Variation in histopathological assessment and association with surgical quality indicators following oesophagectomy: National survey of practice in England and Wales

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Keywords:

Esophageal; gastric; cancer; adenocarcinoma; ivor lewis; esophagogastrectomy; surgical quality

Background: Histopathological outcomes, such as lymph node yield and margin positivity, are used to benchmark and assess surgical centre quality, and are reported annually by the National Oesophago-Gastric Cancer Audit (NOGCA) in England and Wales. The variation in pathological specimen assessment and how this impacts on these outcomes is not known.

Methods: A survey of practice was circulated to all tertiary oesophago-gastric cancer centres across England and Wales. Questions captured demographic data, and data on how specimens were prepared and analysed. National performance data was retrieved from the NOGCA. Survey results were compared for tertiles for lymph node yield, circumferential, and longitudinal margins.

Results: An 87%(32/37) survey response rate, accounting for 93% of oesophagectomy volume in England and Wales, was achieved. Only 16%(5/32) units met or exceeded current guidelines on specimen preparation according to the Royal College of Pathology guidelines. There was high variation in how centres defined positive (R1) margins, and how margins and lymph nodes were assessed. Highest nodal yield centres were more likely to use systematic fat blocking, and re-examine specimens in cases of low initial yield. Systematic blocking of lesser curve fat resulted in significantly higher rates of patients with ≥15 lymph nodes (91.4% vs. 86.5%, p=0.027).

Conclusion: Preparation and histopathological assessment of specimens varies significantly across institutions. This challenges the validity of currently used surgical quality metrics for oesophageal and other tumours. National standardisation of surgical specimen pathological assessment is required to allow use of these measures as markers of surgical quality.

Lymph node yield[1-3] and rates of tumour-free (R0) resection margins[4, 5] are used as surrogate measures of treatment quality and benchmarking. The UK National Oesophago-Gastric Cancer Audit (NOGCA), a prospective database of all oesophago-gastric cancer resections in England and Wales, records the proportion of patients with 15 or more lymph nodes examined, and the proportion of patients with positive circumferential and longitudinal margins, as quality indicators.[6] These outcomes are influenced not only by the surgery itself, but also by histopathological specimen reporting.

Differences in the histopathological workup and assessment of specimens are known to affect outcomes such as nodal yield.[7, 8] The Royal College of Pathologists (RCPath) most recent (October 2019) guidelines recommend a number of techniques with reference to assessment of oesophageal specimens and margins.[9] However, the levels of adherence to these standards, and association with markers of oesophageal cancer treatment quality, are not known. A previous 2004 audit of pathology reporting for gastro-oesophagectomy specimens showed deficiencies in the completeness of dataset-recommended outcomes reporting but did not assess clinical practice itself.[10]

This study assesses current histopathological practice across England and Wales and considers the association between practices and treatment quality outcomes.

Methods

Survey questions regarding the preparation and assessment of specimens following oesophagectomy for cancer were developed by a project steering committee with reference to the RCPath Cancer Dataset[9] and the input of surgeons, pathologists, and qualitative researchers (see appendix). The survey questions captured demographic information and local practices for specimen handling across the care pathway, from intra-operative extraction through to the assessment of individual tissue blocks. To allow for intra-departmental variations in practice, respondents were asked to indicate the answer which best applied to the majority of oesophagectomy specimens dealt with by that institution. Free-text fields were available for all open-ended questions to capture any practices or variations not already presented as response options.

Following internal piloting and iterative refinement, the survey was circulated electronically to all oesophago-gastric units who had contributed eligible data to NOGCA, with two further weekly reminders, in May 2020. Institutions which had been absorbed or merged into other units since the

most recent NOGCA data publication, and as such no longer practiced oesophago-gastric surgery, were excluded.

Publicly available outcome data were retrieved from NOGCA.

Data were anonymised, collated and analysed in Microsoft Excel (Microsoft Corp, Redmond, WA). Institutions were divided into tertiles based on the three histological outcomes used by NOGCA: (1) percentage of patients with greater than 15 lymph nodes assessed, (2) percentage of positive longitudinal margins, and (3) percentage of positive circumferential margins according to the 2019 NOGCA report[11]; highest and lowest tertiles were compared for survey-reported practices. Non-parametric tests were conducted in SPSS (IBM Corp, Armonk, NY). A p-value of < 0.05 was considered significant.

