CAS-SOP #4.8

Linking treatment tables: chemotherapy, tumour resections, and radiotherapy
About the NDRS

The National Disease Registration Service (NDRS) is part of NHS England (NHSE). 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.

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1. Introduction

This Standard Operating Procedure (SOP) (v4.8) updates the previous version (v4.7.1) to include tumours diagnosed in 2020. This version also adds resection procedures for melanoma in situ, extramammary paget disease (the latter is grouped with Skin: Rare), and non-malignant bladder tumours (ICD10 D090 and D414). In addition, this version adds outpatient Hospital Episode Statistics (HES) data for surgical resection procedures. Radio-isotope treatments are counted as radiotherapy treatment in this version, rather than as chemotherapy treatment, as in the previous version, and brachytherapy is counted as radiotherapy whereby it was previously not counted at all. The changes to the code since the previous release are summarised in Appendix 1 of this document. The ICD10 codes used for tumour sites and treatment timeframe rules are included in Appendix 2. Resection procedure codes are provided in Appendix 3.

The purpose of this SOP is to describe the method of linking treatment tables to the cancer registration data in the Cancer Analysis System (CAS). This allows basic treatment flags to be created; recording whether there was chemotherapy, tumour resection, or radiotherapy recorded following cancer diagnosis. This method was used for NCRAS publications of treatment work including the workbook ‘Chemotherapy, Radiotherapy and Tumour Resections in England, 2013 – 2015’ (available here) and the ‘Chemotherapy, Radiotherapy and Tumour Resections in England, 2013-2020’ tool available on CancerData.

The cancer sites included are the 32 sites which have pre-defined lists of relevant tumour resection procedures. All other sites are grouped under either ‘other malignant’ or ‘other non-malignant’ tumours. The term ‘tumour resection’ (previously termed ‘major resection’ in other outputs) is used to describe surgical attempts to remove the primary tumour. This SOP replaces the previous method used to count tumour resections (available here).

Cancer site and treatment-specific timeframes have been adopted to strike a balance between including as many treatments as possible carried out as part of the patient’s first course of treatment for that tumour, whilst minimising the inclusion of treatments for recurrent tumours.

This SOP is to be used where the analyst wishes to extract data on treatments among cancer sites listed in Appendix 2. The cancer sites with a tumour resection flag have been chosen because they are solid tumours (so are potentially resectable); are commonly diagnosed; and input from a site-specific clinician was available. Expansion of this list to include more cancer sites, where
resection is a treatment choice, will be considered for future NCRAS work. Chemotherapy and radiotherapy data was available for all cancer sites. This SOP exists to set a standard that can be followed to produce uniform and replicable results and in particular for external requests for treatment data received via the NHSE Data Access Request Service (DARS). Certain projects may require a different approach and should be discussed with the lead of the NCRAS therapeutics functional team.

The procedure codes used to select tumour resections are listed in Appendix 3. The SQL script which accompanies this SOP can be found in Appendix 4. The SQL code produces tumour-level data with 3 treatment flags (chemotherapy [CT], tumour resection [SG] and radiotherapy [RT]), with 0 as no treatment and 1 where treatment is present.
2. Method

Cohort definition
Cancer registry data from AT_TUMOUR_ENGLAND was used to identify the cohort of patients. All patients diagnosed with malignant cancer, and some non-malignant tumours, as listed in appendix 2, in England between 2013 and 2020 were included. Males with gynaecological cancer and females with prostate cancer were excluded. Death certificate only registrations are included (0.1% of the cohort with a known route to diagnosis).

Overall approach to identify treatments
The datasets used to collate treatment data are AT_TREATMENT_ENGLAND, SACT (Systemic Anti-Cancer Therapy), RTDS (RadioTherapy DataSet), inpatient (Admitted Patient Care (APC)) HES (Hospital Episode Statistics) and outpatient (OP) HES. The AT_TREATMENT_ENGLAND table is linked at tumour level, based on registration staff linking tumours to recorded treatments. Appendix 5 details the datasets and Snapshots used in this update.

The scope of this SOP is tumours diagnosed from 2013 onwards as it is known that the data quality in AT_TREATMENT_ENGLAND and SACT is lower before this point. However, treatment flags for select groups (e.g. childhood cancers) may be fairly complete in AT_TREATMENT_ENGLAND for earlier years. Cancer Waiting Times (CWT) data is not currently used. This decision was made following an assessment of the coverage of the datasets, and as ≥98% of radiotherapy and ≥94% of chemotherapy were captured by registry, SACT and RTDS in the period October 2012 to March 2013 (with the data completeness believed to be increasing since) it did not justify the complication of including CWT data.

For patients with one tumour diagnosed in 2013-2020, and those patients with multiple tumours diagnosed more than eighteen months apart, data from both the tumour linked treatment table (AT_TREATMENT_ENGLAND) and the patient linked treatment tables (SACT, RTDS and HES) are used. However, for patients with two or more tumours diagnosed within eighteen months of each other, only data from the tumour linked treatment table (AT_TREATMENT_ENGLAND) is used. This is because for the patient linked tables, the precise tumour that a treatment relates to is not identified, only the person. The current scope of this SOP is to define a working methodology for counting treatments in the absence of tumour level linked data, i.e., currently SACT, RTDS and HES data are linked at patient level and while the tumour that any treatment data applies to (where a patient has multiple tumours) can be inferred it is not definitively linked. This may
be modified as and when further tumour-linked treatment data becomes available.

Tumours which received the same treatment more than once are only counted once.

**Early stage tumour resections**

Previous resections work relied upon lists of procedure codes (OPCS-4 codes) which would be used to remove the primary tumour (available [here](#)). These lists were defined in consultation with experienced clinicians. Lack of data on stage at diagnosis at the time of definition meant that the lists were conservative, and each code would apply across all tumours of that particular site regardless of stage. Now that high quality stage at diagnosis data is available for most sites, the list of OPCS-4 procedure codes used to define tumour resections has been adapted to include tumour resections for early stage tumours. Site-specific clinicians were consulted for the 30 sites included in the original major resection list, and stage-specific rules have now been incorporated for relevant sites (cervical, colon, rectum, malignant and non-malignant bladder, liver, oesophageal and stomach cancers).

In addition to the existing tumour resection list, the following procedures were identified as tumour resections in early stage disease only:

<table>
<thead>
<tr>
<th>Site</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical</td>
<td>Cone biopsies for FIGO stage 1a tumours, and also those with stage 1b &amp; 1b1 disease if the patient also had a lymphadenectomy</td>
</tr>
<tr>
<td>Colon and rectum</td>
<td>Endoscopic resections and endoscopic biopsy procedures for TNM stage 1 tumours</td>
</tr>
<tr>
<td>Malignant bladder</td>
<td>Endoscopic resections, destructions, and cauterisation of lesion of bladder (TURBT) and other specified endoscopic extirpation of lesion of malignant bladder for T1 (non-muscle invasive) tumours</td>
</tr>
<tr>
<td>Non-malignant bladder</td>
<td>Endoscopic resections, destructions, and cauterisation of lesion of bladder (TURBT) and other specified endoscopic extirpation of lesion of bladder for ICD10 D090 ICDO 8130 (G2 pTa high grade) tumours</td>
</tr>
</tbody>
</table>
Liver | Percutaneous radiofrequency and microwave ablation of lesion of liver for TNM stage 1 tumours
Oesophagus | Fibreoptic endoscopic resection of lesions of upper gastrointestinal tract and oesophagus for TNM stage 1a tumours
Stomach | Fibreoptic endoscopic resection of lesion of upper gastrointestinal tract and oesophagus for TNM stage 1a tumours

In addition, after clinical review certain OPCS-4 codes were added to or removed from the previous list for all stages of disease. For more information, see Appendix 3, and Appendix 6 for a sensitivity analysis showing the impact of adding stage-specific tumour resections.

**Timeframe**

NCRAS follows European Network of Cancer Registries (ENCR) rules to define the date of diagnosis. This may be sourced from several data items including the date of the first pathological report confirming the tumour (although the date the pathological sample was taken is preferred, if available). This means that date of diagnosis can be shortly after a surgical resection. To avoid excluding relevant data, treatments in the one month (-31 days inclusive) prior to diagnosis were included in the analysis.

A data-driven approach with additional input from site-specialist clinicians was used to decide a site- and modality-specific post-diagnosis timeframe. The timeframe was chosen to be long enough to capture as many treatments as possible as part of the patient’s primary course of treatment, while also minimising the inclusion of treatments for recurrence. This SOP counts treatments between one month before, to up to eighteen months after diagnosis, with the exact timeframe depending on the site and treatment type. For patients who received each treatment for each cancer, the number of days after diagnosis at which 95% of these patients received the treatment was identified. This was rounded up to the nearest three-month interval, and this timeframe cut off was applied. Post-diagnosis timeframes were therefore 6, 9, 12, 15 or 18 months. The timeframes were based on 2013 and 2014 data only, because of the length of follow-up data required.

For example, of the pancreatic tumours diagnosed in 2013-14 which received a tumour resection within two years of diagnosis, 95% had their resection within
226 days. Therefore, for all pancreatic cancers diagnosed in 2013-2016, a post-diagnosis tumour resection timeframe of 274 days (9 months) was applied. Exceptions to the data driven approach were made for particular treatments for certain cancer sites under recommendation from clinicians. For these sites, clinicians decided the timeframe using a combination of their own experience and the data. See Appendix 2 for details, and Appendix 7 for a sensitivity analysis showing the impact of changing the timeframes.

Relative to other tumour sites, treatment data quality for non-melanoma skin cancers (NMSC) (BCC, cSCC and rare tumours) is poor. A data-driven approach failed to identify 95% of chemotherapy and radiotherapy treatments within an appropriate timeframe. Clinician input was therefore used to decide suitable timeframes for treatment periods, with the view that quantifying the current state of treatment data can be used as a base to improve overall data quality. These figures should therefore be considered provisional and are expected to be incomplete.
SQL rules used to identify treatments

In order to match the output from CancerStats, the cascade_inci_flag (from the registry AT_TUMOUR_ENGLAND base table) must equal 1 (refer to the standard operating procedure “CAS-SOP #1: Counting Cancer Cases” for further information on this, available on request to NCRAS). This SOP applies to CAS 1612 onwards, as it uses the newly categorised treatments implemented in December 2016.

Chemotherapy

A tumour is recorded as treated with chemotherapy if:

- there is a record in AT_TREATMENT_ENGLAND which states that the tumour was treated with chemotherapy (event is either 'Cytotoxic Chemotherapy' (code = 02) or 'CT - Other' (code = CTX) or 'chemoradiotherapy' (code = 04) or 'Immunotherapy' (code = 15))
- and the event date (EVENTDATE) occurred in the relevant timeframe

OR

- there is a record in SACT (excluding those null or classified as 'Hormones' or 'Not chemo' or 'Zoledronic acid' or 'Pamidronate' or 'Denosumab' or ‘Radium 223’ or ‘Lutetium-177’ or ‘Yttrium-90’)
- and the start date of the regimen (START_DATE_OF_REGIMEN) occurred in the relevant timeframe
- and the patient had no other tumours diagnosed in the 18 months before or after that tumour’s diagnosis date

SACT is linked to cancer registration where NHS numbers are a perfect match. Regimen mappings are based on both those directly confirmed by trusts, and those assigned by the SACT team (for example where trusts haven’t addressed unmapped regimens).

Tumour resections

A tumour is recorded as treated by resection if:

- there is a record in AT_TREATMENT_ENGLAND which states that the tumour was treated with surgery (event is '01a', '01b', '01z', or '01c')
- and the OPCS4_CODE is in the tumour resection list
- or the OPCS4_CODE is identified as a tumour resection in early stage tumours for that specific cancer site (see Appendix 3)
- and the operation date (OPERTN) occurred in the relevant timeframe (see Appendix 2)
OR

- there is an inpatient or outpatient HES episode with a tumour resection OPCS-4 code in one of the operation fields
- or one of the operation fields contains an OPCS-4 code identified as a tumour resection in early stage tumours for that specific cancer site (see Appendix 3)
- and the operation date (OPERTN) occurred in the relevant timeframe
- and the patient had no other tumours diagnosed in the 18 months before or after that tumour’s diagnosis date

HES is linked to the cancer registration using a matching algorithm taking into account NHS number, date of birth, sex and postcode at diagnosis (details available on request to NCRAS).

**Radiotherapy**

A tumour is recorded as treated with radiotherapy if:

- there is a record in AT_TREATMENT_ENGLAND which states that the tumour was treated with radiotherapy (event is either ‘RT - Teletherapy’ (code = 05) or ‘chemoradiotherapy’ (code = 04) or ‘radiosurgery’ (code = 22) or ‘RT - Other/ NK’ (code = RTX) or ‘radioisotope therapy (including radioiodine)’ (code = 19)) or ‘brachytherapy’ (code=06)
- and the event date (EVENTDATE) occurred in the relevant timeframe (see Appendix 2)

OR

- there is a record in RTDS (including for ‘brachytherapy’ (RTTREATMENTMODALITY=06))
- and the appointment date (APPTDATE) occurred in the relevant timeframe
- and the patient had no other tumours diagnosed in the 18 months before or after that tumour’s diagnosis date

RTDS is linked to the cancer registration using a matching algorithm taking into account NHS number, date of birth, sex and postcode at diagnosis (details available on request to NCRAS).

From 1 April 2016, NHSE (previously Public Health England) took over full responsibility for RTDS, allowing greater integration of the management, collection, quality assurance and analysis of radiotherapy data alongside the other major national cancer data sets in its charge. For patients whose follow up
period for radiotherapy extended past April 2016, the RTDS_AT_PRESCRIPTIONS_ENGLAND dataset in CAS2303 was used.

Results breakdowns
Results are broken down by 32 tumour sites; the ICD-10 codes used to define these can be found in Appendix 2. Definitions for skin cancer can be found in the CAS_SOP_CountingSkinCancer_2.0.

Stage breakdowns in the data release use TNM staging, except for gynaecological cancers which use FIGO staging. For cervical cancers, only FIGO staging was used. For ovarian, uterine and vulval cancers, TNM stage was used where FIGO stage was unknown. FIGO substages were collated into FIGO stages 1, 2, 3, 4, and unknown. To remain consistent with published stage data, Breast tumours (C50) with Paget’s disease were excluded. The final recorded stage of a tumour is derived by the registration service using all information available up to 3 months after diagnosis. For this reason, the tumour stage shown in this data may be different to the stage originally available to the clinician when deciding a course of treatment, as it may have been subsequently updated following removal of the tumour and pathology results.

The patient’s age group was based on the age of the patient when they were diagnosed with the tumour.

The patient’s Index of multiple deprivation (IMD) quintile was allocated by linking the patient’s postcode to their 2011 ONS census Lower Super Output Area (LSOA). This was then linked to the Ministry of Housing, Communities & Local Government English Indices of Deprivation equal LSOA weighted quintile for that LSOA and appropriate year (2015 quintiles were using for diagnoses in 2013, 2019 quintiles were used for diagnoses after 2013).

The patient’s Charlson comorbidity score was derived from Hospital Episodes Statistics (HES) and Cancer Registry data combined and looks back at the time period between 27 months to 3 months before the patient’s cancer diagnosis.

The patient’s Cancer Alliance was allocated based on their Cancer Alliance of residence at point of diagnosis, not the location(s) where they were treated.
Appendix 1: Code changes in SOP version 4.8 compared to 4.7.1

Changes have been made to the extraction code and lookups in SOP version 4.8 since SOP version 4.7.1 was published for 2013-2019 diagnoses. These are noted below. Only non-superficial changes are noted; i.e. changes that could potentially impact the results.

Timeframe rules
Timeframes were added for non-malignant bladder cancers (ICD10 D090 and D414), melanoma in situ and extra mammary paget disease tumours.

Tumour resection rules
Resection OPCS-4 codes were added for non-malignant bladder cancers (ICD10 D090 and D414), melanoma in situ tumours and extra mammary paget disease tumours.

Tumour cohort table
The Snapshot used for AT_TUMOUR_ENGLAND and AT_TREATMENT_ENGLAND was updated to AV2020.

Tumours were extracted with diagnoses between 2013-2020.

Cancer group updates:

- ICD10 D414 and D090 are extracted into a non-malignant bladder group.
- Melanoma in situ tumours are extracted in to their own group from AT_TUMOUR_SKIN. For the full definition please refer to CAS_SOP_CountingSkinCancer_2.0.
- The definition for skin: rare tumours were updated to additionally include extra mammary paget disease from AT_TUMOUR_SKIN. For the full definition please refer to CAS_SOP_CountingSkinCancer_2.0.

Chemotherapy flag
The snapshot used for AT_TREATMENT_ENGLAND was updated to AV2020. The snapshot used for the SACT dataset post-July 2017 was updated to CAS2303. Radioisotope therapy is no longer counted as a chemotherapy treatment.

Tumour resection flag
Code to extract tumour resections from outpatient HES data was added, in addition to the pre-existing code to extract tumour resections from inpatient HES. Where a resection procedure is recorded in both the HES APC and HES OP data, the earliest is taken. Where a resection procedure occurs on the same day from the HES APC and HES OP data, the resection from HES APC is taken over HES OP.
Resection codes were added for non-malignant bladder, melanoma in situ and extramammary paget disease tumours. Endoscopic resections, destructions, and cauterisation of lesion of bladder (TURBT) and other specified endoscopic extirpation of lesion of bladder were only counted for non-malignant bladder tumours of ICD10 D090 ICDO 8130 (G2 pTa high grade) tumours. See appendix 3 for a complete list of resection codes used.

Radiotherapy flag
The snapshot used for AT_TREATMENT_ENGLAND was updated to AV2020. The snapshot used for the RTDS dataset post-April 2016 was updated to CAS2303.

Tumours recorded as receiving radioisotope therapy are now counted as radiotherapy, and not chemotherapy as in the previous SOP (4.7.1). Additionally, those treated with brachytherapy are now counted as radiotherapy compared to the previous version (4.7.1) in which they were not counted at all.

Index of Deprivation
Historically NCRAS have used equal population-weighted income domain quintiles to assess deprivation. This method is limited in that income by itself may not give a full reflection of deprivation. After a recent review NCRAS will now use the ‘index of multiple deprivation’ (IMD) to assess deprivation, which is in line with the rest of the public health world. The IMD looks at six categories:

1. Employment deprivation
2. Education, skills and training deprivation
3. Health deprivation and disability
4. Crime
5. Barriers to housing and services
6. Living environment deprivation

Quintiles in the IMD are equally weighted by Lower Layer Super Output Areas (LSOAs) where 1 is the most deprived quintile and 5 the least.

The deprivation measure (IMD19_QUINTILE_LSOAS) in this version of the treatment flags table therefore uses the IMD equal LSOA weighted deprivation measures where quintile 1 is the most deprived and quintile 5 this least. This replaces the use of equal population-weighted income domain quintiles, where 1 is the least deprived quintile and quintile 5 the most deprived, used in previous versions.
## Appendix 2: Summary of tumour sites & timeframe rules

<table>
<thead>
<tr>
<th>Cancer site</th>
<th>ICD10 codes</th>
<th>Chemotherapy</th>
<th>Tumour resections</th>
<th>Radiotherapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bladder: Malignant bladder</td>
<td>C67</td>
<td>365 (12)</td>
<td>274 (9)</td>
<td>365 (12)*</td>
</tr>
<tr>
<td>Bladder: Non-malignant bladder</td>
<td>D090</td>
<td>274 (9)</td>
<td>456 (15)</td>
<td>547 (18)</td>
</tr>
<tr>
<td>Bladder: Non-malignant bladder</td>
<td>D414</td>
<td>183 (6)</td>
<td>456 (15)</td>
<td>547 (18)</td>
</tr>
<tr>
<td>Brain: Benign endocrine</td>
<td>D35.2-D35.4</td>
<td>547 (18)</td>
<td>365 (12)</td>
<td>547 (18)</td>
</tr>
<tr>
<td>Brain: Malignant brain</td>
<td>C70-72</td>
<td>547 (18)</td>
<td>183 (6)</td>
<td>365 (12)</td>
</tr>
<tr>
<td>Brain: Non-benign endocrine</td>
<td>C75.1-C75.3 D44.3-D44.5</td>
<td>547 (18)</td>
<td>183 (6)</td>
<td>365 (12)</td>
</tr>
<tr>
<td>Brain: Non-malignant brain</td>
<td>D32-D33, D42-D44.5</td>
<td>547 (18)</td>
<td>365 (12)</td>
<td>547 (18)</td>
</tr>
<tr>
<td>Breast</td>
<td>C50</td>
<td>365 (12)*</td>
<td>365 (12)*</td>
<td>365 (12)*</td>
</tr>
<tr>
<td>Cervical</td>
<td>C53</td>
<td>274 (9)*</td>
<td>274 (9)*</td>
<td>274 (9)*</td>
</tr>
<tr>
<td>Colorectal: Colon</td>
<td>C18-19</td>
<td>365 (12)*</td>
<td>183 (6)*</td>
<td>365 (12)*</td>
</tr>
<tr>
<td>Colorectal: Rectum</td>
<td>C20</td>
<td>365 (12)*</td>
<td>365 (12)*</td>
<td>365 (12)*</td>
</tr>
<tr>
<td>Hypopharynx</td>
<td>C12, C13</td>
<td>183 (6)</td>
<td>365 (12)</td>
<td>183 (6)</td>
</tr>
<tr>
<td>Larynx</td>
<td>C32</td>
<td>365 (12)</td>
<td>456 (15)</td>
<td>183 (6)</td>
</tr>
<tr>
<td>Oral cavity</td>
<td>C02, C03, C04, C06</td>
<td>456 (15)</td>
<td>183 (6)</td>
<td>456 (15)</td>
</tr>
<tr>
<td>Oropharynx</td>
<td>C01, C09, C10</td>
<td>183 (6)</td>
<td>365 (12)</td>
<td>183 (6)</td>
</tr>
<tr>
<td>Other head and neck</td>
<td>C05, C11, C14, C30, C31</td>
<td>365 (12)</td>
<td>456 (15)</td>
<td>274 (9)</td>
</tr>
<tr>
<td>Salivary glands</td>
<td>C07, C08</td>
<td>547 (18)</td>
<td>183 (6)</td>
<td>274 (9)</td>
</tr>
<tr>
<td>Kidney</td>
<td>C64-C66, C68</td>
<td>365 (12)*</td>
<td>183 (6)</td>
<td>365 (12)*</td>
</tr>
<tr>
<td>Liver</td>
<td>C22</td>
<td>456 (15)</td>
<td>365 (12)</td>
<td>547 (18)</td>
</tr>
<tr>
<td>SCLC</td>
<td>C33-C34 with ICD-O-2 morphology in list 8041, 8042, 8043, 8044, 8045</td>
<td>183 (6)*</td>
<td>183 (6)*</td>
<td>183 (6)*</td>
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<tr>
<td>NSCLC</td>
<td>C33-C34 with ICD-O-2 morphology not</td>
<td>183 (6)*</td>
<td>183 (6)*</td>
<td>183 (6)*</td>
</tr>
</tbody>
</table>
### Linking treatment tables in list 8041, 8042, 8043, 8044, 8045

<table>
<thead>
<tr>
<th>Location</th>
<th>Code</th>
<th>183 (6)</th>
<th>274 (9)</th>
<th>274 (9)*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oesophagus</strong></td>
<td>C15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ovary</strong></td>
<td>C56-C57, C48 (females, excluding ICD-O-2 8693, 8800-8806, 8963, 8990, 8991, 9040-9044, 8810-8921, 9120-9373, 9490, 9500, 9530-9582), D39.1</td>
<td>274 (9)*</td>
<td>274 (9)*</td>
<td>274 (9)*</td>
</tr>
<tr>
<td><strong>Pancreas</strong></td>
<td>C25</td>
<td>183 (6)</td>
<td>274 (9)</td>
<td>547 (18)</td>
</tr>
<tr>
<td><strong>Prostate</strong></td>
<td>C61</td>
<td>365 (12)*</td>
<td>456 (15)</td>
<td>365 (12)*</td>
</tr>
<tr>
<td><strong>Skin: Melanoma^</strong></td>
<td>C43</td>
<td>456 (15)</td>
<td>183 (6)</td>
<td>547 (18)</td>
</tr>
<tr>
<td><strong>Skin: Melanoma in situ^</strong></td>
<td>D03</td>
<td>456 (15)</td>
<td>183 (6)</td>
<td>547 (18)</td>
</tr>
<tr>
<td><strong>Skin: NMSC BCC^</strong></td>
<td>First ever BCC registration and all BCC genital tumours</td>
<td>547 (18)</td>
<td>365 (12)</td>
<td>547 (18)</td>
</tr>
<tr>
<td><strong>Skin: NMSC cSCC^</strong></td>
<td>First ever cSCC registration and all cSCC genital tumours</td>
<td>456 (15)</td>
<td>183 (6)</td>
<td>547 (18)</td>
</tr>
<tr>
<td><strong>Skin: Rare^</strong></td>
<td>All registered rare skin tumours</td>
<td>456 (15)</td>
<td>183 (6)</td>
<td>547 (18)</td>
</tr>
<tr>
<td><strong>Skin: Rare^</strong></td>
<td>Extramammary Paget’s disease</td>
<td>547 (18)</td>
<td>365 (12)</td>
<td>547 (18)</td>
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<tr>
<td><strong>Stomach</strong></td>
<td>C16</td>
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<tr>
<td><strong>Testis</strong></td>
<td>C62, D29.2</td>
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<td>547(18)</td>
</tr>
<tr>
<td><strong>Uterine</strong></td>
<td>C54-C55</td>
<td>274 (9)*</td>
<td>274 (9)*</td>
<td>274 (9)*</td>
</tr>
<tr>
<td><strong>Other malignant neoplasms</strong></td>
<td>C00, C17, C21, C23-C24, C26, C37-C42, C45-C48, non-ovarian C48, C49, C52, C58-C60, C63, C69, C75.0, C75.4-C97</td>
<td>456 (15)</td>
<td>N/A</td>
<td>547 (18)</td>
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<tr>
<td><strong>Other non-malignant neoplasms</strong></td>
<td>D00, D02, D05, D09.1-D09.9, D10, D12, D14, D17, D19-D24, D26, D28, D30, D31, D34, D35.0-D35.1, D35.5-D35.9, D37-D38, D41.0-D41.3, D41.7-D41.9, D44.0-D44.2, D44.6-D44.9, D45-D47</td>
<td>456 (15)</td>
<td>183 (6)</td>
<td>547 (18)</td>
</tr>
</tbody>
</table>
The following ICD 10 codes and post-diagnostic treatment time periods were used for the cancer sites presented in this workbook. The time periods were identified using a data driven approach detailed in CAS-SOP #4.4, with exceptions (*) made for particular treatments for certain cancer sites under recommendation from clinicians. These timeframes were chosen by clinicians using their own experience and the data.

