

Supplementary Materials

Definitions and derivations of key quantities using administrative data (based on validated algorithm⁽¹⁾ and definition used in the Canadian guideline⁽²⁾)

Abnormal recall: An index screen mammography procedure followed by any breast-related procedure (mammogram, ultrasound, MRI, biopsy etc.) in the next 30 days, or an index screen that associated with diagnosis of cancer within 6 months (9 months in one remote region in Alberta). Note, this algorithm classifies abnormal/normal with a sensitivity of 88% and specificity of 99%. The overall accuracy is 98%. (Unpublished data, using methods described in a previous publication⁽¹⁾)

Normal screen: An index screen that is not classified as abnormal.

Screen-detected cancer: Breast cancer diagnosed per Alberta cancer registry record within 6 months (9 months in one remote region) of an index screen.⁽¹⁾

False positive: Abnormal recall that did not result in a screen-detected cancer, i.e. abnormal recall minus screen-detected cancer.

Benign biopsy: Biopsy procedure following an abnormal recall that did not result in a screen-detected cancer.

Post-screen invasive cancer: An invasive non-screen detected cancer diagnosed after a normal screen but before a subsequent screen mammogram.

Positive Predictive Value (PPV): The percentage of screen-detected cancer among abnormal recalls, i.e. Number of screen-detected cancer/Number of abnormal calls X 100%.

Overall cancer: Breast cancer diagnosed per Alberta cancer registry record within a pre-specified period (e.g. one year) of an index screen.

References

1. Yuan Y, Li M, Yang J, Winget M. Using administrative data to estimate time to breast cancer diagnosis and percent of screen-detected breast cancers - a validation study in Alberta, Canada. *European Journal of Cancer Care*. 2015;24(3):367-75.
2. Canadian Partnership Against Cancer. The Evaluation Indicators Working Group Report: Guidelines for Monitoring Breast Screening Program Performance: 3rd edition 2012 [accessed 2018 Sep 10]. Available from: <http://www.getcheckedmanitoba.ca/files/b-rep-gdlnmonitor.pdf>.

Supplementary Table 1: Number of screening mammograms, abnormal recalls and screen-detected cancers (including *in situ*) by service provider, region and study period. Numbers in parentheses indicate row percentages. Study period A: July 2006 – June 2008; study period B: July 2008 – June 2010.

Region	Study period	Screen mammograms (N, %)			Abnormal recalls (N, %)			Screen-detected Cancers (N, %)		
		Community clinics	Screen Test	Total	Community clinics	Screen Test	Total	Community clinics	Screen Test	Total
Edmonton area	A	61,633 (88.7)	7,840 (11.3)	69,473	5,985 (94.9)	323 (5.1)	6,308	195 (85.9)	32 (14.1)	227
	B	75,379 (92.9)	5,766 (7.1)		81,145	6,472 (97.0)		203 (3.0)	6,675	
Calgary area	A	68,624 (89.7)	7,852 (10.3)	76,476	7,666 (96.5)	275 (3.5)	7,941	270 (87.1)	40 (12.9)	310
	B	75,238 (93.3)	5,429 (6.7)		80,667	6,508 (97.4)		173 (2.6)	6,681	
Other areas	A	25,790 (68.3)	11,965 (31.7)	37,755	1,534 (76.9)	461 (23.1)	1,995	90 (62.5)	54 (37.5)	144
	B	33,805 (76.4)	10,467 (23.6)		44,272	2,724 (87.4)		391 (12.6)	3,115	
Total	A	156,047 (84.9)	27,657 (15.1)	183,704	15,185 (93.5)	1,059 (6.5)	16,244	555 (81.5)	126 (18.5)	681
	B	184,422 (89.5)	21,662 (10.5)		206,084	15,704 (95.3)		767 (4.7)	16,471	

Supplementary Table 2: Distribution of women's age by service provider and region.

Age	Edmonton area		Calgary area		Other areas	
	Community Clinic	Screen Test	Community Clinic	Screen Test	Community Clinic	Screen Test
mean (sd)	57.7 (5.7)	58.5 (5.8)	57.4 (5.5)	58.6 (5.6)	57.8 (5.6)	58.5 (5.7)
median (IQR)	57 (9)	58 (10)	57 (9)	58 (9)	57 (9)	58 (10)

Supplementary Table 3. The number of screening mammograms, abnormal recalls and screen-detected cancers (including *in situ*) in the subset of women whose index screen results were normal in study period A and who had their subsequent screening between 18 and 30 months after her index screen, by service provider and region. % indicates abnormal calls as a percentage of screen mammograms. The cancer detection rate is calculated at the subsequent screening.