Results

Survey responses were received from 32 of 37 units (87% response rate), accounting for 93% of all oesophagectomy case volume (3964 / 4257 patients between 2016 and 2018) in England and Wales as recorded in NOGCA.

Within each unit, the number of pathologists who routinely assessed oesophagectomy specimens varied from 2 to 8 (median 4), with a calculated mean annual volume of between 3.3 – 26 specimens (median 10.2) per pathologist.

Survey results are shown in table 1. While 88% of units performed the specimen dissection in the pathology lab, 12% (4/32) reported surgeons performing limited, partial or complete dissection in theatre prior to fixation. 9% (3/32) of units reported using additional fixative techniques to improve identification of lymph nodes. Assessment and cutting up of the specimen was performed by consultant pathologists in 47% (15/32) of units, with the remainder reporting that this was performed by trainees (28%, 9/32), biomedical scientists (6%, 2/32), or a combination of the above depending on availability (19%, 6/32).

Only 5/32 (16%) units met or exceeded all RCPath recommendations with regard to fixation times (minimum 24 hours), primary tumour assessment (minimum 4 blocks), proximal margin assessment (blocking of entire margin or donut), and local definition of positive margins (tumour ≤1mm of margin).

The definition and the assessment of margins varied greatly. -The current RCPath definition (a positive margin is defined as malignant cells at or within 1mm of the resection margin), was used in

only 9/32 (28%) units. In two cases, respondents acknowledged in their free-text comments that current guidelines differed to their own practice, but did not give any further explanation. Similarly, the number of tissue blocks assessed for each margin was variable, with the proximal margin, in particular, assessed in line with recommendations (i.e. blocking of the entire margin or donut) in only 20/32 (63%) of units.

The initial lymph node assessment varied between the assessment of palpable nodes only to partial blocking of fat to systematic blocking of fat tissue. In 53% (17/32) of units specimens were subsequently re-assessed with examination of further tissue blocks if a threshold minimum nodal count was not met. This locally set threshold was highly variable but most commonly set at the NOGCA reporting benchmark of 15 lymph nodes.

Comparing highest and lowest tertiles for lymph node counts (table 2), the highest tertile units were more likely to block most or all of the additional fat tissue, although this did not reach statistical significance (5/10 vs 1/10 for >5 blocks or all of lesser curve fat examined, p=0.051), and were significantly more likely to re-examine additional tissue in cases of low initial lymph node yield (5/6 vs 4/10, p=0.021).

No significant differences in practice were found between highest and lowest tertiles for longitudinal margins (table 3) or circumferential margins (table 4).

Units which blocked all, or >5 blocks, of lesser curve fat (i.e. left gastric artery and associated nodal tissues), reported significantly higher rates of patients with ≥15 lymph nodes (91.4% vs. 86.5%, p=0.027). This trend was not seen for greater curve fat (97.6% vs. 87.5%, p=0.068) or perioesophageal fat blocking (89.9% vs. 87.5%, p=0.472).

Discussion

This national survey of practice suggests that significant variation in the histopathological preparation and assessment of oesophagectomy specimens exists, and that the rate of adherence to national guidelines is low. Certain practices, such as routine specimen reassessment and systematic fat blocking, may increase nodal yield. This lack of standardisation in practice challenges the use of lymph node count as a national comparator and surrogate marker of surgical quality.

The RCPath recommendations[12], regarding the handling and assessment of specimens, aim to counteract the effects of fixation, (i.e. minimising tissue contraction by pinning the specimen to a backing or support), standardise practice (agreed margin definition), and maximise diagnostic

accuracy (prescribed minimum number of primary tumour blocks, blocking of entire proximal margin). Despite this, 83% of units' practice did not meet the minimum recommendations.

The assessment of the primary tumour showed reasonable agreement across respondents, with almost all units meeting or exceeding the recommended number of primary tumour blocks, and blocking the entire presumed tumour bed or scar when faced with potential complete response to neoadjuvant therapy. However, variation was high with reference to what definition respondents used for margin positivity. The previous RCPath definition, wherein tumour cells within <1mm of the resection margin is deemed R1, has been superseded by the October 2019 definition (≤1mm of margin), but continues to be used by a large majority of centres; a small minority (n=2) of centres use instead the American definition[13] of R1 being defined as tumour cells at the margin itself. Variability in the number of blocks taken for each margin increase the likelihood of variation in accuracy further.

