**Ovarian/Uterine Cancer (OvUtCa) Phenotype Pseudo Code**

**Kaiser Permanente Washington/University of Washington, eMERGE-3**

**David Carrell, Gail Jarvik, Kathy Leppig**

**Updated: June 6th and June 7th, 2018
(edits since the 4/18/2018 version are in red)**

Table of contents

[Contact information 2](#_Toc508402204)

[Background 2](#_Toc508402205)

[References 2](#_Toc508402206)

[Useful Definitions 2](#_Toc508402207)

[Overview of operational definition and censoring measures 3](#_Toc508402208)

[Data modalities 3](#_Toc508402209)

[Flow diagram 4](#_Toc508402210)

[Case definition 4](#_Toc508402211)

[Control definition 5](#_Toc508402212)

[Covariate data 6](#_Toc508402213)

[Chart validation at the primary and secondary study sites 10](#_Toc508402214)

[Flow diagram of phenotype logic 11](#_Toc508402215)

[Table 1. Codes used to identify and classify cases and controls 12](#_Toc508402216)

[Table 2. Codes for characterizing cases and determining censoring dates 16](#_Toc508402217)

[Table 3. Codes for measuring benign tumors 21](#_Toc508402218)

[Table 4. Codes for measuring breast, GI, and pancreatic cancers 22](#_Toc508402219)

[Table 5. Codes for measuring tubal ligation 26](#_Toc508402220)

[Table 6. Rules and codes for measuring cancer antigen 125 27](#_Toc508402221)

[Table 7. Rules and codes for measuring HPV 28](#_Toc508402222)

[Table 8. Rules and codes for measuring tamoxifen exposure 34](#_Toc508402223)

[Table 9. Rules and codes for measuring oral contraceptive exposure 35](#_Toc508402224)

[Table 10. Rules and codes for measuring IUD exposure 36](#_Toc508402225)

[Table 11. Rules and codes for measuring MHT exposure 37](#_Toc508402226)

## Contact information

Questions about this phenotype definition should be directed to *both* of the following people:

David Carrell, Investigator, KPW (carrell.d@ghc.org)

Aaron Scroll, Project Manager, KPW (scroll.a@ghc.org)

## Background

Ovarian cancer is a type of cancer that begins in the ovaries. Women have two ovaries, one on each side of the uterus. The ovaries — each about the size of an almond — produce eggs (ova) as well as the hormones estrogen and progesterone.

An estimated 222,060 women in the United States were living with ovarian cancer in 2014. Median age at diagnosis is 63. Lifetime risk of developing ovarian cancer is approximately one in 80, and lifetime risk of dying from the disease is approximately one in 110.

Ovarian cancer often goes undetected until it has spread within the pelvis and abdomen. At this late stage, ovarian cancer is more difficult to treat and is frequently fatal. Early-stage ovarian cancer, in which the disease is confined to the ovary, is more likely to be treated successfully.

Surgery and chemotherapy are generally used to treat ovarian cancer.

## References

1. Patient Care and Health Information, Diseases and Conditions: Ovarian Cancer. Mayo Clinic. Rochester, MN. <https://www.mayoclinic.org/diseases-conditions/ovarian-cancer/symptoms-causes/syc-20375941>. Accessed March 5, 2018.
2. SEER Cancer Stat Facts: Ovarian Cancer. National Cancer Institute. Bethesda, MD, <http://seer.cancer.gov/statfacts/html/ovary.html>. Accessed March 5, 2018.
3. About Ovarian Cancer: Statistics. Ovarian Cancer Research Fund Alliance. New York, NY. <https://ocrfa.org/patients/about-ovarian-cancer/statistics>. Accessed March 5, 2018.

## Useful Definitions

The following definitions are useful:

Diagnoses:

* Endometrial cancer: cancer of the lining of the uterus

Procedures:

* Hysterectomy: surgical removal of the uterus
* Subtotal hysterectomy: removal of the uterus, leaving the cervix in situ (synonym: supracervical hysterectomy)
* Total hysterectomy: surgical removal of the uterus and cervix, with or without oophorectomy
* Oophorectomy: surgical removal of an ovary or ovaries
* Salpingectomy: removal of a fallopian tube or fallopian tubes
* Salpingo-oophorectomy: removal of an ovary together with the fallopian tube
* Bilateral salpingo-oophorectomy: removal of both ovaries together with the fallopian tubes

## Overview of operational definition and censoring measures

This phenotype used demographic, diagnosis and surgical procedure information to identify subjects qualifying as controls or cases, and to exclude subjects not qualified to be a control or a case. Care must be taken in identifying qualifying diagnosis codes; some diagnosis code matches must match at least the initial characters of the code (represented as a character string) while other diagnosis codes must match the exact string, including its length and sequence of characters. This is because some diagnosis codes may appear in a local research database with fewer than the standard number of characters, and if this occurs, we want to identify those instances as such and exclude them. The tables of codes indicate when exact matching is required.

To avoid rule-out codes we sometimes require diagnoses to satisfy a rule of “2/30,” by which we mean any of a group of diagnosis codes (where groups are identified by descriptors in column G of Table X) must appear at least twice over a period of at least 30 days. Note that when applying this 2/30 rule only codes of the same subgroup qualify for satisfying the 2/30 rule. For example, a patient with diagnosis codes including C57.00 (Table 1 row 18) on 4/1/2010 and C57.01 (Table 1 row 19) on 5/1/2010 would qualify by this rule because these two codes are at least 30 days apart and, though different, are both in the Cancer type group “Fallopian” as indicated by the descriptor in Table 1 column G. However, if this patient’s code on 5/1/2010 had been C56.9 (Table 1 row 16) the 2/30 rule would not have been met because C56.9 belongs to Cancer type group “Ovarian” (Table 1 column G) and the 4/1/2010 code belongs to Cancer type group “Fallopian” which are not the same.

Note that each subject qualifying as a case may qualify for one of more types of the cancers of interest (i.e., cancers of the ovary, uterus, fallopian tube, peritoneum, or endometrium). Flag variables are created for each cancer type to indicate the types for which each case qualifies, and if so the earliest date thereof.

Both cases and controls may undergo surgical procedures that result in the remove of organs that alter their risk of the cancers of interest. For example, if a woman has both of her fallopian tubes surgically removed, the fallopian tubes can no longer be a source of new neoplasms. For this reason we require tracking for each case or control whether such procedures occurred, and if so the earliest date thereof. These dates are used as censoring dates in analyses to adjust for time when a subject was not at risk of a particular type of cancer because of the absence of relevant organs. We also record each subject’s age as of the last date of known follow-up (for both cases and controls), to censor analyses with respect to cancers that may occur after last follow up.

## Data modalities

Data modalities used to operationalize this phenotype include:

* Demographics
* Diagnoses
* Surgical procedures
* Laboratory measures
* Medications

## Flow diagram

A flow diagram illustrating the logic used to identify controls and cases (and exclude other subjects) is provided in Figure 1.

## Case definition

Generally, to qualify as a case for this phenotype a subject must be a woman, have a diagnosis of a qualifying cancer (ovarian, uterine, peritoneal, fallopian, or endometrial) and have no evidence of any malignant neoplasms of other specific tissues of or adjacent to the reproductive organs. Once a case has been identified she must be categorized according to whether she has ever had each of the five qualifying cancer types. Additionally, cases must be evaluated further to determine if they have received any of a specific set of surgical procedures.

To qualify as a case a subject must satisfy each of the following criteria:

1. Sex is **female**.
2. **Have diagnoses** associated with encounters occurring ≥30 days apart (a rule of “2/30”) for any specific ICD 9 or ICD 10 code represented in **columns B and C of Table 1** that belong to the same Cancer type (represented by descriptors in Table 1 column G). By this we mean the 2/30 rule must be satisfied for a specific code. Thus, two occurrences of ICD 10 code C56.1 ≥30 days apart would satisfy this criterion, but a single occurrence of C56.1 (“Malignant neoplasm of right ovary”) combined with a single occurrence of code C57.0 (“Malignant neoplasm of fallopian tube”) would not. This rule is intended to avoid misinterpreting two separate rule-out diagnoses as evidence of a confirmed cancer diagnosis. Please pay close attention to the footnotes in Table 1 for details about rules for determining when diagnosis codes from your subjects’ data are considered to match those specified in Table 1.
3. **Does not have any diagnoses** in **column E of Table 1**. Any single instance of any of the codes in column E disqualifies a subject as a case.

Subjects meeting the above case definition must be classified according to each of the following binary indicators:

1. Ever satisfied criterion for **ovarian** cancer per **column G in Table 1**.
	1. Age at date of earliest known ovarian cancer.
2. Ever satisfied criterion for **uterine** cancer per **column G in Table 1**.
	1. Age at date of earliest known uterine cancer.
3. Ever satisfied criterion for **fallopian** cancer per **column G in Table 1**.
	1. Age at date of earliest known fallopian cancer.
4. Ever satisfied criterion for **peritoneal** cancer per **column G in Table 1**.
	1. Age at date of earliest known peritoneal cancer.
5. Ever satisfied criterion for **endometrial** cancer per **column G in Table 1**.
	1. Age at date of earliest known endometrial cancer.

## Control definition

Generally, to qualify as a control for this phenotype a subject must be a woman and never have received a diagnosis of any of several specific cancers, including all cancers used to identify phenotype-defined cancer cases plus other cancers. Additionally, controls must be evaluated further to determine if they were ever known to have received any of a specific set of surgical procedures that censor their contribution to the data set as a control.

To qualify as a **control** a subject must satisfy both of the following criteria:

1. Sex is **female**.
2. **Never know to have received** a diagnosis of cancer represented by any of the ICD-9 or ICD-10 codes in **column F in Table 1**.

Additionally, the following information must be assembled for each control to determine whether and if so when her contribution to study data must be censored because she received a hysterectomy, oophorectomy and/or salpingectomy surgical procedure. The earliest date of each type of surgical procedure will be determined used during analyses to censor a control subject’s contribution to the data. A pair of measures will be operationalized for each type of surgical procedure:

For **hysterectomy** procedures:

1. Ever versus never known to have received a hysterectomy as evidenced by the presence of ≥1 of the procedure codes listed in **column D in Table 2**.
2. Age at date of earliest known hysterectomy.

For **oophorectomy** procedures:

1. Ever versus never known to have received an oophorectomy as evidenced by the presence of ≥1 of the procedure codes listed in **column E in Table 2**.
2. Age at date of earliest known oophorectomy.

For **salpingectomy** procedures:

1. Ever versus never known to have received a salpingectomy as evidenced by the presence of ≥1 of the procedure codes listed in **column F in Table 2**.
2. Age at date of earliest known salpingectomy.

