

Supplementary figures

eFigure S1: Kaplan-Meier plot for overall survival by Charlson comorbidity index.

eFigure S2: Patient selection. OHIP – Ontario Health Insurance Plan database.

eFigure S3: Directed acyclic graph illustrating the potential links between the method of cancer detection (OBSP-screen-detected versus symptomatic) on overall survival.

Supplementary tables

eTable S1: Administrative codes used to classify histological subtypes.

eTable S2: List of institutions and associated institution numbers of O-BAS at the time of analysis. The assessment centre start date is the date the institution became affiliated with the OBSP (e.g. met the criteria to be considered an O-BAS and a funding agreement was enacted with the Ontario Ministry of Health). OBSP – Ontario Breast Screening Program; O-BAS – OBSP-affiliated breast assessment site

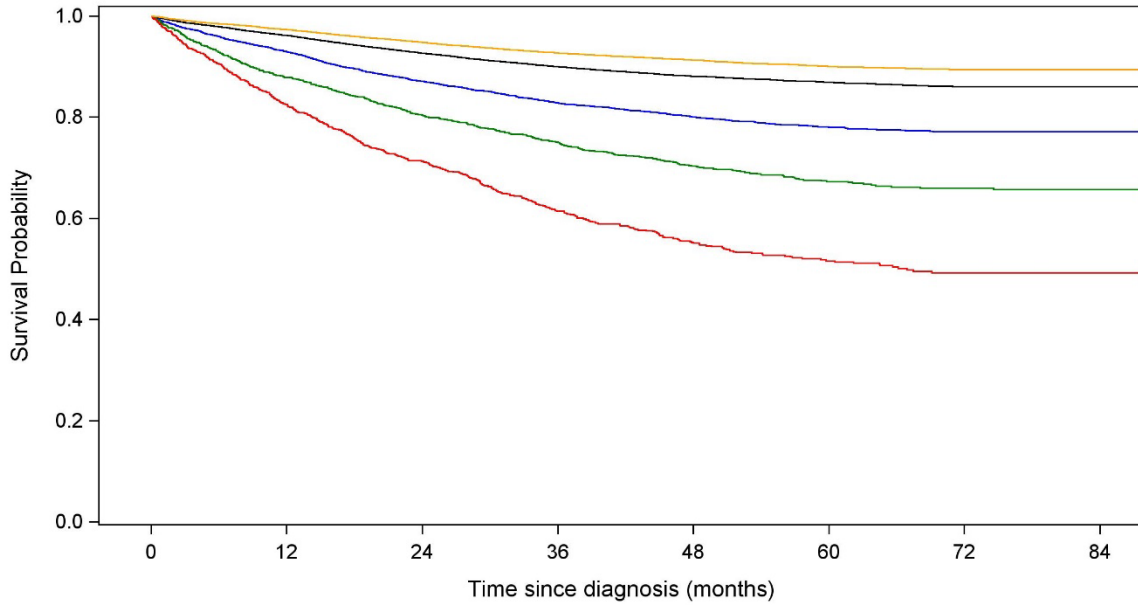
eTable S3: Administrative codes to identify the date of surgery.

eTable S4: Administrative codes to identify the date of various diagnostic tests, consultations and visits, and imaging.

eTable S5: Healthcare encounters observed the suspicion date. If multiple encounters (e.g. diagnostic tests or consults) were observed on this date, the one chosen was based on a hierarchy.

eTable S6: Length of various subintervals measured between the date of suspicion and the date treatment started.

eFigure S1: Kaplan-Meier plot for overall survival by Charlson comorbidity score

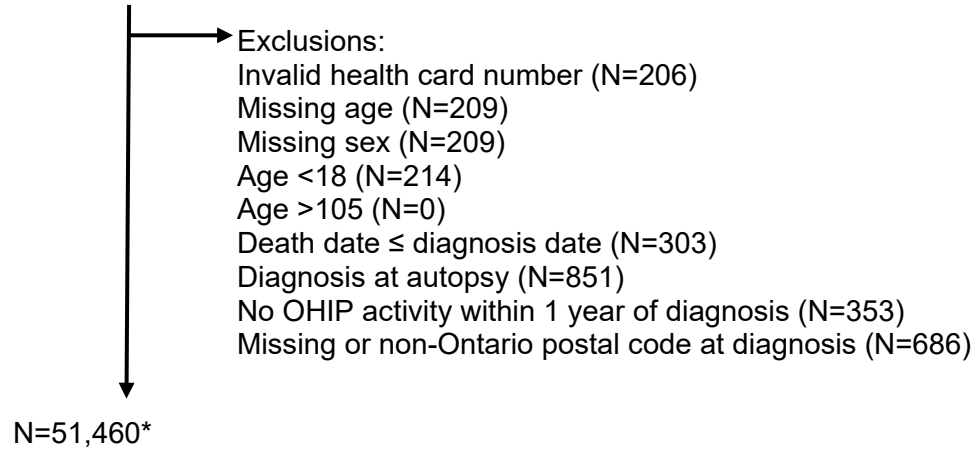


Charlson Comorbidity Index	0	1	2	3+	missing
0	25132	24046	22648	20035	16183
1	4598	4252	3889	3397	2689
2	1404	1227	1091	909	676
3+	1073	881	739	568	406
missing	19218	18530	17621	15709	12865