Internationally, the definition of margin positivity continues to be a topic of debate. Whereas the RCPath definition originally derives from evidence in rectal cancer margins, other publications have suggested that in oesophagectomy, cells involving the margin directly (i.e. College of American Pathologists definition) are the most significant prognostic factor.[14, 15] It is anticipated that this may be addressed in the next iteration of TNM staging.

While lymph node yield is increasingly used as a marker of surgical and therapeutic quality in oesophago-gastric cancer, the evidence for this is mixed. A recent meta-analysis reported that increased nodal yields were associated with improved long-term oncological outcomes.[3] However, the quality of the included studies was variable and other studies have found no association.[16] In an assessment of learning curves in oesophagectomy, Markar et al reported on the long proficiency gain curve seen for lymph node yields in oesophagectomy, and suggested a potential link between nodal yield and expertise.[17]

However, it is clear that nodal counts are the result of more than just surgically intended radicality of lymphadectomy or technical skill, and are subject to myriad factors including disease stage, neoadjuvant therapy, specimen processing, and pathologist assessment. Benchmarking to a predefined threshold, furthermore, risks setting a target for identifying lymph nodes beyond which further counts are not felt necessary.

Increasing use of neoadjuvant therapies may cause regression or fibrosis of lymph node tissue, making them more difficult to palpate manually, and making this process increasingly susceptible to individual variations in skill and experience on the part of the clinician or technician charged with

dissecting the specimen. While we did not explicitly consider them in this study, one must consider whether other variables including lymphovascular invasion, final staging, or tumour regression, might be subject to similar variation. Whereas surgeons are subject to a minimum recommended annual case volume (in view of volume-outcome relationships), this is not currently the case for pathologists, where data are more limited. However, given the well established link between case volume or experience, and expertise, across numerous other specialties, it must be time for this to be considered. In one US study of 2,718 cancer specimens, review by a high-volume cancer specialist pathologist resulted in alterations to the non-specialist's initial report in 25% of cases, with significant changes that altered patient treatment in 6% of cases.[18]

Systematic fat blocking, the blocking of all fatty tissues for pathological assessment to capture small and impalpable nodes rather than only manually identified nodes, has been shown in a retrospective study by Hanna et al[8] to improve gastrectomy nodal yields by up to 15%, with significant differences between reporting pathologists. Greater impact of systematic fat blocking still was reported by Ni Mhaolcatha et al in their study of radical prostatectomy specimens, where a 70% increase in median nodal count was seen.[19] Other techniques, such as methylene blue and fat dissolution, have demonstrated similar positive effects in a meta-analysis by Abbassi-Ghadi et al.[7] Amongst the 10 units in the top tertile for achieving the NOGCA nodal count threshold, four used systematic fat blocking (compared to none in the lowest tertile), and five of the remaining six routinely re-examined specimens and blocked remaining fat if threshold count values were not met (compared to four of ten in the lowest tertile). This variation in practice has clear implications for the interpretation of nodal counts as a quality marker at a national level, and must be taken into consideration. Beyond this, the impact on potential patient outcomes or prognosis is less clear. Whereas some authors have found that lymph node ratio (number of positive lymph nodes : total lymph node count) is significantly associated with survival,[20] Abbassi-Ghadi et al's meta-analysis suggested that adjuvant pathological techniques to increase nodal yield may increase the number of total nodes assessed, but have no impact on final staging as these additional nodes are unlikely to contain metastatic disease.[7] This potentially calls into question the value of additional pathological workload to identify and analyse small, non-palpable nodes, if this is not of benefit to patients.

While this study represents a national assessment of practice in England and Wales with a high response rate, the detailed results may not be generalisable to other countries or settings. By capturing data at a unit level, we were unable to assess for individual patient outcomes, or account for intra-departmental variations such as individual surgeon or pathologist experience, case volume, or practices; survey responses represented majority unit practice. Furthermore, we did not have access to exact lymph node harvest yields, or rates of nodal positivity. This would have provided

greater insight into the effect of practices on nodal yields and relationship between higher yields and potential impact on staging and outcome, which other predictive models have shown to be significantly associated with survival.[21] The availability of only the binary outcomes for the RCPath cut-off of 15 or more lymph nodes means we were unable to fully quantify the effect of systematic fat blocking on absolute nodal yields. Further prospective or larger-scale study of the impact of differing specimen handling practices on histopathological outcomes and prognosis is required.

