Supplementary Online Content

Bouck Z, Calzavara AJ, Ivers NM, et al. Association of low-value testing with subsequent health care use and clinical outcomes among low-risk primary care outpatients undergoing an annual health examination. *JAMA Intern Med*. Published online June 8, 2020. doi:10.1001/jamainternmed.2020.1611

This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. Eligibility criteria to identify annual health examinations involving patients eligible for low-value screening tests of interest. *Note:* The following exclusion criteria represent the first set of exclusions applied in **Figure 1** per cohort. All definitions based on preceding study by Bouck et al. (2018).[1]

Index event	**Inclusion criterion/definition**
Annual health examination (AHE)	An OHIP claim for an AHE: FEECODE = 'A003' with DXCODE = 917 OR for a periodic health examination: FEECODE = 'K130' (adolescent), 'K131' (18-64), OR 'K132' (65+)* AND Attending physician at examination, as indicated on claim, is a family physician/general practitioner (i.e. SPEC=00)** *Notes*: *Cohorts below using the periodic health examination as an index event may involve minor revisions to the above definition (e.g. they may exclude code K130 as only adult patients eligible for recruitment). ** We recorded the physnum of the family physician responsible for the examination. It was required to tie that physician with subsequent test ordering and define their associated covariates.
Based on the resulting pool of AHE claims within study window, determine if it meets the eligibility criteria for any of the following three cohorts:	
Cohort	**Exclusion criteria (with codes where applicable)** *Note: lookback window for application of all exclusion criteria includes index AHE date.
Chest X-ray (CXR) – *adult patients at low-risk for cardiovascular and pulmonary disease*	1. Patient has invalid Ontario health card number
	2. Age <18 or >105 as of AHE
	3. Non-Ontario resident
	4. Residents in long-term care facility Lookback one year from AHE for OHIP claim with location="L", ODB record with LTC="1" or CAPE record with STATUS_CAPE="15" (resides in LTC facility)
	5. Meet any of the following high-risk exclusion criteria (i.e., are deemed at high-risk and/or have a prior diagnosis for cardiovascular OR pulmonary disease): • Lookback a maximum of 3 years from cohort entry or anytime between a patient's first eligible PHV and their last eligible PHV within the observation window for the following high-risk exclusions unless otherwise stated:

	Signs and symptoms or diagnosis of cardiovascular or pulmonary disease [OHIP]- two physician claims within a two-year period with one of the following diagnostic codes (DXCODE): • 010-017 = Tuberculosis • 785 = Undiagnosed chest pain, tachycardia, syncope, shock, edema, masses • 786 = Undiagnosed epistaxis, hemoptysis, cough, dyspnea, masses, shortness of breath, hyperventilation, sleep apnea • 391 = Rheumatic fever with endocarditis, myocarditis or pericarditis • 402 = Hypertensive heart disease • 410 = Acute myocardial infarction • 412, 413 = Old myocardial infarction, chronic coronary artery disease of arteriosclerotic heart disease, without symptoms; angina pectoris • 415 = Pulmonary embolism, pulmonary infarction • 426 = Heart blocks, other conduction disorders • 427 = Paroxysmal tachycardia, atrial or ventricular flutter or fibrillation, cardiac arrest, other arrythmias • 428, 429 = Congestive heart failure; all other forms of heart disease • 432 = Intracranial haemorrhage • 435-437= transient cerebral ischemia, acute cerebrovascular accident, chronic arteriosclerotic cerebrovascular disease, hypertensive encephalopathy • 440 = Generalized arteriosclerosis, atherosclerosis • 441 = Aortic aneurysm (non-syphilitic) • 443 = Peripheral vascular disease • 446 = Polyarteritis nodosa, temporal arteritis • 447 = Other disorders of arteries • 451 = Phlebitis, thrombophlebitis • 452 = Portal vein thrombosis • 466 = Acute bronchitis • 491, 492 = Chronic bronchitis; emphysema • 494 = Bronchiectasis • 074 = Coxsackie myocarditis • 512 = Pneumothorax, spontaneous or tension • 511 = Pleurisy with or without effusion • 515 = Pulmonary fibrosis • 518 = Atelectasis, other disease of lung • 519 = Other diseases of the respiratory system • 530 = Esophagitis, cardiospasm, ulcer of esophagus • 745, 746 = Congenital anomalies of heart • 747 = Pulmonary artery stenosis, other anomalies of the circulatory system • 748 = Congenital anomalies of nose and respiratory system OR *Signs, symptoms, or diagnosis related to the respiratory or cardiac system* [CIHI – DAD] – at least one admission with one of the following ICD-10 diagnostic codes (DX10CODE:_): • Atrial fibrillation/flutter: I48; other cardiac arrhythmia (I44-147, I49) • Coronary artery disease (including myocardial infarction): I20-

