

Endometrial Cancer Audit Pilot

Treatment Report
Revised September 2026

About the NDRS

The National Disease Registration Service (NDRS) is part of NHS England. Its purpose is to collect, collate and analyse data on patients with cancer, congenital anomalies, and rare diseases. It provides robust surveillance to monitor and detect changes in health and disease in the population. NDRS is a vital resource that helps researchers, healthcare professionals and policy makers make decisions about NHS services and the treatments people receive.

The NDRS includes:

- the National Cancer Registration and Analysis Service (NCRAS) and
- the National Congenital Anomaly and Rare Disease Registration Service (NCARDRS)

Healthcare professionals, researchers and policy makers use data to better understand population health and disease. The data is provided by patients and collected by the NHS as part of their care and support. The NDRS uses the data to help:

- understand cancer, rare diseases, and congenital anomalies
- improve diagnosis
- plan NHS services
- improve treatment
- evaluate policy
- improve genetic counselling

This piece of work was done in partnership with the following organisations:



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Corrections: This revised version (V2) was released on 29 September 2026. In the previously published version, the geographical funnel plots presented expected percentages but incorrectly labelled them as risk-adjusted percentages. The additional calculation required to derive the risk-adjusted percentage (observed divided by expected, multiplied by the overall percentage) had not been applied. This version corrects the affected figures and now presents risk-adjusted percentages in Figures 4, 5, 8, 12, 13, 17, 18, 25 and 26.

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1. Introduction

Background

This Treatment Report is part of the Endometrial Cancer Audit Pilot (ECAP) and builds on the findings of the ECAP Baseline Profile Report, published in April 2025.

Full details of the ECAP, along with its publications and outputs, can be accessed online.¹

The ECAP is overseen by a Project Steering Group which comprises individuals from the National Disease Registration Service (NDRS), Health Data Insight (HDI), the British Gynaecological Cancer Society (BGCS), the British Association of Gynaecological Pathologists (BAGP) and representation from charities The Eve Appeal and Peaches Womb Cancer Trust. The project is funded by a collaboration of the BGCS and the charities.

This is the second report planned as part of the ECAP project, and focuses on developing an understanding of treatment utilisation for patients diagnosed with endometrial cancer in England and quantifying regional variation in clinical management. To do this, findings are shown based on routinely-collected cancer registration and linked treatment data (see Appendix 1 for full details of the data sources used).

This work uses data that has been provided by patients and collected by the NHS as part of their care and support. The data are collated, maintained and quality assured by the National Disease Registration Service, which is part of NHS England.

Treatment for endometrial cancer

Uterine cancer is the fourth most common cancer among females in the UK and the most common gynaecological cancer, with endometrial cancer being its most frequent type.²

Treatment modalities

Treatment for endometrial cancer includes surgery, radiotherapy, systemic anti-cancer therapy (SACT — hereafter referred to as ‘chemotherapy’, as this was the standard form until immunotherapy and targeted therapy entered routine commissioning in 2023), and hormone (endocrine) therapy.

Surgery is the mainstay of treatment and has evolved from open laparotomy to minimal access approaches (laparoscopy or robotics). Randomised controlled trials have shown equivalent oncological outcomes, with lower perioperative morbidity, for minimal access surgery compared to traditional laparotomy.³ Robotic surgery has become increasingly widespread in gynaecological cancer pathways over the past decade, with many centres transforming from laparoscopic to robotic surgery as the method of choice for endometrial cancer surgery. NHS gynaecological cancer commissioning guidelines recommend that “low risk” cases be managed in gynaecological cancer units, while “high risk” cases should be referred to specialist

¹ <https://digital.nhs.uk/ndrs/our-work/ncras-partnerships/endometrial-cancer-audit-pilot>

² Morrison, J., Balega, J., Buckley, L., Clamp, A., Crosbie, E., et al. (2022). British Gynaecological Cancer Society (BGCS) uterine cancer guidelines: Recommendations for practice. *European journal of obstetrics, gynecology, and reproductive biology*, 270, 50–89.

³ Galaal K, Donkers H, Bryant A, Lopes AD. Laparoscopy versus laparotomy for the management of early stage endometrial cancer. *Cochrane Database Syst Rev*. 2018;10:CD006655

gynaecological cancer centres.⁴ There are 40 specialist gynaecological cancer centres in England, operating within 20 Cancer Alliances; this list was collated specifically for the Ovarian Cancer Audit Feasibility Pilot (OCAFP).⁵ Other acute NHS trusts either provide diagnostic services only for gynaecological cancers or offer “unit level” surgery for low risk oncology cases including low grade endometrial cancer supported by local multidisciplinary teams and overseen by the regional specialist gynaecological cancer centre.

Surgery including hysterectomy is typically the primary treatment, and the majority of patients do not require any additional cancer treatment. Selected cases at higher risk of disease recurrence, based on stage, grade and other risk stratification factors are offered adjuvant therapy following surgery to reduce recurrence risk which is often radiotherapy and in some circumstances chemotherapy. Adjuvant radiotherapy following surgery is delivered as external beam radiotherapy (EBRT) to the pelvis, vaginal vault brachytherapy or a combination of both.

In advanced stage disease, neoadjuvant chemotherapy (NACT) prior to surgery as part of an interval (typically after 3 cycles of chemotherapy) or delayed (typically after 6 cycles) debulking approach may be used. Specifically, NACT followed by interval debulking surgery (IDS) may be an alternative treatment approach for selected patients with advanced stage endometrial cancer (stage 4) who are considered poor candidates for primary debulking surgery (PDS) either due to disease distribution/extent or patient factors.

Lymph node assessment and staging

Traditionally, FIGO has recommended use of lymphadenectomy alongside hysterectomy for staging to assess pelvic and para-aortic lymph node involvement.⁶ While it improves staging accuracy, evidence shows increased morbidity with no survival benefit.⁷ Sentinel lymph node assessment, associated with lower risk of surgical complications and long-term morbidity, has since been incorporated into clinical practice, though uptake across the UK is likely to be inconsistent. British Gynaecological Cancer Society guidelines published in 2019⁸ supported the routine use of sentinel lymph node assessment and implementation throughout cancer centres in England has likely increased dramatically since their publication.

Treatment pathways

Treatment options depend on cancer stage and grade, as well as patient fitness and preferences. Newer treatments, including immunotherapy, are beginning to change treatment options in advanced stage or recurrent disease. Molecular subtyping is also being adopted to guide therapy, as distinct subtypes have different risks of recurrence and treatment response. However, these developments are not covered in this report as they fall outside the timeframe of the current cohort and due to limited availability of genetic profiling data.

⁴ <https://www.england.nhs.uk/commissioning/spec-services/npc-crg/group-b/b03/>

⁵ <https://digital.nhs.uk/ndrs/our-work/ncras-partnerships/ovarian-cancer-feasibility-pilot>

⁶ Abu-Rustum NR, Zhou Q, Iasonos A, Alektiar KM, Leitao MM, et al. The Revised 2009 FIGO Staging System for Endometrial Cancer: Should the 1988 FIGO Stages IA and IB Be Altered?, *International Journal of Gynecological Cancer*, 2011 21:511-516

⁷ ASTEC study group, Kitchener H, Swart AM, Qian Q, Amos C, Parmar MK. Efficacy of systematic pelvic lymphadenectomy in endometrial cancer (MRC ASTEC trial): a randomised study [published correction appears in *Lancet*. 2009 May 23;373(9677):1764]. *Lancet*. 2009;373(9658):125-136.

⁸ British Gynaecological Cancer Society (BGCS). 2019. Sentinel Consensus Document for Vulval, Endometrial and Cervical Cancer BGCS, available from <https://www.bgcs.org.uk/sentinel-consensus-document-for-endometrial-and-cervical-cancer-bgcs/>

Variability in practice

Previous studies have reported low adherence to treatment guidelines and an association between adjuvant radiotherapy and survival, though these findings predate current clinical practice.⁹ Recent research highlights changes in surgical management, with geographic variation in the use of lymphadenectomy and adjuvant radiotherapy use, particularly for patients with advanced or recurrent disease.¹⁰

Considering the evolving changes of surgical practice with implementation of sentinel lymph node assessment and the uptake in robotic surgery, it is essential to consider the time of diagnosis of the analysis cohort when interpreting the findings of this audit pilot, with recognition that varied chronology of uptake of these technologies between NHS trusts will inevitably lead to regional variation in treatment pathways.

Variations in service configuration may also lead to regional differences in management pathways.

Project aims

The aims of this project were to explore the feasibility of (i) capturing distinct treatment modalities and (ii) exploring geographic variation in their application across England.

This report provides information on the following primary treatments for endometrial cancer:

1. Hysterectomy;
2. Nodal management using lymphadenectomy or sentinel node biopsy;
3. Chemotherapy, including as part of the interval debulking pathway for advanced stage endometrial cancer;
4. Radiotherapy (use of EBRT or brachytherapy);
5. Endocrine therapy.

Geographical variation is reported with adjustment for patient demographics and tumour characteristics likely to be associated with treatment options and decision-making.

Appendix 2 provides a glossary of the treatment terms used within the report.

⁹ Tilling K, Wolfe CD, Raju KS. (1998) Variations in the management and survival of women with endometrial cancer in south east England. *Eur J Gynaecol Oncol*. 19(1):64-8; Crawford S.C., De Caestecker L., Gillis C.R., Hole D., Davis J.A., et al. (2002). Staging quality is related to the survival of women with endometrial cancer: a Scottish population based study. Deficient surgical staging and omission of adjuvant radiotherapy is associated with poorer survival of women diagnosed with endometrial cancer in Scotland during 1996 and 1997. *Br J Cancer*. 17;86(12):1837-42.

¹⁰ Moss EL, Morgan G, Martin AP, Sarhanis P, Ind T. (2020). Surgical trends, outcomes and disparities in minimal invasive surgery for patients with endometrial cancer in England: a retrospective cohort study. *BMJ Open*. 16;10(9):e036222; Heffernan K., Nikitas F.S., Shukla U., Camejo H.S., Knott C., (2022). Previously treated recurrent or advanced endometrial cancer in England: A real-world observational analysis. *Gynecol Oncol*. 166(2):317-325; White B., Nordin A., Fry A., Ahmad A., McPhail S., et al. (2019). Geographic variation in the use of lymphadenectomy and external-beam radiotherapy for endometrial cancer: a cross-sectional analysis of population-based data. *BJOG*. 126(12):1456-1465.

2. Defining the cohort

Information is presented for women in England who were diagnosed with endometrial cancer between 2017 and 2019 (inclusive). This time period covers diagnoses in the years immediately before the Covid-19 pandemic, so treatment for women diagnosed in the second half of 2019 may have been impacted by the pandemic and any changes in access to treatments during that time. See Appendix 3 for full inclusion and exclusion criteria.

3. Cohort baseline characteristics

A total of 23,386 women were diagnosed with endometrial cancer in England from 2017 to 2019. The average (mean) age of women diagnosed was 67.0 years (median 68.0, IQR 59.0 – 75.0).

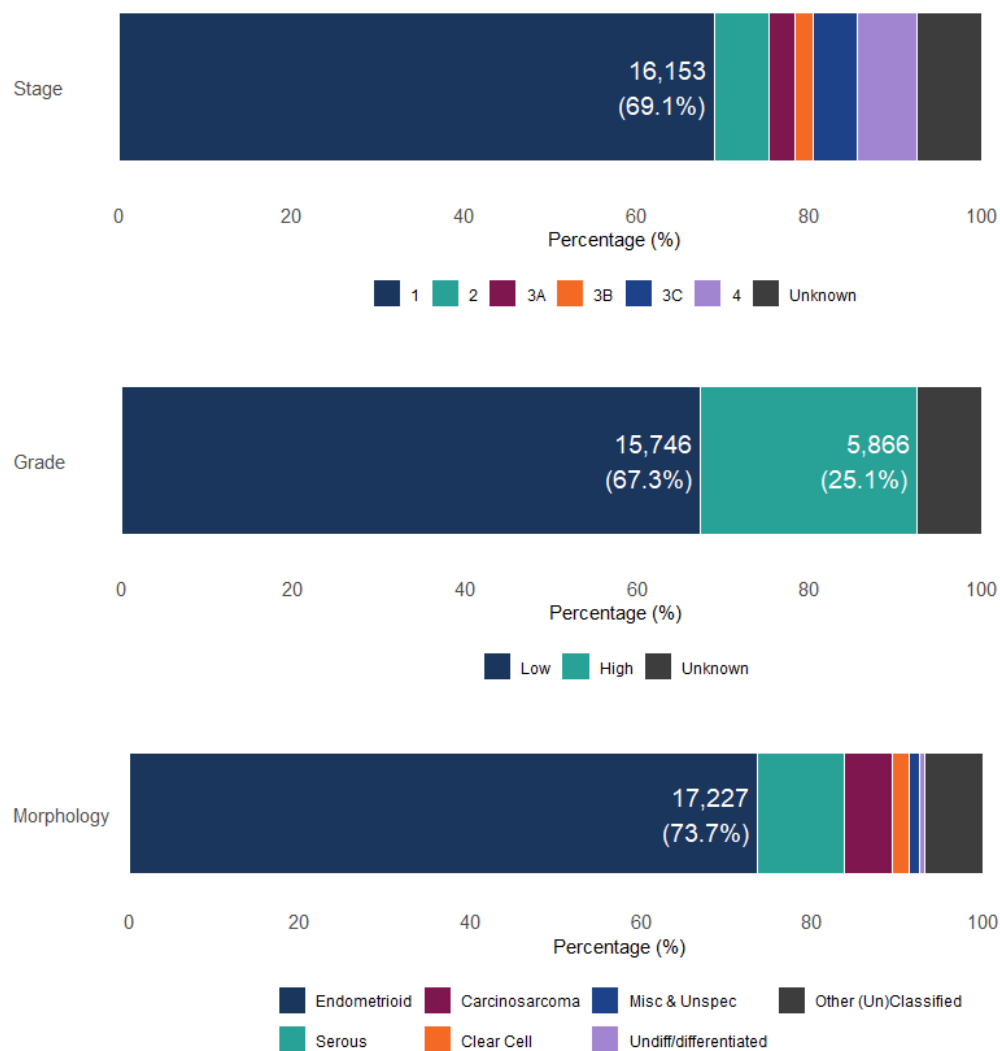
Figure 1 shows the distributions of patient characteristics at diagnosis. Over half of patients were aged 60 to 79 years at diagnosis. Availability of data on World Health Organization (WHO) performance status was poor with 49.8% of patients not having a status recorded. A majority (83.5%) of patients were defined as having no comorbidity. Charlson comorbidity score was derived from inpatient Hospital Episode Statistics (HES) data, identifying an inpatient treatment episode within the 27 to 3 months before the diagnosis of endometrial cancer. It should be recognised that this methodology does not capture comorbidity managed in primary care or specialist outpatient clinics and will therefore underestimate the degree of comorbidity of the study population.

Figure 2 shows the distributions of tumour characteristics at diagnosis. The majority of women were diagnosed with stage 1 cancer (69.1%), low grade tumours (defined where grade was recorded as low, 1 or 2; 67.3%) and endometrioid adenocarcinoma tumours (73.7%). Full details of the distributions presented in Figures 1 and 2 are provided in the accompanying Excel workbook (Table Baseline_Chars). Appendix 4 provides full information on how cancer stage was defined and Appendix 5 describes how each tumour morphology was defined.

Figure 1 : Distributions of patient characteristics at diagnosis (age, ethnic group, Charlson comorbidity score, WHO performance status) among women diagnosed with endometrial cancer from 2017 to 2019



Figure 2 : Distributions of tumour characteristics at diagnosis (stage, grade, morphology) among women diagnosed with endometrial cancer from 2017 to 2019



4. Surgical management of endometrial cancer

This section focuses on the surgical treatment of endometrial cancer. The percentage of women with a recorded hysterectomy is presented, along with a breakdown of the surgical approach — open surgery versus minimal access (laparoscopic or robotic) hysterectomy.

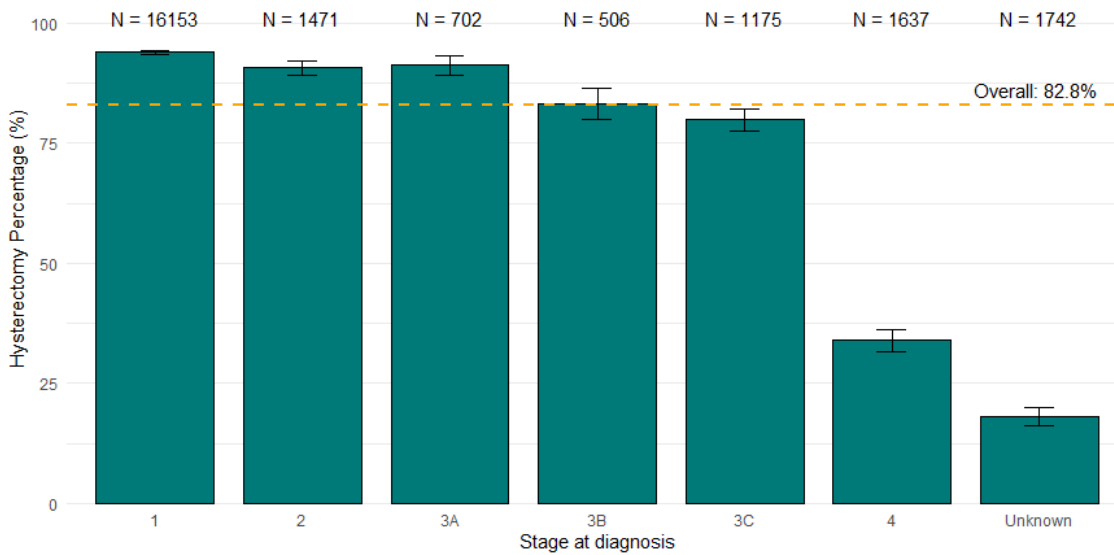
Among all women diagnosed with endometrial cancer in England from 2017 to 2019, 82.8% (N = 19,366) had a recorded hysterectomy. Factors associated with hysterectomy use, after adjustment for other factors, are shown in Table 1 below. We report global p-values for each factor, which assess whether including it in the model helped explain observed variation in the odds of receiving a hysterectomy, beyond what would be expected by chance.

Receipt of hysterectomy varied by patient and tumour characteristics at diagnosis, including age, Index of Multiple Deprivation (IMD), Charlson comorbidity score, ethnic group, stage (Figure 3), grade and morphology. Additionally, being diagnosed at a specialist gynaecological cancer centre was associated with increased odds of receiving a hysterectomy. These associations were identified using global p-values, from an adjusted logistic regression model, testing whether each factor as a whole was associated with the outcome after adjusting for all other factors. These results reflect adjusted associations and should not be interpreted as independent causal effects.

Commissioning and clinical guidelines recommend referral to specialist gynaecological cancer centres for high risk histology cases and cases with radiological staging above stage 1A. By analysing surgery rates based on trust of diagnosis we ensure that referral to a specialist centre does not distort the true rate of hysterectomies for women diagnosed within each geographical region. Without this approach, those areas without a specialist centre might appear to have low hysterectomy rates, because their higher-risk patients were referred elsewhere for surgery. Analysis using an adjusted logistic regression model indicated that women diagnosed at trusts housing a specialist gynaecological cancer centre had higher odds of receiving a hysterectomy, even after accounting for patient and tumour characteristics. This suggests possible real differences in the diagnostic and treatment pathways between specialist centres and other trusts in England, though a causal effect cannot be inferred from this observational analysis.

The authors suggest that the local data available on the CancerStats2 portal (within the ECAP section) are reviewed by cancer alliance gynaecological tumour site specific groups to assess if these differences exist within their geography, and use the data to understand which cohort of cases this may apply to (for example advanced stage or high risk histology cases) and how any inequity to surgery might be addressed.

Figure 3 : Use of hysterectomy among women diagnosed with endometrial cancer from 2017 to 2019, by stage at diagnosis



It is important to recognise that FIGO staging for endometrial cancer is principally based on surgery histology, and many patients who may appear to be stage 1 on imaging (with disease confined to the uterus) may be upstaged to FIGO Stage 3 on the basis of positive lymph node histology. Varying use of staging lymphadenectomy during surgery may therefore lead to variation between Cancer Alliances in the proportion of cases with advanced stage disease and may also lead to variation in the proportion of advanced stage cases undergoing surgery.