^ Please refer to the CAS_SOP_CountingSkinCancer_2.0 SOP for full details on how skin tumours, in particular non-melanoma skin cancers (NMSC) are defined.
## Appendix 3: Site-specific summary of tumour resection rules

<table>
<thead>
<tr>
<th>OPCS-4 code</th>
<th>Procedure name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>M421</td>
<td>Endoscopic resection of lesion of bladder</td>
<td>Non muscle invasive (T1) C67 tumours and G2 pTa high grade (defined by morphology 8130) D090 tumours only. All D414.</td>
</tr>
<tr>
<td>M422</td>
<td>Endoscopic cauterisation of lesion of bladder</td>
<td>Non muscle invasive (T1) C67 tumours and G2 pTa high grade (defined by morphology 8130) D090 tumours only. All D414.</td>
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<tr>
<td>M423</td>
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<td>Non muscle invasive (T1) C67 tumours and G2 pTa high grade (defined by morphology 8130) D090 tumours only. All D414.</td>
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<tr>
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<td>Non muscle invasive (T1) C67 tumours and G2 pTa high grade (defined by morphology 8130) D090 tumours only. All D414.</td>
</tr>
<tr>
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<td>Non muscle invasive (T1) C67 tumours and G2 pTa high grade (defined by morphology 8130) D090 tumours only. All D414.</td>
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<tr>
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<td>Cystoprostatectomy</td>
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<td>M342</td>
<td>Cystourethrectomy</td>
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<td>M343</td>
<td>Cystectomy NEC</td>
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<tr>
<td>M344</td>
<td>Simple cystectomy</td>
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<td>M348</td>
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<tr>
<td>M349</td>
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<td>M359</td>
<td>Unspecified partial excision of bladder</td>
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<td>X142</td>
<td>Anterior exenteration of pelvis</td>
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<tr>
<td>Code</td>
<td>Description</td>
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<tr>
<td>A011</td>
<td>Hemispherectomy</td>
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<td>Total lobectomy of brain</td>
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<td>A021</td>
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<td>Excision of lesion of temporal lobe of brain</td>
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<td>Excision of lesion of parietal lobe of brain</td>
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<td>Endoscopic extirpation of lesion of ventricle of brain</td>
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<td>Excision of lesion of optic nerve (II)</td>
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<td>Excision of lesion of trigeminal nerve (V)</td>
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<td>Extirpation of lesion of meninges of sphenoidal ridge of cranium</td>
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<td>Extirpation of lesion of meninges of parasagittal region of brain</td>
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<td>Extirpation of lesion of falx cerebri</td>
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<td>Extirpation of lesion of meninges of skull clivus</td>
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<td>Excision of lesion of extradural spinal cord</td>
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<td>B012</td>
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<td>Code</td>
<td>Description</td>
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<td>Trans-septal hypophysectomy</td>
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<td>B019</td>
<td>Unspecified excision of pituitary gland</td>
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<td>Excision of lesion of pituitary gland</td>
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<td>C021</td>
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<td>V051</td>
<td>Extirpation of lesion of cranium</td>
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<td>V074</td>
<td>Excision of lesion of infratemporal fossa</td>
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<td>V291</td>
<td>Primary laminectomy excision of cervical intervertebral disc</td>
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<td>V312</td>
<td>Primary anterolateral excision of thoracic intervertebral disc NEC</td>
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<tr>
<td>V318</td>
<td>Other specified primary excision of thoracic intervertebral disc NEC</td>
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<td>V319</td>
<td>Unspecified primary excision of thoracic intervertebral disc</td>
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<td>V331</td>
<td>Primary laminectomy excision of lumbar intervertebral disc</td>
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<td>V339</td>
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<td>V431</td>
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**Breast (C50)**

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<tbody>
<tr>
<td>B271</td>
<td>Total mastectomy and excision of both pectoral muscles and part of chest wall</td>
</tr>
<tr>
<td>B272</td>
<td>Total mastectomy and excision of both pectoral muscles NEC</td>
</tr>
</tbody>
</table>
B273  Total mastectomy and excision of pectoralis minor muscle
B274  Total mastectomy NEC
B275  Subcutaneous mastectomy
B276  Skin sparing mastectomy
B278  Other specified total excision of breast
B279  Unspecified total excision of breast
B281  Quadrantectomy of breast
B282  Partial excision of breast NEC
B283  Excision of lesion of breast NEC
B284  Re-excision of breast margins
B285  Wire guided partial excision of breast
B286  Excision of accessory breast tissue
B287  Wire guided excision of lesion of breast
B288  Other specified other excision of breast
B289  Unspecified other excision of breast
B341  Subareolar excision of mammary duct
B342  Excision of lesion of mammary duct
B343  Excision of lesion of mammary duct
B352  Excision of nipple
B353  Extirpation of lesion of nipple
B374  Capsulectomy of breast
B401  Interstitial laser destruction of lesion of breast
B408  Other specified destruction of lesion of breast
B409  Unspecified destruction of lesion of breast

Cervical (C53)
P172  Partial colpectomy
<table>
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<td>Q011</td>
<td>Amputation of cervix uteri</td>
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<tr>
<td>Q013</td>
<td>Excision of lesion of cervix uteri</td>
</tr>
<tr>
<td>Q018</td>
<td>Other specified excision of cervix uteri</td>
</tr>
<tr>
<td>Q071</td>
<td>Abdominal hysterocolpectomy and excision of periuterine tissue</td>
</tr>
<tr>
<td>Q072</td>
<td>Abdominal hysterectomy and excision of periuterine tissue NEC</td>
</tr>
<tr>
<td>Q073</td>
<td>Abdominal hysterocolpectomy NEC</td>
</tr>
<tr>
<td>Q074</td>
<td>Total abdominal hysterectomy NEC</td>
</tr>
<tr>
<td>Q078</td>
<td>Other specified abdominal excision of uterus</td>
</tr>
<tr>
<td>Q079</td>
<td>Unspecified abdominal excision of uterus</td>
</tr>
<tr>
<td>Q081</td>
<td>Vaginal hysterocolpectomy and excision of periuterine tissue</td>
</tr>
<tr>
<td>Q082</td>
<td>Vaginal hysterectomy and excision of periuterine tissue NEC</td>
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<tr>
<td>Q083</td>
<td>Vaginal hysterocolpectomy NEC</td>
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<td>Q089</td>
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<tr>
<td>X141</td>
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<td>X142</td>
<td>Anterior exenteration of pelvis</td>
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<tr>
<td>X143</td>
<td>Posterior exenteration of pelvis</td>
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<td>X148</td>
<td>Other specified clearance of pelvis</td>
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<td>Unspecified clearance of pelvis</td>
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<tr>
<td>Q014</td>
<td>Large loop excision of transformation zone</td>
</tr>
<tr>
<td>Q031</td>
<td>Knife cone biopsy of cervix uteri</td>
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Figo stage 1a only, and stage 1b and 1b1 where also present with a lymphadenectomy code (T856, T859, T865)
<table>
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<td>Laser cone biopsy of cervix uteri</td>
<td>Figo stage 1a only, and stage 1b and 1b1 where also present with a lymphadenectomy code (TT856, T859, T865)</td>
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<td>Cone biopsy of cervix uteri NEC</td>
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<tr>
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<td>Block dissection of pelvic lymph nodes</td>
<td>Figo stage 1b and 1b1 where also present with a cone biopsy code (Q014, Q031, Q032, Q033)</td>
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<td>Figo stage 1b and 1b1 where also present with a cone biopsy code (Q014, Q031, Q032, Q033)</td>
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<td>T865</td>
<td>Sampling of mediastinal lymph nodes</td>
<td>Figo stage 1b and 1b1 where also present with a cone biopsy code (Q014, Q031, Q032, Q033)</td>
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**Colon and rectum (C18, C19 and C20)**

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<td>H041</td>
<td>Panproctocolectomy and ileostomy</td>
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<tr>
<td>H042</td>
<td>Panproctocolectomy and anastomosis of ileum to anus and creation of pouch HFQ</td>
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</tr>
<tr>
<td>H043</td>
<td>Panproctocolectomy and anastomosis of ileum to anus NEC</td>
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<tr>
<td>H048</td>
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<td>H049</td>
<td>Unspecified total excision of colon and rectum</td>
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<td>Total colectomy and anastomosis of ileum to rectum</td>
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<td>H052</td>
<td>Total colectomy and ileostomy and creation of rectal fistula HFQ</td>
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<td>Total colectomy and ileostomy NEC</td>
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<tr>
<td>H061</td>
<td>Extended right hemicolecotomy and end to end anastomosis</td>
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<tr>
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<td>Extended right hemicolecotomy and anastomosis of ileum to colon</td>
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</tr>
<tr>
<td>H063</td>
<td>Extended right hemicolecotomy and anastomosis NEC</td>
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<tr>
<td>H064</td>
<td>Extended right hemicolecotomy and ileostomy HFQ</td>
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<td>Extended right hemicolecotomy and end to side anastomosis</td>
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<td>Right hemicolecotomy and end to end anastomosis of ileum to colon</td>
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<td>Right hemicolecotomy and side to side anastomosis of ileum to transverse colon</td>
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<td>Right hemicolecotomy and anastomosis NEC</td>
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<td>Right hemicolecotomy and ileostomy HFQ</td>
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<td>Right hemicolecotomy and end to side anastomosis</td>
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<td>Transverse colectomy and end to end anastomosis</td>
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<td>Transverse colectomy and anastomosis of ileum to colon</td>
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<td>Transverse colectomy and ileostomy HFQ</td>
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<tr>
<td>H092</td>
<td>Left hemicolectomy and end to end anastomosis of colon to colon</td>
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<td>H093</td>
<td>Left hemicolectomy and anastomosis NEC</td>
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<tr>
<td>H094</td>
<td>Left hemicolectomy and ileostomy HFQ</td>
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<tr>
<td>H095</td>
<td>Left hemicolectomy and exteriorisation of bowel NEC</td>
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<td>H098</td>
<td>Other specified excision of left hemicolon</td>
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<tr>
<td>H099</td>
<td>Unspecified excision of left hemicolon</td>
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<tr>
<td>H101</td>
<td>Sigmoid colectomy and end to end anastomosis of ileum to rectum</td>
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</tr>
<tr>
<td>H102</td>
<td>Sigmoid colectomy and anastomosis of colon to rectum</td>
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</tr>
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<td>H103</td>
<td>Sigmoid colectomy and anastomosis NEC</td>
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</tr>
<tr>
<td>H104</td>
<td>Sigmoid colectomy and ileostomy HFQ</td>
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<td>H105</td>
<td>Sigmoid colectomy and exteriorisation of bowel NEC</td>
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<td>H106</td>
<td>Sigmoid colectomy and end to side anastomosis</td>
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<td>H108</td>
<td>Other specified excision of sigmoid colon</td>
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<td>H109</td>
<td>Unspecified excision of sigmoid colon</td>
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<tr>
<td>H111</td>
<td>Colectomy and end to end anastomosis of colon to colon NEC</td>
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<tr>
<td>H112</td>
<td>Colectomy and side to side anastomosis of ileum to colon NEC</td>
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<tr>
<td>H113</td>
<td>Colectomy and anastomosis NEC</td>
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</tr>
<tr>
<td>H114</td>
<td>Colectomy and ileostomy NEC</td>
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</tbody>
</table>
H115  Colectomy and exteriorisation of bowel NEC
H118  Other specified other excision of colon
H119  Unspecified other excision of colon
H291  Subtotal excision of colon and rectum and creation of colonic pouch and anastomosis of colon to anus
H292  Subtotal excision of colon and rectum and creation of colonic pouch NEC
H293  Subtotal excision of colon and creation of colonic pouch and anastomosis of colon to rectum
H294  Subtotal excision of colon and creation of colonic pouch NEC
H298  Other specified subtotal excision of colon
H299  Unspecified subtotal excision of colon
H322  Hartmann procedure (rectosigmoidectomy)
H331  Abdominoperineal excision of rectum and end colostomy
H332  Proctectomy and anastomosis of colon to anus
H333  Anterior resection of rectum and anastomosis of colon to rectum using staples
H334  Anterior resection of rectum and anastomosis NEC
H335  Rectosigmoidectomy and closure of rectal stump and exteriorisation of bowel
H336  Anterior resection of rectum and exteriorisation of bowel
H337  Perineal resection of rectum HFQ
H338  Other specified excision of rectum
H339  Unspecified excision of rectum
H404  Trans-sphincteric anastomosis of colon to anus
H408 Other specified operations on rectum through anal sphincter

H409 Unspecified operations on rectum through anal sphincter

X141 Total exenteration of pelvis

X142 Anterior exenteration of pelvis

X143 Posterior exenteration of pelvis

X148 Other specified clearance of pelvis

X149 Unspecified clearance of pelvis

H122 Excision of lesion of colon NEC Stage 1 only

H181 Open colonoscopy Stage 1 only

H191 Open biopsy of lesion of colon Stage 1 only

H201 Fibreoptic endoscopic snare resection of lesion of colon Stage 1 only

H202 Fibreoptic endoscopic cauterisation of lesion of colon Stage 1 only

H204 Fibreoptic endoscopic destruction of lesion of colon NEC Stage 1 only

H205 Fibreoptic endoscopic submucosal resection of lesion of colon Stage 1 only

H206 Fibreoptic endoscopic resection of lesion of colon NEC Stage 1 only

H208 Other specified endoscopic extirpation of lesion of colon Stage 1 only

H209 Unspecified endoscopic extirpation of lesion of colon Stage 1 only

H221 Diagnostic fibreoptic endoscopic examination of colon and biopsy of lesion of colon Stage 1 only

H229 Undescribed diagnostic endoscopic examination of colon Stage 1 only

H231 Endoscopic snare resection of lesion of lower bowel using fibreoptic sigmoidoscope Stage 1 only
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>H232</td>
<td>Endoscopic cauterisation of lesion of lower bowel using fibreoptic sigmoidoscope</td>
<td>Stage 1 only</td>
</tr>
<tr>
<td>H235</td>
<td>Endoscopic submucosal resection of lesion of lower bowel using fibreoptic sigmoidoscope</td>
<td>Stage 1 only</td>
</tr>
<tr>
<td>H236</td>
<td>Endoscopic resection of lesion of lower bowel using fibreoptic sigmoidoscope NEC</td>
<td>Stage 1 only</td>
</tr>
<tr>
<td>H238</td>
<td>Other specified endoscopic extirpation of lesion of lower bowel using fibreoptic sigmoidoscope</td>
<td>Stage 1 only</td>
</tr>
<tr>
<td>H239</td>
<td>Unspecified endoscopic extirpation of lesion of lower bowel using fibreoptic sigmoidoscope</td>
<td>Stage 1 only</td>
</tr>
<tr>
<td>H248</td>
<td>Other specified other therapeutic endoscopic operations on lower bowel using fibreoptic sigmoidoscope</td>
<td>Stage 1 only</td>
</tr>
<tr>
<td>H251</td>
<td>Diagnostic endoscopic examination of lower bowel and biopsy of lesion of lower bowel using fibreoptic sigmoidoscope</td>
<td>Stage 1 only</td>
</tr>
<tr>
<td>H259</td>
<td>Unspecified diagnostic endoscopic examination of lower bowel using fibreoptic sigmoidoscope</td>
<td>Stage 1 only</td>
</tr>
<tr>
<td>H261</td>
<td>Endoscopic snare resection of lesion of sigmoid colon using rigid sigmoidoscope</td>
<td>Stage 1 only</td>
</tr>
<tr>
<td>H281</td>
<td>Diagnostic endoscopic examination of sigmoid colon and biopsy of lesion of sigmoid colon using rigid sigmoidoscope</td>
<td>Stage 1 only</td>
</tr>
<tr>
<td>H341</td>
<td>Open excision of lesion of rectum</td>
<td>Stage 1 only</td>
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<tr>
<td>H402</td>
<td>Trans-sphincteric excision of lesion of rectum</td>
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<td>H412</td>
<td>Peranal excision of lesion of rectum</td>
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<td>H418</td>
<td>Other specified other operations on rectum through anus</td>
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<td>H419</td>
<td>Unspecified other operations on rectum through anus</td>
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<td>H561</td>
<td>Biopsy of lesion of anus</td>
<td>Stage 1 only</td>
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CAS-SOP #4.8: Linking treatment tables

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<tr>
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<th>ICD-10 Code</th>
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<tbody>
<tr>
<td>H024</td>
<td>Incidental appendicectomy</td>
<td>C18.1 (appendix tumours) only</td>
</tr>
<tr>
<td>H019</td>
<td>Unspecified emergency excision of appendix</td>
<td>C18.1 (appendix tumours) only</td>
</tr>
<tr>
<td>H011</td>
<td>Emergency excision of abnormal appendix and drainage HFQ</td>
<td>C18.1 (appendix tumours) only</td>
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</tbody>
</table>

Head and neck (C01, C02, C03, C04, C05, C06, C07, C08, C09, C10, C11, C12, C13, C14, C30, C31, C32)

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>E191</td>
<td>Total pharyngectomy</td>
</tr>
<tr>
<td>E192</td>
<td>Partial pharyngectomy</td>
</tr>
<tr>
<td>E214</td>
<td>Plastic repair of pharynx NEC</td>
</tr>
<tr>
<td>E231</td>
<td>Open excision of lesion of pharynx</td>
</tr>
<tr>
<td>E242</td>
<td>Endoscopic extirpation of lesion of pharynx NEC</td>
</tr>
<tr>
<td>E291</td>
<td>Total laryngectomy</td>
</tr>
<tr>
<td>E292</td>
<td>Partial horizontal laryngectomy</td>
</tr>
<tr>
<td>E293</td>
<td>Partial vertical laryngectomy</td>
</tr>
<tr>
<td>E294</td>
<td>Partial laryngectomy NEC</td>
</tr>
<tr>
<td>E295</td>
<td>Laryngofissure and chordectomy of vocal chord</td>
</tr>
<tr>
<td>E296</td>
<td>Laryngectomy NEC</td>
</tr>
<tr>
<td>E299</td>
<td>Unspecified excision of larynx</td>
</tr>
<tr>
<td>E301</td>
<td>Excision of lesion of larynx using thryotomy as approach</td>
</tr>
<tr>
<td>E341</td>
<td>Microtherapeutic endoscopic extirpation of lesion of larynx using laser</td>
</tr>
<tr>
<td>E342</td>
<td>Microtherapeutic endoscopic resection of lesion of larynx NEC</td>
</tr>
<tr>
<td>E343</td>
<td>Microtherapeutic endoscopic destruction of lesion of larynx NEC</td>
</tr>
<tr>
<td>E352</td>
<td>Endoscopic resection of lesion of pharynx NEC</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
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<td>-------</td>
<td>-------------------------------------------------------</td>
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<tr>
<td>E414</td>
<td>Tracheo-oesophageal puncture with insertion of speech prothesis</td>
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<tr>
<td>F011</td>
<td>Excision of vermillion border of lip and advancement of mucosa of lip</td>
</tr>
<tr>
<td>F018</td>
<td>Other specified partial excision of lip</td>
</tr>
<tr>
<td>F021</td>
<td>Excision of lesion of lip</td>
</tr>
<tr>
<td>F042</td>
<td>Reconstruction of lip using skin flap</td>
</tr>
<tr>
<td>F202</td>
<td>Excision of lesion of gingiva</td>
</tr>
<tr>
<td>F221</td>
<td>Total glossectomy</td>
</tr>
<tr>
<td>F222</td>
<td>Partial glossectomy</td>
</tr>
<tr>
<td>F231</td>
<td>Excision of lesion of tongue</td>
</tr>
<tr>
<td>F281</td>
<td>Excision of lesion of palate</td>
</tr>
<tr>
<td>F301</td>
<td>Plastic repair of palate using flap of palate</td>
</tr>
<tr>
<td>F303</td>
<td>Plastic repair of palate using flap of tongue</td>
</tr>
<tr>
<td>F304</td>
<td>Plastic repair of palate using graft of skin</td>
</tr>
<tr>
<td>F305</td>
<td>Plastic repair of palate using flap of mucosa</td>
</tr>
<tr>
<td>F324</td>
<td>Operations on uvula NEC</td>
</tr>
<tr>
<td>F328</td>
<td>Other specified other operations on palate</td>
</tr>
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<td>F341</td>
<td>Bilateral dissection tonsillectomy</td>
</tr>
<tr>
<td>F349</td>
<td>Unspecified excision of tonsil</td>
</tr>
<tr>
<td>F381</td>
<td>Excision of lesion of floor of mouth</td>
</tr>
<tr>
<td>F382</td>
<td>Excision of lesion of mouth NEC</td>
</tr>
<tr>
<td>F391</td>
<td>Reconstruction of mouth using flap NEC</td>
</tr>
<tr>
<td>F392</td>
<td>Reconstruction of mouth using graft NEC</td>
</tr>
<tr>
<td>F441</td>
<td>Total excision of parotid gland</td>
</tr>
<tr>
<td>F442</td>
<td>Partial excision of parotid gland</td>
</tr>
<tr>
<td>F443</td>
<td>Excision of parotid gland NEC</td>
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<tr>
<td>F444</td>
<td>Excision of submandibular gland</td>
</tr>
<tr>
<td>F451</td>
<td>Excision of lesion of parotid gland</td>
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Tonsil tumours (C09) only
<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>G021</td>
<td>Total oesophagectomy and anastomosis of pharynx to stomach</td>
</tr>
<tr>
<td>G032</td>
<td>Partial oesophagectomy and interposition of microvascularily attached jejunum</td>
</tr>
<tr>
<td>S171</td>
<td>Distant myocutaneous subcutaneous pedicle flap to head or neck</td>
</tr>
<tr>
<td>S208</td>
<td>Other specified other distant flap of skin</td>
</tr>
<tr>
<td>S248</td>
<td>Other specified local flap of skin and muscle</td>
</tr>
<tr>
<td>S288</td>
<td>Other specified flap of mucosa</td>
</tr>
<tr>
<td>S353</td>
<td>Split autograft of skin to head or neck NEC</td>
</tr>
<tr>
<td>T851</td>
<td>Block dissection of cervical lymph nodes</td>
</tr>
<tr>
<td>V061</td>
<td>Medial maxillectomy</td>
</tr>
<tr>
<td>V068</td>
<td>Other specified excision of maxilla</td>
</tr>
<tr>
<td>V069</td>
<td>Unspecified excision of maxilla</td>
</tr>
<tr>
<td>V141</td>
<td>Hemimandibulectomy</td>
</tr>
<tr>
<td>V142</td>
<td>Extensive excision of mandible NEC</td>
</tr>
<tr>
<td>V143</td>
<td>Partial excision of mandible NEC</td>
</tr>
<tr>
<td>V144</td>
<td>Excision of lesion of mandible</td>
</tr>
<tr>
<td>V149</td>
<td>Unspecified excision of mandible</td>
</tr>
<tr>
<td>V168</td>
<td>Other specified division of mandible</td>
</tr>
<tr>
<td>V191</td>
<td>Reconstruction of mandible</td>
</tr>
<tr>
<td>Y051</td>
<td>Total excision of organ NOC</td>
</tr>
<tr>
<td>Y592</td>
<td>Harvest of radial artery flap of skin and fascia</td>
</tr>
<tr>
<td>Y598</td>
<td>Other specified harvest of flap of skin and fascia</td>
</tr>
<tr>
<td>Y612</td>
<td>Harvest of flap of skin and pectoralis major muscle</td>
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<tr>
<td>Y631</td>
<td>Harvest of flap of latissimus dorsi muscle NEC</td>
</tr>
<tr>
<td>Y638</td>
<td>Other specified harvest of flap of muscle of trunk</td>
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### Kidney (C64-C66, C68)