Appendix 1, as supplied by the authors. Appendix to: Habbous S, Homenauth E, Barisic A, et al. Differences in breast cancer diagnosis by patient presentation in Ontario: a retrospective cohort study. *CMAJ Open* 2022. DOI:10.9778/cmajo.20210254. Copyright © 2022 The Author(s) or their employer(s). To receive this resource in an accessible format, please contact us at cmajgroup@cmaj.ca.

eFigure S2: Patient selection

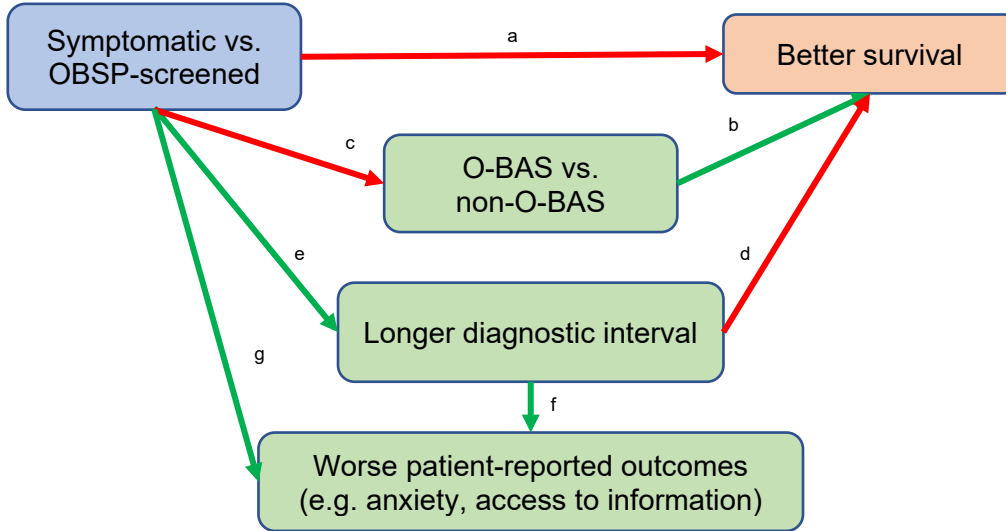
Number of unique patients with a breast cancer diagnosis between 2013 and 2017 (ICD-O-3 topography code C50; ICD-O-D behavior code = 3) (N=52,642)*



*Cohort includes only unique patients.

1. For patients with bilateral breast cancer on the same day (i.e. same histology, same diagnosis date) and different laterality, we created a 'bilateral' flag for these patients and kept their record with the higher stage
2. If patient had multiple primaries during time period, we kept their earliest record.

eFigure S3: Directed acyclic graph of symptomatic versus screened patients



^a symptomatic patients have features (e.g. demographic, clinical, and tumor characteristics) that negatively affect survival

^b O-BAS is associated with better overall survival

^c symptomatic patients are less likely to be referred to an O-BAS

^d a longer diagnostic interval may result in worse survival for some patients

^e symptomatic patients have a longer diagnostic interval

^f a longer diagnostic interval may increase patient anxiety and other patient-reported outcomes

^g symptomatic patients are more likely to have anxiety due to the presence of painful or noticeable breast symptoms, independent of wait-times

O-BAS - breast assessment site affiliated with the Ontario Breast Screening Program (OBSP)

eTable S1: Histology categorization using the International Classification of Diseases for Oncology version 3.2 (ICD-O-3.2)

Histological subgroup	ICD-O-3 histology code
Ductal	8500 – Infiltrating duct carcinoma, NOS 8523 – Infiltrating duct mixed with other types of carcinoma 8507 – Intraductal micropapillary carcinoma 8541 – Paget disease and infiltrating duct carcinoma of breast
Lobular	8520 – Lobular carcinoma, NOS 8524 – Infiltrating lobular mixed with other types of carcinoma
Ductal and lobular	8522 – Infiltrating duct and lobular carcinoma
Mucinous	8480 – Mucinous adenocarcinoma
Adenocarcinoma	8140 – Adenocarcinoma, NOS 8211 – Tubular adenocarcinoma 8401 – Apocrine adenocarcinoma 8503 – Intraductal papillary adenocarcinoma with invasion 8260 – Papillary adenocarcinoma, NOS 8574 – Adenocarcinoma with neuroendocrine differentiation 8255 – Adenocarcinoma with mixed subtypes 8570 – Adenocarcinoma with squamous metaplasia
Other	All else

eTable S2: List of Ontario Breast Screening Program (OBSP)-affiliated Breast Assessment Sites (O-BAS)

Ontario facilities designated as an O-BAS that provide organized assessment must have certified mammography technologists and equipment that meets or exceeds that specified by Canadian Association of Radiologist's Mammography Accreditation Program (CAR-MAP); provide all abnormal mammographic work-up, including special mammographic views and image-guided core biopsy; provide radiological, surgical and pathologic consultation with experts in breast evaluation; and provide navigation for patient support and coordination of referrals.