While we have captured the variations of practice which exist, the underlying reasons for these remain unclear. Anecdotally, some respondents raised concerns at the workload involved with additional techniques or tissue analysis, and expressed uncertainty at whether this would meaningfully impact patient treatment or outcomes. Some openly acknowledged that their unit's practice did not reflect current guidance (i.e. with reference to definition of positive margins), but did not elaborate on why.

In conclusion, this national survey of practice highlights the variation which exists in the handling and assessment of oesophagectomy specimens. Adjuvant histopathological techniques are likely to increase nodal yields, albeit at the expense of increased workload for pathology departments. NOGCA has helped drive a significant improvement in short term outcomes from oesophago-gastric cancer surgery, but it is widely recognised that we need valid markers with which to compare between regions or units for the quality or radicality of surgery. To enable this, standardised practice and reporting methods are mandatory. It is crucial that all stakeholders (pathologists, surgeons, specialist associations and other stakeholders) agree standardised methods, or that reporting and quality metrics are appropriately weighted to reflect practice and impact on outcome. In order to minimise variation it would seem logical that such quality-assured and validated performance indicators should be required of providers, to ensure not only the quality of care for patients with oesophgeal and gastric cancer, but other cancer groups as well.

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Table 1. Survey results. Criteria which meet or exceed RCPath recommendations in *italics*.

Specimen delivery and preparation	**Response n (%)**
Surgeon nodal dissection from specimen	
None / minimal (<5 dissected nodal specimens)	27 (88%)
Yes, limited dissection (<15 nodes)	1 (3%)
Yes, to AUGIS benchmark (15 nodes)	2 (6%)
Yes, near-complete / complete	1 (3%)
Further specimen assessment by pathologists?	
Yes	32 (100%)
When is the specimen opened prior to fixation?	
In theatre	6 (19%)
In pathology lab	18 (56%)
Not opened	8 (25%)
Is specimen pinned or sutured to backing prior to fixation?	
Yes	24 (75%)
No	8 (25%)
Are adjunctive fixative methods used?	
No (standard fixation)	29 (91%)
Davidson's fixative (selective use)	2 (6%)
Fat dissolution	1 (3%)
Duration of fixation prior to cutting up specimen?	
12-24 hrs (next day after surgery)	5 (16%)
24-48 hrs	22 (69%)
48-72 hrs	2 (6%)
>72 hrs	3 (9%)
Tissue blocking and slide preparation	
Who is responsible for cutting up specimen?	
Consultant pathologist	15 (47%)
Trainee pathologist	9 (28%)
Biomedical scientist or advanced practitioner	2 (6%)
Various	6 (19%)
How many sections or levels routinely prepared from each block?	
Single section	31 (97%)
4 or more sections	1 (3%)
How many blocks are taken for assessment of the primary tumour?	
2-3 representative blocks	1 (3%)
4 representative blocks	14 (44%)
5 or more blocks	17 (53%)
If no macroscopic disease or only scar remains (potential complete response to neoadjuvant therapy), how many blocks are taken?	
<5 blocks	0 (0%)
5 or more representative blocks	3 (9%)
Entire scar or presumed tumour bed blocked	29 (91%)
Assessment of margins	
How is a positive margin defined at your centre?	
Tumour cells on margin	2 (6%)
Tumour cells <1mm from margin	21 (66%)
Tumour cells at or less than 1mm from margin	9 (28%)
How many blocks are taken for the circumferential margin?	

1 representative block	3 (9%)
2-5 representative blocks	20 (63%)
6 or more representative blocks	7 (22%)
How many blocks are taken for the distal margin?	
1 representative block	16 (50%)
2 or more representative blocks	9 (28%)
Entire distal margin blocked	7 (22%)
How many blocks are taken for the proximal margin?	
1 representative block	9 (28%)
2 or more representative blocks	3 (9%)
Entire proximal margin (or entire donut) blocked	20 (63%)
When on initial sections, tumour is seen close to resection margin, are further sections taken?	
No, margin assessed based on prepared specimens	12 (38%)
Yes, further sections cut from tissue block to assess margin	20 (63%)
Assessment of lymph nodes	
Is peri-oesophageal fat tissue routinely blocked and examined?	
No, only identified lymph nodes blocked and examined	13 (41%)
Yes, 2-5 representative blocks	4 (13%)
Yes, >5 representative blocks	1 (3%)
Yes, all perioesophageal fat tissue blocked and examined	13 (41%)
Is greater curve fat tissue routinely blocked and examined?	
No, only identified lymph nodes blocked and examined	19 (59%)
Yes, 2-5 representative blocks	5 (16%)
Yes, >5 representative blocks	3 (9%)
Yes, all greater curve fat tissue blocked and examined	5 (16%)
Is lesser curve fat tissue routinely blocked and examined?	
No, only identified lymph nodes blocked and examined	18 (56%)
Yes, 2-5 representative blocks	5 (16%)
Yes, >5 representative blocks	3 (9%)
Yes, all lesser curve fat tissue blocked and examined	6 (19%)
Is further examination routinely undertaken if a minimum lymph node count is not achieved?	
No further examination routinely undertaken	10 (31%)
Re-examination for additional palpable nodes	5 (16%)
Re-examination for additional palpable nodes plus random fat sampling	10 (31%)
Re-examination with blocking of all remaining fat tissue	2 (6%)
Not applicable (all tissue already blocked)	5 (16%)
Threshold minimum node count for re-examination of specimen	
No threshold	12 (38%)
7 (TNM full staging minimum)	3 (9%)
10	1 (3%)
12	2 (6%)
15 (NOGCA benchmark)	6 (19%)
16	1 (3%)
18	1 (3%)
30	1 (3%)
Not applicable (all tissue already blocked)	5 (16%)