	I25 • Cardiac valvular disease: I05-I08, I09.1, I09.8, I34-I38 • Heart failure = I50 • Venous thromboembolism: I80.1, I80.2, I80.8, I82.2, I82.3, I82.8, I82.9 • Abnormalities of heartbeat = R00 • Cardiac murmurs or other cardiac sounds = R01 • Abnormal blood pressure reading, without diagnosis = R03 • Abnormalities of breathing = R06 • Pain in throat and chest = R07 • Chest pain = R071-R074 • Previous cerebrovascular disease: I60, I61, I63, I64, G45, G46, H34 • Peripheral vascular disease: I70, I71, I73.1, I73.8, I73.9, I77.1, I79.0, I79.2, K55.1, K55.8, K55.9, Z95.8, Z95.9 • Other symptoms and signs involving the circulatory and respiratory system = R09, R098 • Pneumonia: Steptococcus pneumonia (J13); unspecified (J18.9); lobar pneumonia, unspecified (J18.1); bronchopneumonia, unspecified (J18.0) • R091 = Pleurisy • R092 = Respiratory arrest *Prior or existing cancer diagnoses* [OHIP, CIHI DAD]: • Two or more claims in OHIP with one of the following diagnostic codes (DXCODE): o Any neoplasm (malignant, unspecified or uncertain behavior) 140-165, 170-172, 174-215, 217-239 OR • One hospital admission in [CIHI DAD] with one of the following ICD-10 codes: C00-C43, C45-C97, D00-D03, D05-D09 *Heart failure diagnosis* [CHF] anytime prior to cohort entry *Hypertension diagnosis* [HYPER] anytime prior to cohort entry *Asthma diagnosis* [ASTHMA] anytime prior to cohort entry *Chronic obstructive pulmonary disease diagnosis* [COPD] anytime prior to entry *Diabetes diagnosis* [ODD] anytime prior to entry Other comorbidities that suggest high risk for cardiopulmonary disease: • *High-risk for cardiopulmonary diseases*: o [OHIP] – two physician claims within a two-year period with one of the following diagnostic codes: AIDS (042), AIDS-related complex (043), other human immunodeficiency virus infection (044); essential, benign hypertension (401); hypertensive renal disease (403); acute renal failure (584), chronic renal failure, uremia (585) OR o [CIHI-DAD] – at least one admission with one of the following ICD-10 diagnostic codes: HIV (B20-B24); chronic renal disease (I12, I13, N03.2-N03.7, N05.2-N05.7, N17-19, N25.0, Z49, Z94.0, Z99.2)