To determine whether GP-screened and symptomatic patients were assessed at an O-BAS, we used the location of the patients' biopsy from billing data, supplemented with the location of the patients' surgery.^{12,15} Using the OBSP-screened cohort for validation of this approach, we achieved a sensitivity of 95% and a specificity of 80% for the O-BAS designation.

Clinic Name	Assessment Centre Start Date	Institution Numbers
Ottawa Hospital - Civic Campus	October 29, 1998	4046; 4079
Listowel Memorial Hospital	November 1, 1999	1740
Timmins and District Hospital	January 1, 2000	3414; 4123
Health Sciences North	October 15, 2000	4059; 4063
Renfrew Victoria Hospital	March 1, 2001	1813; 4184
Hotel Dieu Hospital	July 1, 2001	4106; 4105
St. Joseph's Hospital (London)	March 1, 2002	1497; 4255
Pembroke Regional Hospital	March 15, 2002	1804; 4071
Greater Niagara General Hospital	April 1, 2002	3982; 4213
St. Catharine's General Hospital	April 1, 2002	4045; 4224
Welland County General Hospital	April 1, 2002	3978; 4227
St. Michael's Hospital	August 1, 2002	1444; 3985
Dixie X-Ray Associates - Finch	March 10, 2003	N/A
Winchester District Memorial Hospital	April 4, 2003	4267
Grey Bruce Health Services - Owen Sound	October 20, 2003	3944; 4131
St. Joseph's Healthcare Hamilton - King Campus	November 20, 2003	N/A

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Windsor Regional Hospital - Metropolitan Campus	January 26, 2004	1079; 4414
Stratford General Hospital	October 5, 2004	1754; 4168
Chatham Centre	October 14, 2005	1223; 4238
Thunder Bay Regional Health Sciences Centre	March 27, 2006	3853; 4315
Vaughan Imaging Consultants	April 1, 2006	N/A
Princess Margaret Hospital	May 1, 2006	4406; 3910
Lakeridge Health - Oshawa	September 25, 2006	4171
Lakeridge Health - Bowmanville	September 25, 2006	N/A
Grand River Hospital - Freeport	July 30, 2007	3734; 4107
Wentworth-Halton X-Ray and Ultrasound - Burlington South	February 1, 2008	1160; 4144
Woodstock General Hospital	May 1, 2008	1716; 4057
Hawkesbury and District General Hospital	July 1, 2008	1777; 4268
Credit Valley Hospital	January 19, 2009	4747; 4751
Sault Area Hospital	April 1, 2009	3972; 4407
Juravinski Hospital & Cancer Care Centre**	August 10, 2010	N/A
Trenton Memorial Hospital	September 7, 2010	4099
WRH Breast Health - Ouellette Campus (formerly Hotel Dieu)**	January 4, 2011	4773; 4774; 4142
Markham Stouffville Hospital	January 17, 2011	3587; 4235
Uxbridge Cottage Hospital	January 17, 2011	N/A
Bluewater Health - Norman	June 1, 2011	4109; 4415
Peterborough Regional Health Centre	June 24, 2011	1768; 4073
Sensenbrenner Hospital	July 1, 2011	N/A
Kirkland and District Hospital	July 1, 2011	
Hôpital Notre-Dame Hospital	July 1, 2011	N/A
Weeneebayko General Hospital	July 1, 2011	
Women's College Hospital	July 4, 2011	4631
Sunnybrook Health Sciences Centre	July 4, 2011	3936; 4205
Scarborough Health Network - General	August 15, 2011	3975; 4152
Scarborough Health Network - Centenary	November 1, 2011	3943; 4139
Southlake Regional Health Centre	November 1, 2011	2038; 4001
Ross Memorial Hospital	November 1, 2011	1893; 4177
Etobicoke General Hospital	November 7, 2011	3929; 4245
Brampton Civic Hospital	November 7, 2011	4016; 4681; 4685
Mount Sinai Hospital	November 14, 2011	1423; 4110; 4804; 4805
Merivale Medical Imaging	April 1, 2012	N/A
Hôpital Montfort	April 1, 2012	1661; 4130; 4461
North York General - Branson	April 1, 2012	4234
Royal Victoria Regional Health Centre	October 29, 2012	1825; 3987
Brantford General Hospital	November 14, 2012	4675; 4679
St. Joseph's Healthcare Hamilton - Charlton Campus	November 15, 2012	2003; 4054; 4055
OBSP Hamilton*	April 1, 2013	4014; 4140

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Lakeridge Health - Ajax Pickering Hospital*	June 1, 2013	4104
North Bay Regional Health Centre*	April 1, 2014	4730; 4734
South Bruce Grey Health Centre - Walkerton*	May 1, 2014	1330; 4233
York Radiology Consultants***	May 1, 2014	1983; 4285
Georgetown Hospital*	July 1, 2014	3926; 4192
Northumberland Hills Hospital*	July 7, 2014	1681; 3970
Juravinski Hospital	October 1, 2014	4039
Mackenzie Health*	December 1, 2014	1515
Oakville-Trafalgar Memorial Hospital*	February 1, 2015	4759
Queensway Carleton Hospital*	April 1, 2015	2046
North York General - General*	April 15, 2015	N/A
Dixie X-Ray Associates - Highpoint*	April 15, 2015	N/A
Queensway Health Centre*	April 18, 2015	4624
Strathroy Middlesex General Hospital*	January 4, 2016	3860; 4237
Erie Shores HealthCare - Leamington*	August 2, 2016	4231; 4298