<table>
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<tr>
<td>M021</td>
<td>Nephrectomy and excision of perirenal tissue</td>
</tr>
<tr>
<td>M022</td>
<td>Nephroureterectomy NEC</td>
</tr>
<tr>
<td>M023</td>
<td>Bilateral nephrectomy</td>
</tr>
<tr>
<td>M024</td>
<td>Excision of half of horseshoe kidney</td>
</tr>
<tr>
<td>M025</td>
<td>Nephrectomy NEC</td>
</tr>
<tr>
<td>M028</td>
<td>Other specified total excision of kidney</td>
</tr>
<tr>
<td>M029</td>
<td>Unspecified total excision of kidney</td>
</tr>
<tr>
<td>M038</td>
<td>Other specified partial excision of kidney</td>
</tr>
<tr>
<td>M039</td>
<td>Unspecified partial excision of kidney</td>
</tr>
<tr>
<td>M042</td>
<td>Open excision of lesion of kidney NEC</td>
</tr>
<tr>
<td>M104</td>
<td>Endoscopic cryoablation of lesion of kidney</td>
</tr>
<tr>
<td>M137</td>
<td>Percutaneous radiofrequency ablation of lesion of kidney</td>
</tr>
<tr>
<td>M181</td>
<td>Total ureterectomy</td>
</tr>
<tr>
<td>M182</td>
<td>Excision of segment of ureter</td>
</tr>
<tr>
<td>M183</td>
<td>Secondary ureterectomy</td>
</tr>
<tr>
<td>M252</td>
<td>Open excision of lesion of ureter NEC</td>
</tr>
<tr>
<td>M291</td>
<td>Endoscopic extirpation of lesion of ureter</td>
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#### Tumours of ureter (C66) & pelvis (C65) only

<table>
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<tbody>
<tr>
<td>Y112</td>
<td>Cryotherapy to organ NOC</td>
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### Liver (C22)

<table>
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<tr>
<td>J011</td>
<td>Orthotopic transplantation of liver NEC</td>
</tr>
<tr>
<td>J015</td>
<td>Orthotopic transplantation of whole liver</td>
</tr>
<tr>
<td>J019</td>
<td>Unspecified transplantation of liver</td>
</tr>
<tr>
<td>J021</td>
<td>Right hemihepatectomy NEC</td>
</tr>
<tr>
<td>J022</td>
<td>Left hemihepatectomy NEC</td>
</tr>
<tr>
<td>J023</td>
<td>Resection of segment of liver</td>
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CAS-SOP #4.8: Linking treatment tables

<table>
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<tr>
<td>J024</td>
<td>Wedge excision of liver</td>
</tr>
<tr>
<td>J026</td>
<td>Extended right hemihepatectomy</td>
</tr>
<tr>
<td>J027</td>
<td>Extended left hemihepatectomy</td>
</tr>
<tr>
<td>J028</td>
<td>Other specified partial excision of liver</td>
</tr>
<tr>
<td>J029</td>
<td>Unspecified partial excision of liver</td>
</tr>
<tr>
<td>J031</td>
<td>Excision of lesion of liver NEC</td>
</tr>
<tr>
<td>J053</td>
<td>Open wedge biopsy of lesion of liver</td>
</tr>
<tr>
<td>J101</td>
<td>Percutaneous transluminal embolisation of hepatic artery</td>
</tr>
<tr>
<td>J124</td>
<td>Percutaneous radiofrequency ablation of lesion of liver</td>
</tr>
<tr>
<td>J127</td>
<td>Percutaneous microwave ablation of lesion of liver</td>
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Small cell lung cancer (SCLC) and Non small cell lung cancer (NSCLC) (C33-C34)

<table>
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<tr>
<td>E391</td>
<td>Open excision of lesion of trachea</td>
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<td>E398</td>
<td>Other specified partial excision of trachea</td>
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<tr>
<td>E399</td>
<td>Unspecified partial excision of trachea</td>
</tr>
<tr>
<td>E438</td>
<td>Other specified other open operations on trachea</td>
</tr>
<tr>
<td>E441</td>
<td>Excision of carina</td>
</tr>
<tr>
<td>E461</td>
<td>Sleeve resection of bronchus and anastomosis HFQ</td>
</tr>
<tr>
<td>E463</td>
<td>Excision of lesion of bronchus NEC</td>
</tr>
<tr>
<td>E468</td>
<td>Other specified partial extirpation of bronchus</td>
</tr>
<tr>
<td>E541</td>
<td>Total pneumonectomy</td>
</tr>
<tr>
<td>E542</td>
<td>Bilobectomy of lung</td>
</tr>
<tr>
<td>E543</td>
<td>Lobectomy of lung</td>
</tr>
<tr>
<td>E544</td>
<td>Excision of segment of lung</td>
</tr>
<tr>
<td>E545</td>
<td>Partial lobectomy of lung NEC</td>
</tr>
<tr>
<td>E548</td>
<td>Other specified excision of lung</td>
</tr>
<tr>
<td>E549</td>
<td>Unspecified excision of lung</td>
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**CAS-SOP #4.8: Linking treatment tables**

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<tbody>
<tr>
<td>E552</td>
<td>Open excision of lesion of lung</td>
</tr>
<tr>
<td>E554</td>
<td>Open destruction of lesion of lung NEC</td>
</tr>
<tr>
<td>E559</td>
<td>Unspecified open extirpation of lesion of lung</td>
</tr>
<tr>
<td>T011</td>
<td>Thoracoplasty</td>
</tr>
<tr>
<td>T012</td>
<td>Removal of plombage material from chest wall</td>
</tr>
<tr>
<td>T013</td>
<td>Excision of lesion of chest wall</td>
</tr>
<tr>
<td>T018</td>
<td>Other specified partial excision of chest wall</td>
</tr>
<tr>
<td>T019</td>
<td>Unspecified partial excision of chest wall</td>
</tr>
<tr>
<td>T023</td>
<td>Insertion of prosthesis into chest wall NEC</td>
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**Oesophagus (C15)**

<table>
<thead>
<tr>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>G011</td>
<td>Oesophagogastrectomy and anastomosis of oesophagus to stomach</td>
</tr>
<tr>
<td>G013</td>
<td>Oesophagogastrectomy and anastomosis of oesophagus to jejunum NEC</td>
</tr>
<tr>
<td>G018</td>
<td>Other specified excision of oesophagus and stomach</td>
</tr>
<tr>
<td>G019</td>
<td>Unspecified excision of oesophagus and stomach</td>
</tr>
<tr>
<td>G021</td>
<td>Total oesophagectomy and anastomosis of pharynx to stomach</td>
</tr>
<tr>
<td>G022</td>
<td>Total oesophagectomy and interposition of microvascularly attached jejunum</td>
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<tr>
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<td>Total oesophagectomy and interposition of jejunum NEC</td>
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<td>Total oesophagectomy and interposition of microvascularly attached colon</td>
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<tr>
<td>G031</td>
<td>Partial oesophagectomy and end to end anastomosis of oesophagus</td>
</tr>
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<td>G032</td>
<td>Partial oesophagectomy and interposition of microvascularily attached jejunum</td>
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<td>Partial oesophagectomy and anastomosis of oesophagus to transposed jejunum</td>
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<td>Partial oesophagectomy and anastomosis of oesophagus to jejunum NEC</td>
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<td>Partial oesophagectomy and interposition of microvascularily attached colon</td>
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<td>G146</td>
<td>Fibreoptic endoscopic submucosal resection of lesion of oesophagus</td>
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<td>G171</td>
<td>Endoscopic snare resection of lesion of oesophagus using rigid oesophagoscope</td>
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<tr>
<td>G271</td>
<td>Total gastrectomy and excision of surrounding tissue</td>
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<td>G274</td>
<td>Total gastrectomy and anastomosis of oesophagus to transposed jejunum</td>
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<td>Total gastrectomy and anastomosis of oesophagus to jejunum NEC</td>
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<tr>
<td>G279</td>
<td>Unspecified total excision of stomach</td>
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<td>G421</td>
<td>Fibreoptic endoscopic submucosal resection of lesion of upper gastrointestinal tract</td>
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Ovarian (C56-C57, and selected C48 tumours)
H331  Abdominoperineal excision of rectum and end colostomy
H332  Proctectomy and anastomosis of colon to anus
H333  Anterior resection of rectum and anastomosis of colon to rectum using staples
H334  Anterior resection of rectum and anastomosis NEC
H335  Rectosigmoidectomy and closure of rectal stump and exteriorisation of bowel
H336  Anterior resection of rectum and exteriorisation of bowel
H337  Perineal resection of rectum HFQ
H338  Other specified excision of rectum
H339  Unspecified excision of rectum
Q071  Abdominal hysterocolpectomy and excision of periuterine tissue
Q072  Abdominal hysterectomy and excision of periuterine tissue NEC
Q073  Abdominal hysterocolpectomy NEC
Q074  Total abdominal hysterectomy NEC
Q075  Subtotal abdominal hysterectomy
Q078  Other specified abdominal excision of uterus
Q079  Unspecified abdominal excision of uterus
Q081  Vaginal hysterocolpectomy and excision of periuterine tissue
Q082  Vaginal hysterectomy and excision of periuterine tissue NEC
Q083  Vaginal hysterocolpectomy NEC
Q088  Other specified vaginal excision of uterus
Q089  Unspecified vaginal excision of uterus
Q221  Bilateral salpingoophorectomy
Q223  Bilateral oophorectomy NEC
Q231  Unilateral salpingoophorectomy NEC
Q232  Salpingoophorectomy of remaining solitary fallopian tube and ovary
Q235  Unilateral oophorectomy NEC
Q236  Oophorectomy of remaining solitary ovary NEC
Q241  Salpingoophorectomy NEC
Q243  Oophorectomy NEC
### CAS-SOP #4.8: Linking treatment tables

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<td>Q438</td>
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<td>Q473</td>
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<td>Q478</td>
<td>Other specified other open operations on ovary</td>
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<td>Open excision of lesion of peritoneum</td>
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<td>Omentectomy</td>
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<td>Excision of lesion of omentum</td>
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<td>Total exenteration of pelvis</td>
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<td>X142</td>
<td>Anterior exenteration of pelvis</td>
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<tr>
<td>X143</td>
<td>Posterior exenteration of pelvis</td>
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<td>X148</td>
<td>Other specified clearance of pelvis</td>
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### Pancreas (C25)

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<td>J551</td>
<td>Total pancreatectomy and excision of surrounding tissue</td>
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<td>J559</td>
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<td>J561</td>
<td>Pancreaticoduodenectomy and excision of surrounding tissue</td>
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<td>J562</td>
<td>Pancreaticoduodenectomy and resection of antrum of stomach</td>
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<tr>
<td>J568</td>
<td>Other specified excision of head of pancreas</td>
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<td>J569</td>
<td>Unspecified excision of head of pancreas</td>
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<tr>
<td>J571</td>
<td>Subtotal pancreatectomy</td>
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<tr>
<td>J573</td>
<td>Left pancreatectomy NEC</td>
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J574  Excision of tail of pancreas and drainage of pancreatic duct
J575  Excision of tail of pancreas NEC
J578  Other specified other partial excision of pancreas
J579  Unspecified other partial excision of pancreas
J582  Excision of lesion of pancreas NEC

Prostate (C61)

M341  Cystoprostatectomy
M611  Total excision of prostate and capsule of prostate
M614  Perineal prostatectomy
M618  Other specified open excision of prostate
M619  Unspecified open excision of prostate
M671  Endoscopic cryotherapy to lesion of prostate
M711  High intensity focused ultrasound of prostate
X141  Total exenteration of pelvis

Skin (Melanoma, Melanoma in situ and Non-Melanoma Skin Cancers (BCC, cSCC, Rare including extra mammary paget disease))

B279  Unspecified total excision of breast
B283  Excision of lesion of breast NEC
B284  Re-excision of breast margins
C011  Exenteration of orbit
C012  Enucleation of eye
C013  Evisceration of eye
C018  Other specified excision of eye
C019  Unspecified excision of eye
C021  Excision of lesion of orbit
C022  Destruction of lesion of orbit
C028  Other specified extirpation of lesion of orbit
C029  Unspecified extirpation of lesion of orbit
C101  Excision of lesion of eyebrow
C102  Hair bearing flap to eyebrow
C103  Hair bearing graft to eyebrow
C111  Excision of lesion of canthus
C115  Graft of skin to canthus
C121  Excision of lesion of eyelid NEC
C124  Curettage of lesion of eyelid
C126  Wedge excision of lesion of eyelid
C141  Flap of skin to eyelid
C142  Graft of skin to eyelid
C143  Graft of cartilage to eyelid
C144  Graft of skin and fat to eyelid
C145  Graft of fascia to eyelid
C148  Other specified reconstruction of eyelid
C149  Unspecified reconstruction of eyelid
C162  Lateral tarsorrhaphy
C164  Tarsorrhaphy NEC
C168  Other specified other plastic repair of eyelid
C178  Other specified other repair of eyelid
C179  Unspecified other repair of eyelid
D011  Total excision of external ear
D012  Partial excision of external ear
D013  Excision of preauricular abnormality
D018  Other specified excision of external ear
D019  Unspecified excision of external ear
D021  Excision of lesion of external ear
D028  Other specified extirpation of lesion of external ear
D031  Reconstruction of external ear using graft

BCC, cSCC and extra mammary paget tumours only
D032  Reconstruction of external ear NEC
D063  Repair of external ear NEC
D064  Graft of skin to external ear
D065  Flap of skin to external ear
D191  Excision of lesion of middle ear
E011  Total excision of nose
E018  Other specified excision of nose
E019  Unspecified excision of nose
E021  Total reconstruction of nose
E022  Reconstruction of nose NEC
E023  Septorhinoplasty using implant
E024  Septorhinoplasty using graft
E025  Reduction rhinoplasty
E026  Rhinoplasty NEC
E027  Alar reconstruction with cartilage graft
E028  Other specified plastic operations on nose
E029  Unspecified plastic operations on nose
E032  Excision of lesion of septum of nose
E037  Septal reconstruction with cartilage graft
E091  Excision of lesion of external nose
E094  Shave of skin of nose
E097  Graft of skin to external nose
E661  Flap of skin to external nose
F011  Excision of vermilion border of lip and advancement of mucosa of lip
F018  Other specified partial excision of lip
F019  Unspecified partial excision of lip
F021  Excision of lesion of lip
F029  Unspecified extirpation of lesion of lip