Table 1: Adjusted Associations Between Patient and Tumour Characteristics and Receipt of Hysterectomy

Factor	Descriptive Statistics		Adjusted Logistic Regression Model Results*		
	No hysterectomy N = 4,020 ¹	Hysterectomy N = 19,366 ¹	OR	95% CI	p-value**
Age group					<0.001
20-24	5 (63%)	3 (38%)	0.04	0.01, 0.17	
25-29	18 (47%)	20 (53%)	0.10	0.05, 0.23	
30-34	36 (32%)	75 (68%)	0.22	0.13, 0.37	
35-39	65 (27%)	175 (73%)	0.28	0.19, 0.41	
40-44	51 (15%)	292 (85%)	0.87	0.58, 1.33	
45-49	86 (12%)	654 (88%)	1.00	0.74, 1.37	
50-54	191 (10%)	1,636 (90%)	1.17	0.94, 1.46	
55-59	262 (8.9%)	2,683 (91%)	1.44	1.18, 1.75	
60-64	319 (9.7%)	2,981 (90%)	1.32	1.10, 1.59	
65-69	431 (12%)	3,165 (88%)	1.06	0.89, 1.26	
70-74	564 (15%)	3,324 (85%)	1.00	-	
75-79	539 (19%)	2,278 (81%)	0.80	0.67, 0.95	
80-84	613 (30%)	1,442 (70%)	0.40	0.34, 0.48	
85-89	537 (50%)	542 (50%)	0.17	0.14, 0.20	

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	Descriptive Statistics		Adjusted Logistic Regression Model Results*		
Factor	No hysterectomy N = 4,020 ¹	Hysterectomy N = 19,366 ¹	OR	95% CI	p-value**
90+	303 (76%)	96 (24%)	0.07	0.05, 0.09	
Deprivation (IMD quintile)					<0.001
1 - most deprived	805 (20%)	3,317 (80%)	1.00	—	
2	826 (18%)	3,726 (82%)	1.17	1.01, 1.36	
3	835 (17%)	4,105 (83%)	1.33	1.15, 1.55	
4	835 (17%)	4,111 (83%)	1.27	1.09, 1.47	
5 - least deprived	719 (15%)	4,107 (85%)	1.40	1.20, 1.63	
Charlson Comorbidity Score					<0.001
0	2,896 (15%)	16,625 (85%)	1.00	—	
1	411 (22%)	1,493 (78%)	0.68	0.58, 0.80	
2	289 (28%)	758 (72%)	0.53	0.44, 0.65	
3	185 (39%)	292 (61%)	0.39	0.30, 0.52	
4+	239 (55%)	198 (45%)	0.17	0.13, 0.22	
Ethnic group					<0.001
Asian	172 (16%)	935 (84%)	1.06	0.85, 1.33	
Black	154 (26%)	429 (74%)	0.82	0.63, 1.06	
Chinese	10 (13%)	65 (87%)	0.88	0.39, 2.23	
Mixed	18 (15%)	105 (85%)	0.93	0.49, 1.87	
White	3,318 (17%)	16,504 (83%)	1.00	—	
Other	48 (14%)	294 (86%)	1.15	0.78, 1.74	
Unknown	300 (22%)	1,034 (78%)	0.60	0.49, 0.73	
Stage at diagnosis					<0.001
1	989 (6.1%)	15,164 (94%)	1.00	—	
2	138 (9.4%)	1,333 (91%)	0.75	0.62, 0.92	
3A	62 (8.8%)	640 (91%)	0.77	0.58, 1.04	
3B	85 (17%)	421 (83%)	0.40	0.31, 0.53	
3C	237 (20%)	938 (80%)	0.23	0.19, 0.27	
4	1,082 (66%)	555 (34%)	0.03	0.02, 0.03	
Unknown	1,427 (82%)	315 (18%)	0.02	0.02, 0.03	
Tumour grade					<0.001
Low	1,782 (11%)	13,964 (89%)	1.00	—	
High	1,258 (21%)	4,608 (79%)	1.00	0.87, 1.16	
Unknown	980 (55%)	794 (45%)	0.36	0.30, 0.44	
Missing	0 (NA%)	0 (NA%)			
Morphology					<0.001
Endometrioid Adenocarcinoma	2,124 (12%)	15,103 (88%)	1.00	—	
Serous	575 (24%)	1,777 (76%)	1.49	1.25, 1.77	
Carcinosarcoma	284 (22%)	1,033 (78%)	1.96	1.58, 2.44	
Clear Cell	108 (24%)	350 (76%)	1.40	1.03, 1.91	
Miscellaneous and Unspecified	276 (91%)	28 (9.2%)	0.22	0.12, 0.37	

Endometrial Cancer Audit Pilot – Treatment Report (Version 2)

	Descriptive Statistics		Adjusted Logistic Regression Model Results*		
Factor	No hysterectomy N = 4,020 ¹	Hysterectomy N = 19,366 ¹	OR	95% CI	p-value**
Undifferentiated/differentiated Carcinoma	59 (44%)	75 (56%)	0.61	0.38, 0.98	
Other Classified & Unclassified Carcinoma	594 (37%)	1,000 (63%)	0.62	0.52, 0.74	
Diagnosed at a specialist gynaecological cancer centre	1,605 (16%)	8,229 (84%)	1.12	1.02, 1.23	0.022
¹ n (%) *Odds ratios are adjusted for all other factors presented in the table and represent conditional associations, not independent causal effects. **Global p-values are from Type II likelihood-ratio χ^2 tests, assessing whether each factor considered as a whole is associated with receipt of hysterectomy. Abbreviations: CI = Confidence Interval, OR = Odds Ratio					

Surgical management by geographical region

When comparing the use of treatments across geographical regions it is useful to adjust them by factors likely to be associated with treatment decision-making and likely to differ between regions to enable fairer comparisons.

The funnel plots in Figures 4 and 5 illustrate variation in hysterectomy use, with and without adjustment for the factors reported in Table 1, across Cancer Alliances and Integrated Care Boards (ICBs). Each point on the plots represents an individual Cancer Alliance or ICB. The horizontal axis shows the size of the underlying cancer population — defined as the number of women diagnosed with endometrial cancer from 2017 to 2019 within the respective geography — while the vertical axis displays the corresponding unadjusted or risk-adjusted hysterectomy percentage. See Appendix 6 for more information on the geographical groupings (Cancer Alliance or ICB) used in this report.

Overall, hysterectomy use across England showed relatively little variation with percentage use for most areas falling within the range expected given the size of their underlying cancer population. However, even after adjusting for factors influencing treatment decisions, one Cancer Alliance and two ICBs had hysterectomy rates more than three standard deviations below the national average, although one of the two ICBs was geographically nested within the Cancer Alliance. Conversely, three Cancer Alliances and two ICBs (also geographically nested within the Cancer Alliances) had hysterectomy rates more than three standard deviations above the national average.

Figure 4 : Use of hysterectomy by Cancer Alliance at diagnosis, unadjusted and risk-adjusted percentages

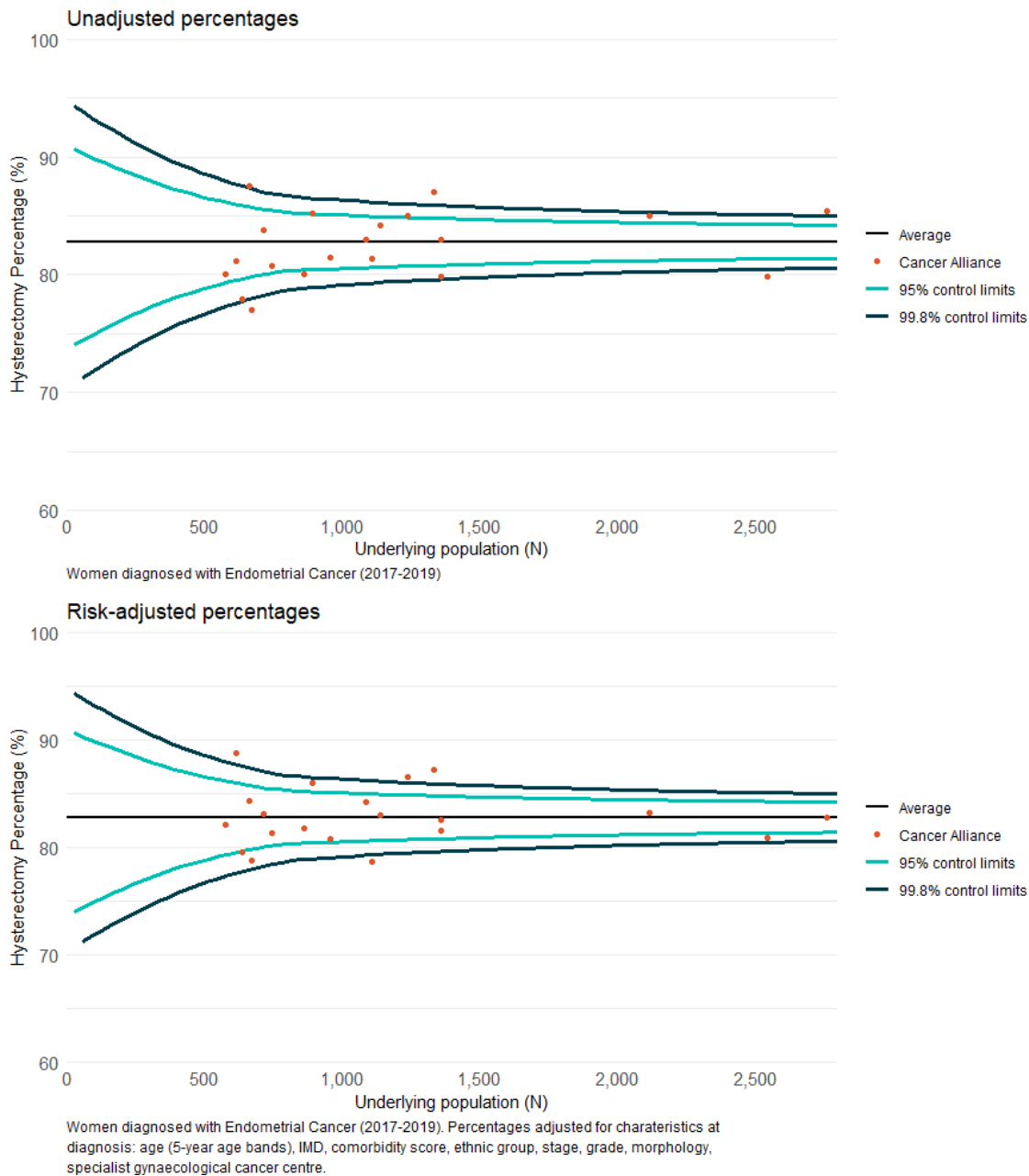
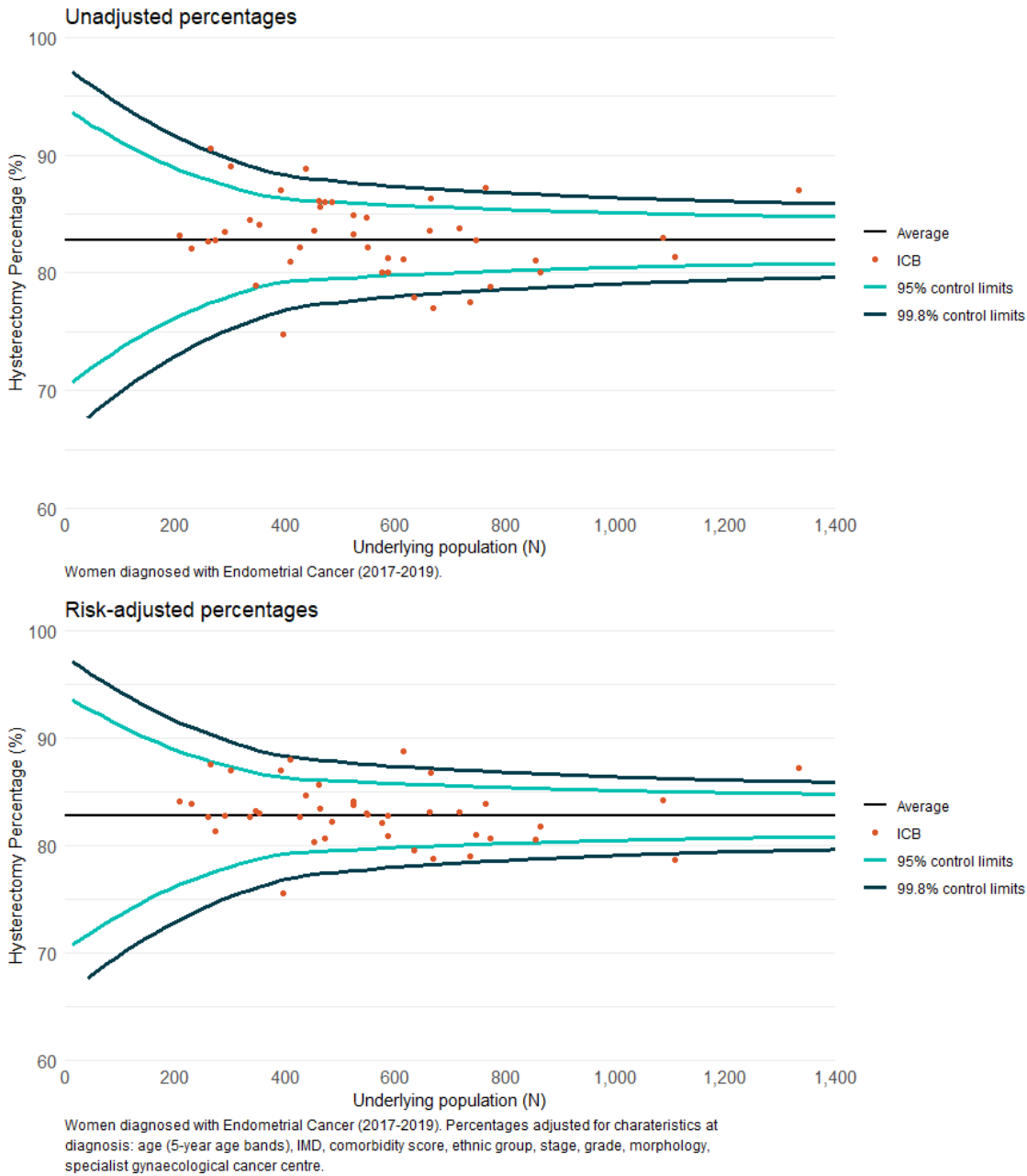


Figure 5 : Use of hysterectomy by Integrated Care Board at diagnosis, unadjusted and risk-adjusted percentages

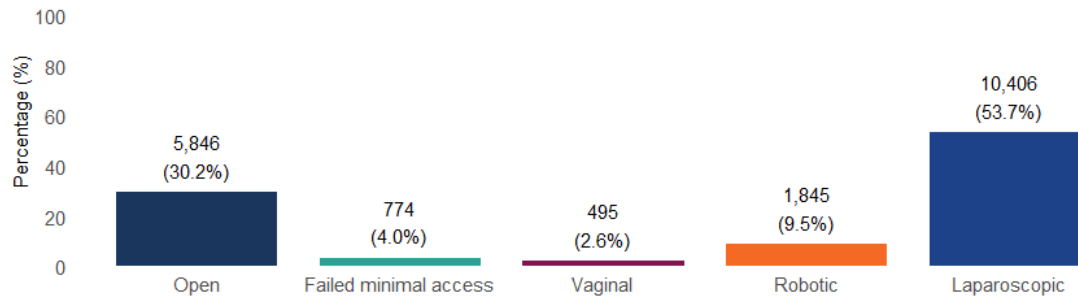


The unadjusted and risk-adjusted percentages and 95% confidence intervals presented in Figures 4 and 5 are provided in the accompanying Excel workbook (Tables CAL_Surg and ICB_Surg).

Type of hysterectomy

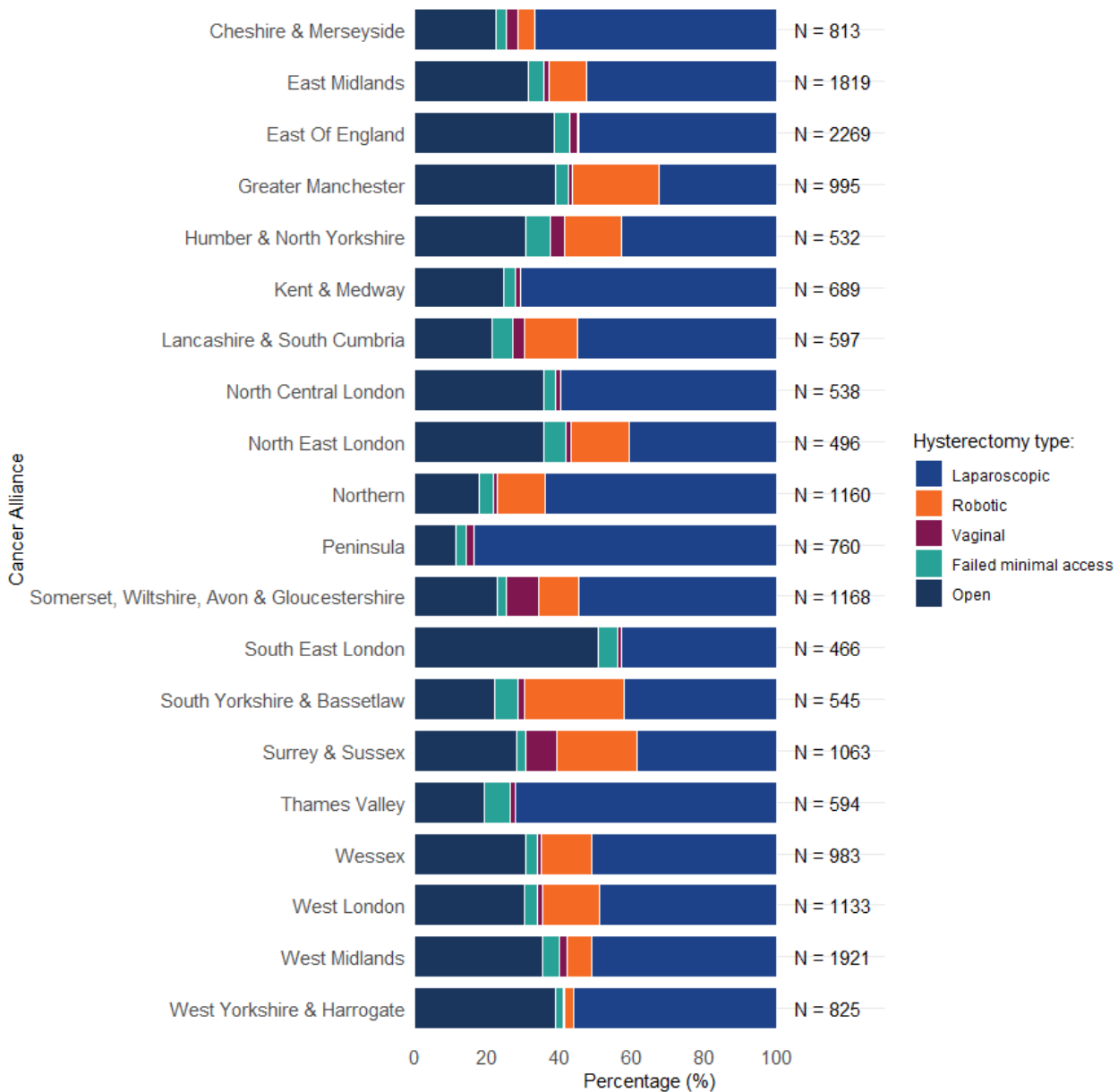
Among women with a recorded hysterectomy, 65.8% (N = 12,746) underwent minimal access surgery (vaginal, robotic or laparoscopic; Figure 6), with the most common being minimal access surgery using a laparoscopic approach (53.7%; N = 10,406).

Figure 6 : Distribution of surgical approach among women diagnosed with endometrial cancer from 2017 to 2019 with a recorded hysterectomy



Variation in the type of procedure used was observed by tumour characteristics - such as stage and grade at diagnosis - as well as by the geographical region where the surgery was performed (Figure 7). The percentages presented in Figure 7 are provided in the accompanying Excel workbook (Table CAL_Surg_Type).

Figure 7 : Distribution of hysterectomy type among women diagnosed with endometrial cancer from 2017 to 2019, who received a hysterectomy, by Cancer Alliance where surgery was performed



The standard of care for endometrial cancer hysterectomy has been by a minimal access route for more than a decade, although the suitability of women to undergo minimal access surgery may be restricted by factors such as large uterine fibroids and some comorbidities.

Laparoscopic hysterectomy has been replaced by robotic hysterectomy as the preferred minimal access modality as access to robotic surgery has emerged in gynaecological cancer centres and units. Access to robotics was sporadic but increasing around England during 2017-2019.

The authors suggest that the most important parameter for comparison is the proportion of cases undergoing open hysterectomy, performed by open laparotomy as opposed to the minimal access routes. The funnel plots in Figure 8 illustrate variation in use of minimal access

surgery, with and without adjustment for the factors reported in Table 2, across Cancer Alliances. The percentages presented in Figure 8 are provided in the accompanying Excel workbook (Table CAL_MA_Surg).