The following institutions were identified as an O-BAS from algorithm, but corresponding assessment center is Unknown: 3984, 4048, 4085, 4180

* Site became a paid assessment center during study period

** Site closed during study period

*** Site became a paid assessment center during study period and was subsequently closed

eTable S3: Healthcare encounters on the suspicion date

Index Contact Encounter Category	N=47,840	%
OBSP abnormal breast screening	11,821	25%
Screening mammography	3,004	6%
Breast cancer	3,154	7%
Other related cancers	371	1%
Benign neoplasm/CIS	2,445	5%
Breast cyst, cystic disease, abscess, hypertrophy, other	6,423	13%
Lymph system–related conditions	76	0%
Diagnostic mammography and related procedures, with referral	11,534	24%
Diagnostic mammography and related procedures, no referral	742	2%
Breast ultrasound, with referral	4,248	9%
Breast ultrasound, no referral	190	<1%
Other ultrasound, with referral	1,074	2%
Other ultrasound, no referral	42	<1%
Surgical consult with no procedure, with referral	1,518	3%
Surgical consult with no procedure, no referral	25	<1%
Cyst aspiration or drainage, with referral	62	<1%
Cyst aspiration or drainage, no referral	6	<1%
Breast biopsy with or without ultrasound guidance, with referral	576	1%
Breast biopsy with or without ultrasound guidance, no referral	24	<1%
Mastectomy, with referral	<6	<1%
Mastectomy, no referral	<6	<1%
Breast MRI, with referral	128	<1%
Breast MRI, no referral	<6	<1%
Other MRI, with referral	194	<1%
Other MRI, no referral	24	<1%
Nuclear medicine, with referral	154	<1%
Nuclear medicine, no referral	<6	<1%

Healthcare encounters on the suspicion date. If more than one encounter was present on this date, a previously established hierarchy was used as per Groome et al (2019):

Groome PA, Webber C, Whitehead M, et al. Determining the Cancer Diagnostic Interval Using Administrative Health Care Data in a Breast Cancer Cohort. *JCO Clin cancer informatics*. 2019;3:1-10.

doi:10.1200/CCI.18.00131

OBSP – Ontario Breast Screening Program; CIS – Carcinoma *in situ*; MRI – magnetic resonance imaging

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eTable S4: Administrative codes for surgery

Code	Description
Surgery (OHIP definition)	
R111	Integumentary system surgical procedures – operations of the breast – partial mastectomy or wedge resection for treatment of breast disease, with or without biopsy, e.g. carcinoma or extensive fibrocystic disease
R108	Integumentary system surgical procedures – operations of the breast – mastectomy – female (with or without biopsy), simple
R109	Mastectomy, radical or modified radical (with or without biopsy)
R107	Integumentary system surgical procedures – operations of the breast, excision, tumor or tissue for diagnostic biopsy and/or treatment, e.g. carcinoma, fibroadenoma or fibrocystic disease (single or multiple – same breast)
R117	Integumentary system surgical procedures – operations of the breast – mastectomy, radical or modified radical (with or without biopsy)
R148	Integumentary system surgical procedures – operations of the breast – mastectomy – male – unilateral for treatment of pathological male breast disease (with or without biopsy), e.g. carcinoma – simple
R149	Integumentary system surgical procedures – operations of the breast – mastectomy – male – unilateral for treatment of pathological male breast disease (with or without biopsy), e.g. carcinoma – subcutaneous with nipple preservation
Surgery (CIHI definition)	
1YM87	Excision partial, breast
1YM89	Excision total, breast
1YM91	Excision(modified) radical, breast
1YM90	Excision total with reconstruction, breast
1YM88	Excision partial with reconstruction, breast
1YM92	Excision radical with reconstruction, breast
1YK87	Excision partial, nipple
1YK90	Excision total with reconstruction, nipple
1YK89	Excision total, nipple
1YL89	Excision total, lactiferous duct
1YL87	Excision partial, lactiferous duct
Surgery (QBP definition, using CIHI)	
1YM87	Excision partial, breast