Information about age at last known contact with the healthcare system or date of death must also be recorded for each control.

The above information, along with other information to be used as covariates in analyses, is specified in the accompanying data dictionary.

## Covariate data

Operational definitions of study covariates are defined in the accompanying data dictionary available on PkeKB.org (with file name *OV\_UT\_Ca\_Data\_Dictionary\_YYYY\_MM\_DD.csv*). Covariate measure names and descriptions from the data dictionary are provided in Table C below for convenience. Covariates include measures of weight, history of selected other cancers, history of selected procedures, exposure to selected pharmacological therapies, history of selected diseases, history of selected laboratory measures and other covariates. Detailed specifications for operationalizing each covariate is provided in the data dictionary, which references Tables 3 through 11 in this document.

| **Table C. Covariates as defined in the accompanying data dictionary (available on the PheKB Web site).** |
| --- |
| **Covariate name** | **Covariate description** |
| eMERGEid | Unique eMERGE person identifier |
| Case\_Control | Case control status (as defined by pseudo code OV\_CA\_Pseudo\_Code\_YYYY\_MM\_DD.docx and its Table 1) |
| Case\_Ever\_OV\_Ca | Ever qualified as case for OVARIAN cancer (per pseudo code Table 1) |
| Case\_Age\_OV\_Ca | Age (integer years) when first qualified as a case for OVARIAN cancer |
| Case\_Ever\_UT\_Ca | Ever qualified as case for UTERINE cancer (per pseudo code Table 1) |
| Case\_Age\_UT\_Ca | Age (integer years) when first qualified as a case for UTERINE cancer |
| Case\_Ever\_PERIT\_Ca | Ever qualified as case for PERITONEAL cancer (per pseudo code Table 1) |
| Case\_Age\_PERIT\_Ca | Age (integer years) when first qualified as a case for PERITONEAL cancer |
| Case\_Ever\_FALLO\_Ca | Ever qualified as case for FALLOPIAN cancer (per pseudo code Table 1) |
| Case\_Age\_FALLO\_Ca | Age (integer years) when first qualified as a case for FALLOPIAN cancer |
| Case\_Ever\_ENDOM\_Ca | Ever qualified as case for ENDOMETRIAL cancer (per pseudo code Table 1) |
| Case\_Age\_ENDOM\_Ca | Age (integer years) when first qualified as a case for ENDOMETRIAL cancer |
| Age\_Ptype\_Cancer\_Free | For CASES this is the age (integer years) at the subject's last birthday before qualifying as a case per pseudo code Table 1 (i.e., the minimum of the Case\_Age… measures for cases); for CONTROLS this is age (integer years) at last known follow-up |
| Weight\_kg\_Ptype\_Ca\_Free\_Last | Weight in kilograms at Age\_Ptype\_Cancer\_Free (using the earliest available measurement at that age; if not available, use the most recent preceding measurement) |
| Height\_m\_Ptype\_Ca\_Free\_Last | Height in meters at Age\_Ptype\_Cancer\_Free (using the earliest available measurement at that age; if not available, use the most recent preceding measurement) |
| BMI\_Ptype\_Ca\_Free\_Last | Body Mass Index (BMI) at Age\_Ptype\_Cancer\_Free (using the earliest available measurement at that age; if not available, use the most recent preceding measurement) |
| CA125\_Above\_Normal\_Ever | Ever known to have a measurement in blood serum for cancer antigen 125 (CA125) that was above the relevant local lab's normal high threshold |
| CA125\_Quotient\_Max | Across all available CA125 lab measurements for this subject, this measure captures the MAXIMUM value calculated when dividing the measured CA125 lab value by the normal high value associated with that particular measurement (note that normal high values may vary from one CA125 measurement to the next, that this measure identifies a subject's highest CA125 measurement relative to its benchmark, and that this measure is meaningful whether the measured CA125 value is above or below the normal high value) |
| CA125\_Measured\_Value | For the subject's lab measurement that determined CA125\_Quotient\_Max, the measured cancer antigen 125 (CA125) value in units per milliliter (U/mL) from blood serum |
| CA125\_Normal\_High\_Value | For the subject's lab measurement that determined CA125\_Quotient\_Max, the normal high threshold associated with that lab measurement (also in units per milliliter [U/mL] from blood serum) |
| CA125\_Above\_Normal\_Age | Subject's age (integer years) when measure CA125\_Above\_Normal\_Ever was first set to 1 = Yes |
| US\_Lower\_Abdo\_Ever | Ever known to have received an ultrasound imaging procedure of the lower abdomen (includes CPT codes 76700, 76705, 76706, 76770, or 76775 and HCPCS codes C9744 or C9455) |
| US\_Lower\_Abdo\_Age\_At | Earliest age at which an ultrasound imaging procedure of the lower abdomen was performed (i.e., when US\_Lower\_Abdo\_Ever was first set = 1) |
| Diabetes\_Dx\_Ever | Ever known to have been diagnosed with Type 2 Diabetes (ICD-9 250.\* or ICD-10 E11.\*) followed by another diagnosis code from the same set 30-730 days later (a rule-of-two) |
| Diabetes\_Dx\_Age | Earliest age at which Diabetes\_Dx = 1 (integer years) |
| Diabetes\_T2\_eMERGE\_Ptype | Phenotype status as determined by the eMERGE Type 2 Diabetes Mellitus phenotype (PheKB ID = 18), if available (indicate missing if not assessed; see VALUES column in this data dictionary) |
| Benign\_Ut\_Tumor\_Ever | Ever known to have been diagnosed with a leiomyoma or benign uterine neoplasms (as defined in Table 3 of the pseudo code document); any single occurrence of such a diagnosis qualifies |
| Benign\_Ut\_Tumor\_Age | Earliest age at which Benign\_Ut\_Tumor\_Ever = 1 (integer years) |
| Oral\_Contra\_Expos\_16\_30 | Number of years with any dispensings of oral contraceptives (as defined in Table 9 of the pseudo code document) while age 16-30 (each year spans birthday +365 days) |
| Years\_Outpat\_Encs\_16\_30 | As evidence of health system contact, number of years with outpatient encounters while age 16-30 (each year spans birthday +365 days) |
| Oral\_Contra\_Expos\_31\_45 | Number of years with any dispensings of oral contraceptives (as defined in Table 9 of the pseudo code document) while age 31-45 (each year spans birthday +365 days) |
| Years\_Outpat\_Encs\_31\_45 | As evidence of health system contact, number of years with outpatient encounters while age 31-45 (each year spans birthday +365 days) |
| Oral\_Contra\_Earliest\_Age | Earliest age (integer years) with any dispensings of oral contraceptives (as defined in Table 9 of the pseudo code document)  |
| MHT\_Estrogen\_Expos\_45\_49 | Number of calendar quarters with any dispensing of menopausal hormone therapy (MHT) containing ESTROGEN (as defined by Rule A in Table 11 of the pseudo code document) while age 45-49 |
| MHT\_Progest\_Expos\_45\_49 | Number of calendar quarters with any dispensings of menopausal hormone therapy (MHT) containing PROGESTERONE (as defined by Rule B in Table 11 of the pseudo code document) while age 45-49 |
| Oral\_Contra\_Expos\_45\_49 | Number of calendar quarters with any dispensings of oral contraceptives (as defined in Table 9 of the pseudo code document) while age 45-49 |
| Years\_Outpat\_Encs\_45\_49 | As evidence of health system contact, number of years with outpatient encounters while age 45-49 (each year spans birthday +365 days) |
| MHT\_Estrogen\_Expos\_50\_54 | Number of calendar quarters with any dispensings of menopausal hormone therapy (MHT) containing ESTROGEN (as defined by Rule A in Table 11 of the pseudo code document) while age 50-54 |
| MHT\_Progest\_Expos\_50\_54 | Number of calendar quarters with any dispensings of menopausal hormone therapy (MHT) containing PROGESTERONE (as defined by Rule B in Table 11 of the pseudo code document) while age 50-54 |
| Oral\_Contra\_Expos\_50\_54 | Number of calendar quarters with any dispensings of oral contraceptives (as defined in Table 9 of the pseudo code document) while age 50-54 |
| Years\_Outpat\_Encs\_50\_54 | As evidence of health system contact, number of years with outpatient encounters containing age 50-54 (each year spans birthday +365 days) |
| MHT\_Estrogen\_Expos\_55\_plus | Number of calendar quarters with any dispensings of menopausal hormone therapy (MHT) containing ESTROGEN (as defined by Rule A in Table 11 of the pseudo code document) while age 55 or older |
| MHT\_Progest\_Expos\_55\_plus | Number of calendar quarters with any dispensings of menopausal hormone therapy (MHT) containing PROGESTERONE (as defined by Rule B in Table 11 of the pseudo code document) while age 55 or older |
| Oral\_Contra\_Expos\_55\_plus | Number of calendar quarters with any dispensings of oral contraceptives (as defined in Table 9 of the pseudo code document) while age 55 or older |
| Years\_Outpat\_Encs\_55\_64 | As evidence of health system contact, number of years with outpatient encounters while age 55-64 (each year spans birthday +365 days); note this measure intentionally covers 10 years |
| Br\_Ca\_Dx\_Ever | Ever known to have been diagnosed with breast cancer (as defined in Table 4 of the pseudo code document) followed by another diagnosis code from the same set 30-730 days later (a rule-of-two) |
| Br\_Ca\_Dx\_Age | Earliest age at which Br\_Ca\_Dx\_Ever = 1 (integer years) |
| Lower\_GI\_Ca\_Ever | Ever known to have been diagnosed with a cancer of the LOWER gastrointestinal tract (as defined in Table 4 of the pseudo code document) followed by another diagnosis code from the same set 30-730 days later (a rule-of-two) |
| Lower\_GI\_Ca\_Age | Earliest age at which Lower\_GI\_Ca\_Ever = 1 (integer years) |
| Other\_GI\_Ca\_Ever | Ever known to have been diagnosed with any OTHER (non-lower) gastrointestinal tract cancer (as defined in Table 4 of the pseudo code document) followed by another diagnosis code from the same set 30-730 days later (a rule-of-two) |
| Other\_GI\_Ca\_Age | Earliest age at which Other\_GI\_Ca\_Ever = 1 (integer years) |
| Panc\_Ca\_Dx\_Ever | Ever known to have been diagnosed with pancreatic cancer (as defined in Table 4 of the pseudo code document) followed by another diagnosis code from the same set 30-730 days later (a rule-of-two) |
| Panc\_Ca\_Dx\_Age | Earliest age at which Panc\_Ca\_Dx\_Ever = 1 (integer years) |
| Polys\_Ov\_Synd\_Dx\_Ever | Ever known to have been diagnosed with polycystic ovarian syndrome (POS; ICD-9 256.4 or ICD-10 E28.2) followed by another diagnosis code from the same set 30-730 days later (a time-bounded rule-of-two) |
| Polys\_Ov\_Synd\_Dx\_Age | Earliest age at which Polys\_Ov\_Synd\_Dx\_Ever = 1 (integer years) |
| IUD\_Ever | Ever known to have used an intrauterine contraceptive device (IUD) as defined in Table 10 of the pseudo code document |
| IUD\_Age | Earliest age at which IUD\_Ever = 1 (integer years) |
| Tamoxifen\_Ever | Ever known to have received the antineoplastic medication Tamoxifen, as defined in Table 8 of the pseudo code document; any single dispensing satisfies this definition of exposure. |
| Tamoxifen\_Age | Earliest age (in integer years) at which measure Tamoxifen\_Ever (defined in this dictionary) was equal to 1 |
| Tubal\_Ligation\_Ever | Ever known to have received a tubal ligation procedure (as defined in Table 5 of the pseudo code document); a single occurrence of any code listed in Table 5 satisfies this definition |
| Tubal\_Ligation\_Age | Earliest age at which Tubal\_Ligation\_Ever = 1 (integer years) |
| HPV\_Status | Human papillomavirus (HPV) infection status (always negative, ever positive, or not assessed/unknown as defined in Table 7 of the pseudo code document); positive HPV tests are defined as tests that satisfy the local institution's definition of positive |
| HPV\_Status\_Age | Latest age known to be HPV negative (i.e., age at first HPV positive test if HPV\_Status=1, age at last HPV negative test if HPV\_Status=0, or missing if HPV\_Status=not assessed/unknown) |
| Hysterect\_Ever | Ever known to have received a hysterectomy (as defined in Table 2 of the pseudo code document); a single occurrence of any code listed in Table 2 satisfies this defintion |
| Hysterect\_Age | Earliest age at which Hysterect\_Ever = 1 (integer years) |
| Oophorect\_Ever | Ever known to have received an oophorectomy (as defined in Table 2 of the pseudo code document); a single occurrence of any code listed in Table 2 satisfies this defintion |
| Oophorect\_Age | Earliest age at which Oophorect\_Ever = 1 (integer years) |
| Salpingect\_Ever | Ever known to have received a salpingectomy (as defined in Table 2 of the pseudo code document); a single occurrence of any code listed in Table 2 satisfies this defintion |
| Salpingect\_Age | Earliest age at which Salpingect\_Ever = 1 (integer years) |