Table 2: Adjusted Associations Between Patient and Tumour Characteristics and Receipt of Minimal Access Surgery

	Descriptive Statistics		Adjusted Logistic Regression Model Results*		
Factor	Open N = 6,620 ¹	Minimal access N = 12,746 ¹	OR	95% CI	p-value**
Age group					<0.001
20-24	1 (33%)	2 (67%)	1.11	0.10, 25.3	
25-29	8 (40%)	12 (60%)	0.61	0.25, 1.57	
30-34	32 (43%)	43 (57%)	0.62	0.38, 1.00	
35-39	75 (43%)	100 (57%)	0.61	0.44, 0.84	
40-44	122 (42%)	170 (58%)	0.66	0.51, 0.85	
45-49	309 (47%)	345 (53%)	0.50	0.42, 0.59	
50-54	675 (41%)	961 (59%)	0.65	0.57, 0.73	
55-59	929 (35%)	1,754 (65%)	0.86	0.77, 0.96	
60-64	1,004 (34%)	1,977 (66%)	0.91	0.82, 1.02	
65-69	988 (31%)	2,177 (69%)	1.04	0.93, 1.16	
70-74	1,079 (32%)	2,245 (68%)	1.00	—	
75-79	739 (32%)	1,539 (68%)	1.05	0.94, 1.19	
80-84	449 (31%)	993 (69%)	1.13	0.99, 1.30	
85-89	175 (32%)	367 (68%)	1.05	0.86, 1.28	
90+	35 (36%)	61 (64%)	0.88	0.58, 1.38	
Deprivation (IMD quintile)					0.117
1 - most deprived	1,206 (36%)	2,111 (64%)	1.00	—	
2	1,365 (37%)	2,361 (63%)	0.97	0.88, 1.07	
3	1,363 (33%)	2,742 (67%)	1.08	0.97, 1.19	
4	1,327 (32%)	2,784 (68%)	1.08	0.98, 1.20	
5 - least deprived	1,359 (33%)	2,748 (67%)	1.03	0.93, 1.13	
Charlson Comorbidity Score					0.024
0	5,641 (34%)	10,984 (66%)	1.00	—	
1	536 (36%)	957 (64%)	0.87	0.78, 0.98	
2	279 (37%)	479 (63%)	0.83	0.71, 0.97	
3	98 (34%)	194 (66%)	0.88	0.68, 1.13	
4+	66 (33%)	132 (67%)	0.90	0.66, 1.23	
Ethnic group					<0.001
Asian	361 (39%)	574 (61%)	0.85	0.73, 0.98	
Black	254 (59%)	175 (41%)	0.43	0.35, 0.53	
Chinese	33 (51%)	32 (49%)	0.55	0.33, 0.91	
Mixed	50 (48%)	55 (52%)	0.63	0.42, 0.95	
White	5,372 (33%)	11,132 (67%)	1.00	—	
Other	126 (43%)	168 (57%)	0.69	0.54, 0.88	
Unknown	424 (41%)	610 (59%)	0.65	0.57, 0.74	

	Descriptive Statistics		Adjusted Logistic Regression Model Results*		
Factor	Open N = 6,620 ¹	Minimal access N = 12,746 ¹	OR	95% CI	p-value**
Stage at diagnosis					<0.001
1	4,517 (30%)	10,647 (70%)	1.00	—	
2	527 (40%)	806 (60%)	0.65	0.58, 0.73	
3A	308 (48%)	332 (52%)	0.46	0.39, 0.55	
3B	204 (48%)	217 (52%)	0.44	0.36, 0.54	
3C	502 (54%)	436 (46%)	0.39	0.33, 0.44	
4	425 (77%)	130 (23%)	0.14	0.11, 0.17	
Unknown	137 (43%)	178 (57%)	0.60	0.48, 0.76	
Tumour grade					<0.001
Low	4,373 (31%)	9,591 (69%)	1.00	—	
High	1,869 (41%)	2,739 (59%)	0.91	0.82, 1.00	
Unknown	378 (48%)	416 (52%)	0.72	0.60, 0.85	
Morphology					<0.001
Endometrioid Adenocarcinoma	4,759 (32%)	10,344 (68%)	1.00	—	
Serous	758 (43%)	1,019 (57%)	0.85	0.74, 0.97	
Carcinosarcoma	525 (51%)	508 (49%)	0.59	0.51, 0.70	
Clear Cell	136 (39%)	214 (61%)	0.93	0.73, 1.19	
Miscellaneous and Unspecified	17 (61%)	11 (39%)	0.41	0.18, 0.90	
Undifferentiated/differentiated Carcinoma	48 (64%)	27 (36%)	0.36	0.21, 0.58	
Other Classified & Unclassified Carcinoma	377 (38%)	623 (62%)	0.86	0.74, 0.99	
Surgery undertaken at a specialist gynaecological cancer centre	4,098 (33%)	8,182 (67%)	1.43	1.33, 1.53	<0.001

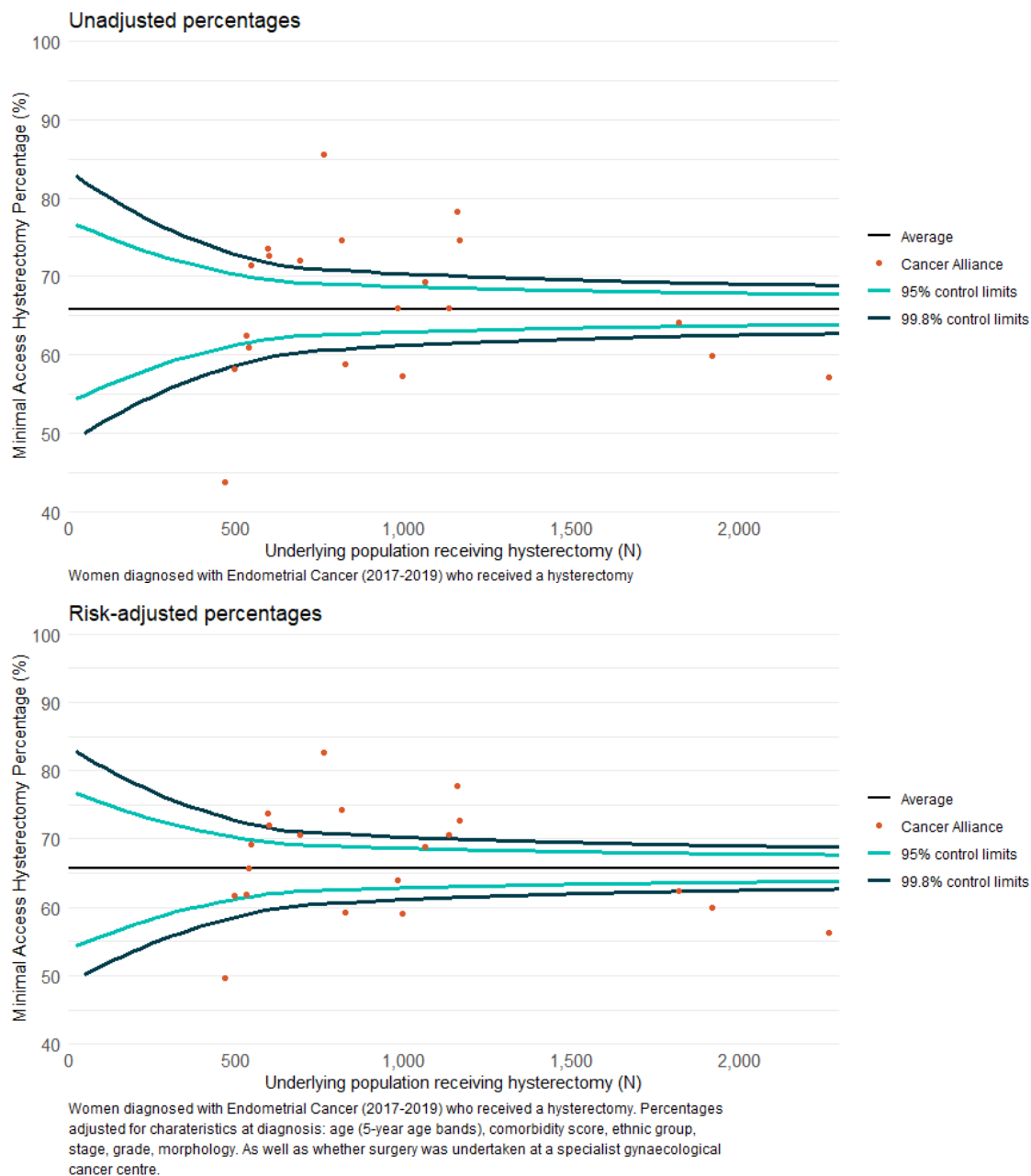
¹n (%)

*Odds ratios are adjusted for all other factors presented in the table and represent conditional associations, not independent causal effects.

**Global p-values are from Type II likelihood-ratio χ^2 tests, assessing whether each factor considered as a whole is associated with receipt of minimal access surgery.

Abbreviations: CI = Confidence Interval, OR = Odds Ratio

Figure 8 : Use of minimal access surgery among women who received a hysterectomy, by Cancer Alliance where surgery was performed, unadjusted and risk-adjusted percentages



Overall, there was marked variation in the use of minimal access surgery across England (Figure 8). Whilst some of the variation in rates was reduced after adjusting for the patient and tumour factors presented in Table 2 that were associated with the use of minimal access compared with open surgery, the funnel plot above demonstrates genuine variation across the country with five Cancer Alliances showing adjusted rates of minimal access surgery more than three standard deviations below the national average and seven more than three standard deviations above the national average.

It should be noted that these data reflect surgery for endometrial cancer cases diagnosed in 2017-2019. Since 2019 robotic surgery has been extended to most gynaecological oncology centres and many unit-level services, and although this has likely been associated with a decline in laparoscopic surgery it is likely that future analysis of more contemporaneous data will show increased rates of minimal access surgery in England. Notwithstanding, ongoing audit of

minimal access surgery is important to ascertain whether the geographical variation demonstrated in this report has been addressed. Table 3 below provides the unadjusted and risk-adjusted percentages plotted in the funnel plots above.

Table 3: Unadjusted and risk-adjusted percentages of minimal access surgery among women diagnosed with endometrial cancer (2017-2019) who received a hysterectomy, by Cancer Alliance where surgery was performed

Cancer Alliance of surgery	Numerator	Denominator	Crude percentage receiving minimal access surgery (95% CI)	Risk-adjusted percentage receiving minimal access surgery
Cheshire & Merseyside	606	813	74.5% (71.5% - 77.5%)	74.3%
East Midlands	1,166	1,819	64.1% (61.9% - 66.3%)	62.4%
East Of England	1,297	2,269	57.2% (55.1% - 59.2%)	56.2%
Greater Manchester	570	995	57.3% (54.2% - 60.4%)	59.1%
Humber & North Yorkshire	332	532	62.4% (58.3% - 66.5%)	61.8%
Kent & Medway	496	689	72.0% (68.6% - 75.3%)	70.5%
Lancashire & South Cumbria	434	597	72.7% (69.1% - 76.3%)	72.1%
North Central London	328	538	61.0% (56.8% - 65.1%)	65.8%
North East London	289	496	58.3% (53.9% - 62.6%)	61.6%
Northern	907	1,160	78.2% (75.8% - 80.6%)	77.8%
Peninsula	650	760	85.5% (83.0% - 88.0%)	82.7%
Somerset, Wiltshire, Avon & Gloucestershire	872	1,168	74.7% (72.2% - 77.2%)	72.8%
South East London	204	466	43.8% (39.3% - 48.3%)	49.5%
South Yorkshire & Bassetlaw	389	545	71.4% (67.6% - 75.2%)	69.2%
Surrey & Sussex	736	1,063	69.2% (66.5% - 72.0%)	68.9%
Thames Valley	437	594	73.6% (70.0% - 77.1%)	73.8%
Wessex	649	983	66.0% (63.1% - 69.0%)	63.9%
West London	748	1,133	66.0% (63.3% - 68.8%)	70.6%
West Midlands	1,151	1,921	59.9% (57.7% - 62.1%)	59.9%
West Yorkshire & Harrogate	485	825	58.8% (55.4% - 62.1%)	59.3%

CI = confidence interval; Risk-adjusted percentages from logistic regression models including characteristics at diagnosis: age (5-year age bands), comorbidity score, ethnic group, stage, grade, morphology. As well as whether surgery was undertaken at a specialist gynaecological cancer centre.

5. Management of lymph nodes

This section examines the management of lymph nodes through either lymphadenectomy or sentinel node excision biopsy, both of which are used to assess lymph node involvement and aid in staging the cancer.

Lymphadenectomy was identified using OPCS codes for block dissections (T85.4, T85.6, T85.8) and sampling procedures (T86.6, T86.8, T86.9). Sentinel node biopsy was identified using excision or biopsy codes (T87.5, T87.8, T87.9). In addition, codes indicating pelvic (O14.1), sentinel lymph (O14.2), and para-aortic (Z61.5) nodes were also examined. Recording of these codes was examined in routine hospital data and the treatment table of the National Cancer Registration Dataset (NCRD).

The use of each of these code groupings is described among women with a recorded hysterectomy (Figure 9) who were diagnosed up to 2022, to see if there had been any change in the recording of the OPCS codes.

Among all women diagnosed with endometrial cancer in England from 2017 to 2019 who had a hysterectomy recorded, 24.9% (N = 4,815) had at least one of the above OPCS codes recorded in the routine hospital data. This was slightly higher for women diagnosed more recently from 2020 to 2022, at 28.1% (N = 5,318).

Looking at changes over time (Figure 9) there was increased recording of excision/biopsy codes, pelvic node codes and sentinel lymph node codes, with decreased recording of block dissection codes. Sampling codes remained relatively stable over the period (2017-22).

There was also variation in recording levels across England (Figure 10; see Excel workbook Table LN_OPCS for full details).

Figure 9 : Lymph node procedure OPCS code recording among women diagnosed from 2017 to 2022 with a recorded hysterectomy

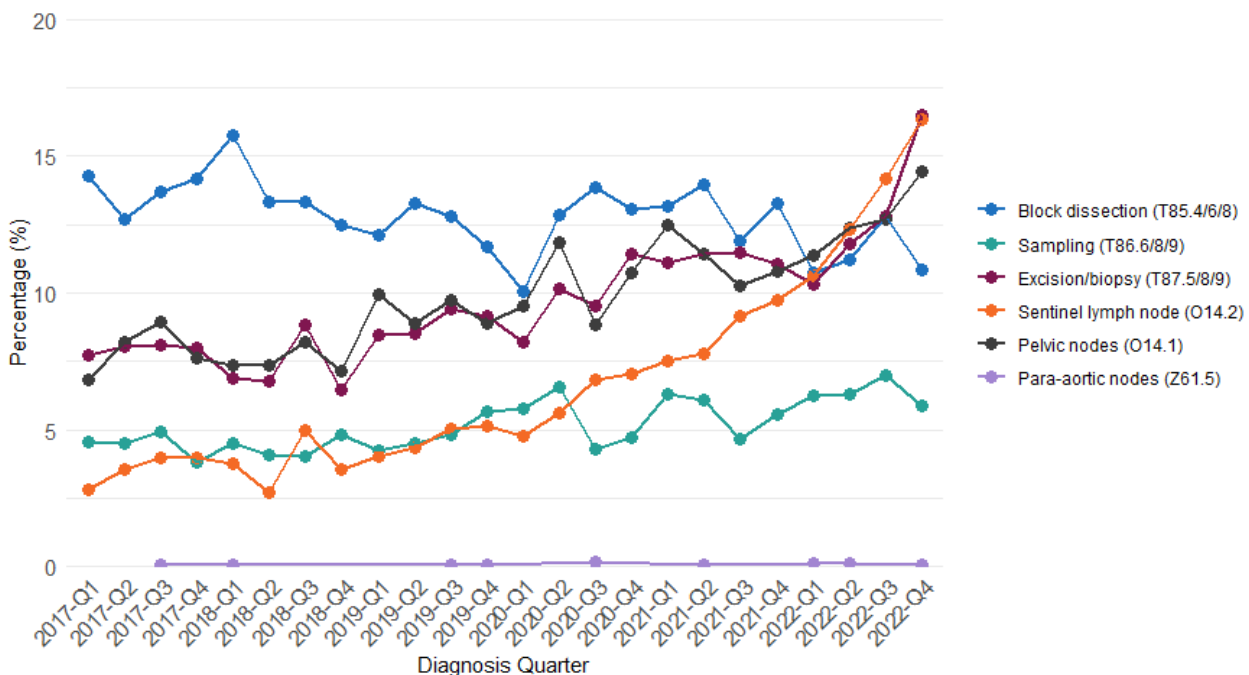
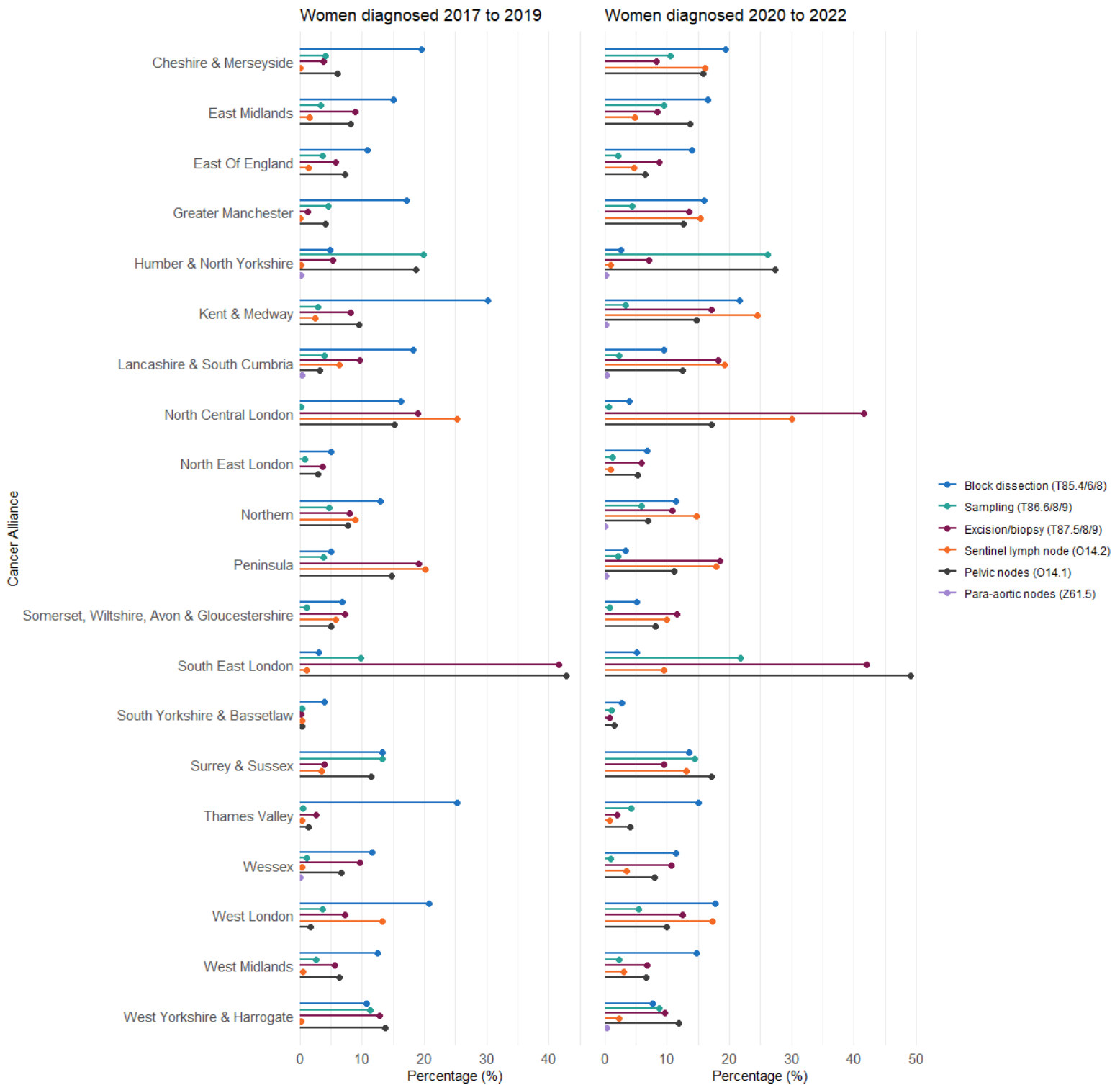


Figure 10 : Lymph node procedure OPCS code recording among women diagnosed from 2017 to 2022 with a recorded hysterectomy, by Cancer Alliance at diagnosis, split by diagnosis years



A previous analysis of the use of lymphadenectomy in uterine cancer in England among women diagnosed from 2013 to 2016, published in 2019, showed marked variation in the use of lymphadenectomy between cancer networks, with a similar degree of variation in practice between Cancer Alliances to that demonstrated by the analysis of women diagnosed between 2017 and 2022 described above.¹¹

In January 2019 the BGCS published a consensus statement on the use of sentinel lymph node assessment in gynaecological cancers.¹² The implementation of routine sentinel lymph node assessment in endometrial cancer has progressed rapidly since that time, but analysis of cases diagnosed from 2017 to 2019 shows that this procedure was only utilised in less than 5% of cases (Figure 9). The rate had increased to over 15% of hysterectomies for endometrial cancer by the end of 2022 (Figure 9).

¹¹ White B., Nordin A., Fry A., Ahmad A., McPhail S., et al. (2019). Geographic variation in the use of lymphadenectomy and external-beam radiotherapy for endometrial cancer: a cross-sectional analysis of population-based data. *BJOG*. 126(12):1456-1465.

¹² British Gynaecological Cancer Society (BGCS). 2019. Sentinel Consensus Document for Vulval, Endometrial and Cervical Cancer BGCS, available from <https://www.bgcs.org.uk/sentinel-consensus-document-for-endometrial-and-cervical-cancer-bgcs/>

6. Chemotherapy

This section examines the use of chemotherapy in the treatment of endometrial cancer, with further analysis of its use in different surgical settings, specifically as adjuvant treatment following surgery and in the context of neoadjuvant chemotherapy prior to interval debulking surgery (IDS).