1YM91LAXXQ	Excision radical, breast using combined sources of tissue [e.g. local flap and tissue expander] modified or NOS
1YM87DA	Excision partial, breast using endoscopic approach with simple apposition
1YM87GB	Excision partial, breast using endoscopic guide wire (or needle hook) excision technique with simple apposition of tissue
1YM87LA	Excision partial, breast using open approach with simple apposition of tissue (e.g. suturing)
1YM87LAXXA	Excision partial, breast using open approach and full thickness autograft to close defect
1YM87LAXXE	Excision partial, breast using open approach and local flap (to close defect)
1YM87UT	Excision partial, breast using open guide wire (or needle hook) excision technique and simple apposition of tissue
1YM89LA	Excision total, breast without tissue repair
1YM89LAXXA	Excision total, breast with full thickness autograft
1YM89LAXXE	Excision total, breast using open approach and local flap
1YM91LA	Excision (modified) radical, breast without tissue
1YM91LAPM	Excision radical, breast with implantation of breast prosthesis modified or NOS
1YM91LATP	Excision (modified) radical, breast with implantation of tissue expander
1YM91LAXXA	Excision radical (modified), breast using full thickness autograft
1YM91LAXXE	Excision (modified) radical, breast using local flap
1YM91TR	Excision extended radical, breast without tissue
1YM91TRXXA	Excision extended radical, breast using full thickness autograft
1YM91TRXXE	Excision extended radical, breast using local flap
1YM91WP	Excision super radical, breast without tissue
1YM91WPXXA	Excision radical, breast using autograft super [Wangensteen
1YM91WPXXE	Excision super radical, breast using local flap
1YM88LAPM	Excision partial with reconstruction, breast without tissue with implantation of prosthesis
1YM88LAPME	Excision partial with reconstruction, breast with local flap with implantation of prosthesis
1YM88LAPMF	Excision partial with reconstruction, breast using free flap with implantation of prosthesis
1YM88LAPMG	Excision partial with reconstruction, breast using distant pedicled flap with implantation of prosthesis
1YM88LAPMK	Excision partial with reconstruction, breast using homograft with implantation of prosthesis
1YM88LAQF	Excision partial with reconstruction, breast without tissue with implantation of prosthesis and expander
1YM88LAQFE	Excision partial with reconstruction, breast with local flap with implantation of prosthesis and expander
1YM88LAQFF	Excision partial with reconstruction, breast using free flap with implantation of prosthesis and expander
1YM88LAQFG	Excision partial with reconstruction, breast using distant pedicled flap with implantation of prosthesis and ex
1YM88LATP	Excision partial with reconstruction, breast without tissue with implantation of tissue expander
1YM88LATPE	Excision partial with reconstruction, breast with local flap with tissue expander
1YM88LATPF	Excision partial with reconstruction, breast using free flap with implantation of tissue expander
1YM88LATPG	Exc prt breast w tiss expand ped flap reconstr
1YM88LATPK	Excision partial with reconstruction, breast using homograft with implantation of tissue expander
1YM88LAXXE	Excision partial with reconstruction, breast using local flap with no implanted device

1YM88LAXXF	Excision partial with reconstruction, breast using free flap with no implanted device
1YM88LAXXG	Excision partial with reconstruction, breast using distant pedicled flap with no implanted device
1YM90LAPM	Excision total with reconstruction, breast simple mastectomy with no node dissection without tissue with implantation of breast prosth
1YM90LAPME	Excision total with reconstruction, breast simple mastectomy with no node dissection using local flap with implantation of breast pros
1YM90LAPMF	Excision total with reconstruction, breast simple mastectomy with no node dissection using free flap (2) with implantation of breast p
1YM90LAPMG	Excision total with reconstruction, breast simple mastectomy with no node dissection using distant pedicled flap(1) with implantation
1YM90LAPMK	Excision total with reconstruction, breast using homograft with implantation of breast prosthesis
1YM90LAQF	Excision total with reconstruction, breast simple mastectomy with no node dissection without tissue with implantation of prosthesis an
1YM90LAQFE	Excision total with reconstruction, breast simple mastectomy with no node dissection using local flap with implantation of prosthesis
1YM90LAQFF	Excision total with reconstruction, breast simple mastectomy with no node dissection using free flap (2) with implantation of prosthes
1YM90LAQFG	Excision total with reconstruction, breast simple mastectomy with no node dissection using distant pedicled flap(1) with implantation
1YM90LATP	Excision total with reconstruction, breast simple mastectomy with no node dissection without tissue with implantation of tissue expand
1YM90LATPE	Excision total with reconstruction, breast using local flap with implantation of tissue expander
1YM90LATPF	Excision total with reconstruction, breast simple mastectomy with no node dissection using free flap (2) with implantation of tissue e
1YM90LATPG	Excision total with reconstruction, breast simple mastectomy with no node dissection using distant pedicled flap(1) with implantation
1YM90LATPK	Excision total with reconstruction, breast using homograft with implantation of tissue expander
1YM90LAXXE	Excision total with reconstruction, breast simple mastectomy with no node dissection using local flap with no implanted device
1YM90LAXXF	Excision total with reconstruction, breast simple mastectomy with no node dissection using free flap (2) with no implanted device
1YM90LAXXG	Excision total with reconstruction, breast simple mastectomy with no node dissection using distant pedicled flap(1) with no implanted
1YM90LAXXQ	Excision total with reconstruction, breast with no implanted device using combined sources of tissue (e.g. free
1YM92LAPME	Excision (modified) radical with reconstruction, breast using local flap with implantation of breast prosthesis
1YM92LAPMF	Excision (modified) radical with reconstruction, breast using free flap with implantation of breast prosthesis
1YM92LAPMG	Excision (modified) radical with reconstruction, breast using distant pedicled flap with implantation of breast prosthesis