## Chart validation at the primary and secondary study sites

Manual chart review of representative samples of subjects’ charts will be used to estimate positive predictive value (PPV) for “case-ness” and “control-ness.” Calculations of PPV will be based on whether the phenotype algorithm correctly identified the subject as a case or a control. Secondary validation outcomes include the date on which a case qualifies as a case (by sub-type of cancer), the date on which a case or a control has a risk-altering surgical procedure (described above), and the end of follow up date. Secondary validation outcomes will be recorded and shared with the primary study site.

## Flow diagram of phenotype logic



Figure 1. Flow diagram of logic for identifying subjects who are controls, cases, or excluded from the ovarian/uterine cancer phenotype (with Table 1 column labels updated 3/9/2018).

## Table 1. Codes used to identify and classify cases and controls

| **Table 1. Diagnosis codes used in determining eligibility of cases and controls for the KPW/UW ovarian/uterine cancer phenotype.** |
| --- |
|  | **Description** | **Diagnosis code type** | **CASES MUST have ≥2 of these codes from the same Cancer type (Col. G) ≥30 days apart:** | **CASES must NOT have any of these:** | **CONTROLS must NOT have any of these:** | **Cancer type** |
|  | **ICD-09** | **ICD-10** |
| **Row** | **Col. A** | **Col. B** | **Col. C** | **Col. D** | **Col. E** | **Col. F** | **Col. G** |
| **1** | Malignant neoplasm of specified part of the peritoneum | 158.8\* | C48.1\* | X |   | X | Peritoneal |
| **2** | Malignant neoplasm of corpus uteri, except isthmus | 182 (a)182.0\* |   | X |   | X | Endometrial |
| **3** | Malignant neoplasm of endometrium |   | C54.1\* | X |   | X | Endometrial |
| **4** | Malignant neoplasm of uterus, part unspecified | 179\* | C55\* | X |   | X | Uterine |
| **5** | Malignant neoplasm of myometrium |   | C54.2\* | X |   | X | Uterine |
| **6** | Malignant neoplasm of fundus uteri |   | C54.3\* | X |   | X | Uterine |
| **7** | Malignant neoplasm of corpus uteri, unspecified |   | C54.9\* | X |   | X | Uterine |
| **8** | Malignant neoplasm of isthmus | 182.1\* |   | X |   | X | Uterine |
| **9** | Malignant neoplasm of corpus uteri |   | C54 (a)C54.0\* | X |   | X | Uterine |
| **10** | Malignant neoplasm of other specified sites of body of uterus | 182.8\* |   | X |   | X | Uterine |
| **11** | Malignant neoplasm of overlapping sites of corpus uteri |   | C54.8\* | X |   | X | Uterine |
| **12** | Malignant neoplasm of ovary and other uterine adnexa | 183 (a) |   | X |   | X | Ovarian |
| **13** | Malignant neoplasm of ovary | 183.0\* |   | X |   | X | Ovarian |
| **14** | Malignant neoplasm of right ovary |   | C56.1\* | X |   | X | Ovarian |
| **15** | Malignant neoplasm of left ovary |   | C56.2\* | X |   | X | Ovarian |
| **16** | Malignant neoplasm of unspecified ovary |   | C56.9\* | X |   | X | Ovarian |
| **17** | Malignant neoplasm of fallopian tube | 183.2\* | C57.0\* | X |   | X | Fallopian |
| **18** | Malignant neoplasm of unspecified fallopian tube |   | C57.00\* | X |   | X | Fallopian |
| **19** | Malignant neoplasm of right fallopian tube |   | C57.01\* | X |   | X | Fallopian |
| **20** | Malignant neoplasm of left fallopian tube |   | C57.02\* | X |   | X | Fallopian |
| **21** | Malignant neoplasm of cervix uteri | 181 (a) |   |   | X |   |   |
| **22** | Malignant neoplasm of endocervix | 180.0\* | C53.0\* |   | X |   |   |
| **23** | Malignant neoplasm of exocervix | 180.1\* | C53.1\* |   | X |   |   |
| **24** | Malignant neoplasm of other specified sites of cervix | 180.8\* |   |   | X |   |   |
| **25** | Malignant neoplasm of overlapping sites of cervix uteri |   | C53.8\* |   | X |   |   |
| **26** | Malignant neoplasm of cervix uteri, unspecified site | 180.9\* | C53.9\* |   | X |   |   |
| **27** | Malignant neoplasm of placenta | 181\* | C58\* |   | X |   |   |
| **28** | Malignant neoplasm of vagina | 184.0\* | C52\* |   | X |   |   |
| **29** | Malignant neoplasm of labia majora | 184.1\* |  |   | X |   |   |
| **30** | Malignant neoplasm of labium majus |   | C51.0\* |   | X |   |   |
| **31** | Malignant neoplasm of labia minora | 184.2\* |   |   | X |   |   |
| **32** | Malignant neoplasm of labium minus |   | C51.1\* |   | X |   |   |
| **33** | Malignant neoplasm clitoris | 184.3\* | C51.2\* |   | X |   |   |
| **34** | Malignant neoplasm of vulva, unspecified site | 184.4\* |   |   | X |   |   |
| **35** | Malignant neoplasm of overlapping sites of vulva |   | C51.8\* |   | X |   |   |
| **36** | Malignant neoplasm of vulva, unspecified |   | C51.9\* |   | X |   |   |
| **37** | Benign neoplasm of ovary | 220 (a) |   |   | X |   |   |
| **38** | Benign neoplasm of right ovary |   | D27.0\* |   | X |   |   |
| **39** | Benign neoplasm of left ovary |   | D27.1\* |   | X |   |   |
| **40** | Benign neoplasm of unspecified ovary |   | D27.9\* |   | X |   |   |
| **41** | Benign neoplasm of other female genital organs | 221 (a) |  |   | X |   |   |
| **42** | Benign neoplasm of fallopian tube and uterine ligaments | 221.0\* |  |   | X |   |   |
| **43** | Benign neoplasm of uterine tubes and ligaments |   | D28.2\* |   | X |   |   |
| **44** | Benign neoplasm of vagina | 221.1\* | D28.1\* |   | X |   |   |
| **45** | Benign neoplasm of vulva | 221.2\* | D28.0\* |   | X |   |   |
| **46** | Benign neoplasm of other specified sites of female genital organs | 221.8\* |  |   | X |   |   |
| **47** | Benign neoplasm of other specified female genital organs |   | D28.7\* |   | X |   |   |
| **48** | Benign neoplasm of female genital organ, site unspecified | 221.9\* |   |   | X |   |   |
| **49** | Benign neoplasm of female genital organ, unspecified |   | D28.9\* |   | X |   |   |
| **50** | Malignant neoplasm of broad ligament of uterus | 183.3\* |  |   | X | X |   |
| **51** | Malignant neoplasm of broad ligament |   | C57.1\* |   | X | X |   |
| **52** | Malignant neoplasm of round ligament of uterus | 183.5\* |   |   | X | X |   |
| **53** | Malignant neoplasm of round ligament |   | C57.2\* |   | X | X |   |
| **54** | Malignant neoplasm of other specified sites of uterine adnexa | 183.8\* |  |   | X | X |   |
| **55** | Malignant neoplasm of uterine adnexa, unspecified site | 183.9\* | C57.4\* |   | X | X |   |
| **56** | Malignant neoplasm of other specified female genital organs |   | C57.7\* |   | X | X |   |
| **57** | Malignant neoplasm of overlapping sites of female genital organs |   | C57.8\* |   | X | X |   |
| **58** | Malignant neoplasm of female genital organ, unspecified |   | C57.9\* |   | X | X |   |
| **59** | Malignant neoplasm of parametrium | 183.4\* | C57.3\* |   | X | X |   |
| **60** | Malignant neoplasm of other and unspecified female genital organs | 184 (a) |   |   | X | X |   |
| **61** | Malignant neoplasm of other specified sites of female genital organs | 184.8\* |   |   | X | X |   |
| **62** | Malignant neoplasm of other specified female genital organs |   | C57.7\* |   | X | X |   |
| **63** | Malignant neoplasm of overlapping sites of female genital organs |   | C57.8\* |   | X | X |   |
| **64** | Malignant neoplasm of female genital organ, site unspecified | 184.9\* | C57.9\* |   | X | X |   |
| **65** | Malignant neoplasm of abdomen | 195.2\* | C76.2\* |   |   | X |   |
| **66** | Malignant neoplasm of pelvis | 195.3\* | C76.3\* |   |   | X |   |
| **67** | Secondary malignant neoplasm of ovary | 198.6\* | C79.6\* |   |   | X |   |
| **68** | Secondary malignant neoplasm of genital organs | 198.82\* | C79.82\* |   |   | X |   |
| **69** | Personal hist. of malignant neoplasm of female genital organ, unspec. |  V10.40\* | Z85.40\* |  |   | X |  |
| **70** | Personal history of malignant neoplasm of cervix uteri |  V10.41\* | Z85.41\* |  |   | X |  |
| **71** | Personal history of malignant neoplasm of other parts of uterus |  V10.42\* | Z85.42\* |   |   | X |   |
| **72** | Personal history of malignant neoplasm of ovary |  V10.43\* | Z85.43\* |   |   | X |   |
| **73** | Personal hist. of malignant neoplasm of other female genital organs |  V10.44\* | Z85.44\* |  |  | X |  |
| (a) To qualify as a match the ICD code must have exactly these digits--no more and no fewer. |
| \* The asterisk to the right of a diagnosis code indicates any code beginning with the sequence to the left of the asterisk qualifies. |
| Translations between ICD-09-CM and ICD-10-CM was done using information from www.icd10data.com. |
| Source: \\Groups\Data\CTRHS\eMERGE\_III\PROGRAMMING\OV\_CA\_phenotype\OV\_CA\_Pseudo\_Code\_TABLES\_2018\_03\_04.xlsx |