BCC, cSCC and extra mammary paget tumours only
F041  Reconstruction of lip using tongue flap
F042  Reconstruction of lip using skin flap
F048  Other specified other reconstruction of lip
F049  Unspecified other reconstruction of lip
F052  Advancement of mucosa of lip NEC
F382  Excision of lesion of mouth NEC
F402  Graft of skin to mouth NEC
F441  Total excision of parotid gland
F442  Partial excision of parotid gland
F443  Excision of parotid gland NEC
F444  Excision of submandibular gland
F445  Excision of sublingual gland
F448  Other specified excision of salivary gland
F449  Unspecified excision of salivary gland
F451  Excision of lesion of parotid gland
F452  Excision of lesion of submandibular gland
N011  Excision of scrotum
N012  Excision of lesion of scrotum
N036  Reconstruction of scrotum
N052  Bilateral orchidectomy NEC
N063  Orchidectomy NEC
N241  Excision of sweat gland bearing skin of male perineum
N243  Excision of male periurethral tissue NEC
N261  Total amputation of penis
N262  Partial amputation of penis
N268  Other specified amputation of penis
N271  Excision of lesion of penis
N287  Graft to penis
N303  Circumcision
P011  Clitoridectomy
P031  Excision of Bartholin gland
P033  Excision of lesion of Bartholin gland
P051  Total excision of vulva
P052  Partial excision of vulva
P054  Excision of lesion of vulva NEC
P058  Other specified excision of vulva
P059  Unspecified excision of vulva
P065  Excision of lesion of labia
P071  Plastic repair of vulva
P078  Other specified repair of vulva
P111  Excision of lesion of female perineum
P137  Excision of sweat gland bearing skin of female perineum
P151  Hymenectomy
P152  Excision of hymenal tag
P201  Excision of lesion of vagina
S018  Other specified plastic excision of skin of head or neck
S019  Unspecified plastic excision of skin of head or neck
S028  Other specified plastic excision of skin of abdominal wall
S029  Unspecified plastic excision of skin of abdominal wall
S038  Other specified plastic excision of skin of other site
S039  Unspecified plastic excision of skin of other site
S041  Excision of sweat gland bearing skin of axilla
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<td>Shave excision of lesion of skin of head or neck</td>
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<td>Excision of lesion of skin of head or neck NEC</td>
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<td>Re-excision of skin margins of head or neck</td>
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| S081   | Curettage and cauterisation of lesion of skin of head or neck                                 | BCC, cSCC and extra mammary paget tumours only
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<td>BCC, cSCC and extra mammary paget tumours only</td>
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<td>BCC, cSCC and extra mammary paget tumours only</td>
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<td>BCC, cSCC and extra mammary paget tumours only</td>
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S188 Other specified distant flap of skin and fascia
S189 Unspecified distant flap of skin and fascia
S191 Distant tube pedicle flap of skin to head or neck
S192 Distant tube pedicle flap of skin NEC
S198 Other specified distant pedicle flap of skin
S199 Unspecified distant pedicle flap of skin
S201 Axial pattern distant flap of skin to head or neck
S202 Axial pattern distant flap of skin NEC
S203 Random pattern distant flap of skin to head or neck
S204 Random pattern distant flap of skin NEC
S205 Distant flap of skin to head or neck NEC
S206 Distant free flap of skin to head or neck NEC
S207 Distant free flap of skin NEC
S208 Other specified other distant flap of skin
S209 Unspecified other distant flap of skin
S211 Hair bearing flap of skin to scalp for male pattern baldness
S212 Hair bearing flap of skin to scalp NEC
S213 Hair bearing flap of skin to nasolabial area
S214 Hair bearing flap of skin to chin area
S218 Other specified hair bearing flap of skin
S219 Unspecified hair bearing flap of skin
S221 Neurovascular island sensory flap of skin to head or neck
S222 Neurovascular island sensory flap of skin NEC
S223 Local sensory flap of skin to head or neck
S224  Local sensory flap of skin NEC
S228  Other specified sensory flap of skin
S229  Unspecified sensory flap of skin
S231  Z plasty to head or neck
S232  Z plasty NEC
S233  W plasty to head or neck
S234  W plasty NEC
S238  Other specified flap operations to relax contracture of skin
S239  Unspecified flap operations to relax contracture of skin
S241  Local myocutaneous subcutaneous pedicle flap to head or neck
S242  Local myocutaneous subcutaneous pedicle flap NEC
S243  Local myocutaneous flap to head or neck NEC
S248  Other specified local flap of skin and muscle
S249  Unspecified local flap of skin and muscle
S251  Local fasciocutaneous subcutaneous pedicle flap to head or neck
S252  Local fasciocutaneous subcutaneous pedicle flap NEC
S253  Local fasciocutaneous flap to head or neck nec
S258  Other specified local flap of skin and fascia
S259  Unspecified local flap of skin and fascia
S304  Final inset of flap of skin to head or neck
S261  Axial pattern local subcutaneous pedicle flap of skin to head or neck
S262  Axial pattern local subcutaneous pedicle flap of skin NEC
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<td>Other specified distant flap of skin and bone</td>
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<td>Unspecified distant flap of skin and bone</td>
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<td>S302</td>
<td>Transfer of flap of skin to head or neck</td>
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<td>Final inset of flap of skin NEC</td>
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<td>Distant osteomusculocutaneous pedicle flap of head or neck</td>
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<td>Distant osteomusculocutaneous flap to head or neck NEC</td>
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<td>Other specified distant flap of skin and multiple tissues</td>
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<td>Unspecified distant flap of skin and multiple tissues</td>
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<tr>
<td>S341</td>
<td>Hair bearing graft to nasolabial area</td>
</tr>
<tr>
<td>S348</td>
<td>Other specified hair bearing graft of skin to other site</td>
</tr>
<tr>
<td>S349</td>
<td>Unspecified hair bearing graft of skin to other site</td>
</tr>
<tr>
<td>S351</td>
<td>Meshed split autograft of skin to head or neck</td>
</tr>
<tr>
<td>S352</td>
<td>Meshed split autograft of skin NEC</td>
</tr>
<tr>
<td>S353</td>
<td>Split autograft of skin to head or neck NEC</td>
</tr>
<tr>
<td>S358</td>
<td>Other specified split autograft of skin</td>
</tr>
<tr>
<td>S359</td>
<td>Unspecified split autograft of skin</td>
</tr>
<tr>
<td>S361</td>
<td>Full thickness autograft of skin to head or neck</td>
</tr>
<tr>
<td>S362</td>
<td>Full thickness autograft of skin NEC</td>
</tr>
<tr>
<td>S363</td>
<td>Composite autograft of skin to head or neck</td>
</tr>
<tr>
<td>S364</td>
<td>Composite autograft of skin NEC</td>
</tr>
<tr>
<td>S365</td>
<td>Pinch graft of skin to head or neck</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>S366</td>
<td>Pinch graft of skin NEC</td>
</tr>
<tr>
<td>S368</td>
<td>Other specified other autograft of skin</td>
</tr>
<tr>
<td>S369</td>
<td>Unspecified other autograft of skin</td>
</tr>
<tr>
<td>S371</td>
<td>Allograft of skin to head or neck</td>
</tr>
<tr>
<td>S372</td>
<td>Allograft of skin NEC</td>
</tr>
<tr>
<td>S373</td>
<td>Xenograft of skin to head or neck</td>
</tr>
<tr>
<td>S374</td>
<td>Xenograft of skin NEC</td>
</tr>
<tr>
<td>S378</td>
<td>Other specified other graft of skin</td>
</tr>
<tr>
<td>S379</td>
<td>Unspecified other graft of skin</td>
</tr>
<tr>
<td>S391</td>
<td>Allograft of amniotic membrane to head or neck</td>
</tr>
<tr>
<td>S392</td>
<td>Allograft of amniotic membrane NEC</td>
</tr>
<tr>
<td>S398</td>
<td>Other specified graft of other tissue to skin</td>
</tr>
<tr>
<td>S399</td>
<td>Unspecified graft of other tissue to skin</td>
</tr>
<tr>
<td>S641</td>
<td>Excision of nail bed</td>
</tr>
<tr>
<td>T013</td>
<td>Excision of lesion of chest wall</td>
</tr>
<tr>
<td>T313</td>
<td>Excision of lesion of anterior abdominal wall NEC</td>
</tr>
<tr>
<td>T851</td>
<td>Block dissection of cervical lymph nodes</td>
</tr>
<tr>
<td>T852</td>
<td>Block dissection of axillary lymph nodes</td>
</tr>
<tr>
<td>T853</td>
<td>Block dissection of mediastinal lymph nodes</td>
</tr>
<tr>
<td>T854</td>
<td>Block dissection of para-aortic lymph nodes</td>
</tr>
<tr>
<td>T855</td>
<td>Block dissection of inguinal lymph nodes</td>
</tr>
<tr>
<td>T856</td>
<td>Block dissection of pelvic lymph nodes</td>
</tr>
<tr>
<td>T858</td>
<td>Other specified block dissection of lymph nodes</td>
</tr>
<tr>
<td>T859</td>
<td>Unspecified block dissection of lymph nodes</td>
</tr>
<tr>
<td>T911</td>
<td>Biopsy of sentinel lymph node NEC</td>
</tr>
<tr>
<td>T962</td>
<td>Excision of lesion of soft tissue NEC</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>X071</td>
<td>Forequarter amputation</td>
</tr>
<tr>
<td>X072</td>
<td>Disarticulation of shoulder</td>
</tr>
<tr>
<td>X073</td>
<td>Amputation of arm above elbow</td>
</tr>
<tr>
<td>X074</td>
<td>Amputation of arm through elbow</td>
</tr>
<tr>
<td>X075</td>
<td>Amputation of arm through forearm</td>
</tr>
<tr>
<td>X078</td>
<td>Other specified amputation of arm</td>
</tr>
<tr>
<td>X079</td>
<td>Unspecified amputation of arm</td>
</tr>
<tr>
<td>X081</td>
<td>Amputation of hand at wrist</td>
</tr>
<tr>
<td>X082</td>
<td>Amputation of thumb</td>
</tr>
<tr>
<td>X083</td>
<td>Amputation of phalanx of finger</td>
</tr>
<tr>
<td>X084</td>
<td>Amputation of finger NEC</td>
</tr>
<tr>
<td>X088</td>
<td>Other specified amputation of hand</td>
</tr>
<tr>
<td>X089</td>
<td>Unspecified amputation of hand</td>
</tr>
<tr>
<td>X091</td>
<td>Hindquarter amputation</td>
</tr>
<tr>
<td>X092</td>
<td>Disarticulation of hip</td>
</tr>
<tr>
<td>X093</td>
<td>Amputation of leg above knee</td>
</tr>
<tr>
<td>X094</td>
<td>Amputation of leg through knee</td>
</tr>
<tr>
<td>X095</td>
<td>Amputation of leg below knee</td>
</tr>
<tr>
<td>X098</td>
<td>Other specified amputation of leg</td>
</tr>
<tr>
<td>X099</td>
<td>Unspecified amputation of leg</td>
</tr>
<tr>
<td>X101</td>
<td>Amputation of foot through ankle</td>
</tr>
<tr>
<td>X102</td>
<td>Disarticulation of tarsal bones</td>
</tr>
<tr>
<td>X103</td>
<td>Disarticulation of metatarsal bones</td>
</tr>
<tr>
<td>X104</td>
<td>Amputation through metatarsal bones</td>
</tr>
<tr>
<td>X108</td>
<td>Other specified amputation of foot</td>
</tr>
<tr>
<td>X109</td>
<td>Unspecified amputation of foot</td>
</tr>
<tr>
<td>X111</td>
<td>Amputation of great toe</td>
</tr>
<tr>
<td>X112</td>
<td>Amputation of phalanx of toe</td>
</tr>
<tr>
<td>X118</td>
<td>Other specified amputation of toe</td>
</tr>
</tbody>
</table>
X119 Unspecified amputation of toe
X121 Reamputation at higher level
X122 Excision of lesion of amputation stump
X123 Shortening of length of amputation stump
X124 Revision of coverage of amputation stump
X125 Drainage of amputation stump
X128 Other specified operations on amputation stump
X129 Unspecified operations on amputation stump
Y551 Harvest of random pattern flap of skin from limb
Y552 Harvest of random pattern flap of skin from limb
Y553 Harvest of random pattern flap of skin from limb
Y554 Harvest of random pattern flap of skin from limb
Y555 Harvest of random pattern flap of skin from limb
Y556 Harvest of random pattern flap of skin from limb
Y558 Harvest of random pattern flap of skin from limb
Y559 Harvest of random pattern flap of skin from limb
Y561 Harvest of random pattern flap of skin from other site
Y562 Harvest of random pattern flap of skin from other site
Y563 Harvest of random pattern flap of skin from other site
Y564 Harvest of random pattern flap of skin from other site
Y568  Harvest of random pattern flap of skin from other site
Y569  Harvest of random pattern flap of skin from other site
Y571  Harvest of axial pattern flap of skin
Y572  Harvest of axial pattern flap of skin
Y573  Harvest of axial pattern flap of skin
Y574  Harvest of axial pattern flap of skin
Y575  Harvest of axial pattern flap of skin
Y576  Harvest of axial pattern flap of skin
Y578  Harvest of axial pattern flap of skin
Y579  Harvest of axial pattern flap of skin
Y581  Harvest of skin for graft
Y588  Harvest of skin for graft
Y589  Harvest of skin for graft
Y591  Harvest of flap of skin and fascia
Y592  Harvest of flap of skin and fascia
Y593  Harvest of flap of skin and fascia
Y594  Harvest of flap of skin and fascia
Y595  Harvest of flap of skin and fascia
Y596  Harvest of flap of skin and fascia
Y598  Harvest of flap of skin and fascia
Y599  Harvest of flap of skin and fascia
Y601  Other harvest of fascia
Y602  Other harvest of fascia
Y604  Other harvest of fascia
Y608  Other harvest of fascia
Y609  Other harvest of fascia
Y611  Harvest of flap of skin and muscle of trunk
Y612  Harvest of flap of skin and muscle of trunk
Y613  Harvest of flap of skin and muscle of trunk
Y614  Harvest of flap of skin and muscle of trunk
Y615  Harvest of flap of skin and muscle of trunk
Y618  Harvest of flap of skin and muscle of trunk
Y619  Harvest of flap of skin and muscle of trunk
Y621  Harvest of flap of skin and muscle of other site
Y622  Harvest of flap of skin and muscle of other site
Y623  Harvest of flap of skin and muscle of other site
Y628  Harvest of flap of skin and muscle of other site
Y629  Harvest of flap of skin and muscle of other site
Y671  Harvest of other multiple tissue
Y672  Harvest of other multiple tissue
Y678  Harvest of other multiple tissue
Y679  Harvest of other multiple tissue
Y692  Harvest of other tissue

Stomach (C16)

G011  Oesophagogastrectomy and anastomosis of oesophagus to stomach
G012  Oesophagogastrectomy and anastomosis of oesophagus to transposed jejunum
G013  Oesophagogastrectomy and anastomosis of oesophagus to jejunum NEC
G039  Unspecified partial excision of oesophagus
G271  Total gastrectomy and excision of surrounding tissue
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G272</td>
<td>Total gastrectomy and anastomosis of oesophagus to duodenum</td>
</tr>
<tr>
<td>G273</td>
<td>Total gastrectomy and interposition of jejunum</td>
</tr>
<tr>
<td>G274</td>
<td>Total gastrectomy and anastomosis of oesophagus to transposed jejunum</td>
</tr>
<tr>
<td>G275</td>
<td>Total gastrectomy and anastomosis of oesophagus to jejunum NEC</td>
</tr>
<tr>
<td>G278</td>
<td>Other specified total excision of stomach</td>
</tr>
<tr>
<td>G279</td>
<td>Unspecified total excision of stomach</td>
</tr>
<tr>
<td>G281</td>
<td>Partial gastrectomy and anastomosis of stomach to duodenum</td>
</tr>
<tr>
<td>G282</td>
<td>Partial gastrectomy and anastomosis of stomach to transposed jejunum</td>
</tr>
<tr>
<td>G283</td>
<td>Partial gastrectomy and anastomosis of stomach to jejunum NEC</td>
</tr>
<tr>
<td>G288</td>
<td>Other specified partial excision of stomach</td>
</tr>
<tr>
<td>G289</td>
<td>Unspecified partial excision of stomach</td>
</tr>
<tr>
<td>G421</td>
<td>Fibreoptic endoscopic submucosal resection of lesion of upper gastrointestinal tract</td>
</tr>
<tr>
<td>G146</td>
<td>Fibreoptic endoscopic submucosal resection of lesion of oesophagus</td>
</tr>
<tr>
<td>G449</td>
<td>Unspecified other therapeutic fibreoptic endoscopic operations on upper gastrointestinal tract</td>
</tr>
</tbody>
</table>

**Testis (C62, D292)**

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N051</td>
<td>Bilateral Subcapsular Orchidectomy</td>
</tr>
<tr>
<td>N052</td>
<td>Bilateral Orchidectomy NEC, Ablation of Testes</td>
</tr>
<tr>
<td>N053</td>
<td>Bilateral Inguinal Orchidectomy</td>
</tr>
<tr>
<td>N061</td>
<td>Subcapsular Orchidectomy NEC</td>
</tr>
<tr>
<td>N063</td>
<td>Orchidectomy NEC</td>
</tr>
</tbody>
</table>
# CAS-SOP #4.8: Linking treatment tables

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N066</td>
<td>Inguinal Orchidectomy NEC</td>
</tr>
<tr>
<td>N068</td>
<td>Other Specified Other Excision of Testis</td>
</tr>
<tr>
<td>N069</td>
<td>Unspecified Other Excision of Testis</td>
</tr>
<tr>
<td>N072</td>
<td>Destruction Of Lesion of Testis</td>
</tr>
<tr>
<td>N078</td>
<td>Other Specified Exirpation of Lesion of Testis</td>
</tr>
<tr>
<td>N079</td>
<td>Unspecified Exirpation of Lesion of Testis</td>
</tr>
<tr>
<td>X163</td>
<td>Excision of Gonad from Abdomen</td>
</tr>
<tr>
<td>X164</td>
<td>Excision of Gonad from Pelvis</td>
</tr>
<tr>
<td>X165</td>
<td>Excision of Gonad from Inguinal Canal</td>
</tr>
<tr>
<td>X166</td>
<td>Excision of Gonad NEC</td>
</tr>
</tbody>
</table>

### Uterine (C54-C55)

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q071</td>
<td>Abdominal hysterocolpectomy and excision of periuterine tissue</td>
</tr>
<tr>
<td>Q072</td>
<td>Abdominal hysterectomy and excision of periuterine tissue NEC</td>
</tr>
<tr>
<td>Q073</td>
<td>Abdominal hysterocolpectomy NEC</td>
</tr>
<tr>
<td>Q074</td>
<td>Total abdominal hysterectomy NEC</td>
</tr>
<tr>
<td>Q075</td>
<td>Subtotal abdominal hysterectomy</td>
</tr>
<tr>
<td>Q078</td>
<td>Other specified abdominal excision of uterus</td>
</tr>
<tr>
<td>Q079</td>
<td>Unspecified abdominal excision of uterus</td>
</tr>
<tr>
<td>Q081</td>
<td>Vaginal hysterocolpectomy and excision of periuterine tissue</td>
</tr>
<tr>
<td>Q082</td>
<td>Vaginal hysterectomy and excision of periuterine tissue NEC</td>
</tr>
<tr>
<td>Q083</td>
<td>Vaginal hysterocolpectomy NEC</td>
</tr>
<tr>
<td>Q088</td>
<td>Other specified vaginal excision of uterus</td>
</tr>
<tr>
<td>Q089</td>
<td>Unspecified vaginal excision of uterus</td>
</tr>
<tr>
<td>Q093</td>
<td>Open excision of lesion of uterus NEC</td>
</tr>
<tr>
<td>Q161</td>
<td>Vaginal excision of lesion of uterus</td>
</tr>
<tr>
<td>Q221</td>
<td>Bilateral salpingoophorectomy</td>
</tr>
<tr>
<td>Q222</td>
<td>Bilateral salpingectomy NEC</td>
</tr>
<tr>
<td>Q223</td>
<td>Bilateral oophorectomy NEC</td>
</tr>
<tr>
<td>Q228</td>
<td>Other specified bilateral excision of adnexa of uterus</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>Q229</td>
<td>Unspecified bilateral excision of adnexa of uterus</td>
</tr>
<tr>
<td>Q231</td>
<td>Unilateral salpingoophorectomy NEC</td>
</tr>
<tr>
<td>Q232</td>
<td>Salpingoophorectomy of remaining solitary fallopian tube and ovary</td>
</tr>
<tr>
<td>Q235</td>
<td>Unilateral oophorectomy NEC</td>
</tr>
<tr>
<td>Q236</td>
<td>Oophorectomy of remaining solitary ovary NEC</td>
</tr>
<tr>
<td>Q238</td>
<td>Other specified unilateral excision of adnexa of uterus</td>
</tr>
<tr>
<td>Q239</td>
<td>Unspecified unilateral excision of adnexa of uterus</td>
</tr>
<tr>
<td>Q521</td>
<td>Excision of lesion of broad ligament of uterus</td>
</tr>
<tr>
<td>X141</td>
<td>Total exenteration of pelvis</td>
</tr>
<tr>
<td>X142</td>
<td>Anterior exenteration of pelvis</td>
</tr>
<tr>
<td>X143</td>
<td>Posterior exenteration of pelvis</td>
</tr>
<tr>
<td>X148</td>
<td>Other specified clearance of pelvis</td>
</tr>
<tr>
<td>X149</td>
<td>Unspecified clearance of pelvis</td>
</tr>
</tbody>
</table>
Appendix 4: Example code

--The code presented below was used to generate the ***analysisnataliapetersen.av_treatment_table_1320_4p8@casref01*** table AND should be used to identify treatments for cancers diagnosed in 2013-2020.

-------------------------------------
User notes:------------------------
-- This is the SQL to generate treatment flags (resection, chemo, radio) for 2013-20 diagnoses, including demographic & geographic breakdowns

--It uses these tables in casref01:
--analysisnataliapetersen.opcs4resection_lookup_13_20@casref01
--analysisnataliapetersen.timeframe_lookup_13_20@casref01

--1. Set your connection to casref01
--2. Create each table in turn in the SQL, starting with your cohort of interest.
--If limiting the cohort, do this in the first table (tr_tumour_cohort_d)
--3. Then the last table brings all the previous ones together into your final export.
--4. After you run each new table, you need to index it and create database stats - this optimises performance.
--This is included throughout using the create index and execute commands
--You only need to create the database stats if you are creating and using that table the same day (otherwise they are automatically generated overnight)
--You will need to change analysisnataliapetersen to your username
--If, after creating and indexing the tables, you need to rerun any, it may be more efficient to truncate the table than drop and create it again, e.g.:
--Truncate table tr_tumour_cohort;
--insert into tr_tumour_cohort_d (   
--5. Alternatively you can use the final table here:
--***analysisnataliapetersen.av_treatment_table_1320_4p8@casref01***
--6. If analysing in stata, you can use the code below to collapse the data down so it’s not identifiable (example below groups by stage, cancer type & diagnosis year)
--collapse (count) tumourid, by (cancergroup stage_group rt_flag ct_flag SG_flag diagnosisyear)

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
-------- CREATE TUMOUR COHORT TABLE -------------------------
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------

CREATE TABLE tr_tumour_cohort AS
--Skin cancer have been defined in the at_tumour_skin table and so the skin cohort needs to be selected separately to the cohort for other tumours and joined together

WITH skin_cohort AS

--Create cohort of non-keratinocyte skin cancers
(SELECT ats.patientid, ats.tumourid, ats.diagnosisdatebest, ats.diagnosisyear, avt.nhsnumber, avt.figo, avt.sex, avt.ethnicity, avt.morph_icd10_o2, avt.fiveyearageband, avt.age, avt.dedup_flag, avt.site_icd10_o2, avt.site_icd10_o2_3char, avt.ctry_code, avt.statusofregistration
 ,CASE WHEN tumour_type_2 = 'Melanoma' THEN 'NON-KC_MELANOMA'
   WHEN tumour_type_2 = 'Rare' THEN 'NON-KC_RARE'
   WHEN tumour_type_1 = 'Extramammary paget disease' THEN 'NON-KC_EMPD'
   WHEN tumour_type_1 = 'Melanoma in situ' THEN 'NON-KC_MELANOMA_INSITU'
END AS tumour_code
FROM analysisbirgittavanbodegraven.at_tumour_skin@casref01 ats
LEFT JOIN av2020.at_tumour_england@casref01 avt ON ats.tumourid=avt.tumourid
WHERE ats.diagnosisyear between 2013 and 2020
AND (ats.tumour_type_2 IN ('Melanoma', 'Rare') OR ats.tumour_type_1 in ('Melanoma in situ','Extramammary paget disease'))
AND avt.ctry_code = 'E'
AND avt.statusofregistration = 'F'
AND avt.dedup_flag = '1'
AND avt.age BETWEEN 0 AND 200
AND avt.sex IN (1,2)
UNION

--Create cohort of keratinocyte skin cancers following the first ever registration of BCC and first ever registration of cSCC tumours in addition to all genital BCC tumours and all genital cSCC tumours
SELECT ats.patientid, ats.tumourid, ats.diagnosisdatebest, ats.diagnosisyear, avt.nhsnumber, avt.figo, avt.sex, avt.ethnicity, avt.morph_icd10_o2, avt.fiveyearageband, avt.age, avt.dedup_flag, avt.site_icd10_o2, avt.site_icd10_o2_3char, avt.ctry_code, avt.statusofregistration
 ,CASE WHEN tumour_type_3 = 'BCC' THEN 'KC_BCC'
   WHEN tumour_type_3 = 'cSCC' THEN 'KC_CSCC'
END AS tumour_code
FROM analysisbirgittavanbodegraven.at_tumour_skin@casref01 ats
LEFT JOIN av2020.at_tumour_england@casref01 avt ON ats.tumourid=avt.tumourid
WHERE ats.diagnosisyear between 2013 and 2020
AND (ats.tumour_type_4 IN ('Genital BCC', 'Genital cSCC')
OR ats.tumour_type_5 IN ('First BCC', 'First cSCC'))
AND avt.ctry_code = 'E'
AND avt.statusofregistration = 'F'
AND avt.dedup_flag = '1'
AND avt.age BETWEEN 0 AND 200
AND avt.sex IN (1,2)),

-- Create tumour cohort for all other (non skin) tumours
non_skin AS
(SELECT tumourid, patientid, nhsnumber, diagnosisdatebest, site_icd10_o2, figo, sex, ethnicity, morph_icd10_o2, fiveyearageband, age

--Create amended tumour_code variable to differentiate between ovarian and non-ovarian C48 tumours, changes also for brain and testes.
CASE
WHEN avt.site_icd10_o2_3char IN ('C48')
AND (avt.morph_icd10_o2 NOT IN (8693, 8800, 8801, 8802, 8803, 8804, 8805, 8806, 8963, 8990, 8991, 9040, 9041, 9042, 9043, 9044, 8810, 9490, 9500)
AND (avt.morph_icd10_o2 NOT BETWEEN 8811 AND 8921)
AND (avt.morph_icd10_o2 NOT BETWEEN 9120 AND 9373)
AND (avt.morph_icd10_o2 NOT BETWEEN 9530 AND 9582)
AND avt.sex=2)
THEN 'C48OVARY'
WHEN avt.site_icd10_o2_3char IN ('C48') THEN 'C48OTHER'
WHEN avt.site_icd10_o2 IN ('D391') THEN 'D39OVARY'
WHEN avt.site_icd10_o2_3char = 'D39' AND avt.site_icd10_o2 NOT IN ('D391') THEN 'D39OTHER'
WHEN avt.site_icd10_o2 IN ('D292') THEN 'D29TESTES'
WHEN avt.site_icd10_o2_3char = 'D29' AND avt.site_icd10_o2 NOT IN ('D292') THEN 'D29OTHER'
WHEN avt.site_icd10_o2 IN ('C751','C752','C753') THEN 'C75BRAIN'
WHEN avt.site_icd10_o2_3char = 'C75' AND avt.site_icd10_o2 NOT IN ('C751','C752','C753') THEN 'C75OTHER'
WHEN avt.site_icd10_o2 IN ('D320','D321','D329') THEN 'D32BRAIN'
WHEN avt.site_icd10_o2 IN ('D330','D331','D332','D333','D334','D337','D339') THEN 'D33BRAIN'
WHEN avt.site_icd10_o2 IN ('D352','D353','D354') THEN 'D35BRAIN'
WHEN avt.site_icd10_o2 IN ('D420','D421','D429') THEN 'D42BRAIN'
WHEN avt.site_icd10_o2 IN ('D430','D431','D432','D433','D434','D437','D439') THEN 'D43BRAIN'
WHEN avt.site_icd10_o2 IN ('D443','D444','D445') THEN 'D44BRAIN'
WHEN avt.site_icd10_o2 IN ('D414') THEN 'D41BLADDER'
WHEN avt.site_icd10_o2 IN ('D090') THEN 'D09BLADDER'
ELSE avt.site_icd10_o2_3char
END AS tumour_code

FROM av2020.at_tumour_england@casref01 AVT

--Define cohort of interest here
WHERE avt.diagnosisyear between 2013 and 2020
AND avt.site_icd10_o2_3char NOT IN ('D01','D03','D04','D06','D07','D11','D13','D15','D16','D18','D25','D27','D36','D40','D48','C44')
AND avt.cascade_inci_flag = 1
AND avt.ctry_code = 'E'
AND avt.statusofregistration = 'F'
AND avt.dedup_flag = '1'
AND avt.age BETWEEN 0 AND 200
AND avt.sex IN (1,2)),

--Remove any tumours from the all tumours cohort that also appear in the skin cohort to avoid duplication
non_skin_cohort AS
(SELECT nsk.tumourid, nsk.patientid, nsk.nhsnumber, nsk.diagnosisdatebest, nsk.site_icd10_o2, nsk.figo, nsk.sex, nsk.ethnicity, nsk.morph_icd10_o2, nsk.fiveyearageband, nsk.age, nsk.tumour_code
FROM non_skin nsk
LEFT JOIN skin_cohort skn ON nsk.tumourid=skn.tumourid
WHERE skn.tumourid IS NULL),

--Now union together the skin and non-skin cancer cohorts to create the full cohort
tumour_cohort AS
(SELECT tumourid, patientid, nhsnumber, diagnosisdatebest, site_icd10_o2, figo, sex, ethnicity, morph_icd10_o2, fiveyearageband, age, tumour_code
FROM skin_cohort
UNION
SELECT tumourid, patientid, nhsnumber, diagnosisdatebest, site_icd10_o2, figo, sex, ethnicity, morph_icd10_o2, fiveyearageband, age, tumour_code
FROM non_skin_cohort)

--Identify patients with multiple tumours within an 18-month period with tumour_flag
SELECT tumourid, patientid, nhsnumber, diagnosisdatebest, site_icd10_o2, figo, sex, ethnicity, morph_icd10_o2, fiveyearageband, age, tumour_code, tumour_flag
FROM


