

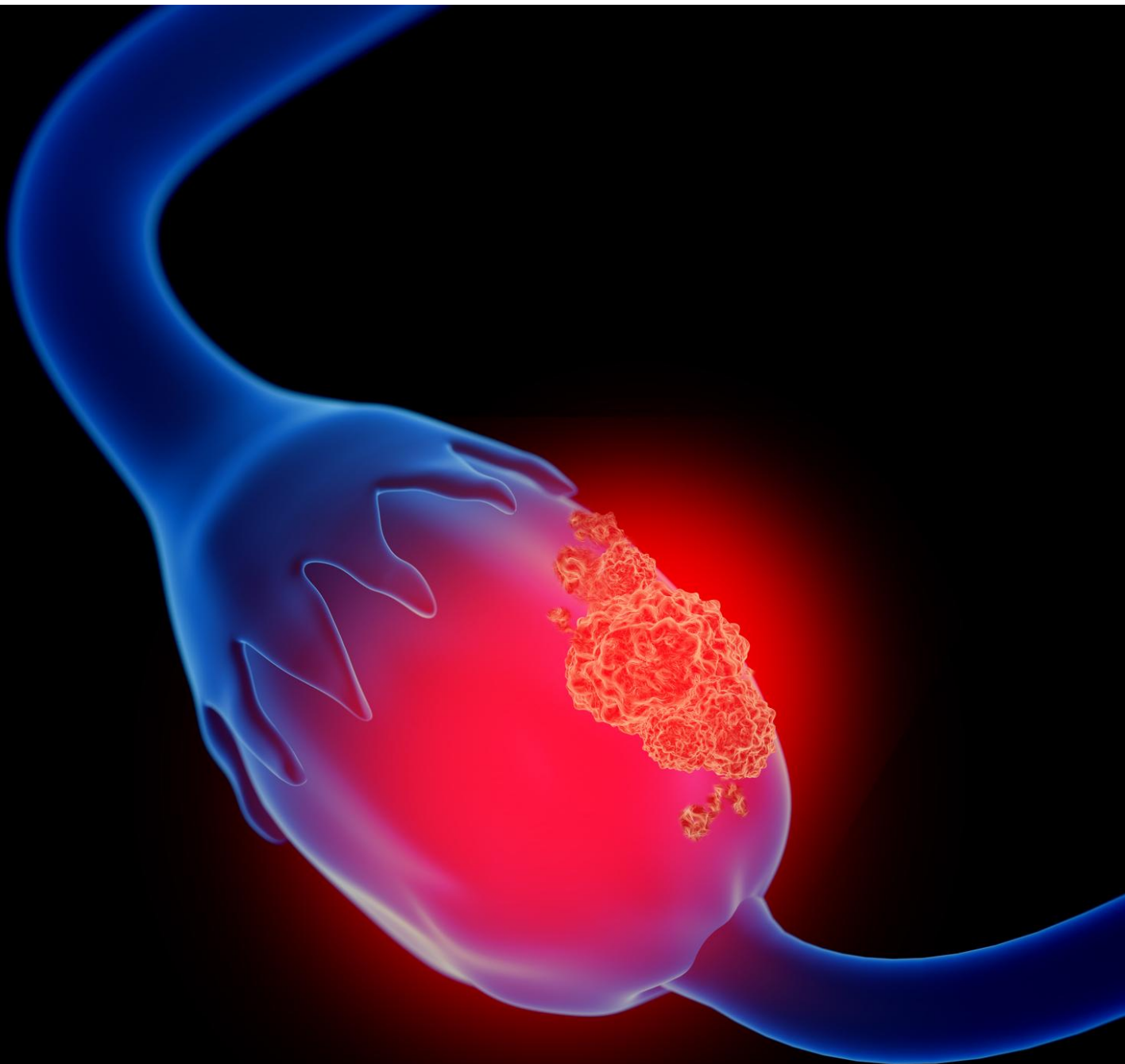
National Ovarian Cancer Audit

State of the Nation Report 2025: Methodology Supplement

An audit of care received by women diagnosed with ovarian cancer between 1 January 2022 and 31 December 2022 in England and 1 January 2022 and 31 December 2023 in Wales.

Published September 2025

v1.0



Citation for this document:

National Ovarian Cancer Audit (NOCA)
State of the Nation Report 2025. London:
National Cancer Audit Collaborating Centre,
Royal College of Surgeons of England, 2025.

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The National Cancer Audit Collaborating Centre (NATCAN) is commissioned by the [Healthcare Quality Improvement Partnership \(HQIP\)](#) and funded by NHS England and Welsh Government as part of the [National Clinical Audit and Patient Outcomes Programme \(NCAPOP\)](#). NATCAN delivers national audits in bowel, breast (primary and metastatic), kidney, lung, non-Hodgkin lymphoma, oesophago-gastric, ovarian, pancreatic and prostate cancers.



The British Gynaecological Cancer Society (BGCS) is the professional home of health providers working and researching the area of gynaecological cancers. The BGCS members consist of medical practitioners, clinical nurse specialists and other allied professionals, including scientists who have an interest in gynaecological cancers. Registered Charity no: 290959.



This work uses data that has been provided by patients and collected by the NHS as part of their care and support. For patients diagnosed in England, the data is collated, maintained and quality assured by the National Disease Registration Service (NDRS), which is part of NHS England. Access to the data was facilitated by the NHS England Data Access Request Service.



NHS Wales is implementing a new cancer informatics system. As a result, the quality and completeness of data from Wales is likely to have been impacted due to implementation of this new system across multiple NHS organisations (Health Boards), which has resulted in data being supplied by both old and new systems. Additionally, and reflecting the uncertainty of data quality, the data submitted to the audit may not have undergone routine clinical validation prior to submission to the Wales Cancer Network (WCN), Public Health Wales.

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1. Introduction

This document provides supporting material to the 2025 State of the Nation (SotN) Report for the National Audit of Ovarian Cancer (NOCA) and its data tables and data viewer. The document describes the data used in the report with details on sources of data, criteria for inclusion and how data completeness, patient characteristics and performance indicators are derived and reported.