Among all women diagnosed with endometrial cancer in England from 2017 to 2019, 15.9% (N = 3,715) had chemotherapy recorded. Factors associated with chemotherapy use, after adjustment for other factors, are shown in Table 4 below. We report global p-values for each factor, which assess whether including it in the model helped explain observed variation in the odds of receiving chemotherapy, beyond what would be expected by chance.

Receipt of chemotherapy varied by patient and tumour characteristics at diagnosis, including age, IMD, Charlson comorbidity score, ethnic group, stage (Figure 11), grade and morphology. These associations were identified using global p-values, from an adjusted logistic regression model, testing whether each factor as a whole was associated with the outcome after adjusting for all other factors. These results reflect adjusted associations and should not be interpreted as independent causal effects.

Figure 11 : Use of chemotherapy among women diagnosed with endometrial cancer from 2017 to 2019, by stage at diagnosis

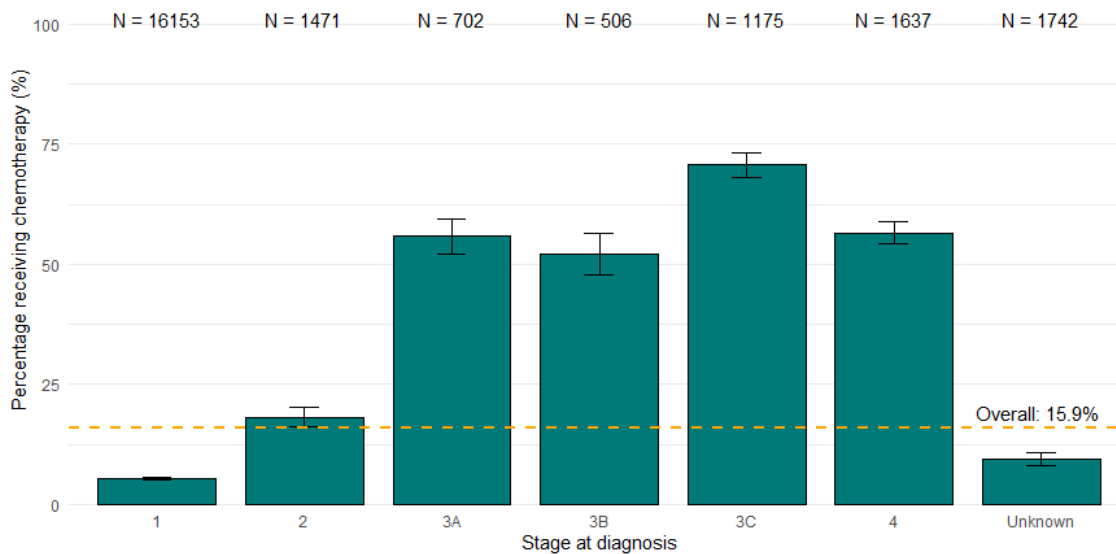


Table 4: Adjusted Associations Between Patient and Tumour Characteristics and Receipt of Chemotherapy

	Descriptive Statistics		Adjusted Logistic Regression Model Results*		
Factor	No chemotherapy N = 19,671 ¹	Chemotherapy N = 3,715 ¹	OR	95% CI	p-value**
Age group					<0.001
20-24	7 (88%)	1 (13%)	0.57	0.01, 8.91	
25-29	34 (89%)	4 (11%)	0.97	0.24, 3.09	
30-34	98 (88%)	13 (12%)	1.70	0.80, 3.30	
35-39	211 (88%)	29 (12%)	1.60	0.98, 2.53	
40-44	290 (85%)	53 (15%)	1.70	1.15, 2.47	
45-49	614 (83%)	126 (17%)	1.84	1.40, 2.41	
50-54	1,532 (84%)	295 (16%)	1.53	1.26, 1.87	
55-59	2,492 (85%)	453 (15%)	1.39	1.17, 1.65	
60-64	2,792 (85%)	508 (15%)	1.05	0.89, 1.24	
65-69	2,926 (81%)	670 (19%)	1.13	0.97, 1.33	
70-74	3,119 (80%)	769 (20%)	1.00	—	
75-79	2,286 (81%)	531 (19%)	0.66	0.56, 0.78	
80-84	1,851 (90%)	204 (9.9%)	0.19	0.16, 0.24	
85-89	1,030 (95%)	49 (4.5%)	0.07	0.05, 0.10	
90+	389 (97%)	10 (2.5%)	0.05	0.02, 0.09	
Deprivation (IMD quintile)					0.015
1 - most deprived	3,504 (85%)	618 (15%)	1.00	—	
2	3,770 (83%)	782 (17%)	1.15	0.98, 1.34	
3	4,158 (84%)	782 (16%)	1.16	0.99, 1.35	
4	4,159 (84%)	787 (16%)	1.15	0.99, 1.35	
5 - least deprived	4,080 (85%)	746 (15%)	1.32	1.13, 1.54	
Charlson Comorbidity Score					<0.001
0	16,268 (83%)	3,253 (17%)	1.00	—	
1	1,628 (86%)	276 (14%)	0.85	0.71, 1.02	
2	921 (88%)	126 (12%)	0.81	0.63, 1.03	
3	439 (92%)	38 (8.0%)	0.41	0.27, 0.61	
4+	415 (95%)	22 (5.0%)	0.31	0.18, 0.50	
Ethnic group					<0.001
Asian	918 (83%)	189 (17%)	1.00	0.81, 1.24	
Black	395 (68%)	188 (32%)	1.04	0.81, 1.34	
Chinese	59 (79%)	16 (21%)	0.98	0.43, 2.09	
Mixed	89 (72%)	34 (28%)	1.94	1.08, 3.37	
White	16,726 (84%)	3,096 (16%)	1.00	—	
Other	272 (80%)	70 (20%)	1.02	0.70, 1.45	
Unknown	1,212 (91%)	122 (9.1%)	0.52	0.41, 0.65	
Stage at diagnosis					<0.001
1	15,281 (95%)	872 (5.4%)	1.00	—	
2	1,204 (82%)	267 (18%)	3.40	2.88, 4.00	
3A	310 (44%)	392 (56%)	25.0	20.8, 30.2	

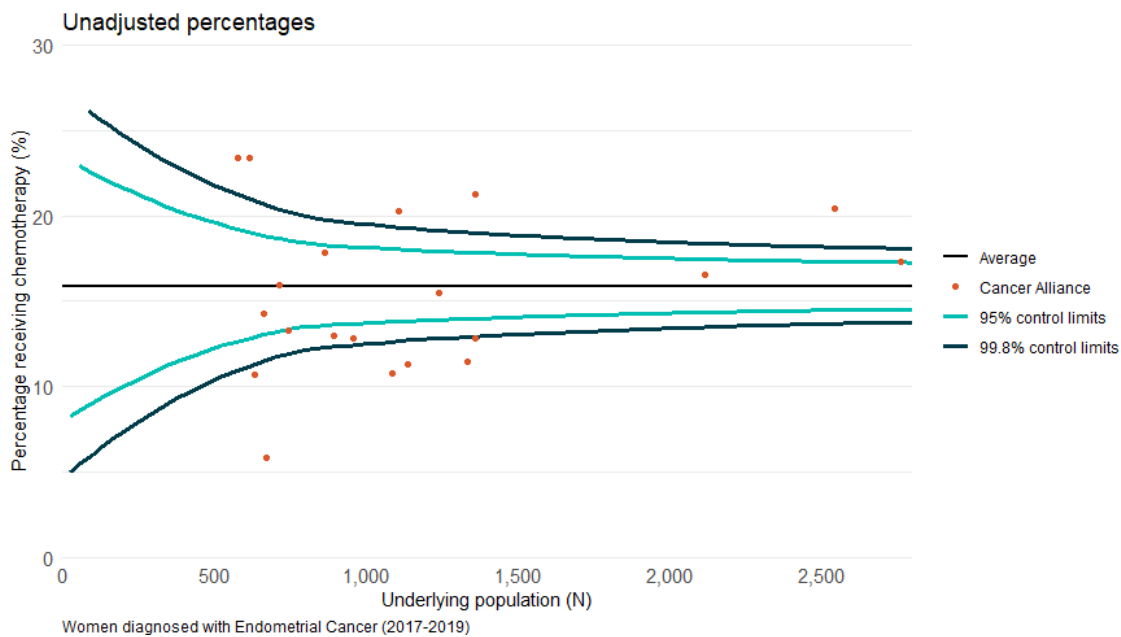
	Descriptive Statistics		Adjusted Logistic Regression Model Results*		
Factor	No chemotherapy N = 19,671 ¹	Chemotherapy N = 3,715 ¹	OR	95% CI	p-value**
3B	242 (48%)	264 (52%)	22.3	17.9, 27.7	
3C	344 (29%)	831 (71%)	32.2	27.4, 38.0	
4	711 (43%)	926 (57%)	16.0	13.9, 18.5	
Unknown	1,579 (91%)	163 (9.4%)	2.41	1.98, 2.92	
Tumour grade					<0.001
Low	14,722 (93%)	1,024 (6.5%)	1.00	—	
High	3,589 (61%)	2,277 (39%)	3.50	3.07, 3.99	
Unknown	1,360 (77%)	414 (23%)	2.06	1.70, 2.49	
Missing	0 (NA%)	0 (NA%)			
Morphology					<0.001
Endometrioid Adenocarcinoma	15,753 (91%)	1,474 (8.6%)	1.00	—	
Serous	1,258 (53%)	1,094 (47%)	3.06	2.62, 3.57	
Carcinosarcoma	716 (54%)	601 (46%)	3.13	2.62, 3.74	
Clear Cell	324 (71%)	134 (29%)	1.41	1.07, 1.86	
Miscellaneous and Unspecified	293 (96%)	11 (3.6%)	0.32	0.15, 0.61	
Undifferentiated/differentiat ed Carcinoma	88 (66%)	46 (34%)	0.71	0.45, 1.12	
Other Classified & Unclassified Carcinoma	1,239 (78%)	355 (22%)	1.46	1.22, 1.74	
¹ n (%) *Odds ratios are adjusted for all other factors presented in the table and represent conditional associations, not independent causal effects. **Global p-values are from Type II likelihood-ratio χ^2 tests, assessing whether each factor considered as a whole is associated with receipt of chemotherapy. Abbreviations: CI = Confidence Interval, OR = Odds Ratio					

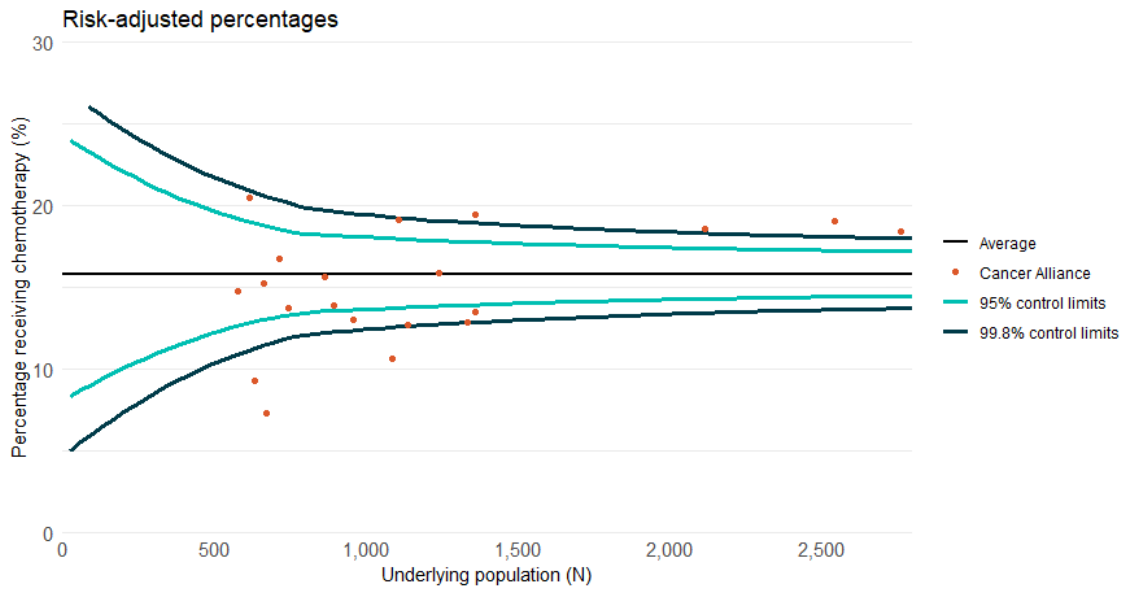
Chemotherapy use by geographical region

Overall, there was wide variation in chemotherapy use across England. This variation was partially reduced after adjusting for factors likely to influence treatment decisions (Figures 12 and 13). However, after adjustment four Cancer Alliances and four ICBs (geographically aligned with the Cancer Alliances) had chemotherapy rates more than three standard deviations above the national average. Conversely, three Cancer Alliances and three ICBs (also geographically nested within the Cancer Alliances) had chemotherapy rates more than three standard deviations below the national average. This wide variation in chemotherapy rates after adjusting for patient and tumour factors including disease stage suggests marked variation in clinical pathways for endometrial cancer throughout England. The authors consider that this warrants further investigation by the clinical community, in association with review of guidelines and ongoing monitoring of adherence to recommended clinical pathways to improve consistency of practice.

The unadjusted and risk-adjusted percentages and 95% confidence intervals presented in Figure 12 are provided in Table 5 below, with details for both Figures 12 and 13 provided in the accompanying Excel workbook (Tables CAL_Chemo and ICB_Chemo).

Figure 12 : Use of chemotherapy by Cancer Alliance at diagnosis, unadjusted and risk-adjusted percentages





Women diagnosed with Endometrial Cancer (2017-2019). Percentages adjusted for characteristics at diagnosis: age (5-year age bands), IMD, comorbidity score, ethnic group, stage, grade, morphology.

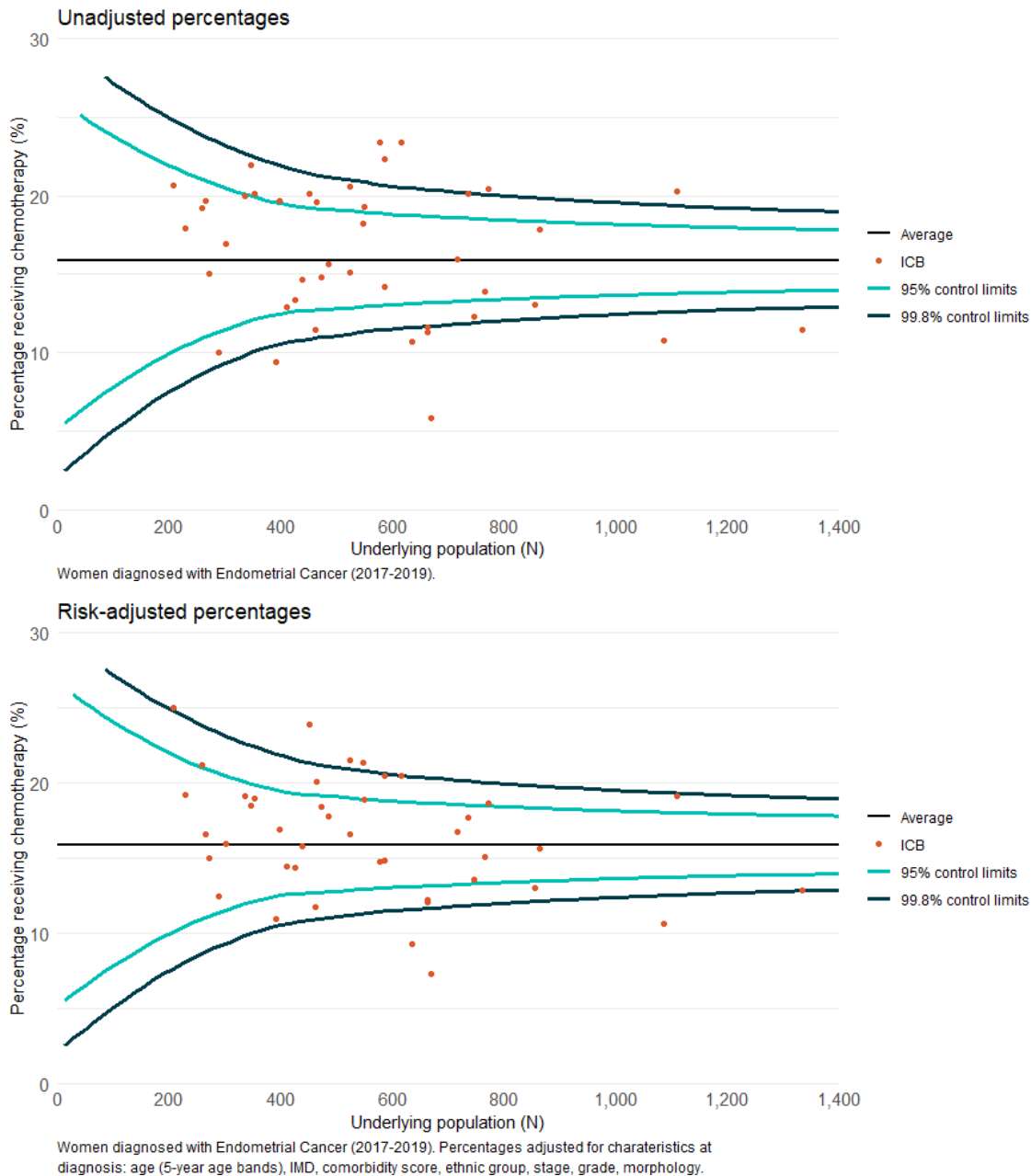
Table 5: Unadjusted and risk-adjusted percentages of chemotherapy among women diagnosed with endometrial cancer (2017-2019), by Cancer Alliance at diagnosis

Cancer Alliance	Numerator	Denominator	Crude percentage receiving chemotherapy (95% CI)	Risk-adjusted percentage receiving chemotherapy
Cheshire & Merseyside	117	1,087	10.8% (8.9% - 12.6%)	10.6%
East Midlands	350	2,115	16.5% (15.0% - 18.1%)	18.6%
East Of England	478	2,762	17.3% (15.9% - 18.7%)	18.4%
Greater Manchester	225	1,109	20.3% (17.9% - 22.7%)	19.2%
Humber & North Yorkshire	95	664	14.3% (11.6% - 17.0%)	15.2%
Kent & Medway	154	863	17.8% (15.3% - 20.4%)	15.7%
Lancashire & South Cumbria	114	716	15.9% (13.2% - 18.6%)	16.7%
North Central London	144	616	23.4% (20.0% - 26.7%)	20.4%
North East London	68	635	10.7% (8.3% - 13.1%)	9.3%
Northern	153	1,333	11.5% (9.8% - 13.2%)	12.8%
Peninsula	116	893	13.0% (10.8% - 15.2%)	13.9%
Somerset, Wiltshire, Avon & Gloucestershire	192	1,239	15.5% (13.5% - 17.5%)	15.8%
South East London	135	577	23.4% (19.9% - 26.9%)	14.7%
South Yorkshire & Bassetlaw	39	670	5.8% (4.0% - 7.6%)	7.4%
Surrey & Sussex	175	1,361	12.9% (11.1% - 14.6%)	13.5%
Thames Valley	99	744	13.3% (10.9% - 15.7%)	13.7%
Wessex	129	1,139	11.3% (9.5% - 13.2%)	12.7%
West London	289	1,360	21.2% (19.1% - 23.4%)	19.4%
West Midlands	520	2,546	20.4% (18.9% - 22.0%)	19.0%

Cancer Alliance	Numerator	Denominator	Crude percentage receiving chemotherapy (95% CI)	Risk-adjusted percentage receiving chemotherapy
West Yorkshire & Harrogate	123	957	12.9% (10.7% - 15.0%)	13.0%

CI = confidence interval; Risk-adjusted percentages adjusted for characteristics at diagnosis: age (5-year age bands), IMD, comorbidity score, ethnic group, stage, grade, morphology.

Figure 13 : Use of chemotherapy by Integrated Care Board at diagnosis, unadjusted and risk-adjusted percentages



Chemotherapy setting

Among women who received chemotherapy, it was most commonly initiated after surgery (72.2%; N = 2,682), compared with little use of neoadjuvant chemotherapy (8.2%; N = 305) or chemotherapy only (19.6%; N = 728). The timing of chemotherapy varied by tumour characteristics, including stage at diagnosis (Figure 14), and geographical region (Figure 15). For instance, the percentage of patients treated with neoadjuvant chemotherapy was greatest among patients diagnosed with stage 4 disease, at 17.1% versus just 3.2% among those diagnosed with stage 1 disease. This is as expected due to the fact that most commonly it will be disease extent that leads to the decision that upfront surgery is not the most suitable approach. A similar pattern was seen for chemotherapy only.

Full details of the distribution presented in Figure 14 are provided in the accompanying Excel workbook (Table Chemo_Setting). The percentages presented in Figure 15 are provided in the accompanying Excel workbook (Table CAL_Chemo_Setting).