## Table 2. Codes for characterizing cases and determining censoring dates

| **Table 2. Procedure codes used in the ovarian cancer phenotype for characterizing cases and determining censoring dates for controls. Any single instance of a code is considered evidence of the procedure/condition.** |
| --- |
| **Source** | **Code** | **Description** | **Hyster-ectomy** | **Oopher-ectomy** | **Salping-ectomy** |
| **Col. A** | **Col. B** | **Col. C** | **Col. D** | **Col. E** | **Col. F** |
| CPT | 51925 | Closure of vesicouterine fistula; with hysterectomy | X |   |   |
| CPT | 56308 | Laparoscopy, surgical; with vaginal hysterectomy with or without removal of tube(s), with or without removal of ovary(s) (laparoscopic assisted vaginal hysterectomy) | X | X | X |
| CPT | 58150 | Total abdominal hysterectomy (corpus and cervix), with or without removal of tube(s), with or without removal of ovary(s); | X |   |   |
| CPT | 58152 | Total abdominal hysterectomy (corpus and cervix), with or without removal of tube(s), with or without removal of ovary(s); with colpo-urethrocystopexy (e.g., Marshall-Marchetti-Krantz, Burch) | X |   |   |
| CPT | 58180 | Supracervical abdominal hysterectomy (subtotal hysterectomy), with or without removal of tube(s), with or without removal of ovary(s) | X |   |   |
| CPT | 58200 | Total abdominal hysterectomy, including partial vaginectomy, with para-aortic and pelvic lymph node sampling, with or without removal of tube(s), with or without removal of ovary(s) | X |   |   |
| CPT | 58210 | Radical abdominal hysterectomy, with bilateral total pelvic lymphadenectomy and para-aortic lymph node sampling (biopsy), with or without removal of tube(s), with or without removal of ovary(s) | X |   |   |
| CPT | 58240 | Pelvic exenteration for gynecologic malignancy, with total abdominal hysterectomy or cervicectomy, with or without removal of tube(s), with or without removal of ovary(s), with removal of bladder and | X |   |   |
| CPT | 58260 | Vaginal hysterectomy, for uterus 250 g or less; | X |   |   |
| CPT | 58262 | Vaginal hysterectomy, for uterus 250 g or less; with removal of tube(s), and/or ovary(s) | X |   |   |
| CPT | 58263 | Vaginal hysterectomy, for uterus 250 g or less; with removal of tube(s), and/or ovary(s), with repair of enterocele | X |   |   |
| CPT | 58267 | Vaginal hysterectomy, for uterus 250 g or less; with colpo-urethrocystopexy (Marshall-Marchetti-Krantz type, Pereyra type) with or without endoscopic control | X |   |   |
| CPT | 58270 | Vaginal hysterectomy, for uterus 250 g or less; with repair of enterocele | X |   |   |
| CPT | 58275 | Vaginal hysterectomy, with total or partial vaginectomy; | X |   |   |
| CPT | 58280 | Vaginal hysterectomy, with total or partial vaginectomy; with repair of enterocele | X |   |   |
| CPT | 58285 | Vaginal hysterectomy, radical (Schauta type operation) | X |   |   |
| CPT | 58290 | Vaginal hysterectomy, for uterus greater than 250 g; | X |   |   |
| CPT | 58291 | Vaginal hysterectomy, for uterus greater than 250 g; with removal of tube(s) and/or ovary(s) | X |   |   |
| CPT | 58292 | Vaginal hysterectomy, for uterus greater than 250 g; with removal of tube(s) and/or ovary(s), with repair of enterocele | X |   |   |
| CPT | 58293 | Vaginal hysterectomy, for uterus greater than 250 g; with colpo-urethrocystopexy (Marshall-Marchetti-Krantz type, Pereyra type) with or without endoscopic control | X |   |   |
| CPT | 58294 | Vaginal hysterectomy, for uterus greater than 250 g; with repair of enterocele | X |   |   |
| CPT | 58541 | Laparoscopy, surgical, supracervical hysterectomy, for uterus 250 g or less; | X |   |   |
| CPT | 58542 | Laparoscopy, surgical, supracervical hysterectomy, for uterus 250 g or less; with removal of tube(s) and/or ovary(s) | X |   |   |
| CPT | 58543 | Laparoscopy, surgical, supracervical hysterectomy, for uterus greater than 250 g; | X |   |   |
| CPT | 58544 | Laparoscopy, surgical, supracervical hysterectomy, for uterus greater than 250 g; with removal of tube(s) and/or ovary(s) | X |   |   |
| CPT | 58548 | Laparoscopy, surgical, with radical hysterectomy, with bilateral total pelvic lymphadenectomy and para-aortic lymph node sampling (biopsy), with removal of tube(s) and ovary(s), if performed | X |   |   |
| CPT | 58550 | Laparoscopy, surgical, with vaginal hysterectomy, for uterus 250 g or less; | X |   |   |
| CPT | 58552 | Laparoscopy, surgical, with vaginal hysterectomy, for uterus 250 g or less; with removal of tube(s) and/or ovary(s) | X |   |   |
| CPT | 58553 | Laparoscopy, surgical, with vaginal hysterectomy, for uterus greater than 250 g; | X |   |   |
| CPT | 58554 | Laparoscopy, surgical, with vaginal hysterectomy, for uterus greater than 250 g; with removal of tube(s) and/or ovary(s) | X |   |   |
| CPT | 58570 | Laparoscopy, surgical, with total hysterectomy, for uterus 250 g or less; | X |   |   |
| CPT | 58571 | Laparoscopy, surgical, with total hysterectomy, for uterus 250 g or less; with removal of tube(s) and/or ovary(s) | X |   |   |
| CPT | 58572 | Laparoscopy, surgical, with total hysterectomy, for uterus greater than 250 g; | X |   |   |
| CPT | 58573 | Laparoscopy, surgical, with total hysterectomy, for uterus greater than 250 g; with removal of tube(s) and/or ovary(s) | X |   |   |
| CPT | 58951 | Resection (initial) of ovarian, tubal or primary peritoneal malignancy with bilateral salpingo-oophorectomy and omentectomy; with total abdominal hysterectomy, pelvic and limited para-aortic lymphaden | X | X | X |
| CPT | 58953 | Bilateral salpingo-oophorectomy with omentectomy, total abdominal hysterectomy and radical dissection for debulking; | X | X | X |
| CPT | 58954 | Bilateral salpingo-oophorectomy with omentectomy, total abdominal hysterectomy and radical dissection for debulking; with pelvic lymphadenectomy and limited para-aortic lymphadenectomy | X | X | X |
| CPT | 58956 | Bilateral salpingo-oophorectomy with total omentectomy, total abdominal hysterectomy for malignancy | X | X | X |
| CPT | 59135 | Surgical treatment of ectopic pregnancy; interstitial, uterine pregnancy requiring total hysterectomy | X |   |   |
| CPT | 59525 | Subtotal or total hysterectomy after cesarean delivery (List separately in addition to code for primary procedure) | X |   |   |
| ICD9-CM | 65.41 | Salpingo-oophorectomy, unilateral by laparoscope |   | X | X |
| ICD9-CM | 65.49 | Salpingo-oophorectomy, unilateral |   | X | X |
| ICD9-CM | 65.61 | Salpingo-oophorectomy, bilateral (same operative episode) |   | X | X |
| ICD9-CM | 65.62 | Salpingo-oophorectomy, bilateral, remaining or solitary tube and ovary |   | X | X |
| ICD9-CM | 65.63 | Salpingo-oophorectomy, bilateral (same operative episode), laparoscopic |   | X | X |
| ICD9-CM | 65.64 | Salpingectomy, remaining or solitary tube, with ovary, laparoscopic |   | X | X |
| ICD9-CM | 68.3 | Subtot abd hysterectomy | X |   |   |
| ICD9-CM | 68.39 | Subtot abd hyst NEC&NOS | X |   |   |
| ICD9-CM | 68.4 | Total abd hysterectomy | X |   |   |
| ICD9-CM | 68.5 | Vaginal hysterectomy | X |   |   |
| ICD9-CM | 68.59 | Vag hyst NEC & NOS | X |   |   |
| ICD9-CM | 68.6 | Radical abd hysterectomy | X |   |   |
| ICD9-CM | 68.69 | Rad abd hyst NEC & NOS | X |   |   |
| ICD9-CM | 68.7 | Radical vag hysterectomy | X |   |   |
| ICD9-CM | 68.79 | Rad vag hyst NEC & NOS | X |   |   |
| ICD9-CM | 68.9 | Other & unspecified hysterectomy | X |   |   |
| ICD9-CM | 65.3\* | Unilateral oophorectomy |   | X |   |
| ICD9-CM | 65.4\* | Salpingo-oophorectomy, unilateral |   | X | X |
| ICD9-CM | 65.5\* | Bilateral oophorectomy |   | X |   |
| ICD9-CM | 65.6\* | Bilat salpingo-oophorectomy |   | X | X |
| ICD9-CM | V88.01 | Acquired absence of both cervix and uterus | X |   |   |
| ICD9-CM | V88.02 | Acquired absence of uterus with remaining cervical stump | X |   |   |
| \* The asterisk to the right of a diagnosis code indicates any code beginning with the sequence to the left of the asterisk qualifies. |