2. Sources of Data

The audit uses information from routine national health care datasets in England and Wales. These datasets capture details on the diagnosis, management, treatment and outcome of every patient newly diagnosed with cancer in the NHS in England and Wales.

For England, the audit received information from the National Disease Registration Service (NDRS) at a tumour level for this State of the Nation report. The information held in the NCRD is compiled from a variety of sources including the Cancer Outcomes and Services Dataset (COSD), Hospital Episode Statistics admitted patient care (HES APC) records, the Systemic Anti-Cancer Therapy dataset (SACT) and data submitted by pathology laboratories. The audit also received linked information from COSD (linked at tumour level), HES APC, HES Outpatients data (HES OP), SACT and RTDS (all linked at patient level). Appendix 1 provides more detail on the data sources listed below and the information they contain.

The English data received by the National Cancer Audit Collaborating Centre (NATCAN) included data on patients registered with cancer up to 31 December 2022.

As with cancer registries in other countries, cancer registrations in England can take up to 5 years after the end of a given calendar year to reach 100% completeness and stability. NDRS uses an active system of gathering information on cancer diagnoses from multiple sources across the patient pathway. Completeness varies by tumour type because different patient pathways provide different opportunities for data flows into NDRS. The 'Gold standard' cancer registration dataset that is used in cancer statistics bulletins and available for analysis outside of NDRS contains over 98% of all the people that will eventually be found by the registration process, and the completeness for a calendar year of data increases over time. More information about the cancer registration process can be found [here](#).

For Wales, the audit was provided with a registration dataset at patient level for patients diagnosed with cancer in 2023. Welsh cancer registration data is captured through a national system, Cancer Information System for Wales (CaNISC) and the new Welsh Clinical Portal. The audit also received linked datasets of records from the Patient Episode Database for Wales (PEDW) containing information on inpatient and day case activity, and mortality data from the Office for National Statistics (ONS).

Preparation of patient-level datasets for England and Wales was managed separately and combined for analysis.

3. Inclusion and Exclusion Criteria

The data submitted by NDRS and WCN is checked and filtered for eligible participants, tables 3.1 and 3.2 explain the process in defining the final cohort to be used in the audit.

People were included for analysis within the SotN Report if they met the following inclusion and not the exclusion criteria:

Table 3.1: Audit Inclusion Criteria

<u>Inclusion Criteria</u>	<u>Details</u>
Ovarian (including fallopian tube and primary peritoneal) cancer	ICD-10 codes C48 (Malignant neoplasm of retroperitoneum and peritoneum), C56 (Malignant neoplasm of ovary), C57 (Malignant neoplasm of other and unspecified female genital organs) or D39.1 (Neoplasm of uncertain or unknown behaviour of female genital organs - ovary).
Adults	Age >=18

Females	Gender recorded as female
Valid Diagnosis Date	1/1/2022 to 31/12/2022 (England) and 1/1/2023 to 31/12/2023 (Wales)
First ovarian cancer diagnosis	No earlier (since 1/1/2015) eligible ovarian tumour recorded in NCRD
Eligible organisation	Diagnosed at an eligible NHS trust (England) or Health Board (Wales).

Table 3.2: Audit Exclusion Criteria

<u>Exclusion Criteria</u>	<u>Details</u>
Type of cancer	<p>Sarcomas with ICD-10 code C48 (ICD-O-2 morphology 8693, 8800, 8801, 8802, 8803, 8804, 8805, 8806, 8963, 8990, 8991, 9040, 9041, 9042, 9043, 9044, 8810, 8811-8921, 9120-9373, 9490, 9500, 9530-9582)</p> <p>Borderline tumours as defined by the NDRS morphology lookup via https://nhsd-ndrs.shinyapps.io/get_data_out/</p>
Reported by death certificate only	<p>For English data: dco = Y (tumour registered from a death certificate only)</p> <p>For Welsh data: DiagnosisDate = DeathDate</p>

4. Key Data Items

Details of the variables and datasets used to compile the data completeness are shown below in Table 4.1

Table 4.1: Data Completeness Variables

<u>Data Item</u>	<u>Source</u>			
	England		Wales	
	<u>Data field</u>	<u>Dataset</u>	<u>Data field</u>	<u>Dataset</u>
Age at diagnosis	age	NCRD	AgeAtDiag	Registration
Ethnicity	ethnicity	NCRD	EthnicGroupCategory	PEDW
Stage at Diagnosis	stage_best	NCRD	StageOther or StageGroup	Registration
Grade	grade	NCRD	<i>Not available</i>	
Performance status	performancestatus	COSD	PerformanceStatus	Registration
Basis of diagnosis	basisofdiagnosis	NCRD	DiagnosisBasis	Registration

Patients with the following ICD-O-2 morphology codes are excluded from the denominator for data completeness for grade because they are not usually graded: 8044, 8320, 8590, 8591, 8592, 8594, 8620, 8622, 8623, 8630, 8632, 8670, 8897, 9000, 9060, 9064, 9071, 9073, 9085, 9090, 9100.

Patients with no recorded grade and one of the following ICD-O-2 morphology codes are categorised as complete with an inferred grade: 8460, 8931 (low grade), 8249, 8631 (intermediate grade), 8020, 8021, 8033, 8041, 8045, 8120, 8310, 8313, 8461, 8490, 8634, 8805, 8891, 8950, 8951, 8980, 9120, 9364 (high grade).

Details of the variables and datasets used to compile the patient characteristics are shown below in Table 4.2.

Table 4.2: Patient Characteristics Variables				
<u>Data Item</u>	<u>Source</u>			
	England		Wales	
	<u>Data field</u>	<u>Dataset</u>	<u>Data field</u>	<u>Dataset</u>
Age at diagnosis	See Table 4.1		See Table 4.1	
Index of multiple deprivation	<i>imd19_quintile_isoas</i>	NCRD	<i>deprivationquintile</i>	PEDW
Performance status	See Table 4.1		See Table 4.1	Registration
Stage at Diagnosis	See Table 4.1		See Table 4.1	
Grade	See Table 4.1		Not available	
Morphology	Derived from <i>morph_icd10_o2</i> and <i>site_icd10_3char</i> using the NDRS morphology lookup	NCRD	Derived from <i>Histology</i> and <i>PrimarySite</i> using the NDRS morphology lookup	Registration

5. Indicator Definitions

The audit uses key indicators to monitor progress against its healthcare improvement goals. These indicators align with national guidelines and standards. Definitions of how the indicators included in the SotN report were derived from data for England and Wales are described below.