1YM92LAQFE	Excision (modified) radical with reconstruction, breast using local flap with implantation of prosthesis and expander
1YM92LAQFG	Excision (modified) radical with reconstruction, breast using distant pedicled flap with implantation of prosthesis and expander
1YM92LATPE	Excision (modified) radical with reconstruction, breast using local flap with implantation of tissue expander
1YM92LATPF	Excision (modified) radical with reconstruction, breast using free flap with implantation of tissue expander
1YM92LATPG	Excision (modified) radical with reconstruction, breast using distant pedicled flap with implantation of tissue expander
1YM92LATPK	Excision radical with reconstruction, breast modified or NOS using homograft with implantation of tissue expander
1YM92LAXXE	Excision (modified) radical with reconstruction, breast using local flap with no implanted device
1YM92LAXXF	Excision (modified) radical with reconstruction, breast using free flap with no implanted device
1YM92LAXXG	Excision (modified) radical with reconstruction, breast using distant pedicled flap with no implanted device
1YM92LAXXQ	Excision radical with reconstruction, breast modified or NOS with no implanted device using combined sources of
1YM92TRPME	Excision radical with reconstruction, breast extended [Urban] using local flap with implantation of breast prosthesis
1YM92TRPMK	Excision radical with reconstruction, breast extended [Urban] using homograft with implantation of breast prosthesis
1YM92TRTPE	Excision radical with reconstruction, breast extended [Urban] using local flap with implantation of tissue expander
1YM92TRTPK	Excision radical with reconstruction, breast extended [Urban] using homograft with implantation of tissue expander
1YM92TRXXE	Excision extended radical with reconstruction, breast using local flap with no implanted device
1YM92TRXXF	Excision extended radical with reconstruction, breast using free flap with no implanted device
1YM92TRXXQ	Exc rad w reconstr breast OA w ext rad excisn combo tis
1YM92WPPMK	Excision radical with reconstruction, breast super [Wangensteen] using homograft with implantation of breast prosthesis
1YM92WPTPK	Excision radical with reconstruction, breast super [Wangensteen] using homograft with implantation of tissue expander
1YM92LAPMK	Excision radical with reconstruction, breast modified or NOS using homograft with implantation of breast prosthesis
1YM92TRPMF	Excision radical with reconstruction, breast extended [Urban] using free flap with implantation of breast prosthesis
1YM92TRPMG	Excision radical with reconstruction, breast extended [Urban] using distant pedicled flap with implantation of breast prosthesis
1YM92TRTPF	Excision radical with reconstruction, breast extended [Urban] using free flap with implantation of tissue expander

1YM92TRTPG	Excision radical with reconstruction, breast extended [Urban] using distant pedicled flap with implantation of tissue expander
1YM92TRXXG	Excision radical with reconstruction, breast extended [Urban] using distant pedicled flap with no implanted device
1YM92WPPME	Excision radical with reconstruction, breast super [Wangensteen] using local flap with implantation of breast prosthesis
1YM92WPPMF	Excision radical with reconstruction, breast super [Wangensteen] using free flap with implantation of breast prosthesis
1YM92WPPMG	Excision radical with reconstruction, breast super [Wangensteen] using distant pedicled flap with implantation of breast prosthesis
1YM92WPTPE	Excision radical with reconstruction, breast super [Wangensteen] using local flap with implantation of tissue expander
1YM92WPTPF	Excision radical with reconstruction, breast super [Wangensteen] using free flap with implantation of tissue expander
1YM92WPTPG	Excision radical with reconstruction, breast super [Wangensteen] using distant pedicled flap with implantation of tissue expander
1YM87UTXXA	Excision partial, breast using open guide wire (or needle hook) excision technique with autograft (to close defect)
1YM87UTXXE	Excision partial, breast using open guide wire (or needle hook) excision technique with local flap (to close defect)
1YM92WPXXF	Excision radical with reconstruction, breast super [Wangensteen] using free flap with no implanted device
1YM92WPXXG	Excision radical with reconstruction, breast super [Wangensteen] using distant pedicled flap with no implanted device
1YM92WPXXQ	Excision radical with reconstruction, breast super [Wagensteen] using combined sources of tissue (e.g. free and pedicled TRAM flap) with no implanted device
1YK87LA	Excision partial, nipple using open excisional approach
1YK87LAXXA	Excision partial, nipple using open excisional approach and full thickness autograft
1YK87LAXXB	Excision partial, nipple using open excisional approach and split thickness autograft
1YK87LAXXE	Excision partial, nipple using open excisional approach and local flap [e.g. rotation, advancement, transposition, Z-plasty] for closure
1YK89LA	Excision total, nipple using open approach
1YK89LAXXA	Excision total, nipple using open approach and full thickness autograft
1YK89LAXXE	Excision total, nipple using open approach and local flap [e.g. rotation, advancement, transposition, Z-plasty]
1YK90LAXXA	Excision total with reconstruction, nipple using open approach and full thickness autograft [e.g. contralateral nipple, labia, thigh, retroauricular tissue]
1YK90LAXXE	Excision total with reconstruction, nipple using open approach and local skin flap [e.g. propeller, star, quadripod skate]
1YK90LAXXQ	Excision total with reconstruction, nipple using open approach and combined local flap [e.g. nipple] and autograft [e.g. areola]