Figure 14 : Sequencing of chemotherapy and hysterectomy among women diagnosed with endometrial cancer from 2017 to 2019 who received chemotherapy, by stage at diagnosis

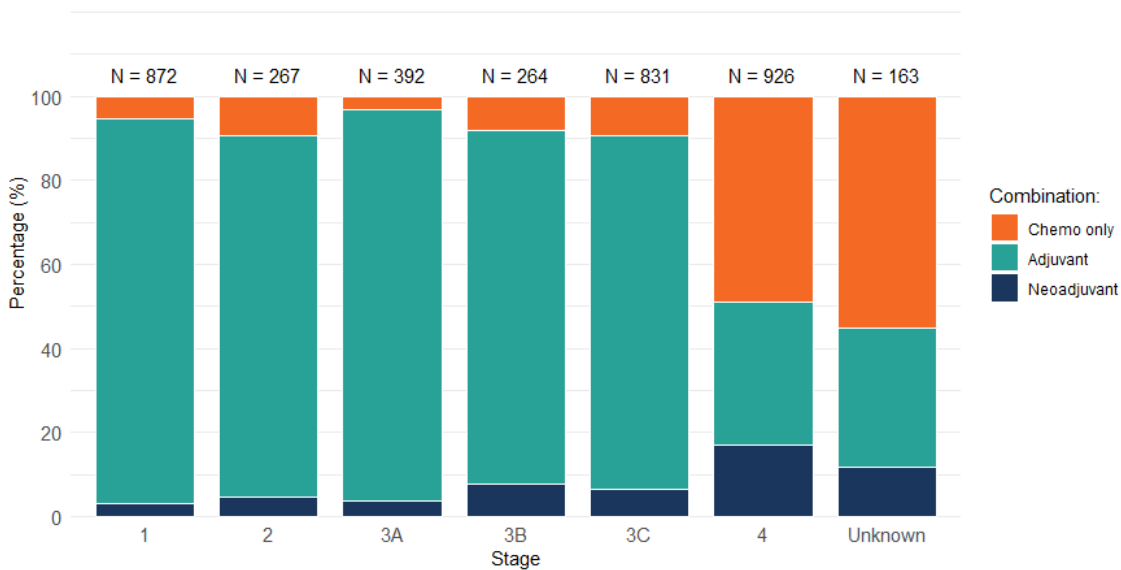
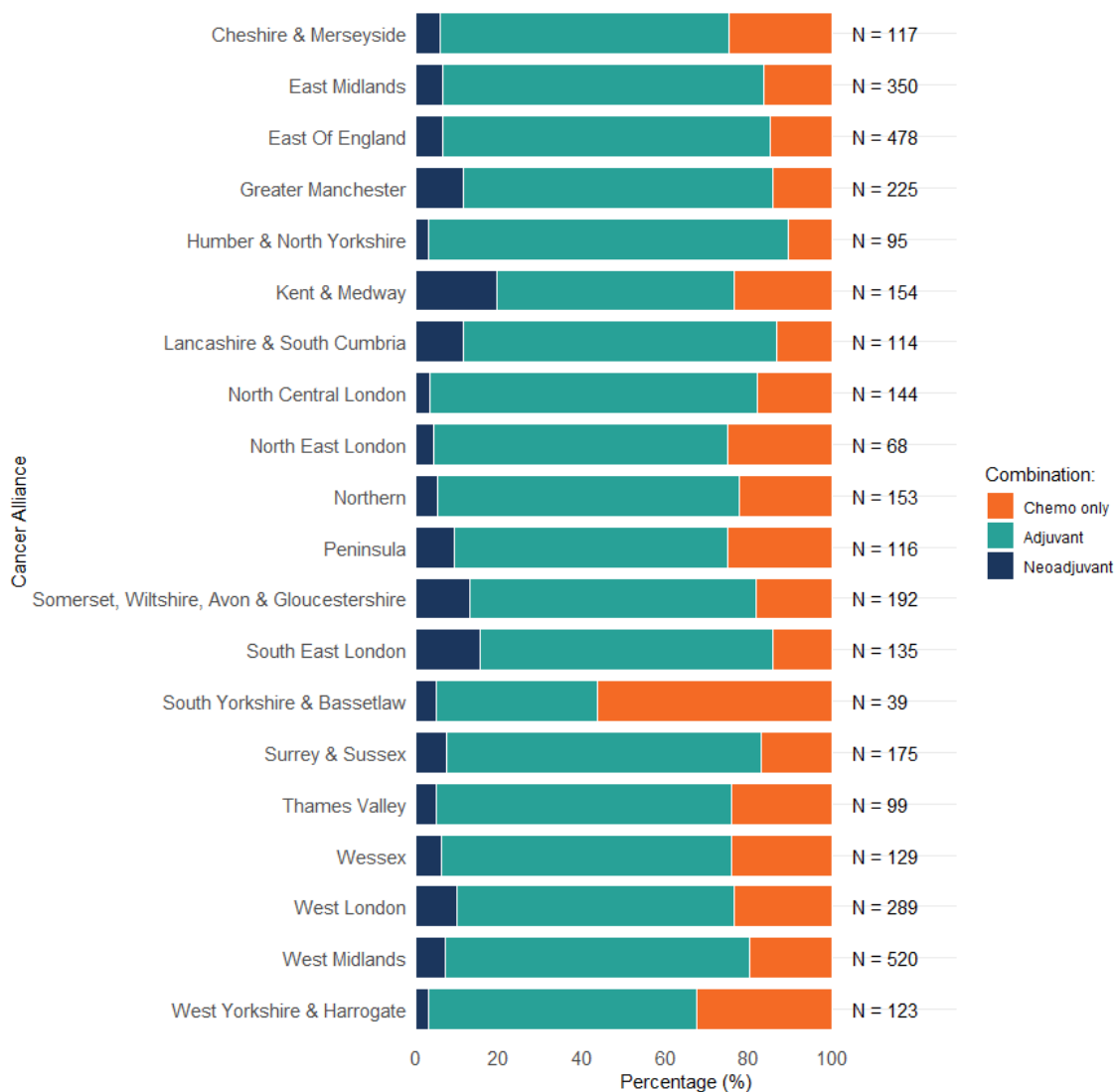


Figure 15 : Sequencing of chemotherapy and hysterectomy among women diagnosed with endometrial cancer from 2017 to 2019, who received chemotherapy, by Cancer Alliance at diagnosis



7. Radiotherapy

Some patients require adjuvant treatment following surgery, most commonly in the form of radiotherapy delivered via EBRT and/or vaginal vault brachytherapy (see Appendix 2 for definitions of each). This section examines the use of radiotherapy, with further analysis of the type of radiotherapy received.

Among all women diagnosed with endometrial cancer in England from 2017 to 2019, 31.7% (N = 7,414) had radiotherapy recorded. The association of patient and tumour factors with radiotherapy use, after adjustment for other factors, are shown in Table 6 below. We report global p-values for each factor, which assess whether including the factor in the model helped explain observed variation in the odds of receiving radiotherapy, beyond what would be expected by chance.

The likelihood of receiving radiotherapy varied by patient and tumour characteristics at diagnosis, including age, Charlson comorbidity score, ethnic group, stage (Figure 16), grade and morphology. These associations were identified using global p-values from an adjusted logistic regression model, which tested whether each factor as a whole was associated with the outcome after adjusting for all other factors. These results reflect adjusted associations and should not be interpreted as independent causal effects.

Figure 16 : Use of radiotherapy among women diagnosed with endometrial cancer from 2017 to 2019, by stage at diagnosis

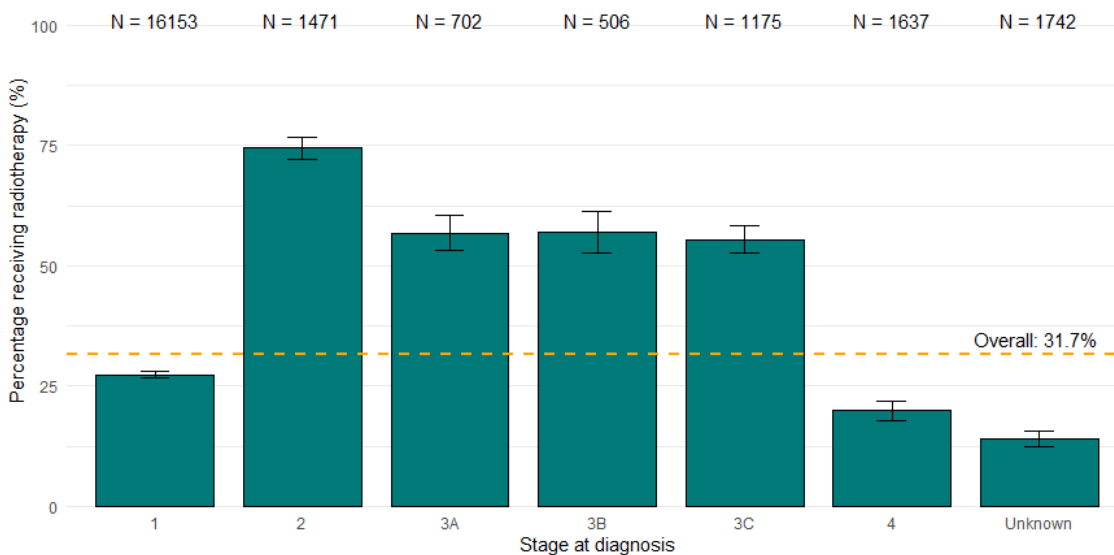


Table 6: Adjusted Associations Between Patient and Tumour Characteristics and Receipt of Radiotherapy

	Descriptive Statistics		Adjusted Logistic Regression Model Results*		
Factor	No radiotherapy N = 15,972 ¹	Radiotherapy N = 7,414 ¹	OR	95% CI	p-value**
Age group					<0.001
20-24	7 (88%)	1 (13%)	0.23	0.01, 1.51	
25-29	31 (82%)	7 (18%)	0.47	0.18, 1.06	
30-34	95 (86%)	16 (14%)	0.32	0.17, 0.55	
35-39	213 (89%)	27 (11%)	0.21	0.14, 0.33	
40-44	273 (80%)	70 (20%)	0.42	0.31, 0.56	
45-49	562 (76%)	178 (24%)	0.52	0.43, 0.63	
50-54	1,427 (78%)	400 (22%)	0.46	0.40, 0.53	
55-59	2,148 (73%)	797 (27%)	0.64	0.57, 0.72	
60-64	2,244 (68%)	1,056 (32%)	0.79	0.71, 0.88	
65-69	2,301 (64%)	1,295 (36%)	0.91	0.82, 1.01	
70-74	2,386 (61%)	1,502 (39%)	1.00	—	
75-79	1,730 (61%)	1,087 (39%)	0.93	0.83, 1.04	
80-84	1,353 (66%)	702 (34%)	0.73	0.65, 0.83	
85-89	844 (78%)	235 (22%)	0.39	0.33, 0.46	
90+	358 (90%)	41 (10%)	0.17	0.12, 0.24	
Deprivation (IMD quintile)					0.513
1 - most deprived	2,901 (70%)	1,221 (30%)	1.00	—	
2	3,092 (68%)	1,460 (32%)	1.04	0.94, 1.16	
3	3,354 (68%)	1,586 (32%)	1.09	0.99, 1.20	
4	3,352 (68%)	1,594 (32%)	1.05	0.95, 1.16	
5 - least deprived	3,273 (68%)	1,553 (32%)	1.07	0.97, 1.19	
Charlson Comorbidity Score					<0.001
0	13,157 (67%)	6,364 (33%)	1.00	—	
1	1,356 (71%)	548 (29%)	0.83	0.74, 0.93	
2	768 (73%)	279 (27%)	0.75	0.64, 0.88	
3	355 (74%)	122 (26%)	0.70	0.56, 0.89	
4+	336 (77%)	101 (23%)	0.69	0.54, 0.89	
Ethnic group					<0.001
Asian	760 (69%)	347 (31%)	1.09	0.94, 1.25	
Black	374 (64%)	209 (36%)	0.98	0.81, 1.19	
Chinese	47 (63%)	28 (37%)	1.46	0.84, 2.47	
Mixed	85 (69%)	38 (31%)	1.01	0.65, 1.54	
White	13,462 (68%)	6,360 (32%)	1.00	—	
Other	226 (66%)	116 (34%)	1.20	0.93, 1.53	
Unknown	1,018 (76%)	316 (24%)	0.73	0.64, 0.85	
Stage at diagnosis					<0.001
1	11,742 (73%)	4,411 (27%)	1.00	—	
2	376 (26%)	1,095 (74%)	7.85	6.91, 8.93	
3A	303 (43%)	399 (57%)	2.96	2.52, 3.49	

	Descriptive Statistics		Adjusted Logistic Regression Model Results*		
Factor	No radiotherapy N = 15,972 ¹	Radiotherapy N = 7,414 ¹	OR	95% CI	p-value**
3B	218 (43%)	288 (57%)	2.60	2.15, 3.15	
3C	524 (45%)	651 (55%)	1.99	1.74, 2.27	
4	1,312 (80%)	325 (20%)	0.35	0.31, 0.40	
Unknown	1,497 (86%)	245 (14%)	0.47	0.41, 0.55	
Tumour grade					<0.001
Low	11,791 (75%)	3,955 (25%)	1.00	—	
High	2,865 (49%)	3,001 (51%)	3.23	2.95, 3.54	
Unknown	1,316 (74%)	458 (26%)	1.60	1.38, 1.86	
Missing	0 (NA%)	0 (NA%)			
Morphology					<0.001
Endometrioid Adenocarcinoma	12,397 (72%)	4,830 (28%)	1.00	—	
Serous	1,261 (54%)	1,091 (46%)	0.93	0.82, 1.05	
Carcinosarcoma	681 (52%)	636 (48%)	1.06	0.92, 1.23	
Clear Cell	224 (49%)	234 (51%)	1.18	0.94, 1.46	
Miscellaneous and Unspecified	285 (94%)	19 (6.3%)	0.31	0.18, 0.50	
Undifferentiated/differentiated Carcinoma	85 (63%)	49 (37%)	0.67	0.45, 1.00	
Other Classified & Unclassified Carcinoma	1,039 (65%)	555 (35%)	1.07	0.94, 1.21	
¹ n (%) *Odds ratios are adjusted for all other factors presented in the table and represent conditional associations, not independent causal effects. **Global p-values are from Type II likelihood-ratio χ^2 tests, assessing whether each factor considered as a whole is associated with receipt of radiotherapy. Abbreviations: CI = Confidence Interval, OR = Odds Ratio					

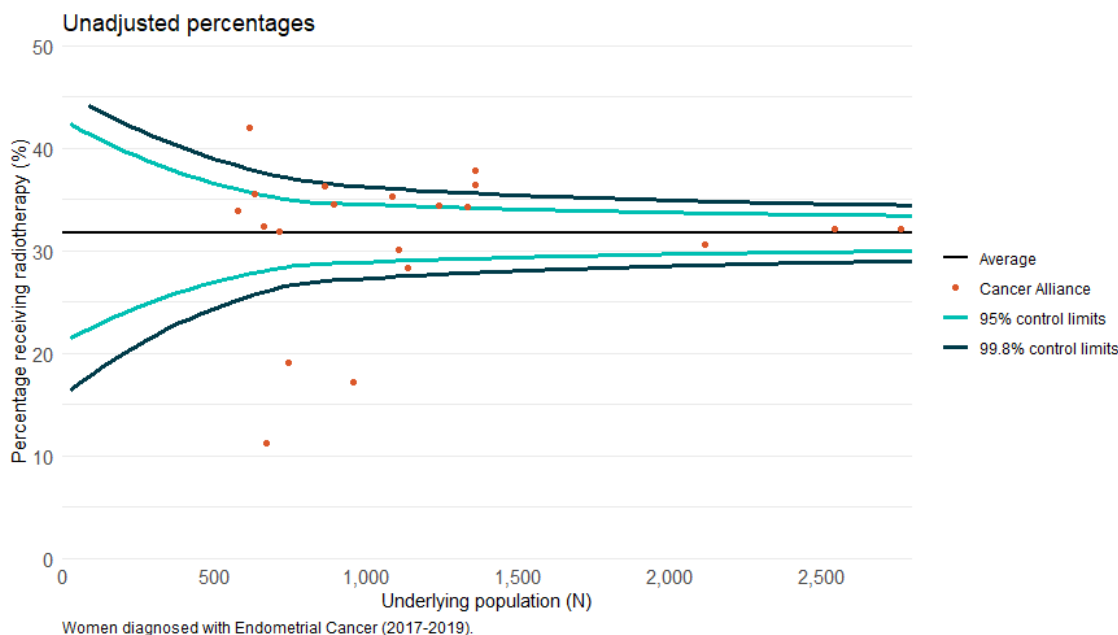
Radiotherapy use by geographical region

There was marked geographical variation in radiotherapy use across England (Figures 17 and 18), beyond what would be expected based on the size of the underlying cancer population. After adjustment, three Cancer Alliances and seven ICBs (five were geographically aligned with the Cancer Alliances) had radiotherapy rates more than three standard deviations above the national average. Conversely, three Cancer Alliances and six ICBs (three geographically nested within the Alliances) had radiotherapy rates more than three standard deviations below the national average.

It should be noted that in this analysis radiotherapy includes both vaginal brachytherapy and external beam radiotherapy, which is explored later in this report. The indications for these treatments vary and are complex, potentially impacted on by additional factors such as the use of lymphadenectomy to assess risk of disease recurrence. Notwithstanding, this wide variation in radiotherapy rates after adjusting for patient and tumour factors including disease stage again indicates marked variation in clinical pathways for endometrial cancer throughout England. The authors consider that these findings support further consideration of how ongoing national monitoring of endometrial cancer care could help promote consistency of practice and improve clinical outcomes, potentially through a national audit.

The unadjusted and risk-adjusted percentages and 95% confidence intervals presented in Figure 17 are provided in Table 7 below, with details for both Figures 17 and 18 provided in the accompanying Excel workbook (Tables CAL_RT and ICB_RT).

Figure 17 : Use of radiotherapy by Cancer Alliance at diagnosis, unadjusted and risk-adjusted percentages



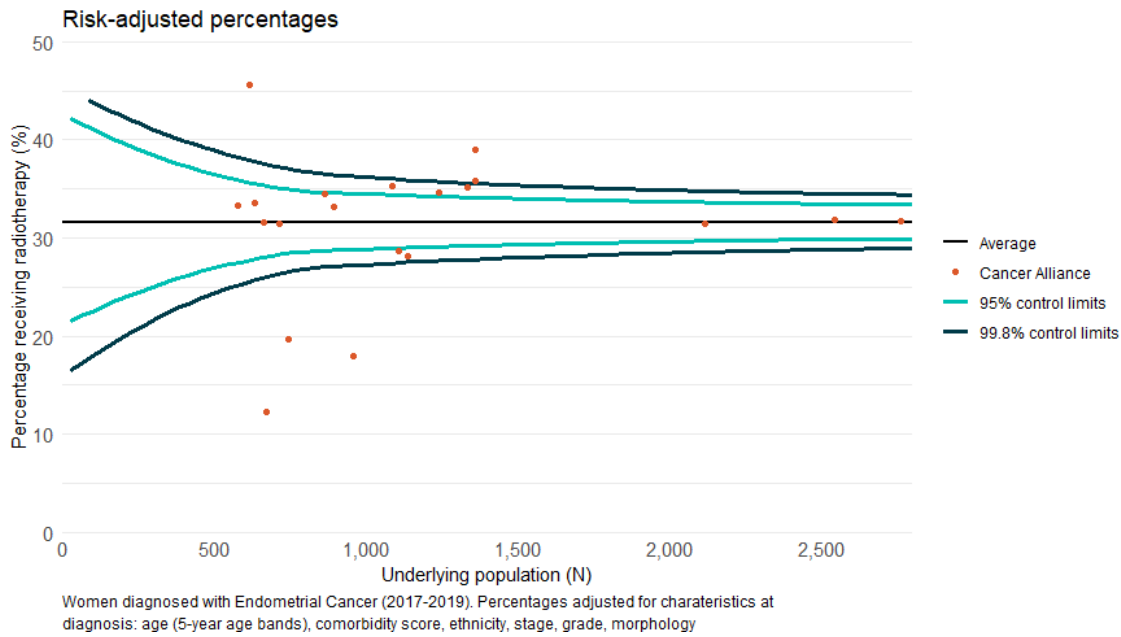


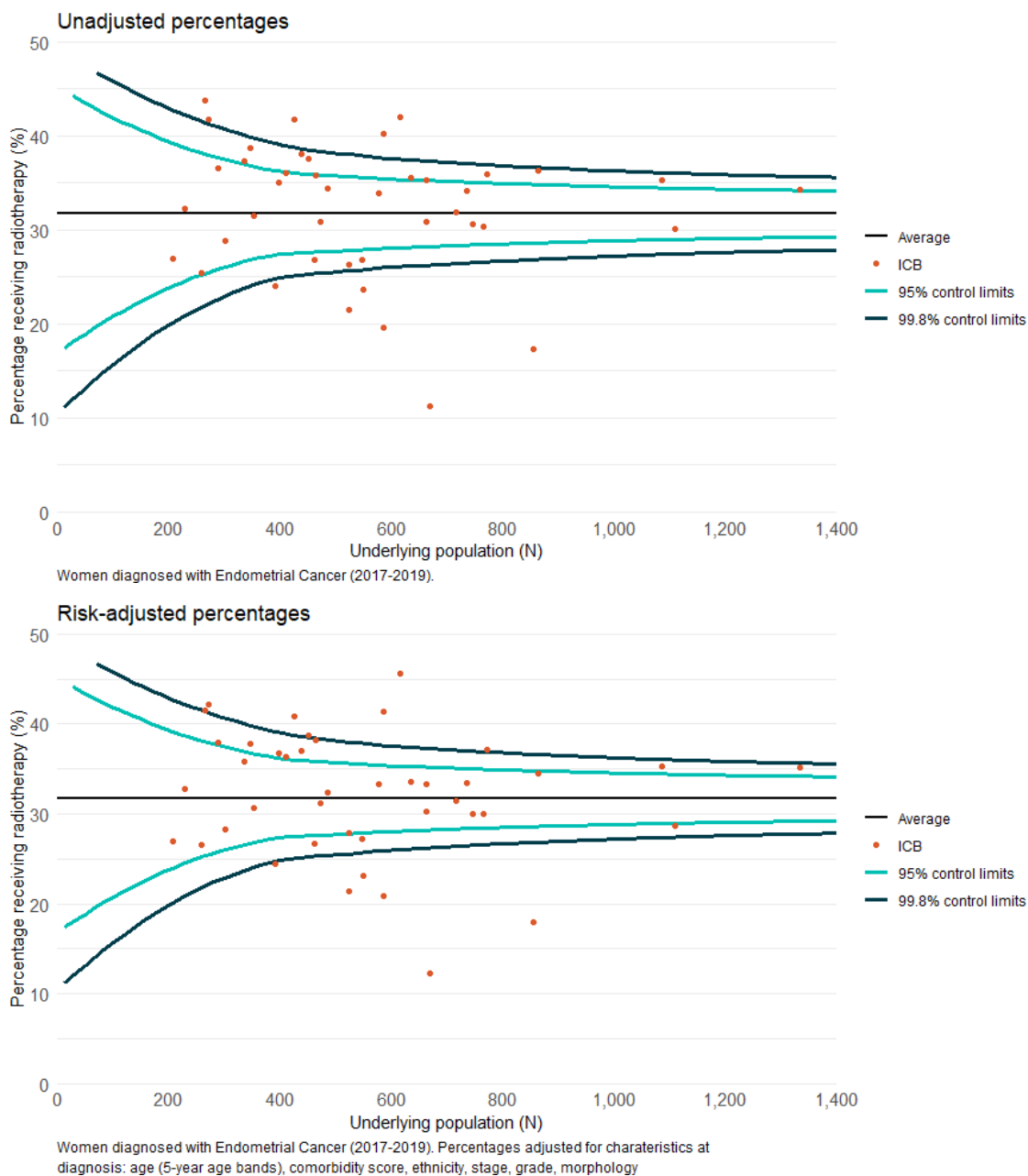
Table 7: Unadjusted and risk-adjusted percentages of radiotherapy among women diagnosed with endometrial cancer (2017-2019), by Cancer Alliance at diagnosis