(SELECT avt.tumourid, avt.patientid, avt.nhsnumber, avt.diagnosisdatebest, avt.site_icd10_o2, avt.figo, avt.sex, avt.ethnicity, avt.morph_icd10_o2, avt.fiveyearageband, avt.age, avt.tumour_code

-- This join flags any tumours diagnosed in 2013-20 that belong to a patient who had another tumour in the 18 months before or after that diagnosis
--(so that later, patient level datasets (hes, sact, rtds) are only used for patients with 1 tumour)
-- Tumour_flag = 1; the tumour belonged to a patient who had another tumour within 18 months

CASE WHEN ABS(avt.diagnosisdatebest-avt2.diagnosisdatebest)<548 THEN 1 ELSE 0 END AS tumour_flag

-- In the process of joining AVT2 to AVT to identify multiple tumours, duplicate rows are generated
-- The difference between diagnosis date for tumours in AVT AND AVT2 ranks multiple tumours where more than one exists AND drops all but the closest tumour to the original tumour.
-- Where rk = 1; this is the tumour record to keep

RANK() OVER (PARTITION BY avt.tumourid ORDER BY ABS(avt.diagnosisdatebest-avt2.diagnosisdatebest) ASC, avt2.tumourid) AS rk
FROM tumour_cohort AVT

-- Multiple tumours join:
-- For tumours diagnosed from 2013-2020, identify any other tumour IDs that occurred between 2011-2022
-- A second copy of the tumour cohort (AVT2) is joined to the original tumour cohort of 2013-20 diagnoses (TC)
-- Records from AVT2 are only joined if the patient ID is the same but the tumour ID is different

LEFT JOIN av2020.at_tumour_england@casref01 AVT2 ON avt.patientid=avt2.patientid
AND NOT(avt.tumourid=avt2.tumourid)
--AND avt2.cascade_inci_flag = 1
AND avt2.site_icd10_o2_3char NOT IN ('D01','D03','D04','D06','D07','D11','D13','D15','D16','D18','D25','D27','D36','D40','D48','C44')
AND avt2.diagnosisyear BETWEEN 2011 AND 2022

--Removes duplicate tumour rows that had been added to identify patients with multiple tumours
CREATE UNIQUE INDEX analysisnataliapetersen.tr_tumcohort_tumourid_uq ON analysisnataliapetersen.tr_tumour_cohort ( tumourid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE INDEX analysisnataliapetersen.tr_tumcohort_patientid_ix ON analysisnataliapetersen.tr_tumour_cohort ( patientid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE INDEX analysisnataliapetersen.tr_tumcohort_nhsnumber_ix ON analysisnataliapetersen.tr_tumour_cohort ( nhsnumber ) NOLOGGING TABLESPACE analysisdata_IX;
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_tumour_cohort')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_tumcohort_tumourid_uq')

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CREATE SURGERY FLAG TABLES
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------------------------------------------------------------------------------
-- 1)---------------- ALL SITES - SURGERY FROM AT_TREATMENT_ENGLAND -----------
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-- Create a surgery flag for the tumour if:
-- there is a record in AT_TREATMENT_ENGLAND which states that the tumour was
treated with surgery (event is '01a', '01b', '01z', or '01c')
-- and the opcs4_code is in the tumour resection list
-- and the operation date (opertn) occurred in the relevant timeframe (see SOP)

CREATE TABLE tr_av_sg AS(
SELECT DISTINCT
  tumourid,
  CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS avsg_flag,
  eventdate AS avsg_date,
  avsg_trust_code
FROM (SELECT tumourid, datediff, rk , eventdate, avsg_trust_code
  FROM (
SELECT tumourid, datediff, rk , eventdate, avsg_trust_code
  FROM (SELECT tc.tumourid,
    (avtreat.eventdate - tc.diagnosisdatebest) AS datediff,
    RANK() OVER (PARTITION BY tc.tumourid ORDER BY avtreat.eventdate,
    avtreat.eventid) AS rk
))WHERE rk=1;
--Create table indexes for tumour cohort table
, avtreat.eventdate
, avtreat.trust_code AS avsg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysismatialiapetersen.timeframe_lookup_13_20@casref01  tim ON
tim.tumouricdsite3code = tc.tumour_code
INNER JOIN av2020.at_treatment_england@casref01 avtreat ON
avtreat.tumourid=tc.tumourid
AND eventcode IN ('01a','01b','01z', '01c') AND (avtreat.eventdate-tc.diagnosisdatebest
BETWEEN -31 AND tim.resect_time)
INNER JOIN analysismatialiapetersen.opcs4resection_lookup_13_20@casref01 opcs ON
opcs.tumouricdsite3code = tc.tumour_code AND TRIM(opcs.opcsresectioncode) =
avtreat.opcs4_code
);
WHERE rk=1
});

--2)------------------ ALL SITES - SURGERY FROM HES ------------------
-- Create a surgery flag for the tumour if:
-- There is an inpatient hes episode with a tumour resection opcs-4 code in one of the
-- operation fields
-- and the operation date (opertn) occurred in the relevant timeframe
create table
CREATE TABLE tr_hes_sg AS(
SELECT DISTINCT tumourid, hessg_flag, hessg_date, hessg_trust_code
FROM (
select tumourid, hessg_flag, hessg_date, hessg_trust_code, RANK() OVER (PARTITION
BY tumourid ORDER BY hessg_date, source) as rk
FROM (
SELECT DISTINCT
 tumourid,
 CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS hessg_flag
 , opdate AS hessg_date
 , hessg_trust_code
 , 'HESAPC' as source
FROM (  
SELECT tumourid, datediff, rk , opdate, hessg_trust_code
FROM (  
SELECT tc.tumourid,  
ho.opdate-tc.diagnosisdatebest AS datediff,  
RANK() OVER (PARTITION BY tc.tumourid ORDER BY ho.opdate,  
hl.datayear,hl.epikeyanon,POS) AS rk  
, ho.opdate  
, procode3 AS hessg_trust_code  
FROM tr_tumour_cohort tc


INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON tim.tumouricdsite3code = tc.tumour_code
INNER JOIN heslive.hes_linkage_av_apc@casref01 hl ON tc.patientid = hl.patientid
INNER JOIN heslive.hesapc_opertn@casref01 ho ON ho.datayear = hl.datayear AND ho.epikeyanon = hl.epikeyanon
AND ho.opdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
INNER JOIN heslive.hesapc@casref01 ha ON ha.datayear = hl.datayear AND ha.epikeyanon = hl.epikeyanon
INNER JOIN analysisnataliapetersen.opcs4resection_lookup_13_20@casref01 opcs ON opcs.tumouricdsite3code = tc.tumour_code AND TRIM(opcs.opcsresectioncode) = ho.opertn
)
WHERE rk=1)

UNION ALL

SELECT DISTINCT
tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS hessg_flag
, apptdate AS hessg_date
, hessg_trust_code
, 'HESOP' as source
FROM (SELECT tumourid, datediff, rk, apptdate, hessg_trust_code
FROM (SELECT tc.tumourid, op.apptdate - tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY op.apptdate, h2.datayear, h2.attendkeyanon, POS) AS rk
, op.apptdate
, procodet AS hessg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON tim.tumouricdsite3code = tc.tumour_code
INNER JOIN heslive.hes_linkage_av_op@casref01 h2 ON tc.patientid = h2.patientid
INNER JOIN heslive.hesop_opertn@casref01 ho2 ON ho2.datayear = h2.datayear AND ho2.attendkeyanon = h2.attendkeyanon
INNER JOIN heslive.hesop@casref01 op ON op.datayear = h2.datayear and op.attendkeyanon = h2.attendkeyanon
INNER JOIN analysisnataliapetersen.opcs4resection_lookup_13_20@casref01 opcs ON opcs.tumouricdsite3code = tc.tumour_code
where op.apptdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
AND TRIM(opcs.opcsresectioncode) = ho2.opertn

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CREATE TABLE tr_av_liver as (
SELECT DISTINCT
  tumourid,
  CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS liver_avtreat,
  eventdate AS avsg_date,
  avsg_trust_code
FROM (
  SELECT tumourid, datediff, rk, eventdate, avsg_trust_code
  FROM (
    SELECT tc.tumourid, avtreat.eventdate - tc.diagnosisdatebest AS datediff,
    RANK() OVER (PARTITION BY tc.tumourid ORDER BY avtreat.eventdate,
    avtreat.eventid) AS rk, avtreat.eventdate,
    avtreat.trust_code AS avsg_trust_code
    FROM tr_tumour_cohort tc
    INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON
    tim.tumouricdsite3code = tc.tumour_code
    INNER JOIN av2020.at_treatment_england@casref01 avtreat ON
    avtreat.tumourid = tc.tumourid
    AND eventcode IN ('01a','01b','01z','01c')
    AND avtreat.eventdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time)
  WHERE rk=1));
--4)------------------ LIVER C22 - HES---------------------
-- Create a surgery flag for the tumour if:
-- There is an inpatient hes episode with a tumour resection opcs-4 code in one of the operation fields
-- and the opcs4_code is a percutaneous radiofrequency AND microwave ablation of lesion of liver (see SOP Appendices for list of opcs4 codes)
-- and the operation date (opertn) occurred in the relevant timeframe (see SOP)
-- and the tumour is TNM stage 1 (a stage-specific tumour resection flag will incorporate this stage criteria in the final table)
-- and the patient only had one tumour in the time period of interest (this is also incorporated in the final table)

CREATE TABLE tr_hes_liver AS(
SELECT DISTINCT tumourid, liver_hes, hessg_date, hessg_trust_code
FROM (select tumourid, liver_hes, hessg_date, hessg_trust_code, RANK() OVER (PARTITION BY tumourid ORDER BY hessg_date, source) as rk
FROM (SELECT DISTINCT tumourid, CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS liver_hes, opdate AS hessg_date, hessg_trust_code, 'HESAPC' as source
FROM (SELECT tumourid, datediff, rk, opdate, hessg_trust_code FROM (SELECT tc.tumourid, ho.opdate - tc.diagnosisdatebest AS datediff, RANK() OVER (PARTITION BY tc.tumourid ORDER BY ho.opdate, hl.datayear, hl.epikeyanon, pos) AS rk, ho.opdate, procode3 AS hessg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON tim.tumouricdsite3code = tc.tumour_code
INNER JOIN heslive.hes_linkage_av_apc@casref01 hl ON tc.patientid = hl.patientid
INNER JOIN heslive.hesapc@casref01 ha ON ha.datayear = hl.datayear AND ha.epikeyanon = hl.epikeyanon
INNER JOIN heslive.hesapc_opertn@casref01 ho ON ho.datayear = hl.datayear AND ho.epikeyanon = hl.epikeyanon
AND ho.opdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
AND ho.opertn IN ('J124', 'J127') AND tc.tumour_code in ('C22'))
WHERE rk=1)
UNION ALL

SELECT DISTINCT
tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS liver_hes
, apptdate AS hessg_date
, hessg_trust_code
, 'HESOP' as source
FROM (SELECT tumourid, datediff, rk, apptdate, hessg_trust_code FROM (SELECT tumourid, datediff, rk, apptdate, hessg_trust_code FROM (SELECT tumourid, datediff, rk, apptdate, hessg_trust_code FROM (SELECT tumourid, datediff, rk, apptdate, hessg_trust_code FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON tim.tumouricdsite3code = tc.tumour_code
INNER JOIN heslive.hes_linkage_av_op@casref01 h2 ON tc.patientid = h2.patientid
INNER JOIN heslive.hesop@casref01 op ON op.datayear = h2.datayear and op.attendkeyanon = h2.attendkeyanon
INNER JOIN heslive.hesop_opertn@casref01 ho2 ON ho2.datayear = h2.datayear AND ho2.attendkeyanon = h2.attendkeyanon
WHERE op.apptdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
AND ho2.opern IN ('J124','J127') AND tc.tumour_code in ('C22'))
WHERE rk=1))))
WHERE rk=1);

--5)---------------- OESOPHAGUS C15 - AT_TREATMENT_ENGLAND ------------------

CREATE TABLE tr_av_oesoph AS(
SELECT DISTINCT

tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS oesoph_avtreat,
, eventdate AS avsg_date,
, avsg_trust_code
FROM (SELECT tumourid, datediff, rk, eventdate, avsg_trust_code
FROM (SELECT tc.tumourid, avtreat.eventdate - tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY avtreat.eventdate, avtreat.eventid) AS rk, avtreat.eventdate,
, avtreat.trust_code AS avsg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON
tim.tumouricdsite3code = tc.tumour_code
INNER JOIN av2020.at_treatment_england@casref01 avtreat ON
avtreat.tumourid=tc.tumourid
AND eventcode IN ('01a','01b','01z','01c') AND (avtreat.eventdate - tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time)
AND avtreat.opcs4_code IN ('G421','G431','G146','G171','G438') AND tc.tumour_code IN ('C15'))
WHERE rk=1));

--6)------------------ OESOPHAGUS C15 - HES --------------------
-- Create a surgery flag for the tumour if:
-- There is an inpatient hes episode with a tumour resection opcs-4 code in one of the
-- operation fields
-- and the opcs4_code is a fibreoptic endoscopic resection of lesions of upper
gastrointestinal tract AND oesophagus (see SOP Appendices for list of opcs4 codes)
-- and the operation date (opertn) occurred in the relevant timeframe (see SOP)
-- and the tumour is TNM stage 1a (a stage-specific tumour resection flag will incorporate
this stage criteria in the final table)
-- and the patient only had one tumour in the time period of interest (this is also
incorporated in the final table)

CREATE TABLE tr_hes_oesoph AS(
SELECT DISTINCT tumourid, oesoph_hes, hessg_date, hessg_trust_code
FROM (select tumourid, oesoph_hes, hessg_date, hessg_trust_code, RANK() OVER (PARTITION BY tumourid ORDER BY hessg_date, source) as rk
FROM SELECT DISTINCT
tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS oesoph_hes
, opdate AS hessg_date
, hessg_trust_code
, 'HESAPC' as source
FROM ( SELECT tumourid, datediff, rk, opdate, hessg_trust_code FROM ( SELECT tc.tumourid,
ho.opdate-tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY ho.opdate,
hl.datayear,hl.epikeyanon,POS) AS rk
, ho.opdate
, procodet AS hessg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON
tim.tumouricdsite3code = tc.tumour_code
INNER JOIN heslive.hes_linkage_av_apc@casref01 hl ON tc.patientid = hl.patientid
INNER JOIN heslive.hesapc@casref01 ha ON ha.datayear = hl.datayear AND
ha.epikeyanon = hl.epikeyanon
INNER JOIN heslive.hesapc_opertn@casref01 ho ON ho.datayear = hl.datayear AND
ho.epikeyanon = hl.epikeyanon
AND ho.opdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
AND ho.opertn IN ('G421','G431','G146','G171','G438') AND tc.tumour_code IN ('C15')
WHERE rk=1)
UNION ALL

SELECT DISTINCT
 tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS oesoph_hes
, apptdate AS hessg_date
, hessg_trust_code
, 'HESOP' as source
FROM ( SELECT tumourid, datediff, rk, apptdate, hessg_trust_code FROM ( SELECT tc.tumourid,
op.apptdate-tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY op.apptdate,
h2.datayear,h2.attendkeyanon,POS) AS rk
, op.apptdate
, procodet AS hessg_trust_code
FROM tr_tumour_cohort tc

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INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON tim.tumouricdsite3code = tc.tumour_code
INNER JOIN heslive.hes_linkage_av_op@casref01 h2 ON tc.patientid = h2.patientid
INNER JOIN heslive.hesop@casref01 op ON op.datayear = h2.datayear and op.attendkeyanon = h2.attendkeyanon
INNER JOIN heslive.hesop_opertn@casref01 ho2 ON ho2.datayear = h2.datayear AND ho2.attendkeyanon = h2.attendkeyanon
where op.apptdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
AND ho2.opertn IN ('G421','G431','G146','G171','G438') AND tc.tumour_code IN ('C15'))
WHERE rk=1));

--7)----------------- STOMACH C16 - AT_TREATMENT_ENGLAND -----------------
-- Create a surgery flag for the tumour if:
-- there is a record in AT_TREATMENT_ENGLAND which states that the tumour was
treated with surgery (event is '01a', '01b', '01z', or '01c')
-- and the opcs4_code is a fibreoptic endoscopic resection of lesions of upper
gastrointestinal tract AND oesophagus (see SOP Appendixes for list of opcs4 codes)
-- and the operation date (opertn) occurred in the relevant timeframe (see SOP)
-- and the tumour is TNM stage 1a (a stage-specific tumour resection flag will incorporate
this stage criteria in the final table)

CREATE TABLE tr_av_stomach AS(
SELECT DISTINCT tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS stomach_avtreat,
eventdate AS avsg_date,
avsg_trust_code
FROM (SELECT tumourid, datediff, rk, eventdate, avsg_trust_code
FROM (SELECT tc.tumourid, avtreat.eventdate - tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY avtreat.eventdate, avtreat.eventid) AS rk, avtreat.eventdate,
avtreat.trust_code AS avsg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON tim.tumouricdsite3code = tc.tumour_code
INNER JOIN av2020.at_treatment_england@casref01 avtreat ON avtreat.tumourid=tc.tumourid
AND eventcode IN ('01a','01b','01z','01c') AND (avtreat.eventdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time)
AND avtreat.opcs4_code IN ('G421','G146','G449') AND tc.tumour_code IN ('C16'))
WHERE rk=1));

--8)---------------- STOMACH C16 - HES -----------------
-- Create a surgery flag for the tumour if:
-- There is an inpatient hes episode with a tumour resection opcs-4 code in one of the
-- operation fields
-- and the opcs4_code is a fibreoptic endoscopic resection of lesions of upper
gastrointestinal tract AND oesophagus (see SOP Appendices for list of opcs4 codes)
-- and the operation date (opertn) occurred in the relevant timeframe (see SOP)
-- and the tumour is TNM stage 1a (a stage-specific tumour resection flag will incorporate
this stage criteria in the final table)
-- and the patient only had one tumour in the time period of interest (this is also
incorporated in the final table)

CREATE TABLE tr_hes_stomach AS(
SELECT DISTINCT tumourid, stomach_hes, hessg_date, hessg_trust_code
FROM ( select tumourid, stomach_hes, hessg_date, hessg_trust_code, RANK() OVER
(PARTITION BY tumourid ORDER BY hessg_date, source) as rk
FROM ( SELECT DISTINCT
 tumourid, CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS stomach_hes
, opdate AS hessg_date
, hessg_trust_code
, 'HESAPC' as source
FROM ( SELECT tumourid, datediff, rk, opdate, hessg_trust_code FROM ( SELECT tc.tumourid,
ho.opdate-tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY ho.opdate,
hl.datayear,hl.epikeyanon,POS) AS rk
, ho.opdate
, procode3 AS hessg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON
tim.tumouricdsite3code = tc.tumour_code
INNER JOIN heslive.hes_linkage_av_apc@casref01 hl ON tc.patientid = hl.patientid
})
}
INNER JOIN heslive.hesapc@casref01 ha ON ha.datayear = hl.datayear AND ha.epikeyanon = hl.epikeyanon
INNER JOIN heslive.hesapc_opertn@casref01 ho ON ho.datayear = hl.datayear AND ho.epikeyanon = hl.epikeyanon
AND ho.opdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
AND ho.opertn IN ('G421','G146','G449') AND tc.tumour_code IN ('C16'))
WHERE rk=1)

UNION ALL

SELECT DISTINCT
tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS stomach_hes,
apptdate AS hessg_date,
hessg_trust_code,
'HESOP' as source
FROM (SELECT tumourid, datediff, rk, apptdate, hessg_trust_code FROM (SELECT tc.tumourid, op.apptdate - tc.diagnosisdatebest AS datediff, RANK() OVER (PARTITION BY tc.tumourid ORDER BY op.apptdate, h2.datayear,h2.attendkeyanon,pos) AS rk, op.apptdate, procodet AS hessg_trust_code FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON tim.tumouricdsite3code = tc.tumour_code
INNER JOIN heslive.hes_linkage_av_op@casref01 h2 ON tc.patientid = h2.patientid
INNER JOIN heslive.hesop@casref01 op ON op.datayear = h2.datayear and op.attendkeyanon = h2.attendkeyanon
INNER JOIN heslive.hesop_opertn@casref01 ho2 ON ho2.datayear = h2.datayear AND ho2.attendkeyanon = h2.attendkeyanon
where op.apptdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
AND ho2.opertn IN ('G421','G146','G449') AND tc.tumour_code IN ('C16'))
WHERE rk=1)))
WHERE rk=1);

--9)------------------ BLADDER CANCERS (C67) - AT_TREATMENT_ENGLAND------------------
-- Create a surgery flag for the tumour if:
-- there is a record in AT_TREATMENT_ENGLAND which states that the tumour was treated with surgery (event is '01a', '01b', '01z', or '01c')
-- and the opcs4_code is an endoscopic resections of lesion of bladder (TURBT) (see SOP Appendices for list of opcs4 codes)
-- and the operation date (opertn) occurred in the relevant timeframe (see SOP)
-- and the tumour is T1 (non-muscle invasive) (a stage-specific tumour resection flag will incorporate this stage criteria in the final table)

CREATE TABLE tr_av_bladder AS(
SELECT DISTINCT
tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS bladder_avtreat
, eventdate AS avsg_date
, avsg_trust_code
FROM (SELECT tumourid, datediff, rk, eventdate, avsg_trust_code
FROM (SELECT tc.tumourid, avtreat.eventdate - tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY avtreat.eventdate, avtreat.eventid) AS rk, avtreat.eventdate
, avtreat.trust_code AS avsg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON tim.tumouricdsite3code = tc.tumour_code
INNER JOIN av2020.at_treatment_england@casref01 avtreat ON avtreat.tumourid=tc.tumourid
AND eventcode IN ('01a','01b','01z','01c') AND (avtreat.eventdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time)
AND avtreat.opcs4_code IN ('M421', 'M422', 'M423', 'M428', 'M429') AND tc.tumour_code IN ('C67','D09BLADDER'))
WHERE rk=1));

--10)---------------- BLADDER CANCERS (C67) - HES ------------------------
-- Create a surgery flag for the tumour if:
-- There is an inpatient hes episode with a tumour resection opcs-4 code in one of the operation fields
-- and the opcs4_code is an endoscopic resections of lesion of bladder (TURBT) (see SOP Appendices for list of opcs4 codes)
-- and the operation date (opertn) occurred in the relevant timeframe (see SOP)
-- and the tumour is T1 (non-muscle invasive) (a stage-specific tumour resection flag will incorporate this stage criteria in the final table)
-- and the patient only had one tumour in the time period of interest (this is also incorporated in the final table)
CREATE TABLE tr_hes_bladder AS(
SELECT DISTINCT tumourid, bladder_hes, hessg_date, hessg_trust_code
FROM (
select tumourid, bladder_hes, hessg_date, hessg_trust_code, RANK() OVER
(PARTITION BY tumourid ORDER BY hessg_date, source) as rk
FROM (
SELECT DISTINCT tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS bladder_hes,
opdate AS hessg_date,
hessg_trust_code,
,'HESAPC' as source
FROM (SELECT tumourid, datediff, rk, opdate, hessg_trust_code FROM (SELECT tc.tumourid,
ho.opdate - tc.diagnosisdatebest AS datediff,
rk, ho.opdate, procode3 AS hessg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON
tim.tumouricdsite3code = tc.tumour_code
INNER JOIN heslive.hes_linkage_av_apc@casref01 hl ON tc.patientid = hl.patientid
INNER JOIN heslive.hesapc@casref01 ha ON ha.datayear = hl.datayear AND
ha.epikeyanon = hl.epikeyanon
INNER JOIN heslive.hesapc_opertn@casref01 ho ON ho.datayear = hl.datayear AND
ho.epikeyanon = hl.epikeyanon
AND ho.opdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
AND ho.opertn IN ('M421', 'M422', 'M423', 'M428', 'M429') AND tc.tumour_code IN ('C67','D09BLADDER'))
WHERE rk=1)
UNION ALL
SELECT DISTINCT tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS bladder_hes,
apptdate AS hessg_date,
hessg_trust_code,
,'HESOP' as source
FROM (SELECT tumourid, datediff, rk, apptdate, hessg_trust_code FROM (SELECT tumourid,
SELECT tc.tumourid,
op.apptdate-tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY op.apptdate,
h2.datayear,h2.attendkeyanon,pos) AS rk
, op.apptdate
, procodet AS hessg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON
tim.tumouricdsite3code = tc.tumour_code
INNER JOIN heslive.hes_linkage_av_op@casref01 h2 ON tc.patientid = h2.patientid
INNER JOIN heslive.hesop@casref01 op ON op.datayear = h2.datayear and
op.attendkeyanon = h2.attendkeyanon
INNER JOIN heslive.hesop_opertn@casref01 ho2 ON ho2.datayear = h2.datayear AND
ho2.attendkeyanon = h2.attendkeyanon
WHERE op.apptdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
AND ho2.opertn IN ('M421', 'M422', 'M423', 'M428', 'M429') AND tc.tumour_code IN
('C67','D09BLADDER'))
WHERE rk=1)))
WHERE rk=1);