1YL87LA	Excision partial, lactiferous duct using open approach
1YL89LA	Excision total, lactiferous duct using open approach
<p>Restricted to the following ICD-10 diagnostic codes: C00-C97, D050, D051, D057, D059, D24, D486, D0500, D0501, D0509, D0510, D0511, D0519, D0570, D0571, D0579, D0590, D0591, D0599, D038, D039, D048, D049, D097, D099, D197, D199, D367, D369, D487, D489.</p> <p>OHIP – Ontario Health Insurance Plan database; CIHI – Canadian Institute of Health Information, which includes data from hospital-based procedures (inpatient and outpatient); QBP – quality-based procedures (a definition of surgery established at Cancer Care Ontario)</p>	

eTable S5: Administrative codes for healthcare utilization

Code	Source	Description
Diagnostic mammogram		
X184	OHIP	Unilateral Mammogram - for individuals with signs or symptoms or follow-up of established disease
X185	OHIP	Bilateral Mammogram - for individuals with signs or symptoms or follow-up of established disease
X194	OHIP	Additional coned views with or without magnification (limit of two per breast) per film
Screening mammogram		
X172	OHIP	Unilateral Mammogram - for individuals with identified risk factors in accordance with clinical practice guidelines
X178	OHIP	Bilateral Mammogram - for individuals with identified risk factors in accordance with clinical practice guidelines
Breast biopsy		
J149	OHIP	Ultrasonic guidance of biopsy, aspiration, amniocentesis or drainage procedures (one physician only)
X121	OHIP	Stereotactic core breast biopsy
Z141	OHIP	Needle Biopsy - one or more
Z143	OHIP	Needle Biopsy - large core breast biopsy - (14 gauge or larger bore needle)
2YK71	CIHI	Biopsy, nipple using percutaneous approach (needle, punch) or open [incisional] approach
2YM71	CIHI	Biopsy, breast using percutaneous (needle) aspiration, device NEC or ore needle aspiration technique
2SZ71	CIHI	Biopsy, soft tissue of the chest and abdomen using percutaneous (needle) approach or open [incisional] approach
Lymph node biopsy		
R914	OHIP	Axillary or inguinal lymph nodes - limited resection, unilateral
Z405	OHIP	Biopsy, Anterior cervical lymph node(s), unilateral
Z406	OHIP	Biopsy, Scalene, posterior cervical lymph node(s), unilateral
Z407	OHIP	Percutaneous retroperitoneal, one group
Z408	OHIP	Bone marrow core biopsy (with biopsy needle)
Z409	OHIP	Percutaneous retroperitoneal, two group
Z411	OHIP	Biopsy, Axillary or inguinal lymph node(s), unilateral
Sentinel node biopsy		
Z427	OHIP	Sentinel node biopsy, per draining basin
2MD71	CIHI	Biopsy, lymph node(s), axillary using percutaneous (needle) approach or open approach

Consultations and visits

Internal medicine consult	OHIP	A135, A130, A435, A136, A133, A134, A138, C135, C130, C435, C136, C133, C134, C131, W235, W130, W435, W236
Dermatology consult	OHIP	A025, A027, A026, A023, A024, A020, C025, C026, C023, C024, C020, W025, W026
Cardiology consult	OHIP	A605, A600, A675, A606, A603, A604, A601, A608, A605, A600, A675, A606, A603, A604, A601, A608, C605, C600, C675, C606, C603, C604, C601 HSP specialty code = 60
General practitioner visit	OHIP	A005, A911, A912, A945, A905, A006, A003, A004, A888, A091, A900, A933, A100, A937, A967
Cardiac surgery consult	OHIP	A095, A935, A096, A093, A094, C095, C935, C096, C093, C094, W095, W096 HSP specialty code = 09
Medical oncology consult	OHIP	A445, A845, A446, A443, A444, A441, A448, C445, C845, C446, C443, C444, C441, W445, W765, W845, W44
Radiation oncology consult	OHIP	A345, A765, A745, A346, A343, A340, A341, A348, C345, C765, C745, C346, C343, C344, C341
General or general thoracic surgery consult	OHIP	A645, A935, A646, A643, A644, C645, C935, C646, C643, C644, A035, A036, A033, A034, C035, C935, C036, C033, C034, W035, W036 HSP specialty code = 03 (general surgery) or 64 (general thoracic surgery)
Diagnostic radiology assessment	OHIP	A335, A365, A330, A332, A331, A338, C335, C365, C330, C332

Breast ultrasound

J127	OHIP	Diagnostic Ultrasound - scan B-mode (per breast)
3YM30	OHIP	Ultrasound, breast

Abdominal/thoracic ultrasound

J128	OHIP	Abdominal scan - limited study (e.g. gallbladder only, aorta only or follow-up study)
J135	OHIP	Abdominal scan - complete
3OT30	CIHI	Ultrasound, abdominal cavity
3GY30	CIHI	Ultrasound, thoracic cavity