	Visits to pulmonologist (respiratory disease specialist) (SPEC=47), cardiologist (SPEC=60), general thoracic surgeon (SPEC=64) or cardiothoracic surgeon (SPEC=09) – one of more claim(s) with the following [OHIP] fee codes: • **Outpatient consultations and visits:** ○ *Pulmonologist (47):* consultation (A475), comprehensive consultation (A470), limited consultation (A575), repeat consultation (A476), medical specific assessment (A473), medical specific re-assessment (A474), complex medical specific re-assessment (A471), partial assessment (A478) ○ *Cardiologist (60):* consultation (A605), comprehensive consultation (A600), limited consultation (A675), repeat consultation (A606), medical specific assessment (A603), medical specific re-assessment (A604), complex medical specific re-assessment (A601), partial assessment (A608) ○ *General thoracic surgery (64):* consultation (A645), special surgical consultation (A935) with SPEC=64, repeat consultation (A646), specific assessment (A643), partial assessment (A644) ○ *Cardiothoracic surgery (09):* consultation (A095), special surgical consultation (A935) with SPEC=09, repeat consultation (A096), specific assessment (A093), partial assessment (A094) • **Non-emergency hospital in-patient services:** ○ *Pulmonologist (47):* consultation (C475), comprehensive consultation (C470), limited consultation (C575), repeat consultation (C476), medical specific assessment (C473), medical specific re-assessment (C474), complex medical specific re-assessment (C471); subsequent visits – first five weeks (C472), sixth to thirteenth week inclusive (C477), after thirteenth week (C479); concurrent care (C478) ○ *Cardiologist (60):* consultation (C605), comprehensive consultation (C600), limited consultation (C675), repeat consultation (C606), medical specific assessment (C603), medical specific re-assessment (C604), complex medical specific re-assessment (C601); subsequent visits – first five weeks (C602), sixth to thirteenth week inclusive (C607), after thirteenth week (C609); concurrent care (C608) ○ *General thoracic surgery (64):* consultation (C645), repeat consultation (C646), specific assessment (C643), specific re-assessment (C644); subsequent visits – first five weeks (C642), sixth to thirteenth week (C647), after thirteenth week (C649); concurrent care (C648); special surgical consultation (C935) where SPEC=09 ○ *Cardiac surgeon (09):* consultation (C095); repeat consultation (C096); specific assessment (C093); specific re-assessment (C094); subsequent visits – first five weeks (C092), sixth to thirteenth week inclusive (C097), after thirteenth week (C099); concurrent care (C098); special surgical consultation (C935) where SPEC=09 ○ OR any of the following fee codes where SPEC=47 (pulmonologist) OR SPEC=60 (cardiologist) OR SPEC=64 (general thoracic surgeon) OR SPEC=09 (cardiothoracic

surgeon) for the Most Responsible Physician (MRP):
    - Subsequent visits by the MRP – day following hospital admission assessment (C122), second day following the hospital assessment (C123), day of discharge (C124); subsequent visits by the MRP following transfer from an intensive care area – first visit (C142), second visit (C143), additional visits due to intercurrent illness (C121)

History of prior cardiothoracic tests and procedures:

Cardiothoracic procedures:

- Misc surgical procedures:
    - [OHIP]: thoracotomy (M137, M134, Z401, Z414, R750), pericardiectomy (R748, R749), cardiotomy (R706-R714, E660, E661, E658), cardiovascular excisions (R920, R746, R747, E648, R741, E651), cardiac or cardiopulmonary transplantation (R874, R870)
- Aortic valve replacement:
    - [OHIP] FEECODE = R738, R863
    - [CIHI-DAD] CCI code = 1HV90
- Mitral valve replacement:
    - [OHIP] FEECODE = R735
    - [CIHI-DAD] CCI code = 1HU90
- Coronary artery repair/revascularization:
    - [OHIP] FEECODE = Z434, Z448, Z449, Z460, Z461, R742, R743; resection coarctation (R758); other heart and pericardium repair (R720-R723, R922-R929, R768-R771)
    - [CIHI-DAD] CCI codes = 1IJ126, 1IJ50, 1IJ55, 1IJ57, 1IJ76, 1IJ80
- Cardiac catheterization:
    - [OHIP]: Z439, Z440, Z441, Z442, Z456, Z457, G263, G269, G285, G286
- Device implantation:
    - [OHIP] FEECODE = ventricular assist devices (R701-R705), implantation of cardioverter defibrillator (R753, R761, Z415), cardiac massage including placement and replacement of pacemakers (R765, Z433, Z444, Z445, Z435, R752, R751, Z429)
    - [CIHI-DAD] CCI codes = 1HZ53GRFS, 1HZ53LAFS, 1HZ53GRNM, 1HZ53LANM, 1HZ53GRNK, 1HZ53LANK, 1HZ53GRNL, 1HZ53LANL, 1HZ53GRFR, 1HZ53LAFR
- Pneumonectomy or lobectomy:
    - [OHIP] fee codes = M142 (pneumonectomy), M143 (lung lobectomy)
    - [CIHI-DAD] CCI codes = 1GR87:_(excision partial, lobe of lung), 1GR89:_ (excision total, lobe of lung), 1GR91:_ (excision radical, lobe of lung); history of lobectomy or pneumonectomy (Z902:_, Z8511:_)

Patients who experienced severe trauma or injury to chest:

- [OHIP] – one or more claims with the following diagnostic codes:

	○ *Fractures:* Vertebral column – with spinal cord damage (806), ribs (807), clavicle (810) ○ 869 = Internal injuries to organ(s) OR • [CIHI – DAD, CIHI - NACRS] – at least one admission or ambulatory visit with the following ICD-10 diagnostic codes: ○ *Fractures:* thoracic vertebrae, sternum and ribs (S220-S229), clavicle (S420), scapula (S421) ○ *Dislocations, sprains and strain of thoracic joints and ligaments:* S230-S235 ○ *Injury of thoracic blood vessels:* S250-S259 ○ *Injury of intrathoracic organs (includes pneumothorax, hemothorax and hemopneumothorax):* S26:_, S270-S279 ○ *Crushed chest*: S28 *Other and unspecified injuries of thorax*: S290-S299
	6. Incomplete or missing demographic data (age, sex, or postal code)
Electrocardiogram (ECG) – *adult patients at low-risk for cardiovascular disease*	1. Patient has invalid Ontario health card number
	2. Age <18 or >105 as of AHE
	3. Non-Ontario resident
	4. Residents in long-term care facility Lookback one year from AHE for OHIP claim with location="L", ODB record with LTC="1" or CAPE record with STATUS_CAPE="15" (resides in LTC facility)
	5. Meet any of the following high-risk exclusion criteria (i.e., are deemed at high-risk and/or have a prior diagnosis for cardiovascular disease): • Lookback a maximum of 3 years from cohort entry for the following high-risk exclusions unless otherwise stated. *Cardiovascular diagnoses* (OHIP) – 2 physician claims in OHIP within a 2 year period with one of the following diagnostic codes 402 = Hypertensive heart disease 410 = Acute myocardial infarction 412 = Old myocardial infarction, chronic coronary artery disease or arteriosclerotic heart disease, without symptoms 413 = Acute coronary insufficiency, angina pectoris, acute ischaemic heart disease 415 = Pulmonary embolism, pulmonary infarction 426 = Heart blocks, other conduction disorders 427 = Paroxysmal tachycardia, atrial or ventricular flutter or fibrillation, cardiac arrest, other arrythmias 428 = Congestive heart failure

	429 = All other forms of heart disease (incl. pericarditis) 398 = Other rheumatic heart disease 746 = Other congential anomalies of the heart *Cardiovascular diagnoses* (CIHI-DAD) – at least 1 admission with one of the following diagnostic codes Coronary artery disease: ICD-10 codes: I20, I21, I22, I23, I24, I25 Atrial fibrillation/flutter: ICD-10 codes: I48 Other cardiac arrhythmia: ICD-10 codes: I44, I45, I46, I47, I49 Cardiac valvular disease: ICD-10 codes: I05, I06, I07, I08, I09.1, I09.8, I34, I35, I36, I37, I38 Venous thromboembolism: ICD-10 codes: I80.1, I80.2, I80.8, I82.2, I82.3, I82.8, I82.9 *Cerebrovascular and peripheral vascular disease diagnoses* (OHIP) – 2 physician claims in OHIP within a 2 year period with one of the following diagnostic codes • 432 = Intracranial Haemorrhage • 435 = Transient cerebral ischaemia • 436 = Acute cerebrovascular accident, C.V.A., stroke • 437 = Chronic arteriosclerotic cerebrovascular disease, hypertensive encephalopathy • 440 = Generalized arteriosclerosis, atherosclerosis • 441 = Aortic aneurysm (non-syphilitic) • 443 = Raynaud's disease, Buerger's disease, peripheral vascular disease, intermittent claudication • 446 = Polyarteritis nodosa, temporal arteritis • 447 = Other disorders of arteries • 451 = Phlebitis, thrombophlebitis • 452 = Portal vein thrombosis *Cerebrovascular and peripheral vascular disease diagnoses* (CIHI-DAD) – at least 1 admission with one of the following diagnostic codes Previous cerebrovascular disease: ICD-10 codes: I60, I61, I63, I64, G45, G46, H34 Peripheral vascular disease: ICD-10 codes: I70, I71, I73.1, I73.8, I73.9, I77.1, I79.0, I79.2, K55.1, K55.8, K55.9, Z95.8, Z95.9 Venous thromboembolism: ICD-10 codes: I80.1, I80.2, I80.8, I82.2, I82.3, I82.8, I82.9 *Comorbidities suggesting high risk for cardiac disease* (OHIP) – 2 physician claims in OHIP within a 2 year period with one of the following diagnostic codes 042 = AIDS 043 = AIDS-related complex (A.R.C.) 044 = Other human immunodeficiency virus infection 401 = Essential, benign hypertension 403 = Hypertensive renal disease 584 = Acute renal failure 585 = Chronic renal failure, uremia