Cancer Alliance	Numerator	Denominator	Crude percentage receiving radiotherapy (95% CI)	Risk-adjusted percentage receiving radiotherapy
Cheshire & Merseyside	383	1,087	35.2% (32.4% - 38.1%)	35.3%
East Midlands	648	2,115	30.6% (28.7% - 32.6%)	31.4%
East Of England	887	2,762	32.1% (30.4% - 33.9%)	31.7%
Greater Manchester	334	1,109	30.1% (27.4% - 32.8%)	28.6%
Humber & North Yorkshire	215	664	32.4% (28.8% - 35.9%)	31.7%
Kent & Medway	313	863	36.3% (33.1% - 39.5%)	34.6%
Lancashire & South Cumbria	228	716	31.8% (28.4% - 35.3%)	31.4%
North Central London	259	616	42.0% (38.1% - 45.9%)	45.6%
North East London	226	635	35.6% (31.9% - 39.3%)	33.6%
Northern	457	1,333	34.3% (31.7% - 36.8%)	35.1%
Peninsula	308	893	34.5% (31.4% - 37.6%)	33.2%
Somerset, Wiltshire, Avon & Gloucestershire	427	1,239	34.5% (31.8% - 37.1%)	34.7%
South East London	196	577	34.0% (30.1% - 37.8%)	33.3%
South Yorkshire & Bassetlaw	75	670	11.2% (8.8% - 13.6%)	12.3%
Surrey & Sussex	496	1,361	36.4% (33.9% - 39.0%)	35.9%
Thames Valley	142	744	19.1% (16.3% - 21.9%)	19.7%
Wessex	323	1,139	28.4% (25.7% - 31.0%)	28.2%
West London	514	1,360	37.8% (35.2% - 40.4%)	38.9%
West Midlands	818	2,546	32.1% (30.3% - 33.9%)	31.8%

Cancer Alliance	Numerator	Denominator	Crude percentage receiving radiotherapy (95% CI)	Risk-adjusted percentage receiving radiotherapy
West Yorkshire & Harrogate	165	957	17.2% (14.8% - 19.6%)	17.9%

CI = confidence interval; Risk-adjusted percentages adjusted for characteristics at diagnosis: age (5-year age bands), comorbidity score, ethnic group, stage, grade, morphology.

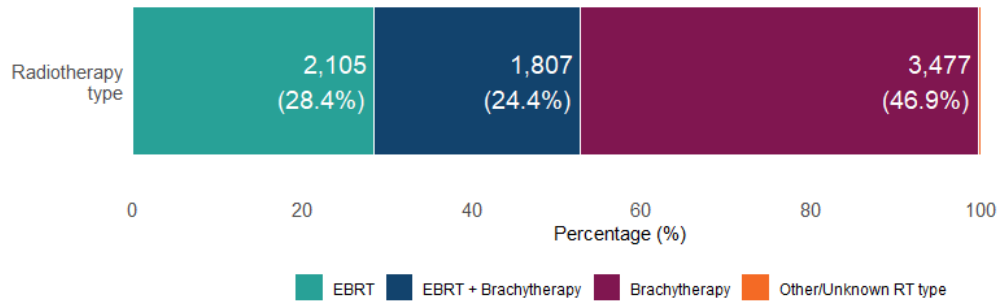
Figure 18 : Use of radiotherapy by Integrated Care Board at diagnosis, unadjusted and risk-adjusted percentages



Type of radiotherapy

Among women with radiotherapy recorded, 52.8% received EBRT, with or without brachytherapy (Figure 19), whilst 46.9% received brachytherapy only.

Figure 19 : Distribution of radiotherapy type among women diagnosed with endometrial cancer from 2017 to 2019 with radiotherapy recorded



Variation in the type of radiotherapy used was observed by tumour characteristics - such as stage (Figure 20) and grade at diagnosis - as well as by geographical region (Figures 21 and 22). The wide geographical variation in the patterns of radiotherapy treatments is striking, suggesting marked variation in interpretation of treatment guidelines and subsequent variation of treatment pathways across England.

Full details of the distribution presented in Figure 20 are provided in the accompanying Excel workbook (Table RT_Type). The percentages presented in Figures 21 and 22 are provided in the accompanying Excel workbook (Tables CAL_RT_Type and CAL_RT_ALL).

Figure 20 : Distribution of radiotherapy type among women diagnosed with endometrial cancer from 2017 to 2019, who received radiotherapy, by stage at diagnosis

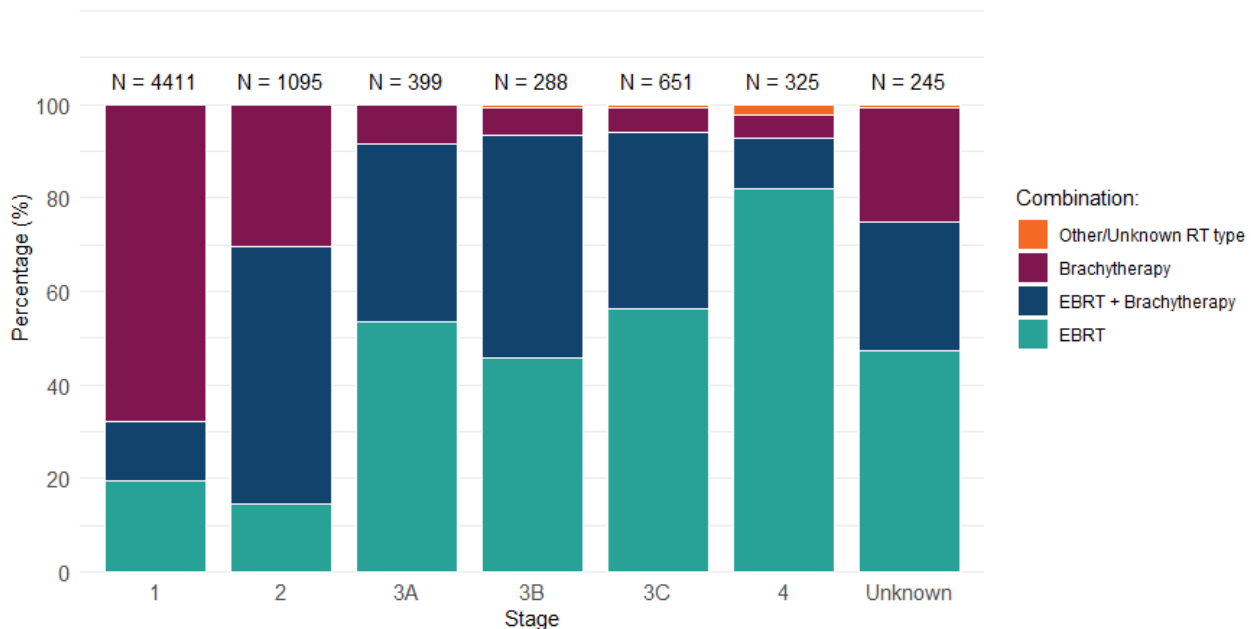


Figure 21 : Distribution of radiotherapy type among women diagnosed with endometrial cancer from 2017 to 2019, who received radiotherapy, by Cancer Alliance at diagnosis

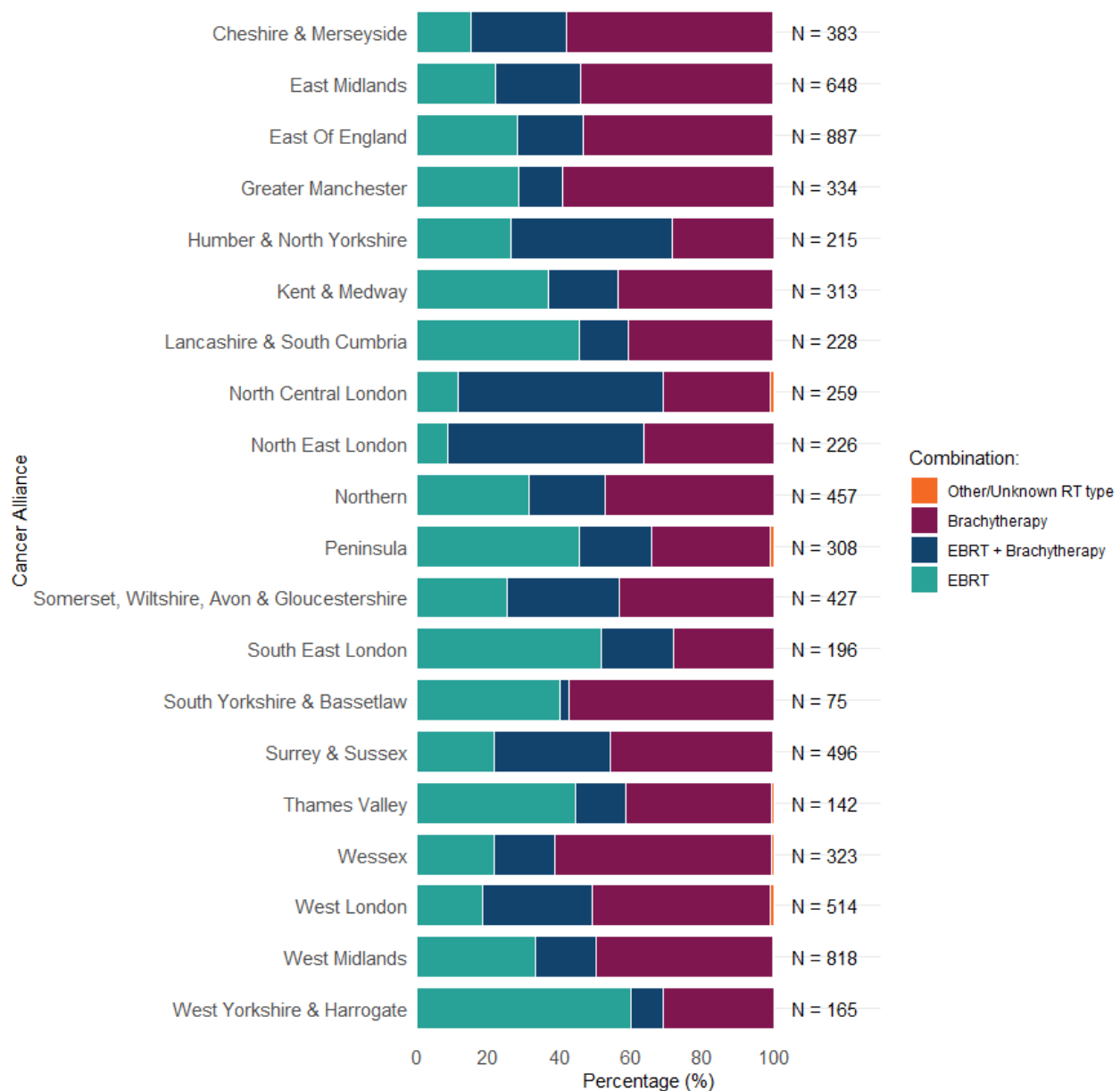
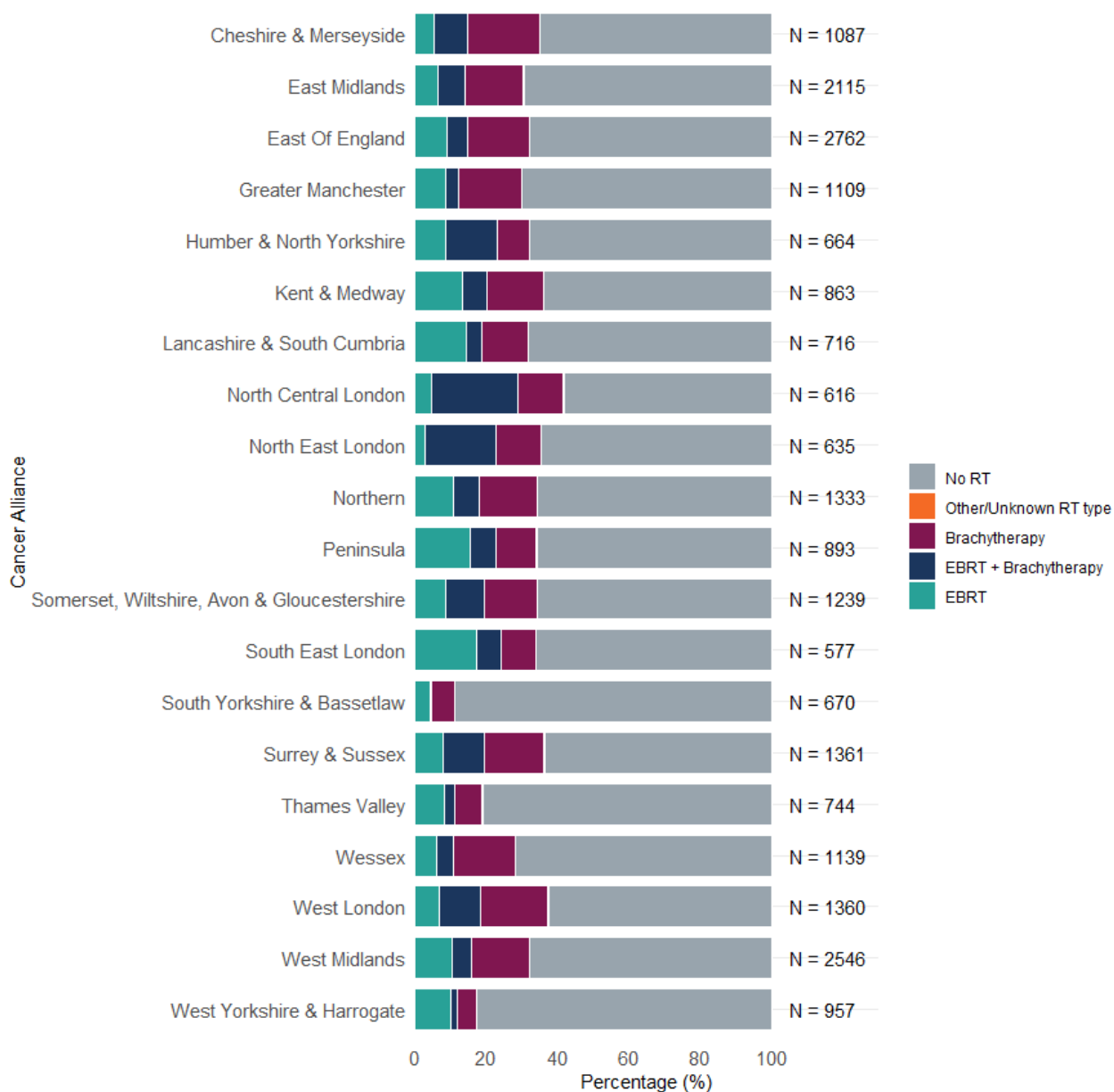


Figure 22 : Distribution of radiotherapy use and type among all women diagnosed with endometrial cancer from 2017 to 2019, by Cancer Alliance at diagnosis



8. Endocrine therapy

This section examines how endocrine therapy is recorded in routinely-collected national data sources. Appendix 1 provides details of the data sources used.

Overall, recording was low, with endocrine therapy documented for only 13.8% (N = 3,236) of all women diagnosed with endometrial cancer in England from 2017 to 2019.

Our methodology captures progesterone and aromatase inhibitor therapy prescribed in primary care (as captured in the Primary Care Prescription Dataset; PCPD), treatment documented in the NCRD and SACT datasets, and some in/outpatient procedures associated with insertion of progesterone intrauterine devices (as captured in the HES Admitted Patient Care [APC] and Outpatient [OP] datasets). However, intrauterine devices fitted in secondary care outpatient or primary care settings would not have been captured in this analysis, hence the authors consider that this data is likely to under-represent the use of hormone therapy in the management of endometrial cancer.

The likelihood of recording varied by patient and tumour characteristics at diagnosis, including age (Figure 23). There was also a small increase in recording over time from 13.7% at the start of 2017 up to 15.1% at the end of 2019 (Figure 24).

