oesophagogastric cancer cases.		
ITU, intensive care unit; HDU, high dependency unit.		

audit by Forshaw *et al*¹⁹ reported their regional experience of high workload but efficient cancer service whilst continuing to meet elective workload targets. The principal findings of the present study are in keeping with this, in that centralisation of oesophagogastric surgery following local diagnosis and staging was feasible in South East Wales and also had potential training benefits.

There are clearly limitations to this study. Not all new cases of oesophagogastric cancer from South East Wales were included as patients diagnosed at Merthyr Tydfil and Royal Glamorgan hospitals were not included. It was not within the remit of this study to analyse cost effectiveness; in the study by Forshaw *et al*¹⁹ in one regional cancer centre, the cost of an oesophageal resection was reported to be £8070, with palliation costs varying from £1390 to £4720 according to modality. Clearly, there are several aspects to costs, not only fiscal considerations but also a possible trade-off in a deterioration of services elsewhere. A crude estimate of costs may be gleaned from the relative workload in the two time periods. An 84% increase in operative cancer work, 62% increase in operative-related bed occupancy, 110% increase in palliative bed occupancy, a 40% decrease in ITU bed utilisation, and an 80% increase in high-dependency bed utilisation must have increased overall financial costs at least 2-fold. The reason for the change in the level of critical-care bed occupancy is unclear, although arguably it might be a by-product of consultant team operating. With the implementation of the COG guidelines expected to cost £87.5 million, any potential fiscal benefit of centralisation merits further research. There was no direct evidence of a trade-off in terms of a deterioration in service elsewhere; as all patients underwent their staging investigations at their local hospital, there were no delays in diagnoses or treatment and no complaints were received.

In 1990, The Royal College of Surgeons of England published guidelines regarding an acceptable workload for general surgeons working in a district general hospital.²⁰ It was suggested that a standard surgical team (SEV 1.6) could expect to see approximately 1000 new patients a year and have an operative workload of 900 IE values per year. Based on the findings reported in this study, a central South East Wales team might see approximately 1400 new patients per year, about one-third fewer per SEV than the College guidelines (426 versus 616 patients per SEV). However, provision must be made for the burden in excess of 1700 follow-up patients per year (532 patients per SEV). Moreover, patients diagnosed with oesophagogastric cancer require consultant-led out-patient care and clearly demand more time and, on occasion, audiotape recorded consultations.²¹

Sixty-eight new oesophagogastric cancers were detected during the study period of which 24 underwent potentially curative surgery (35%) compared to 14 of 33 (42%) in the first 6 months of the study ($P = 0.488$) and 298 (33%) in the

all-Wales audit reported by Pye *et al*.⁷ Concerns have been published regarding the applicability of intermediate equivalents when applied to major oesophagogastric cancer surgery.²² Recalculating the IE values in this study with regard to the above, based on 6 IEs per D2 gastrectomy, and 8 per oesophagectomy, produces an oesophagogastric cancer operative workload of 188 IEs following centralisation equating to 116 IEs per SEV per year. This equates to 21% of the total operative workload advised in College guidelines, compared with 17% previously reported from a district general hospital with one specialist upper gastrointestinal surgeon.²⁵

The benefits of multidisciplinary team frameworks are well publicised,¹ although the ideal structure of a regional upper GI oesophagogastric surgical unit remain to be determined, and whether or not consultant team operating works in practice is also controversial.⁵ The expanded unit at the University Hospital of Wales functioned, in terms of productivity, as two conjoined units with no perceived added bonus in this regard; clearly, a case can be made to keep the *status quo* of multiple smaller units, preserving unit skill base and improving outcomes by streamlining clinical pathways by common MDM and assessment algorithm but separate delivery of surgery. However, the operating theatre can be a lonely place for a single-handed upper GI surgeon when faced with a high-risk, overweight patient with a difficult abdomen, and a locally advanced tumour, and may certainly seem far distant from the crowded MDT meeting room where the case was deemed operable and an attempt at cure by radical surgery to be feasible. Centralised specialised units have the benefit of an immediate second opinion and experienced assistant with whom to share the burden of difficult decisions. Moreover, training opportunities appear to be increased – in this study, experience of major oesophagogastric resection over a 6-month period increased over 80%. Granted there are arguments against; defining a fixed number of cases deemed to equate to competence is controversial. Indeed, Sutton *et al*.²⁴ have reported that a so-called trained consultant continues to learn for at least 7 years, partly due to maturity and depth of experience. Modernising Medical Careers and plans for seamless run-through training may potentially see completion of training 6 years after medical school.²⁵ Arguably, therefore, training in a centralised unit in upper GI cancer might be restricted to a fellowship level for the exceptional few, who are dedicated to cancer surgery and want to specialise in that area, and these numbers should be matched to national requirements.

Conclusions

Although the findings of this study suggest that centralisation of cancer services in South East Wales is feasible in terms of

the resources available at the University Hospital, after December 2005 the South East Wales upper GI cancer network reverted to the previous service delivery model, and local health care commissioners continue to consider the relative merits of local versus central models of cancer service delivery. The above data may serve to provide a factual basis for healthcare planners, commissioners, and postgraduate deans alike to face the difficult decisions required, not only with regard to meeting national cancer guidelines, but also improving specialist upper GI cancer training and audit in Wales.

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