5.1 Performance Indicator 1: Emergency admission prior to diagnosis

This indicator measures the percentage of patients who had an emergency admission in the 4 weeks prior to their diagnosis.

Emergency admissions prior to diagnosis were derived by linking the date of diagnosis recorded in registration data with hospital admission records for England (HES) and Wales (PEDW).

Table 5.1: Patients who have an emergency admission in the 4 weeks prior to diagnosis		
	<u>England</u>	<u>Wales</u>
Dates of diagnosis:	1/1/2022 to 31/12/2022	1/1/2023 to 31/12/2023
Numerator: Number of patients with an emergency admission in the 28 days prior to diagnosis.	Number of patients with an admission date (<i>admidate</i>) and an emergency admission (<i>admimeth</i> field with first character 2) recorded in a linked HES APC episode up to 28 days prior to the date of diagnosis (<i>diagnosisdatebest</i>) recorded in NCRD.	Number of patients with an admission category (<i>AdmissionMethodCategory</i>) coded "Emergency" and admission date (<i>AdmissionDate</i>) recorded in a linked PEDW record up to 28 days prior to the date of diagnosis (<i>DiagnosisDate</i>) recorded in the registration extract.

Denominator: Number of patients diagnosed with ovarian cancer	Final cohort as described in patient inclusion / exclusion.	Final cohort as described in patient inclusion / exclusion.
Construction notes		
Country reporting:	England & Wales combined	
Organisational reporting level:	NHS trust	Health Board
Subgroup reporting:	No	No
Risk adjusted:	No	
Outlier reporting:	No	

5.2 Performance Indicator 2: Receipt of any treatment for women with an emergency admission prior to diagnosis

This indicator measures the percentage of patients who had an emergency admission in the 4 weeks prior to their diagnosis.

Emergency admissions prior to diagnosis were derived by linking the date of diagnosis recorded in registration data with hospital admission records for England (HES) and Wales (PEDW).

Table 5.2: Patients who receive any type of treatment (surgery and/or chemotherapy) within 1 month prior to 9 months following diagnosis

	<u>England</u>	<u>Wales</u>
Dates of diagnosis:	1/1/2022 to 31/12/2022	1/1/2023 to 31/12/2023
Numerator: Number of patients with a record of treatment (surgery and/or chemotherapy) in the period one month prior to nine months after diagnosis.	<p>Number of patients with a record of an eligible OPCS code for surgery in the NCRD treatment table or HES APC and/or an eligible chemotherapy record in the NCRD treatment table, SACT or HES APC.</p> <p>Surgery (HES): any eligible OPCS code appearing in <i>opertn_nn</i> with <i>opdate_nn</i> within -30 to +274 days of <i>diagnosisdatebest</i> in NCRD. <i>admidate</i> was substituted for a missing or invalid <i>opdate_nn</i></p> <p>Surgery (NCRD treatment table): any eligible OPCS code appearing in <i>opcs4_code</i> and <i>eventdate</i> within -30 to +273 days of <i>diagnosisdatebest</i> in NCRD.</p> <p>Chemotherapy (HES APC and OP): any eligible OPCS code (see Appendix 2) appearing in <i>opertn_nn</i> or eligible ICD10 code appearing in <i>diag_nn</i> with <i>epistart</i> within -30 to +273 days of <i>diagnosisdatebest</i> in NCRD.</p> <p>Chemotherapy (NCRD treatment table): any record including 'cytotoxic' in <i>eventdesc</i> with an</p>	<p>Number of patients with a record of an eligible OPCS code for surgery in the registration extract or PEDW and/or an eligible chemotherapy record in the registration extract or PEDW.</p> <p>Surgery (PEDW): any eligible OPCS code appearing in <i>operationnnn</i> with <i>operationnnndatestyle</i> within -30 to +273 days of <i>DiagnosisDate</i> in the registration extract.</p> <p>Surgery (registration extract): any eligible OPCS code appearing in <i>SurgicalProcedures</i> with <i>SurgeryDate</i> within -30 to +273 days of <i>DiagnosisDate</i>.</p> <p>Chemotherapy (PEDW): any eligible OPCS code appearing in <i>operationnnn</i> with <i>operationnnndatestyle</i> within -30 to +273 days of <i>DiagnosisDate</i> in the registration extract OR any eligible ICD10 code appearing in <i>diagnosisnn</i> with <i>episodestartdate</i> within -30 to +273 days of <i>DiagnosisDate</i> in the registration extract.</p> <p>Chemotherapy (registration</p>

	<p><i>eventcode</i> 02, 02_15 or 02_21 and <i>eventdate</i> within -30 to +273 days of <i>diagnosisdatebest</i> in NCRD.</p> <p>Chemotherapy (SACT): any event with <i>start_date_of_regimen</i> within -30 to +273 days of <i>diagnosisdatebest</i> in NCRD. NCRD treatment tables are linked by tumour ID and the above was applied to additional tumours for patients with >1 tumour.</p>	extract): <i>ChemoStarted</i> within -30 to +273 days of <i>DiagnosisDate</i> .
Denominator: Number of patients patients who had an emergency admission in the 28 days prior to diagnosis.	See numerator definition in Table 5.1.	See numerator definition in Table 5.1.
Construction notes		
Country reporting:	England & Wales Combined	
Organisational Reporting level:	Gynaecological Cancer System	Gynaecological Cancer System
Subgroup reporting:	No	No
Risk adjusted:	No	
Outlier reporting:	No	

5.3 Performance Indicator 3: Receipt of any treatment (surgery or chemotherapy)

This indicator measures the percentage of patients who received any type of treatment (surgery and/or chemotherapy) within 1 month prior to 9 months following diagnosis.