--11)----------------- CERVICAL CANCERS; CONE BIOPSIES - AT_TREATMENT_ENGLAND ------------------
--The final treatment table will create a surgery flag for the tumour if:
--The tumour received a cone biopsy and was FIGO stage 1a (see SOP Appendices for
list of opcs4 codes)
--Or the tumour received a cone biopsy and was FIGO stage 1b & 1b1 disease, if the
--tumour also received a lymphadenectomy
--Tables 11-14 flag the cone biopsies and lymphadenectomies, AND a cervical tumour
--resection flag will bring this together in the final table
-- Create a cone biopsy flag for the tumour if:
--there is a record in at_treatment_england which states that the tumour was treated with
surgery (event is '01a', '01b', '01z', or '01c')
--and the opcs4_code is a cone biopsy
--and the operation date (opertn) occurred in the relevant timeframe (see SOP)

CREATE TABLE tr_av_conebiops AS(
SELECT DISTINCT
  tumourid,
  CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS conebiops_avtreat
, eventdate AS avsg_date
, avsg_trust_code
CREATE TABLE tr_hes_conebiops AS
SELECT DISTINCT tumourid, conebiops_hes, hessg_date, hessg_trust_code
FROM (select tumourid, conebiops_hes, hessg_date, hessg_trust_code, RANK() OVER (PARTITION BY tumourid ORDER BY hessg_date, source) as rk
FROM SELECT DISTINCT tumourid, datediff, rk, opdate, hessg_trust_code FROM (SELECT tumourid, datediff, rk, opdate, hessg_trust_code FROM (SELECT tumourid, datediff, rk, eventdate, avsg_trust_code
FROM (SELECT tumourid, datediff, rk, eventdate, avsg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN timeframe_lookup_13_20 AT casref01 tim ON tim.tumouricdsite3code = tc.tumour_code
INNER JOIN av2020.at_treatment_england@casref01 avtreat ON avtreat.tumourid=tc.tumourid
AND eventcode IN ('01a','01b','01z','01c') AND (avtreat.eventdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time)
AND avtreat.opcs4_code IN ('Q014','Q033','Q031','Q032') AND tc.tumour_code='C53'))
WHERE rk=1));

CREATE TABLE tr_hes_conebiops AS (SELECT DISTINCT tumourid, conebiops_hes, hessg_date, hessg_trust_code
FROM (select tumourid, conebiops_hes, hessg_date, hessg_trust_code, RANK() OVER (PARTITION BY tumourid ORDER BY hessg_date, source) as rk
FROM SELECT DISTINCT tumourid, datediff, rk, eventdate, avsg_trust_code
FROM (SELECT tumourid, datediff, rk, eventdate, avsg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON tim.tumouricdsite3code = tc.tumour_code
INNER JOIN av2020.at_treatment_england@casref01 avtreat ON avtreat.tumourid=tc.tumourid
AND eventcode IN ('01a','01b','01z','01c') AND (avtreat.eventdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time)
AND avtreat.opcs4_code IN ('Q014','Q033','Q031','Q032') AND tc.tumour_code='C53')
WHERE rk=1));

--12)----------------- CERVICAL CANCERS; CONE BIOPSIES - HES ------------------------
-- Create a cone biopsy flag for the tumour if:
-- There is an inpatient hes episode with a tumour resection opcs-4 code in one of the operation fields
-- and the opcs4_code is a cone biopsy (see SOP Appendices for list of opcs4 codes)
-- and the operation date (opertn) occurred in the relevant timeframe (see SOP)
-- and the patient only had one tumour in the time period of interest (this is incorporated in the final table)

--12)----------------- CERVICAL CANCERS; CONE BIOPSIES - HES ------------------------
-- Create a cone biopsy flag for the tumour if:
-- There is an inpatient hes episode with a tumour resection opcs-4 code in one of the operation fields
-- and the opcs4_code is a cone biopsy (see SOP Appendices for list of opcs4 codes)
-- and the operation date (opertn) occurred in the relevant timeframe (see SOP)
-- and the patient only had one tumour in the time period of interest (this is incorporated in the final table)
ho.opdate-tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY ho.opdate,
hl.datayear,hl.epikeyanon,POS) AS rk
, ho.opdate
, procode3 AS hessg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON
tim.tumouricdsite3code = tc.tumour_code
INNER JOIN heslive.hes_linkage_av_apc@casref01 hl ON tc.patientid = hl.patientid
INNER JOIN heslive.hesapc@casref01 ha ON ha.datayear = hl.datayear AND
ha.epikeyanon = hl.epikeyanon
INNER JOIN heslive.hesapc_opertn@casref01 ho ON ho.datayear = hl.datayear AND
ho.epikeyanon = hl.epikeyanon
AND ho.opdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
AND ho.opertn IN ('Q014','Q033','Q031','Q032') AND tc.tumour_code='C53')
WHERE rk=1)

UNION ALL

SELECT DISTINCT
tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS conebiops_hes
, apptdate AS hessg_date
, hessg_trust_code
, 'HESOP' as source
FROM (SELECT tumourid, datediff, rk, apptdate, hessg_trust_code FROM (SELECT
tc.tumourid,
ho.apptdate-tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY ho.apptdate,
h2.datayear,h2.attendkeyanon,pos) AS rk
, ho.apptdate
, procode AS hessg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON
tim.tumouricdsite3code = tc.tumour_code
INNER JOIN heslive.hes_linkage_av_op@casref01 h2 ON tc.patientid = h2.patientid
INNER JOIN heslive.hesop@casref01 op ON op.datayear = h2.datayear AND
op.attendkeyanon = h2.attendkeyanon
INNER JOIN heslive.hesop_opertn@casref01 ho2 ON ho2.datayear = h2.datayear AND
ho2.attendkeyanon = h2.attendkeyanon
where op.apptdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
AND ho2.opertn IN ('Q014','Q033','Q031','Q032') AND tc.tumour_code='C53')

WHERE 1=1

SELECT tumourid, datediff, rk, apptdate, hessg_trust_code FROM (SELECT
tc.tumourid,
ho2.opertn AS hessg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON
tim.tumouricdsite3code = tc.tumour_code
INNER JOIN heslive.hes_linkage_av_op@casref01 h2 ON tc.patientid = h2.patientid
INNER JOIN heslive.hesop@casref01 op ON op.datayear = h2.datayear AND
op.attendkeyanon = h2.attendkeyanon
INNER JOIN heslive.hesop_opertn@casref01 ho2 ON ho2.datayear = h2.datayear AND
ho2.attendkeyanon = h2.attendkeyanon
where op.apptdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
AND ho2.opertn IN ('Q014','Q033','Q031','Q032') AND tc.tumour_code='C53')

WHERE 1=1

WHERE 1=1

WHERE 1=1
WHERE rk=1));
WHERE rk=1);

--13)----------------- CERVICAL CANCERS; LYMPHADENECTOMIES -
AT_TREATMENT_ENGLAND ------------------
-- Create a lymphadenectomy flag for the tumour if:
-- there is a record in at_treatment_england which states that the tumour was treated with surgery (event is '01a', '01b', '01z', or '01c')
-- and the opcs4_code is a lymphadenectomy (see SOP Appendices for list of opcs4 codes)
-- and the operation date (opertn) occurred in the relevant timeframe (see SOP)

CREATE TABLE tr_av_lymph AS(
SELECT DISTINCT tumourid,
    CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS lymph_avtreat,
    eventdate AS avsg_date,
    avsg_trust_code
FROM (SELECT tumourid, datediff, rk, eventdate, avsg_trust_code
    FROM (SELECT tc.tumourid, avtreat.eventdate - tc.diagnosisdatebest AS datediff,
            RANK() OVER (PARTITION BY tc.tumourid ORDER BY avtreat.eventdate, avtreat.eventid) AS rk, avtreat.eventdate, avtreat.trust_code AS avsg_trust_code
    FROM tr_tumour_cohort tc
    INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON tim.tumouri
cdsite3code = tc.tumour_code
    INNER JOIN av2020.at_treatment_england@casref01 avtreat ON avtreat.tumourid=tc.tumourid
    AND eventcode IN ('01a','01b','01z','01c') AND (avtreat.eventdate - tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time)
    AND avtreat.opcs4_code IN ('T856','T859','T865') AND tc.tumour_code='C53')
    WHERE rk=1));

--14)----------------- CERVICAL CANCERS; LYMPHADENECTOMIES - HES ------------------
-- Create a lymphadenectomy flag for the tumour if:
-- There is an inpatient hes episode with a tumour resection opcs4 code in one of the operation fields
-- And the opcs4_code is a lymphadenectomy (see SOP Appendices for list of opcs4 codes)
-- And the operation date (opertn) occurred in the relevant timeframe (see SOP)
-- And the patient only had one tumour in the time period of interest (this is incorporated in the final table)

CREATE TABLE tr_hes_lymph AS(
SELECT DISTINCT tumourid, lymph_hes, hessg_date, hessg_trust_code
FROM (
select tumourid, lymph_hes, hessg_date, hessg_trust_code, RANK() OVER (PARTITION BY tumourid ORDER BY hessg_date, source) as rk
FROM (SELECT DISTINCT tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS lymph_hes,
opdate AS hessg_date,
hessg_trust_code,
,'HESAPC' as source
FROM (SELECT tumourid, datediff, rk, opdate, hessg_trust_code FROM (SELECT tc.tumourid, ho.opdate - tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY ho.opdate, hl.datayear, hl.epikeyanon, pos) AS rk,
ho.opdate, procode3 AS hessg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnanatlapietersen.timeframe_lookup_13_20@casref01 tim ON tim.tumouricdsite3code = tc.tumour_code
INNER JOIN heslive.hes_linkage_av_apc@casref01 hl ON tc.patientid = hl.patientid
INNER JOIN heslive.hesapc@casref01 ha ON ha.datayear = hl.datayear AND ha.epikeyanon = hl.epikeyanon
INNER JOIN heslive.hesapc_opertn@casref01 ho ON ho.datayear = hl.datayear AND ho.epikeyanon = hl.epikeyanon
AND ho.opdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
AND ho.opertn IN ('T856', 'T859', 'T865') AND tc.tumour_code = 'C53')
WHERE rk=1)
UNION ALL
SELECT DISTINCT tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS lymph_hes,
apptdate AS hessg_date
FROM tr_hes_lymph AS (...)
)
\[ hessg\_trust\_code, \ engine\_code \ AS \ 'HESOP' \ AS \ source \] FROM ( 
SELECT tumourid, datediff, rk, apptdate, hessg_trust_code FROM ( 
SELECT tc.tumourid, 
op.apptdate-tc.diagnosisdatebest AS datediff, 
RANK() OVER (PARTITION BY tc.tumourid ORDER BY op.apptdate, 
h2.datayear,h2.attendkeyanon,pos) AS rk 
, op.apptdate 
, procodet AS hessg_trust_code 
FROM tr_tumour_cohort tc 
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON 
tim.tumouricdsite3code = tc.tumour_code 
INNER JOIN heslive.hes_linkage_av_op@casref01 h2 ON tc.patientid = h2.patientid 
INNER JOIN heslive.hesop@casref01 op ON op.datayear = h2.datayear and 
op.attendkeyanon = h2.attendkeyanon 
INNER JOIN heslive.hesop_opertn@casref01 ho2 ON ho2.datayear = h2.datayear AND 
ho2.attendkeyanon = h2.attendkeyanon 
WHERE op.apptdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time 
AND ho2.opertn IN ('T856','T859','T865') AND tc.tumour_code='C53') 
WHERE rk=1)) 
WHERE rk=1); 

--15)-------------- COLORECTAL CANCERS; ENDOSCOPIES - 
AT_TREATMENT_ENGLAND------- 
-- Create a surgery flag for the tumour if: 
-- there is a record in AT_TREATMENT_ENGLAND which states that the tumour was 
treated with surgery (event is '01a', '01b', '01z', or '01c') 
-- and the opcs4_code is an endoscopic resection or endoscopic biopsy procedure (see 
SOP Appendices for list of opcs4 codes) 
-- and the operation date (opertn) occurred in the relevant timeframe (see SOP) 
-- and the tumour is TNM stage 1 (a stage-specific tumour resection flag will incorporate 
this stage criteria in the final table) 

CREATE TABLE tr_av_colorec AS( 
SELECT DISTINCT 
tumourid, 
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS colorec_avtreat 
, eventdate AS avsg_date 
, avsg_trust_code
FROM (  
SELECT tumourid, datediff, rk, eventdate, avsg_trust_code  
FROM (  
SELECT tc.tumourid,  
avtreat.eventdate-tc.diagnosisdatebest AS datediff,  
RANK() OVER (PARTITION BY tc.tumourid ORDER BY avtreat.eventdate,  
avtreat.eventid) AS rk, avtreat.eventdate  
, avtreat.trust_code AS avsg_trust_code  
FROM tr_tumour_cohort tc  
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON  
tim.tumouricdsite3code = tc.tumour_code  
INNER JOIN av2020.at_treatment_england@casref01 avtreat ON  
avtreat.tumourid=tc.tumourid AND eventcode IN ('01a', '01b', '01z', '01c') AND (avtreat.eventdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time)  
AND avtreat.opcs4_code IN ('H201','H412','H206','H231','H236','H205','H202','H122','H235','H239','H402','H232','H261','H208','H341','H418','H209','H248','H238','H204','H419','H221','H251','H259','H229','H181','H281','H191','H561')  
AND tc.tumour_code in ('C18', 'C19', 'C20'))  
WHERE rk=1));

CREATE TABLE tr_hes_colorec AS(  
SELECT DISTINCT tumourid, colorec_hes, hessg_date, hessg_trust_code  
FROM (  
select tumourid, colorec_hes, hessg_date, hessg_trust_code, RANK() OVER (PARTITION BY tumourid ORDER BY hessg_date, source) as rk  
FROM (  
SELECT DISTINCT
tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS colorec_hes
, opdate AS hessg_date
, hessg_trust_code
, 'HESAPC' as source
FROM ( SELECT tumourid, datediff, rk, opdate, hessg_trust_code FROM ( SELECT tc.tumourid,
ho.opdate-tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY ho.opdate,
hl.datayear,hl.epikeyanon,POS) AS rk
, ho.opdate
, procode3 AS hessg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON
tim.tumourid=tc.tumour_code
INNER JOIN heslive.hes_linkage_av_apc@casref01 hl ON tc.patientid = hl.patientid
INNER JOIN heslive.hesapc@casref01 ha ON ha.datayear = hl.datayear AND
ha.epikeyanon = hl.epikeyanon
INNER JOIN heslive.hesapc_opertn@casref01 ho ON ho.datayear = hl.datayear AND
ho.epikeyanon = hl.epikeyanon
AND ho.opdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
AND ho.opertn IN ('H201','H412','H206','H231','H236','H205','H202','H122','H235','H239','H402','H232',
'H261','H208','H341','H418','H209','H248','H238','H204','H419','H221','H251','H259','H229','H181','H281','H191','H561')
AND tc.tumour_code in ('C18', 'C19', 'C20'))
WHERE rk=1)
UNION ALL
SELECT DISTINCT
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS colorec_hes
, apptdate AS hessg_date
, hessg_trust_code
, 'HESOP' as source
FROM ( SELECT tumourid, datediff, rk, apptdate, hessg_trust_code FROM ( SELECT tc.tumourid,
op.apptdate-tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY op.apptdate, h2.datayear,h2.attendkeyanon,pos) AS rk
, op.apptdate
, procodet AS hessg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON tim.tumouricdsite3code = tc.tumour_code
INNER JOIN heslive.hes_linkage_av_op@casref01 h2 ON tc.patientid = h2.patientid
INNER JOIN heslive.hesop@casref01 op ON op.datayear = h2.datayear and op.attendkeyanon = h2.attendkeyanon
INNER JOIN heslive.hesop_opertn@casref01 ho2 ON ho2.datayear = h2.datayear AND ho2.attendkeyanon = h2.attendkeyanon
WHERE op.apptdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
AND ho2.opertn IN ('H201','H412','H206','H231','H236','H205','H202','H122','H235','H239','H402','H232','H261','H208','H341','H418','H209','H248','H238','H204','H419','H221','H251','H259','H229','H181','H281','H191','H561')
AND tc.tumour_code in ('C18', 'C19', 'C20'))
WHERE rk=1)))
WHERE rk=1);

--17)----------------- COLORECTAL CANCERS; APPENDECTOMIES FOR APPENDIX TUMOURS ONLY C18.1 - AT_TREATMENT_ENGLAND -----------------
-- Create a surgery flag for the tumour if:
-- there is a record in AT_TREATMENT_ENGLAND which states that the tumour was treated with surgery (event is '01a', '01b', '01z', or '01c')
-- And the opcs4_code is an appendectomy procedure (see SOP Appendices for list of opcs4 codes)
-- And the operation date (opertn) occurred in the relevant timeframe (see SOP)
-- And the tumour is an appendix tumour (C18.1)

CREATE TABLE tr_av_coloappen
(SELECT DISTINCT tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS colorec_avtreat_appen
, eventdate AS avsg_date
, avsg_trust_code
FROM (SELECT tumourid, datediff, rk, eventdate, avsg_trust_code FROM (SELECT tc.tumourid,
avtreat.eventdate-tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY avtreat.eventdate,
avtreat.eventid) AS rk, avtreat.eventdate
, avtreat.trust_code AS avsg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON
tim.tumouricsite3code = tc.tumour_code
INNER JOIN av2020.at_treatment_england@casref01 avtreat ON
avtreat.tumourid=tc.tumourid
AND eventcode IN ('01a','01b','01z','01c') AND (avtreat.eventdate-
tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time)
AND avtreat.opcs4_code IN ('H024','H019','H011') AND tc.site_icd10_o2 in ('C181'))
WHERE rk=1));

--18)------------------ COLORECTAL CANCERS; APPENDECTOMIES FOR APPENDIX TUMOURS ONLY C18.1 - HES ------------------
-- Create a surgery flag for the tumour if:
-- There is an inpatient hes episode with a tumour resection opcs-4 code in one of the operation fields
-- and the opcs4_code is an appendectomy procedure (see SOP Appendices for list of opcs4 codes)
-- and the operation date (opertn) occurred in the relevant timeframe (see SOP)
-- and the tumour is an appendix tumour (C18.1)
-- and the patient only had one tumour in the time period of interest (this is also incorporated in the final table)

CREATE TABLE tr_hes_coloappen AS (
SELECT DISTINCT tumourid, colorec_hes_appen, hessg_date, hessg_trust_code
FROM (
select tumourid, colorec_hes_appen, hessg_date, hessg_trust_code, RANK() OVER (PARTITION BY tumourid ORDER BY hessg_date, source) as rk
FROM (SELECT DISTINCT tumourid, colorec_hes_appen, hessg_date, hessg_trust_code, datediff, tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY avtreat.eventdate, avtreat.eventid) AS rk, avtreat.eventdate
, avtreat.trust_code AS avsg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON
tim.tumouricsite3code = tc.tumour_code
INNER JOIN av2020.at_treatment_england@casref01 avtreat ON
avtreat.tumourid=tc.tumourid
AND eventcode IN ('01a','01b','01z','01c') AND (avtreat.eventdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time)
AND avtreat.opcs4_code IN ('H024','H019','H011') AND tc.site_icd10_o2 in ('C181'))
WHERE rk=1));
ho.opdate-tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY ho.opdate,
hl.datayear,hl.epikeyanon,POS) AS rk
, ho.opdate
, procode3 AS hessg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON
tim.tumouricdsite3code = tc.tumour_code
INNER JOIN heslive.hes_linkage_av_apc@casref01 hl ON tc.patientid = hl.patientid
INNER JOIN heslive.hesapc@casref01 ha ON ha.datayear = hl.datayear AND
ha.epikeyanon = hl.epikeyanon
INNER JOIN heslive.hesapc_opertn@casref01 ho ON ho.datayear = hl.datayear AND
ho.epikeyanon = hl.epikeyanon
AND ho.opdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
AND ho.opertn IN ('H024', 'H019', 'H011') AND tc.site_icd10_o2 in ('C181'))
WHERE rk=1)
UNION ALL
SELECT DISTINCT
tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS colorec_hes_appen
, apptdate AS hessg_date
, hessg_trust_code
, 'HESOP' as source
FROM (SELECT tumourid, datediff, rk, apptdate, hessg_trust_code FROM (SELECT tc.tumourid,
op.apptdate-tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY op.apptdate,
h2.datayear,h2.attendkeyanon,pos) AS rk
, op.apptdate
, procode AS hessg_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON
tim.tumouricdsite3code = tc.tumour_code
INNER JOIN heslive.hes_linkage_av_op@casref01 h2 ON tc.patientid = h2.patientid
INNER JOIN heslive.hesop@casref01 op ON op.datayear = h2.datayear AND
op.attendkeyanon = h2.attendkeyanon
INNER JOIN heslive.hesop_opertn@casref01 ho2 ON ho2.datayear = h2.datayear AND
ho2.attendkeyanon = h2.attendkeyanon
WHERE op.apptdate-tc.diagnosisdatebest BETWEEN -31 AND tim.resect_time
AND ho2.opertn IN ('H024', 'H019', 'H011') AND tc.site_icd10_o2 in ('C181'))
85
WHERE rk=1)))
WHERE rk=1);

--- CREATE CHEMO FLAG TABLES ---

--19)----------------- ALL SITES - AVCT TABLE ---------------------
-- Create a chemo flag for the tumour if:
-- There is a record in AT_TREATMENT_ENGLAND which states that the tumour was treated with chemotherapy (event is either 'Cytotoxic Chemotherapy' (code = 02) or 'CT Other' (code = CTX) or 'chemoradiotherapy' (code = 04) or 'Immunotherapy' (code = 15))
-- AND the event date (eventdate) occurred in the relevant timeframe (see SOP)
CREATE TABLE tr_av_ct AS
SELECT DISTINCT tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS avct_flag , eventdate AS avct_date , avct_trust_code FROM ( SELECT tumourid, datediff, rk, eventdate, avct_trust_code FROM ( SELECT tc.tumourid, avtreat.eventdate - tc.diagnosisdatebest AS datediff , RANK() OVER (PARTITION BY tc.tumourid ORDER BY avtreat.eventdate, avtreat.eventid) AS rk , avtreat.eventdate , avtreat.trust_code AS avct_trust_code FROM tr_tumour_cohort tc INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON tim.tumouricdsite3code = tc.tumour_code INNER JOIN av2020.at_treatment_england@casref01 avtreat ON avtreat.tumourid=tc.tumourid AND eventcode IN ('02','04','15','CTX') AND (avtreat.eventdate-tc.diagnosisdatebest BETWEEN -31 AND tim.CHEMO_TIME) ) WHERE rk=1));