Abdominal/thoracic computed tomography (CT) scan

X406	OHIP	Thorax -without IV contrast
X407	OHIP	Thorax -with IV contrast
X125	OHIP	Thorax -with and without IV contrast
X409	OHIP	Abdomen -without IV contrast
X410	OHIP	Abdomen -without IV contrast
X126	OHIP	Abdomen -without IV contrast
3OT20	CIHI	Computerized tomography [CT], abdominal cavity

3YM20	CIHI	Computerized tomography [CT], breast
3GY20	CIHI	Computerized tomography [CT], thoracic cavity

Abdominal/thoracic magnetic resonance imaging (MRI) scan

X446	OHIP	Breast - unilateral or bilateral, multislice sequence
X447	OHIP	Breast - unilateral or bilateral, repeat (another plane, different pulse sequence - to a maximum of 3 repeats).
X441	OHIP	Thorax - multislice sequence
X445	OHIP	Thorax - repeat (another plane, different pulse sequence - to a maximum of 3 repeats).
X451	OHIP	Abdomen - multislice sequence
X455	OHIP	Abdomen - repeat (another plane, different pulse sequence - to a maximum of 3 repeats).
X499	OHIP	Three Dimensional MRI acquisition sequence, including post-processing (minimum of 60 slices; maximum 1 per patient per day)
3OT40	CIHI	Magnetic resonance imaging [MRI], abdominal cavity
3YM40	CIHI	Magnetic resonance imaging [MRI], breast
3GY40	CIHI	Magnetic resonance imaging [MRI], thoracic cavity

Chest x-ray

X090	OHIP	Chest - single view
X091	OHIP	Chest - two views
X092	OHIP	Chest - three or more views
3GY10	CIHI	Xray, thoracic cavity

Other (ductogram, capsulotomy, capsulectomy)

X192	OHIP	Mammary ductography
J037	OHIP	Mammary ductography
3YL10	CIHI	Xray, lactiferous duct
Z182	OHIP	Breast capsulectomy
Z135	OHIP	Open capsulotomy with or without replacement of breast prosthesis
1YM72	CIHI	Release, breast

OHIP – Ontario Health Insurance Plan database; CIHI – Canadian Institute of Health Information, which includes data from hospital-based procedures (inpatient and outpatient)

eTable S6: Subintervals

Time interval	Description	Statistic	Non-O-BAS (n=8,862)	O-BAS (n=42,598)	Total (n=51,460)
Pre-treatment interval	Time from diagnosis to first treatment	N (%)	7,386 (83%)	39,614 (93%)	50,232 (98%)
		Median (IQR), days	34 (21, 49)	34 (23, 47)	34 (23, 47)
		90% percentile, days	72	63	63
Total interval	Time from index contact to initial treatment (diagnosis or first treatment)	N (%)	7,788 (88%)	40,052 (94%)	47,840 (93%)
		Median (IQR), days	39 (20, 92)	35 (18, 79)	35 (19, 82)
		90% percentile, days	174	162	165
Breast imaging interval	Time from referring physician visit to first breast imaging (diagnostic mammogram, breast ultrasound or breast magnetic resonance imaging)	N (%)	6,982 (79%)	38,991 (92%)	45,973 (89%)
		Median (IQR), days	7 (3, 14)	7 (3, 14)	7 (3, 14)
		90% percentile, days	31	29	29
Surgical consult interval	Time from referring physician visit to first surgical consult (biopsy, cyst aspiration, mastectomy)	N (%)	6,670 (75%)	37,453 (88%)	44,123 (86%)
		Median (IQR), days	6 (3, 12)	6 (3, 10)	6 (3, 10)
		90% percentile, days	21	18	19
Biopsy interval	Time from referring physician/biopsying physician to first biopsy between index contact and diagnosis date	N (%)	6,492 (73%)	37,948 (89%)	44,440 (86%)
		Median (IQR), days	2 (2, 5)	2 (2, 4)	2 (2, 4)
		90% percentile, days	7	6	6
First assessment interval	Time from index contact to first diagnostic test/consult	N (%)	7,250 (82%)	38,934 (91%)	46,184 (90%)
		Median (IQR), days	11 (4, 31)	13 (6, 29)	13 (5, 29)
		90% percentile, days	89	80	82
First Assessment to Diagnostic Interval	Time from first diagnostic test to diagnosis date	N (%)	7,250 (82%)	38,934 (91%)	46,184 (90%)
		Median (IQR), days	20 (10, 42)	17 (8, 36)	17 (8, 36)
		90% percentile, days	113	100	102
Diagnostic interval	Time from index contact to diagnosis date	N (%)	7,788 (88%)	40,052 (94%)	47,840 (93%)
		Median (IQR), days	39 (20, 92)	35 (18, 79)	35 (19, 82)
		90% percentile, days	174	162	165

O-BAS – OBSP-affiliated breast assessment site; OBSP – Ontario Breast Screening Program; IQR – (25th, 75th percentile)