Table 5.3: Patients who receive any type of treatment (surgery and/or chemotherapy) within 1 month prior to 9 months following diagnosis		
	<u>England</u>	<u>Wales</u>
Dates of diagnosis:	1/1/2022 to 31/12/2022	1/1/2023 to 31/12/2023
Numerator: Number of patients with a record of treatment (surgery and/or chemotherapy) in the period one month prior to nine months after diagnosis.	See numerator definition in Table 5.2	See numerator definition Table 5.2
Denominator: Number of patients patients diagnosed with stage 2-4 or unstaged ovarian cancer.	Final cohort as described in patient inclusion / exclusion with additional exclusion of <i>stage_best</i> = 1.	Final cohort as described in patient inclusion / exclusion with additional exclusion of <i>StageOther</i> or <i>StageGroup</i> = 1.
Construction notes		
Country reporting:	England & Wales Combined	
Organisational Reporting level:	Gynaecological Cancer System	Gynaecological Cancer System
Subgroup reporting:	No	No
Risk adjusted:	No	
Outlier reporting:	No	

5.4 Performance Indicator 4: Receipt of platinum-based chemotherapy

This indicator measures the percentage of patients who had an emergency admission in the 4 weeks prior to their diagnosis.

Emergency admissions prior to diagnosis were derived by linking the date of diagnosis recorded in registration data with hospital admission records for England (HES) and Wales (PEDW).

Table 5.4: Patients who receive platinum-based chemotherapy within 1 month prior to 3 months following diagnosis		
	England	Wales
Dates of diagnosis:	1/1/2022 to 31/12/2022	N/A
Numerator: Number of patients with a record of treatment (surgery and/or chemotherapy) in the period one month prior to nine months after diagnosis.	<p>The presence of any platinum-based chemotherapy record in SACT or Hospital Episode Statistics APC or OP within -1 month (up to 30 days before) and +3 months (up to 91 days after) <i>diagnosisdatebest</i> in NCRD.</p> <p>Chemotherapy (SACT): presence of an event reporting platinum-based chemotherapy regimen / drug (carboplatin, oxaliplatin, cisplatin) identified in variables <i>analysis_group</i> or <i>drug_group</i> linked by <i>patient_pseudo_id</i>.</p> <p>Chemotherapy (HES APC, HES OP): presence of any of the OPCS code combinations for platinum-based chemotherapy drug procurement and delivery (Appendix 3) as defined from National Tariff for Chemotherapy Regimens[2], in the <i>opcs4_code</i> linked by <i>patient_pseudo_id</i>.</p>	N/A
Denominator: Number of patients diagnosed with a stage 2-4 or unstaged malignant Epithelial ovarian cancer	Patients with a stage at diagnosis (<i>stage_best</i>) including 2, 3, 4 or any missing or unknown AND a malignant epithelial morphology, see Table 4.2.	N/A
Construction notes		N/A
Country reporting:	England only	
Organisational reporting level:	Gynaecological Cancer System	N/A
Subgroup reporting:	No	N/A
Risk adjusted:	No	
Outlier reporting:	No	

5.5 Performance Indicator 5: One-year survival

This indicator measures the percentage of patients who had an emergency admission in the 4 weeks prior to their diagnosis.

Emergency admissions prior to diagnosis were derived by linking the date of diagnosis recorded in registration data with hospital admission records for England (HES) and Wales (PEDW).

Table 5.5: Patients who survive for one year following an ovarian cancer diagnosis		
	England	Wales
Dates of diagnosis:	1/1/2022 to 31/12/2022	1/1/2023 to 31/12/2023
Numerator: Number of patients without death recorded in the first year following diagnosis.	Survival (NCRD): patients with <i>vitalstatusdate</i> >365 days after <i>diagnosisdatebest</i> .	No record of <i>DeathDate</i> within 365 days of <i>DiagnosisDate</i> (linked ONS data) and no record of <i>dateofdeath</i> within 365 days of <i>DiagnosisDate</i> from the registration extract.
Denominator: Number of patients diagnosed with ovarian cancer.	Final cohort as described in patient inclusion / exclusion.	Final cohort as described in patient inclusion / exclusion.
Construction notes		
Country reporting:	England & Wales Combined	
Organisational Reporting level:	Gynaecological Cancer System	Gynaecological Cancer System
Subgroup reporting:	No	No
Risk adjusted:	Yes (age, age-squared, ethnicity, deprivation, morphology, grade, stage, comorbidity, frailty)	
Outlier reporting:	Yes	

5.6 Performance Indicator 6: Two-year survival

This indicator measures the percentage of patients who had an emergency admission in the 4 weeks prior to their diagnosis.

Emergency admissions prior to diagnosis were derived by linking the date of diagnosis recorded in registration data with hospital admission records for England (HES) and Wales (PEDW).

Table 5.6: Patients who survive for two years following an ovarian cancer diagnosis		
	England	Wales
Dates of diagnosis:	1/1/2022 to 30/9/2022	1/1/2022 to 31/12/2022
Numerator: Number of patients without death recorded in the first year following diagnosis.	Survival (NCRD): patients with <i>vitalstatusdate</i> >365 days after <i>diagnosisdatebest</i> .	No record of <i>DeathDate</i> within 365 days of <i>DiagnosisDate</i> (linked ONS data) and no record of <i>dateofdeath</i> within 365 days of <i>DiagnosisDate</i> from the registration extract.
Denominator: Number of patients diagnosed with ovarian cancer.	Final cohort as described in patient inclusion / exclusion with additional exclusion for diagnoses after 30/9/2022 based on <i>vitalstatusdate</i>	Final cohort as described in patient inclusion / exclusion.
Construction notes		
Country reporting:	England & Wales combined	
Organisational Reporting level:	Gynaecological Cancer System	Gynaecological Cancer System.
Subgroup reporting:	No	No
Risk adjusted:	Yes (age, age-squared, ethnicity, deprivation, morphology, grade, stage, comorbidity, frailty)	
Outlier reporting:	No	

6. NHS organisations

The main organisational unit for audit reporting is the gynaecological cancer system (GCS). This was recommended as a level for reporting performance indicators in the British Gynaecological Cancer Society's recommendations for evidence-based, population data derived quality performance indicators for ovarian cancer.[ref] This choice of unit acknowledges that decisions about ovarian cancer care are not always attributable to an individual NHS Trust such as the trust or hospital where a woman is diagnosed. It also avoids the problem of reporting indicators for individual trusts or hospitals that may diagnose a small number of patients each year.