Table 2. Comparison of tertiles for % of patients with ≥15 nodes examined, median (range) or absolute values

	1st tertile	**3rd tertile**	**p**
% patients ≥15 nodes examined	70.8% (33.8 - 78.4%)	95.8% (90.7 - 100%)	
Annual volume / pathologist	9.8 (3.3 – 26.0)	11.2 (5.3 – 24.7)	0.631
Surgeon dissection ≥15 nodes	0/10	2/10	0.136
Fixation duration			0.654
12-24h	2/10	3/10	
24-48h	6/10	5/10	
48-72h	0/10	1/10	
>72h	2/10	1/10	
Cut up by consultant pathologist	5/10	4/10	0.653
Most (>5 blocks) or all perioesophageal fat blocked	5/10	5/10	1.000
Most (>5 blocks) or all greater curve fat blocked	1/10	4/10	0.121
Most (>5 blocks) or all lesser curve fat blocked	1/10	5/10	0.051
Routine re-examination if threshold count not met	4/10	5/6*	**0.021**

*3rd tertile includes 4 units which routinely process all tissue at initial workup, so no re-examination possible

Table 3. Comparison of tertiles for % positive longitudinal margin, median (range) or absolute values

	1st tertile	**3rd tertile**	**p**
% positive longitudinal margin	1.3% (0 – 2.2%)	5.9% (4.8 – 11.8%)	
Annual volume / pathologist	11.8 (5.3 – 24.7)	12.2 (6.0 – 17.0)	0.218
Fixation duration			0.721
12-24h	1/10	2/10	
24-48h	7/10	7/10	
48-72h	1/10	0/10	
>72h	1/10	1/10	
Cut up by consultant pathologist	6/10	4/10	0.371
Definition of positive margin			0.607
At margin	1/10	1/10	
<1mm	5/10	7/10	
1mm or less	4/10	2/10	
Entire distal margin blocked	3/10	4/10	0.639
Entire proximal margin blocked	7/10	6/10	0.639
Further sections if tumour close to margin	5/10	6/10	0.653

Table 4. Comparison of tertiles for % positive circumferential margin, median (range) or absolute values

	1st tertile	**3rd tertile**	**p**
% positive circumferential margin	14.7% (6.2 – 17.9%)	30.9% (29.5 – 44.2%)	
Annual volume / pathologist	9.0 (5.3 – 15.0)	12.7 (6.0 – 24.7)	0.315
Specimen opened in theatre	4/10	1/10	0.121
Fixation duration			0.627
12-24h	2/10	1/10	
24-48h	6/10	7/10	
48-72h	0/10	1/10	
>72h	2/10	1/10	
Cut up by consultant pathologist	6/10	4/10	0.371
Definition of positive margin			1.000
At margin	1/10	1/10	
<1mm	7/10	7/10	
1mm or less	2/10	2/10	
>5 blocks assessed for circumferential margin blocks	3/10	3/10	1.000
Further sections if tumour close to margin	6/10	6/10	1.000

Appendix 1. Survey questionnaire

1. Name (required)*

2. Email address (required)*

3. Hospital (required)*

4. How many consultant pathologists routinely deal with oesophagectomy specimens at your institution?*

Specimen delivery and fixation

5. Do surgeons dissect lymph nodes from the en bloc specimen prior to fixation?*

No / minimal (Specimen intact or <5 additional separate nodal specimens)