	785 = Chest pain, tachycardia, syncope, shock, edema, masses *Comorbidities suggesting high risk for cardiac disease* (CIHI-DAD) – at least 1 admission with one of the following diagnostic codes Human immunodeficiency virus [HIV] disease: ICD-10 codes: B20-B24 Chronic renal disease: ICD-10 codes: I12, I13, N03.2-N03.7, N05.2-N05.7, N17, N18, N19, N25.0, Z49, Z94.0, Z99.2 *Symptoms and signs involving the circulatory and respiratory systems, not elsewhere classified* [DAD]: ICD-10 codes: R00 = abnormalities of heart beat; R01 = cardiac murmurs and other cardiac sounds; R03 = abnormal blood pressure reading, without diagnosis; R06 = abnormalities of breathing; R07 = pain in throat and chest; R09 = other symptoms and signs involving the circulatory and respiratory system *Heart failure diagnosis* (CHF) anytime prior to cohort entry *Diabetes diagnosis* (ODD) anytime prior to cohort entry *Hypertension diagnosis* (HYPER) anytime prior to cohort entry *Visits to cardiologists or cardiac surgeons* (OHIP, IPDB) – 1 or more claim with one of the following fee codes: **Outpatient cardiology visit fee codes** A605 = Consultation; A600 = Comprehensive cardiology consultation; A675 = Limited consultation; A606 = Repeat consultation; A603 = Medical specific assessment; A604 = Medical specific re-assessment; A601 = Complex medical specific re-assessment; A608 = Partial assessment **Non-emergency hospital inpatient cardiology visit fee codes** C605 = Consultation; C600 = Comprehensive cardiology consultation; C675 = Limited consultation; C606 = Repeat consultation; C603 = Medical specific assessment; C604 = Medical specific re-assessment; C601 = Complex medical specific re-assessment; C602 = subsequent visits, first 5 weeks; C607 = subsequent visits, 6th-13th week; C609 = subsequent visits, after 13th week; C122 = subsequent visits by MRP, day following admission assessment; C123 = subsequent visit by MRP, second day following hospital assessment; C124 = day of discharge; C142 = subsequent visits by MRP following transfer from ICU, 1st subsequent visit; C143 = subsequent visits by MRP following transfer from ICU, 2nd subsequent visit; C121 = subsequent visits by MRP following transfer from ICU, additional visits due to intercurrent illness; C608 = subsequent visits by MRP following transfer from ICU, concurrent care **Outpatient cardiac surgery visit fee codes** A095 = Consultation; A935 = Special surgical consultation with MAINSPECIALTY = “CARDIAC SURGERY” in IPDB; A096 = Repeat consultation; A093 = Specific assessment; A094 = Partial assessment **Non-emergency hospital inpatient cardiac surgery visit fee codes** C095 = Consultation; C096 = Repeat consultation; C093 = Specific assessment; C094 = Specific re-assessment; C092 = subsequent visits, first 5 weeks; C097 = subsequent visits, 6th-13th week; C099 = subsequent visits, after 13th week; C098 =