Figure 23 : Percentage of women with endocrine therapy recorded in each routine data source, by age at diagnosis)

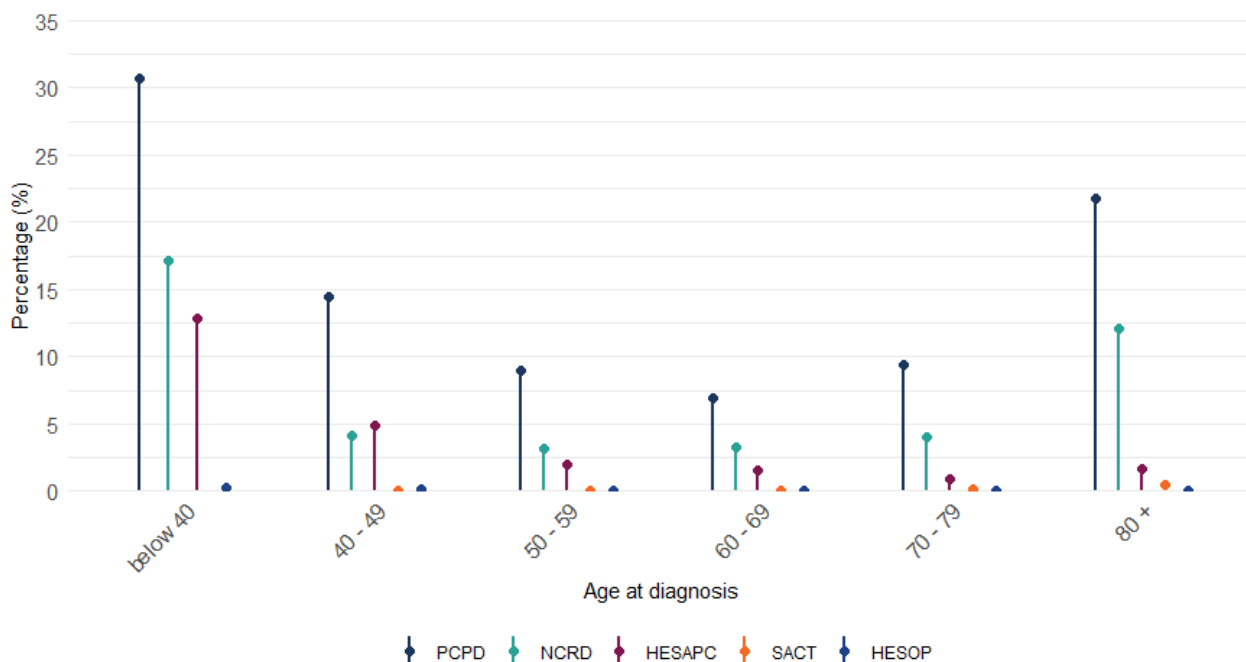
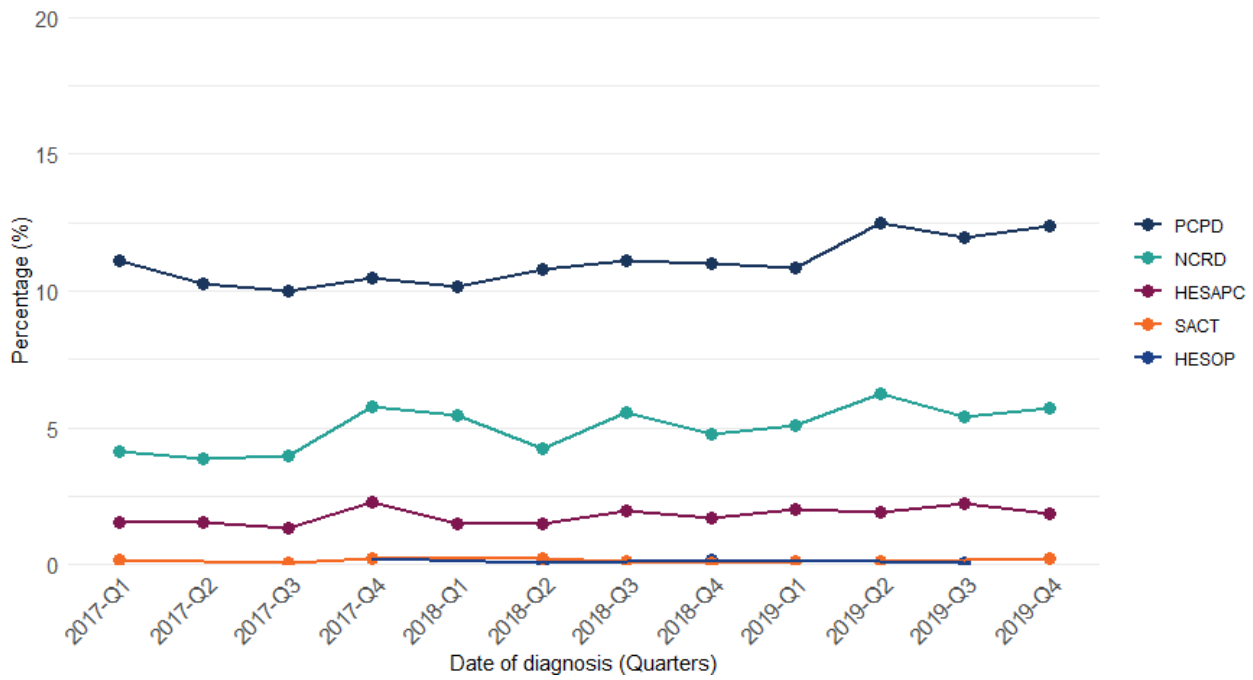


Figure 24 : Percentage of women with endocrine therapy recorded in each routine data source, by quarter of diagnosis (2017–2019)



9. Overall treatment use

This section presents an overview of treatment use among women diagnosed with endometrial cancer, specifically the use of surgery (hysterectomy), chemotherapy or radiotherapy. Due to the paucity of data on use of endocrine therapy in this cohort of women it was not included here in the definition of treatment; findings on endocrine therapy data were reported in a separate section above with a focus on capture across the different data sources. As such, rates of overall treatment will be lower than expected.

With guidelines recommending management of “low risk” patients at gynaecological cancer units, whilst “high risk” patients should be referred to specialist gynaecological cancer centres, the adjusted analyses include a variable that indicates whether the diagnosing NHS trust housed a specialist gynaecological cancer centre.

Among all women diagnosed with endometrial cancer in England from 2017 to 2019, 88.1% (N = 20,613) had a recorded treatment with surgery, chemotherapy or radiotherapy (EBRT or brachytherapy). Factors associated with receiving any of these treatments, after adjustment for other factors, are shown in Table 8 below. We report global p-values for each factor, which assess whether including the factor in the model helped explain observed variation in the odds of receiving treatment with surgery, chemotherapy or radiotherapy, beyond what would be expected by chance. Treatment use was associated with various patient and tumour characteristics at diagnosis including age, IMD, Charlson comorbidity score, ethnic group, stage, grade, morphology and whether the diagnosis was made at a specialist centre. These associations were identified using global p-values, from an adjusted logistic regression model, testing whether each factor as a whole was associated with the outcome after adjusting for all other factors. These results reflect adjusted associations and should not be interpreted as independent causal effects.

Table 8: Adjusted Associations Between Patient and Tumour Characteristics and Receipt of Treatment with Surgery, Chemotherapy or Radiotherapy

Factor	Descriptive Statistics		Adjusted Logistic Regression Model Results**		
	No treatment* N = 2,773 ¹	Treatment N = 20,613 ¹	OR	95% CI	p-value***
Age group					<0.001
20-24	5 (63%)	3 (38%)	0.02	0.00, 0.11	
25-29	16 (42%)	22 (58%)	0.09	0.04, 0.20	
30-34	34 (31%)	77 (69%)	0.16	0.09, 0.26	
35-39	60 (25%)	180 (75%)	0.20	0.14, 0.30	
40-44	40 (12%)	303 (88%)	0.65	0.43, 1.00	
45-49	59 (8.0%)	681 (92%)	0.92	0.66, 1.31	
50-54	133 (7.3%)	1,694 (93%)	0.95	0.74, 1.22	
55-59	157 (5.3%)	2,788 (95%)	1.37	1.09, 1.73	
60-64	182 (5.5%)	3,118 (94%)	1.30	1.05, 1.63	
65-69	244 (6.8%)	3,352 (93%)	1.04	0.85, 1.27	
70-74	317 (8.2%)	3,571 (92%)	1.00	—	
75-79	343 (12%)	2,474 (88%)	0.73	0.60, 0.88	
80-84	457 (22%)	1,598 (78%)	0.33	0.28, 0.40	

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	Descriptive Statistics		Adjusted Logistic Regression Model Results**		
Factor	No treatment* N = 2,773 ¹	Treatment N = 20,613 ¹	OR	95% CI	p-value***
85-89	454 (42%)	625 (58%)	0.14	0.11, 0.17	
90+	272 (68%)	127 (32%)	0.06	0.05, 0.09	
Deprivation (IMD quintile)					<0.001
1 - most deprived	581 (14%)	3,541 (86%)	1.00	—	
2	567 (12%)	3,985 (88%)	1.23	1.05, 1.45	
3	573 (12%)	4,367 (88%)	1.37	1.17, 1.61	
4	569 (12%)	4,377 (88%)	1.31	1.12, 1.54	
5 - least deprived	483 (10%)	4,343 (90%)	1.50	1.27, 1.78	
Charlson Comorbidity Score					<0.001
0	1,901 (9.7%)	17,620 (90%)	1.00	—	
1	295 (15%)	1,609 (85%)	0.70	0.59, 0.83	
2	237 (23%)	810 (77%)	0.46	0.37, 0.56	
3	146 (31%)	331 (69%)	0.44	0.33, 0.58	
4+	194 (44%)	243 (56%)	0.22	0.17, 0.29	
Ethnic group					<0.001
Asian	105 (9.5%)	1,002 (91%)	1.20	0.94, 1.56	
Black	97 (17%)	486 (83%)	0.73	0.55, 0.98	
Chinese	9 (12%)	66 (88%)	0.62	0.28, 1.60	
Mixed	11 (8.9%)	112 (91%)	1.03	0.50, 2.38	
White	2,296 (12%)	17,526 (88%)	1.00	—	
Other	28 (8.2%)	314 (92%)	1.25	0.80, 2.04	
Unknown	227 (17%)	1,107 (83%)	0.61	0.50, 0.76	
Stage at diagnosis					<0.001
1	807 (5.0%)	15,346 (95%)	1.00	—	
2	79 (5.4%)	1,392 (95%)	1.11	0.87, 1.43	
3A	33 (4.7%)	669 (95%)	1.21	0.84, 1.79	
3B	40 (7.9%)	466 (92%)	0.80	0.57, 1.16	
3C	109 (9.3%)	1,066 (91%)	0.43	0.34, 0.54	
4	481 (29%)	1,156 (71%)	0.11	0.10, 0.13	
Unknown	1,224 (70%)	518 (30%)	0.03	0.03, 0.04	
Tumour grade					<0.001
Low	1,402 (8.9%)	14,344 (91%)	1.00	—	
High	623 (11%)	5,243 (89%)	1.36	1.16, 1.60	
Unknown	748 (42%)	1,026 (58%)	0.51	0.42, 0.63	
Missing	0 (NA%)	0 (NA%)			
Morphology					<0.001
Endometrioid Adenocarcinoma	1,588 (9.2%)	15,639 (91%)	1.00	—	
Serous	260 (11%)	2,092 (89%)	1.78	1.44, 2.19	
Carcinosarcoma	150 (11%)	1,167 (89%)	1.89	1.47, 2.43	
Clear Cell	65 (14%)	393 (86%)	1.25	0.88, 1.78	
Miscellaneous and Unspecified	257 (85%)	47 (15%)	0.27	0.17, 0.43	

	Descriptive Statistics		Adjusted Logistic Regression Model Results**		
Factor	No treatment* N = 2,773 ¹	Treatment N = 20,613 ¹	OR	95% CI	p-value***
Undifferentiated/differentiated Carcinoma	40 (30%)	94 (70%)	0.43	0.27, 0.70	
Other Classified & Unclassified Carcinoma	413 (26%)	1,181 (74%)	0.72	0.60, 0.87	
Diagnosed at a specialist gynaecological cancer centre	1,087 (11%)	8,747 (89%)	1.12	1.01, 1.25	0.029

¹n (%)

*No treatment with surgery, chemotherapy or radiotherapy

**Odds ratios are adjusted for all other factors presented in the table and represent conditional associations, not independent causal effects.

***Global p-values are from Type II likelihood-ratio χ^2 tests, assessing whether each factor considered as a whole is associated with receipt of treatment with surgery, chemotherapy or radiotherapy.

Abbreviations: CI = Confidence Interval, OR = Odds Ratio

Many of the highly significant findings of this analysis are consistent with expectations, confirming that oncology treatment rates varied by age, Charlson comorbidity score, stage, grade and tumour morphology. It is noteworthy that treatment rates were also markedly varied on the basis of IMD and ethnic group. Treatment rates were also significantly higher for women diagnosed in an NHS trust housing a specialist gynaecological cancer centre, questioning the effectiveness of diagnostic and treatment pathways in some trusts without this facility, though causality cannot be inferred from this observational analysis.

Overall treatment use by geographical region

The funnel plots in Figures 25 and 26 illustrate variation in treatment use, with and without adjustment for the factors reported in Table 8, across Cancer Alliances and ICBs.

Overall, the percentage of women receiving treatment with surgery, chemotherapy or radiotherapy across England varied little beyond what would be expected given the size of the underlying cancer population. Much of the difference in treatment rates between different Cancer Alliances and ICBs were explained by differences in the cohorts of patients between the various geographies and therefore there was less variation seen in the analyses following adjustment for the factors listed above. However, even after adjusting for factors that influence treatment decisions, one Cancer Alliance and one ICB (geographically aligned with the Cancer Alliance) had treatment rates more than three standard deviations above the national average, whilst two ICBs had treatment rates more than three standard deviations below the national average.

Figure 25 : Use of surgery, chemotherapy or radiotherapy by Cancer Alliance at diagnosis, unadjusted and risk-adjusted percentages

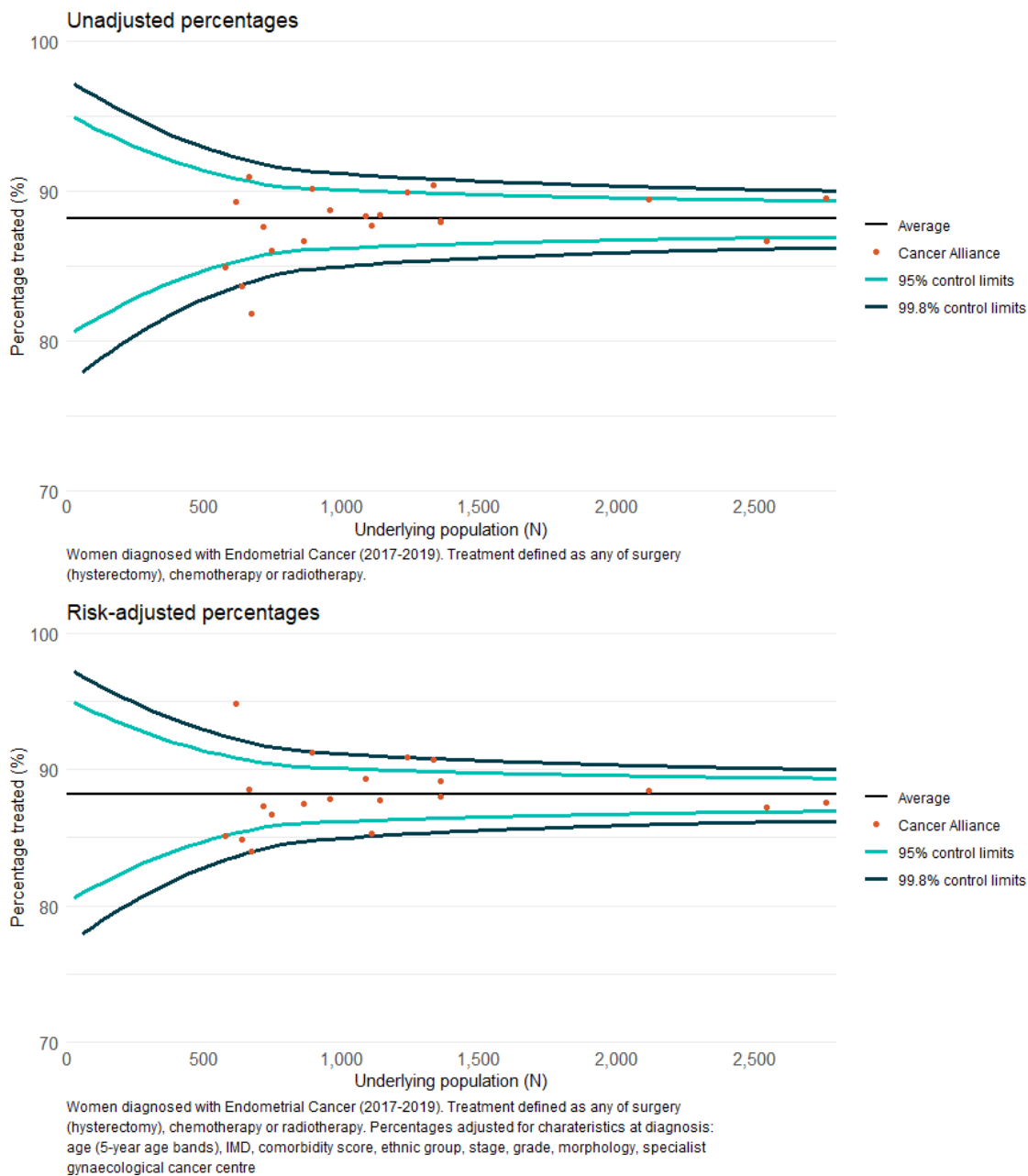
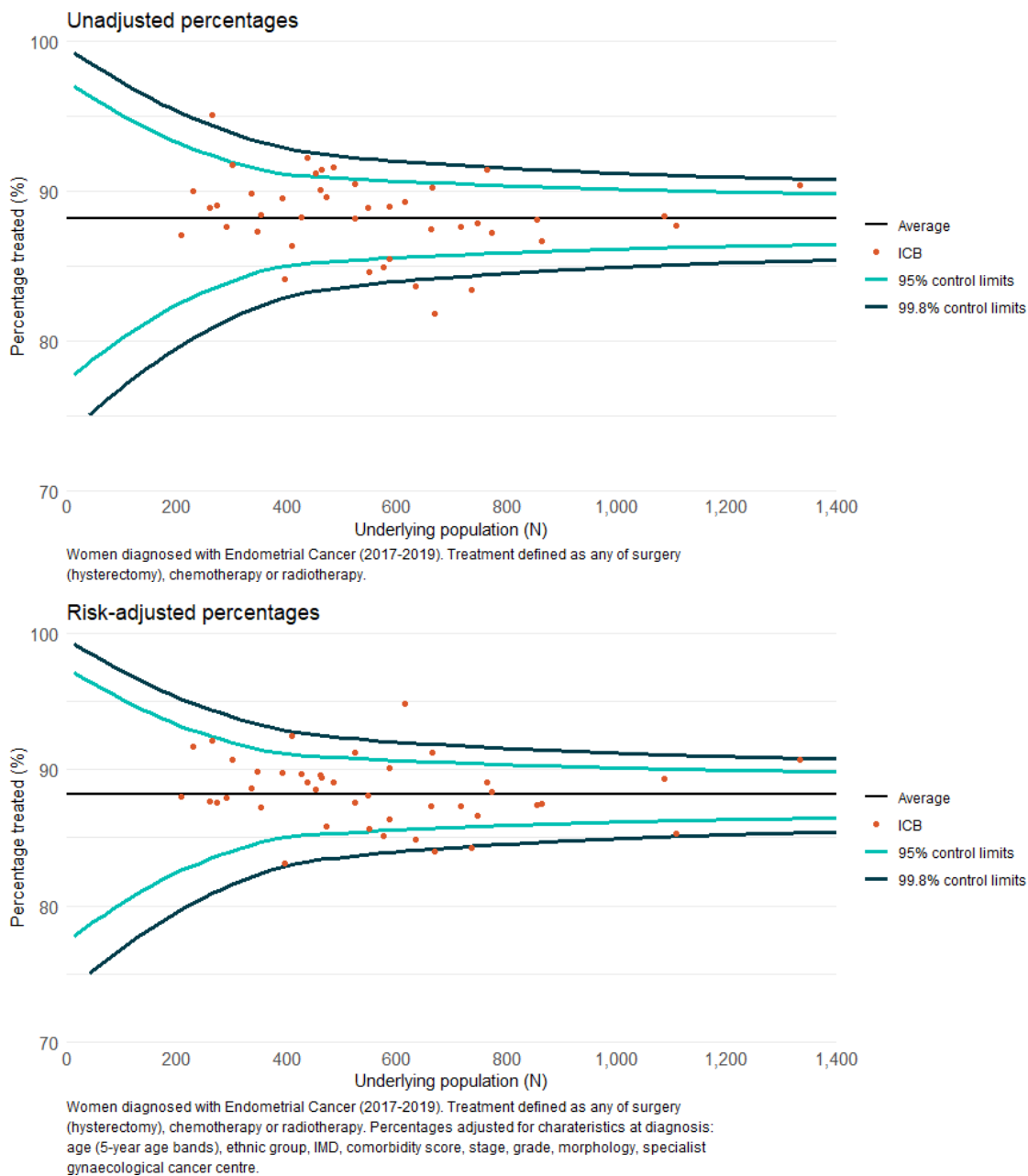


Figure 26 : Use of surgery, chemotherapy or radiotherapy by Integrated Care Board at diagnosis, unadjusted and risk-adjusted percentages



The unadjusted and risk-adjusted percentages and 95% confidence intervals presented in Figures 25 and 26 are provided in the accompanying Excel workbook (Tables CAL_Trtr and ICB_Trtr).

Treatment combinations

Whilst overall rates of any treatment for endometrial cancer showed little variation between the geographical regions in England, the unadjusted percentages presented in Figures 27 and 28 suggest notable differences in the use of specific treatment modalities. These figures reflect raw percentages and do not account for differences in patient or tumour characteristics between Cancer Alliances and ICBs, which may legitimately influence treatment decisions. However, the variability observed in the use of surgery, radiotherapy and chemotherapy, whether in isolation or in combination, suggests that differences in treatment pathways may also exist between Cancer Alliances and ICBs beyond what can be explained by case mix alone. The percentages presented in Figures 27 and 28 are provided in the accompanying Excel workbook (Tables CAL_TrT_Comb and ICB_TrT_Comb).

These charts highlight notable variation in the management pathways for endometrial cancer observed across England, particularly with regard to the detail of adjuvant therapies. Whilst findings from earlier sections indicate that some geographical variation in chemotherapy and radiotherapy use was reduced following case-mix adjustment, Figures 27 and 28 indicate meaningful geographical differences in treatment pathways across England remain.

The authors consider that this variation at least partly relates to the nature of evidence-based guidelines which reflect varied professional opinion and interpretation of evidence. Guidelines for endometrial cancer management frequently identify indications when interventions including adjuvant chemotherapy, external beam radiotherapy and brachytherapy may be considered, compared to other specific clinical scenarios where there is strong consensus regarding the evidence enabling the guidelines to specify that they should or should not be utilised.

Future review of guidelines should consider whether the updated evidence enables a tightening of the guidance for these interventions, in order to reduce regional variation in endometrial cancer management. Implementation of guidelines could be supported by ongoing national monitoring, including audit where appropriate, to help promote consistency in management pathways and optimise outcomes for patients with endometrial cancer in England.