## Table 3. Codes for measuring benign tumors

|  |
| --- |
| **Table 3. Diagnoses of specific leiomyomas and benign uterine neoplasms are used to operationalize covariates. These codes were also used in the primary and secondary study sites during phenotype development and validation. Any single occurrence of these codes satisfies the definition (see the accompanying data dictionary).** |
| **Diagnosis description** | **Diagnosis code type** |
| **ICD-9** | **ICD-10** |
| Row # | Col. A | Col. B | Col. C |
| 1 | Intramural leiomyoma of uterus | 218.1\* | D25.1\* |
| 2 | Subserous leiomyoma of uterus | 218.2\* | D25.2\* |
| 3 | Leiomyoma of uterus, unspecified | 218.9\* | D25.9\* |
| 4 | Other benign neoplasm of uterus | 219 (exact) |   |
| 5 | Benign neoplasm of cervix uteri/Other benign neoplasm of cervix uteri | 219.0\* | D26.0\* |
| 6 | Benign neoplasm of corpus uteri/Other benign neoplasm of corpus uteri | 219.1\* | D26.1\* |
| 7 | Benign neoplasm of other specified parts of uterus/Other benign neoplasm of other parts of uterus | 219.8\* | D26.7\* |
| 8 | Benign neoplasm of uterus, part unspecified/Other benign neoplasm of uterus, unspecified | 219.9\* | D26.9\* |
| \* The asterisk to the right of a diagnosis code indicates any code beginning with the sequence to the left of the asterisk qualifies. |

## Table 4. Codes for measuring breast, GI, and pancreatic cancers

| **Table 4. Diagnosis codes used to operationalize covariate measures of breast cancer, lower gastrointestinal (GI) cancer, other GI cancer, and pancreatic cancer (see data dictionary for additional details).**  |
| --- |
| **Cancer Type** | **Description** | **ICD Ver.** | **Diagnosis code** |
| Breast | Malignant neoplasm of central portion of female breast | 9 | 174.1\* |
| Breast | Malignant neoplasm of upper-inner quadrant of female breast | 9 | 174.2\* |
| Breast | Malignant neoplasm of lower-inner quadrant of female breast | 9 | 174.3\* |
| Breast | Malignant neoplasm of upper-outer quadrant of female breast | 9 | 174.4\* |
| Breast | Malignant neoplasm of lower-outer quadrant of female breast | 9 | 174.5\* |
| Breast | Malignant neoplasm of axillary tail of female breast | 9 | 174.6\* |
| Breast | Malignant neoplasm of other specified sites of female breast | 9 | 174.8\* |
| Breast | Malignant neoplasm of breast (female), unspecified | 9 | 174.9\* |
| Breast | Malignant neoplasm of central portion of unspecified female breast | 10 | C50.11\* |
| Breast | Malignant neoplasm of upper-inner quadrant of unspecified female breast | 10 | C50.21\* |
| Breast | Malignant neoplasm of lower-inner quadrant of unspecified female breast | 10 | C50.31\* |
| Breast | Malignant neoplasm of upper-outer quadrant of unspecified female breast | 10 | C50.41\* |
| Breast | Malignant neoplasm of lower-outer quadrant of unspecified female breast | 10 | C50.51\* |
| Breast | Malignant neoplasm of axillary tail of unspecified female breast | 10 | C50.61\* |
| Breast | Malignant neoplasm of overlapping sites of unspecified female breast | 10 | C50.81\* |
| Breast | Malignant neoplasm of unspecified site of unspecified female breast | 10 | C50.91\* |
| Lower GI | Malignant neoplasm of transverse colon | 9 | 153.1\* |
| Lower GI | Malignant neoplasm of descending colon | 9 | 153.2\* |
| Lower GI | Malignant neoplasm of sigmoid colon | 9 | 153.3\* |
| Lower GI | Malignant neoplasm of cecum | 9 | 153.4\* |
| Lower GI | Malignant neoplasm of appendix vermiformis | 9 | 153.5\* |
| Lower GI | Malignant neoplasm of ascending colon | 9 | 153.6\* |
| Lower GI | Malignant neoplasm of splenic flexure | 9 | 153.7\* |
| Lower GI | Malignant neoplasm of other specified sites of large intestine | 9 | 153.8\* |
| Lower GI | Malignant neoplasm of colon, unspecified site | 9 | 153.9\* |
| Lower GI | Malignant neoplasm of rectum | 9 | 154.1\* |
| Lower GI | Malignant neoplasm of anal canal | 9 | 154.2\* |
| Lower GI | Malignant neoplasm of anus, unspecified site | 9 | 154.3\* |
| Lower GI | Malignant neoplasm of other sites of rectum, rectosigmoid junction, and anus | 9 | 154.8\* |
| Lower GI | Malignant neoplasm of cecum | 10 | C18.0\* |
| Lower GI | Malignant neoplasm of appendix | 10 | C18.1\* |
| Lower GI | Malignant neoplasm of ascending colon | 10 | C18.2\* |
| Lower GI | Malignant neoplasm of transverse colon | 10 | C18.4\* |
| Lower GI | Malignant neoplasm of splenic flexure | 10 | C18.5\* |
| Lower GI | Malignant neoplasm of descending colon | 10 | C18.6\* |
| Lower GI | Malignant neoplasm of sigmoid colon | 10 | C18.7\* |
| Lower GI | Malignant neoplasm of overlapping sites of colon | 10 | C18.8\* |
| Lower GI | Malignant neoplasm of colon, unspecified | 10 | C18.9\* |
| Lower GI | Malignant neoplasm of rectum | 10 | C20\* |
| Lower GI | Malignant neoplasm of anus, unspecified | 10 | C21.0\* |
| Lower GI | Malignant neoplasm of anal canal | 10 | C21.1\* |
| Lower GI | Malignant neoplasm of overlapping sites of rectum, anus and anal canal | 10 | C21.8\* |
| Other GI | Malignant neoplasm of thoracic esophagus | 9 | 150.1\* |
| Other GI | Malignant neoplasm of abdominal esophagus | 9 | 150.2\* |
| Other GI | Malignant neoplasm of upper third of esophagus | 9 | 150.3\* |
| Other GI | Malignant neoplasm of middle third of esophagus | 9 | 150.4\* |
| Other GI | Malignant neoplasm of lower third of esophagus | 9 | 150.5\* |
| Other GI | Malignant neoplasm of other specified part of esophagus | 9 | 150.8\* |
| Other GI | Malignant neoplasm of esophagus, unspecified site | 9 | 150.9\* |
| Other GI | Malignant neoplasm of pylorus | 9 | 151.1\* |
| Other GI | Malignant neoplasm of pyloric antrum | 9 | 151.2\* |
| Other GI | Malignant neoplasm of fundus of stomach | 9 | 151.3\* |
| Other GI | Malignant neoplasm of body of stomach | 9 | 151.4\* |
| Other GI | Malignant neoplasm of lesser curvature of stomach, unspecified | 9 | 151.5\* |
| Other GI | Malignant neoplasm of greater curvature of stomach, unspecified | 9 | 151.6\* |
| Other GI | Malignant neoplasm of other specified sites of stomach | 9 | 151.8\* |
| Other GI | Malignant neoplasm of stomach, unspecified site | 9 | 151.9\* |
| Other GI | Malignant neoplasm of jejunum | 9 | 152.1\* |
| Other GI | Malignant neoplasm of other specified sites of small intestine | 9 | 152.8\* |
| Other GI | Malignant neoplasm of small intestine, unspecified site | 9 | 152.9\* |
| Other GI | Malignant neoplasm of intrahepatic bile ducts | 9 | 155.1\* |
| Other GI | Malignant neoplasm of liver, not specified as primary or secondary | 9 | 155.2\* |
| Other GI | Malignant neoplasm of extrahepatic bile ducts | 9 | 156.1\* |
| Other GI | Malignant neoplasm of ampulla of vater | 9 | 156.2\* |
| Other GI | Malignant neoplasm of other specified sites of gallbladder … | 9 | 156.8\* |
| Other GI | Malignant neoplasm of biliary tract, part unspecified site | 9 | 156.9\* |
| Other GI | Malignant neoplasm of specified parts of peritoneum | 9 | 158.8\* |
| Other GI | Malignant neoplasm of peritoneum, unspecified | 9 | 158.9\* |
| Other GI | Malignant neoplasm of spleen, not elsewhere classified | 9 | 159.1\* |
| Other GI | Malignant neoplasm of other sites of digestive system … | 9 | 159.8\* |
| Other GI | Malignant neoplasm of ill-defined sites within the digestive organs ... | 9 | 159.9\* |
| Other GI | Malignant neoplasm of upper third of esophagus | 10 | C15.3\* |
| Other GI | Malignant neoplasm of middle third of esophagus | 10 | C15.4\* |
| Other GI | Malignant neoplasm of lower third of esophagus | 10 | C15.5\* |
| Other GI | Malignant neoplasm of overlapping sites of esophagus | 10 | C15.8\* |
| Other GI | Malignant neoplasm of esophagus, unspecified | 10 | C15.9\* |
| Other GI | Malignant neoplasm of fundus of stomach | 10 | C16.1\* |
| Other GI | Malignant neoplasm of body of stomach | 10 | C16.2\* |
| Other GI | Malignant neoplasm of pyloric antrum | 10 | C16.3\* |
| Other GI | Malignant neoplasm of pylorus | 10 | C16.4\* |
| Other GI | Malignant neoplasm of lesser curvature of stomach, unspecified | 10 | C16.5\* |
| Other GI | Malignant neoplasm of greater curvature of stomach, unspecified | 10 | C16.6\* |
| Other GI | Malignant neoplasm of overlapping sites of stomach | 10 | C16.8\* |
| Other GI | Malignant neoplasm of stomach, unspecified | 10 | C16.9\* |
| Other GI | Malignant neoplasm of jejunum | 10 | C17.1\* |
| Other GI | Meckel's diverticulum, malignant | 10 | C17.3\* |
| Other GI | Malignant neoplasm of overlapping sites of small intestine | 10 | C17.8\* |
| Other GI | Malignant neoplasm of small intestine, unspecified | 10 | C17.9\* |
| Other GI | Intrahepatic bile duct carcinoma | 10 | C22.1\* |
| Other GI | Malignant neoplasm of liver, not specified as primary or secondary | 10 | C22.9\* |
| Other GI | Malignant neoplasm of extrahepatic bile duct | 10 | C24.0\* |
| Other GI | Malignant neoplasm of ampulla of Vater | 10 | C24.1\* |
| Other GI | Malignant neoplasm of overlapping sites of biliary tract | 10 | C24.8\* |
| Other GI | Malignant neoplasm of biliary tract, unspecified | 10 | C24.9\* |
| Other GI | Malignant neoplasm of spleen | 10 | C26.1\* |
| Other GI | Malignant neoplasm of ill-defined sites within the digestive system | 10 | C26.9\* |
| Other GI | Carcinoma in situ of esophagus | 10 | D00.1\* |
| Other GI | Carcinoma in situ of stomach | 10 | D00.2\* |
| Other GI | Carcinoma in situ of colon | 10 | D01.0\* |
| Other GI | Carcinoma in situ of rectosigmoid junction | 10 | D01.1\* |
| Other GI | Carcinoma in situ of rectum | 10 | D01.2\* |
| Other GI | Carcinoma in situ of anus and anal canal | 10 | D01.3\* |
| Other GI | Carcinoma in situ of unspecified part of intestine | 10 | D01.40\* |
| Other GI | Carcinoma in situ of other parts of intestine | 10 | D01.49\* |
| Other GI | Carcinoma in situ of liver, gallbladder and bile ducts | 10 | D01.5\* |
| Other GI | Carcinoma in situ of other specified digestive organs | 10 | D01.7\* |
| Other GI | Carcinoma in situ of digestive organ, unspecified | 10 | D01.9\* |
| Pancreatic | Malignant neoplasm of body of pancreas | 9 | 157.1\* |
| Pancreatic | Malignant neoplasm of tail of pancreas | 9 | 157.2\* |
| Pancreatic | Malignant neoplasm of pancreatic duct | 9 | 157.3\* |
| Pancreatic | Malignant neoplasm of islets of langerhans | 9 | 157.4\* |
| Pancreatic | Malignant neoplasm of other specified sites of pancreas | 9 | 157.8\* |
| Pancreatic | Malignant neoplasm of pancreas, part unspecified | 9 | 157.9\* |
| Pancreatic | Malignant neoplasm of body of pancreas | 10 | C25.1\* |
| Pancreatic | Malignant neoplasm of tail of pancreas | 10 | C25.2\* |
| Pancreatic | Malignant neoplasm of pancreatic duct | 10 | C25.3\* |
| Pancreatic | Malignant neoplasm of endocrine pancreas | 10 | C25.4\* |
| Pancreatic | Malignant neoplasm of other parts of pancreas | 10 | C25.7\* |
| Pancreatic | Malignant neoplasm of overlapping sites of pancreas | 10 | C25.8\* |
| Pancreatic | Malignant neoplasm of pancreas, unspecified | 10 | C25.9\* |
| \* The asterisk to the right of a diagnosis code indicates any code beginning with the sequence to the left of the asterisk qualifies. |

