Improved patient outcomes have been correlated with high caseload hospitals for a multitude of conditions, including cancer. Using a variety of end points this is true for the treatment of brain tumours, breast cancer and particularly colorectal cancer. The most definitive evidence comes from a Cochrane meta-analysis of the treatment of colorectal cancer between high-volume/specialist hospitals and surgeons and low-volume/specialist hospitals and surgeons. Overall 5 year survival was significantly improved for patients with colorectal cancer treated in high-volume hospitals (hazard ratio = 0.90, 95% confidence interval 0.5–0.96). The volume outcome relationship was somewhat stronger for the individual surgeon than the hospital as the hazard ratio for high-volume versus low-volume surgeons was hazard ratio = 0.88, 95% confidence interval 0.83–0.93 [1].

Data previously published in the west of Scotland had shown that survival was significantly better in both colorectal cancer [2] and breast cancer [3] when patients were treated by high caseload surgeons. Surgeons with a high throughput may have better individual skills and as a consequence carry out a more thorough and technically demanding operation. A study from Finland has shown that surgeons with a high caseload dissect more lymph nodes from the axilla than surgeons with a low caseload (mean number of lymph nodes 11.2 versus 9.4; $P = \leq 0.001$) [4]. High caseload surgeons were also more likely to carry out breast conservation rather than mastectomy ($P = \leq 0.001$) and higher caseloads were related to better survival ($P = 0.031$) [5].

A high caseload may be a surrogate for more subtle factors other than just individual surgical skill. A study that examined the 7 year survival of patients with breast cancer in Quebec [6] showed a survival advantage for women treated in centres seeing more than 100 new cases of breast cancer per year. Survival was better among those treated in high case volume hospitals, but the significance of caseload disappeared when other factors that were associated with improved survival, such as teaching status, research activity and onsite radiotherapy, were taken into account.

There is far less in the literature about caseload volume and outcome after radiotherapy. External beam radiotherapy treatment for nasopharynx cancer is a technically demanding exercise. Therefore it is unsurprising that a group in Taiwan found that patients had a better 10 year survival when treated by physicians who treated more than 35 cases a year compared with those who treated less than 35 cases (75% versus 61%; $P = 0.01$) [7]. We could find no publications correlating caseload and outcome from brachytherapy. The Royal College of Radiologists has made the pragmatic decision that in order to maintain sufficient experience and expertise, the minimum throughput of patients treated by brachytherapy (all sites) in any one centre should be 50 cases a year. Currently, the minimum number of patients undergoing intrauterine insertion should be at least 10 per year. Individual clinicians should carry out or attend more than five insertions annually [8]. Although these limitations are pragmatic and would seem to be sensible, they are not backed by any published evidence.

There was some suspicion in the past that smaller centres had a worse outcome than larger (often tertiary) referral centres. The 5 year survival from large British centres was more reassuring results. Data listing outcome and complications are available from 1075 patients from 42 UK centres and outcome after radiotherapy. External beam radiotherapy treatment for nasopharynx cancer is a technically demanding exercise. Therefore it is unsurprising that a group in Taiwan found that patients had a better 10 year survival when treated by physicians who treated more than 35 cases a year compared with those who treated less than 35 cases (75% versus 61%; $P = 0.01$) [7]. We could find no publications correlating caseload and outcome from brachytherapy. The Royal College of Radiologists has made the pragmatic decision that in order to maintain sufficient experience and expertise, the minimum throughput of patients treated by brachytherapy (all sites) in any one centre should be 50 cases a year. Currently, the minimum number of patients undergoing intrauterine insertion should be at least 10 per year. Individual clinicians should carry out or attend more than five insertions annually [8]. Although these limitations are pragmatic and would seem to be sensible, they are not backed by any published evidence.

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radiotherapy or chemoradiotherapy [10]. The funnel plot is a scatter plot of data derived from multiple treating centres. In these plots the variable, which is treatment outcome, is plotted in the vertical axis and the number of patients treated in each centre on the horizontal axis. The 5 year cancer-specific survival is shown in Figure 1 and overall toxicity grades 1–4 in Figure 2. The number of centres that lay outside the 99.7% control limits for cancer-specific survival at 5 years was only two and for late toxicity three, indicating that the overwhelming majority of centres differed from each other by an order of magnitude no greater than chance. In this analysis, the median number of cases submitted was 17 (interquartile range 12–27). Thus, 50% of centres submitted no more than 17 cases and 25% no more than 12. Inevitably there is increased uncertainty in interpreting findings on the left side of funnel plots when numbers are small and control limits are wide. However, in this study only six centres submitted less than 10 cases, the number thought by some to reflect a cut-off below which numbers might be too small to detect difference in performance [11].

We are conscious that these data are 10–12 years old and are associated with all the problems of any large retrospective audit. However, there is a dearth of data relating to outcome and case volume in brachytherapy and especially gynaecological brachytherapy. The results of this study are important, especially when seen in the context of the overall results of the Royal College of Radiologists’ audit of outcome of cervical cancer between 2001 and 2002. The survival figures were only slightly inferior to those published by the International Federation of Gynecology and Oncology for patients treated between 1999 and 2001 [12]. In the International Federation of Gynecology and Oncology series, the 5 year survival for stage IIIb was 50.2% and 70.5% for stage IIb. UK figures in this audit were a cancer-specific 5 year survival of 48% (overall 5 year survival 44%) for stage IIIb and 68% in IIb (overall 5 year survival 61%).

Brachytherapy is an essential part of the treatment of cervical cancer and the funnel plot analysis suggests that the standard of care in the UK during this time period was remarkably uniform. However, there were missing data from 14 of 56 National Health Service radiotherapy units. A higher proportion of patients will be treated with chemoradiotherapy now compared with the time of the audit, especially in the larger centres [10]. Although survival is of real importance, so is the morbidity associated with treatment. Of note there is much lower toxicity seen in the cohort of patients treated in the largest treating centre in the UK. This may be in part due to the lower numbers of patients treated with concurrent chemotherapy at the time at the centre. It is important that specialist services, such as brachytherapy, are conducted with a team of well-trained nurses, medical physicists and radiographers, as well as an experienced clinician. This is increasingly important now with the move to image-guided brachytherapy and optimisation of treatment.

Owing to the lack of data with regards to patients treated and outcome after brachytherapy, another audit of treatment outcome is essential, especially as brachytherapy techniques have become more complex and technically demanding. Smaller centres do seem to have adopted contemporary techniques such as image-guided brachytherapy, which should reduce the chance of late toxicity. In 2011, Tan [13] sent a questionnaire to 45 UK centres offering cervix brachytherapy. Computed tomography- or magnetic resonance imaging-based image-guided brachytherapy for cervical cancer was offered by 32/43 (72%) of UK centres that replied to the questionnaire. The number of centres offering image-guided brachytherapy may well have increased since 2011 as others have adopted the technique more recently [13].

Fig 1. 5-Year cancer specific survival.
Commissioning arrangements are changing in the UK. It is possible that brachytherapy may just be given in a relatively few large centres. Patients may have to travel a considerable distance for brachytherapy. In view of this, such decisions need to be justified by evidence of superior outcome. However, what data that are available suggest that brachytherapy, at least for gynaecological cancer, can be given safely and effectively in smaller UK centres.

References