Region	Screen mammograms, N		Abnormal recalls, N (%)		Screen-detected cancers, N (rate per 1000 screens)	
	Community clinic	Screen Test	Community Clinic	Screen Test	Community Clinic	Screen Test
Edmonton area	30,813	3,361	2,053 (6.7)	91 (2.7)	63 (2.0)	12 (3.6)
Calgary area	30,930	3,484	2,026 (6.6)	79 (2.3)	80 (2.6)	16 (4.6)
Other areas	14,077	4,940	922 (6.6)	127 (2.6)	36 (2.6)	19 (3.8)
Total	75,820	11,785	5,001 (6.6)	297 (2.5)	179 (2.4)	47 (4.0)

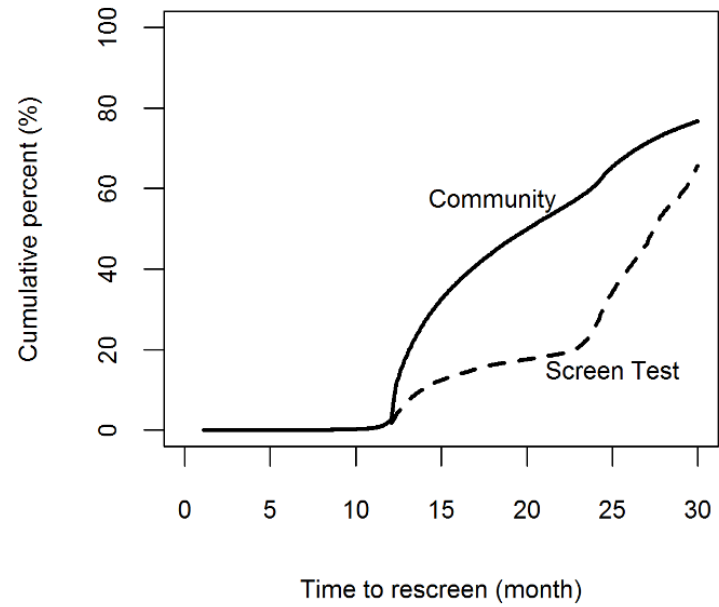
Supplementary Table 4. Invasive and in situ cancer detection rate via screening (per 1,000 screens) in the subsequent screening episode where the screen-interval is between 18 and 30 months, by service provider and region.

	Invasive cancer detection rate (95% CI)			In situ cancer detection rate (95% CI)		
	Community clinic	Screen Test	Rate Ratio	Community clinic	Screen Test	Rate Ratio
Edmonton area	1.2 (0.9-1.7)	3.0 (1.4-5.5)	0.43 (0.22 - 0.87)	0.8 (0.5-1.2)	0.6 (0.1-2.1)	1.42 (0.34 - 5.94)
Calgary area	2.1 (1.6-2.7)	4.3 (2.4-7.1)	0.52 (0.30 - 0.89)	0.5 (0.3-0.8)	0.3 (0.0-1.6)	1.70 (0.23 - 12.56)
Other areas	2.1 (1.4-3.0)	2.8 (1.6-4.8)	0.76 (0.40 - 1.44)	0.4 (0.2-0.9)	1.0 (0.3-2.4)	0.42 (0.12 - 1.46)
Total	1.8 (1.5-2.1)	3.3 (2.4-4.5)	0.55 (0.39 - 0.79)	0.6 (0.4-0.8)	0.7 (0.3-1.3)	0.91 (0.43 - 1.95)

Supplementary Figure 1: Map of five health zones in Alberta, Canada. Three regions of residence were defined from the five health zones: the major urban centres Edmonton (Edmonton zone), Calgary (Calgary zone), and rest of Alberta (comprising the South, Central and North health zones).



Supplementary Figure 2: The cumulative percent of rescreening over time for women who had normal screening mammograms between July 2006 and June 2008, i.e. study period A, stratified by service providers.



Supplementary Figure 3: Abnormal recall (%) and percent cancer detected via screen on average in each health zone, stratified by time period, and service provide. Solid symbols indicate the community clinics average rates and the hollow symbols indicate the screen test average rates. Note that in each graph the vertical distance between the abnormal recall rate, represented by the circle, and its corresponding percent cancer detected, represented by the triangle, is the average false positive rate.