## Table 5. Codes for measuring tubal ligation

|  |
| --- |
| **Table 5. Procedure and diagnosis codes used to operationalize covariate measures of tubal ligation. Any single occurrence of any code satisfies the definition of tubal ligation (see data dictionary for additional details).** |
| **Code type** | **Code** | **Description** |
| CPT | 58565 | Hysteroscopy, surgical; with bilateral fallopian tube cannulation … |
| CPT | 58600 | Ligation or transection of fallopian tube (s), abdominal or vaginal approach … |
| CPT | 58605 | Ligation or transection of fallopian tube(s), abdominal or vaginal approach ... |
| CPT | 58611 | Ligation or transection of fallopian tube(s) when done at the time of cesarean … |
| CPT | 58615 | Occlusion of fallopian tube(s) by device (e.g., band, clip, Fallope ring) … |
| CPT | 58661 | Laparoscopy, surgical; with … partial or total oophorectomy and/or salpingectomy |
| CPT | 58670 | Laparoscopy, surgical; with fulguration of oviducts (with or without transection) |
| CPT | 58671 | Laparoscopy, surgical; with occlusion of oviducts by device (e.g., band, clip …) |
| CPT | 58700 | Removal of fallopian tube |
| HCPCS | A4264 | Permanent implantable contraceptive intratubal occlusion device(s) |
| ICD-9 Dx | V25.2 | Sterilization |
| ICD-9 Px | 65.61 | Other removal of both ovaries and tubes at same operative episode |
| ICD-9 Px | 65.62 | Other removal of remaining ovary and tube |
| ICD-9 Px | 65.63 | Laparoscopic removal of both ovaries and tubes at the same operative episode |
| ICD-9 Px | 65.64 | Laparoscopic removal of remaining ovary and tube |
| ICD-9 Px | 66.21 | Bilateral endoscopic ligation and crushing of fallopian tubes |
| ICD-9 Px | 66.22 | Bilateral endoscopic ligation and division of fallopian tubes |
| ICD-9 Px | 66.29 | Other bilateral endoscopic destruction or occlusion of fallopian tubes |
| ICD-9 Px | 66.31 | Other bilateral ligation and crushing of fallopian tubes |
| ICD-9 Px | 66.32 | Other bilateral ligation and division of fallopian tubes |
| ICD-9 Px | 66.39 | Other bilateral destruction or occlusion of fallopian tubes |
| ICD-9 Px | 66.51 | Removal of both fallopian tubes at same operative episode |
| ICD-9 Px | 66.52 | Removal of remaining fallopian tube |
| ICD-10 Dx | Z30.2 | Encounter for sterilization |
| ICD-10-PCS | 0U57\* | Destruction of bilateral fallopian tubes |
| ICD-10-PCS | 0UL7\* | Occlusion of bilateral fallopian tubes |
| ICD-10-PCS | 0UT5\* | Resection of right fallopian tube |
| ICD-10-PCS | 0UT6\* | Resection of left fallopian tube |
| ICD-10-PCS | 0UT7\* | Resection of bilateral fallopian tubes |
| \* Any code beginning with the characters to the left qualify; not that the leftmost character is a zero. |

## Table 6. Rules and codes for measuring cancer antigen 125

|  |
| --- |
| **Table 6. Rules and codes used to operationalize covariate measures for cancer antigen 125 laboratory results. In addition to using the LOINC codes specified here, a rule is provided for using string search methods to identify relevant laboratory tests that may not be associated with LOINC codes. Additional details for these covariates are in the data dictionary.** |
| **Approach** | **Code/method** | **Description** |
| Rule | String search | Laboratory studies/results described in relevant meta data as "CANCER ANTIGEN 125," "CA125," "CA-125," "CA 125" or local abbreviations; requires manual review of results to confirm selection of relevant records |
| LOINC | 10334-1 | Cancer Ag 125 [Units/volume] in Serum or Plasma |
| LOINC | 15157-1 | Cancer Ag 125 [Units/volume] in Serum or Plasma by Dilution |
| LOINC | 83082-8 | Cancer Ag 125 [Units/volume] in Serum or Plasma by Immunoassay |
| LOINC | 2006-5 |  Cancer Ag 125 [Presence] in Serum or Plasma |
| **Note**: in a previous version of this table the LOINC code 10334-1 was incorrect. |

