



Original Article

Influence of a Regional Centralised Upper Gastrointestinal Cancer Service Model on Patient Safety, Quality of Care and Survival[☆]D.S.Y. Chan^{*}, T.D. Reid^{*}, C. White[†], A. Willicombe^{*}, G. Blackshaw^{*}, G.W. Clark^{*}, T.J. Havard[‡], X. Escofet[‡], T.D.L. Crosby[§], S.A. Roberts[¶], W.G. Lewis^{*}^{*} Department of Surgery, South East Wales Cancer Network, University Hospital of Wales, Cardiff, UK[†] Welsh Cancer Intelligence and Surveillance Unit, Cardiff, UK[‡] Department of Surgery, Royal Glamorgan Hospital, Llantrisant, UK[§] Department of Oncology, Velindre Hospital, Cardiff, UK[¶] Department of Radiology, South East Wales Cancer Network, University Hospital of Wales, Cardiff, UK

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Abstract

Aims: The aim of this study was to determine outcomes of a reconfigured centralised upper gastrointestinal (UGI) cancer service model, allied to an enhanced recovery programme, when compared with historical controls in a UK cancer network.

Materials and methods: Details of 606 consecutive patients diagnosed with UGI cancer were collected prospectively and outcomes before ($n = 251$) and after ($n = 355$) centralisation compared. Primary outcome measures were rates of curative treatment intent, operative morbidity, length of hospital stay and survival.

Results: The rate of curative treatment intent increased from 21 to 36% after centralisation ($P < 0.0001$). Operative morbidity (mortality) and length of hospital stay before and after centralisation were 40% (2.5%) and 16 days, compared with 45% (2.4%) and 13 days, respectively ($P = 0.024$). The median and 1 year survival (all patients) improved from 8.7 months and 39.0% to 10.8 months and 46.8%, respectively, after centralisation ($P = 0.032$). On multivariate analysis, age (hazard ratio 1.894, 95% confidence interval 0.743–4.781, $P < 0.0001$), centralisation (hazard ratio 0.809, 95% confidence interval 0.668–0.979, $P = 0.03$) and overall radiological TNM stage (hazard ratio 3.905, 95% confidence interval 1.413–11.270, $P < 0.0001$) were independently associated with survival.

Conclusion: These outcomes confirm the patient safety, quality of care and survival improvements achievable by compliance with National Health Service Improving Outcomes Guidance.

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Key words: Centralisation; gastric cancer; oesophageal cancer; surgery

Introduction

National Health Service reconfiguration driven by Improving Outcomes Guidance has to date resulted in 41 specialist centres providing upper gastrointestinal (UGI) cancer care in England and Wales [1] and the Association of Upper Gastrointestinal Surgeons (AUGIS) has recommended that such units should consist of four to six surgeons, each carrying out a minimum of 15–20 resections

per year and serving a population of 1–2 million [2]. In 2007, 19 of 31 cancer networks in England were reported to have undergone reconfiguration and centralisation [3], yet progress in Wales has received less resources and support. Indeed, the most recent audit of activity related to oesophagogastric management showed that many surgeons' caseloads remained small, staging strategies were idiosyncratic, operative mortality was 12% and 2 year survival was 42% [4] after curative surgery compared with 6% and 75% in England [5].

Specialist multidisciplinary team (MDT) expertise has been reported sporadically to improve patient outcomes [5–7], but these hypotheses have not been tested by means of randomised control trials. Moreover, although case volume per surgeon (or unit) has also been reported to be an important factor determining short-term treatment

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outcomes of several cancers [6,8–15], data regarding the factual impact of reconfigured centralised cancer surgery on survival is thin and often conflicting [16–20].

The aim of this study was to determine the influence of a new clinical model of care comprising reconfigured centralised surgery, allied to an enhanced recovery programme, when compared with the historical control outcomes of three local hospital trusts over the previous year. The setting was a UK regional cancer network serving a population of 1.4 million.