--20)------------------- ALL SITES - SACT LEGACY -- UP TO 30th JUNE 2017 -----------------
-- Create a chemo flag for the tumour if:
there is a record in SACT LEGACY (excluding those null or classified as 'hormones' or 'Not chemo' or 'Zoledronic acid' or 'Pamidronate' or 'Denosumab' or 'RADIUM 223' or 'LUTETIUM-177' or 'YTTRIUM-90')

-- AND the start date of the regimen (start_date_of_regimen) occurred in the relevant timeframe

-- AND the patient only had one tumour in the time period of interest (this is also incorporated in the final table)

-- AND the start date of the regimen is up to 30th June 2017

CREATE TABLE tr_sact AS
(SELECT DISTINCT tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS sact_flag
, start_date_of_regimen AS sact_date
, sact_trust_code
FROM ( SELECT tumourid,datediff,rk, start_date_of_regimen, sact_trust_code
FROM ( SELECT tc.tumourid, sr.start_date_of_regimen-tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY sr.start_date_of_regimen, sr.merged_regimen_id, st.merged_tumour_id) AS rk
, sr.start_date_of_regimen
, SUBSTR(st.organisation_code_of_provider,1,3) AS sact_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON tim.tumouricdsite3code = tc.tumour_code
INNER JOIN sact_legacy.patient@casref01 sp ON tc.nhsnumber=sp.nhs_number
INNER JOIN sact_legacy.tumour@casref01 st ON sp.merged_patient_id=st.merged_patient_id
INNER JOIN sact_legacy.regimen@casref01 SR on st.merged_tumour_id=sr.merged_tumour_id
AND (NOT (benchmark_group IN ('NOT CHEMO','HORMONES','ZOLEDRONIC ACID','PAMIDRONATE','DENOSUMAB', 'RADIUM 223', 'LUTETIUM-177', 'YTTRIUM-90')
OR benchmark_group IS NULL))
AND sr.start_date_of_regimen-tc.diagnosisdatebest BETWEEN -31 AND tim.chemo_time
AND sr.start_date_of_regimen<=TO_DATE('2017-06-30','YYYY-MM-DD')
) WHERE rk=1
)


-- Create a chemo flag for the tumour if:

-- there is a record in SACT ENCORE (excluding those null or classified as 'hormones' or 'Not chemo' or 'Zoledronic acid' or 'Pamidronate' or 'Denosumab' or 'RADIUM 223' or 'LUTETIUM-177' or 'YTTRIUM-90')
-- AND the start date of the regimen (start_date_of_regimen) occurred in the relevant timeframe
-- AND the patient only had one tumour in the time period of interest (this is also incorporated in the final table)
-- AND the start date of the regimen is from 1 July 2017 onwards

CREATE TABLE tr_sact_2 AS
(SELECT DISTINCT tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS sact2_flag,
start_date_of_regimen AS sact2_date,
sact2_trust_code
FROM (SELECT /*+ USE_HASH(tc tim) USE_HASH(tim sp) USE_HASH(sp st) USE_HASH(st sr)*/ tumourid, datediff ,rk, start_date_of_regimen, sact2_trust_code
FROM (SELECT tc.tumourid, sr.start_date_of_regimen - tc.diagnosisdatebest AS datediff, RANK() OVER (PARTITION BY tc.tumourid ORDER BY sr.start_date_of_regimen, sr.merged_regimen_id, st.sact_tumour_id) AS rk,
sr.start_date_of_regimen, SUBSTR(st.organisation_code_of_provider,1,3) AS sact2_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 TIM ON TIM.tumouricdsite3code = tc.tumour_code
INNER JOIN sact.at_patient_england@cas2303 sp ON tc.nhsnumber=sp.nhs_number
INNER JOIN sact.at_tumour_england@cas2303 st ON sp.encore_patient_id = st.encore_patient_id
INNER JOIN sact.at_regimen_england@cas2303 sr ON st.sact_tumour_id=sr.sact_tumour_id
AND (NOT (benchmark_group IN ('NOT CHEMO','HORMONES','ZOLEDRONIC ACID','PAMIDRONATE','DENOSUMAB', 'RADIUM 223', 'LUTETIUM-177', 'YTTRIUM-90') OR benchmark_group IS NULL))
AND sr.start_date_of_regimen-tc.diagnosisdatebest BETWEEN -31 AND TIM.chemo_time
AND sr.start_date_of_regimen>=TO_DATE('2017-07-01','YYYY-MM-DD')
) WHERE rk=1
));

CREATE RADIOTHERAPY FLAG TABLES

---22)---------------- ALL SITES - AT_TREATMENT_ENGLAND ----------------
-- Create a radiotherapy flag for the tumour if:
-- There is a record in AT_TREATMENT_ENGLAND which states that the tumour was treated with radiotherapy
--(event is either 'RT - Teletherapy' (code = 05) or 'chemoradiotherapy' (code = 04) or
'brachytherapy' (code = 06) or 'radiosurgery' (code = 22) or 'RT - Other/ NK' (code = RTX)
or 'radioisotope therapy (including radiiodine)' (code = 19))
-- AND the event date (eventdate) occurred in the relevant timeframe (see SOP)

```
CREATE TABLE tr_av_rt AS(
SELECT DISTINCT
tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS avrt_flag
, eventdate AS avrt_date
, avrt_trust_code
FROM (SELECT tumourid, datediff, rk, eventdate, avrt_trust_code FROM (SELECT tc.tumourid,
avtreat.eventdate-tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY avtreat.eventdate,
avtreat.eventid) AS rk
, avtreat.eventdate
, avtreat.trust_code AS avrt_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON
  tim.tumouricdsite3code = tc.tumour_code
INNER JOIN av2020.at_treatment_england@casref01 avtreat ON
  avtreat.tumourid=tc.tumourid
AND eventcode IN ('04', '05', '06', '22', 'RTX', '19') AND (avtreat.eventdate-
tc.diagnosisdatebest BETWEEN -31 AND tim.RADIO_TIME)
)
WHERE rk=1
));
```

--23)------------------ALL SITES - RTDS PRE APRIL 2016 (COLLECTED BY NATCANSAT)---
---------
-- Create a radiotherapy flag for the tumour if:
-- There is a record in rtds (excluding those classed as Brachytherapy, i.e., with
RTTREATMENTMODALITY='06') -- removed this restriction due to now counting radio-
isotope treatments as radiotherapy rather than chemotherapy
-- AND the appointment date (APPTDATE) occurred in the relevant timeframe
-- AND the patient only had one tumour in the time period of interest (this is also
incorporated in the final table)
CREATE TABLE tr_rtds
AS(  SELECT DISTINCT tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS rtds_flag
, apptdate AS rtds_date
, rtds_trust_code
FROM (SELECT tumourid,datediff,rk , apptdate, rtds_trust_code FROM (SELECT tc.tumourid, rl.apptdate - tc.diagnosisdatebest AS datediff,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY rl.apptdate,rl.attendid,rl.orgcodeprovider,pr.radiotherapyepisodeid,pr.prescriptionid) AS rk
, rl.apptdate
, CAST(SUBSTR(pr.orgcodeprovider,1,3) AS VARCHAR(3)) AS rtds_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON tim.tumouricdsite3code = tc.tumour_code
INNER JOIN rtds2016.opcds_cas1712_linkage rl ON tc.patientid=rl.patientid AND rl.apptdate-tc.diagnosisdatebest BETWEEN -31 AND tim.radio_time
INNER JOIN rtds2016.rtds_prescriptions pr ON pr.orgcodeprovider = rl.orgcodeprovider AND pr.attendid = rl.attendid
AND pr.apptdate = rl.apptdate ) WHERE rk=1 )
);
SELECT DISTINCT
tumourid,
CASE WHEN datediff IS NULL THEN 0 ELSE 1 END AS rtds2_flag
, TO_DATE(apptdate) AS rtds2_date
, rtds2_trust_code
FROM (SELECT tumourid,datediff,rk, apptdate, rtds2_trust_code FROM (SELECT tc.tumourid, TO_DATE(pr.apptdate) - tc.diagnosisdatebest AS datediff
, TO_DATE(pr.apptdate) AS apptdate,
RANK() OVER (PARTITION BY tc.tumourid ORDER BY TO_DATE(pr.apptdate),pr.attendid,pr.orgcodeprovider,pr.radiotherapyepisodeid,pr.prescriptionid) AS rk
, pr.orgcodeprovider AS rtds2_trust_code
FROM tr_tumour_cohort tc
INNER JOIN analysisnataliapetersen.timeframe_lookup_13_20@casref01 tim ON tim.tumouricdsite3code = tc.tumour_code
INNER JOIN rtds.at_prescriptions_england@cas2303 pr ON pr.patientid=tc.patientid
AND pr.orgcodeprovider <>'7A3'
AND TO_DATE(pr.apptdate)-tc.diagnosisdatebest BETWEEN -31 AND tim.radio_time
AND TO_DATE(pr.apptdate) BETWEEN TO_DATE('01-APR-16', 'dd-mm-yy') AND TO_DATE('31-DEC-20 23:59:00', 'DD/MM/YY HH24:MI:SS')
WHERE rk=1
)
);
-----------------------------------------------------------------------------
------------------ Index the tables from above----------------------------------
-----------------------------------------------------------------------------
CREATE UNIQUE INDEX analysisnataliapetersen.tr_AVCT_tumourid_uq ON analysisnataliapetersen.tr_av_CT ( tumourid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_AVRT_tumourid_uq ON analysisnataliapetersen.tr_av_RT ( tumourid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_AVSG_tumourid_uq ON analysisnataliapetersen.tr_av_sg ( tumourid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_av_bladder_tumourid_uq ON analysisnataliapetersen.tr_av_bladder ( tumourid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_av_coloappen_tumourid_uq ON analysisnataliapetersen.tr_av_coloappen ( tumourid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_av_colorec_tumourid_uq ON analyseisnataliapetersen.tr_av_colorec (tumourid) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_av_conebiops_tumourid_uq ON analysisnataliapetersen.tr_av_conebiops (tumourid) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_av_liver_tumourid_uq ON analysisnataliapetersen.tr_av_liver (tumourid) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_av_lymph_tumourid_uq ON analysisnataliapetersen.tr_av_lymph (tumourid) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_av_oesoph_tumourid_uq ON analysisnataliapetersen.tr_av_oesoph (tumourid) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_av_stomach_tumourid_uq ON analysisnataliapetersen.tr_av_stomach (tumourid) NOLOGGING TABLESPACE analysisdata_IX;
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_av_CT')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_AVCT_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_av_RT')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_AVRT_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_av_sg')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_AVSG_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_av_bladder')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_av_bladder_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_av_coloappen')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_av_coloappen_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_av_colorec')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_av_colorec_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_av_conebiops')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_av_conebiops_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_av_liver')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_av_liver_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_av_lymph')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_av_lymph_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_av_oesoph')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_av_oesoph_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_av_stomach')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_av_stomach_tumourid_uq')

CREATE UNIQUE INDEX analysisnataliapetersen.tr_hes_sg_tumourid_uq ON analysisnataliapetersen.tr_hes_sg ( tumourid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_hes_bladder_tumid_uq ON analysisnataliapetersen.tr_hes_bladder ( tumourid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_hes_coloappenn_tumid_uq ON analysisnataliapetersen.tr_hes_coloappenn ( tumourid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_hes_colorectumourid_uq ON analysisnataliapetersen.tr_hes_colorec ( tumourid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_hes_conebiops_tumid_uq ON analysisnataliapetersen.tr_hes_conebiops ( tumourid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_hes_liver_tumourid_uq ON analysisnataliapetersen.tr_hes_liver ( tumourid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_hes_lymph_tumourid_uq ON analysisnataliapetersen.tr_hes_lymph ( tumourid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_hes_oesoph_tumourid_uq ON analysisnataliapetersen.tr_hes_oesoph ( tumourid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_hes_stomach_tumourid_uq ON analysisnataliapetersen.tr_hes_stomach ( tumourid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_rtds_tumourid_uq ON analysisnataliapetersen.tr_rtds ( tumourid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_rtds_2_tumourid_uq ON analysisnataliapetersen.tr_rtds_2 ( tumourid ) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_sact_tumourid_uq ON analysisnataliapetersen.tr_sact (tumourid) NOLOGGING TABLESPACE analysisdata_IX;
CREATE UNIQUE INDEX analysisnataliapetersen.tr_sact_2_tumourid_uq ON analysisnataliapetersen.tr_sact_2 (tumourid) NOLOGGING TABLESPACE analysisdata_IX;
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_hes_sg')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_hes_sg_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_hes_bladder')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_hes_bladder_tumid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_hes_coloappen')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_hes_coloappon_tumid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_hes_coloappen_tumid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_hes_conebiops')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_hes_conebiops_tumid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_hes_liver')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_hes_liver_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_hes_lymph')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_hes_lymph_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_hes_oesoph')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_hes_oesoph_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_hes_stomach')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_hes_stomach_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_rtds')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_rtds_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_rtds_2')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_rtds_2_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_sact')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_sact_tumourid_uq')
EXECUTE dbms_stats.gather_table_stats('analysisnataliapetersen', 'tr_sact_2')
EXECUTE dbms_stats.gather_index_stats('analysisnataliapetersen', 'tr_sact_2_tumourid_uq')

CREATE TABLE av_treatment_table_1320_4p8 NOLOGGING COMPRESS AS
SELECT

CASE
WHEN avrt_flag=1 THEN 1
WHEN rtds_flag=1 AND tc.tumour_flag=0 THEN 1
WHEN rtds2_flag=1 AND tc.tumour_flag=0 THEN 1
ELSE 0
END AS rt_flag

CASE
WHEN avct_flag=1 THEN 1
WHEN sact_flag=1 AND tc.tumour_flag=0 THEN 1
WHEN sact2_flag=1 AND tc.tumour_flag=0 THEN 1
ELSE 0
END AS ct_flag

CASE
WHEN AVSG_flag=1 THEN 1
WHEN hessg_flag=1 AND tc.tumour_flag=0 THEN 1
-- Secondly, incorporate stage specific rules for particular cancer sites

--Cervical
WHEN avt.site_icd10_o2_3char='C53' AND (upper(SUBSTR(tc.figo,1,2))) IN ('1A','IA') AND conebiops_avtreat=1 THEN 1
WHEN avt.site_icd10_o2_3char='C53' AND (upper(SUBSTR(tc.figo,1,2))) IN ('1A','IA') AND conebiops_hes=1 AND tc.tumour_flag=0 THEN 1
WHEN avt.site_icd10_o2_3char='C53' AND (upper(tc.figo) IN ('1B','IB') or upper(SUBSTR(tc.figo,1,3)) IN ('1B1','IB1')) AND (conebiops_avtreat=1) AND (lymph_avtreat=1) THEN 1
WHEN avt.site_icd10_o2_3char='C53' AND (upper(tc.figo) IN ('1B','IB') or upper(SUBSTR(tc.figo,1,3)) IN ('1B1','IB1')) AND (conebiops_hes=1 AND tc.tumour_flag=0) THEN 1
WHEN avt.site_icd10_o2_3char='C53' AND (upper(tc.figo) IN ('1B','IB') or upper(SUBSTR(tc.figo,1,3)) IN ('1B1','IB1')) AND (conebiops_hes=1 AND tc.tumour_flag=0) AND (lymph_avtreat=1) THEN 1
WHEN avt.site_icd10_o2_3char='C53' AND (upper(tc.figo) IN ('1B','IB') or upper(SUBSTR(tc.figo,1,3)) IN ('1B1','IB1')) AND (conebiops_hes=1 AND tc.tumour_flag=0) AND (lymph_hes=1 AND tc.tumour_flag=0) THEN 1

--colorectal:
WHEN avt.site_icd10_o2_3char IN ('C18','C19','C20') AND SUBSTR(avt.stage_best,1,1)='1' AND colorec_avtreat=1 THEN 1
WHEN avt.site_icd10_o2_3char IN ('C18','C19','C20') AND SUBSTR(avt.stage_best,1,1)='1' AND colorec_hes=1 AND tc.tumour_flag=0 THEN 1

--Sub rule for appendectomies for colorectal:
WHEN avt.site_icd10_o2 IN ('C181') AND colorec_avtreat_appen=1 THEN 1
WHEN avt.site_icd10_o2 IN ('C181') AND colorec_hes_appen=1 AND tc.tumour_flag=0 THEN 1

--bladder
WHEN avt.site_icd10_o2_3char IN ('C67') AND SUBSTR(avt.t_best, 1,1) = '1' AND bladder_avtreat=1 THEN 1
WHEN avt.site_icd10_o2_3char IN ('C67') AND SUBSTR(avt.t_best, 1,1) = '1' AND bladder_hes=1 AND tc.tumour_flag=0 THEN 1

WHEN avt.site_icd10_o2 IN ('D090') AND avt.morph_icd10_o2 = '8130' AND bladder_avtreat=1 THEN 1
WHEN avt.site_icd10_o2 IN ('D090') AND avt.morph_icd10_o2 = '8130' AND bladder_hes=1 AND tc.tumour_flag=0 THEN 1

-- liver
WHEN avt.site_icd10_o2_3char IN ('C22') AND SUBSTR(avt.stage_best,1,1)='1' AND liver_avtreat=1 THEN 1
WHEN avt.site_icd10_o2_3char IN ('C22') AND SUBSTR(avt.stage_best,1,1)='1' AND liver_hes=1 AND tc.tumour_flag=0 THEN 1

-- oesophagus
WHEN avt.site_icd10_o2_3char IN ('C15') AND SUBSTR(avt.stage_best, 1,2)='1A' AND oesoph_avtreat=1 THEN 1
WHEN avt.site_icd10_o2_3char IN ('C15') AND SUBSTR(avt.stage_best,1,2)='1A' AND oesoph_hes=1 AND tc.tumour_flag=0 THEN 1

-- stomach
WHEN avt.site_icd10_o2_3char IN ('C16') AND SUBSTR(avt.stage_best,1,2)='1A' AND stomach_avtreat=1 THEN 1
WHEN avt.site_icd10_o2_3char IN ('C16') AND SUBSTR(avt.stage_best,1,2)='1A' AND stomach_hes=1 AND tc.tumour_flag=0 THEN 1
ELSE 0
END AS sg_flag

--Create cancer site names
CASE WHEN tumour_code IN ('C67') THEN 'MALIGNANT BLADDER'
WHEN tumour_code IN ('D09BLADDER','D41BLADDER') THEN 'NON-MALIGNANT BLADDER'
WHEN tumour_code IN ('C50') THEN 'BREAST'
WHEN tumour_code IN ('C53') THEN 'CERVICAL'
WHEN tumour_code IN ('C18','C19') THEN 'COLON'
WHEN tumour_code IN ('C20') THEN 'RECTUM'
WHEN tumour_code IN ('C01', 'C09', 'C10') THEN 'OROPHARYNX'
WHEN tumour_code IN ('C02', 'C03', 'C04', 'C06') THEN 'ORAL_CAVITY'
WHEN tumour_code IN ('C07', 'C08') THEN 'SALIVARY_GLANDS'
WHEN tumour_code IN ('C12', 'C13') THEN 'HYPOPHARYNX'
WHEN tumour_code IN ('C32') THEN 'LARYNX'
WHEN tumour_code IN ('C05', 'C11', 'C14', 'C30', 'C31') THEN 'OTHER_HEAD_AND_NECK'
WHEN tumour_code IN ('C64', 'C65', 'C66', 'C68') THEN 'KIDNEY'
WHEN tumour_code IN ('C22') THEN 'LIVER'
WHEN tumour_code IN ('C33', 'C34') AND tc.morph_icd10_o2 IN ('8041','8042','8043','8044','8045') THEN 'SCLC'
WHEN tumour_code IN ('C33', 'C34') AND tc.morph_icd10_o2 NOT IN ('8041','8042','8043','8044','8045') THEN 'NSCLC'
WHEN tumour_code IN ('C25') THEN 'PANCREAS'
WHEN tumour_code IN ('C61') THEN 'PROSTATE'
WHEN tumour_code IN ('C15') THEN 'OESOPHAGUS'
WHEN tumour_code IN ('C56', 'C57', 'C48OVARY', 'D39OVARY') THEN 'OVARY'
WHEN tumour_code IN ('C16') THEN 'STOMACH'
WHEN tumour_code IN ('C54', 'C55') THEN 'UTERINE'
WHEN tumour_code IN ('C51') THEN 'VULVA'
WHEN tumour_code IN ('C70', 'C71', 'C72') THEN 'MALIGNANT BRAIN'
WHEN tumour_code IN ('D32BRAIN', 'D33BRAIN', 'D42BRAIN', 'D43BRAIN') THEN 'NON-MALIGNANT BRAIN'
WHEN tumour_code IN ('D35BRAIN') THEN 'NON-MALIGNANT BRAIN'
WHEN tumour_code IN ('C75BRAIN', 'D44BRAIN') THEN 'NON-MALIGNANT ENDOCRINE'
WHEN tumour_code IN ('C75BRAIN', 'D44BRAIN') THEN 'NON-BENIGN ENDOCRINE'
WHEN tumour_code IN ('C62', 'D29TESTES') THEN 'TESTES'
WHEN tumour_code IN ('NON-KC_MELANOMA') THEN 'SKIN:NON-KERATINOCYTE, MELANOMA'
WHEN tumour_code IN ('NON-KC_MELANOMA_INSITU') THEN 'SKIN:NON-KERATINOCYTE, MELANOMA IN SITU'
WHEN tumour_code IN ('NON-KC_RARE', 'NON-KC_EMPD') THEN 'SKIN:NON-KERATINOCYTE, RARE'
WHEN tumour_code IN ('KC_BCC') THEN 'SKIN:KERATINOCYTE SKIN, BCC'
WHEN tumour_code IN ('KC_CSCC') THEN 'SKIN:KERATINOCYTE, CSCC'
WHEN SUBSTR(tumour_code,1,1)='D' AND tumour_code NOT IN ('D01','D04','D03','D06','D07','D11','D13','D15','D16','D18','D25','D27','D36','D40','D48','D29TESTES','D32BRAIN', 'D33BRAIN', 'D35BRAIN', 'D39OVARY', 'D39OVARY', 'D42BRAIN', 'D43BRAIN', 'D44BRAIN') THEN 'OTHER NON-MALIGNANT'
ELSE 'OTHER MALIGNANT'
END AS cancergroup

-- Select all other variables
,avt.tumourid
,avt.diagnosisyear
,avt.age
,avt.sex as gender
,avt.dco
,avt.basisofdiagnosis
,atg.ccg_2021_code
,atg.gor_code
,avt.fiveyearageband
,avt.ethnicity
,chrl.chrl_tot_27_03
,case
  when (diagnosisyear = 2013) then IMD15_quintile_lsoas
end as imd_quintile Lisbon 
,atg.canalliance_2021_name 
,atg.canalliance_2021_code 
--For checking 
,avt.morph_icd10_o2 
,tc.figo 
,avt.t_best 
,avt.stage_best 
,tc.site_icd10_o2 
,site_icd10_o2_3char 
,tc.tumour_flag 

--Select dates of treatment from at_treatment_england 
,avt.diagnosisdatebest 
,avt.deathdatebest 
,avct.avct_date 
,avrt.avrt_date 
,avsg.avsg_date 

--Select dates of treatment from patient-level datasets where only 1 tumour was diagnosed in 18 months before or after that tumour, 
,CASE WHEN tc.tumour_flag=0 THEN sact.sact_date END AS sact_date 
,CASE WHEN tc.tumour_flag=0 THEN sact2.sact2_date END AS sact2_date 
,CASE WHEN tc.tumour_flag=0 THEN rtds.rtds_date END AS rtds_date 
,CASE WHEN tc.tumour_flag=0 THEN hessg.hessg_date END AS hessg_date 
,CASE WHEN tc.tumour_flag=0 THEN rtds2.rtds2_date END AS rtds2_date 

--Select date of surgery where there were additional site-specific resections flagged: 
------------------------CERVICAL------------------------ 
-- Take date of cone biopsy in at_treatment_england if: 
-- The tumour received a cone biopsy and was FIGO stage 1a 
-- Or the tumour received a cone biopsy and was FIGO stage 1b & 1b1 disease, if the tumour also received a lymphadenectomy 