Yes, limited dissection (<15 nodes)

Yes, to AUGIS benchmark (15 nodes)

Yes, near-complete or complete dissection (> 15 nodes)

Other (please specify)

6. If your centre's surgeons dissect out the nodes prior to fixation, is further lymph node identification undertaken by pathologists?*

Yes, further lymph nodes are always identified and blocked for assessment by pathology

No, only nodes prepared by the surgeon are assessed

Not applicable (i.e. lymph node dissection by pathologists only)

Other (please specify)

7. When is the specimen opened prior to fixation?*

Opened in theatre (i.e. by surgical team)

Opened in pathology lab

Not opened

Other (please specify)

8. Is the specimen pinned out / sutured to a support / backing prior to being fixed?*

Yes

No

9. How long is the specimen fixed for after the time of surgery, prior to cut-up?*

12-24 hours (specimen cut up day after surgery)

24-48 hours

48-72 hours

>72 hours

10. Who is responsible for tissue sampling and preparation of tissue blocks?*

Trainee pathologist

Consultant pathologist

Other (e.g. technician or other, please specify)

11. How many sections or levels are routinely prepared from each tissue block?*

Single section / level

2-3 sections / levels

4 or more sections / levels

Assessment of margins

12. How is a positive margin defined in your centre?*

Tumour cells at the resection margin i.e. 'tumour on ink'

Tumour cells < 1mm from the resection margin

Tumour cells at 1mm or <1mm from the resection margin

Other (please specify)

13. Where there is no macroscopically visible disease or only a scar remains (i.e. potential complete response to neoadjuvant therapy), how many blocks are taken for assessment?*

1 representative block

2-3 representative blocks

4 representative blocks

5 or more representative blocks

Entire scar or presumed tumour bed blocked

14. Where on initial sections, tumour is seen close to a resection margin, are further sections taken?*

No, margin assessment based on specimens as prepared

Yes, further sections cut from tissue block to assess additional levels of margin

15. How many blocks are taken for assessment of the tumour itself (assuming macroscopically identifiable tumour)?*

1 representative block

2-3 representative blocks

4 representative blocks

5 or more representative blocks

16. How many blocks are taken for the circumferential resection margin?*

1 representative block

2-5 representative blocks

≥6 representative blocks

17. How many blocks are taken for the distal resection margin?*

1 representative block

≥2 representative blocks

Entire distal resection margin blocked

18. How many blocks are taken for the proximal resection margin?*

1 representative block

≥2 representative blocks

Entire proximal resection margin (or entire donut) blocked

<u>Lymph node assessment</u>

19. Are adjunctive methods for specimen preparation used to identify lymph nodes?*

No (standard fixation)

Fat dissolution

Other (please specify)

Threshold node count / Other comments

20. Is additional examination undertaken if a predefined minimum lymph node count is not achieved? (multiple answers possible)*

No further examination routinely undertaken (either not part of local practice or all additional tissue already processed)

Re-examination to sample additional palpable lymph nodes, only if requested by MDT

Re-examination to sample palpable lymph nodes plus random fat sampling, only if requested by MDT

Re-examination to sample entire remaining fat, only if requested by MDT

Re-examination to sample additional palpable lymph nodes routinely undertaken if initial node count LESS THAN (enter in comment box below)

Re-examination to sample palpable lymph nodes plus random fat sampling routinely undertaken if initial node count LESS THAN (enter in comment box below)

Re-examination to sample entire remaining fat routinely undertaken if initial node count LESS THAN (enter in comment box below)

21. Is additional perioesophageal fat tissue routinely blocked and examined?*

No, only lymph nodes examined

Yes, 1 representative block

Yes, 2-5 representative blocks

Yes, >5 representative blocks

Yes, all perioesophageal fat tissue blocked and examined

Other (please specify)

22. Is additional greater curve fat tissue routinely blocked and examined?*

No, only lymph nodes examined

Yes, 1 representative block

Yes, 2-5 representative blocks

Yes, >5 representative blocks

Yes, all greater curve / fundus fat tissue blocked and examined

Other (please specify)

23. Is additional lesser curve fat tissue routinely blocked and examined?*

No, only lymph nodes examined

Yes, 1 representative block

Yes, 2-5 representative blocks

Yes, >5 representative blocks

Yes, all lesser curve fat tissue blocked and examined

Other (please specify)