Cancer systems were defined following a service mapping exercise that examined where patients were diagnosed with ovarian cancer and where they received surgery or chemotherapy. Cancer systems work on a 'hub and spoke' model with each system made up of a gynaecological cancer centre ('hub') and cancer units ('spokes') that typically refer some patients to the cancer centre for surgery.

In England, cancer systems were based around 40 specialist gynaecological cancer centres in 2021, see appendix 12 at Ovarian Cancer Audit Feasibility Pilot (digital.nhs.uk) [ref] Patients with ovarian cancer diagnosed in 2021 were assigned to a cancer system using, in order, the following process:

- (i) If patients were diagnosed in 38 of the 40 cancer centres then they were assigned to that cancer centre's cancer system. The two exceptions were Mid and South Essex NHS Foundation Trust and University Hospitals Sussex NHS Foundation Trust (see below).
- (ii) If patients were diagnosed in a NHS Trust that was not a cancer centre but received surgery (as defined in the 'any treatment' indicator) at one of the 38 cancer centres above then they were assigned to that cancer centre's cancer system.
- (iii) If patients were diagnosed at a NHS Trust (*diag_trust*) forming part of a cancer system they were included in that cancer system. The mapping of these NHS Trusts was based on where the majority of referrals to a cancer centre for surgery were made for patients diagnosed in 2021 and are shown in Appendix 4.
- (iv) Seven NHS Trusts routinely refer patients for surgery to more than once cancer centre that largely reflects historical referral patterns prior to a NHS Trust merger. These patients are assigned to a cancer system based on the typical surgery referral pattern for the hospital where they were diagnosed (*diag_hosp*). The seven NHS Trusts comprise five cancer units (Bedfordshire Hospitals NHS Foundation Trust, Chelsea and Westminster Hospital NHS Foundation Trust, County Durham and Darlington NHS Foundation Trust, Frimley Health NHS Foundation Trust, and York and Scarborough Teaching Hospitals NHS Foundation Trust) and two cancer centres (Mid and South Essex NHS Foundation Trust and University Hospitals Sussex NHS Foundation Trust). The mapping of these hospitals is shown in Appendix 4 marked with an asterisk.
- (v) For a small proportion of patients, around 0.8%, information on the NHS trust is missing or the NHS organisation is atypical, e.g., a community or non-relevant tertiary NHS trust. Patients are assigned to a cancer system using (ii) above, if applicable, and are unassigned if not applicable.

There are three cancer systems in Wales. Patients diagnosed with ovarian cancer in Wales in 2022 are assigned to a cancer system using the mapping between the hospital where they were diagnosed (*TrustSiteCode*) and the three cancer systems.

Many patients diagnosed in the three NHS Trusts in the Oxford University Hospitals NHS Foundation Trust cancer system, including at the cancer centre, were referred to Imperial College Healthcare NHS Trust for surgery in 2022. Process (ii) above was not applied to patients diagnosed in these Trusts who received surgery at Imperial. Instead, patients were assigned under (i) and (iii) to the Oxford cancer system with an acknowledgement that the system includes referrals for surgery to both Oxford and Imperial.

Appendix [] shows the mapping for 2022 (2023 for Wales) between the trusts or hospitals of diagnosis and cancer systems and the number of patients included in the audit. All major mapping of trusts or hospitals under processes

(i), (iii) and (iv) are shown. Patients assigned to a cancer system under (ii) from a trust or hospital mapped to another cancer system are included under 'Other' in the appendix.

7. Statistical Analysis

All statistical analyses were conducted using Stata version 17.

Most results in the SotN Report are descriptive. The results of categorical data items are reported as percentages (%). Results are typically provided as an overall figure and broken down by NHS organisation of diagnosis (see NHS organisations section). Note that within tables in the SotN Report, the total percentage may not equal 100%, due to rounding.

7.1 Suppression

- Data completeness results have not been suppressed.
- Organisations with indicator denominator values less than 5 have been suppressed.

7.2 Risk-adjustment of indicators

The tables of performance indicators state whether risk adjustment has been performed.

Table 7.1 below provides details on the datasets and variables used to compile the variable used for risk adjustment

Table 7: Risk Adjustment Variables		
<u>Data Item</u>	<u>Source</u>	
	England	Wales
Age at diagnosis	See Table 4.1 (adjusted for age and age-squared)	See Table 4.1 (adjusted for age and age-squared)
Ethnicity	See Table 4.1	See Table 4.1
Deprivation	See Table 4.1	See Table 4.1
Morphology	See Table 4.2	See Table 4.2
Grade	See Table 4.1 (categorised as low, intermediate, high or morphology not graded).	Inferred from morphology only as described in Section 4.
Stage at diagnosis	See Table 4.1	See Table 4.1
Charlson comorbidity index	Derived using the Royal College of Surgeons Charlson Score using ICD-10 diagnosis codes from HES APC (England) or PEDW (Wales) as described at: Armitage JN, van der Meulen JH. Identifying co-morbidity in surgical patients using administrative data with the Royal College of Surgeons Charlson Score. Br J Surg 2010;97:772-81. doi https://doi.org/10.1002/bjs.6930 The following changes were applied:	

	<ul style="list-style-type: none"> • All diagnosis codes in an eligible episode were used • Used hospital episodes in the 2 years prior to diagnosis and, in the absence of an index treatment episode, up to 30 days post-diagnosis • Malignancy, metastatic cancer and HIV/AIDS (suppressed in HES/PEDW) were excluded as comorbidities • Comorbidity coded as missing if there is no eligible episode
Secondary care administrative records frailty (SCARF) index	<p>Derived using ICD-10 diagnosis codes from HES APC (England) or PEDW (Wales) as described at: Jauhari Y, Gannon MR, Dodwell D et al. Construction of the secondary care administrative records frailty (SCARF) index and validation on older women with operable invasive breast cancer in England and Wales: a cohort study. BMJ Open 2020;10:e035395. doi: https://doi.org/10.1136/bmjopen-2019-035395</p> <p>The following changes were applied:</p> <ul style="list-style-type: none"> • In the absence of an index treatment episode an episode up to 30 days post-diagnosis was used • Frailty coded as missing if there is no eligible episode

7.3 Handling of missing data

For the risk-adjustment, missing values were imputed using multiple imputation by chained equations to create an estimated value to ensure all included people contributed to the statistical models.