, CASE 
WHEN avt.site_icd10_o2_3char='C53' AND (upper(SUBSTR(tc.figo,1,2)) IN ('1A','1A')) AND conebiops_avtreat=1 THEN cbavt.avsg_date 
WHEN avt.site_icd10_o2_3char='C53' AND (upper(tc.figo) IN ('1B','1B')) or upper(SUBSTR(tc.figo,1,3)) IN ('1B1','1B1')) AND (conebiops_avtreat=1) AND (lymph_avtreat=1) THEN cbavt.avsg_date
WHEN avt.site_icd10_o2_3char='C53' AND (upper(tc.figo) IN ('1B', 'IB') or upper(SUBSTR(tc.figo,1,3)) IN ('1B1', 'IB1')) AND (lymph_hes=1 AND tc.tumour_flag=0) THEN cbavt.avsg_date
END AS cbavsg_date

-- Take date of cone biopsy in hes if:
-- The tumour received a cone biopsy and was FIGO stage 1a
-- Or the tumour received a cone biopsy and was FIGO stage 1b & 1b1 disease, if the tumour also received a lymphadenectomy
-- and only 1 tumour was diagnosed in 18 months before or after that tumour

, CASE
WHEN avt.site_icd10_o2_3char='C53' AND (upper(tc.figo) IN ('1A', 'IA')) AND conebiops_hes=1 AND tc.tumour_flag=0 THEN cbhes.hessg_date
WHEN avt.site_icd10_o2_3char='C53' AND (upper(tc.figo) IN ('1B', 'IB') or upper(SUBSTR(tc.figo,1,3)) IN ('1B1', 'IB1')) AND (lymph_avtreat=1) AND tc.tumour_flag=0) THEN cbhes.hessg_date
WHEN avt.site_icd10_o2_3char='C53' AND (upper(tc.figo) IN ('1B', 'IB') or upper(SUBSTR(tc.figo,1,3)) IN ('1B1', 'IB1')) AND (lymph_hes=1 AND tc.tumour_flag=0) THEN cbhes.hessg_date
END AS cbhessg_date

--------------- colorectal -------------------------------
-- As with cervical, select the date of the stage-specific resection for each tumour,
-- according to the rules specified earlier for generating the stage-specific resection flag for that tumour site
, CASE WHEN avt.site_icd10_o2_3char IN ('C18', 'C19', 'C20') AND colorec_avtreat=1 THEN coloavt.avsg_date
END AS coloavsg_date
, CASE WHEN avt.site_icd10_o2_3char IN ('C18', 'C19', 'C20') AND colorec_hes=1 AND tc.tumour_flag=0 THEN colohes.hessg_date
END AS colohessg_date
, CASE WHEN avt.site_icd10_o2 IN ('C181') AND colorec_avtreat_appen=1 THEN coloavt_appen.avsg_date
END AS appenavsg_date
, CASE WHEN avt.site_icd10_o2 IN ('C181') AND colorec_hes_appen=1 AND tc.tumour_flag=0 THEN colohes_appen.hessg_date
END AS appenhessg_date

--------------- bladder -------------------------------
, CASE WHEN avt.site_icd10_o2_3char IN ('C67') AND SUBSTR(avt.t_best, 1,1) = '1' AND bladder_avtreat=1 THEN blad1_avt.avsg_date
END AS bladavsg_date
, CASE WHEN avt.site_icd10_o2_3char IN ('C67') AND SUBSTR(avt.t_best, 1,1) = '1'
AND bladder_hes=1 AND tc.tumour_flag=0 THEN blad1_hes.hessg_date
END AS bladhessg_date

, CASE WHEN avt.site_icd10_o2 IN ('D090') AND avt.morph_icd10_o2 = '8130' AND
bladder_avtreat=1 THEN blad1_avt.avsg_date
END AS blad_insitu_avsg_date

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liver---------------------------------

, CASE WHEN avt.site_icd10_o2_3char IN ('C22') AND SUBSTR(avt.stage_best,1,1)='1'
AND liver_avtreat=1 THEN livavt.avsg_date
END AS livavsg_date

, CASE WHEN avt.site_icd10_o2_3char IN ('C22') AND SUBSTR(avt.stage_best,1,1)='1'
AND liver_hes=1 AND tc.tumour_flag=0 THEN livhes.hessg_date
END AS livhessg_date

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oesophageal---------------------------------

, CASE WHEN avt.site_icd10_o2_3char IN ('C15') AND
SUBSTR(avt.stage_best,1,2)='1A' AND oesoph_avtreat=1 THEN oesoavt.avsg_date
END AS oesoavsg_date

, CASE WHEN avt.site_icd10_o2_3char IN ('C15') AND
SUBSTR(avt.stage_best,1,2)='1A' AND oesoph_hes=1 AND tc.tumour_flag=0 THEN
oesohes.hessg_date
END AS oesohessg_date

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stomach---------------------------------

, CASE WHEN avt.site_icd10_o2_3char IN ('C16') AND
SUBSTR(avt.stage_best,1,2)='1A' AND stomach_avtreat=1 THEN stomavt.avsg_date
END AS stomavsg_date

, CASE WHEN avt.site_icd10_o2_3char IN ('C16') AND
SUBSTR(avt.stage_best,1,2)='1A' AND stomach_hes=1 AND tc.tumour_flag=0 THEN
stomhes.hessg_date
END AS stomhessg_date

--Select trust codes from at_treatment_england
, avsg.avsg_trust_code
, avct_trust_code
, avrt_trust_code
--Select trust codes of treatment from patient-level datasets where only 1 tumour was diagnosed in 18 months before or after that tumour

CASE WHEN tc.tumour_flag=0 THEN hessg.hessg_trust_code END AS hessg_trust_code
CASE WHEN tc.tumour_flag=0 THEN sact.sact_trust_code END AS sact_trust_code
CASE WHEN tc.tumour_flag=0 THEN sact2.sact2_trust_code END AS sact2_trust_code
CASE WHEN tc.tumour_flag=0 THEN rtds.rtds_trust_code END AS rtds_trust_code
CASE WHEN tc.tumour_flag=0 THEN rtds2.rtds2_trust_code END AS rtds2_trust_code

--Select trust codes of surgery where there were additional site-specific resections flagged:

CERVICAL

-- Take trust code of cone biopsy in at_treatment_england if:
-- The tumour received a cone biopsy and was FIGO stage 1a
-- Or the tumour received a cone biopsy and was FIGO stage 1b & 1b1 disease, if the tumour also received a lymphadenectomy

, CASE
WHEN avt.site_icd10_o2_3char='C53' AND (upper(SUBSTR(tc.figo,1,2)) IN ('1A','1A1'))
AND conebiops_avtreat=1 THEN cbavt.avsg_trust_code
WHEN avt.site_icd10_o2_3char='C53' AND (upper(tc.figo) IN ('1B','1B'))
or (upper(SUBSTR(tc.figo,1,3)) IN ('1B1','1B1'))
AND (conebiops_avtreat=1) AND (lymph_avtreat=1) THEN cbavt.avsg_trust_code
WHEN avt.site_icd10_o2_3char='C53' AND (upper(tc.figo) IN ('1B','1B1'))
or (upper(SUBSTR(tc.figo,1,3)) IN ('1B1','1B1'))
AND (conebiops_avtreat=1) AND (lymph_hes=1 AND tc.tumour_flag=0) THEN cbhessg.hessg_trust_code

--Take date of cone biopsy in hes if:
--The tumour received a cone biopsy AND was FIGO stage 1a
--Or the tumour received a cone biopsy AND was FIGO stage 1b & 1b1 disease, if the tumour also received a lymphadenectomy
--AND only 1 tumour was diagnosed in 18 months before or after that tumour

, CASE
WHEN avt.site_icd10_o2_3char='C53' AND (upper(SUBSTR(tc.figo,1,2)) IN ('1A','1A'))
AND conebiops_hes=1 AND tc.tumour_flag=0 THEN cbhes.hessg_trust_code
WHEN avt.site_icd10_o2_3char='C53' AND (upper(tc.figo) IN ('1B','1B'))
or (upper(SUBSTR(tc.figo,1,3)) IN ('1B1','1B1'))
AND (conebiops_hes=1 AND tc.tumour_flag=0) AND (lymph_avtreat=1) THEN cbhes.hessg_trust_code
WHEN avt.site_icd10_o2_3char='C53' AND (upper(tc.figo) IN ('1B','1B') or upper(SUBSTR(tc.figo,1,3)) IN ('1B1','1B1')) AND (conebiops_hes=1 AND tc.tumour_flag=0) AND (lymph_hes=1 AND tc.tumour_flag=0) THEN cbhes.hessg_trust_code
END AS cbhessg_trust_code

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colorectal-----------------

-- As with cervical, select the date of the stage-specific resection for each tumour, according to the rules specified earlier for generating the stage-specific resection flag for that tumour site
,CASE WHEN avt.site_icd10_o2_3char IN ('C18','C19','C20') AND SUBSTR(avt.stage_best,1,1)='1' AND colorec_avtreat=1 THEN coloavt.avsg_trust_code
END AS colorectavsg_trust_code
,CASE WHEN avt.site_icd10_o2_3char IN ('C18','C19','C20') AND SUBSTR(avt.stage_best,1,1)='1' AND colorec_hes=1 AND tc.tumour_flag=0 THEN colohes.hessg_trust_code
END AS colorec_hessg_trust_code
,CASE WHEN avt.site_icd10_o2 IN ('C181') AND colorec_avtreat_appen=1 THEN coloavt_appen.avsg_trust_code
END AS colorectavsg_trust_code
,CASE WHEN avt.site_icd10_o2_3char IN ('C18','C19','C20') AND SUBSTR(avt.stage_best,1,1)='1' AND colorec_avtreat=1 THEN coloavt_avtreat_appen.avsg_trust_code
END AS colorectavsg_trust_code
,CASE WHEN avt.site_icd10_o2 IN ('C181') AND colorec_hes_appen=1 AND tc.tumour_flag=0 THEN colohes_appen.hessg_trust_code
END AS colorec_hessg_trust_code

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bladder-----------------

,CASE WHEN avt.site_icd10_o2_3char IN ('C67') AND SUBSTR(avt.t_best, 1,1) = '1' AND bladder_avtreat=1 THEN blad1_avt.avsg_trust_code
END AS blad1_avt_trust_code
,CASE WHEN avt.site_icd10_o2_3char IN ('C67') AND SUBSTR(avt.t_best, 1,1) = '1'
AND bladder_hes=1 AND tc.tumour_flag=0 THEN blad1_hes.hessg_trust_code
END AS blad1_hes_trust_code
,CASE WHEN avt.site_icd10_o2 IN ('D090') AND avt.morph_icd10_o2 = '8130' AND bladder_avtreat=1 THEN blad1_avt.avsg_trust_code
END AS blad1_avt_trust_code
,CASE WHEN avt.site_icd10_o2 IN ('D090') AND avt.morph_icd10_o2 = '8130' AND bladder_hes=1 AND tc.tumour_flag=0 THEN blad1_hes.hessg_trust_code
END AS blad1_hes_trust_code

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liver---------------------

,CASE WHEN avt.site_icd10_o2_3char IN ('C22') AND SUBSTR(avt.stage_best,1,1)='1'
AND liver_avtreat=1 THEN livavt.avsg_trust_code
END AS livavsg_trust_code
,CASE WHEN avt.site_icd10_o2 IN ('D090') AND avt.morph_icd10_o2 = '8130' AND bladder_hes=1 AND tc.tumour_flag=0 THEN blad1_hes.hessg_trust_code
END AS blad_insitu_hessg_trust_code

,CASE WHEN avt.site_icd10_o2_3char IN ('C22') AND SUBSTR(avt.stage_best,1,1)='1'
AND liver_avtreat=1 THEN livavt.avsg_trust_code
END AS livavsg_trust_code
, CASE WHEN avt.site_icd10_o2_3char IN ('C22') AND SUBSTR(avt.stage_best,1,1)='1' AND liver_hes=1 AND tc.tumour_flag=0 THEN livhes.hessg_trust_code END AS livhessg_trust_code

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CASE WHEN avt.site_icd10_o2_3char IN ('C15') AND SUBSTR(avt.stage_best,1,2)='1A' AND oesoph_avtreat=1 THEN oesoavt.avsg_trust_code END AS oesoavsg_trust_code

CASE WHEN avt.site_icd10_o2_3char IN ('C15') AND SUBSTR(avt.stage_best,1,2)='1A' AND oesoph_hes=1 AND tc.tumour_flag=0 THEN oesohes.hessg_trust_code END AS oesohessg_trust_code

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CASE WHEN avt.site_icd10_o2_3char IN ('C16') AND SUBSTR(avt.stage_best,1,2)='1A' AND stomach_avtreat=1 THEN stomavt.avsg_trust_code END AS stomavsg_trust_code

CASE WHEN avt.site_icd10_o2_3char IN ('C16') AND SUBSTR(avt.stage_best,1,2)='1A' AND stomach_hes=1 AND tc.tumour_flag=0 THEN stomhes.hessg_trust_code END AS stomhessg_trust_code

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-- final join of tables with flags
-- Treatment flag tables
-- Do not flag surgery for non-ovarian C48 tumour morphologies (these are classified as "other" tumours)

FROM av2020.at_tumour_england@casref01 AVT
INNER JOIN analysisnataliapetersen.tr_tumour_cohort@casref01 tc ON avt.tumourid = tc.tumourid
LEFT JOIN analysisnataliapetersen.tr_av_ct@casref01 avct ON avt.tumourid=avct.tumourid
LEFT JOIN analysisnataliapetersen.tr_sact@casref01 sact ON avt.tumourid=sact.tumourid
LEFT JOIN analysisnataliapetersen.tr_sact_2@casref01 sact2 ON avt.tumourid=sact2.tumourid
LEFT JOIN analysisnataliapetersen.tr_av_rt@casref01 avrt ON avt.tumourid=avrt.tumourid
LEFT JOIN analysissnataliapetersen.tr_av_sg@casref01 avsg ON avt.tumourid=avsg.tumourid AND (tc.tumour_code NOT IN ('C48OTHER'))
LEFT JOIN analysissnataliapetersen.tr_rtds@casref01 rtds ON avt.tumourid=rtds.tumourid
LEFT JOIN analysissnataliapetersen.tr_hes_sg@casref01 hessg ON avt.tumourid=hessg.tumourid AND (tc.tumour_code NOT IN ('C48OTHER'))
LEFT JOIN analysissnataliapetersen.tr_rtds_2@casref01 rtds2 ON avt.tumourid=rtds2.tumourid

-- Add further joins for stage-specific resections:
-- add gynae tables:
LEFT JOIN analysissnataliapetersen.tr_av_conebiops@casref01 CBAVT ON avt.tumourid=cbavt.tumourid
LEFT JOIN analysissnataliapetersen.tr_hes_conebiops@casref01 CBhes ON avt.tumourid=cbhes.tumourid
LEFT JOIN analysissnataliapetersen.tr_av_lymph@casref01 lyavt ON avt.tumourid=lyavt.tumourid
LEFT JOIN analysissnataliapetersen.tr_hes_lymph@casref01 lyhes ON avt.tumourid=lyhes.tumourid

-- add colorectal tables:
LEFT JOIN analysissnataliapetersen.tr_av_colorec@casref01 coloavt ON avt.tumourid=coloavt.tumourid
LEFT JOIN analysissnataliapetersen.tr_hes_colorec@casref01 colohes ON avt.tumourid=colohes.tumourid
LEFT JOIN analysissnataliapetersen.tr_av_colopappen@casref01 coloavt_appen ON avt.tumourid=coloavt_appen.tumourid
LEFT JOIN analysissnataliapetersen.tr_hes_colopappen@casref01 colohes_appen ON avt.tumourid=colohes_appen.tumourid

-- add urological tables:
LEFT JOIN analysissnataliapetersen.tr_av_bladder@casref01 blad1_avt ON avt.tumourid=blad1_avt.tumourid
LEFT JOIN analysissnataliapetersen.tr_hes_bladder@casref01 blad1_hes ON avt.tumourid=blad1_hes.tumourid

-- add UGI tables:
LEFT JOIN analysissnataliapetersen.tr_av_liver@casref01 livavt ON avt.tumourid=livavt.tumourid
LEFT JOIN analysissnataliapetersen.tr_hes_liver@casref01 livhes ON avt.tumourid=livhes.tumourid
LEFT JOIN analysisnataliapetersen.tr_av_oesoph@casref01 oesoavt ON avt.tumourid=oesoavt.tumourid
LEFT JOIN analysisnataliapetersen.tr_hes_oesoph@casref01 oesohes ON avt.tumourid=oesohes.tumourid
LEFT JOIN analysisnataliapetersen.tr_av_stomach@casref01 stomavt ON avt.tumourid=stomavt.tumourid
LEFT JOIN analysisnataliapetersen.tr_hes_stomach@casref01 stomhes ON avt.tumourid=stomhes.tumourid

-- Additional demographics
LEFT JOIN av2020.at_geography_england@casref01 atg ON avt.tumourid=atg.tumourid
-- join on tumour id
LEFT JOIN imd.imd2015_equal_lsoas imd15 ON atg.lsoa11_code = imd15.lsoa11_code
LEFT JOIN imd.imd2019_equal_lsoas imd19 ON atg.lsoa11_code = imd19.lsoa11_code
LEFT JOIN av2020.charlson_2006to2020@casref01 chrl ON chrl.tumourid=avt.tumourid

/*
LEFT JOIN (select avtu.tumourid
    , CASE WHEN avtu.stage_best is null THEN 'X'
          WHEN (SUBSTR(avtu.stage_best,1,1) NOT IN ('1','2','3','4')) THEN 'X'
          ELSE SUBSTR(avtu.stage_best,1,1) END AS stage
        from av2020.at_tumour_england@casref01 avtu
        WHERE avtu.diagnosisyear BETWEEN 2012 AND 2020
        AND (NOT (avtu.site_icd10_o2_3char='C50' AND
                  SUBSTR(avtu.stage_best,1,1)='0') or avtu.stage_pi is null)
) stage_nopagets
ON stage_nopagets.tumourid=avt.tumourid
*/
## Appendix 5: Datasets used

<table>
<thead>
<tr>
<th>Treatment type</th>
<th>Dataset</th>
<th>Data table version</th>
<th>Follow up period available</th>
<th>Linkage type</th>
<th>Data quality notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemotherapy</td>
<td>Registry data from AT_TREATMENT_ENGLAND</td>
<td>AV2020.AT_TREATMENT_ENGLAND@CASREF01</td>
<td>Historical – October 2022</td>
<td>Tumour level</td>
<td>Corresponds to CAS2210.</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>Systemic Anti-Cancer Therapy (SACT) 2018</td>
<td>SACT_LEGACY.PATIENT, SACT_LEGACY.TUMOUR and SACT_LEGACY.REGIMEN @CASREF01</td>
<td>January 2013 – March 2018</td>
<td>Patient level</td>
<td>Data was not submitted regularly from all NHS Trusts until July 2014 onwards. Regimen start date used to identify date of chemotherapy may be inaccurate for some tumours diagnosed at the start of 2013.</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>Systemic Anti-Cancer Therapy (SACT) pre-2018</td>
<td>SACT.AT_PATIENT_ENGLAND, SACT.AT_TUMOUR_ENGLAND and SACT.AT_REGIMEN_ENGLAND@CAS2303</td>
<td>April 2018 – September 2022</td>
<td>Patient level</td>
<td></td>
</tr>
<tr>
<td>Tumour resection</td>
<td>Registry data from AT_TREATMENT_ENGLAND</td>
<td>AV2020.AT_TREATMENT_ENGLAND@CASREF01AT_TREATMENT_ENGLAND</td>
<td>Historical – October 2022</td>
<td>Tumour level</td>
<td>Corresponds to CAS2210.</td>
</tr>
<tr>
<td>Tumour resection</td>
<td>Inpatient Hospital Episodes Statistics (HES)</td>
<td>HESLIVE.HESAPC and</td>
<td>April 2000 – October 2022</td>
<td>Patient level</td>
<td></td>
</tr>
<tr>
<td>Tumour resection</td>
<td>Outpatient Hospital Episodes Statistics (HES)</td>
<td>HESLIVE.HESAPC_OPERTN @CASREF01 and HESLIVE.HESOP_OPERTN @CASREF01</td>
<td>April 2000 – October 2022</td>
<td>Patient level</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>--------------------------</td>
<td>---------------</td>
<td></td>
</tr>
<tr>
<td>Radiotherapy</td>
<td>Registry data from AT_TREATMENT_ENGLAND</td>
<td>AV2020.AT_TREATMENT_ENGLAND@CASREF01@TREATMENT_ENGLAND</td>
<td>Historical – October 2022</td>
<td>Tumour level</td>
<td></td>
</tr>
<tr>
<td>Radiotherapy</td>
<td>Radiotherapy Dataset (RTDS) collected by NATCANSAT, pre-April 2016</td>
<td>RTDS2016.RTDS_PRESCRIPTIONS@CASREF01</td>
<td>April 2009 – April 2016</td>
<td>Patient level</td>
<td></td>
</tr>
<tr>
<td>Radiotherapy</td>
<td>Radiotherapy Dataset (RTDS) collected by PHE, post April 2016</td>
<td>RTDS.AT_PRESCRIPTIONS@CAS2303</td>
<td>April 2016 – December 2022</td>
<td>Patient level</td>
<td></td>
</tr>
</tbody>
</table>

Brachytherapy & teletherapy variable known to be inaccurate (there is over allocation to brachytherapy & underreporting of teletherapy). Data may be incomplete for selected NHS Trusts. There are known to be undercounts in RTDS in the period between mid-2015 and March 2016.
Appendix 6: Sensitivity analysis – impact of tumour resection code update

The list of relevant tumour resection codes was updated for SOP (v4.4) and previous versions of CAS-SOP#4, from a previous list that did not include stage-specific resections (available here). Please note, this analysis is from SOP (v4.4) and has not been updated for this v4.8 SOP update. Below is a comparison of the previous coding used and the current version, which includes stage-specific resections. The previous code list was applied to the current sites (selected with the same ICD10 codes), and the same timeframes obtained from this SOP.

Findings

- For the 22 cancer sites with defined tumour resections codes, 41% of tumours had a tumour resection using the previous list of codes, and 45% had a tumour resection when using the updated list of codes, plus the site-specific additions (as listed in Appendix 3).
- Statistically significant differences between the proportions are present for all but three of the 22 sites (non-small lung cancer, small cell lung cancer and uterine cancers).
- The differences are most noticeable for bladder cancer (36% absolute difference), cervical (14% absolute difference), salivary glands (13% absolute difference), liver (13% absolute difference), and other head and neck (12% absolute difference).
Appendix 7: Sensitivity analysis – impact of timeframe update

The timeframes as defined above may not capture all treatments for certain cancer sites (underestimate of true figure) or include treatments for recurrence (overestimate of true figure). Therefore, follow-up periods of 6/12/18 months were tested and the results are shown below. Please note, this analysis is from SOP (v4.4) and has not been updated for this v4.8 SOP update.

Chemotherapy

Tumour Resection
Radiotherapy

Findings

- Overall across all sites (excluding NMSC), 27% of tumours received chemotherapy within six months of diagnosis, increasing to 29% within 12 and 18 months. Sites with the greatest absolute differences in proportions from six to 18 months are bladder, kidney, liver, oral cavity, rectum and other (3-4% absolute difference).
- Of the 22 cancer sites with defined tumour resections codes (excluding ‘Other’ sites), 43% of tumours received a tumour resection within six months of diagnosis, increasing to 45% within 12 and 18 months. Sites with the greatest absolute differences in proportions from six to 18 months are rectum, breast, hypopharynx and oropharynx (5-9% absolute difference).
- Overall across all sites (excluding NMSC), 20% of tumours received radiotherapy within six months of diagnosis, increasing to 28% within 12 months and 29% within 18 months. Sites with the greatest absolute differences in proportions from six to 18 months are breast, prostate, small cell lung cancer and oesophageal (8-26% absolute difference).