	subsequent visits by MRP following transfer from ICU, concurrent care **OR** the following visit codes with MAINSPECIALTY = "CARDIAC SURGERY" in IPDB: C935 = Special surgical consultation; C122 = subsequent visits by MRP, day following admission assessment; C123 = subsequent visit by MRP, second day following hospital assessment; C124 = day of discharge; C142 = subsequent visits by MRP following transfer from ICU, 1st subsequent visit; C143 = subsequent visits by MRP following transfer from ICU, 2nd subsequent visit; C121 = subsequent visits by MRP following transfer from ICU, additional visits due to intercurrent illness *Prior cardiac procedure* (CIHI-DAD or OHIP) Aortic valve replacement • CCI code: 1HV90 • OHIP fee codes: R738, R863 Mitral valve replacement • CCI code: 1HU90 • OHIP fee codes: R735 Coronary artery revascularization • CCI codes: 1IJ26, 1IJ50, 1IJ55, 1IJ57, 1IJ76, 1IJ80 • OHIP fee codes: Z434, R742, R743 Device implantation • CCI codes: 1HZ53GRFS, 1HZ53LAFS, 1HZ53GRNM, 1HZ53LANM, 1HZ53GRNK, 1HZ53LANK, 1HZ53GRNL, 1HZ53LANL, 1HZ53GRFR, 1HZ53LAFR • OHIP fee codes: R761, R753, R752
	6. Incomplete or missing demographic data (age, sex, or postal code)
Papanicolaou (Pap) test – *female patients (aged 13-20 or >69) at low-risk for cervical cancer*	1. Patient has invalid Ontario health card number
	2. Male patient
	3. Non-Ontario resident
	4. Age ≥ 21 OR ≤ 69 between AHE and end of observation window
	5. Age < 13 or > 105 [RPDB] at time of AHE
	6. Previous gynecologic cancer diagnoses Claim in Ontario Cancer Registry (OCR) with any of the following diagnostic codes prior to AHE: 179, 1800, 1801, 1808, 1809, 1820, 1821, 1828, 1830, 1832, 1833, 1834, 1835, 1838, 1839
	7. Prior hysterectomy • An OHIP, DAD, SDS, or NACRS claim with one of the following codes: • OHIP dxcode: S710, S727, S757, S758, S759, S762, S763, S765, S766, S767, S810, S816, P042 • CIHI-DAD, SDS or NACRS intervention code (CCI): 1RM89:_, 1RM91:_, 1RN89:_, 5MD60CB, 5MD60KE, 5MD60KF, 5MD60RC, 5MD60RD

	8. Pregnancy (within last 9 months from AHE)
	9. HIV infection
	9. Missing or incomplete demographic data (age, sex, or postal code)

eTable 2. Low-value screening test (exposure) definitions.

Screening test	Definition
Chest X-ray (CXR)	One or more OHIP claims with fee code X090, X091, or X092 within 7 days index AHE.[1,2] *Exclude* any CXRs done during inpatient stay or emergency department visit.
Electrocardiogram (ECG)	One or more OHIP claims with fee code G310 or G313 within 30 days of index AHE.[1,3] *Exclude* any ECGs that occur during an emergency department visit.
Papanicolaou (Pap) test	One or more OHIP claims with fee code G365, G364 (with feesuff="A"), E430, E431, L812, L713, or L733 within 7 days of index AHE.[1,4]

eTable 3. Study outcome definitions.

Utilization outcomes at 90 or 180 days		
Cohort	**Outcome**	**Definition**
CXR	Outpatient visit or consultation with internist, pulmonologist, or general thoracic surgeon	An OHIP claim (LOCATION="Office (O)" or "Home (H)") meeting any of the following criteria: a) Pulmonologist (SPEC=47) AND one of the following fee codes: consultation (A475), comprehensive consultation (A470), limited consultation (A575), repeat consultation (A476), medical specific assessment (A473), medical specific re-assessment (A474), complex medical specific re-assessment (A471), partial assessment (A478), complex respiratory assessment (A570) b) General thoracic surgery (SPEC=64) and one of the following fee codes: consultation (A645), special surgical consultation (A935), repeat consultation (A646), specific assessment (A643), partial assessment (A644) c) Internal and occupational medicine (SPEC=13) and one of the following fee codes: consultation (A475), comprehensive respiratory disease consultation (A470), limited consultation (A575), repeat consultation (A476), medical specific assessment (A473), medical specific re-assessment (A474), complex medical specific re-assessment (A471), partial assessment (A478)
	Bronchoscopy	Any of the following OHIP fee codes: Z327, Z330, Z333, Z342, Z348, Z359
	Pulmonary function test	One or more OHIP claims with any of the following fee codes: J301, J303, J304, J305, J306, J307, J308, J309, J310, J311, J313, J315, J316, J317, J318, J319, J320, J322, J323, J324, J327, J328, J330, J331, J332, J333, J334, J335, J340, J341
	CT scan (abdominal or thorax)	Any of the following OHIP fee codes: X125, X406, X407, X126, X409, X410
ECG	Outpatient visit to cardiologist	One or more OHIP claims (LOCATION="Office (O)" or "Home (H)") with a cardiologist (SPEC=60) and one of the following fee codes: A605 = Consultation; A600 = Comprehensive cardiology consultation; A675 = Limited consultation; A606 = Repeat consultation; A603 = Medical specific assessment; A604 = Medical specific re-assessment; A601 = Complex medical specific re-assessment; A608 = Partial assessment
	Transthoracic echocardiogram	One or more OHIP, NACRS, or DAD claims with any of the following codes: • OHIP fee codes: G560, G561, G562, G566, G567, G568, G570, G571, G572, G574, G575, G576, G577, G578 • CCI code: 3IP30