8. Outlier Process

The outlier process can be found in the separate audit [outlier policy](#).

Appendix 1: Routine data sources

Overview of the data sources used for the SotN Report.

Country	Data source	Content
England	Cancer registry (NCRD and RCRD)	Data on all aspects of the cancer registration including information from hospital pathology systems.
England	COSD	Cancer Outcomes and Services dataset (COSD) items, are submitted routinely by service providers via multidisciplinary team (MDT) electronic data collection systems to the National Cancer Data Repository (NCDR) on a monthly basis.
England	SACT	Systemic Anti-Cancer Therapy (SACT) data contains information on chemotherapy dates, regimen(s) and dose(s).
England	HES	Hospital Episode Statistics (HES) is the administrative database of all NHS hospital admissions in England; records were supplied by NHS Digital to NCRAS.
Wales	CaNISC	Cancer Network Information System Cymru (Canisc) contains data on all aspects of the cancer registration including investigations. (OLD SYSTEM)
Wales	PEDW	Patient Episode Database for Wales (PEDW) is the administrative database of all NHS hospital admissions in Wales.
England & Wales	ONS	Office for National Statistics (ONS) death data including date of death and cause of death.

Appendix 2: OPCS4 and ICD10 codes used to define any chemotherapy

OPCS

code	Description
X701	Procurement of drugs for chemotherapy for neoplasm for regimens in Band 1
X702	Procurement of drugs for chemotherapy for neoplasm for regimens in Band 2
X703	Procurement of drugs for chemotherapy for neoplasm for regimens in Band 3
X704	Procurement of drugs for chemotherapy for neoplasm for regimens in Band 4
X705	Procurement of drugs for chemotherapy for neoplasm for regimens in Band 5
X708	Other specified procurement of drugs for chemotherapy for neoplasm in Bands 1-5
X709	Unspecified procurement of drugs for chemotherapy for neoplasm in Bands 1-5
X711	Procurement of drugs for chemotherapy for neoplasm for regimens in Band 6
X712	Procurement of drugs for chemotherapy for neoplasm for regimens in Band 7
X713	Procurement of drugs for chemotherapy for neoplasm for regimens in Band 8
X714	Procurement of drugs for chemotherapy for neoplasm for regimens in Band 9
X715	Procurement of drugs for chemotherapy for neoplasm for regimens in Band 10
X718	Other specified procurement of drugs for chemotherapy for neoplasm in Bands 6-10
X719	Unspecified procurement of drugs for chemotherapy for neoplasm in Bands 6-10
X721	Delivery of complex chemotherapy for neoplasm including prolonged infusional treatment at first attendance
X722	Delivery of complex parenteral chemotherapy for neoplasm at first attendance
X723	Delivery of simple parenteral chemotherapy for neoplasm at first attendance
X724	Delivery of subsequent element of cycle of chemotherapy for neoplasm
X728	Other specified delivery of chemotherapy for neoplasm
X729	Unspecified delivery of chemotherapy for neoplasm
X731	Delivery of exclusively oral chemotherapy for neoplasm
X738	Other specified delivery of oral chemotherapy for neoplasm
X739	Unspecified delivery of oral chemotherapy for neoplasm
X748	Other specified other chemotherapy drugs
X749	Unspecified other chemotherapy drugs
X352	Intravenous chemotherapy
X373	Intramuscular chemotherapy
X384	Subcutaneous chemotherapy

ICD10

code	Description
Z082	Follow-up exam after chemotherapy for malignant neoplasm
Z292	Other prophylactic chemotherapy
Z511	Chemotherapy session for neoplasm
Z512	Other chemotherapy
Z542	Convalescence following chemotherapy

Source: [Boyle et al 2021](#)[9]

Appendix 3: OPCS4 code combinations used to define platinum-based chemotherapy

Component Drug name	Procurement OPCS	Delivery OPCS
Carboplatin	X70.2	X72.3
Carboplatin	X70.2	X72.2
Carboplatin	X70.2	X72.1
Carboplatin	X70.3	X72.3
Carboplatin	X70.3	X72.1
Carboplatin	X70.3	X72.2
Carboplatin	X70.4	X72.3
Carboplatin	X70.4	X72.1
Carboplatin	X70.4	X72.2
Carboplatin	X70.5	X72.3
Carboplatin	X71.1	X72.2
Carboplatin	X71.1	X72.1
Carboplatin	X71.2	X72.1
Carboplatin	X71.3	X72.2
Carboplatin	X71.4	X72.2
Carboplatin	X71.4	X72.1
Carboplatin	X71.5	X72.1
Carboplatin	X71.5	X72.2
Carboplatin	X70.5	X72.2
Cisplatin	X70.1	X72.1
Cisplatin	X70.2	X72.1
Cisplatin	X70.2	X72.3
Cisplatin	X70.3	X72.1
Cisplatin	X70.4	X72.1
Cisplatin	X70.5	X72.1
Cisplatin	X71.1	X72.1
Cisplatin	X71.2	X72.1
Cisplatin	X71.3	X72.1
Cisplatin	X71.4	X72.1
Cisplatin	X71.5	X72.1
Oxaliplatin	X70.4	X72.2
Oxaliplatin	X70.4	X72.1
Oxaliplatin	X70.5	X72.1
Oxaliplatin	X70.5	X72.2
Oxaliplatin	X71.1	X72.2
Oxaliplatin	X71.1	X72.1
Oxaliplatin	X71.2	X72.1
Oxaliplatin	X71.4	X72.1
Oxaliplatin	X71.5	X72.1
Oxaliplatin	X71.5	X72.1