Materials and Methods

The South East Wales cancer network serves a population of about 1.4 million and encompasses three National Health Service Health Boards; Cardiff and Vale University Health Board (C&V UHB, catchment population 450 000), Aneurin Bevan Local Health Board (AB LHB, catchment population 600 000) and Cwm Taf Local Health Board (CT LHB, catchment population 325 000). Together these LHBs are responsible for six acute hospitals; four district general hospitals and two teaching hospitals. Before August 2010, the surgical care of patients with oesophagogastric cancer was delivered by eight surgeons undertaking surgery at four different hospital sites. An agreement was reached in December 2009 to reconfigure and centralise the UGI surgical service on a single site at the University Hospital of Wales, Cardiff, with an agreed start date of 1 August 2010. The new model was based on five specialist UGI surgeons carrying out all of the resectional surgery; three of the surgeons were based at the surgical centre, whereas the other two were to operate on an in-reach basis, with a facility for joint consultant operating, where necessary. Diagnosis and staging continued to be undertaken locally within each health board, co-ordinated via three local weekly MDT meetings, and all cases deemed suitable for curative treatment were discussed at a weekly regional network South East Wales MDT at Velindre Hospital. Specific additional changes at the Royal Gwent Hospital, Newport, included a two-fold increased frequency of local MDT meetings from fortnightly to weekly and the establishment of a dedicated UGI cancer outpatient clinic, serviced by one of the Cardiff-based surgeons (WGL). Integral to the new surgical model was the establishment of an enhanced recovery programme based on the established principles introduced by Basse and colleagues [21] in the arena of colorectal surgery.

The oesophageal and gastric cancer caseload referred to the MDTs during the year preceding the start of centralisation (August 2009 to July 2010) was compared with the following year (August 2010 to July 2011). Pre-centralisation data across the three health boards were collected using a combination of a prospectively maintained database (for two of the three health boards; C&V and CT) in combination with MDT records and a retrospective review of hospital records. Measures of outcome included postoperative morbidity and mortality, length of hospital stay and survival, 1 year from diagnosis. No patients were lost to follow-

up and dates and causes of death were obtained by the Wales Cancer Intelligence and Surveillance unit from the Office for National Statistics. Informed consent was obtained from all patients and ethical approval was sought from the regional ethics committee, but a formal application was deemed unnecessary.

Surgical Treatment and Neoadjuvant Therapy

All patients had management plans individually tailored according to factors relating to both the patient and their disease. Staging was by means of computed tomography, endoscopic ultrasound, computed tomography positron emission tomography and staging laparoscopy as appropriate. The South East Wales MDT treatment algorithms for oesophageal and gastric cancer have been described previously [22,23]. Operative morbidity was graded in accordance with the Dindo–Clavien classification [24]. Particular emphasis was placed on the incidence of morbidity of Dindo–Clavien grade III or higher, as this represented a complication requiring endoscopic, radiological or surgical intervention, in contrast with morbidity of lower grade requiring only pharmacological treatment. Definitive chemoradiotherapy was offered to patients with localised squamous cell carcinoma and patients with adenocarcinoma deemed unsuitable for surgery because of disease extent and/or medical co-morbidity [25,26].

Data Analysis

Grouped data were expressed as the median (range) and non-parametric statistical methods were used. Continuous data were compared using the Mann–Whitney test and categorical data using the chi-squared test and Fisher's exact test when the number of events was low. StataCorp LP was used to analyse the survival information. A non-parametric two-sample test on the equality of medians was carried out. This tested the null hypothesis that pre-centralisation and post-centralisation patients were drawn from populations with the same median. A Log-rank test was carried out to determine the equality of the survivor functions. Proportional hazard plots were created and Schoenfeld residuals were calculated to confirm that the proportional hazard assumption was appropriate for overall survival. Differences were deemed to be statistically significant when the *P* value was less than 0.05.

Results

The global caseloads of UGI cancer presenting to the regional MDTs were 251 and 355 patients for the years before and after centralisation, respectively. Table 1 shows the demographic details and treatment of the patients. There were 153 and 189 deaths at 1 year before and after centralisation, respectively. All patients were followed-up for at least 1 year or until death. The median follow-up for all patients and patients who remained alive was 9.8 and 23 months, respectively.

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