## Table 7. Rules and codes for measuring HPV

| **Table 7. Rules and codes used to operationalize covariate measures of human papilloma virus (HPV) laboratory findings. In addition to using the LOINC codes specified here, a rule is provided for using string search methods to identify relevant laboratory tests that may not be associated with LOINC codes. Positive HPV tests are defined as tests that satisfy the local institution's definition of "positive." Additional details for these covariates are in the data dictionary.**  |
| --- |
| **Approach** | **Code/method** | **Description** |
| Rule | String search | Laboratory studies/results described in relevant meta data as "HUMAN PAPILLOMA VIRUS," "HPV" or local abbreviations; requires manual review of results to confirm selection of relevant records.  |
| LOINC | 75694-0 | Human papilloma virus 18+45 E6+E7 mRNA [Presence] in Cervix by NAA with probe detection |
| LOINC | 75696-5 | Human papilloma virus 31+33+35+39+45+51+52+56+58+59+66+68 DNA [Presence] in Anorectal specimen by Probe and signal amplification method |
| LOINC | 77394-5 | Human papilloma virus 31+33+35+39+45+51+52+56+58+59+66+68 DNA [Presence] in Anorectal by NAA with probe detection |
| LOINC | 71431-1 | Human papilloma virus 31+33+35+39+45+51+52+56+58+59+66+68 DNA [Presence] in Cervix by NAA with probe detection |
| LOINC | 86563-4 | Human papilloma virus 31+33+35+39+45+51+52+56+58+59+66+68 DNA [Presence] in Tissue by NAA with probe detection |
| LOINC | 77375-4 | Human papilloma virus 31+33+35+39+45+51+52+56+58+59+66+68 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 56140-7 | Human papilloma virus 16+18+31+33+35+39+45+51+52+56+58+59+68 DNA [Presence] in Anal by Probe with signal amplification |
| LOINC | 30167-1 | Human papilloma virus 16+18+31+33+35+39+45+51+52+56+58+59+68 DNA [Presence] in Cervix by Probe with signal amplification |
| LOINC | 86561-8 | Human papilloma virus 16+18+31+33+35+39+45+51+52+56+58+59+68 DNA [Presence] in Tissue by NAA with probe detection |
| LOINC | 49896-4 | Human papilloma virus 16+18+31+33+35+39+45+51+52+56+58+59+68 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 32047-3 | Human papilloma virus 16+18+31+33+35+39+45+51+52+56+58+68+70 DNA [Presence] in Tissue by Probe |
| LOINC | 21440-3 | Human papilloma virus 16+18+31+33+35+45+51+52+56 DNA [Presence] in Cervix by Probe |
| LOINC | 17403-7 | Human papilloma virus 31+33+35 Ag [Presence] in Unspecified specimen |
| LOINC | 38372-9 | Human papilloma virus 6+11+16+18+31+33+35+39+42+43+44+45+51+52+56+58+59+68 DNA [Presence] in Cervix by Probe with signal amplification |
| LOINC | 17398-9 | Human papilloma virus 11 Ag [Presence] in Unspecified specimen |
| LOINC | 74778-2 | Human papilloma virus 11 DNA [Log #/volume] (viral load) in Unspecified specimen by NAA with probe detection |
| LOINC | 74779-0 | Human papilloma virus 11 DNA [#/volume] (viral load) in Unspecified specimen by NAA with probe detection |
| LOINC | 61394-3 | Human papilloma virus 11 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 17399-7 | Human papilloma virus 16 Ag [Presence] in Unspecified specimen |
| LOINC | 75664-3 | Human papilloma virus 16 DNA [Presence] in Anorectal specimen by Probe and signal amplification method |
| LOINC | 77396-0 | Human papilloma virus 16 DNA [Presence] in Anorectal by NAA with probe detection |
| LOINC | 59263-4 | Human papilloma virus 16 DNA [Presence] in Cervix by Probe with signal amplification |
| LOINC | 77399-4 | Human papilloma virus 16 DNA [Presence] in Cervix by NAA with probe detection |
| LOINC | 86560-0 | Human papilloma virus 16 DNA [Presence] in Tissue by NAA with probe detection |
| LOINC | 61372-9 | Human papilloma virus 16 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 14503-7 | Human papilloma virus 16+18 Ag [Presence] in Cervix |
| LOINC | 12223-4 | Human papilloma virus 16+18 Ag [Presence] in Genital specimen |
| LOINC | 14505-2 | Human papilloma virus 16+18 Ag [Presence] in Penis |
| LOINC | 14506-0 | Human papilloma virus 16+18 Ag [Presence] in Urethra |
| LOINC | 14504-5 | Human papilloma virus 16+18 Ag [Presence] in Vaginal fluid |
| LOINC | 17400-3 | Human papilloma virus 16+18 Ag [Presence] in Unspecified specimen |
| LOINC | 18478-8 | Human papilloma virus 16+18 DNA [Presence] in Tissue by Probe |
| LOINC | 43209-6 | Human papilloma virus 16+18+31+33+35+39+45+51+52+56+58+59+68+70 DNA [Presence] in Anal by Probe with signal amplification |
| LOINC | 43210-4 | Human papilloma virus 16+18+31+33+35+39+45+51+52+56+58+59+68+70 DNA [Presence] in Anal by NAA with probe detection |
| LOINC | 17401-1 | Human papilloma virus 18 Ag [Presence] in Unspecified specimen |
| LOINC | 75695-7 | Human papilloma virus 18 DNA [Presence] in Anorectal specimen by Probe and signal amplification method |
| LOINC | 77395-2 | Human papilloma virus 18 DNA [Presence] in Anorectal by NAA with probe detection |
| LOINC | 59264-2 | Human papilloma virus 18 DNA [Presence] in Cervix by Probe with signal amplification |
| LOINC | 77400-0 | Human papilloma virus 18 DNA [Presence] in Cervix by NAA with probe detection |
| LOINC | 86562-6 | Human papilloma virus 18 DNA [Presence] in Tissue by NAA with probe detection |
| LOINC | 61373-7 | Human papilloma virus 18 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 17402-9 | Human papilloma virus 31 Ag [Presence] in Unspecified specimen |
| LOINC | 61375-2 | Human papilloma virus 31 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 18479-6 | Human papilloma virus 31+35+51 DNA [Presence] in Tissue by Probe |
| LOINC | 17404-5 | Human papilloma virus 33 Ag [Presence] in Unspecified specimen |
| LOINC | 61376-0 | Human papilloma virus 33 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 17405-2 | Human papilloma virus 42 Ag [Presence] in Unspecified specimen |
| LOINC | 61395-0 | Human papilloma virus 42 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 17406-0 | Human papilloma virus 43 Ag [Presence] in Unspecified specimen |
| LOINC | 17407-8 | Human papilloma virus 44 Ag [Presence] in Unspecified specimen |
| LOINC | 61379-4 | Human papilloma virus 44 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 17408-6 | Human papilloma virus 45 Ag [Presence] in Unspecified specimen |
| LOINC | 61380-2 | Human papilloma virus 45 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 17409-4 | Human papilloma virus 5 Ag [Presence] in Unspecified specimen |
| LOINC | 17410-2 | Human papilloma virus 51 Ag [Presence] in Unspecified specimen |
| LOINC | 61381-0 | Human papilloma virus 51 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 17411-0 | Human papilloma virus 6 Ag [Presence] in Unspecified specimen |
| LOINC | 74776-6 | Human papilloma virus 6 DNA [Log #/volume] (viral load) in Unspecified specimen by NAA with probe detection |
| LOINC | 74777-4 | Human papilloma virus 6 DNA [#/volume] (viral load) in Unspecified specimen by NAA with probe detection |
| LOINC | 61393-5 | Human papilloma virus 6 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 17412-8 | Human papilloma virus 6+11 Ag [Presence] in Unspecified specimen |
| LOINC | 18480-4 | Human papilloma virus 6+11 DNA [Presence] in Tissue by Probe |
| LOINC | 43211-2 | Human papilloma virus 6+11+42+43+44 DNA [Presence] in Anal by Probe |
| LOINC | 50642-8 | Human papilloma virus 6+11+42+43+44 DNA [Presence] in Anal by Probe with signal amplification |
| LOINC | 21441-1 | Human papilloma virus 6+11+42+43+44 DNA [Presence] in Cervix by Probe |
| LOINC | 42481-2 | Human papilloma virus 6+11+42+43+44 DNA [Presence] in Cervix by Probe with signal amplification |
| LOINC | 55298-4 | Human papilloma virus 6+11+42+43+44 DNA [Presence] in Urethra by Probe with signal amplification |
| LOINC | 55299-2 | Human papilloma virus 6+11+42+43+44 DNA [Presence] in Unspecified specimen by Probe with signal amplification |
| LOINC | 77380-4 | Human papilloma virus 16 and 18 and 31+33+35+39+45+51+52+56+58+59+66+68 DNA [Interpretation] in Anorectal |
| LOINC | 77379-6 | Human papilloma virus 16 and 18 and 31+33+35+39+45+51+52+56+58+59+66+68 DNA [Interpretation] in Cervix |
| LOINC | 77377-0 | Human papilloma virus 16 and 18 and 31+33+35+39+45+51+52+56+58+59+66+68 DNA [Interpretation] in Unspecified specimen |
| LOINC | 77376-2 | Human papilloma virus 16 and 18 and 31+33+35+39+45+51+52+56+58+59+66+68 DNA - Anorectal |
| LOINC | 71432-9 | Human papilloma virus 16 and 18 and 31+33+35+39+45+51+52+56+58+59+66+68 DNA - Cervix |
| LOINC | 77378-8 | Human papilloma virus 16 and 18 and 31+33+35+39+45+51+52+56+58+59+66+68 DNA - Unspecified specimen |
| LOINC | 70061-7 | Human papilloma virus 16 and 18 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 82354-2 | Human papilloma virus 16 and 18+45 E6+E7 mRNA [Identifier] in Cervix by NAA with probe detection |
| LOINC | 82457-3 | Human papilloma virus 16 and 18+45 E6+E7 mRNA panel - Cervix by NAA with probe detection |
| LOINC | 82456-5 | Human papilloma virus 16 E6+E7 mRNA [Presence] in Cervix by NAA with probe detection |
| LOINC | 59420-0 | Human papilloma virus 16+18+31+33+35+39+45+51+52+56+58+59+66+68 DNA [Presence] in Cervix by Probe with signal amplification |
| LOINC | 82675-0 | Human papilloma virus 16+18+31+33+35+39+45+51+52+56+58+59+66+68 DNA [Presence] in Cervix by NAA with probe detection |
| LOINC | 74763-4 | Human papilloma virus E6+E7 mRNA [Presence] in Anal by NAA with probe detection |
| LOINC | 69002-4 | Human papilloma virus E6+E7 mRNA [Presence] in Cervix by NAA with probe detection |
| LOINC | 73959-9 | Human papilloma virus 16+18+31+33+35+39+45+51+52+56+58+66 DNA [Presence] in Tissue by Probe |
| LOINC | 44543-7 | Human papilloma virus 31+33 Ag [Presence] in Unspecified specimen |
| LOINC | 81439-2 | Human papilloma virus 31+33 DNA [Presence] in Tissue by Probe |
| LOINC | 43170-0 | Human papilloma virus 31+33 DNA [Presence] in Tissue by Probe with signal amplification |
| LOINC | 7975-6 | Human papilloma virus Ab [Presence] in Genital specimen |
| LOINC | 6510-2 | Human papilloma virus Ab [Presence] in Genital specimen by Immunoassay |
| LOINC | 6511-0 | Human papilloma virus Ab [Presence] in Genital specimen by Immunoblot |
| LOINC | 22434-5 | Human papilloma virus Ab [Presence] in Tissue |
| LOINC | 6512-8 | Human papilloma virus Ab [Presence] in Tissue by Immunoassay |
| LOINC | 6513-6 | Human papilloma virus Ab [Presence] in Tissue by Immunoblot |
| LOINC | 13321-5 | Human papilloma virus IgG Ab [Presence] in Serum |
| LOINC | 13322-3 | Human papilloma virus IgM Ab [Presence] in Serum |
| LOINC | 14499-8 | Human papilloma virus Ag [Presence] in Cervix |
| LOINC | 12222-6 | Human papilloma virus Ag [Presence] in Genital specimen |
| LOINC | 14501-1 | Human papilloma virus Ag [Presence] in Penis |
| LOINC | 10705-2 | Human papilloma virus Ag [Presence] in Tissue by Immune stain |
| LOINC | 14502-9 | Human papilloma virus Ag [Presence] in Urethra |
| LOINC | 14500-3 | Human papilloma virus Ag [Presence] in Vaginal fluid |
| LOINC | 44550-2 | Human papilloma virus DNA [Presence] in Cervix by Probe |
| LOINC | 44551-0 | Human papilloma virus DNA [Presence] in Tissue by Probe |
| LOINC | 86564-2 | Human papilloma virus DNA [Presence] in Tissue by NAA with probe detection |
| LOINC | 44545-2 | Human papilloma virus DNA [Presence] in Urethra by Probe |
| LOINC | 44548-6 | Human papilloma virus DNA [Presence] in Urethra by Probe with signal amplification |
| LOINC | 44546-0 | Human papilloma virus DNA [Presence] in Vaginal fluid by Probe |
| LOINC | 44549-4 | Human papilloma virus DNA [Presence] in Vaginal fluid by Probe with signal amplification |
| LOINC | 16280-0 | Human papilloma virus DNA [Presence] in Unspecified specimen by Probe with amplification |
| LOINC | 44547-8 | Human papilloma virus DNA [Presence] in Unspecified specimen by Probe with signal amplification |
| LOINC | 49891-5 | Human papilloma virus DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 48560-7 | Human papilloma virus genotype [Identifier] in Unspecified specimen by NAA with probe detection |
| LOINC | 11083-3 | Human papilloma virus identified in Cervix |
| LOINC | 11481-9 | Human papilloma virus identified in Unspecified specimen |
| LOINC | 6514-4 | Human papilloma virus rRNA [Presence] in Genital specimen by NAA with probe detection |
| LOINC | 6515-1 | Human papilloma virus rRNA [Presence] in Tissue by NAA with probe detection |
| LOINC | 6516-9 | Human papilloma virus rRNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 61374-5 | Human papilloma virus 26 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 73732-0 | Human papilloma virus 26+31+33+35+39+45+51+52+53+56+58+59+66+68+73+82 DNA [Presence] in Genital specimen by NAA with probe detection |
| LOINC | 44544-5 | Human papilloma virus 35 Ag [Presence] in Unspecified specimen |
| LOINC | 61377-8 | Human papilloma virus 35 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 61378-6 | Human papilloma virus 39 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 61382-8 | Human papilloma virus 52 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 61383-6 | Human papilloma virus 53 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 61396-8 | Human papilloma virus 56 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 61384-4 | Human papilloma virus 58 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 61385-1 | Human papilloma virus 59 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 61386-9 | Human papilloma virus 66 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 61387-7 | Human papilloma virus 67 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 61388-5 | Human papilloma virus 68 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 61389-3 | Human papilloma virus 69 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 61390-1 | Human papilloma virus 70 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 61391-9 | Human papilloma virus 73 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 61392-7 | Human papilloma virus 82 DNA [Presence] in Unspecified specimen by NAA with probe detection |
| LOINC | 42770-8 | Human papilloma virus high and Low risk DNA panel - Cervix |
| LOINC | 55267-9 | Human papilloma virus immunization status |
| LOINC | 35291-4 | UBE3A gene mutations found [Identifier] in Blood by Molecular genetics method Nominal |