Appendix 4: Mapping of cancer systems with their constituent trusts or hospitals (location of diagnosis) and number of patients diagnosed and included in the audit

Gynaecological cancer system and NHS trusts/hospitals	
Manchester University NHS Foundation Trust	
Manchester University NHS Foundation Trust	97
Mid Cheshire Hospitals NHS Foundation Trust	34
The Christie NHS Foundation Trust	17
East Cheshire NHS Trust	14
Northern Care Alliance NHS Foundation Trust	60
Bolton NHS Foundation Trust	39
Tameside and Glossop Integrated Care NHS Foundation Trust	23
Wrightington, Wigan and Leigh NHS Foundation Trust	30
Stockport NHS Foundation Trust	36
Other	3
<i>Total</i>	<i>353</i>
University Hospitals Dorset NHS Foundation Trust	
University Hospitals Dorset NHS Foundation Trust	80
Dorset County Hospital NHS Foundation Trust	16
Salisbury NHS Foundation Trust	20
<i>Total</i>	<i>116</i>
Barts Health NHS Trust	
Barts Health NHS Trust	92
Barking, Havering and Redbridge University Hospitals NHS Trust	29
Homerton Healthcare NHS Foundation Trust	12
<i>Total</i>	<i>133</i>
Royal Surrey County Hospital NHS Foundation Trust	
Royal Surrey County Hospital NHS Foundation Trust	49
Ashford and St Peter's Hospitals NHS Foundation Trust	22
Surrey and Sussex Healthcare NHS Trust	37
*Frimley Health NHS Foundation Trust (Frimley Park)	27
<i>Total</i>	<i>135</i>
University Hospitals Bristol and Weston NHS Foundation Trust	
University Hospitals Bristol and Weston NHS Foundation Trust	79
North Bristol NHS Trust	23
<i>Total</i>	<i>102</i>
Mid and South Essex NHS Foundation Trust	
*Mid and South Essex NHS Foundation Trust (South Essex)	70
Other	1
<i>Total</i>	<i>71</i>
Royal United Hospitals Bath NHS Foundation Trust	
Royal United Hospitals Bath NHS Foundation Trust	50

<i>Total</i>	<i>50</i>
East Suffolk and North Essex NHS Foundation Trust	
East Suffolk and North Essex NHS Foundation Trust	102
*Mid and South Essex NHS Foundation Trust (Mid Essex)	23
Total	125
Royal Cornwall Hospitals NHS Trust	
Royal Cornwall Hospitals NHS Trust	63
University Hospitals Plymouth NHS Trust	43
Total	106
Liverpool Women's NHS Foundation Trust	
Wirral University Teaching Hospital NHS Foundation Trust	36
Mersey and West Lancashire Teaching Hospitals NHS Trust	58
Liverpool University Hospitals NHS Foundation Trust	16
The Clatterbridge Cancer Centre NHS Foundation Trust	6
Liverpool Women's NHS Foundation Trust	74
Countess of Chester Hospital NHS Foundation Trust	21
Warrington and Halton Teaching Hospitals NHS Foundation Trust	14
Total	225
Cambridge University Hospitals NHS Foundation Trust	
North West Anglia NHS Foundation Trust	45
West Suffolk NHS Foundation Trust	32
Cambridge University Hospitals NHS Foundation Trust	75
*Bedfordshire Hospitals NHS Foundation Trust (Bedford)	33
Total	185
Somerset NHS Foundation Trust	
Somerset NHS Foundation Trust	57
Total	57
Royal Devon University Healthcare NHS Foundation Trust	
Torbay and South Devon NHS Foundation Trust	37
Royal Devon University Healthcare NHS Foundation Trust	60
Total	97
University Hospital Southampton NHS Foundation Trust	
Isle of Wight NHS Trust	19
University Hospital Southampton NHS Foundation Trust	69
Hampshire Hospitals NHS Foundation Trust	73
Other	1
Total	162
Sheffield Teaching Hospitals NHS Foundation Trust	
Barnsley Hospital NHS Foundation Trust	24
The Rotherham NHS Foundation Trust	28
Chesterfield Royal Hospital NHS Foundation Trust	30
Sheffield Teaching Hospitals NHS Foundation Trust	72
Doncaster and Bassetlaw Teaching Hospitals NHS Foundation Trust	37
Total	191
Portsmouth Hospitals University National Health Service Trust	
Portsmouth Hospitals University National Health Service Trust	73
Royal Berkshire NHS Foundation Trust	41
*University Hospitals Sussex NHS Foundation Trust (Chichester)	25

Total	139
Guy's and St Thomas' NHS Foundation Trust	
Guy's and St Thomas' NHS Foundation Trust	40
Lewisham and Greenwich NHS Trust	33
King's College Hospital NHS Foundation Trust	41
<i>Total</i>	<i>114</i>
University Hospitals of North Midlands NHS Trust	
University Hospitals of North Midlands NHS Trust	101
The Shrewsbury and Telford Hospital NHS Trust	33
Other	1
<i>Total</i>	<i>135</i>
University Hospitals Coventry and Warwickshire NHS Trust	
South Warwickshire University NHS Foundation Trust	33
University Hospitals Coventry and Warwickshire NHS Trust	52
George Eliot Hospital NHS Trust	24
Other	5
<i>Total</i>	<i>114</i>
The Royal Wolverhampton NHS Trust	
The Royal Wolverhampton NHS Trust	45
The Dudley Group NHS Foundation Trust	30
Other	3
<i>Total</i>	<i>78</i>
Norfolk and Norwich University Hospitals NHS Foundation Trust	
The Queen Elizabeth Hospital, King's Lynn, NHS Foundation Trust	13
James Paget University Hospitals NHS Foundation Trust	21
Norfolk and Norwich University Hospitals NHS Foundation Trust	90
Other	1
<i>Total</i>	<i>125</i>
Northampton General Hospital NHS Trust	
Milton Keynes University Hospital NHS Foundation Trust	20
Kettering General Hospital NHS Foundation Trust	24
Northampton General Hospital NHS Trust	61
<i>Total</i>	<i>105</i>
The Royal Marsden NHS Foundation Trust	
Kingston and Richmond NHS Foundation Trust	21
Croydon Health Services NHS Trust	25
St George's University Hospitals NHS Foundation Trust	26
The Royal Marsden NHS Foundation Trust	40
Epsom and St Helier University Hospitals NHS Trust	27
*Chelsea and Westminster Hospital NHS Foundation Trust (Chelsea and Westminster)	22
Other	5
<i>Total</i>	<i>166</i>
Gateshead Health NHS Foundation Trust	
South Tyneside and Sunderland NHS Foundation Trust	53
North Cumbria Integrated Care NHS Foundation Trust	24
Gateshead Health NHS Foundation Trust	71
The Newcastle Upon Tyne Hospitals NHS Foundation Trust	63
Northumbria Healthcare NHS Foundation Trust	37