	Cardiac stress test	One or more OHIP, NACRS, or DAD claims with any of the following codes: • OHIP fee codes: maximal stress ECG (G315, G319), stress echocardiogram (G582, G583); dobutamine stress test (G174), dipyramide Thallium stress test (G111, G112), myocardial perfusion scintigraphy (J607, J807, J608, J808, J609, J809, J666, J866) • CCI codes: 2HZ08, 3IP70
	Cardiac catheterization (with* or without coronary angiogram)	Any OHIP, NACRS, or DAD claim with one of the following codes: • OHIP fee codes: G296, G297*, G299-G301, G304-G306; Z442* • CCI codes: 2HZ24GPKJ, 2HZ24GPKL, 2HZ24GPKM, 2HZ24GPXJ, 2HZ28GPPL, 2HZ71GP, 3HZ30GP, 3IJ30GP; 3IP10*
Pap test	Colposcopy	An OHIP claim with fee code Z731
	Outpatient visit or consultation with gynecologist	An OHIP claim (LOCATION="Office (O)" or "Home (H)") with gynecologist (SPEC=20) and one of the following fee codes: A205 = consultation; A935 = special surgical consultation; A206=repeat consultation; A203=specific assessment; A204=partial assessment
	Follow-up Pap test	An OHIP claim with any of the following fee codes: G365 = Papanicolaou smear; G394 AND feesuff='A' = Additional pap smear for follow-up of abnormal or inadequate smears; E430 = pap smear performed outside of hospital; E431 = repeat pap smear performed outside of hospital; L812 = cervical vaginal specimen; L713 = gynecological specimen; L733 = technical code for cervicovaginal specimen – monolayer methodology
<u>Clinical outcomes at 1 year</u>		
Cohort	**Outcome**	**Definition**
All	ED visits	Any claim in NACRS within one year.
	Hospitalization	Any claim in DAD within one year.
	All-cause death	Death date recorded within one year in RPDB.
CXR	Pneumonectomy or lobectomy	A claim in DAD, NACRS, SDS, or OHIP with one of the following codes: • OHIP fee codes: M142 (pneumonectomy), M143 (lung lobectomy) • CCI codes: 1GR87:(excision partial, lobe of lung), 1GR89:_ (excision total, lobe of lung), 1GR91:_ (excision radical, lobe of lung); history of lobectomy or pneumonectomy (Z902:_, Z8511:_)
ECG	Coronary revascularization	A claim in DAD, NACRS, SDS, or OHIP with one of the following codes:

		• OHIP fee codes: Z434, R742, R743 • CCI codes: 1IJ26, 1IJ50, 1IJ55, 1IJ57, 1IJ76, 1IJ80
Pap test	Hysterectomy	A claim in OHIP, DAD, NACRS, or SDS with one of the following codes: • OHIP fee code: S710, S727, S757, S758, S759, S762, S763, S765, S766, S767, S810, S816, P042 • CCI codes: 1RM89:_, 1RM91:_, 1RN89:_, 5MD60CB, 5MD60KE, 5MD60KF, 5MD60RC, 5MD60RD

eREFERENCES.

1. Bouck Z, Ferguson J, Ivers NM, et al. Physician Characteristics Associated With Ordering 4 Low-Value Screening Tests in Primary Care. *JAMA Network Open.* 2018;1(6):e183506-e183506.

2. Bouck Z, Mecredy G, Ivers NM, et al. Routine use of chest x-ray for low-risk patients undergoing a periodic health examination: a retrospective cohort study. *CMAJ open.* 2018;6(3):E322-e329.

3. Bhatia RS, Bouck Z, Ivers NM, et al. Electrocardiograms in Low-Risk Patients Undergoing an Annual Health Examination. *JAMA Internal Medicine.* 2017;177(9):1326-1333.

4. Pendrith C, Bhatia M, Ivers NM, et al. Frequency of and variation in low-value care in primary care: a retrospective cohort study. *CMAJ open.* 2017;5(1):E45-e51.