Figure 27 : Distribution of treatment combinations among women diagnosed with endometrial cancer from 2017 to 2019, who received any treatment with surgery, chemotherapy or radiotherapy, by Cancer Alliance at diagnosis

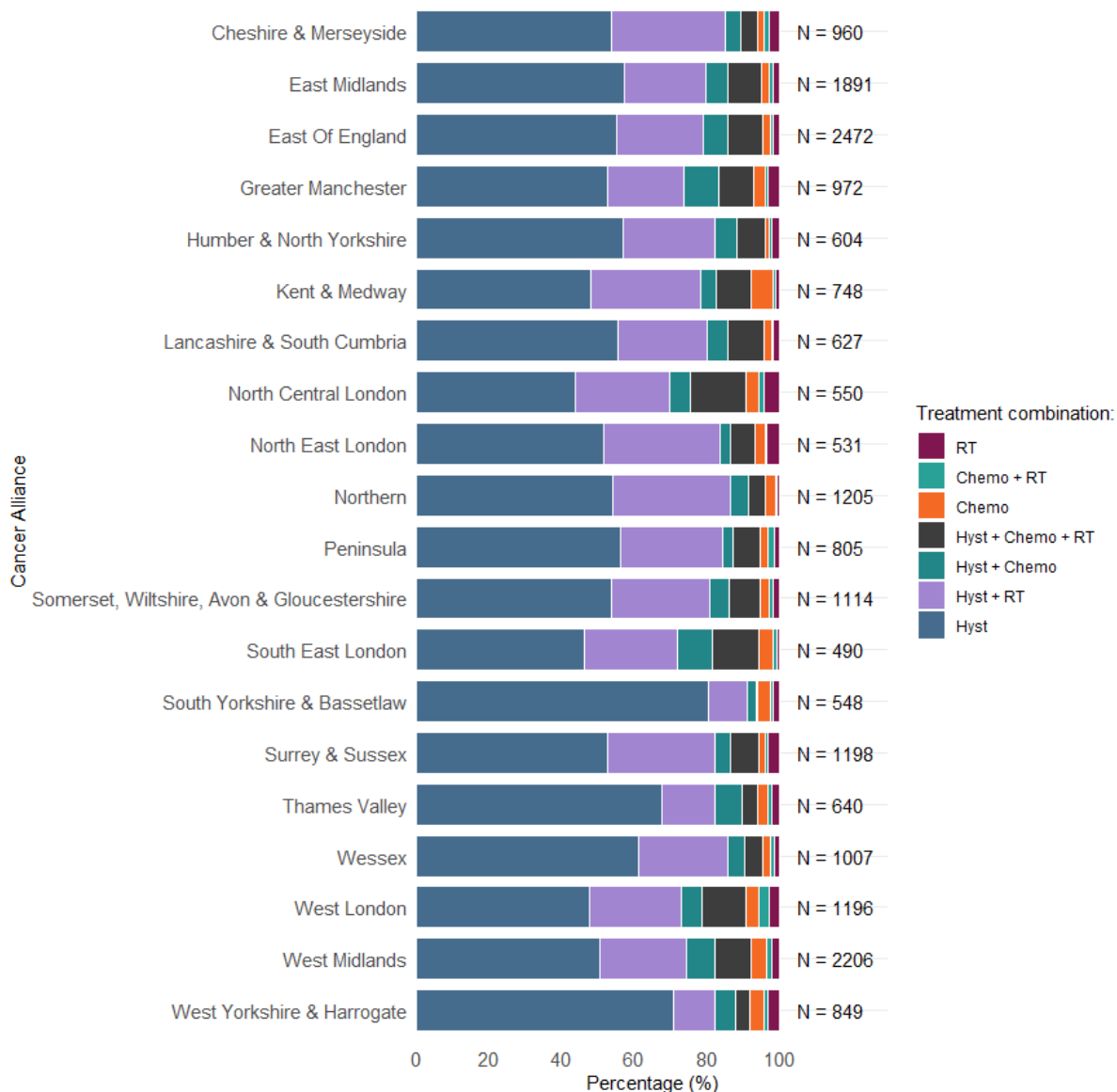
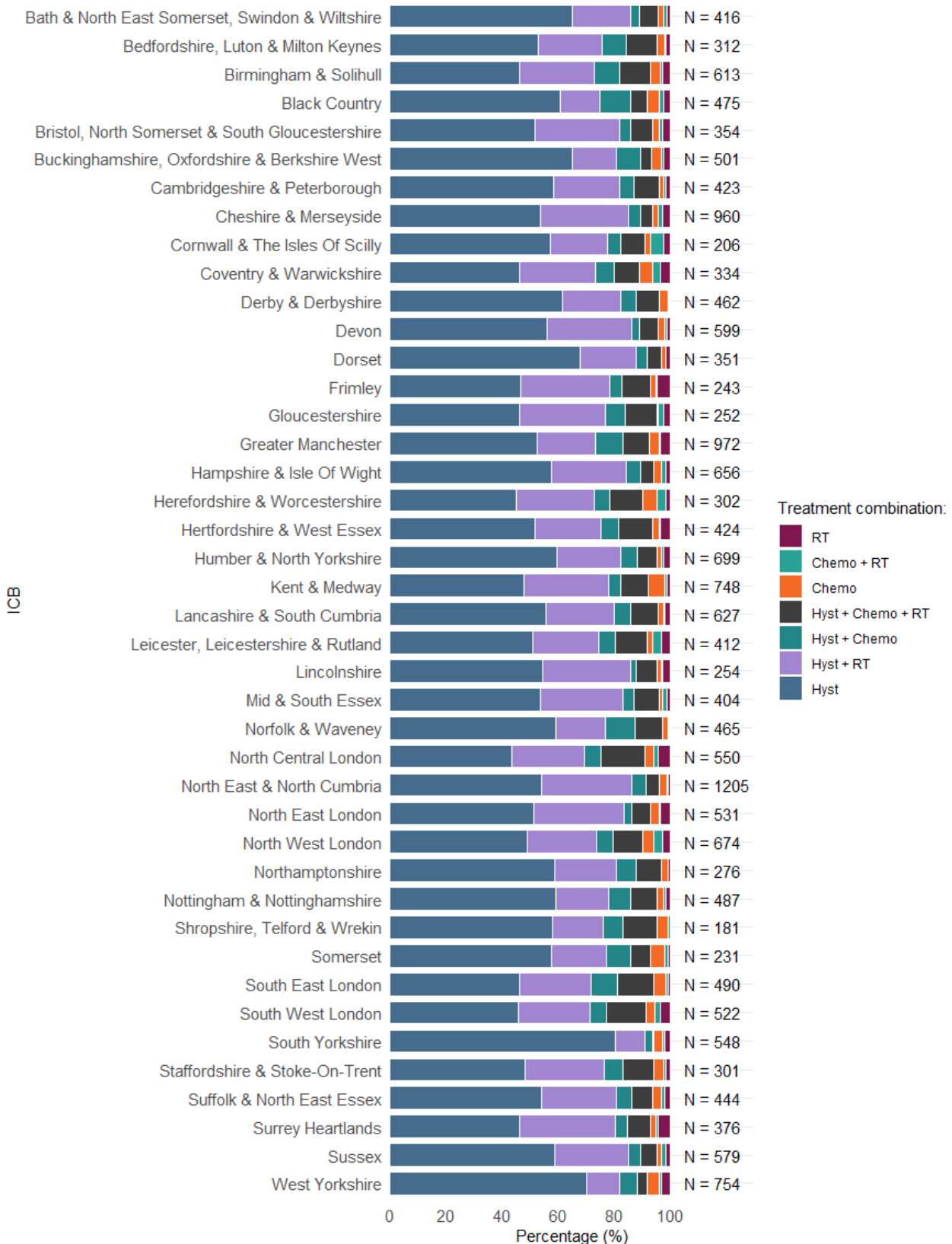


Figure 28 : Distribution of treatment combinations among women diagnosed with endometrial cancer from 2017 to 2019, who received any treatment with surgery, chemotherapy or radiotherapy, by Integrated Care Board at diagnosis



10. Appendices

Appendix 1: Treatment data sources

The National Cancer Registration Dataset (NCRD) was used to select people with a registered diagnosis of endometrial cancer where the initial diagnosis occurred between 1st January 2017 and 31st December 2019. Death certificate data in the NCRD were used to exclude people with a death certificate only cancer registration.

The Cancer Analysis System (CAS) is the database system maintained and used by the National Cancer Registration and Analysis Service, containing data on all tumours registered in England. Versions of the CAS are indicated by “AV” with a numerical indication of the date of the data. Data in this report were derived from the CAS. Further documentation can be found in the Data Resource Profile: National Cancer Registration Dataset in England which contains information about the registry dataset used for this report. Available from <https://doi.org/10.1093/ije/dyz076>.

For analysis of the treatments in this report, relevant information was included where treatment occurred within 31 days pre-diagnosis and up to nine months post-diagnosis. This time frame was used to capture interventions given as part of the patient’s primary course of treatment, while minimising the likelihood of including treatments for recurrence. For a small number of cases, this period is likely to have led to the inclusion of women who had a quickly diagnosed recurrence after surgical resection and received radiotherapy or chemotherapy as treatment for recurrence, but this would only be for a very small percentage of the cohort.

Surgical procedures

Analysis looking at use of surgical procedures was based on records from the Hospital Episodes Statistics (HES) Admitted Patient Care (APC) and HES Outpatient (OP) datasets, along with information from the treatment table of the NCRD. The table below provides the OPCS code(s) associated with each surgical procedure considered in the report, based on existing publications.¹³ Hysterectomy for endometrial cancer was defined where codes were recorded with an associated ICD-10 code for endometrial cancer.

Surgical approach	OPCS code
Hysterectomy	Q07.1, Q07.2, Q07.3, Q07.4, Q07.5, Q07.8, Q07.9, Q08.1, Q08.2, Q08.3, Q08.8, Q08.9
Robotic hysterectomy	Any hysterectomy code (as above) with Y75.3
Laparoscopic hysterectomy	Any hysterectomy code (as above) with one of: Y75.1, Y75.2, Y75.5, Y75.8, Y75.9, T43.9
Vaginal hysterectomy	Any of: Q08.1, Q08.2, Q08.3, Q08.8, Q08.9. Without codes indicating a laparoscopic or robotic approach.
Failed minimal access	Y71.4
Open hysterectomy	Any of: Q07.1, Q07.2, Q07.3, Q07.4, Q07.5, Q07.8, Q07.9. Without codes indicating a laparoscopic or robotic approach.

¹³ Moss EL, Morgan G, Martin AP, Sarhanis P, Ind T. (2020). Surgical trends, outcomes and disparities in minimal invasive surgery for patients with endometrial cancer in England: a retrospective cohort study. *BMJ Open*. 16;10(9):e036222.

Chemotherapy

Analysis looking at use of chemotherapy was based on records within the Systemic Anti-Cancer Therapy dataset (SACT), along with information from the treatment table of the NCRD. Analysis considered all systemic anti-cancer therapies, hereafter referred to as 'chemotherapy' for simplicity, excluding those regimens recorded as "NOT CHEMO", "NOT MATCHED", for a trial or exclusively supportive therapy (primarily zoledronic acid). Records of other treatments such as endocrine therapy were underreported in SACT.

Chemotherapy records in the NCRD were included where any of following were flagged:

NCRD field	Category
Cancer treatment modality	Anti-cancer drug regimen (Cytotoxic Chemotherapy)
Cancer treatment modality	Chemoradiotherapy
Cancer treatment modality	Anti-cancer drug regimen (other)
Cancer treatment modality	Anti-cancer drug regimen (Immunotherapy)
Cancer treatment modality	Biological Therapies (excluding Immunotherapy)
Cancer treatment modality	Chemotherapy - Other/ NK

Use of chemotherapy was defined based on the first recorded cycle date or administration date within a regimen (regimen start date was used where the regimen was empty) in SACT or date of chemotherapy captured in the NCRD. Chemotherapy with a start date earlier than surgery was defined as neoadjuvant, whilst instances where the first chemotherapy was dated after surgery were defined as adjuvant. Where surgery was not recorded, chemotherapy was defined as neoadjuvant where this was recorded as the treatment intent within SACT else it was defined as "Chemotherapy only".

Radiotherapy

Analysis looking at use of radiotherapy techniques was based on records within the National Radiotherapy DataSet (RTDS), along with information from the treatment table of the NCRD.

Radiotherapy records in the NCRD were included where any of following were flagged:

NCRD field	Category
Cancer treatment modality	Chemoradiotherapy
Cancer treatment modality	External Beam Radiotherapy (excluding Proton Therapy)
Cancer treatment modality	Brachytherapy
Cancer treatment modality	Radioisotope Therapy (including Radioiodine)
Cancer treatment modality	Radiosurgery
Cancer treatment modality	RT - Other/ NK

Use of radiotherapy was defined based on the earliest of recorded attendance date in RTDS or date of radiotherapy in the NCRD.

Endocrine (hormone) therapy

Analysis looking at endocrine therapy used information from the treatment table of the NCRD, SACT, HES, and the Primary Care Prescription Database (PCPD) to identify use.

Endocrine therapy records in the NCRD were included where “Anti-cancer drug regimen (Hormone Therapy)” was flagged as the cancer treatment modality.

Regimens in SACT categorised as hormones were included, unless identified as Tamoxifen in the regimen name.

Records in HES were extracted as endocrine therapy where the following OPCS codes were recorded:

Endocrine therapy	OPCS code
Mirena coil	Q12.1, Q12.2, Q12.3, Q12.4, Q12.8, Q12.9
Any	X74.1, X74.2

Records in the PCPD were extracted as endocrine therapy for endometrial cancer based on the following drugs: ANASTROZOLE, LETROZOLE, MEDROXYPROGESTERON, MEGESTROL, or PROGESTERONE. Use of endocrine therapy was defined based on the earliest date of endocrine therapy in the NCRD, first recorded cycle date or administration date within a regimen (regimen start date was used where the regimen was empty) in SACT, admission date in HES, or prescription date captured in the PCPD.

Appendix 2: Glossary of treatment terms (ordered alphabetically)

Adjuvant therapy – Treatment given after the primary treatment to lower the chance of the cancer coming back (this might be chemotherapy, radiotherapy or endocrine therapy).

Biopsy – Taking a small sample of tissue or cells to examine under a microscope to confirm a diagnosis.

Brachytherapy (Internal Radiotherapy) – A sealed radiation source is placed inside the body (intracavitary) or directly into tissues (interstitial) to give a high dose where needed while sparing nearby organs.

External beam radiotherapy – Radiotherapy delivered from outside the body to the pelvis (and/or para-aortic area). Delivered by a Radiotherapy Linear Accelerator machine, using short daily treatments over 4 or 5 weeks.

Failed minimal access surgery – When planned laparoscopic/robotic surgery is not safe or feasible to continue and so is converted to open surgery.

Hysterectomy - A surgical procedure to remove the uterus.

Interval debulking surgery – Surgery performed after neoadjuvant chemotherapy when initial primary surgery isn't feasible or where surgery may be safer and with reduced surgical morbidity if performed following initial chemotherapy; used in selected advanced endometrial cancers (especially serous histology) by extrapolation from ovarian cancer practice.

Laparoscopic hysterectomy – “Keyhole” hysterectomy performed with a camera and long instruments via small cuts in the abdomen and usually removal of the uterus through the vagina.

Lymphadenectomy – An operation to remove lymph nodes (pelvic and/or para-aortic) for staging/clearance.

Minimal access surgery – An umbrella term for laparoscopic or robotic-assisted hysterectomy performed through small cuts in the abdomen (often removing the uterus via the vagina).

Neoadjuvant therapy – Treatment given before the main treatment (usually surgery) to shrink or downstage disease (e.g., chemotherapy) in order to make surgery safer or to reduce the morbidity of surgery.

Open hysterectomy – A surgical procedure to remove the uterus through a cut in the lower abdomen.

Para-aortic nodes – Lymph nodes along the body's main blood vessels at the back of the abdomen.

Pelvic nodes – Lymph nodes within the pelvis that are often the first place the endometrial cancer can spread to.

Robotic hysterectomy – A form of minimal access surgery where the surgeon uses a robotic console to control laparoscopic instruments.

Sentinel lymph node biopsy – A tracer/dye is injected around the cervix to identify the first lymph node(s) that drain the womb; used to stage nodes while avoiding full pelvic/para-aortic lymphadenectomy in suitable patients.

Vaginal hysterectomy – A surgical procedure to remove the uterus through the vagina without any abdominal incisions.

Vaginal vault brachytherapy – A form of brachytherapy delivered by inserting an applicator inside the vagina for a few minutes, ranging from 1-4 sessions.

Appendix 3: Cohort definition

The cohort of women studied for this report were selected according to the criteria below.

Inclusion criteria:

1. Confirmed diagnosis of endometrial cancer, defined based on ICD-10 (International Classification of Diseases, Tenth Revision) codes C54/C55 and morphology codes (classified according to the International Classification of Diseases for Oncology, 3rd Edition, first revision)
 - C54.1;
 - Any of C54.0, C54.3, C54.8 or C54.9, with an epithelial, carcinosarcoma or mullerian mixed tumour morphology (identified by morphology codes¹⁴ 8010-8012, 8014-8035, 8041-8046, 8050-8148, 8160-8231, 8250-8530, 8541, 8550-8576, 8959, 8982, 9110, 8013, 8154, 8246, 8980, 8981 or 8950);
 - C55 with a carcinosarcoma or mullerian mixed tumour morphology (identified by morphology codes 8980, 8981 or 8950).
2. Diagnosis date between 1st January 2017 and 31st December 2019;
3. Resident in England at the time of diagnosis (based on recorded Lower layer Super Output Area; LSOA);
4. Gender self-reported as “Female”;
5. Aged 18 years or over on the date of endometrial cancer diagnosis.
6. Diagnosed via any method other than a death certificate, such that treatment would have been offered.

Exclusion criteria:

7. Cancer registration record which included a morphology code indicating uterine cancer, specifically records for adenosarcoma, endometrial stromal sarcoma, leiomyosarcoma, undifferentiated sarcoma or miscellaneous sarcoma (see below for the associated morphology codes);
8. Gender self-reported not as “Female”, i.e., where the sex-specific diagnosis code does not match the person-stated gender. This may have excluded some people who were transgender or non-binary.

Within each patient, the earliest relevant primary tumour documented between 01 January 2017 and 31st December 2019 was included, unless otherwise specified.

Cases with the following morphology codes were considered to be uterine tumours and therefore excluded:

¹⁴ Classified according to the International Classification of Diseases for Oncology, 3rd Edition, first revision

Adenosarcoma - 8933;

Endometrial Stromal Sarcoma - 8930, 8931, 8932, 8935;

Leiomyosarcoma - 8890-8898;

Undifferentiated sarcoma - 8800-8805;

Miscellaneous Sarcoma - 8381, 8806-8858, 8900-8921, 8936, 8961-8974, 9120-9363, 9480-9989, 9364, 9365.

Appendix 4: Cancer stage

Stage presented in this report is the FIGO 2009 stage at diagnosis of the tumour. Tumour stages are numbered from 1 to 4, with higher values indicating more advanced disease. If no staging data were available at the time of analysis, the corresponding tumour was defined as 'Unknown'.

Appendix 5: Endometrial tumour morphology groups

Each tumour was assigned to distinct morphology groups based on the following criteria:

- Endometrioid Adenocarcinoma: 8380, 8382, 8383, 8430, 8470, 8471, 8560, 8570;
- Serous: 8050, 8441, 8442, 8450, 8451, 8460, 8461, 9014;
- Carcinosarcoma: 8033, 8980, 8981, 8950;
- Clear Cell: 8310, 8443;
- Miscellaneous and Unspecified: 8000-8005, 8580-8790, 8860-8881, 8940, 8941, 8959, 8960, 8983, 9010-9013, 9016-9105, 9370-9474;
- Undifferentiated/differentiated Carcinoma: 8020-8022, 8030-8032, 8034, 8035;
- Other Classified & Unclassified Carcinoma: 8010-8015, 8036-8046, 8051-8131, 8140-8141, 8190-8211, 8230-8231, 8255-8263, 8323, 8384, 8142-8180, 8212-8221, 8240-8254, 8264-8300, 8311-8322, 8324-8375, 8390-8420, 8440, 8452-8459, 8472, 8480-8490, 8500-8508, 8510, 8512-8543, 8550, 8551, 8561, 8562, 8571-8576, 9000, 9015, 9110;

Appendix 6: Geographies

Geographic variation was analysed at the Cancer Alliance and Integrated Care Board (ICB) levels according to borders defined in 2024.

Cancer Alliances are geographic areas that bring together clinicians and managers from different trusts and other health and social care organisations with the aim of coordinating the diagnosis and treatment of people with cancer in the local area.

Established in 2022, ICBs are statutory organisations that bring the NHS together at a local level to improve population health and establish shared strategic priorities within the NHS. England is divided into 42 ICBs.

Each patient was assigned to a Cancer Alliance and ICB based on trust information. For most analyses, this was the trust where the diagnosis was made. For analyses of surgery type, however, patients were assigned according to the trust where surgery was performed; if surgery took place outside the NHS (e.g. a private hospital), the trust of diagnosis was used instead.

For patients with no recorded trust of diagnosis ($n = 127$) or where the trust recorded was not an English NHS trust ($n = 6$ with a Welsh local health board assigned) Cancer Alliance and ICB at diagnosis were instead determined from their post code at diagnosis.