*County Durham and Darlington NHS Foundation Trust (North Durham)	19
Other	9
Total	276
Leeds Teaching Hospitals NHS Trust	
Bradford Teaching Hospitals NHS Foundation Trust	43
Harrogate and District NHS Foundation Trust	30
Airedale NHS Foundation Trust	27
Leeds Teaching Hospitals NHS Trust	78
Calderdale and Huddersfield NHS Foundation Trust	54
Mid Yorkshire Teaching NHS Trust	42
*York and Scarborough Teaching Hospitals NHS Foundation Trust (York)	50
Total	324
University College London Hospitals NHS Foundation Trust	
Royal Free London NHS Foundation Trust	83
Whittington Health NHS Trust	11
The Princess Alexandra Hospital NHS Trust	17
University College London Hospitals NHS Foundation Trust	50
Other	3
Total	164
Gloucestershire Hospitals NHS Foundation Trust	
Wye Valley NHS Trust	18
Gloucestershire Hospitals NHS Foundation Trust	74
Worcestershire Acute Hospitals NHS Trust	31
Total	123
University Hospitals of Derby and Burton NHS Foundation Trust	
University Hospitals of Derby and Burton NHS Foundation Trust	85
Total	85
Oxford University Hospitals NHS Foundation Trust	
Great Western Hospitals NHS Foundation Trust	34
Oxford University Hospitals NHS Foundation Trust	86
Buckinghamshire Healthcare NHS Trust	28
Other	2
Total	150
South Tees Hospitals NHS Foundation Trust	
South Tees Hospitals NHS Foundation Trust	45
North Tees and Hartlepool NHS Foundation Trust	40
*County Durham and Darlington NHS Foundation Trust (Darlington)	18
Other	1
Total	104
East Kent Hospitals University NHS Foundation Trust	
East Kent Hospitals University NHS Foundation Trust	86
Total	86
Hull University Teaching Hospitals NHS Trust	
Northern Lincolnshire and Goole NHS Foundation Trust	42
Hull University Teaching Hospitals NHS Trust	64
*York and Scarborough Teaching Hospitals NHS Foundation Trust (Scarborough)	18
Other	2
Total	126

University Hospitals of Leicester NHS Trust	
University Hospitals of Leicester NHS Trust	85
<i>Total</i>	<i>85</i>
Maidstone and Tunbridge Wells NHS Trust	
Dartford and Gravesham NHS Trust	19
Medway NHS Foundation Trust	33
Maidstone and Tunbridge Wells NHS Trust	66
<i>Total</i>	<i>118</i>
West Hertfordshire Teaching Hospitals NHS Trust	
West Hertfordshire Teaching Hospitals NHS Trust	60
East and North Hertfordshire NHS Trust	27
*Bedfordshire Hospitals NHS Foundation Trust (Luton and Dunstable)	19
<i>Total</i>	<i>106</i>
Nottingham University Hospitals NHS Trust	
Sherwood Forest Hospitals NHS Foundation Trust	22
United Lincolnshire Teaching Hospitals NHS Trust	52
Nottingham University Hospitals NHS Trust	107
<i>Total</i>	<i>181</i>
Sandwell and West Birmingham Hospitals NHS Trust	
Walsall Healthcare NHS Trust	31
Birmingham Women's and Children's NHS Foundation Trust	12
University Hospitals Birmingham NHS Foundation Trust	64
Sandwell and West Birmingham Hospitals NHS Trust	69
Other	4
<i>Total</i>	<i>180</i>
Lancashire Teaching Hospitals NHS Foundation Trust	
University Hospitals of Morecambe Bay NHS Foundation Trust	19
Blackpool Teaching Hospitals NHS Foundation Trust	35
Lancashire Teaching Hospitals NHS Foundation Trust	67
East Lancashire Hospitals NHS Trust	45
<i>Total</i>	<i>166</i>
Imperial College Healthcare NHS Trust	
London North West University Healthcare NHS Trust	40
The Hillingdon Hospitals NHS Foundation Trust	15
Imperial College Healthcare NHS Trust	116
*Frimley Health NHS Foundation Trust (Wexham Park)	22
*Chelsea and Westminster Hospital NHS Foundation Trust (West Middlesex)	17
Other	12
<i>Total</i>	<i>222</i>
University Hospitals Sussex NHS Foundation Trust	
East Sussex Healthcare NHS Trust	50
*University Hospitals Sussex NHS Foundation Trust (Brighton/Worthing)	82
Other	1
<i>Total</i>	<i>133</i>
North Wales	
Glan Clwyd (Rhyl)	27
Ysbyty Maelor (Wrexham)	20
Ysbyty Gwynedd (Bangor)	31

<i>Total</i>	<i>78</i>
<hr/>	
South East Wales	
UHW (Cardiff)	43
Royal Glamorgan Hospital	1
Prince Charles Hospital	24
Nevill Hall Hospital	10
Royal Gwent Hospital	58
The Grange University Hospital	3
<i>Total</i>	<i>139</i>
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South West Wales	
West Wales/Glangwili General Hospital	10
Bronglais General Hospital	12
Prince Philip Hospital	9
Withybush General Hospital	10
Princess of Wales Hospital	18
Singleton Hospital	34
Morrison Hospital	2
Neath Port Talbot Hospital	5
<i>Total</i>	<i>100</i>
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