## Table 8. Rules and codes for measuring tamoxifen exposure

|  |
| --- |
| **Table 8. Rules and codes used to operationalize covariate measures of exposure to tamoxifen medication. In addition to using the RxNORM codes specified here, a rule is provided for using string search methods to identify relevant pharmacy records. Additional details for these covariates are in the data dictionary.** |
| **Approach** | **Code/method** | **Description** |
| Rule | String search | Pharmacy records where relevant meta data indicate the medication's generic name contains the string "TAMOX" and the medication's therapeutic class indicates it is an "ANTINEOPLASTIC" (or local synonyms or abbreviations). Requires manual review to confirm selection of relevant local pharmacy records. |
| **RxNorm** | **RxNorm CUI** | **RxNorm ingredient CUI** | **RxNorm full name** |
| RxNorm | 105630 | 10324 | Tamoxifen 10 MG Oral Tablet [Nolvadex] |
| RxNorm | 198240 | 10324 | Tamoxifen 10 MG Oral Tablet |
| RxNorm | 313195 | 10324 | Tamoxifen 20 MG Oral Tablet |
| RxNorm | 389230 | 10324 | Tamoxifen 2 MG/ML Oral Solution |
| RxNorm | 644304 | 10324 | Tamoxifen 2 MG/ML Oral Solution [Soltamox] |

## Table 9. Rules and codes for measuring oral contraceptive exposure

|  |
| --- |
| **Table 9. Rules and codes used to operationalize covariate measures of exposure to oral contraceptives. Relevant medications are identified by applying specified rules to meta data associated with pharmacy records. *Illustrative (not exhaustive)* RxNorm codes for a convenience sample of qualifying oral contraceptives are provided for illustrative purposes only. Additional details for these covariates are in the data dictionary.** |
| **Approach** | **Code/method** | **Rule description** |
| Rule | String search | Pharmacy records where meta data indicate the medication's general therapeutic class is "CONTRACEPTIVES" (or synonym) and the medication's specific therapeutic class is any of the following: "CONTRACEPTIVES, ORAL" (or synonym), "CONTRACEPTIVES, INJECTABLE" (or synonym), "CONTRACEPTIVES, TRANSDERMAL" (or synonym), "CONTRACEPTIVES, INTRAVAGINAL, SYSTEMIC" (or synonym). This rule is intended to capture the vast majority of medications generally considered "oral contraceptives." |
| **Illustrative (*NOT exhaustive*) RxNorm codes and names for qualifying medications** |
| **Codes** | **Rx CUI** | **Ingredient CUI** | **RxNORM medication names** |
| RxNorm | 1149632 | 4083 | 84 HR Estradiol 0.00313 MG/HR Transdermal System |
| RxNorm | 1440185 | 6373 | {21 (Ethinyl Estradiol 0.02 MG / Levonorgestrel 0.1 MG Oral Tablet) / 7 (Inert Ingredients 1 MG Oral Tablet) } Pack [Aubra 28 Day] |
| RxNorm | 249869 | 7514 | Estradiol 2 MG / Norethindrone 1 MG Oral Tablet |
| RxNorm | 314146 | 7518 | Ethinyl Estradiol 0.05 MG / Norgestrel 0.5 MG Oral Tablet |
| RxNorm | 1994764 | 31994 | {7 (Ethinyl Estradiol 0.035 MG / norgestimate 0.18 MG Oral Tablet) / 7 (Ethinyl Estradiol 0.035 MG / norgestimate 0.215 MG Oral Tablet) / 7 (Ethinyl Estradiol 0.035 MG / norgestimate 0.25 MG Oral Tablet) / 7 (Inert Ingredients 1 MG Oral Tablet) } Pack [Tri-VyLibra 28 Day] |

## Table 10. Rules and codes for measuring IUD exposure

|  |
| --- |
| **Table 10. Codes used to operationalize covariate measures of exposure to intrauterine devices (IUDs). Includes ICD-9 and ICD-10 diagnosis codes, and ICD-9, ICD-10, CPT, and HCPCS procedure codes. Also included are RxNorm medication codes to capture exposure for women where medication data indicate dispensing but procedure and diagnosis data are lacking. Additional details for these covariates are in the data dictionary.** |
| **Code set** | **Code** | **Description** |
| ICD-09 | V25.1\* | Encounter for insertion or removal of intrauterine contraceptive device |
| ICD-09 | V25.42\* | Surveillance of intrauterine contraceptive device |
| ICD-09 | V45.51\* | Presence of intrauterine contraceptive device |
| ICD-09 | 996.32\* | Mechanical complication due to intrauterine contraceptive device |
| ICD-09 | 69.7\* | Insertion of intrauterine contraceptive device |
| ICD-09 | 97.71\* | Removal of intrauterine contraceptive device |
| ICD-10 | Z97.5\* | Presence of (intrauterine) contraceptive device |
| ICD-10 | Z30.014\* | Encounter for initial prescription of intrauterine contraceptive device |
| ICD-10 | Z30.430\* | Encounter for insertion of intrauterine contraceptive device |
| ICD-10 | Z30.431\* | Encounter for routine checking of intrauterine contraceptive device |
| ICD-10 | Z30.432\* | Encounter for removal of intrauterine contraceptive device |
| ICD-10 | Z30.433\* | Encounter for removal and reinsertion of intrauterine contraceptive device |
| ICD-10 | T83.31\*  | Breakdown (mechanical) of intrauterine contraceptive device  |
| ICD-10 | T83.32\* | Displacement of intrauterine contraceptive device  |
| ICD-10 | T83.39\* | Other mechanical complication of intrauterine contraceptive device |
| ICD-10 | O26.3\* | Retained intrauterine contraceptive device in pregnancy |
| CPT | 58300 | Insertion, intrauterine device |
| CPT | 58301 | Removal, intrauterine device |
| HCPCS | J7302 | 52 mg levonorgestrel-releasing IUD |
| HCPCS | J7301 | 13.5mg levonorgestrel-releasing IUD (brand name Skyla) |
| HCPCS | J7300 | intrauterine copper contraceptive (brand name ParaGard)  |
| **Code set** | **RxCUI** | **Generic RxCUI** | **Description** |
| RxNorm | 1366334 |   | Levonorgestrel 0.000583 MG/HR Intrauterine System |
| RxNorm | 1366339 | 1366334 | Levonorgestrel 0.000583 MG/HR Intrauterine System [Skyla] |
| RxNorm | 1605252 |   | Levonorgestrel 0.000813 MG/HR Intrauterine System |
| RxNorm | 1605257 | 1605252 | Levonorgestrel 0.000813 MG/HR Intrauterine System [Liletta] |
| RxNorm | 1811886 |   | Levonorgestrel 0.000729 MG/HR Intrauterine System |
| RxNorm | 1856546 | 1811886 | Levonorgestrel 0.000729 MG/HR Intrauterine System [Kyleena] |
| RxNorm | 804156 |   | Levonorgestrel 0.000833 MG/HR Intrauterine System |
| RxNorm | 807283 | 804156 | Levonorgestrel 0.000833 MG/HR Intrauterine System [Mirena] |
| \* The asterisk to the right of a diagnosis code indicates any code beginning with the sequence to the left of the asterisk qualifies. |

## Table 11. Rules and codes for measuring MHT exposure

|  |
| --- |
| **Table 11. Rules used to operationalize covariate measures of exposure to menopause hormone therapy (MHT) for estrogen-containing MHT (rule A) and progesterone-containing MHT (rule B) using RxNorm ingredient codes. If RxNORM ingredient codes are not available at your study site, contact the phenotype authors at KPWA/UW to negotiate alternative rules. Additional details for these covariates are in the data dictionary.** |
| **Rule** | **RxNorm ingredient** | **Rule** |
| **Ingredient code (ING\_RxCUI)** | **Ingredient description** |
| **Rule A**: **Estrogen**-containing MHT | 3368 | Dienestrol | Any medication whose associated RxNorm meta data (i.e., RxNorm ingredient CUI codes) indicate it contains any of the ingredient listed here is considered an **estrogen**-containing MHT, and will be used to operationalize the **estrogen**-containing MHT measures described in the accompanying data dictionary |
| 3390 | Diethylstilbestrol |
| 4083 | Estradiol |
| 4094 | Estriol |
| 4099 | Estrogens, Conjugated (USP) |
| 4103 | Estrone |
| 4124 | Ethinyl Estradiol |
| 6373 | Levonorgestrel |
| 6782 | Mestranol |
| 33747 | Estropipate |
| 214549 | Estrogens, Esterified (USP) |
| 253166 | Synthetic conjugated estrogens |
| 618365 | Synthetic conjugated estrogens |
| **Rule B**: P**rogesterone**-containing MHT | 3706 | Dydrogesterone | Any medication whose associated RxNorm meta data (i.e., RxNorm ingredient CUI codes) indicate it contains any of the ingredient listed here is considered a **progesterone**-containing MHT, and will be used to operationalize the **progesterone**-containing MHT measures described in the accompanying data dictionary |
| 8727 | Progesterone |
| 22656 | Desogestrel |
| 22968 | Dienogest |
| 31994 | Norgestimate |
| 326374 | Norelgestromin |